



Castle Street, Banbury

Flood Risk & Drainage Technical Note

| | |
|--------------------|---|
| Project No. | 1260 |
| Revision | D (Changes Highlighted) |
| Date | 28 June 2022 |
| Client | Churchill Retirement Living |
| Prepared | L Blackmore |
| Checked | C Yalden |
| Authorised | C Yalden |
| File Ref. | P:\1260 Castle Street, Banbury\C Documents\Reports\1260 - Castle Street, Banbury - Flood Risk & Drainage Technical Note - D |

1 Introduction

Introduction & Background

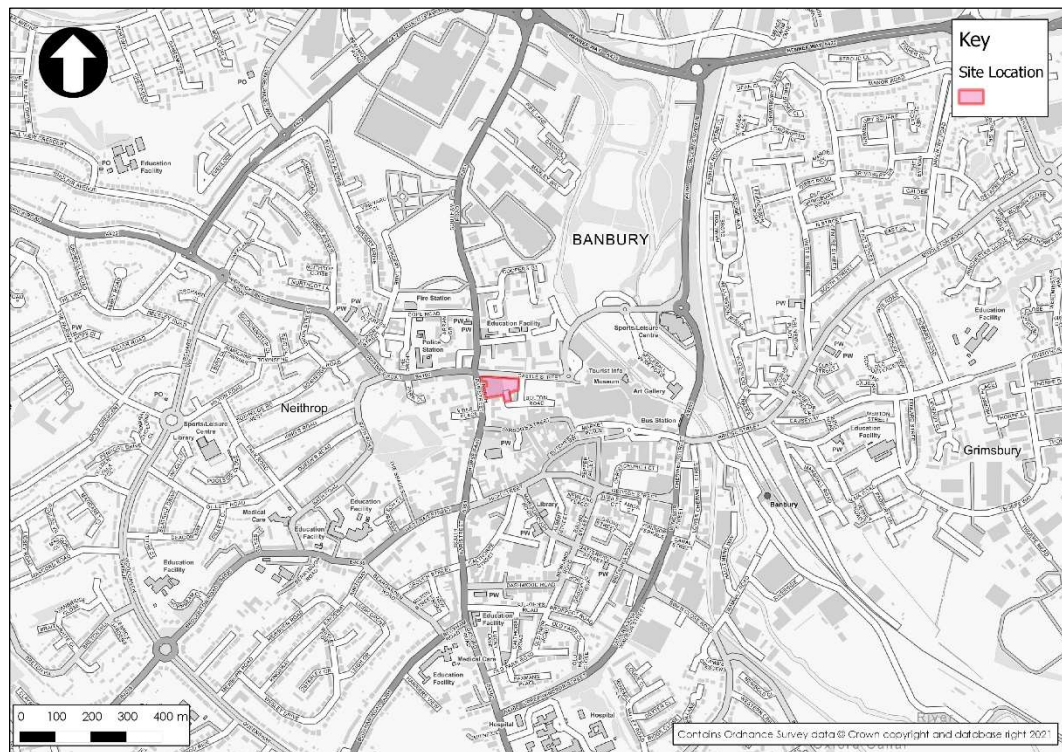
1.1 Awcock Ward Partnership has been commissioned by Churchill Retirement Living (CRL) to prepare a Flood Risk and Drainage Technical Note in support of a full planning application for the redevelopment of the former Buzz Bingo site, Bolton Road, Banbury, Oxfordshire, OX16 0TH.

1.2 This technical note has been revised to take account of Oxfordshire County Council's consultation response for this application (21/04202/F) dated 25 May 2022, specifically related to comments received from the Lead Local Flood Authority (LLFA) dated 20 April 2022 (included in Appendix M for ease of reference). The latest comments follow on from previous comments from the LLFA, dated 25 February 2022 (included in Appendix L as per the previous revision of this technical note). Further revised content has been highlighted for ease of reference and a summarised response provided within the concluding section of this report.

1.3 The redevelopment is proposed to provide 80 new retirement apartments.

- 1.4 The existing site is bound to the north by Castle Street and on the west by North Bar Street (A361). The east and south are bound by Bolton Road. The surrounding area generally consists of both commercial and residential developed land.
- 1.5 The location of the site in relation to its surroundings can be seen within Figure 1.1.

Figure 1.1 – Site Location



- 1.6 This Technical Note has been prepared broadly in accordance with the National Planning Policy Framework (NPPF) and Oxfordshire County Council (OCC) 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' (OCC SWDG, 2018) which provides a guide on surface water management for developments in Oxfordshire. The existing baseline conditions, development proposals and the proposed Surface Water Management Plan and foul water strategy that will serve the development is set out below.
- 1.7 This document sets out the existing baseline conditions in Section 2, the development proposal in Section 3. The proposed surface water management plan and foul water strategy that will serve the development is discussed in Sections 4 and 5 respectively, with Section 6 providing the Ownership and Maintenance information before concluding in Section 7.

2 Existing Baseline Conditions

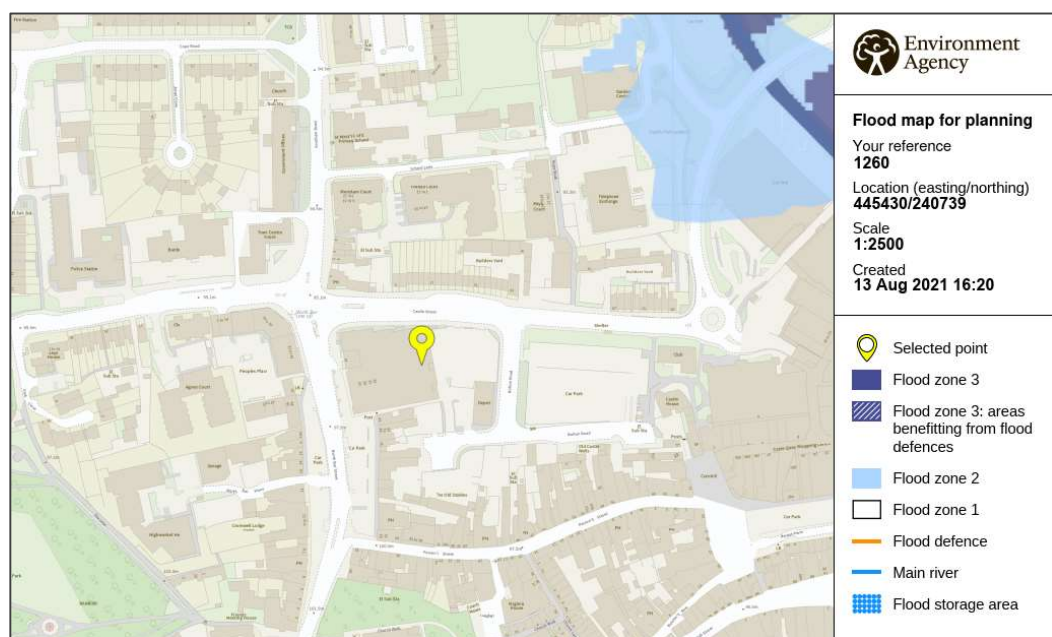
Existing Site

- 2.1 The brownfield site comprises of an existing large building and associated car park, with access from Bolton Road to the south of the site. The topographic survey confirms the site generally falls at a shallow grade of approximately 1 in 35 from south to north and is relatively flat across the car park area. The site has a high point of 98.36mAOD adjacent to the southern boundary, next to the building. The site slopes down to the northwest corner to a low point of 95.01mAOD adjacent to the footway on Castle Street. A copy of the topographic survey for the site can be seen as Appendix A.

Existing Flood Risk

- 2.2 An extract of the 'Flood Map for Planning' has been reproduced as Figure 2.1 and shows the site as being entirely within 'Flood Zone 1', as land assessed as having less than 1 in 1,000 annual probability of flooding from fluvial sources (<0.1%).

Figure 2.1 – EA Flood Map for Planning



Pluvial sources (surface water flooding)

- 2.3 An extract of the EA's 'Flooding from Surface Water' maps for low and medium risk from surface water flooding are shown in Figures 2.2 and 2.3. The mapping is based on LIDAR data and indicates the typical

conveyance routes of surface water runoff. Figure 2.2 indicates the low risk surface water flooding, in up to the 1 in 1,000 year return period storm (annual probability <0.1%), whilst Figure 2.3 shows the medium risk flooding, in up to 1 in 100 year return period storm (1%).

Figure 2.2 – EA Flooding from surface water (low risk, 0.1%)

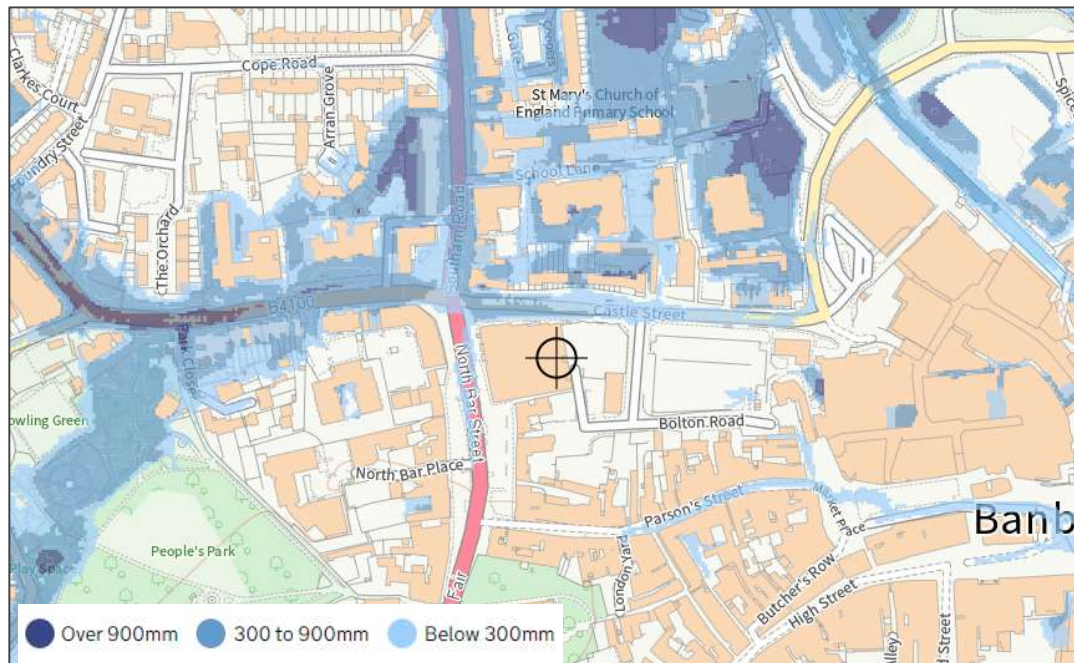
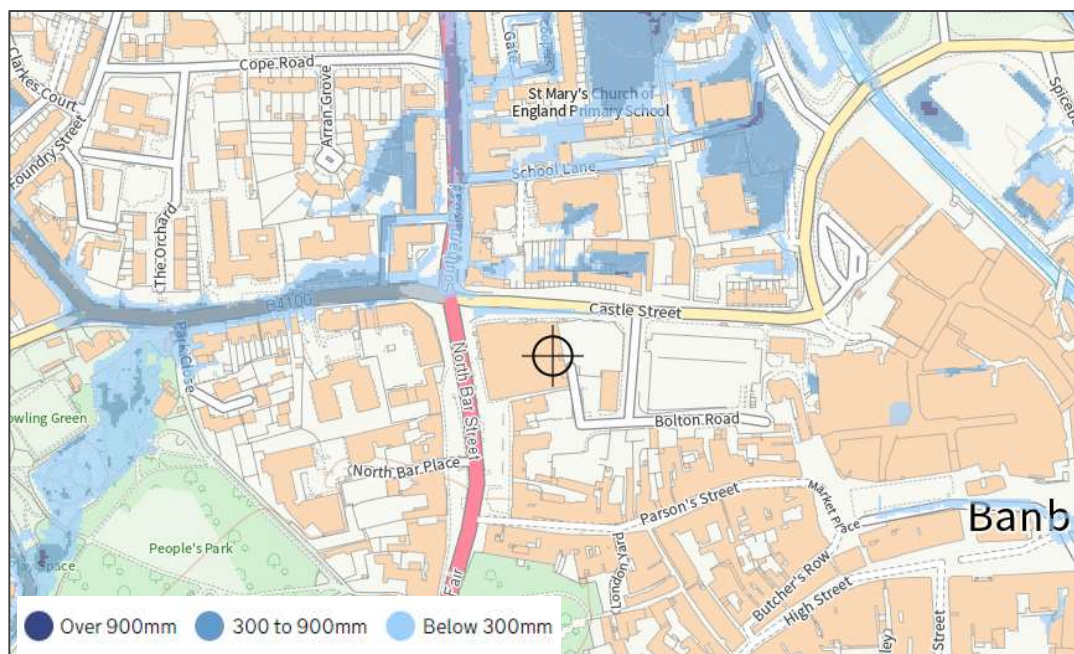


Figure 2.3 – EA Flooding from surface water (medium risk, 1%)



- 2.4 The mapping identifies that the northern boundary of the site may be susceptible to flooding below 300mm within the 100 year design life of the scheme (medium risk). The same area is indicated to be at risk of flooding

greater than 300mm during the low risk event (beyond the 1 in 1,000 year event).

- 2.5 The developable extents of the site remain at a higher elevation above Castle Street and are therefore not at risk of flooding in either event.
- 2.6 It is important to note that the mapping ignores the presence of existing drainage infrastructure, which might otherwise serve the site and surrounding developments. It is therefore considered that this mapping represents a conservative assessment.
- 2.7 The site does not fall within a groundwater flood risk area or lie within the maximum extent of flooding from any reservoirs and there are no known on-site flood risks associated with infrastructure failure.

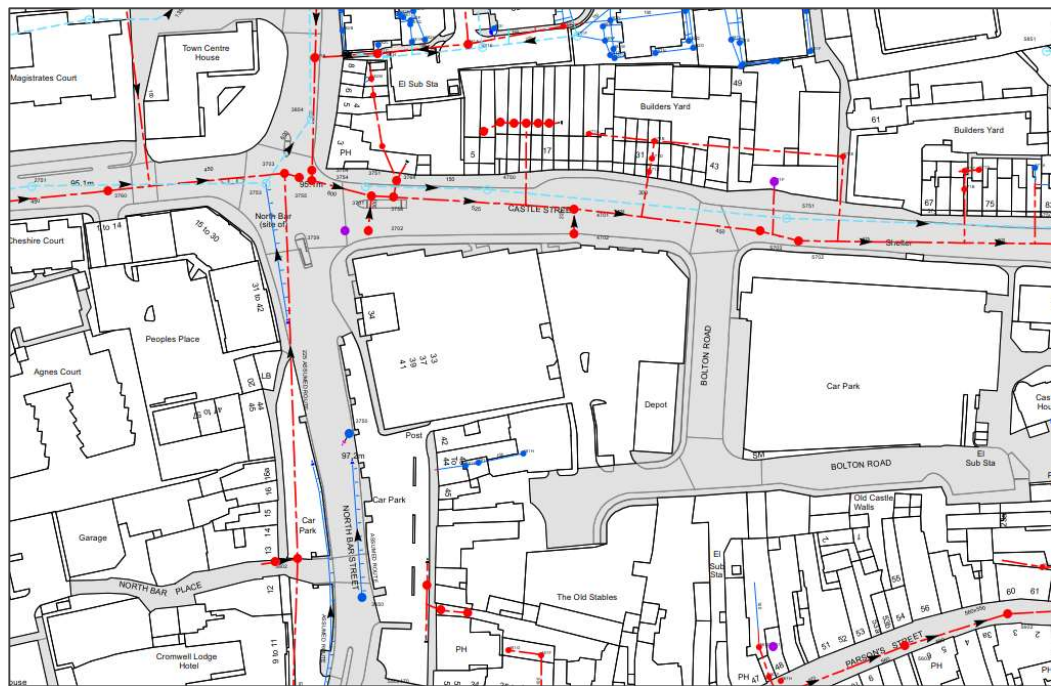
Ground Conditions

- 2.8 Crossfield Consulting have prepared a Ground Investigation Report, GIR (ref. CCL03458.C005), dated August 2021, which identifies potential constraints to redevelopment relating to the ground conditions and including a risk-based environmental assessment and recommendations for remediation works, foundations, road pavement design and general construction advice.
- 2.9 The investigation identified that ground conditions consist of:
- Made Ground from ground level to depths ranging from 1.0m to 2.4m consisting of various surfacing underlain by a sandy gravel subbase over variably sandy gravelly, locally organic, clay.
 - River Terrace Deposits on the eastern half of the site only, to depths between 2.7m and 3.3m.
 - Charmouth Mudstone Formation are present as the substrata reported as firm to stiff clays.
- 2.10 Groundwater was encountered at depths of 4.1m and 5.2m in two exploratory holes. The investigation also identified localised perched groundwater at the time of the investigation and noted damp materials at depths approximately 2.5m below ground level. Therefore, based on the recorded groundwater conditions and the impermeable substrata, it is concluded that soakaway based drainage would not be viable as concluded in the GIR (August, 2021).
- 2.11 Extracts from the Ground Investigation Report can be found in Appendix B of this report.

Existing Site Drainage

- 2.12 There are no apparent nearby surface water features or watercourses. The Thames Water (TW) records are extracted in Figure 2.4 below which identifies that there are existing surface and foul sewers within Castle Street and North Bar Street to the north and west of the site. There are also combined sewers and gullies indicated south of the site, but these are not operated by TW (ownership is unknown). A full copy of TW records can be found within Appendix C of this report.

Figure 2.4 – Thames Water sewer asset record



- 2.13 A utility survey has been completed for the site which identifies existing foul and surface water drainage, with separate discharges to the adopted sewers within Castle Street.
- 2.14 The existing site drainage also receives separate private foul and storm connections from the adjacent commercial unit (Land Tyre Service). Whilst the existing site drainage can be abandoned, any live connections from other developments will need to be retained or otherwise diverted to accommodate the proposed development.
- 2.15 A CCTV condition survey has been conducted by Utilities Survey Ltd. (CCTV report ref. 071398, August, 2021). The 150mm diameter foul sewer connection to be retained (F4 to F5) is in good condition and is therefore considered adequate for re-use. The 225mm diameter surface water sewer connection from S7 to Mains are reported as DRB Grade: C, due to a large

joint displacement. Thus, there is a defect that requires remedial works before the existing surface water connection can be deemed serviceable.

- 2.16 The CCTV survey report is included within Appendix D of this report.

Existing surface water runoff

- 2.17 The existing site consists of a hard paved parking area and roof space, with minor landscaping areas to the north of the building along Castle Street, overall ~98% impermeable catchment.
- 2.18 The existing site does not comprise any existing attenuation. Instead, flows are limited by the 225mm outflow pipe linking to the existing surface water sewer network (estimate 40 l/s pipe-full capacity). Excess flows would overwhelm the system and flow overland towards Castle Street.
- 2.19 The existing brownfield rates have been estimated based on the Modified Rational Method (HR Wallingford, 1990), with a Hydrological Region 6, rainfall intensity of 57.6 mm/hr and growth curves taken from CIRIA C753. The results can be seen within in Table 2.1 below.

Table 2.1 – Estimated Brownfield Runoff Rates (0.49ha)

| Return Period | Brownfield Rate (l/s) |
|---------------|-----------------------|
| 2 year | 69.0 |
| 30 years | 188.3 |
| 100 years | 250.3 |

- 2.20 Oxfordshire County Council's (OCC) 'Local Standards and Guidance for Surface Water Drainage on Major Development in Oxfordshire' (OCC SWDG, Nov 2018) states under National Standards for Peak Flow Control (S3): *"For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to the redevelopment"*.
- 2.21 The equivalent greenfield runoff rates for the site have been calculated using FEH, with the results summarised within Table 2.2 and the calculation sheet included within Appendix E of this report.

Table 2.2 – Equivalent Greenfield Runoff Rates (0.37ha)

| Return Period | Greenfield Rate (l/s) |
|---------------|-----------------------|
| 1 year | 0.7 |
| 30 years | 1.9 |
| 100 years | 2.6 |

- 2.22 It is proposed that peak flows from the site are limited to greenfield rates as far as is practicable. In this instance limiting peak flows well below 1 l/s would require an impractically small control with increased risk of blockage, instead it is proposed to limit flows based on a minimum vortex flow control diameter of 100mm. This follows Sewer Sector Guidance where it recommends 100mm minimum control diameter where there is a risk of debris passing through the control.
- 2.23 Local Standard L3 states: *"For brownfield or previously developed sites, where it is proposed to discharge runoff at rates greater than greenfield rates, evidence will be required to demonstrate why it is not feasible to achieve greenfield rates. The capacity of any existing drainage system within the site should also be assessed to determine the current discharge rates."* Additional local guidance: *"As a minimum, brownfield sites should reduce the discharge by 40% to account for the impacts of climate change, from the existing site runoff OR from the original un-surcharged pipe-full capacity of the existing system, whichever is the lowest."*
- 2.24 It is considered that use of a 100mm diameter vortex flow control will restrict peak flows as close to greenfield rates as is practicable, whilst ensuring that flows are significantly below the existing brownfield rates (250 l/s) and pipe-full capacity of the existing system (40 l/s).
- 2.25 Any off-site drainage connections, new or retained, would need to be agreed with OCC LLFA and TW.

3 Development Proposal

- 3.1 The development proposes to demolish the existing building and car parking area to enable the construction of a new apartment building which comprises 80 new retirement apartments and associated facilities, parking, and landscaping.
- 3.2 A copy of the proposed site layout has been included within Appendix F of this report.

4 Surface Water Management Plan

- 4.1 The site is 0.49ha (less than 1ha) and is located within Flood Zone 1, therefore a Flood Risk Assessment is not required. This technical note has been prepared to assess any relevant flood risks and drainage constraints and to identify an appropriate drainage strategy for the proposed development.

- 4.2 To ensure the development is safe throughout its lifetime, the surface water strategy accounts for runoff in up to the 100 year return period.
- 4.3 The strategy also safeguards against the upper end allowances for climate change (40%) providing betterment over existing conditions, where the rate and volume of runoff would continue to increase due to climate change in line with local standards (OCC SWDG, Nov 2018).
- 4.4 The Crossfield Consulting ground investigation has concluded that the underlying ground conditions are unsuitable for the use of soakaways (see Section 2). Instead, surface water runoff will be attenuated on-site and discharged to the nearest and most appropriate receiving system.
- 4.5 The existing Thames Water gravity sewer beneath Castle Street currently receives surface water runoff from the site, with peak flows restricted via the existing 225mm diameter connection drain.
- 4.6 The proposed scheme identifies a significant amount more permeable green space than the existing site, reducing the drained catchment from 0.477ha to 0.308ha, offering a 35% reduction. An 'Existing Impermeable Areas' plan is provided in Appendix I.
- 4.7 There are no nearby watercourses or other surface water features therefore the proposed scheme looks to reuse the existing connection to the TW surface water system.
- 4.8 Due to the proposed development reducing the impermeable catchment there is no requirement for long-term storage, however in line with OCC guidance the surface water strategy seeks to limit peak flows as close to greenfield rates as is practicable, based on a minimum 100mm diameter control.
- 4.9 Where possible, runoff from the access road will be directed towards areas of under-drained permeable paving. The use of under-drained permeable paving will be limited to the proposed parking bays within the central and eastern parking court. The paving is included as a pollution control measure and also forms part of the 1 in 100 year attenuation system.
- 4.10 Runoff generated by the southern extents of building, external hard paving and any residual access road will be collected and drained towards a new cellular attenuation tank beneath the proposed car park to the south of the building. The tank will also receive flows from the under-drained permeable paving.

- 4.11 All chambers immediately upstream of the tank will include silt traps, whilst the tank itself will include vented covers or a high-level vent pipe to mitigate air-locks.
- 4.12 Runoff generated by the northern extents of building will drain towards an oversized pipe within the amenity space at the northern edge of site.
- 4.13 The proposed attenuation features will be linked by a balance pipe spanning beneath the groundfloor slab. Runoff from the tank, and enlarged diameter pipe, will pass through the new flow control chamber prior to discharging to the retained existing surface water chamber (S7) from which it will discharge to the TW surface water network via the existing lateral site connection. This will be subject to remedial works to correct a joint displacement, based on the CCTV condition report discussed in Section 2.
- 4.14 A discharge of surface water to the TW surface water sewer network has been agreed at 5.0l/s as per confirmation included in Appendix J.
- 4.15 Following comments received (February 2022), a refined drainage model has been simulated using the MicroDrainage Network module to determine the 100 year +40% climate change storage requirements for the development. The Network model has been updated to reflect minor changes following comments received in April 2022, to provide some capacity for exceedance flow volumes, and the model details are included within Appendix G. The attenuation storage volumes are summarised in Table 4.1 below.
- 4.16 The surface water network as modelled, including pipe and manhole details, is indicated on the preliminary drainage layout (PDL) drawing 1260-01-PDL-1001 provided in Appendix H. The contributing impermeable area of 0.308ha is modelled, with sub-catchments of roof and external areas allocated to the network as demarcated on the PDL drawing.

Table 4.1 – Attenuation Storage Volumes

| Attenuation Feature | Attenuation Volume m ³ |
|--------------------------------|-----------------------------------|
| Cellular Tank | 127.7 |
| 450mm diameter Pipe | 8.4 |
| Under-Drained Permeable Paving | 12.4 |
| Total | 148.5 |

- 4.17 The proposed development offers significant betterment compared to existing brownfield conditions, with peak rates of discharge limited to just 5.0 l/s peak in the 100 year return period storm with 40% climate change,

compared to 40 l/s from the 225mm lateral connection alone (87% betterment), or 250 l/s from the full brownfield catchment (98% betterment).

- 4.18 The design offers residual attenuation storage within the under-drained permeable paving to receive and attenuate exceedance events beyond the 1 in a 100 year, plus 40% climate change. The residual storage for exceedance volumes is equivalent to the attenuation volume requirements from a 1 in 200 year, with 40% climate change event.
- 4.19 Copies of the modelling outputs, including the exceedance model can be seen within Appendix G.
- 4.20 The existing private storm connection from the adjacent commercial unit (Land Tyre Service) will be diverted within the site boundary to avoid conflict with the proposed development. Where possible it is recommended that this is dealt with privately on-site to avoid a S185 sewer diversion application. However, if this is not feasible the existing drainage could be diverted as an adopted sewer beneath Bolton Road to the network within Castle Street.
- 4.21 It is understood that Trelawn House, to the west of the proposed development, is served by a separate surface water network. If during demolition it is found that this property is served by the existing site drainage, a retained connection will be permitted. This will provide attenuation and reduced discharge under normal operating conditions. A high level overflow would be installed in the control chamber at the top water level, so that excess flows from Trelawn House can continue downstream without flooding.
- 4.22 Beyond the 100-year critical storm, exceedance runoff will be directed towards any residual areas of open space and/or the proposed car park, where any residual capacity within the under-drained permeable pavement can be utilised, and aboveground storage thereafter. External works and landscaping within the site and along the site boundary will accommodate exceedance flows as far as possible.
- 4.23 Beyond the limits of the site, any residual exceedance flows (beyond the 1 in 200 year +40% climate change event) would continue to the northern and the eastern boundaries and towards Castle Street as per existing conditions. However, the likelihood of exceedance runoff from the site is significantly improved when compared to the existing conditions and capacity of current on-site infrastructure and the proposed drainage scheme exceeds normal planning design parameters.

- 4.24 A copy of the updated preliminary drainage layout can be found on drawing 1260-01-PDL-1001 included within Appendix H.

Long-Term Storage

- 4.25 The proposed developments provides a significant reduction in the impermeable drained catchment, resulting in the volume of runoff from the site decreasing. It is therefore considered that Long-Term Storage is not necessary in this instance.

5 Foul Water Strategy

- 5.1 Foul flows generated by the proposed development will drain through a new private gravity foul network and will utilise the existing connections to the TW foul sewer network, located to the north of the development.
- 5.2 Foul capacity has been confirmed by TW within the foul sewer network beneath Castle Street as per the correspondence included in Appendix J.
- 5.3 Under-slab connections for apartments on the western side of the proposed development, facing North Bar Street, are required due to the space constraints between the building and site boundary. Similarly, the private foul system runs under the building from south to north due to boundary constraints.
- 5.4 The existing private foul connection from the adjacent commercial unit (Land Tyre Service) will be diverted within the site boundary to avoid conflict with the proposed development. Where possible it is recommended that this is dealt with privately on-site to avoid a S185 sewer diversion application. However, if this is not feasible the existing drainage could be diverted as an adopted sewer beneath Bolton Road to the network within Castle Street.
- 5.5 The proposed foul drainage arrangements can be seen on the preliminary drainage layout drawing 1260-01-PDL-1001 within Appendix H.

6 Ownership & Maintenance

- 6.1 All on-site piped drainage will remain private and will be designed in accordance with Building Regulations Part H and will become the responsibility of the building operator.
- 6.2 The proposed attenuation will also be retained under private ownership and operated and maintained by the operator or appointed

management contractor in accordance with CIRIA C753 and any manufacturer specific guidance.

- 6.3 A 'Drainage Maintenance Plan' has been prepared and provided in Appendix K. The Plan sets out maintenance tasks, responsibilities, and frequencies for the entire drainage network.
- 6.4 The private drainage maintenance (for retained private and proposed drains) is also identified on the preliminary drainage layout drawing as required by OCC LLFA.

7 Conclusion

- 7.1 The proposed development has been assessed in line with the National Planning Policy Framework, to allow the planning application to be progressed and to show that the development can be undertaken in an acceptable manner from a flood risk perspective.
- 7.2 The proposed development is located within Flood Zone 1 and is not known to be susceptible to flooding from pluvial, groundwater, infrastructure or artificial sources.
- 7.3 To ensure the development is safe throughout its lifetime, the surface water strategy accounts for runoff in up to the 1 in 100 year return period.
- 7.4 The strategy also safeguards against climate change (40%), providing betterment over existing conditions, where the rate and volume of runoff would continue to increase due to climate change.
- 7.5 The existing ground conditions preclude the use of soakaways. Instead, storm water runoff will be attenuated on-site and will discharge via the existing site connection to the TW stormwater sewer to the north of the site within Castle Street.
- 7.6 The impermeable drained catchment will reduce though the development, also reducing the peak rates and volumes of runoff from the site.
- 7.7 The attenuation requirements for the site are being delivered by a combination of cellular attenuation, oversized pipe and under-drained permeable pavements. The use of permeable pavements will offer treatment of runoff from trafficked areas prior to discharge.

- 7.8 The proposed drainage strategy for this site reduces peak flows as close to the equivalent greenfield rates as is practicable, providing significant betterment compared to existing brownfield conditions.
- 7.9 Following a pre-application enquiry, Thames Water (TW) has agreed to the re-use of existing sewer connections and agreed surface water discharge to the surface water sewer in Castle Street at 5 l/s peak.
- 7.10 Beyond the 100-year critical storm, exceedance runoff will be directed towards any residual areas of open space and/or car parking, where any residual capacity or aboveground storage can be utilised.
- 7.11 Foul flows generated by the proposed development will be served by a new private gravity network, utilising the existing connection to the TW foul sewer network. Suitable capacity has been confirmed by TW.
- 7.12 Existing drainage connections from the commercial building to the southeast of the development (Land Tyre Service) will be retained and diverted to avoid conflict with the development. Where possible it is recommended that this is dealt with privately on-site to avoid a S185 sewer diversion application.
- 7.13 Any potential drainage connections from Trelawn House would be accommodated by the proposed development, with the ability to introduce a high-level weir within the stormwater network to assist in managing any additional inflows from Trelawn House roof catchment.
- 7.14 All on-site proposed drainage will remain private and will be designed in accordance with Building Regulations Part H and CIRIA C753 and will become the responsibility of the building operator as per the 'Drainage Maintenance Plan'.
- 7.15 As the development will be safe from flooding throughout its lifetime and will actively reduce the flood risk to properties within the downstream catchment, it is recommended that the Local Planning Authority confirm they have no objections to the proposed development.

8 Summarised response to LLFA comments

Response to comments dated February 2022

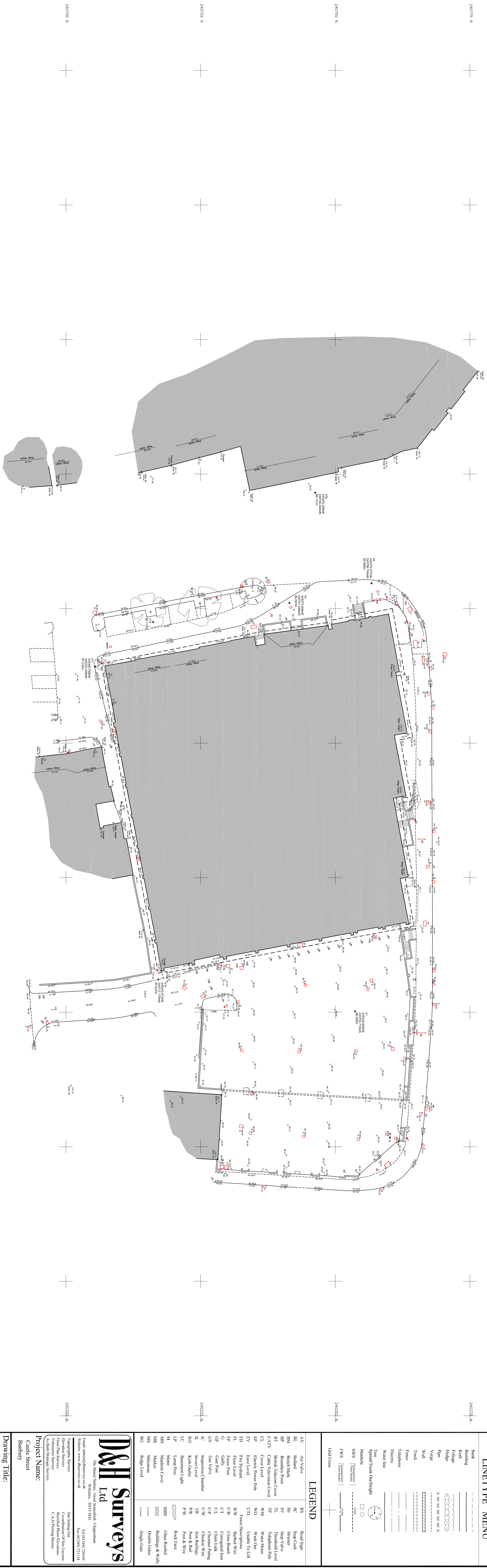
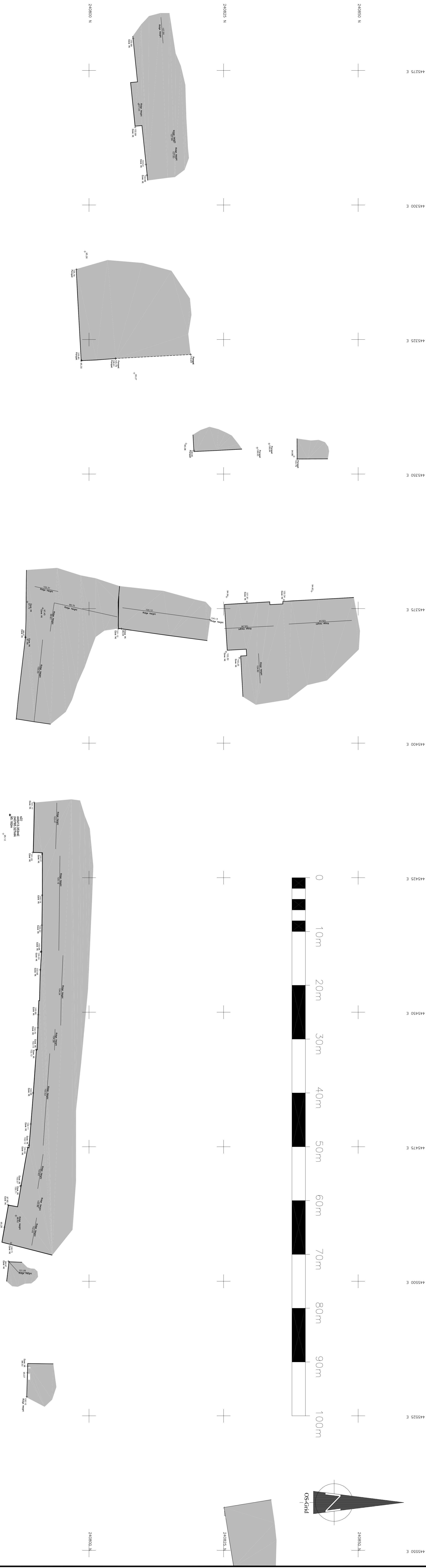
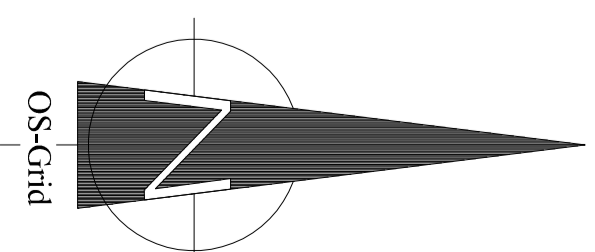
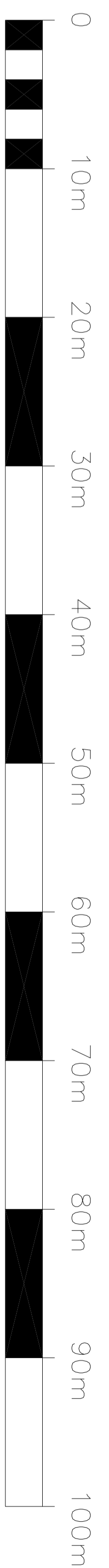
- 8.1 In response to LLFA comments, dated 25 February 2022 (provided in Appendix L), additional information has been provided as a revision to this drainage technical note. A summarised response to key issues raised within the comments received is provided below for ease of reference.

- 8.2 *Drainage strategy not detailed.* Surface water strategy now modelled as a Network (see Appendix G for details). Surface water network details included on the updated PDL drawing (Appendix H, Par. 4.15).
- 8.3 *Microdrainage Calculations not detailed.* Surface water strategy modelled as a Network (see Appendix G for details). Surface water network details included on the updated PDL drawing (Appendix H, Par. 4.15).
- 8.4 *Existing drainage not shown on the drainage strategy drawing.* All the existing drainage, to be abandoned, has now been included on the updated PDL (Appendix H).
- 8.5 *Remedial works for existing drainage pipes not identified on plan drawing.* Remedial work at point of connection with the surface water network now noted on the updated PDL (Appendix H).
- 8.6 *Surface water catchment plan not provided.* An 'Existing Impermeable Area' plan has now been provided (Appendix I). The impermeable catchment areas for the proposed development are now indicated on the updated PDL (Appendix H).
- 8.7 *Detailed SuDS maintenance schedule not provided.* A 'Drainage Maintenance Plan' is now provided in Appendix K (Par. 6.3, Appendix K).
- 8.8 *Surface water exceedance plan not provided.* Beyond the 100-year critical storm, exceedance runoff will be directed towards any residual areas of open space and/or the proposed car park, where any residual capacity within the under-drained permeable pavement can be utilised, and aboveground storage thereafter. External works and landscaping within the site and along the site boundary will accommodate exceedance flows as far as possible. Beyond the limits of the site, exceedance flows would continue to the natural low point along the eastern and northern boundaries as indicated on the PDL. (Par. 4.19, Appendix H).
- 8.9 *Public sewer technical approval not provided.* Thames water confirmation of sufficient foul and surface water sewer capacity now provided in Appendix J. (Par. 4.14, 5.2, Appendix J).
- 8.10 *Ground investigation report does not show the infiltration testing results.* Based on the recorded groundwater during the ground investigation and the impermeable substrata, it has been concluded that soakaway based drainage would not be viable as per the GIR dated August, 2021.













Response to comments dated April 2022

- 8.11 In response to LLFA comments, dated 20 April 2022 (provided in Appendix M), additional information has been provided as a revision to this drainage technical note. A summarised response to key issues raised within the comments received is provided below for ease of reference.
- 8.12 *Drainage strategy drawing not detailed.* Surface water network details, now including cover and invert levels for attenuation features included on the updated PDL drawing (Appendix H). Surface water strategy network model updated to suit most up to date levels with modelling output provided in Appendix G.
- 8.13 *Surface water catchment plan.* The surface water catchments are shown on the PDL drawing (Appendix H). The total area drained is 0.308ha as stated in the PDL summary notes. Individual catchment areas have been annotated, together with which pipe they are draining to in the network model. It should be noted that some pipe runs receive flow from multiple areas. The text has been made clearer on the PDL drawing.
- 8.14 *Surface water exceedance plan.* The attenuation design provides additional capacity for the management of exceedance events. The residual capacity within the under-drained permeable paving can be accommodate up to the 1 in 200 year, with 40% climate change, beyond which there would be some localised ponding within areas of green space and parking bays. Beyond the capacity of the site, external levels have been adjusted to direct exceedance runoff, to the south of the building, to flow east towards the eastern boundary. External works and landscaping within the site and along the site boundary will accommodate exceedance flows as far as possible. Beyond the limits of the site, exceedance flows would continue to the northern and the eastern boundaries and towards Castle Street as per existing conditions. However, the likelihood of exceedance runoff from the site is significantly improved when compared to the existing conditions (See par 4.16, 4.18 & 4.22).

Appendix A Topographic Survey



LINETYPE MENU

| | |
|------------------------|--|
| Blank | _____ |
| Building | _____ |
| Architectural | _____ |
| Electric | _____ |
| Hydraulic | _____ |
| Hedge | _____ |
| Pipe | _____ |
| Verge | _____ |
| Wall | _____ |
| Track | _____ |
| Fence | _____ |
| Telephone | _____ |
| Power | _____ |
| Water line | _____ |
| Time | _____ |
| Special Track Daylight | _____ |
| Methods | <input type="checkbox"/>  |
| | <input type="checkbox"/>  |
| SMS |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| |  _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | _____ |
| | |

[illegible]

D&H
Surveys
Ltd

The Manor Solihull, Great Snowford, Chippingham
Warwick, CV34 5EH

Email: advertising@surveys.co.uk
Website: www.dh-surveys.co.uk

Telephone: 0121 250 72045
Fax: 0121 250 721124

Surveys
Economic Surveys
Floor Plan Surveys
Valuation Surveys
As Built Drainage Surveys

Site Survey
Coordination of Site Layouts
Revised Plans Elevations
C.A.D Plotting Bureau

| | |
|----------------|-----------------------------|
| Project Name: | Castle Street Banbury |
| Drawing Title: | Topographic Survey |
| Client: | Churchill Retirement Living |
| Agent: | |

| | | | | | |
|-------|-----------|--------|----------|----------|--|
| Date: | July 2021 | | Scale: | 1:250000 | |
| Drawn | Surveyor | Dwg No | Revision | | |
| P.J.S | S.C.B | SU-01 | | | |

| | |
|------------------|------------------------------|
| Site Datum | OSGB 1936 |
| OSGB 15 | |
| Grid Orientation | Sheet ID |
| OS Grid | Churchill-Bankbury-July 2021 |

Disclaimer
D & H Surveys will Guarantee that this Survey Data Is Correct to the Indicated Scale only.

Copyright of this Document Remains With D & H Surveys.

Appendix B Ground Investigation (Extracts)

4. DESK STUDY ENQUIRIES

Detailed desk study information is presented in the Desk Study Appraisal by Crossfield Consulting Limited. A summary of relevant information is provided below.

The Groundsure Environmental Database indicates that there are no active or historical landfills recorded within 250 m of the site.

Hydrogeological information indicates that there are no superficial deposits aquifer strata below the site. Bedrock aquifer strata underlying the site are classified as 'Secondary Undifferentiated' aquifer strata.

There are no records of surface or underground mineral workings within 1 km of the site and there are no records of mining or mining cavities within the same search radius.

Within the section of the site occupied by the building, the exploratory hole records in the Desk Study Appraisal report (obtained from the BGS) indicate a thickness of Made Ground up to 1.5 m depth. Beneath the Made Ground 'firm' brown clays are recorded that quickly become 'stiff' and grey with depth with occasional lenses of silt and becoming 'very stiff' with partings of mudstone below approximately 5 m depth.

BRE BR211 (2015) and the Groundsure report (based on BGS/Public Health England data) indicate that the site is within an area where radon precautions are not required in new buildings.

5. GROUND CONDITIONS AND GEOLOGICAL MODEL

5.1 Ground Investigation

Details of the rationale and scope of the ground investigation and laboratory testing, together with exploratory hole logs, monitoring, in situ and laboratory test results, are given in Appendix I. The investigation has identified the presence of the following, below the site.

5.2 Buried Foundations and Services

Concrete was encountered immediately below the block paving in the northwest corner and towards the south of the car parking (possibly associated with a historical yard area). No other buried obstructions or services were encountered during the investigation. However, services are known to be below the site and obstructions should be anticipated associated with current and historical structures.

5.3 Strata Encountered

Made Ground

Made Ground was encountered from ground level down to depths of between 1.0 m and 2.4 m. An initial layer of tarmac-surfacing (in the east of the car park), and block paving and localised concrete (in the west of the car park) was underlain by a layer of sandy gravel subbase with low to medium cobble content. Generally, beneath the subbase, variably sandy gravelly, locally organic, clay was encountered.

River Terrace Deposits

Predominantly within the eastern half of the site, River Terrace Deposits are present beneath the Made Ground, and are recorded to depths of between 2.7 m and 3.3 m. The deposits generally comprise soft to firm and firm consistency (low to medium strength) variably sandy and gravelly, silty clays with horizons of loose to medium

dense gravelly sand. With reference to the desk study information, these deposits appear to be largely absent from the western section of the site.

Charmouth Mudstone Formation

Charmouth Mudstone Formation strata are present beneath the Made Ground and/or River Terrace Deposits (where present) and are recorded down to the full depth of the investigation at approximately 5.0 m depth. These strata generally comprise firm to stiff and stiff consistency (medium to high strength), orange brown and greyish brown, locally sandy clays with some mudstone. At depth, generally below 4.7 m towards the east of the site, stiff consistency (high strength) grey silty clay was encountered.

Within the section of the site occupied by the building, the exploratory hole records in the Desk Study Appraisal report indicate a thickness of Made Ground up to 1.5 m depth. Beneath the Made Ground 'firm' brown clays are recorded that quickly become 'stiff' and grey with depth with occasional lenses of silt and becoming 'very stiff' with partings of mudstone below approximately 5 m depth.

5.4 Groundwater

Groundwater was encountered in two exploratory holes at depths of 4.1 m and 5.2 m. Localised perched water was encountered in one exploratory hole, an accurate measurement of the water level could not be obtained due to hole instability. It should also be noted that damp materials were recorded in the sample liners at depths of approximately 2.5 m, such that groundwater may also be located around this depth.

The groundwater conditions are based on observations made at the time of the fieldwork. It should be noted that groundwater levels may vary due to seasonal and other effects.

6. PROPOSED DEVELOPMENT

The proposed development includes the following buildings and other structures, as shown on Figure 3:

- Up to four-storey block of retirement apartments
- Car parking
- Managed soft landscaping
- Electrical substation

7. ASSESSMENT OF POTENTIAL CONTAMINATION AND GROUND GASES

7.1 Assessment Criteria

Assessment of potential contamination and ground gases has been undertaken using a risk assessment based approach, as recommended within the Environmental Protection Act (1990) (and subsequent amendments), Environment Agency LCRM (2020), CLEA Model (2004-2009), BS 10175:2011+A2:2017, CIRIA C552 (2001) and NHBC R&D Report 66 (2008). This approach considers the likely source of contamination, given the history and location of the site, and the possible migration pathways by which these potentially hazardous substances may reach likely receptors, such as end users of the site, controlled waters, or the wider environment, in the context of the proposed development.

9.6 General Construction Advice

An allowance should be included for breaking out/removal of obstructions.

Following completion of any ground treatment/vibro works, excavations should be designed and undertaken so as to ensure that areas of ground treatment/stone columns are not loosened or disturbed.

Ground treatment works should be undertaken and monitored in conjunction with a suitable specification.

All formations should be cleaned, and subsequently inspected by a suitably qualified engineer prior to placing foundation concrete and vibro “stone columns” should be confirmed to be correctly positioned (in compliance with the design and foundation requirements).

Foundation concrete, or alternatively, a blinding layer of concrete, should be placed immediately after excavation and inspection in order to protect the formation against softening and disturbance.

Care should be taken to ensure that any existing services encountered are carefully and satisfactorily blocked to prevent water seeping through the drains and into any excavations.

10. TEMPORARY WORKS

Conventional plant is considered appropriate for shallow excavation works at the site. However, the use of hydraulic breakers may be required to break up any remaining buried concrete materials or buried hard surfacing or other obstructions that may remain from previous developments.

Shallow excavations may remain stable in the short term, although some loose Made Ground materials have been encountered, and additional investigation and review of temporary works/support requirements is recommended. Instability should be anticipated in any excavations left open for extended periods of time, particularly during inclement weather. Support should be provided, or the sides battered back, in any excavations requiring man entry, in compliance with a suitable risk assessment. Likewise, support is likely to be necessary in deeper excavations and where groundwater seepages occur.

Groundwater may be encountered within assumed excavation depths for the development and, there is a possibility that perched water may locally be encountered. If water does enter excavations, sump pumping may be required. As outlined above, additional review of temporary works requirements is recommended following the additional investigation outlined in Section 14.

If large plant is proposed (including vibro equipment) then a temporary working platform should be provided for the specific plant to be used, in compliance with the requirements of FPS (2002) and BRE BR470 (2004).

11. ASSESSMENT OF SOAKAWAY DRAINAGE

Based on the presence of low permeability strata beneath the site, together with relatively deep Made Ground and evidence of shallow groundwater, and with reference to the guidance published in BRE DG365 (2016) and CIRIA C753 (2015), it is considered that soakaway drainage is not suitable for the proposed development and an alternative SuDS drainage solution should be identified.

Appendix C Thames Water Records

Asset location search



Property Searches

NRSWA Ltd
The Rosery
Odiham Road
READING
RG7 1SD

Search address supplied Bingo Hall
Bolton Road
Banbury
Oxfordshire
OX16 0TH

Your reference Banbury

Our reference ALS/ALS Standard/2021_4472919

Search date 22 July 2021

Knowledge of features below the surface is essential for every development

The benefits of this knowledge not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility of any development.

Did you know that Thames Water Property Searches can also provide a variety of utility searches including a more comprehensive view of utility providers' assets (across up to 35-45 different providers), as well as more focused searches relating to specific major utility companies such as National Grid (gas and electric).

Contact us to find out more.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0800 009 4540

Search address supplied: Bingo Hall, Bolton Road, Banbury, Oxfordshire, OX16 0TH

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.



For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

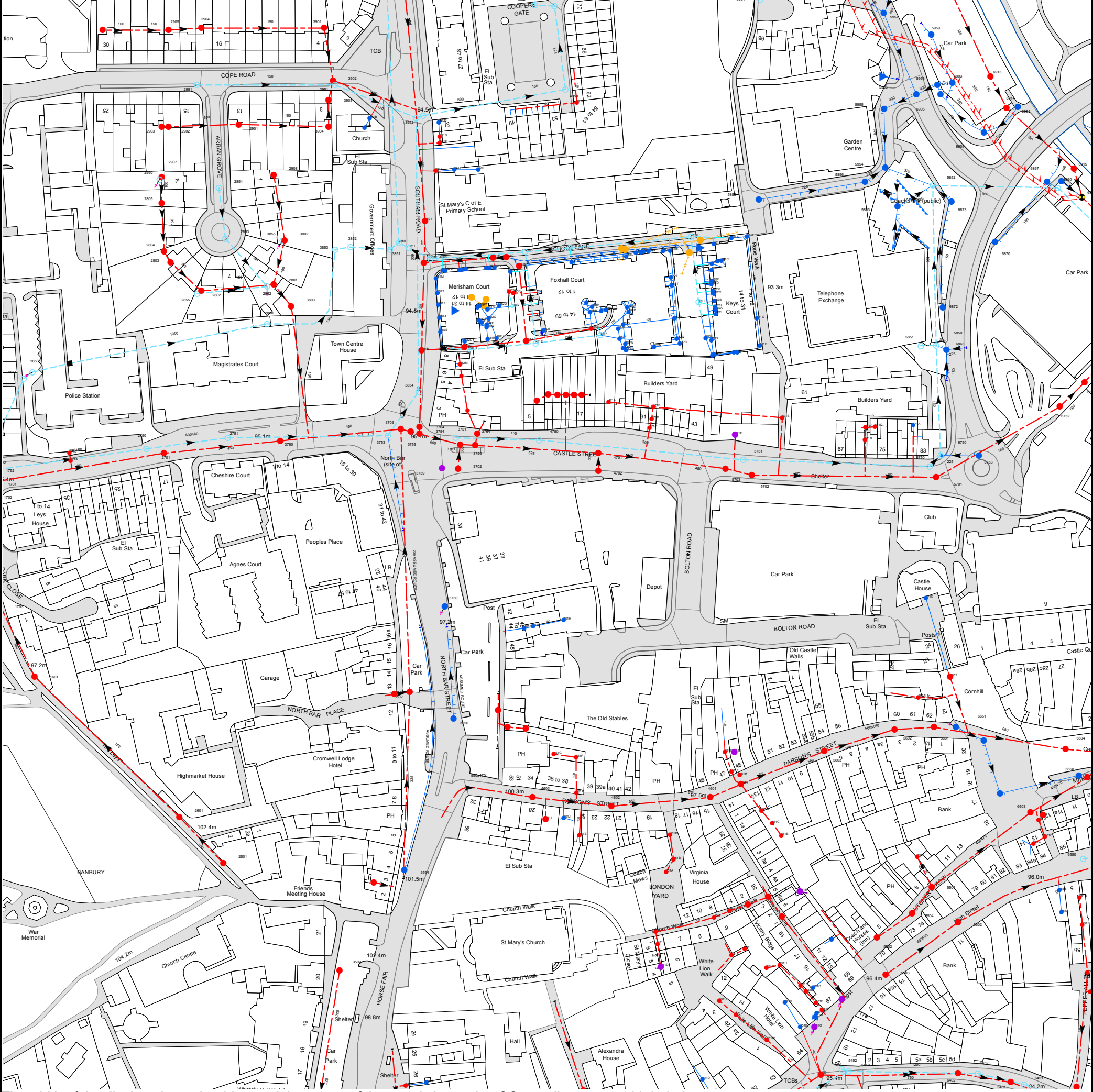
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4472919



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 445423,240735
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 6914 | 91.7 | 91.17 |
| 6904 | n/a | n/a |
| 5956 | n/a | n/a |
| 6906 | n/a | n/a |
| 5958 | n/a | n/a |
| 6903 | n/a | n/a |
| 6913 | 92.1 | 91.36 |
| 5959 | n/a | n/a |
| 5957 | n/a | n/a |
| 5951 | 92.65 | 91.15 |
| 4952 | 93.31 | 91.49 |
| 4951 | 93.09 | 91.61 |
| 581F | 93.5 | 93.1 |
| 5851 | 92.64 | 91.38 |
| 5850 | 92.6 | 91.03 |
| 581G | 93.5 | 92.93 |
| 6872 | n/a | n/a |
| 6870 | n/a | n/a |
| 581E | 93.5 | 92.67 |
| 5853 | n/a | n/a |
| 6873 | n/a | n/a |
| 5855 | n/a | n/a |
| 6859 | 92 | 90.12 |
| 6860 | n/a | n/a |
| 5852 | n/a | n/a |
| 5856 | n/a | n/a |
| 6867 | n/a | n/a |
| 681A | n/a | n/a |
| 6915 | 91.5 | 90.72 |
| 5954 | n/a | n/a |
| 6905 | n/a | n/a |
| 5955 | n/a | n/a |
| 6602 | 94.01 | 91.64 |
| 6650 | 93.98 | 92.31 |
| 561H | n/a | n/a |
| 5603 | 96.38 | 93.71 |
| 6604 | 94.24 | 91.39 |
| 661A | n/a | n/a |
| 5602 | 95.68 | 92.55 |
| 5601 | 95.16 | 92.19 |
| 6651 | 94.96 | 92.28 |
| 561A | n/a | n/a |
| 6652 | n/a | n/a |
| 571G | n/a | n/a |
| 5701 | 94.45 | 91.12 |
| 5702 | 94.95 | 91.22 |
| 5750 | 94.37 | 91.84 |
| 5751 | 94.96 | 92.54 |
| 6753 | n/a | n/a |
| 6750 | 94.09 | 91.55 |
| 571B | n/a | n/a |
| 571C | n/a | n/a |
| 571D | n/a | n/a |
| 571A | n/a | n/a |
| 571E | n/a | n/a |
| 6752 | n/a | 90.9 |
| 6862 | n/a | 88.49 |
| 6863 | n/a | n/a |
| 6403 | 94.03 | 91.6 |
| 6451 | 94.2 | 91.74 |
| 6401 | 94.23 | 90.73 |
| 6452 | 94.33 | 92.04 |
| 6402 | 94.39 | 91.12 |
| 551W | n/a | n/a |
| 651E | n/a | n/a |
| 5503 | 96.46 | 93.4 |
| 6503 | 95.29 | 92.46 |
| 5502 | 96.49 | 93.87 |
| 651F | n/a | n/a |
| 6502 | 96.27 | 92.78 |
| 5504 | 96.25 | 93.67 |
| 651A | n/a | n/a |
| 651D | n/a | n/a |
| 651B | n/a | n/a |
| 5501 | 95.95 | 93.59 |
| 6550 | 94.99 | 93.84 |
| 551L | n/a | n/a |
| 651C | n/a | n/a |
| 661C | n/a | n/a |
| 661D | n/a | n/a |
| 6653 | n/a | n/a |
| 6603 | 94.69 | 92.24 |
| 661B | n/a | n/a |
| 3502 | 102.57 | 100.16 |
| 341B | n/a | n/a |
| 341A | n/a | n/a |
| 441A | n/a | n/a |
| 451C | n/a | n/a |
| 451E | n/a | n/a |
| 451D | n/a | n/a |
| 441D | n/a | n/a |

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 451F | n/a | n/a |
| 551U | n/a | n/a |
| 551S | n/a | n/a |
| 551V | n/a | n/a |
| 5604 | 97.13 | 94.28 |
| 551I | n/a | n/a |
| 5506 | n/a | n/a |
| 561D | n/a | n/a |
| 551G | n/a | n/a |
| 5507 | n/a | n/a |
| 561C | n/a | n/a |
| 551H | n/a | n/a |
| 561B | n/a | n/a |
| 5508 | n/a | n/a |
| 551A | n/a | n/a |
| 551R | n/a | n/a |
| 551B | n/a | n/a |
| 551C | n/a | n/a |
| 551D | n/a | n/a |
| 551Q | n/a | n/a |
| 551O | n/a | n/a |
| 551M | n/a | n/a |
| 551E | n/a | n/a |
| 551N | n/a | n/a |
| 5401 | 95.54 | 91.83 |
| 551F | n/a | n/a |
| 551J | n/a | n/a |
| 5452 | 95.41 | 93.66 |
| 551P | n/a | n/a |
| 5450 | 95.31 | 93 |
| 482Y | 93.85 | 93.3 |
| 482A | 93.5 | 92.82 |
| 482U | 93.96 | 93.2 |
| 482J | n/a | n/a |
| 481I | 93.37 | 92.62 |
| 482B | 93.5 | 92.82 |
| 482C | 93.5 | 92.82 |
| 482K | n/a | n/a |
| 483T | 93.76 | 93.32 |
| 482D | 93.5 | 92.82 |
| 482L | n/a | n/a |
| 482E | 93.5 | 92.82 |
| 482T | 93.76 | 93.42 |
| 482F | 93.5 | 92.82 |
| 482M | n/a | n/a |
| 482G | 93.5 | 92.78 |
| 581C | 93.5 | 92.82 |
| 481L | n/a | n/a |
| 483M | 93.96 | 93.32 |
| 483L | 93.8 | 93.34 |
| 483K | 93.8 | 93.4 |
| 482P | n/a | n/a |
| 483J | 93.76 | 93.46 |
| 481K | 93.76 | 92.76 |
| 481O | n/a | n/a |
| 581A | 93.5 | 92.58 |
| 481H | 93.23 | 92.33 |
| 5703 | 94.97 | 91.46 |
| 4701 | 95.13 | 91.75 |
| 571F | n/a | n/a |
| 471C | n/a | n/a |
| 471D | n/a | n/a |
| 471B | n/a | n/a |
| 471A | n/a | n/a |
| 482H | 93.5 | 93 |
| 481W | 93.5 | 92.55 |
| 581D | 93.5 | 93.1 |
| 581B | 93.5 | 92.82 |
| 482X | 93.76 | 93.25 |
| 483G | 93.76 | 93.05 |
| 482N | 93.76 | 93.25 |
| 482W | 93.76 | 93.21 |
| 482O | 93.76 | 93.04 |
| 481X | 93.5 | 92.55 |
| 482Q | 93.76 | 93.36 |
| 483F | 93.76 | 92.95 |
| 481J | 93.5 | 92.85 |
| 481F | 93.66 | 92.12 |
| 483E | 93.76 | 93.25 |
| 482V | 93.76 | 93.04 |
| 482R | 93.87 | 93.19 |
| 482I | n/a | n/a |
| 483D | 93.98 | 93.2 |
| 482Z | 93.76 | 93.25 |
| 382E | 94.81 | 93.91 |
| 382G | 94.7 | 93.85 |
| 483B | 93.76 | 93.15 |
| 381S | 94.6 | 94 |
| 381P | n/a | n/a |
| 483H | 93.76 | 92.75 |
| 481V | 94.6 | 93.7 |
| 382C | 94.6 | 93.88 |
| 382D | 94.6 | 93.88 |

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 483A | 93.76 | 93.3 |
| 483S | 93.61 | 93 |
| 483R | 94.6 | 92.9 |
| 481N | n/a | n/a |
| 381U | 94.6 | 93.91 |
| 381L | 94.6 | 93.98 |
| 381V | 94.6 | 93.91 |
| 381K | 94.6 | 94 |
| 381W | 94.6 | 93.91 |
| 381X | 94.6 | 93.91 |
| 381J | n/a | n/a |
| 381Y | 94.6 | 93.91 |
| 481B | 94.11 | 92.96 |
| 481M | n/a | n/a |
| 381E | 94.07 | 92.89 |
| 481C | 94 | 92.94 |
| 481D | 93.92 | 92.09 |
| 481G | 93.73 | 92.26 |
| 3702 | 94.89 | 92.82 |
| 3759 | n/a | n/a |
| 3756 | 95.07 | 91.6 |
| 3701 | 95.07 | 91.85 |
| 4750 | 95.04 | 93.3 |
| 3751 | 95 | 93.65 |
| 3764 | 95.14 | 91.82 |
| 3766 | n/a | n/a |
| 4801 | n/a | n/a |
| 4806 | n/a | n/a |
| 4805 | n/a | n/a |
| 4803 | n/a | n/a |
| 4804 | n/a | n/a |
| 4802 | n/a | n/a |
| 3856 | n/a | n/a |
| 382M | n/a | n/a |
| 381H | 94.3 | 92.85 |
| 381C | 94.19 | 92.54 |
| 481E | 93.49 | 91.89 |
| 382L | 94.6 | 93.91 |
| 481A | 93.49 | 92.73 |
| 381R | 93.54 | 92.94 |
| 382H | 94.6 | 93.85 |
| 483I | 93.61 | 92.9 |
| 483C | 93.76 | 92.93 |
| 381Q | 94.81 | 93.85 |
| 382F | 94.81 | 93.85 |
| 381O | n/a | n/a |
| 3555 | n/a | n/a |
| 361A | n/a | n/a |
| 3554 | n/a | n/a |
| 3602 | 99.5 | 96.52 |
| 3750 | 97.63 | 96.55 |
| 3650 | 99.58 | n/a |
| 3601 | 98.95 | 96.17 |
| 4605 | n/a | n/a |
| 461C | n/a | n/a |
| 4604 | n/a | n/a |
| 4603 | 100.1 | 96.76 |
| 461B | n/a | n/a |
| 461I | n/a | n/a |
| 461G | n/a | n/a |
| 461H | n/a | n/a |
| 461J | n/a | n/a |
| 461F | n/a | n/a |
| 461A | n/a | n/a |
| 461E | n/a | n/a |
| 4702 | 94.92 | 92.75 |
| 4602 | 98.87 | 95.85 |
| 451A | n/a | n/a |
| 461D | n/a | n/a |
| 451B | n/a | n/a |
| 4601 | 97.42 | 94.59 |
| 561G | n/a | n/a |
| 551K | n/a | n/a |
| 561F | n/a | n/a |
| 561E | n/a | n/a |
| 2852 | 94.63 | 93.79 |
| 2801 | 94.63 | 93.67 |
| 3760 | n/a | n/a |
| 3855 | 94.77 | 94.08 |
| 3802 | 94.78 | 94.08 |
| 3803 | 95.24 | 93.29 |
| 3853 | 94.31 | 90.87 |
| 3852 | 94.53 | 90.78 |
| 3753 | 95.19 | n/a |
| 3851 | 94.55 | 90.91 |
| 3850 | 94.5 | 90.7 |
| 3703 | 95.28 | 91.86 |
| 381I | 94.4 | 91.03 |
| 3755 | n/a | n/a |
| 3854 | 94.75 | 91.64 |
| 3704 | 94.96 | 92.07 |
| 3754 | n/a | n/a |
| 381B | 94.4 | 92.32 |

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|--|---------------------|----------------------|
| 381D | 94.4 | 92.6 |
| 3801 | 94.23 | 92.71 |
| 381F | 94.32 | 91.07 |
| 381M | 94.6 | 94.03 |
| 381T | n/a | n/a |
| 381Z | 94.6 | 93.91 |
| 381N | 94.29 | n/a |
| 382A | 94.6 | 93.83 |
| 382B | 94.6 | 93.72 |
| 2854 | 95.86 | 94.71 |
| 2950 | 96.71 | 95.84 |
| 2907 | 96.7 | 95.75 |
| 2908 | n/a | n/a |
| 391L | n/a | n/a |
| 391J | n/a | n/a |
| 391I | n/a | n/a |
| 391E | n/a | n/a |
| 391D | n/a | n/a |
| 391A | n/a | n/a |
| 2902 | 97.33 | 96.3 |
| 2903 | 97.66 | 96.45 |
| 3904 | 95.67 | 94.39 |
| 2901 | 96.07 | 95.07 |
| 391C | n/a | n/a |
| 391B | n/a | n/a |
| 3952 | 94.37 | 91.49 |
| 3950 | 94.32 | 91.47 |
| 491B | n/a | n/a |
| 3903 | 95.55 | 94.3 |
| 4950 | 93.91 | 91.09 |
| 3951 | 95.41 | 93.94 |
| 2951 | 97.33 | 96.18 |
| 3902 | 95.45 | 94.1 |
| 2905 | 99.02 | 98.11 |
| 2904 | 96.77 | 95.76 |
| 3901 | 95.85 | 94.64 |
| 1851 | 95.82 | 91.35 |
| 1850 | 95.76 | 91.26 |
| 1601 | 97.24 | 96.87 |
| 271B | n/a | n/a |
| 271A | n/a | n/a |
| 2750 | 95.25 | 94.23 |
| 2805 | 96.43 | 95.37 |
| 2701 | 95.26 | 92.17 |
| 2804 | 95.75 | 94.76 |
| 2803 | 95.48 | 94.62 |
| 2601 | 99.6 | 99.06 |
| 2855 | 95.29 | n/a |
| 2802 | 95.3 | 94.31 |
| 2501 | 102.6 | 102.16 |
| 2853 | 95.33 | 94.41 |
| 2751 | n/a | n/a |
| 2850 | 95.36 | 91.06 |
| L | 99.25 | 98.41 |
| The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken. | | |



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

| | |
|--|---|
| | Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works. |
| | Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses. |
| | Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works. |
| | Trunk Surface Water |
| | Trunk Foul |
| | Storm Relief |
| | Trunk Combined |
| | Vent Pipe |
| | Bio-solids (Sludge) |
| | Proposed Thames Surface Water Sewer |
| | Proposed Thames Water Foul Sewer |
| | Gallery |
| | Foul Rising Main |
| | Surface Water Rising Main |
| | Combined Rising Main |
| | Sludge Rising Main |
| | Proposed Thames Water Rising Main |
| | Vacuum |

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or 'D' on a manhole level indicates that data is unavailable.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

| | |
|--|-------------|
| | Air Valve |
| | Dam Chase |
| | Fitting |
| | Meter |
| | Vent Column |

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

| | |
|--|---------------|
| | Control Valve |
| | Drop Pipe |
| | Ancillary |
| | Weir |

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

| | |
|--|---------------|
| | Outfall |
| | Undefined End |
| | Inlet |

Other Symbols

Symbols used on maps which do not fall under other general categories

| | |
|--|---|
| | Public/Private Pumping Station |
| | Change of characteristic indicator (C.O.C.I.) |
| | Invert Level |
| | Summit |

Areas

Lines denoting areas of underground surveys, etc.

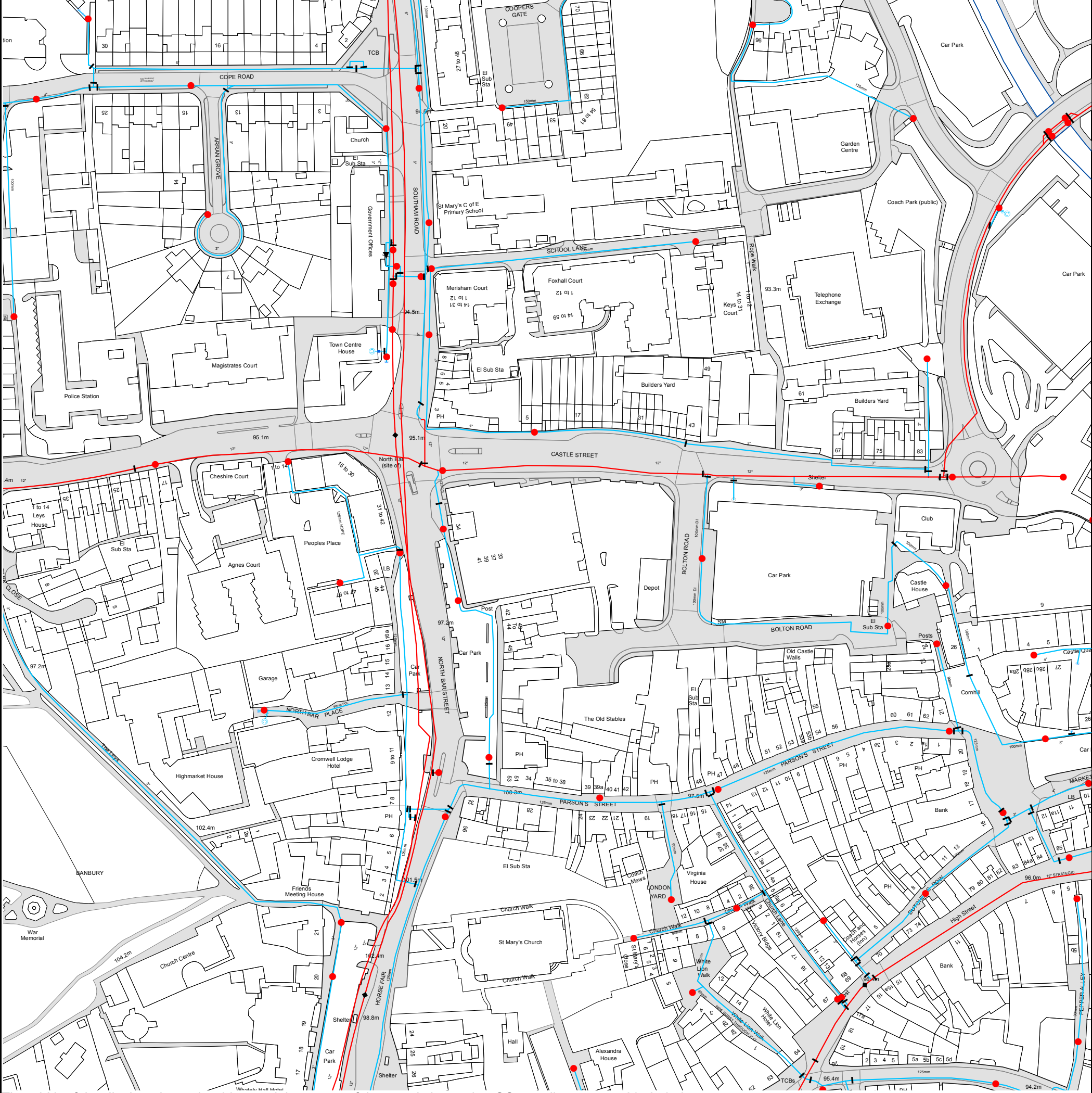
| | |
|--|------------------|
| | Agreement |
| | Operational Site |
| | Chamber |
| | Tunnel |
| | Conduit Bridge |

Other Sewer Types (Not Operated or Maintained by Thames Water)

| | | | |
|--|-----------------------|--|---------------------|
| | Foul Sewer | | Surface Water Sewer |
| | Combined Sewer | | Gully |
| | Culverted Watercourse | | Proposed |
| | | | Abandoned Sewer |

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2021 4472919



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 445423, 240735.
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

| | |
|------------|---|
| 4" | Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains. |
| 16" | Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers. |
| 3" SUPPLY | Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties. |
| 3" FIRE | Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe. |
| 3" METERED | Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown. |
| | Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided. |
| | Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main. |

| PIPE DIAMETER | DEPTH BELOW GROUND |
|-----------------------------|--------------------|
| Up to 300mm (12") | 900mm (3') |
| 300mm - 600mm (12" - 24") | 1100mm (3' 8") |
| 600mm and bigger (24" plus) | 1200mm (4') |

Valves

| | |
|--|------------------------|
| | General Purpose Valve |
| | Air Valve |
| | Pressure Control Valve |
| | Customer Valve |

Hydrants

| | |
|--|----------------|
| | Single Hydrant |
|--|----------------|

Meters

| | |
|--|-------|
| | Meter |
|--|-------|

End Items

Symbol indicating what happens at the end of a water main.

| | |
|--|-----------------|
| | Blank Flange |
| | Capped End |
| | Emptying Pit |
| | Undefined End |
| | Manifold |
| | Customer Supply |
| | Fire Supply |

Operational Sites

| | |
|--|-------------------|
| | Booster Station |
| | Other |
| | Other (Proposed) |
| | Pumping Station |
| | Service Reservoir |
| | Shaft Inspection |
| | Treatment Works |
| | Unknown |
| | Water Tower |

Other Symbols

| | |
|--|-------------|
| | Data Logger |
|--|-------------|

Other Water Pipes (Not Operated or Maintained by Thames Water)

| | |
|--|---|
| | Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them. |
| | Private Main: Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe. |

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

| Credit Card | BACS Payment | Telephone Banking | Cheque |
|---|--|--|--|
| Call 0800 009 4540 quoting your invoice number starting CBA or ADS / OSS | Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk | By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number | Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13 |

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

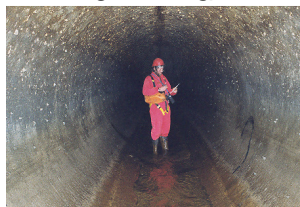
Appendix D CCTV Drainage Survey



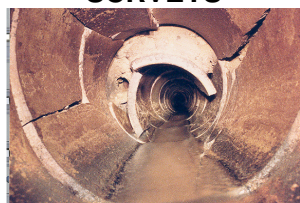
CCTV SURVEYS



**HIGH PRESSURE
JETTING**



**MAN ENTRY
SURVEYS**



RELINING & REPAIRS



PILING SURVEYS



CHIMNEY SURVEYS



**5 SUFFOLK ROAD
MALDON
ESSEX
CM9 6AX**

Telephone: 07971 910370

CCTV REPORT

| | |
|-----------------|--|
| CLIENT | CHURCHILL RETIREMENT LIVING |
| LOCATION | FORMER BUZZ BINGO BOULTON ROAD BANBURY OX16 0TH |
| DATE | 10/08/2021 |
| REF | 071398 |

CONTENTS

| | |
|---|---|
| 1. GENERAL INFORMATION..... | 3 |
| 2. CONTACT INFORMATION..... | 3 |
| 3. UTILITY SURVEYS LTD CONTACT DETAILS..... | 3 |
| 4. SITE DESCRIPTION..... | 4 |
| 5. SURVEY BRIEF..... | 5 |
| 6. SURVEY TECHNIQUES..... | 7 |
| 7. INDIVIDUAL INSPECTION REPORT..... | 8 |

REGISTER OF APPENDICES

- A. MANHOLE INSPECTION REPORT
- B. COPIES OF SITE HAND WRITTEN DAILY RECORD SHEETS
- C. ANNOTATED SITE DRAWINGS

GENERAL INFORMATION

Utility Surveys Ltd have been appointed by Churchill Retirement Living to undertake a Sewer Condition Survey at the location identified. This survey commenced on 10 August 2021.

CONTACT INFORMATION

| | |
|---|--|
| SITE ADDRESS: FORMER BUZZ BINGO BOULTON ROAD BANBURY OX16 0TH | SITE CONTACT: N/A CONTACT NO: EMAIL: |
| CLIENT DETAILS: CHURCHILL RETIREMENT LIVING CHURCHILL HOUSE PARKSIDE RINGWOOD BH24 3SG | CONTACT: JAMES McCARTHY CONTACT NO: 01425 462312 EMAIL: |

UTILITY SURVEYS LTD CONTACT DETAILS

| | |
|--------------------|--|
| OFFICE | SIMON GARDINER 07971 910370 simon@utilitysurveysltd.co.uk |
| RIG MANAGER | SIMON GARDINER |

SITE DESCRIPTION

Site Description

DEVELOPMENT SITE

Site Boundaries

CLEARLY DEFINED ON SUPPLIED DRAWINGS

SURVEY BRIEF

Sewer Condition Inspection Survey

The Purpose of the Sewer Condition Inspection Survey was to establish the location and extent of foul and/ or surface water drainage systems and to document their condition prior to any further works.

- A full condition survey can only be produced if precleansing / jetting is carried out in conjunction with the CCTV survey.
- If precleansing is not carried out at the time of the survey further faults and conditional defects may be present but not recorded in this report.

In addition Utility Surveys Ltd have;

- Attempted to investigate all agreed areas, although if not all could be fully accessed (see Daily Record Sheet).
- Produced a report to establish the location and extent of foul and surface water drainage systems and to document their condition prior to any further works.
- Provided the basic information from which a remediation or management plan can be instigated.
- Highlighted the requirement for urgent action to repair or remediation works to the surveyed drainage system.
- Incorporated in the results any additional manholes/ drainage found, which may have been buried, obscured or not identified in the original scope of works.

Agreed Restrictions and Exclusions

This report is based upon a Sewer Condition Inspection Survey of an unfamiliar site.

During the course of the survey all reasonable efforts were made to identify and access all Manholes and foul/ surface drainage/ outfall, throughout the site.

Some installations/ areas may not have been inspected due to access and or safety reasons (e.g. Wet Wells, Large Unventilated Tanks, Traffic Management Situations). Unless an accepted safe system of work has been devised.

Access may not have been gained to several areas of the site due to conditions outside the control of the client or contractor, any such areas have been documented within this report (see Daily Record Sheet).

Any diagrams/ CAD drawings in the report are not to be scaled and are illustrative only to indicate approximate locations.

Manhole covers will not be lifted if:

- a) There is a danger of damaging surrounding flooring or finishes.
- b) They are covered, i.e. under fitted carpets, flooring, tiling or paving etc.
- c) Under fittings, fixtures, fencing, equipment etc.

Buried manholes will be located, if possible, position marked. If instructed, excavated in soft ground only up to a depth of 350mm with temporary reinstatement.

No allowance has been made for any precleansing unless stated in the quotation.

Full and free access to all areas affected is to be arranged by the instructing party.

SURVEY TECHNIQUES

The areas set out within the survey brief underwent inspection for a Sewer Condition Inspection Survey each area within the agreed scope of works was surveyed for location extent and condition of foul and/ or surface water drainage systems and CCTV footage gathered for confirmation. Every reasonable effort was made to investigate all aspects of the drainage system. Additional photographs were taken where relevant to the inspection.

There were no deviations from the agreed scope of works.

This Sewer Condition Inspection Survey was carried out in accordance with the Utility Surveys Ltd documented 'in-house' procedure 820 'Code of Working Practice' based on National Sewerage Association guidance. The Sewer Condition Inspection Survey Report states information recorded at the time of survey only, based on visual and CCTV assessment in accordance with sewer classification codings issued by WRC, incorporating the following inspection criteria:

CONDITION of pipe work
LOCATION of pipe work
EXTENT of the pipe work

A defect grade description has been provided for the identification of defective pipe work.

Changes to any of the above criteria shall necessitate the need for reassessment

These gradings and the reports can be used to form the basis of a planned preventative maintenance programme. This can be the subject of further discussions with our technical support team.

Drainage Report



Prepared For
CHURCHILL RETIREMENT PLC
CHURCHILL HOUSE
PARKSIDE
RINGWOOD
BH24 3SG

Site
FORMER BUZZ BINGO
BOLTON ROAD
BANBURY
OX16 0TH



UTILITY SURVEYS LIMITED
Surveyor: Simon Gardiner
simon@utilitysurveysltd.co.uk

Total Defects for Project

Total DRB Grades for Project



071398 Former Buzz Bingo Banbury - CCTV Survey Report : 10/08/21

| | |
|--------------------------|-------------------------------|
| Name : | UTILITY SURVEYS LIMITED |
| Contact : | SIMON GARDINER |
| Location : | 5 SUFFOLK ROAD |
| Town : | MALDON |
| Region : | ESSEX |
| Postcode : | CM9 6AX |
| Email : | simon@utilitysurveysltd.co.uk |
| Contact Number : | |
| Surveyor : | Simon Gardiner |
| Valid Certification No : | L1103 |

Client Information

| | |
|------------|--------------------------|
| Name : | CHURCHILL RETIREMENT PLC |
| Contact : | JAMES McCARTHY |
| Location : | CHURCHILL HOUSE |
| Town : | PARKSIDE |
| Region : | RINGWOOD |
| Postcode : | BH24 3SG |
| Tel : | 01425 462312 |
| Mobile : | |
| Email : | |
| Fax : | |

Site Information

| | |
|------------|-------------------|
| Name : | FORMER BUZZ BINGO |
| Contact : | |
| Location : | BOLTON ROAD |
| Town : | BANBURY |
| Region : | |
| Postcode : | OX16 0TH |
| Tel : | |
| Mobile : | |
| Email : | |
| Fax : | |

Total Defects for Project



Total DRB Grades for Project



Report interpretation.

Overview:

Each section of the drainage system is allocated a score indicating areas that require attention. These areas are detailed in the Overview section on the following page and also at the bottom right of the first few pages. We use colour coding as an indicator of severity. Additional information concerning rehabilitation options/recommendations is included in the Overview page, which can also be used as an, "at a glance" indication of system condition. More in depth information for each section, including images can be found later in the report. Grade indicators are as follows:

Grade A: Drain is serviceable no recommendations required

Grade B: There is an issue that might require remedial works

Grade C: There is a defect that requires remedial works, the drain is not serviceable.

Observations:

Each section of drainage reported on (manhole to manhole for example), contains detailed information about that drain and any observations made concerning condition are detailed below the header section. The observations are colour coded and given a severity score, with more significant defects being given a higher score, using a scale from 1 to 5 as detailed below:

Severity 1 to 2: These defects may require remedial monitoring

Severity 3: These defects probably require some form of remedial works

Severity 4 to 5: Defects that will require remedial repair or replacement

General:

The information provided is relevant at the time of survey. The coding system in this report is based on the Manual of Sewer Condition Classification, 5th edition (MSCC5) domestic codes (BS EN 13508-1:2003). This is the official standard for the water industry.

The severity system is based on significant experience in general practice and the 1 -5 grades represent the severity of individual defects: 5 representing a more serious defect.

Please feel free to contact us for further explanation or pricing for remedial works required.

Total Defects for Project



Total DRB Grades for Project



Overview

| | | |
|---|---------|---|
| Section: 1 From: F1 To: F2 | Grade A | DRB Grade: A Pipe Size: 100 Material: Vitrified Clay (i.e. all clayware) Use: Foul |
| Section: 2 From: F2 To: F3 | Grade A | DRB Grade: A Pipe Size: 100 Material: Vitrified Clay (i.e. all clayware) Use: Foul |
| Section: 3 From: F3 To: F4 | Grade B | DRB Grade: B Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Foul |
| Section: 4 From: F4 To: F5 | Grade A | DRB Grade: A Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Foul |
| Section: 5 From: S1 To: S2 | Grade B | DRB Grade: B Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 6 From: S3 To: S4 | Grade B | DRB Grade: B Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 7 From: S4 To: S5 | Grade A | DRB Grade: A Pipe Size: 225 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 8 From: S5 To: S6 | Grade A | DRB Grade: A Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |

Total Defects for Project



Total DRB Grades for Project



| | | |
|--|---------|--|
| Section: 9 From: S4 To: S7 | Grade B | DRB Grade: B Pipe Size: 225 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 10 From: S9 To: S8 | Grade B | DRB Grade: B Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 11 From: S9 To: S10 | Grade B | DRB Grade: B Pipe Size: 150 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 12 From: S10 To: P11 | Grade C | DRB Grade: C Pipe Size: 225 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 13 From: S7 To: MAIN | Grade C | DRB Grade: C Pipe Size: 225 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |
| Section: 14 From: S11 To: S5 | Grade B | DRB Grade: B Pipe Size: 225 Material: Vitrified Clay (i.e. all clayware) Use: Surface Water |

Total Defects for Project



Total DRB Grades for Project



Site: BOLTON ROAD, BANBURY

Section 1

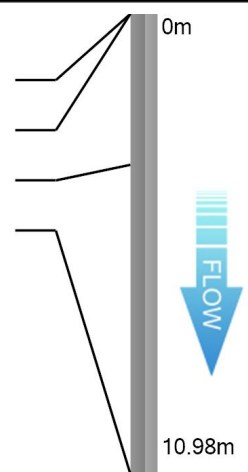
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: F1 | Finish Node Ref: F2 | Direction: D | Height/Dia: 100 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: F | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 10.98 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|--|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 03.60m | LRQ | Line of drain/sewer deviates right [quarter] | | | 0:00:30 |
| 10.98m | MHF | Finish node type, manhole | | | |



Total Defects for section

DRB Grade for Section

0 0 0 0 0



Descriptive Report with Remarks and Observation Images

Section 1

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|--|-------|
| 00.00m | | MH | Start node type, manhole F1 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 03.60m | 0:00:30 | LRQ | Line of drain/sewer deviates right [quarter] | |
| 10.98m | | MHF | Finish node type, manhole F2 | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 2

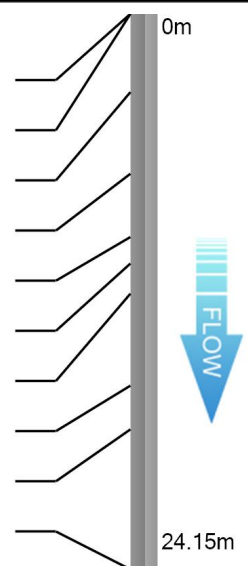
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: F2 | Finish Node Ref: F3 | Direction: D | Height/Dia: 100 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: F | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

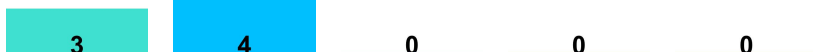
| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 24.15 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|---------------------------|----|------|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 03.40m | CL | Crack, longitudinal 12 | | | 0:00:32 | |
| 06.95m | CL | Crack, longitudinal 10 | | | 0:00:55 | |
| 09.70m | CM | S1 Cracks, multiple 06-06 | S1 | 1_3 | 0:01:17 | |
| 10.85m | CM | F1 Cracks, multiple 06-06 | F1 | 1_-3 | 0:01:17 | |
| 12.16m | CL | Crack, longitudinal 11 | | | 0:01:51 | |
| 16.16m | CM | Cracks, multiple 07-03 | | 1_6 | 0:02:24 | |
| 18.06m | CM | Cracks, multiple 07-05 | | 1_7 | 0:02:40 | |
| 24.15m | MHF | Finish node type, manhole | | | | |





Total Defects for section

DRB Grade for Section

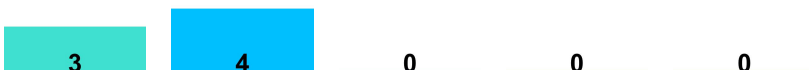


Descriptive Report with Remarks and Observation Images

Section 2


| Pos | Video Ref | Code | Description | Image |
|--------|-----------|-------|---|---|
| 00.00m | | MH | Start node type, manhole F2 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 03.40m | 0:00:32 | CL | Crack, longitudinal at 12 o'clock - Severity 1 | |
| 06.95m | 0:00:55 | CL | Crack, longitudinal at 10 o'clock - Severity 1 | |
| 09.70m | 0:01:17 | S1 CM | Cracks, multiple 9.7m - 10.85m from 06 o'clock to 06 o'clock - Severity 2 | Image Provided - Ref: 1_3  |
| 10.85m | 0:01:17 | F1 CM | Cracks, multiple Defect End from 06 o'clock to 06 o'clock - Severity 2 | |
| 12.16m | 0:01:51 | CL | Crack, longitudinal at 11 o'clock - Severity 1 | |
| 16.16m | 0:02:24 | CM | Cracks, multiple from 07 o'clock to 03 o'clock - Severity 2 | Image Provided - Ref: 1_6  |

Total Defects for section

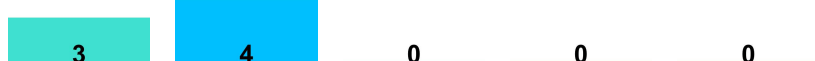


DRB Grade for Section



| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|---|
| 18.06m | 0:02:40 | CM | Cracks, multiple from 07 o'clock to 05 o'clock - Severity 2 | <p>Image Provided - Ref: 1_7</p>  |
| 24.15m | | MHF | Finish node type, manhole F3 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 3

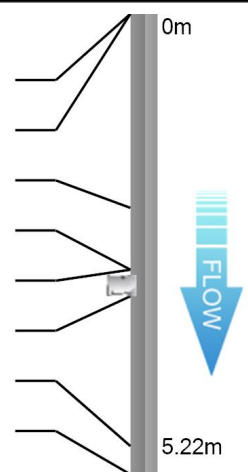
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: F3 | Finish Node Ref: F4 | Direction: D | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: F | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 5.22 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|------------------------------|-----|-----|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 02.20m | WL | Water level 10% | | | 0:00:26 | |
| 02.90m | JDM | Joint displaced medium | | | 0:00:30 | |
| 02.90m | WL | Water level 20% | | | 0:00:30 | |
| 03.20m | JN | Junction 03 : 150mm Diameter | | | 0:00:35 | |
| 04.90m | JN | Junction 06 : 150mm Diameter | 2_6 | | 0:01:15 | |
| 05.22m | MHF | Finish node type, manhole | | | | |



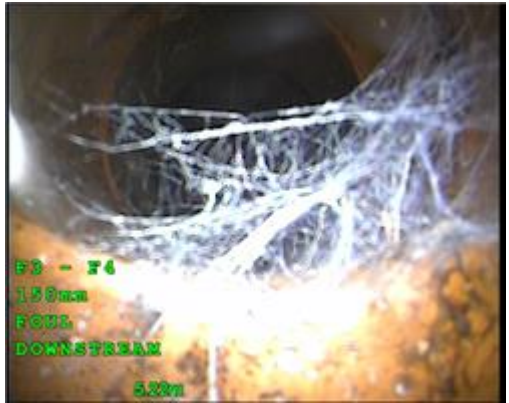
Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 3

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|--|
| 00.00m | | MH | Start node type, manhole F3 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 02.20m | 0:00:26 | WL | Water level: 10% Height/Diameter | |
| 02.90m | 0:00:30 | JDM | Joint displaced medium - Severity 3 | |
| 02.90m | 0:00:30 | WL | Water level: 20% Height/Diameter | |
| 03.20m | 0:00:35 | JN | Junction at 03 o'clock: 150mm Diameter | |
| 04.90m | 0:01:15 | JN | Junction at 06 o'clock: 150mm Diameter BACKDROP AT MANHOLE | Image Provided - Ref: 2_6  |
| 05.22m | | MHF | Finish node type, manhole F4 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 4

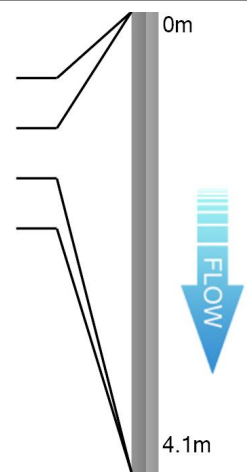
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: F4 | Finish Node Ref: F5 | Direction: D | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: F | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 4.1 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|---------------------------|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 04.10m | REM | General remark | | 3_2 | 0:00:33 |
| 04.10m | MHF | Finish node type, manhole | | | |



Total Defects for section


DRB Grade for Section

0 0 0 0 0



Descriptive Report with Remarks and Observation Images

Section 4

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|-------------------------------------|---|
| 00.00m | | MH | Start node type, manhole F4 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 04.10m | 0:00:33 | REM | General remark ENTERS MANHOLE F5 | <p>Image Provided - Ref: 3_2</p>  |
| 04.10m | | MHF | Finish node type, manhole F5 | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 5

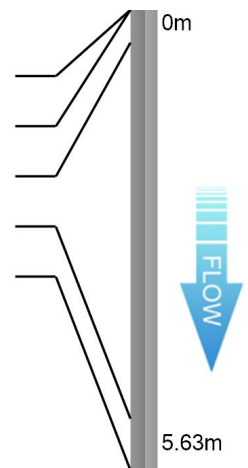
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: S1 | Finish Node Ref: S2 | Direction: D | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 5.63 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|---------------------------|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 00.40m | DES | Settled deposits fine 40% | | | 0:00:00 |
| 05.00m | DES | Settled deposits fine 50% | | | 0:01:01 |
| 05.63m | SA | Survey abandoned | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 5

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|-------|
| 00.00m | | MH | Start node type, manhole S1 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 00.40m | 0:00:00 | DES | Settled deposits fine: 40% Cross sectional area loss - Severity 3 | |
| 05.00m | 0:01:01 | DES | Settled deposits fine: 50% Cross sectional area loss - Severity 3 | |
| 05.63m | | SA | Survey abandoned UNABLE TO PASS DEBRIS | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 6

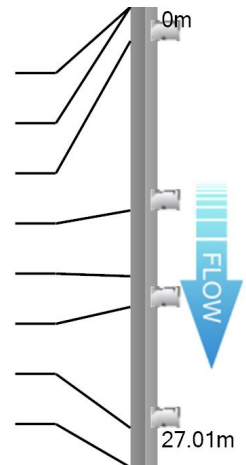
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: S3 | Finish Node Ref: S4 | Direction: D | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 27.01 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|------------------------------|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 02.00m | JN | Junction 10 : 100mm Diameter | | | 0:00:19 |
| 11.94m | JN | Junction 10 : 100mm Diameter | | | 0:02:14 |
| 15.80m | DER | Settled deposits coarse 20% | | | 0:02:48 |
| 17.60m | JN | Junction 10 : 100mm Diameter | | | 0:03:19 |
| 24.70m | JN | Junction 10 : 100mm Diameter | | | 0:04:24 |
| 27.01m | MHF | Finish node type, manhole | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 6

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|-------|
| 00.00m | | MH | Start node type, manhole S3 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 02.00m | 0:00:19 | JN | Junction at 10 o'clock: 100mm Diameter | |
| 11.94m | 0:02:14 | JN | Junction at 10 o'clock: 100mm Diameter | |
| 15.80m | 0:02:48 | DER | Settled deposits coarse: 20% Cross sectional area loss - Severity 3 | |
| 17.60m | 0:03:19 | JN | Junction at 10 o'clock: 100mm Diameter | |
| 24.70m | 0:04:24 | JN | Junction at 10 o'clock: 100mm Diameter | |
| 27.01m | | MHF | Finish node type, manhole S4 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 7

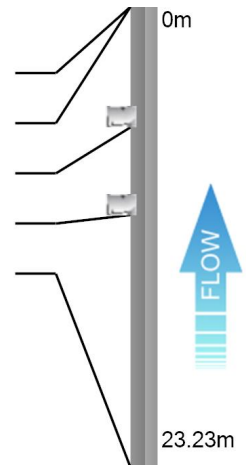
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: S4 | Finish Node Ref: S5 | Direction: U | Height/Dia: 225 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 23.23 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|------------------------------|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 0% | | | 0:00:00 |
| 06.08m | JN | Junction 03 : 100mm Diameter | | | 0:00:52 |
| 10.50m | JN | Junction 03 : 100mm Diameter | | | 0:01:33 |
| 23.23m | MHF | Finish node type, manhole | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 7

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|--|-------|
| 00.00m | | MH | Start node type, manhole S4 | |
| 00.00m | 0:00:00 | WL | Water level: 0% Height/Diameter | |
| 06.08m | 0:00:52 | JN | Junction at 03 o'clock: 100mm Diameter | |
| 10.50m | 0:01:33 | JN | Junction at 03 o'clock: 100mm Diameter | |
| 23.23m | | MHF | Finish node type, manhole S5 | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 8

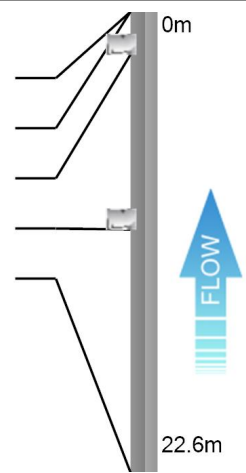
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: S5 | Finish Node Ref: S6 | Direction: U | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 22.6 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|------------------------------|----|-----|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 02.10m | JN | Junction 03 : 100mm Diameter | | | 0:00:21 | |
| 10.68m | JN | Junction 02 : 100mm Diameter | | | 0:01:09 | |
| 22.60m | MHF | Finish node type, manhole | | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 8

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|--|-------|
| 00.00m | | MH | Start node type, manhole S5 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 02.10m | 0:00:21 | JN | Junction at 03 o'clock: 100mm Diameter | |
| 10.68m | 0:01:09 | JN | Junction at 02 o'clock: 100mm Diameter | |
| 22.60m | | MHF | Finish node type, manhole S6 | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 9

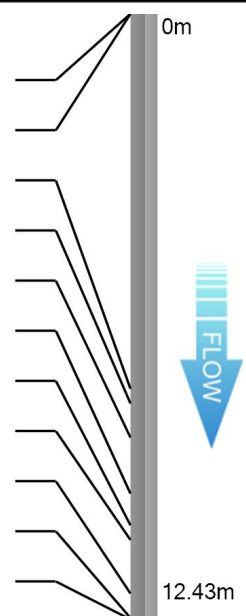
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: S4 | Finish Node Ref: S7 | Direction: D | Height/Dia: 225 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 12.43 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|--|----|-----|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 07.70m | LRQ | Line of drain/sewer deviates right [quarter] | | | 0:01:02 | |
| 08.00m | DES | Settled deposits fine 10% | | | 0:01:06 | |
| 08.70m | WL | Water level 10% | | | 0:01:14 | |
| 09.85m | FCJ | Fracture circumferential 07-05 at joint | | | 0:01:21 | |
| 10.50m | WL | Water level 5% | | | 0:01:30 | |
| 10.80m | WL | Water level 0% | | | 0:01:30 | |
| 11.90m | JDM | Joint displaced medium | | | 0:01:42 | |
| 12.40m | LDF | Line of drain/sewer deviates down [full] | | | 0:01:58 | |
| 12.43m | MHF | Finish node type, manhole | | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 9

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|--|-------|
| 00.00m | | MH | Start node type, manhole S4 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 07.70m | 0:01:02 | LRQ | Line of drain/sewer deviates right [quarter] | |
| 08.00m | 0:01:06 | DES | Settled deposits fine: 10% Cross sectional area loss - Severity 3 | |
| 08.70m | 0:01:14 | WL | Water level: 10% Height/Diameter | |
| 09.85m | 0:01:21 | FCJ | Fracture circumferential from 07 o'clock to 05 o'clock at joint - Severity 3 | |
| 10.50m | 0:01:30 | WL | Water level: 5% Height/Diameter | |
| 10.80m | 0:01:30 | WL | Water level: 0% Height/Diameter | |
| 11.90m | 0:01:42 | JDM | Joint displaced medium - Severity 3 | |
| 12.40m | 0:01:58 | LDF | Line of drain/sewer deviates down [full] BEND INTO MANHOLE | |
| 12.43m | | MHF | Finish node type, manhole S7 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 10

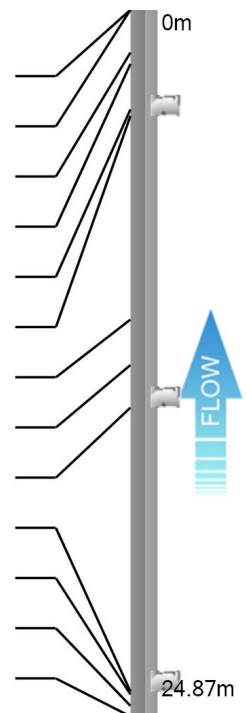
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: S9 | Finish Node Ref: S8 | Direction: U | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 24.87 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|---|----|-----|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 0% | | | 0:00:00 | |
| 01.50m | CL | Crack, longitudinal 01 | | | 0:00:13 | |
| 01.90m | CM | S1 Cracks, multiple 08-04 | S1 | | 0:00:15 | |
| 03.50m | CM | F1 Cracks, multiple 08-04 | F1 | | 0:00:15 | |
| 03.73m | JN | Junction 10 : 150mm Diameter | | | 0:00:31 | |
| 10.90m | DES | S2 Settled deposits fine 20% | S2 | | 0:01:29 | |
| 12.50m | DES | F2 Settled deposits fine 20% | F2 | | 0:01:29 | |
| 14.00m | JN | Junction 10 : 150mm Diameter | | | 0:02:03 | |
| 24.00m | JN | Junction 10 : 100mm Diameter | | | 0:03:31 | |
| 24.10m | DER | Settled deposits coarse 60% | | | 0:03:31 | |
| 24.50m | DEE | Attached deposits, encrustation 03-09 40% | | | 0:00:00 | |
| 24.87m | SA | Survey abandoned | | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 10

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|--------|---|-------|
| 00.00m | | MH | Start node type, manhole S9 | |
| 00.00m | 0:00:00 | WL | Water level: 0% Height/Diameter | |
| 01.50m | 0:00:13 | CL | Crack, longitudinal at 01 o'clock - Severity 1 | |
| 01.90m | 0:00:15 | S1 CM | Cracks, multiple 1.9m - 3.5m from 08 o'clock to 04 o'clock - Severity 2 | |
| 03.50m | 0:00:15 | F1 CM | Cracks, multiple Defect End from 08 o'clock to 04 o'clock - Severity 2 | |
| 03.73m | 0:00:31 | JN | Junction at 10 o'clock: 150mm Diameter | |
| 10.90m | 0:01:29 | S2 DES | Settled deposits fine 10.9m - 12.5m: 20% Cross sectional area loss - Severity 3 | |
| 12.50m | 0:01:29 | F2 DES | Settled deposits fine Defect End: 20% Cross sectional area loss - Severity 3 | |
| 14.00m | 0:02:03 | JN | Junction at 10 o'clock: 150mm Diameter | |
| 24.00m | 0:03:31 | JN | Junction at 10 o'clock: 100mm Diameter | |
| 24.10m | 0:03:31 | DER | Settled deposits coarse: 60% Cross sectional area loss - Severity 3 | |
| 24.50m | 0:00:00 | DEE | Attached deposits, encrustation from 03 o'clock to 09 o'clock: 40% Cross sectional area loss - Severity 3 | |
| 24.87m | | SA | Survey abandoned UNABLE TO PASS DEBRIS AND ENCUSTATION | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 11

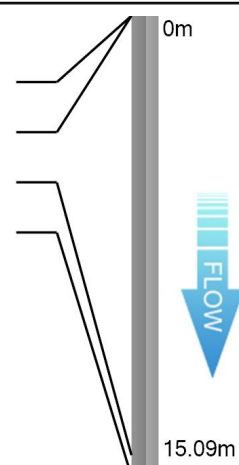
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|------------------------|-------------------------|--------------|-----------------|
| Start Node Ref: S9 | Finish Node Ref: S10 | Direction: D | Height/Dia: 150 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned: N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 15.09 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|---------------------------|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 14.40m | JDM | Joint displaced medium | | | 0:02:01 |
| 15.09m | MHF | Finish node type, manhole | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 11

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|-------------------------------------|-------|
| 00.00m | | MH | Start node type, manhole S9 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 14.40m | 0:02:01 | JDM | Joint displaced medium - Severity 3 | |
| 15.09m | | MHF | Finish node type, manhole S10 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 12

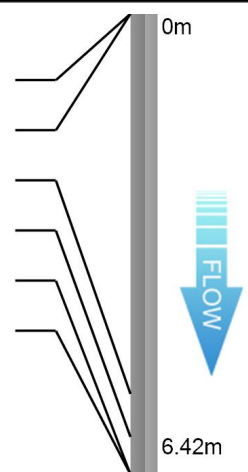
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: S10 | Finish Node Ref: PI1 | Direction: D | Height/Dia: 225 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 6.42 | |

| Position | Code | Description | CD | Pic | Video Ref |
|----------|------|--|----|-----|-----------|
| 00.00m | MH | Start node type, manhole | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 |
| 05.30m | DER | Settled deposits coarse 20% | | | 0:00:44 |
| 05.90m | FM | Fracture multiple 06-06 | | | 0:00:50 |
| 06.42m | LDF | Line of drain/sewer deviates down [full] | | | 0:01:04 |
| 06.42m | MHF | Finish node type, manhole | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 12

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|-------|
| 00.00m | | MH | Start node type, manhole S10 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 05.30m | 0:00:44 | DER | Settled deposits coarse: 20% Cross sectional area loss - Severity 3 | |
| 05.90m | 0:00:50 | FM | Fracture multiple from 06 o'clock to 06 o'clock - Severity 4 | |
| 06.42m | 0:01:04 | LDF | Line of drain/sewer deviates down [full] BEND INTO MANHOLE | |
| 06.42m | | MHF | Finish node type, manhole PI1 | |

Total Defects for section



DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 13

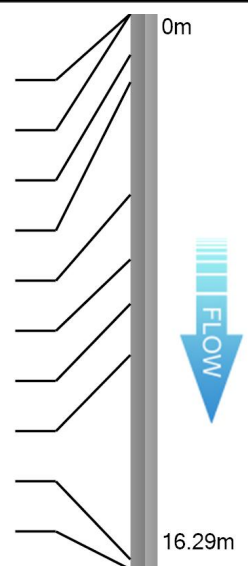
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: S7 | Finish Node Ref: MAIN | Direction: D | Height/Dia: 225 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 16.29 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|--|----|------|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 01.20m | FC | Fracture circumferential 12-12 | | | 0:00:14 | |
| 02.00m | CL | Crack, longitudinal 12 | | | 0:00:20 | |
| 05.30m | CC | Crack, circumferential 07-05 | | | 0:00:47 | |
| 07.20m | LDH | Line of drain/sewer deviates down [half] | | | 0:01:06 | |
| 08.50m | LDH | Line of drain/sewer deviates down [half] | | | 0:01:16 | |
| 10.00m | REM | General remark | | | 0:01:32 | |
| 16.00m | JDL | Joint displaced large | | 12_9 | 0:02:48 | |
| 16.29m | WRF | Finish node type, major connection without | | | | |




Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 13

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|------|---|--|
| 00.00m | | MH | Start node type, manhole S7 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 01.20m | 0:00:14 | FC | Fracture circumferential from 12 o'clock to 12 o'clock - Severity 3 | |
| 02.00m | 0:00:20 | CL | Crack, longitudinal at 12 o'clock - Severity 1 | |
| 05.30m | 0:00:47 | CC | Crack, circumferential from 07 o'clock to 05 o'clock - Severity 1 | |
| 07.20m | 0:01:06 | LDH | Line of drain/sewer deviates down [half] | |
| 08.50m | 0:01:16 | LDH | Line of drain/sewer deviates down [half] | |
| 10.00m | 0:01:32 | REM | General remark LINE LEVELS | |
| 16.00m | 0:02:48 | JDL | Joint displaced large - Severity 4 | <p>Image Provided - Ref: 12_9</p>  |
| 16.29m | | WRF | Finish node type, major connection without manhole JOINS MAIN | |

Total Defects for section

DRB Grade for Section



Site: BOLTON ROAD, BANBURY

Section 14

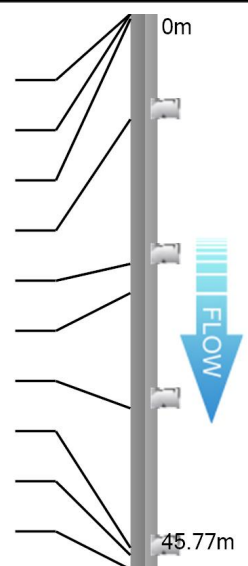
| | | | | | |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|
| Client: CHURCHILL RETIREMENT PLC | Location (Street Name): BOLTON ROAD | City/Town/Village BANBURY | Cust Job Ref. | Surveyors Name: Simon Gardiner | Date: 10/08/2021 |
|--|--|------------------------------|---------------|-----------------------------------|---------------------|

| | | | |
|---------------------------|----------------------------|-----------------|--------------------|
| Start Node Ref: S11 | Finish Node Ref: S5 | Direction: D | Height/Dia: 225 |
| Start Node Depth: 0.00 | Finish Node Depth: 0.00 | Use: S | Shape: C |
| Start Node Coordinate: | Finish Node Coordinate: | Material: VC | Cleaned N |

| Node Type | Cover Condition | Benching Condition | 1/2 Channel Condition | Node Condition Remarks |
|-----------|-----------------|--------------------|-----------------------|------------------------|
| MH | | | | |

| Drain Type | Lining Type | Lining Mat. | Year Const. | Weather | Flow Cont. | Length | General Remarks |
|------------|-------------|-------------|-------------|---------|------------|--------|-----------------|
| A | | | | D | N | 45.77 | |

| Position | Code | Description | CD | Pic | Video Ref | |
|----------|------|--|----|-----|-----------|--|
| 00.00m | MH | Start node type, manhole | | | | |
| 00.00m | WL | Water level 5% | | | 0:00:00 | |
| 00.40m | DES | S1 Settled deposits fine 10% | S1 | | 0:00:22 | |
| 08.68m | JN | Junction 10 : 150mm Diameter | | | 0:01:10 | |
| 20.60m | JN | Junction 10 : 150mm Diameter | | | 0:02:55 | |
| 23.00m | DES | F1 Settled deposits fine 10% | F1 | | 0:00:22 | |
| 32.50m | JN | Junction 09 : 150mm Diameter | | | 0:04:37 | |
| 44.00m | LRQ | Line of drain/sewer deviates right [quarter] | | | 0:06:30 | |
| 44.60m | JN | Junction 09 : 150mm Diameter | | | 0:06:33 | |
| 45.77m | MHF | Finish node type, manhole | | | | |



Total Defects for section

DRB Grade for Section



Descriptive Report with Remarks and Observation Images

Section 14

| Pos | Video Ref | Code | Description | Image |
|--------|-----------|--------|--|-------|
| 00.00m | | MH | Start node type, manhole S11 | |
| 00.00m | 0:00:00 | WL | Water level: 5% Height/Diameter | |
| 00.40m | 0:00:22 | S1 DES | Settled deposits fine 0.4m - 23m: 10% Cross sectional area loss - Severity 3 | |
| 08.68m | 0:01:10 | JN | Junction at 10 o'clock: 150mm Diameter | |
| 20.60m | 0:02:55 | JN | Junction at 10 o'clock: 150mm Diameter | |
| 23.00m | 0:00:22 | F1 DES | Settled deposits fine Defect End: 10% Cross sectional area loss - Severity 3 | |
| 32.50m | 0:04:37 | JN | Junction at 09 o'clock: 150mm Diameter | |
| 44.00m | 0:06:30 | LRQ | Line of drain/sewer deviates right [quarter] | |
| 44.60m | 0:06:33 | JN | Junction at 09 o'clock: 150mm Diameter | |
| 45.77m | | MHF | Finish node type, manhole S5 | |

Total Defects for section



DRB Grade for Section

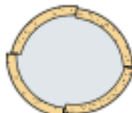




A guide to defects and other observations in drainage systems

More detailed information can be found in the National Standard (BS EN 13508-1:2003) and in the Manual of Sewer Condition Classification (MSCC) 5th Edition, written by the Water Research Centre (WRc).

| Use | |
|------------------|-----------------------|
| Code | Description |
| C | Combined |
| F | Foul |
| S | Surface Water |
| T | Trade Effluent |
| W | Culverted Watercourse |
| Z | Other |
| Common Materials | |
| Code | Description |
| VC | Vitrified Clay |
| PVC | Polyvinyl Chloride |
| CO | Concrete |
| CI | Cast Iron |
| PF | Pitch Fibre |
| PE | Polyethylene |
| DI | Ductile Iron |

| Start Node | Description | Finish Node |
|------------|------------------------------|-------------|
| MH | Manhole | MHF |
| IC | Inspection Chamber | ICF |
| GY | Gulley | GYF |
| RE | Rodding Eye | REF |
| SK | Soakaway | SKF |
| BN | Buchan Trap | BNF |
| BR | Major Connection without Ref | BRF |
| CP | Catch Pit | CPF |
| OC | Other Special Chamber | OCF |
| OF | Outfall | OFF |
| OS | Oil Separator | OSF |
| WR | Major Connection without mh | WRF |
| LH | Lamphole | LHF |



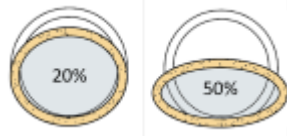
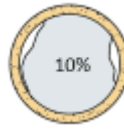






| Code | Observation | Description | Attributes | |
|----------------------|-------------|---|---|---|
| B | Broken | Pieces pipe have visibly moved | Defined by clock references. Associated with deformity in rigid pipe |  |
| CC CL CM CR | Cracks | Cracks are break lines that are not visibly open | Defined by clock reference position/s. Longitudinal and radiating cracks attract only one clock reference |  |
| CN | Connection | Lateral pipe has been connected after original construction | Described by clock reference position and diameter |  |

Total Defects for section



DRB Grade for Section





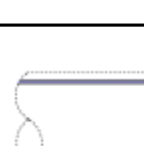
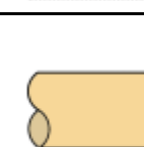
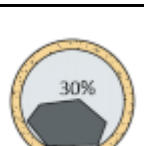
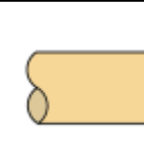
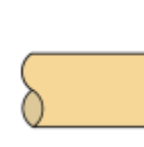
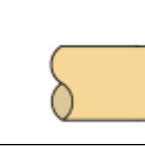


| | | | | |
|--------------------|----------------------------------|---|--|---|
| CX(I) | Defective Connection (Intruding) | Defective by intrusion or damage due to factors including: cracks, fractures, obstruction, position etc | Described by clock reference position and diameter (+ % intrusion) |  |
| CU | Loss of Vision | Lens of camera is obscured by debris, water etc. Operator is unable to see drain clearly | 'W' can be added if loss of vision is due to water |  |
| D | Deformed | Pipe has lost its structure | Described by percentage loss of height or width. Recorded in 5% increments |  |
| DEE | Deposits Encrustation | Eg. Attached scale deposits evident | Described by clock referenced position and percentage loss of cross-sectional area (5% increments) |  |
| DEG | Deposits Grease | Attached grease deposits evident | Described by clock referenced position and percentage loss of cross-sectional area (5% increments) |  |
| DER DES | Deposits Coarse/Fine | Settled deposits on the invert of the pipe. | Described by percentage loss of height or diameter. Recorded in 5% increments. |  |
| FC FL FM FR | Fractures | Fractures are visibly open. Pieces of pipe have not moved | Defined by clock reference position/s. Longitudinal and radiating fractures attract only one clock reference |  |
| H | Holes | Section of pipe fabric is missing | Defined by clock reference location. Normally two clock references |  |
| I | Infiltration | Water is infiltrating the pipe, normally via a joint but could be via another defect | Can be described in Remarks using terms such as Seeper, Dripper and Runner |  |
| JDL | Joint Displaced Large | Pipe has moved at joint, perpendicular to axis of pipe | More than 1.5 times the pipe wall thickness must be visible |  |

Total Defects for section

DRB Grade for Section






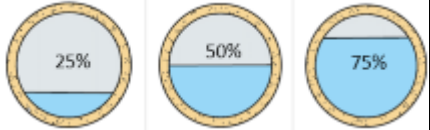



| | | | | |
|--------------------------------|------------------------|--|---|---|
| JDM | Joint Displaced Medium | Pipe has moved at joint, perpendicular to axis of pipe | Between 1 and 1.5 times the pipe wall thickness must be visible |  |
| JN | Junction | Lateral pipe was installed at construction | Described by clock reference position and diameter |  |
| JX | Defective Junction | Lateral pipe was installed at construction but is defective in some way | Joint can be defective due to factors including: cracks, fractures, obstruction, position etc |  |
| LD LU LL LR | Line Deviation | LD = Line Down, LU = Line Up, LL = Line Left, LR = Line Right. Not related to CIPP lining. | Additional modifiers are added: Q = Quarter (22.5), H = Half (45), F = Full (90). In degrees. |  |
| LC | Lining Changes | If the drain is lined, the lining material has changed | Position of lining material change |  |
| MC | Material Change | The pipe material has changed | Position of change is noted. Type of material change can be defined |  |
| OB | Obstruction/Obstacle | An obstruction or obstacle is affecting the flow through the pipe | Described in percentage loss of cross-sectional area |  |
| OJL | Open Joint Large | Pipe has moved at joint, along the axis of pipe | More than 1.5 times the pipe wall thickness must be visible |  |
| OJM | Open Joint Medium | Pipe has moved at joint, along the axis of pipe | Between 1 and 1.5 times the pipe wall thickness must be visible |  |
| PC | Pipe Length Changes | Length of individual pipe changes | New length described at this position |  |

Total Defects for section

DRB Grade for Section



| | | | | |
|------------|------------------|---|--|---|
| R | Roots | Evidence of root ingress | Roots will normally infiltrate via bad joints, cracks, fractures, breaks etc |  |
| REM | Remark | General remark | Used for additional information | |
| S | Surface Damage | This might include corrosion, spalling and chemical attack | Position only. Additional information can be added in Remarks |  |
| SA | Survey Abandoned | Used when a survey cannot continue for any reason | The reason for abandoning a survey should be noted in the remarks area | |
| SC | Shape Changes | Dimension of drain changes | Diameter dimension change recorded. Second dimension is recorded for no circular pipe changes |  |
| SR | Sealing Ring | Sealing ring intrudes into pipe at joint | Described by clock reference position |  |
| V | Vermin | Evidence of Vermin in pipe | Can also be used for evidence within manhole etc |  |
| WL | Water Level | Used to record changes in water level. Always shown at the beginning of every survey, if dry noted as 00. | Described by percentage of height or diameter. Recorded in 5% increments |  |
| XP | Collapsed | Drain is suffering from complete loss of structural integrity. Always followed by SA - Survey Abandoned | Percentage loss of cross-sectional area is recorded. Other related structural defects are not recorded |  |

REGISTER OF APPENDICES

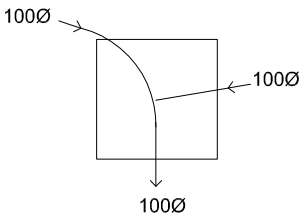
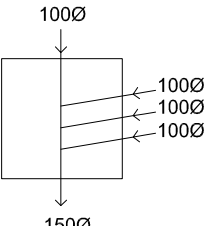
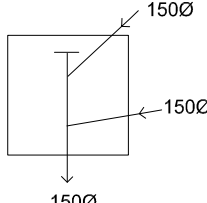
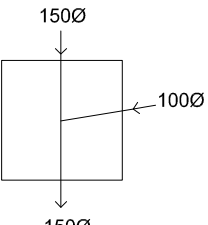
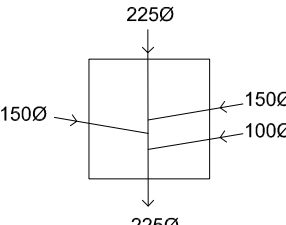
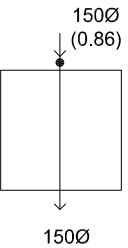
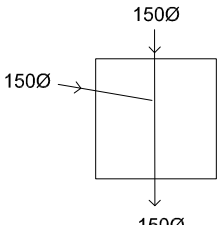
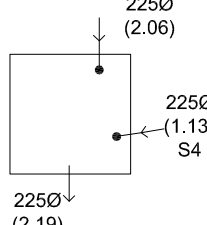
- A. MANHOLE INSPECTION REPORT
- B. COPIES OF SITE HAND WRITTEN DAILY RECORD SHEETS
- C. ANNOTATED SITE DRAWINGS

UTILITY SURVEYS LTD

5 SUFFOLK ROAD
MALDON
ESSEX
CM9 6AX

LOCATION: FORMER BUZZ BINGO BOLTON ROAD BANBURY JOB REF: 071398

CLIENT: CHURCHILL RETIREMENT LIVING DATE: 10/08/2021

| | | | |
|---|---|---|---|
| MH No. F1 DEPTH. 0.87 COVER. RH CONSTRUCTION. Br REMARKS. |  | MH No. S2 DEPTH. COVER. CONSTRUCTION. REMARKS. | AUDIBLE TRACE TO INTERCEPTOR |
| MH No. F2 DEPTH. 0.61 COVER. RH CONSTRUCTION. Br REMARKS. |  | MH No. S3 DEPTH. 0.72 COVER. RH CONSTRUCTION. Br REMARKS. |  |
| MH No. F3 DEPTH. 0.81 COVER. SH CONSTRUCTION. Br REMARKS. |  | MH No. S4 DEPTH. 1.28 COVER. RH CONSTRUCTION. Br REMARKS. |  |
| MH No. F4 DEPTH. 3.42 COVER. RH CONSTRUCTION. Br REMARKS. |  | MH No. S5 DEPTH. COVER. CONSTRUCTION. REMARKS. | INTERNAL MANHOLE |
| MH No. F5 DEPTH. COVER. CONSTRUCTION. REMARKS. | UNABLE TO LIFT IN ROAD | MH No. S6 DEPTH. COVER. CONSTRUCTION. REMARKS. | INTERNAL MANHOLE |
| MH No. S1 DEPTH. 0.97 COVER. RH CONSTRUCTION. Br REMARKS. |  | MH No. S7 DEPTH. 2.22 COVER. RH CONSTRUCTION. Br REMARKS. |  |
| <p>KEY: C - Circular S - Square T - Triangular</p> <p>L - Light Duty M - Medium Duty H - Heavy Duty</p> <p>Co - Concrete Br - Brick R - Rectangular</p> | | | |

UTILITY SURVEYS LTD

5 SUFFOLK ROAD
MALDON
ESSEX
CM9 6AX

LOCATION: FORMER BUZZ BINGO BOLTON ROAD BANBURY JOB REF: 071398

CLIENT: CHURCHILL RETIREMENT LIVING DATE: 10/08/2021

| | | | |
|--|--|--|--|
| MH No. S8 DEPTH. 1.21 COVER. RH CONSTRUCTION. Br REMARKS. | | | |
| MH No. S9 DEPTH. 0.59 COVER. RH CONSTRUCTION. Br REMARKS. | | | |
| MH No. S10 DEPTH. 1.38 COVER. RH CONSTRUCTION. Br REMARKS. | | | |
| MH No. S11 DEPTH. 1.79 COVER. RM CONSTRUCTION. Br REMARKS. | | | |
| | | | |
| | | | |

KEY: C - Circular L - Light Duty Co - Concrete
S - Square M - Medium Duty Br - Brick
T - Triangular H - Heavy Duty R - Rectangular

CCTV Sewer Survey – Daily Record Sheet

| | | | |
|--------------|-----------------------------|-----------|-------------|
| Date | 10/08/2021 | Job No | 071398 |
| Client | CHURCHILL RETIREMENT LIVING | | |
| Site Address | FORMER BUZZ BINGO | | |
| | BOLTON ROAD | | |
| | BANBURY OX16 0TH | | |
| Rig Manager | S. GARDINER | Operative | M. CAMPBELL |
| | | | |



UTILITY SURVEYS LTD.

5 Suffolk Road
Maldon
Essex
CM9 6AX

Tel: 07971910370

| Manhole | | Sewer dia. | Recorded Metreage | Survey Abandoned | Remarks |
|---------|--------|---------------|----------------------|---------------------|--------------|
| Start | Finish | | | | |
| F1 | F2 | 100 | 10-98 | | |
| F2 | F3 | 100 | 24-15 | | |
| F3 | FA | 150 | 5-22 | | |
| FA | F5 | 150 | A-10 | | |
| S1 | S2 | 150 | S-63 | | DEBRIS |
| S3 | SA | 150 | 27-01 | | |
| SA | SS | 225 | 23-23 | | |
| SS | S6 | 150 | 22-60 | | |
| S4 | S7 | 225 | 12-43 | | |
| S9 | S8 | 150 | 24-87 | / | ENCrustation |
| S9 | S10 | 150 | 18-09 | | |
| S10 | P11 | 225 | 6-42 | | |
| S7 | MAIN | 225 | 16-29 | | SOILS MAIN |
| S11 | SS | 150 | 45-77 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| TOTAL | | | | | |

| | | | | | |
|---------------|--|----------------|---|--------|----|
| Standing Time | | Meterage check | X | Length | OK |
|---------------|--|----------------|---|--------|----|

Reason for standing time

Remarks FI LATA LIVE CONNECTION TO LAND T./RE SERVICE
FI LATB 100% MUD
S8-S9 50% ENCRUSTATION
S1-S2 UNABLE TO CLEAR NO ACCESS FROM DOWNSTREAM END

Special Instructions; Site Contact --

Checked

s4
445370.277mE
240756.745mN
95.585m

s3
445373.946mE
240741.489mN
96.091m

s1d
96.717m

s1c
445385.768mE
240705.428mN
97.232m

s1b
98.381m

s1
445449.829mE
240753.710mN
96.559m

s1a
445443.912mE
240717.175mN
97.837m

ROADWORKS
LANE CLOSED

UNABLE TO LIFT MANHOLES
IN ROAD

JOINS MAIN

MHD 48m

MHD 23m

BEND
UP

MHD 10m

MHD 6m

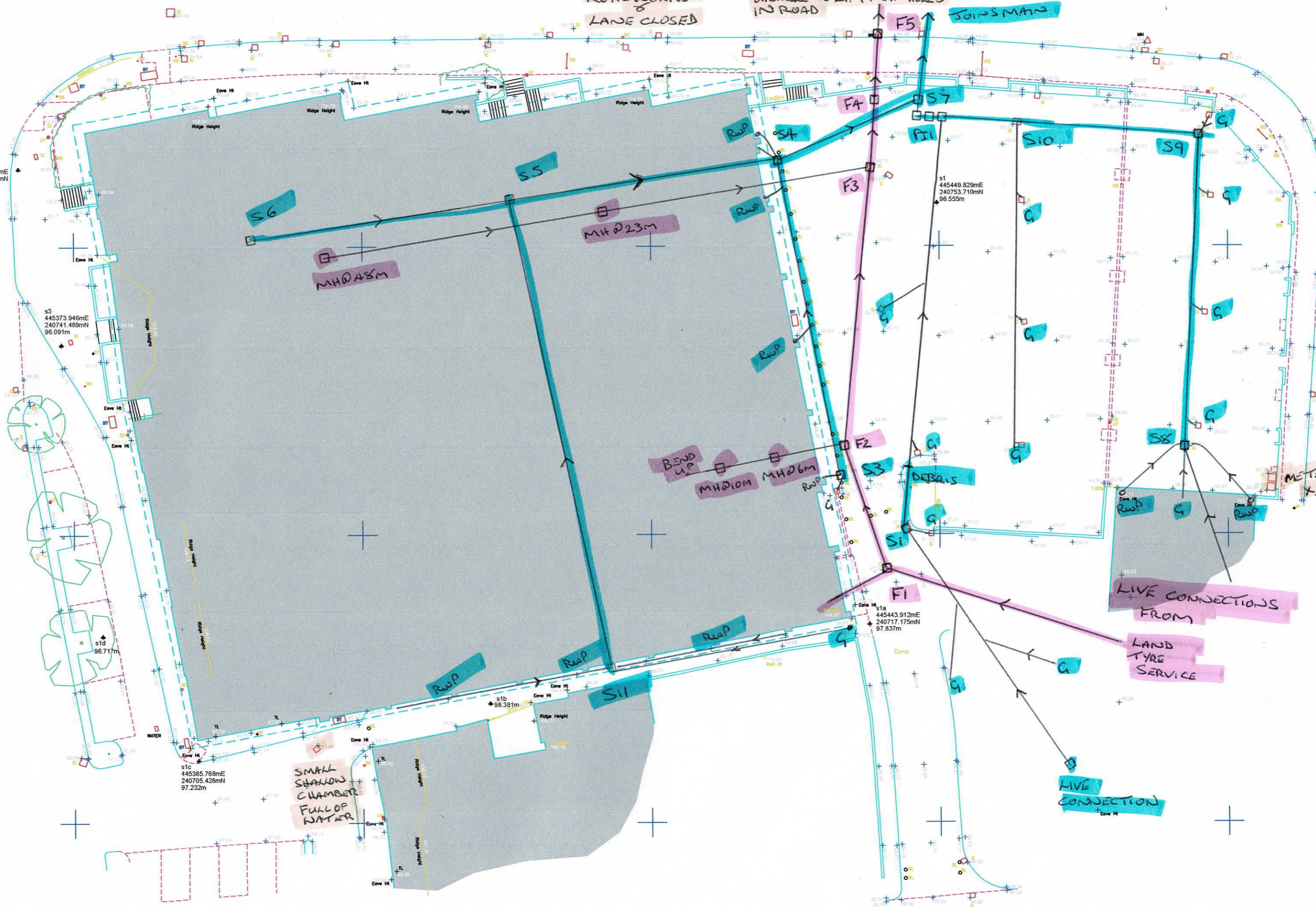
DEBRIS

LIVE CONNECTIONS
FROM

LAND
TYRE
SERVICE

LIVE
CONNECTION

METERS
x2



Appendix E Greenfield Runoff Calculation

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{MED} estimation method:

BFI and SPR method:

HOST class:

BFI / BFIHOST:

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor:

Hydrological characteristics

| | Default | Edited |
|--------------------------------|-----------------------------------|-----------------------------------|
| SAAR (mm): | <input type="text" value="654"/> | <input type="text" value="654"/> |
| Hydrological region: | <input type="text" value="6"/> | <input type="text" value="6"/> |
| Growth curve factor 1 year: | <input type="text" value="0.85"/> | <input type="text" value="0.85"/> |
| Growth curve factor 30 years: | <input type="text" value="2.3"/> | <input type="text" value="2.3"/> |
| Growth curve factor 100 years: | <input type="text" value="3.19"/> | <input type="text" value="3.19"/> |
| Growth curve factor 200 years: | <input type="text" value="3.74"/> | <input type="text" value="3.74"/> |

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPR_{HOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

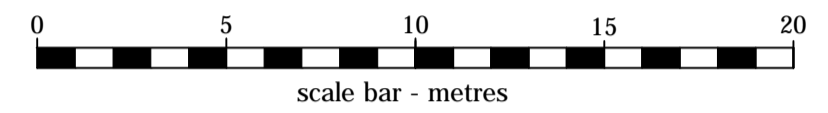
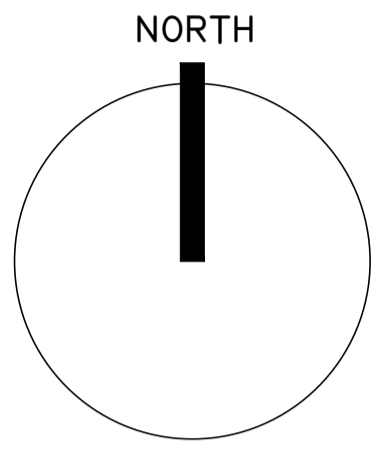
| | Default | Edited |
|-----------------------|-------------------------------|-----------------------------------|
| Q_{BAR} (l/s): | <input type="text" value=""/> | <input type="text" value="0.81"/> |
| 1 in 1 year (l/s): | <input type="text" value=""/> | <input type="text" value="0.69"/> |
| 1 in 30 years (l/s): | <input type="text" value=""/> | <input type="text" value="1.86"/> |
| 1 in 100 year (l/s): | <input type="text" value=""/> | <input type="text" value="2.58"/> |
| 1 in 200 years (l/s): | <input type="text" value=""/> | <input type="text" value="3.02"/> |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.



Appendix F Proposed Site Plan

| REVISIONS | | |
|---|---------|-----|
| Rev. | Date | By |
| A | Feb. 22 | KLS |
| Stair 2 relocated centrally within proposed scheme. | | |
| Proposed scheme reduced to 78no. units. | | |
| B | Mar. 22 | KLS |
| 2no. cycle stands added within buggy store. | | |
| 1no. disabled parking space added adjacent to main entrance path. | | |
| C | Mar. 22 | KLS |
| Vehicle turning head added adjacent to refuse store. | | |
| D | Jun. 22 | KLS |
| Additional levels added to car park to suit Drainage proposals. | | |



©CHURCHILL RETIREMENT LIVING

planning issues
TOWN PLANNING AND ARCHITECTURAL DESIGN

Rob Jackson RIBA
Design Director - South West
Churchill House * Parkside
Ringwood * Hampshire BH24 3SG
Telephone: 014293 462372
Fax : 014293 462101
Email design@planningissues.co.uk

Client

Churchill Retirement Living

Project Title


Proposed Retirement Housing
Bolton Road
Banbury
OX16 0TH

Drawing Title

PROPOSED SITE PLAN
PLANNING APPLICATION

| | | | |
|-------------|----------------|---------|-----------|
| Scale | 1:200 @ A1 | Date | DEC. 2021 |
| Drawn | KLS | Checked | RJ |
| Drawing No. | 10116BB - PA01 | Rev. | D |

Appendix G MicroDrainage Network Calculations

| | | |
|---|---|---|
| AWP | | Page 1 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | | Network 2017.1.1 |

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

| | |
|---|-------|
| FEH Rainfall Model | |
| Return Period (years) | 2 |
| FEH Rainfall Version | 2013 |
| Site Location GB 445419 240741 SP 45419 40741 | |
| Data Type | Point |
| Maximum Rainfall (mm/hr) | 50 |
| Maximum Time of Concentration (mins) | 30 |
| Foul Sewage (l/s/ha) | 0.000 |
| Volumetric Runoff Coeff. | 0.750 |
| PIMP (%) | 100 |
| Add Flow / Climate Change (%) | 0 |
| Minimum Backdrop Height (m) | 0.200 |
| Maximum Backdrop Height (m) | 1.500 |
| Min Design Depth for Optimisation (m) | 1.200 |
| Min Vel for Auto Design only (m/s) | 1.00 |
| Min Slope for Optimisation (1:X) | 500 |

Designed with Level Soffits

Time Area Diagram for Storm





| Time (mins) | Area (ha) | Time (mins) | Area (ha) | Time (mins) | Area (ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-4 | 0.133 | 4-8 | 0.167 | 8-12 | 0.008 |

Total Area Contributing (ha) = 0.308

Total Pipe Volume (m³) = 17.155


Network Design Table for Storm

« - Indicates pipe capacity < flow


















| 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 | 21.364 | 0.330 | 64.7 | 0.013 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 1.001 | 22.323 | 0.170 | 131.3 | 0.003 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 1.002 | 7.361 | 0.049 | 150.2 | 0.003 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 2.000 | 11.150 | 0.089 | 125.3 | 0.056 | 5.00 | 0.0 | 0.600 | o | 150 | 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 | 5.28 | 95.500 | 0.013 | 0.0 | 0.0 | 0.0 | 1.25 | 22.1 | 1.8 |
| 1.001 | 50.00 | 5.71 | 95.170 | 0.016 | 0.0 | 0.0 | 0.0 | 0.88 | 15.5 | 2.2 |
| 1.002 | 50.00 | 5.86 | 95.000 | 0.019 | 0.0 | 0.0 | 0.0 | 0.82 | 14.4 | 2.6 |
| 2.000 | 50.00 | 5.21 | 95.040 | 0.056 | 0.0 | 0.0 | 0.0 | 0.90 | 15.8 | 7.6 |


| | | |
|--|-----------------------------|--|
| AWP | | Page 2 |
| Kensington Court | 1260-Castle Street, Banbury |  |
| Woodwater Park Pynes Hill | Surface Water Network | |
| Exeter EX2 5TY | All Return Periods +40%CC | |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

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 |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|---|
| 1.003 | 3.491 | 0.021 | 170.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.004 | 7.449 | 0.002 | 3724.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 3.000 | 27.045 | 0.010 | 2704.5 | 0.000 | 5.00 | 0.0 | 0.600 | o | 100 | Pipe/Conduit |  |
| 3.001 | 2.069 | 0.035 | 59.1 | 0.037 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 4.000 | 14.380 | 0.010 | 1438.0 | 0.000 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 4.001 | 9.257 | 0.062 | 149.3 | 0.028 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 3.002 | 0.906 | 0.005 | 170.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 3.003 | 21.875 | 0.002 | 10937.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.005 | 11.261 | 0.070 | 160.9 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 5.000 | 17.824 | 0.119 | 149.8 | 0.032 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 5.001 | 10.920 | 0.059 | 185.1 | 0.014 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 6.000 | 19.299 | 0.010 | 1929.9 | 0.000 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 6.001 | 10.308 | 0.069 | 149.4 | 0.027 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 5.002 | 25.204 | 0.257 | 98.1 | 0.046 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.006 | 26.183 | 0.154 | 170.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 7.000 | 19.732 | 0.132 | 149.5 | 0.012 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit |  |
| 1.007 | 18.746 | 0.046 | 407.5 | 0.009 | 0.00 | 0.0 | 0.600 | o | 450 | 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) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 1.003 | 50.00 | 5.92 | 94.876 | 0.075 | 0.0 | 0.0 | 0.0 | 1.00 | 39.8 | 10.2 |
| 1.004 | 50.00 | 6.52 | 94.855 | 0.075 | 0.0 | 0.0 | 0.0 | 0.21 | 8.2« | 10.2 |
| 3.000 | 50.00 | 8.23 | 96.510 | 0.000 | 0.0 | 0.0 | 0.0 | 0.14 | 1.1 | 0.0 |
| 3.001 | 50.00 | 8.25 | 96.500 | 0.037 | 0.0 | 0.0 | 0.0 | 1.31 | 23.2 | 5.0 |
| 4.000 | 50.00 | 5.93 | 96.010 | 0.000 | 0.0 | 0.0 | 0.0 | 0.26 | 4.5 | 0.0 |
| 4.001 | 50.00 | 6.12 | 94.922 | 0.028 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 3.8 |
| 3.002 | 50.00 | 8.27 | 94.860 | 0.065 | 0.0 | 0.0 | 0.0 | 1.00 | 39.8 | 8.8 |
| 3.003 | 45.03 | 11.40 | 94.855 | 0.065 | 0.0 | 0.0 | 0.0 | 0.12 | 4.6« | 8.8 |
| 1.005 | 44.62 | 11.59 | 94.853 | 0.140 | 0.0 | 0.0 | 0.0 | 1.03 | 40.9 | 16.9 |
| 5.000 | 50.00 | 5.28 | 95.250 | 0.032 | 0.0 | 0.0 | 0.0 | 1.07 | 42.4 | 4.3 |
| 5.001 | 50.00 | 5.47 | 95.120 | 0.046 | 0.0 | 0.0 | 0.0 | 0.96 | 38.1 | 6.2 |
| 6.000 | 50.00 | 6.46 | 96.010 | 0.000 | 0.0 | 0.0 | 0.0 | 0.22 | 3.9 | 0.0 |
| 6.001 | 50.00 | 6.67 | 96.000 | 0.027 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 3.7 |
| 5.002 | 50.00 | 6.99 | 95.040 | 0.119 | 0.0 | 0.0 | 0.0 | 1.32 | 52.5 | 16.1 |
| 1.006 | 43.68 | 12.02 | 94.783 | 0.259 | 0.0 | 0.0 | 0.0 | 1.00 | 39.8 | 30.6 |
| 7.000 | 50.00 | 5.40 | 94.840 | 0.012 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 1.6 |
| 1.007 | 43.04 | 12.33 | 94.629 | 0.280 | 0.0 | 0.0 | 0.0 | 1.00 | 159.2 | 32.6 |

| | | |
|---|---|---|
| AWP | | Page 3 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | | Network 2017.1.1 |

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 |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|---|
| 1.008 | 19.010 | 0.046 | 413.3 | 0.016 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit |  |
| 8.000 | 21.353 | 0.052 | 410.6 | 0.012 | 5.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit |  |
| 1.009 | 3.563 | 0.267 | 13.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | 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) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 1.008 | 42.40 | 12.65 | 94.583 | 0.296 | 0.0 | 0.0 | 0.0 | 0.99 | 158.1 | 34.0 |
| 8.000 | 50.00 | 5.36 | 94.589 | 0.012 | 0.0 | 0.0 | 0.0 | 1.00 | 158.6 | 1.6 |
| 1.009 | 42.37 | 12.67 | 94.537 | 0.308 | 0.0 | 0.0 | 0.0 | 3.60 | 143.2 | 35.3 |

| Manhole Schedules for Storm | | | | | | | | | | | |
|-----------------------------|-----------|--------------|---------------|--------------------|-------|---------------------------|------------------------|-------------|---------------------------|------------------------|---------------|
| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
| SW101 | 96.750 | 1.250 | Open Manhole | 600 | 1.000 | 95.500 | 150 | | | | |
| SW102 | 97.350 | 2.180 | Open Manhole | 600 | 1.001 | 95.170 | 150 | 1.000 | 95.170 | 150 | |
| SW103 | 98.350 | 3.350 | Open Manhole | 600 | 1.002 | 95.000 | 150 | 1.001 | 95.000 | 150 | |
| SW201 | 96.750 | 1.710 | Open Manhole | 600 | 2.000 | 95.040 | 150 | | | | |
| SW104 | 96.750 | 1.874 | Open Manhole | | 1.003 | 94.876 | 225 | 1.002 | 94.951 | 150 | |
| | | | | | | | | 2.000 | 94.951 | 150 | |
| TANK IN | 96.100 | 1.245 | Junction | | 1.004 | 94.855 | 225 | 1.003 | 94.855 | 225 | |
| SW301 | 97.010 | 0.500 | Open Manhole | 1200 | 3.000 | 96.510 | 100 | | | | |
| SW302 | 97.000 | 0.500 | Open Manhole | 1200 | 3.001 | 96.500 | 150 | 3.000 | 96.500 | 100 | |
| SW401 | 96.700 | 0.690 | Open Manhole | 1200 | 4.000 | 96.010 | 150 | | | | |
| SW402 | 96.700 | 1.778 | Open Manhole | 1200 | 4.001 | 94.922 | 150 | 4.000 | 96.000 | 150 | 1078 |
| SW303 | 96.700 | 1.840 | Open Manhole | 1200 | 3.002 | 94.860 | 225 | 3.001 | 96.465 | 150 | 1530 |
| | | | | | | | | 4.001 | 94.860 | 150 | |
| TANK IN 304 | 96.700 | 1.845 | Open Manhole | | 3.003 | 94.855 | 225 | 3.002 | 94.855 | 225 | |
| TANK OUT | 96.750 | 1.897 | Junction | 0 | 1.005 | 94.853 | 225 | 1.004 | 94.853 | 225 | |
| | | | | | | | | 3.003 | 94.853 | 225 | |
| SW501 | 96.750 | 1.500 | Open Manhole | 600 | 5.000 | 95.250 | 225 | | | | |
| SW502 | 96.750 | 1.630 | Open Manhole | 600 | 5.001 | 95.120 | 225 | 5.000 | 95.131 | 225 | 11 |
| SW601 | 96.510 | 0.500 | Open Manhole | 1200 | 6.000 | 96.010 | 150 | | | | |
| SW602 | 96.500 | 0.500 | Open Manhole | 1200 | 6.001 | 96.000 | 150 | 6.000 | 96.000 | 150 | |
| SW503 | 96.750 | 1.710 | Open Manhole | 600 | 5.002 | 95.040 | 225 | 5.001 | 95.061 | 225 | 21 |
| | | | | | | | | 6.001 | 95.931 | 150 | 816 |
| SW105 | 96.750 | 1.967 | Open Manhole | 1200 | 1.006 | 94.783 | 225 | 1.005 | 94.783 | 225 | |
| | | | | | | | | 5.002 | 94.783 | 225 | |
| SW401 | 96.750 | 1.910 | Open Manhole | 600 | 7.000 | 94.840 | 150 | | | | |
| SW106 | 96.750 | 2.121 | Open Manhole | 1200 | 1.007 | 94.629 | 450 | 1.006 | 94.629 | 225 | |
| | | | | | | | | 7.000 | 94.708 | 150 | |
| SW107 | 96.750 | 2.167 | Open Manhole | 1200 | 1.008 | 94.583 | 450 | 1.007 | 94.583 | 450 | |
| SW801 | 96.750 | 2.161 | Open Manhole | 1200 | 8.000 | 94.589 | 450 | | | | |
| SW108 | 96.750 | 2.213 | Open Manhole | 1200 | 1.009 | 94.537 | 225 | 1.008 | 94.537 | 450 | |
| | | | | | | | | 8.000 | 94.537 | 450 | |
| | 96.490 | 2.220 | Open Manhole | 0 | | OUTFALL | | 1.009 | 94.270 | 225 | |

| Free Flowing Outfall Details for Storm | | | | | | |
|--|-----------------|-----------|--------------|------------------|-----------|--------|
| Outfall Pipe Number | Outfall C. Name | Level (m) | I. Level (m) | Min I. Level (m) | D, L (mm) | W (mm) |
| 1.009 | | 96.490 | 94.270 | 0.000 | 0 | 0 |


| | | |
|--|-----------------------------|--|
| AWP | | Page 5 |
| Kensington Court | 1260-Castle Street, Banbury |  |
| Woodwater Park Pynes Hill | Surface Water Network | |
| Exeter EX2 5TY | All Return Periods +40%CC | |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

Simulation Criteria for Storm

| | | | |
|---------------------------------|-------|-------------------------------------|---------------|
| Volumetric Runoff Coeff | 0.750 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m ³ /ha | Storage 2.000 |
| Hot Start (mins) | 0 | Inlet Coefficient | 0.800 |
| Hot Start Level (mm) | 0 | Flow per Person per Day (l/per/day) | 0.000 |
| Manhole Headloss Coeff (Global) | 0.500 | Run Time (mins) | 60 |
| Foul Sewage per hectare (l/s) | 0.000 | Output Interval (mins) | 1 |
| Number of Input Hydrographs | 0 | Number of Offline Controls | 0 |
| Number of Online Controls | 2 | Number of Storage Structures | 4 |
| | | Number of Time/Area Diagrams | 0 |
| | | Number of Real Time Controls | 0 |

Synthetic Rainfall Details

| | | | |
|---|-----------------------------|---------------|-------|
| Rainfall Model | FEH | Summer Storms | Yes |
| Return Period (years) | 2 | Winter Storms | Yes |
| FEH Rainfall Version | 2013 | Cv (Summer) | 0.750 |
| Site Location GB 445419 240741 SP 45419 40741 | | Cv (Winter) | 0.840 |
| Data Type | Point Storm Duration (mins) | | 30 |

| | | |
|---|---|---|
| AWP | | Page 6 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

Online Controls for Storm

Orifice Manhole: SW302, DS/PN: 3.001, Volume (m³): 0.8

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 96.500


Hydro-Brake® Optimum Manhole: SW108, DS/PN: 1.009, Volume (m³): 8.5

| | |
|-----------------------------------|----------------------------|
| Unit Reference | MD-SHE-0101-5000-1300-5000 |
| Design Head (m) | 1.300 |
| Design Flow (l/s) | 5.0 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 101 |
| Invert Level (m) | 94.537 |
| Minimum Outlet Pipe Diameter (mm) | 150 |
| Suggested Manhole Diameter (mm) | 1200 |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---------------------------|----------|------------|---------------------------|----------|------------|
| Design Point (Calculated) | 1.300 | 5.0 | Kick-Flo® | 0.798 | 4.0 |
| Flush-Flo™ | 0.384 | 5.0 | Mean Flow over Head Range | - | 4.4 |

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) | Depth (m) | Flow (l/s) |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 0.100 | 3.4 | 0.800 | 4.0 | 2.000 | 6.1 | 4.000 | 8.5 | 7.000 | 11.0 |
| 0.200 | 4.7 | 1.000 | 4.4 | 2.200 | 6.4 | 4.500 | 9.0 | 7.500 | 11.4 |
| 0.300 | 4.9 | 1.200 | 4.8 | 2.400 | 6.7 | 5.000 | 9.4 | 8.000 | 11.8 |
| 0.400 | 5.0 | 1.400 | 5.2 | 2.600 | 6.9 | 5.500 | 9.8 | 8.500 | 12.1 |
| 0.500 | 4.9 | 1.600 | 5.5 | 3.000 | 7.4 | 6.000 | 10.3 | 9.000 | 12.5 |
| 0.600 | 4.8 | 1.800 | 5.8 | 3.500 | 7.9 | 6.500 | 10.7 | 9.500 | 12.8 |

| | | |
|---|---|---|
| AWP | | Page 7 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

Storage Structures for Storm

Porous Car Park Manhole: SW302, DS/PN: 3.001

| | | | |
|--------------------------------------|---------|-------------------------|--------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 27.0 |
| Max Percolation (l/s) | 37.5 | Slope (1:X) | 1000.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 96.500 | Membrane Depth (mm) | 0 |

Porous Car Park Manhole: SW402, DS/PN: 4.001

| | | | |
|--------------------------------------|---------|-------------------------|------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 15.6 |
| Max Percolation (l/s) | 21.7 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 96.000 | Membrane Depth (mm) | 0 |

Complex Manhole: TANK OUT, DS/PN: 1.005

Cellular Storage


| | | | |
|--------------------------------------|---------|---------------|------|
| Invert Level (m) | 94.853 | Safety Factor | 2.0 |
| Infiltration Coefficient Base (m/hr) | 0.00000 | Porosity | 0.95 |
| Infiltration Coefficient Side (m/hr) | 0.00000 | | |

| Depth (m) | Area (m ²) | Inf. Area (m ²) | Depth (m) | Area (m ²) | Inf. Area (m ²) | Depth (m) | Area (m ²) | Inf. Area (m ²) |
|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|
| 0.000 | 135.0 | 0.0 | 1.000 | 135.0 | 0.0 | 1.001 | 0.0 | 0.0 |

Porous Car Park Manhole: SW602, DS/PN: 6.001

| | | | |
|--------------------------------------|---------|-------------------------|------|
| Infiltration Coefficient Base (m/hr) | 0.00000 | Width (m) | 5.0 |
| Membrane Percolation (mm/hr) | 1000 | Length (m) | 19.2 |
| Max Percolation (l/s) | 26.7 | Slope (1:X) | 0.0 |
| Safety Factor | 2.0 | Depression Storage (mm) | 5 |
| Porosity | 0.30 | Evaporation (mm/day) | 3 |
| Invert Level (m) | 96.000 | Membrane Depth (mm) | 0 |

2 Year +40% Climate Change

| | | |
|---|---|---|
| AWP | | Page 8 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 File 1260-NW-01-A-101-SURFACE WATER... | Designed by tom.richards Checked by | |
| XP Solutions | Network 2017.1.1 | |

2 year Return Period 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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 445419 240741 SP 45419 40741 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON


Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100, 200
 Climate Change (%) 40, 40, 40, 40

| | | | | | | | | Water | Surcharged | Flooded | | | | |
|-------|-------------|------------|--------|--------|-------|--------|--------|--------|------------|---------|--------|----------|---------|----------|
| | US/MH | | | | | | | Level | Depth | Volume | Flow / | Overflow | Maximum | |
| PN | Name | Event | | | | | | (m) | (m) | (m) | (m³) | Cap. | (l/s) | Vol (m³) |
| 1.000 | SW101 | 15 minute | 2 year | Winter | I+40% | 96.750 | 95.539 | -0.111 | 0.000 | 0.15 | | | 0.010 | |
| 1.001 | SW102 | 15 minute | 2 year | Winter | I+40% | 97.350 | 95.222 | -0.098 | 0.000 | 0.25 | | | 0.029 | |
| 1.002 | SW103 | 15 minute | 2 year | Winter | I+40% | 98.350 | 95.061 | -0.089 | 0.000 | 0.35 | | | 0.055 | |
| 2.000 | SW201 | 15 minute | 2 year | Winter | I+40% | 96.750 | 95.156 | -0.034 | 0.000 | 0.94 | | | 0.031 | |
| 1.003 | SW104 | 180 minute | 2 year | Winter | I+40% | 96.750 | 95.052 | -0.049 | 0.000 | 0.18 | | | 0.182 | |
| 1.004 | TANK IN | 180 minute | 2 year | Winter | I+40% | 96.100 | 95.052 | -0.028 | 0.000 | 0.19 | | | 0.293 | |
| 3.000 | SW301 | 120 minute | 2 year | Winter | I+40% | 97.010 | 96.598 | -0.012 | 0.000 | 0.01 | | | 0.094 | |
| 3.001 | SW302 | 120 minute | 2 year | Winter | I+40% | 97.000 | 96.598 | -0.052 | 0.000 | 0.12 | | | 3.701 | |
| 4.000 | SW401 | 360 minute | 2 year | Winter | I+40% | 96.700 | 96.010 | -0.150 | 0.000 | 0.00 | | | 0.000 | |
| 4.001 | SW402 | 180 minute | 2 year | Winter | I+40% | 96.700 | 95.056 | -0.016 | 0.000 | 0.13 | | | 0.146 | |
| 3.002 | SW303 | 180 minute | 2 year | Winter | I+40% | 96.700 | 95.054 | -0.031 | 0.000 | 0.09 | | | 0.348 | |
| 3.003 | TANK IN 304 | 180 minute | 2 year | Winter | I+40% | 96.700 | 95.054 | -0.026 | 0.000 | 0.28 | | | 0.223 | |
| 1.005 | TANK OUT | 180 minute | 2 year | Winter | I+40% | 96.750 | 95.051 | -0.027 | 0.000 | 0.11 | | | 26.509 | |
| 5.000 | SW501 | 15 minute | 2 year | Winter | I+40% | 96.750 | 95.319 | -0.156 | 0.000 | 0.20 | | | 0.018 | |
| 5.001 | SW502 | 15 minute | 2 year | Winter | I+40% | 96.750 | 95.209 | -0.136 | 0.000 | 0.32 | | | 0.090 | |
| 6.000 | SW601 | 30 minute | 2 year | Winter | I+40% | 96.510 | 96.048 | -0.112 | 0.000 | 0.01 | | | 0.038 | |
| 6.001 | SW602 | 30 minute | 2 year | Winter | I+40% | 96.500 | 96.048 | -0.102 | 0.000 | 0.23 | | | 1.525 | |
| 5.002 | SW503 | 15 minute | 2 year | Winter | I+40% | 96.750 | 95.143 | -0.122 | 0.000 | 0.43 | | | 0.096 | |
| 1.006 | SW105 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.078 | 0.070 | 0.000 | 0.39 | | | 1.402 | |
| 7.000 | SW401 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.076 | 0.086 | 0.000 | 0.11 | | | 0.065 | |
| 1.007 | SW106 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.073 | -0.006 | 0.000 | 0.11 | | | 1.823 | |
| 1.008 | SW107 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.066 | 0.033 | 0.000 | 0.10 | | | 3.219 | |
| 8.000 | SW801 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.065 | 0.026 | 0.000 | 0.01 | | | 0.533 | |
| 1.009 | SW108 | 60 minute | 2 year | Winter | I+40% | 96.750 | 95.065 | 0.303 | 0.000 | 0.07 | | | 6.593 | |

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Discharge Vol (m³) | Pipe Flow (l/s) | Status |
|-------|---------------|-----------------------|-----------------------|------------|
| 1.000 | SW101 | 1.464 | 3.1 | OK |
| 1.001 | SW102 | 1.802 | 3.7 | OK |
| 1.002 | SW103 | 2.141 | 4.3 | OK |
| 2.000 | SW201 | 6.307 | 13.5 | OK |
| 1.003 | SW104 | 20.034 | 4.7 | OK |
| 1.004 | TANK IN | 20.027 | 4.6 | OK* |
| 3.000 | SW301 | -0.001 | 0.0 | OK |
| 3.001 | SW302 | 7.755 | 1.4 | OK |
| 4.000 | SW401 | 0.000 | 0.0 | OK |
| 4.001 | SW402 | 7.087 | 1.7 | OK |
| 3.002 | SW303 | 16.254 | 2.8 | OK |
| 3.003 | TANK IN 304 | 16.236 | 2.8 | OK |
| 1.005 | TANK OUT | 34.831 | 4.1 | OK* |
| 5.000 | SW501 | 3.604 | 7.6 | OK |
| 5.001 | SW502 | 5.182 | 10.4 | OK |
| 6.000 | SW601 | 0.000 | 0.0 | OK |
| 6.001 | SW602 | 3.109 | 3.0 | OK |
| 5.002 | SW503 | 12.739 | 20.8 | OK |
| 1.006 | SW105 | 30.946 | 14.3 | SURCHARGED |
| 7.000 | SW401 | 2.102 | 1.4 | SURCHARGED |
| 1.007 | SW106 | 32.997 | 13.8 | OK |
| 1.008 | SW107 | 33.411 | 11.6 | SURCHARGED |
| 8.000 | SW801 | 1.708 | 0.9 | SURCHARGED |
| 1.009 | SW108 | 29.877 | 5.0 | SURCHARGED |

30 Year +40% Climate Change

| | | |
|---|---|---|
| AWP | | Page 10 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 File 1260-NW-01-A-101-SURFACE WATER... | Designed by tom.richards Checked by | |
| XP Solutions | Network 2017.1.1 | |

30 year Return Period 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 Coefficient 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 445419 240741 SP 45419 40741 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON


Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100, 200
 Climate Change (%) 40, 40, 40, 40

| | | | | | | | | | | Water | Surcharged | Flooded | | |
|-------|-------------|------------|---------|--------|-------|--------|--------|--------|--------|--------|------------|----------|--|--|
| | US/MH | | | | | US/CL | Level | Depth | Volume | Flow / | Overflow | Maximum | | |
| PN | Name | | Event | | | (m) | (m) | (m) | (m³) | Cap. | (l/s) | Vol (m³) | | |
| 1.000 | SW101 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.560 | -0.090 | 0.000 | 0.33 | | 0.015 | | |
| 1.001 | SW102 | 240 minute | 30 year | Winter | I+40% | 97.350 | 95.536 | 0.216 | 0.000 | 0.11 | | 0.411 | | |
| 1.002 | SW103 | 240 minute | 30 year | Winter | I+40% | 98.350 | 95.535 | 0.385 | 0.000 | 0.14 | | 0.534 | | |
| 2.000 | SW201 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.607 | 0.417 | 0.000 | 2.04 | | 0.159 | | |
| 1.003 | SW104 | 240 minute | 30 year | Winter | I+40% | 96.750 | 95.535 | 0.434 | 0.000 | 0.26 | | 0.491 | | |
| 1.004 | TANK IN | 60 minute | 30 year | Winter | I+40% | 96.100 | 95.080 | 0.000 | 0.000 | 0.78 | | 0.688 | | |
| 3.000 | SW301 | 60 minute | 30 year | Winter | I+40% | 97.010 | 96.727 | 0.117 | 0.000 | 0.03 | | 0.240 | | |
| 3.001 | SW302 | 60 minute | 30 year | Winter | I+40% | 97.000 | 96.727 | 0.077 | 0.000 | 0.20 | | 9.114 | | |
| 4.000 | SW401 | 360 minute | 30 year | Winter | I+40% | 96.700 | 96.010 | -0.150 | 0.000 | 0.00 | | 0.000 | | |
| 4.001 | SW402 | 240 minute | 30 year | Winter | I+40% | 96.700 | 95.539 | 0.467 | 0.000 | 0.20 | | 0.692 | | |
| 3.002 | SW303 | 240 minute | 30 year | Winter | I+40% | 96.700 | 95.537 | 0.452 | 0.000 | 0.14 | | 0.903 | | |
| 3.003 | TANK IN 304 | 240 minute | 30 year | Winter | I+40% | 96.700 | 95.537 | 0.457 | 0.000 | 0.40 | | 0.770 | | |
| 1.005 | TANK OUT | 240 minute | 30 year | Winter | I+40% | 96.750 | 95.534 | 0.456 | 0.000 | 0.34 | | 89.093 | | |
| 5.000 | SW501 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.715 | 0.240 | 0.000 | 0.41 | | 0.130 | | |
| 5.001 | SW502 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.694 | 0.349 | 0.000 | 0.61 | | 0.846 | | |
| 6.000 | SW601 | 15 minute | 30 year | Winter | I+40% | 96.510 | 96.094 | -0.066 | 0.000 | 0.03 | | 0.089 | | |
| 6.001 | SW602 | 15 minute | 30 year | Winter | I+40% | 96.500 | 96.094 | -0.056 | 0.000 | 0.71 | | 2.978 | | |
| 5.002 | SW503 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.647 | 0.382 | 0.000 | 0.96 | | 0.581 | | |
| 1.006 | SW105 | 240 minute | 30 year | Winter | I+40% | 96.750 | 95.541 | 0.533 | 0.000 | 0.34 | | 2.242 | | |
| 7.000 | SW401 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.595 | 0.605 | 0.000 | 0.42 | | 0.212 | | |
| 1.007 | SW106 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.572 | 0.493 | 0.000 | 0.28 | | 2.387 | | |
| 1.008 | SW107 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.582 | 0.549 | 0.000 | 0.22 | | 3.915 | | |
| 8.000 | SW801 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.581 | 0.542 | 0.000 | 0.07 | | 1.116 | | |
| 1.009 | SW108 | 15 minute | 30 year | Winter | I+40% | 96.750 | 95.581 | 0.819 | 0.000 | 0.07 | | 7.213 | | |

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH | Discharge | Pipe Flow | Status |
|-------|-------------|-----------|--------------|-------------|
| | Name | Vol (m³) | (l/s) | |
| 1.000 | SW101 | 3.220 | 6.8 | OK |
| 1.001 | SW102 | 9.051 | 1.6 | SURCHARGED |
| 1.002 | SW103 | 10.555 | 1.7 | SURCHARGED |
| 2.000 | SW201 | 13.757 | 29.1 | SURCHARGED |
| 1.003 | SW104 | 41.769 | 6.9 | SURCHARGED |
| 1.004 | TANK IN | 27.953 | 18.7 | SURCHARGED* |
| 3.000 | SW301 | -0.073 | 0.1 | FLOOD RISK |
| 3.001 | SW302 | 11.078 | 2.3 | FLOOD RISK |
| 4.000 | SW401 | 0.000 | 0.0 | OK |
| 4.001 | SW402 | 15.120 | 2.5 | SURCHARGED |
| 3.002 | SW303 | 34.907 | 4.1 | SURCHARGED |
| 3.003 | TANK IN 304 | 34.564 | 4.0 | SURCHARGED |
| 1.005 | TANK OUT | 37.299 | 12.6 | SURCHARGED* |
| 5.000 | SW501 | 7.925 | 15.7 | SURCHARGED |
| 5.001 | SW502 | 11.376 | 19.5 | SURCHARGED |
| 6.000 | SW601 | 0.000 | 0.1 | OK |
| 6.001 | SW602 | 5.983 | 9.2 | OK |
| 5.002 | SW503 | 28.578 | 46.3 | SURCHARGED |
| 1.006 | SW105 | 102.102 | 12.3 | SURCHARGED |
| 7.000 | SW401 | 2.842 | 5.7 | SURCHARGED |
| 1.007 | SW106 | 18.662 | 34.6 | SURCHARGED |
| 1.008 | SW107 | 18.979 | 26.3 | SURCHARGED |
| 8.000 | SW801 | 2.283 | 8.5 | SURCHARGED |
| 1.009 | SW108 | 14.500 | 4.9 | SURCHARGED |

100 Year +40% Climate Change

| | | |
|---|---|---|
| AWP | | Page 12 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

100 year Return Period 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 445419 240741 SP 45419 40741 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON


Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100, 200
 Climate Change (%) 40, 40, 40, 40

| PN | US/MH Name | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flooded Volume (m³) | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) |
|-------|---------------|----------------------------------|--------------|--------------------|-------------------------|------------------------|----------------|-------------------|---------------------|
| | | | | | | | | | |
| 1.000 | SW101 | 240 minute 100 year Winter I+40% | 96.750 | 95.836 | 0.186 | 0.000 | 0.08 | | 0.094 |
| 1.001 | SW102 | 240 minute 100 year Winter I+40% | 97.350 | 95.835 | 0.515 | 0.000 | 0.13 | | 0.554 |
| 1.002 | SW103 | 240 minute 100 year Winter I+40% | 98.350 | 95.834 | 0.684 | 0.000 | 0.16 | | 0.618 |
| 2.000 | SW201 | 15 minute 100 year Winter I+40% | 96.750 | 95.936 | 0.746 | 0.000 | 2.62 | | 0.252 |
| 1.003 | SW104 | 240 minute 100 year Winter I+40% | 96.750 | 95.834 | 0.733 | 0.000 | 0.33 | | 0.575 |
| 1.004 | TANK IN | 30 minute 100 year Winter I+40% | 96.100 | 95.080 | 0.000 | 0.000 | 1.60 | | 0.751 |
| 3.000 | SW301 | 60 minute 100 year Winter I+40% | 97.010 | 96.807 | 0.197 | 0.000 | 0.04 | | 0.330 |
| 3.001 | SW302 | 60 minute 100 year Winter I+40% | 97.000 | 96.807 | 0.157 | 0.000 | 0.24 | | 12.419 |
| 4.000 | SW401 | 360 minute 100 year Winter I+40% | 96.700 | 96.010 | -0.150 | 0.000 | 0.00 | | 0.000 |
| 4.001 | SW402 | 240 minute 100 year Winter I+40% | 96.700 | 95.839 | 0.767 | 0.000 | 0.26 | | 1.031 |
| 3.002 | SW303 | 240 minute 100 year Winter I+40% | 96.700 | 95.837 | 0.752 | 0.000 | 0.17 | | 1.242 |
| 3.003 | TANK IN 304 | 240 minute 100 year Winter I+40% | 96.700 | 95.837 | 0.757 | 0.000 | 0.48 | | 1.109 |
| 1.005 | TANK OUT | 240 minute 100 year Winter I+40% | 96.750 | 95.833 | 0.755 | 0.000 | 0.34 | | 127.744 |
| 5.000 | SW501 | 15 minute 100 year Winter I+40% | 96.750 | 96.227 | 0.752 | 0.000 | 0.50 | | 0.275 |
| 5.001 | SW502 | 15 minute 100 year Winter I+40% | 96.750 | 96.171 | 0.826 | 0.000 | 0.83 | | 0.981 |
| 6.000 | SW601 | 15 minute 100 year Winter I+40% | 96.510 | 96.118 | -0.042 | 0.000 | 0.04 | | 0.117 |
| 6.001 | SW602 | 15 minute 100 year Winter I+40% | 96.500 | 96.118 | -0.032 | 0.000 | 0.95 | | 3.739 |
| 5.002 | SW503 | 15 minute 100 year Winter I+40% | 96.750 | 96.092 | 0.827 | 0.000 | 1.29 | | 0.808 |
| 1.006 | SW105 | 240 minute 100 year Winter I+40% | 96.750 | 95.840 | 0.832 | 0.000 | 0.31 | | 2.580 |
| 7.000 | SW401 | 15 minute 100 year Winter I+40% | 96.750 | 95.892 | 0.902 | 0.000 | 0.55 | | 0.296 |
| 1.007 | SW106 | 240 minute 100 year Winter I+40% | 96.750 | 95.845 | 0.766 | 0.000 | 0.08 | | 2.696 |
| 1.008 | SW107 | 15 minute 100 year Winter I+40% | 96.750 | 95.864 | 0.831 | 0.000 | 0.24 | | 4.233 |
| 8.000 | SW801 | 15 minute 100 year Winter I+40% | 96.750 | 95.873 | 0.834 | 0.000 | 0.08 | | 1.447 |
| 1.009 | SW108 | 15 minute 100 year Winter I+40% | 96.750 | 95.869 | 1.107 | 0.000 | 0.07 | | 7.539 |

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Discharge Vol (m³) | Pipe Flow (l/s) | Status |
|-------|---------------|-----------------------|-----------------------|-------------|
| | | | | |
| 1.000 | SW101 | 9.507 | 1.7 | SURCHARGED |
| 1.001 | SW102 | 11.433 | 1.9 | SURCHARGED |
| 1.002 | SW103 | 13.113 | 2.0 | SURCHARGED |
| 2.000 | SW201 | 17.666 | 37.3 | SURCHARGED |
| 1.003 | SW104 | 53.167 | 8.8 | SURCHARGED |
| 1.004 | TANK IN | 28.937 | 38.4 | SURCHARGED* |
| 3.000 | SW301 | -0.126 | 0.1 | FLOOD RISK |
| 3.001 | SW302 | 13.635 | 2.8 | FLOOD RISK |
| 4.000 | SW401 | 0.000 | 0.0 | OK |
| 4.001 | SW402 | 19.331 | 3.3 | SURCHARGED |
| 3.002 | SW303 | 44.913 | 5.1 | SURCHARGED |
| 3.003 | TANK IN 304 | 44.259 | 4.9 | SURCHARGED |
| 1.005 | TANK OUT | 22.313 | 12.7 | SURCHARGED* |
| 5.000 | SW501 | 10.232 | 19.1 | SURCHARGED |
| 5.001 | SW502 | 14.440 | 26.7 | SURCHARGED |
| 6.000 | SW601 | 0.000 | 0.2 | OK |
| 6.001 | SW602 | 7.933 | 12.4 | OK |
| 5.002 | SW503 | 36.554 | 62.7 | SURCHARGED |
| 1.006 | SW105 | 104.843 | 11.2 | SURCHARGED |
| 7.000 | SW401 | 3.672 | 7.5 | SURCHARGED |
| 1.007 | SW106 | 117.597 | 9.6 | SURCHARGED |
| 1.008 | SW107 | 18.249 | 28.6 | SURCHARGED |
| 8.000 | SW801 | 3.045 | 10.1 | SURCHARGED |
| 1.009 | SW108 | 14.449 | 5.0 | SURCHARGED |

200 Year +40% Climate Change
Exceedance Event only

| | | |
|---|---|---|
| AWP | | Page 14 |
| Kensington Court Woodwater Park Pynes Hill Exeter EX2 5TY | 1260-Castle Street, Banbury Surface Water Network All Return Periods +40%CC |  |
| Date 27/06/2022 16:23 | Designed by tom.richards | |
| File 1260-NW-01-A-101-SURFACE WATER... | Checked by | |
| XP Solutions | Network 2017.1.1 | |

200 year Return Period 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 2 Number of Storage Structures 4 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH Data Type Point
 FEH Rainfall Version 2013 Cv (Summer) 0.750
 Site Location GB 445419 240741 SP 45419 40741 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

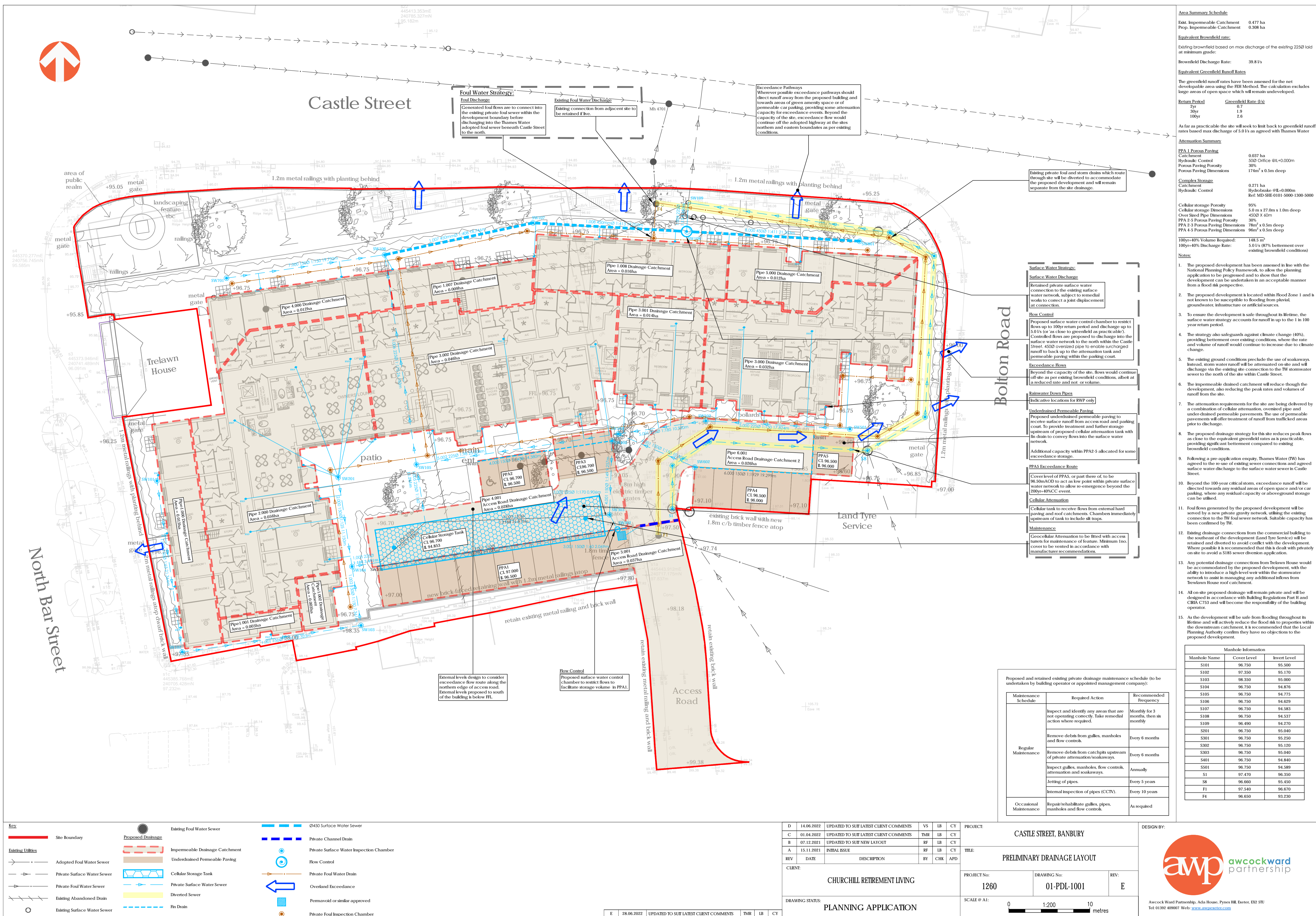
Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
 Return Period(s) (years) 2, 30, 100, 200
 Climate Change (%) 40, 40, 40, 40

| PN | US/MH Name | Event | US/CL (m) | Water Surcharged Flooded | | | Flow / Cap. | Overflow (l/s) | Maximum Vol (m³) |
|-------|---------------|----------------------------------|--------------|--------------------------------|--------------|----------------|----------------|-------------------|---------------------|
| | | | | Level (m) | Depth (m) | Volume (m³) | | | |
| 1.000 | SW101 | 240 minute 200 year Winter I+40% | 96.750 | 96.319 | 0.669 | 0.000 | 0.09 | | 0.230 |
| 1.001 | SW102 | 240 minute 200 year Winter I+40% | 97.350 | 96.318 | 0.998 | 0.000 | 0.14 | | 0.690 |
| 1.002 | SW103 | 240 minute 200 year Winter I+40% | 98.350 | 96.316 | 1.166 | 0.000 | 0.19 | | 0.755 |
| 2.000 | SW201 | 240 minute 200 year Winter I+40% | 96.750 | 96.319 | 1.129 | 0.000 | 0.56 | | 0.360 |
| 1.003 | SW104 | 240 minute 200 year Winter I+40% | 96.750 | 96.315 | 1.214 | 0.000 | 0.39 | | 0.711 |
| 1.004 | TANK IN | 15 minute 200 year Winter I+40% | 96.100 | 95.080 | 0.000 | 0.000 | 2.28 | | 0.665 |
| 3.000 | SW301 | 60 minute 200 year Winter I+40% | 97.010 | 96.861 | 0.251 | 0.000 | 0.04 | | 0.391 |
| 3.001 | SW302 | 60 minute 200 year Winter I+40% | 97.000 | 96.861 | 0.211 | 0.000 | 0.26 | | 14.670 |
| 4.000 | SW401 | 240 minute 200 year Winter I+40% | 96.700 | 96.320 | 0.160 | 0.000 | 0.02 | | 0.345 |
| 4.001 | SW402 | 240 minute 200 year Winter I+40% | 96.700 | 96.320 | 1.248 | 0.000 | 0.29 | | 9.293 |
| 3.002 | SW303 | 240 minute 200 year Winter I+40% | 96.700 | 96.319 | 1.234 | 0.000 | 0.19 | | 1.787 |
| 3.003 | TANK IN 304 | 240 minute 200 year Winter I+40% | 96.700 | 96.318 | 1.238 | 0.000 | 0.55 | | 1.654 |
| 1.005 | TANK OUT | 240 minute 200 year Winter I+40% | 96.750 | 96.313 | 1.235 | 0.000 | 0.34 | | 130.890 |
| 5.000 | SW501 | 15 minute 200 year Winter I+40% | 96.750 | 96.351 | 0.876 | 0.000 | 0.62 | | 0.310 |
| 5.001 | SW502 | 240 minute 200 year Winter I+40% | 96.750 | 96.314 | 0.969 | 0.000 | 0.20 | | 1.021 |
| 6.000 | SW601 | 240 minute 200 year Winter I+40% | 96.510 | 96.313 | 0.153 | 0.000 | 0.02 | | 0.337 |
| 6.001 | SW602 | 240 minute 200 year Winter I+40% | 96.500 | 96.313 | 0.163 | 0.000 | 0.31 | | 9.689 |
| 5.002 | SW503 | 240 minute 200 year Winter I+40% | 96.750 | 96.313 | 1.048 | 0.000 | 0.35 | | 0.935 |
| 1.006 | SW105 | 240 minute 200 year Winter I+40% | 96.750 | 96.309 | 1.301 | 0.000 | 0.30 | | 3.111 |
| 7.000 | SW401 | 240 minute 200 year Winter I+40% | 96.750 | 96.299 | 1.309 | 0.000 | 0.12 | | 0.411 |
| 1.007 | SW106 | 240 minute 200 year Winter I+40% | 96.750 | 96.298 | 1.219 | 0.000 | 0.08 | | 3.208 |
| 1.008 | SW107 | 240 minute 200 year Winter I+40% | 96.750 | 96.295 | 1.262 | 0.000 | 0.06 | | 4.722 |
| 8.000 | SW801 | 240 minute 200 year Winter I+40% | 96.750 | 96.294 | 1.255 | 0.000 | 0.01 | | 1.922 |
| 1.009 | SW108 | 240 minute 200 year Winter I+40% | 96.750 | 96.293 | 1.531 | 0.000 | 0.08 | | 8.018 |

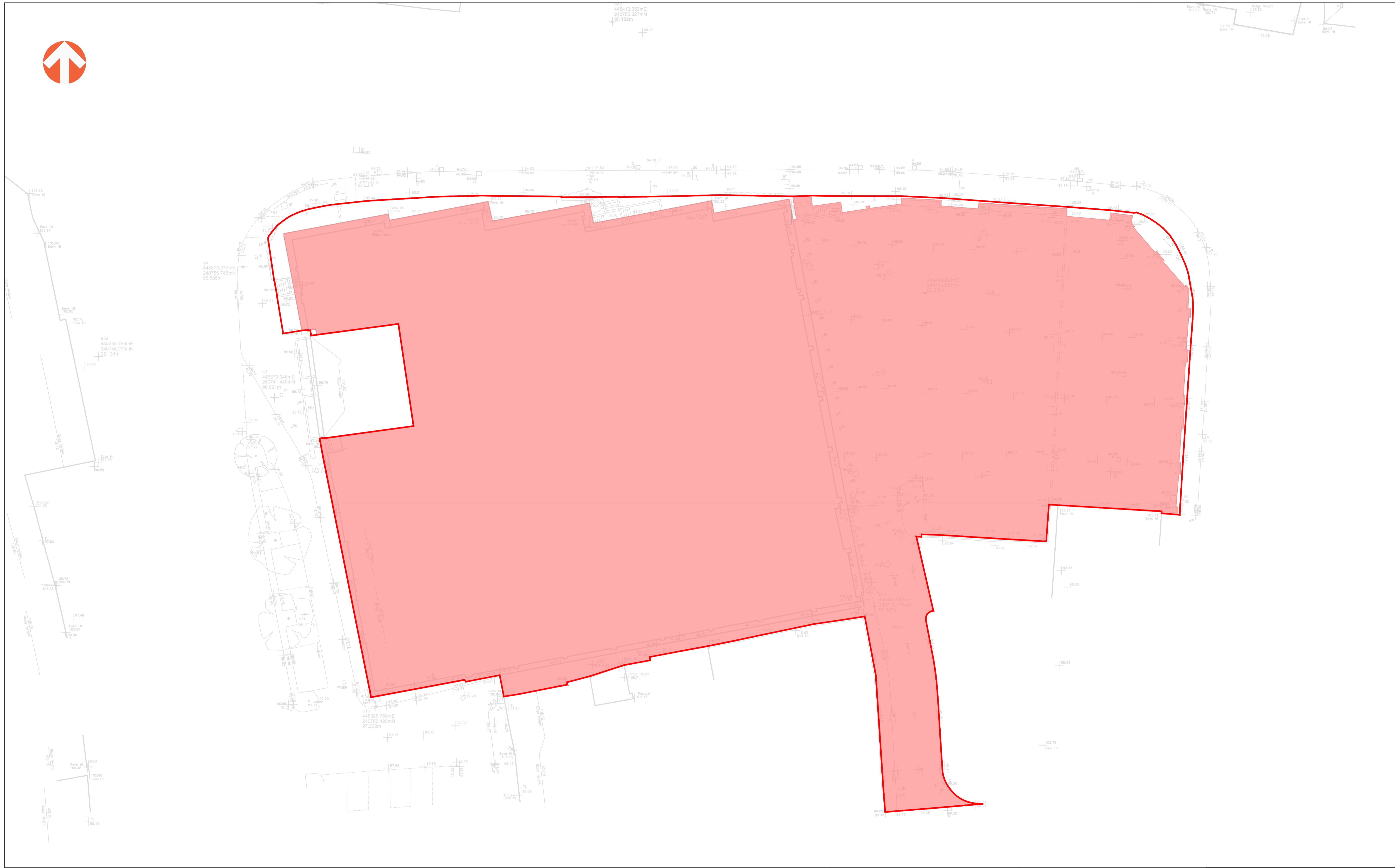
200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

| PN | US/MH Name | Discharge Vol (m³) | Pipe Flow (l/s) | Status |
|-------|---------------|-----------------------|-----------------------|-------------|
| 1.000 | SW101 | 10.982 | 1.9 | SURCHARGED |
| 1.001 | SW102 | 13.048 | 2.1 | SURCHARGED |
| 1.002 | SW103 | 15.027 | 2.4 | SURCHARGED |
| 2.000 | SW201 | 46.888 | 8.0 | SURCHARGED |
| 1.003 | SW104 | 61.400 | 10.3 | SURCHARGED |
| 1.004 | TANK IN | 25.375 | 54.7 | SURCHARGED* |
| 3.000 | SW301 | -0.165 | 0.1 | FLOOD RISK |
| 3.001 | SW302 | 15.174 | 3.0 | FLOOD RISK |
| 4.000 | SW401 | 0.000 | 0.1 | SURCHARGED |
| 4.001 | SW402 | 22.323 | 3.8 | SURCHARGED |
| 3.002 | SW303 | 52.025 | 5.8 | SURCHARGED |
| 3.003 | TANK IN 304 | 51.196 | 5.5 | SURCHARGED |
| 1.005 | TANK OUT | 16.169 | 12.5 | SURCHARGED* |
| 5.000 | SW501 | 11.661 | 23.4 | SURCHARGED |
| 5.001 | SW502 | 37.844 | 6.4 | SURCHARGED |
| 6.000 | SW601 | -0.001 | 0.1 | FLOOD RISK |
| 6.001 | SW602 | 22.361 | 4.0 | FLOOD RISK |
| 5.002 | SW503 | 98.278 | 16.9 | SURCHARGED |
| 1.006 | SW105 | 111.844 | 11.1 | SURCHARGED |
| 7.000 | SW401 | 9.869 | 1.7 | SURCHARGED |
| 1.007 | SW106 | 126.690 | 9.4 | SURCHARGED |
| 1.008 | SW107 | 136.085 | 7.5 | SURCHARGED |
| 8.000 | SW801 | 8.979 | 1.5 | SURCHARGED |
| 1.009 | SW108 | 137.874 | 5.8 | SURCHARGED |

Appendix H Preliminary Drainage Layout



Appendix I Existing Impermeable Areas Plan



Key


Site Boundary

Existing Impermeable Areas Catchments

Area Summary Schedule

Exist. Impermeable Catchment

0.477 ha

| | | | | | | | | | | | |
|--------------------------------------|------------|---------------|----|-----|-----|---|--|--|---|--------|--|
| | | | | | | PROJECT: CASTLE STREET, BANBURY | | | DESIGN BY: | | |
| A | 01.04.2022 | INITIAL ISSUE | RF | LB | CY | TITLE: PRE-DEVELOPMENT IMPERMEABLE AREAS PLAN | | |  | | |
| REV | DATE | DESCRIPTION | BY | CHK | APD | | | | | | |
| CLIENT: CHURCHILL RETIREMENT LIVING | | | | | | PROJECT No: 1260 | | DRAWING No: 01-PDL-1002 | | REV: A | |
| DRAWING STATUS: PLANNING APPLICATION | | | | | | SCALE @ A1: 0 1:200 10 metres | | Awcock Ward Partnership, Ada House, Pynes Hill, Exeter, EX2 5TU Tel: 01392 409007 Web: www.awpexeter.com | | | |

Appendix J Thames water capacity confirmation letter



Ms Letisha Blackmore

Awcock Ward Partnership Ltd

Ada House,
Pynes Hill,
Exeter, Devon,
EX2 5TU

**Wastewater
pre-planning**



Our ref **DS6093062, DTS-54207**

15 March 2022

Pre-planning enquiry: Confirmation of sufficient capacity

Site: Former Buzz Bingo, Bolton Road, Banbury, Oxfordshire - OX16 OTH

Dear Letisha,

Thank you for providing information on your development.

Existing site: Brownfield site.

Proposed site: Retirement living apartments (82 units)

Proposed foul water discharge by gravity into manhole SP45404702.

Proposed surface water discharge at 5.0 l/s for all storm events up to and including 1:100yr+40%CC into manhole SP45404750.

We're pleased to confirm that there will be sufficient foul and surface water capacity in our sewerage network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 07747 647 155.

Kind Regards

Zaid Kazi

Developer Services – Major Projects, Project Engineer

zaid.kazi@thameswater.co.uk

Get advice on making your sewer connection correctly at connectright.org.uk

Clearwater Court, Vastern Road, Reading, RG1 8DB

Find us online at developers.thameswater.co.uk

Appendix K Drainage Maintenance Plan

Castle Street, Banbury

Churchill Retirement Living

Drainage Maintenance Plan



1 Introduction

- 1.1 The maintenance of drainage networks is fundamental to secure their long-term operation and functionality. If the maintenance regimes are not adhered to, the systems design capacity and performance will deteriorate over time, reducing the level of protection offered to the development and its downstream catchment.
- 1.2 Whilst the maintenance regimes covered by this document are based on best practice guidance for the surface water management system, those responsible for maintenance must acknowledge the need to appraise the effectiveness of the recommended actions and frequencies, so that any variations in site or drainage conditions can be controlled throughout the developments lifetime.
- 1.3 This maintenance plan must be read in conjunction with the final drainage plans or as-built records, so that all drainage features can be identified and located on site.
- 1.4 A schedule has been provided at the rear of this maintenance plan to document any variations which might be implemented through the developments lifetime.

2 Adopted Drainage

- 2.1 The on-site piped drainage and attenuation features will remain private and is not proposed to be put up for adoption by the Water Authority and/or Highway Authority.

3 Overview of Maintenance required for Sustainable Drainage Systems (SuDS)

- 3.1 It is important to ensure that thought is given to the long-term maintenance of SuDS features during the feasibility and planning stages. By ensuring SuDS features are correctly monitored and maintained throughout their lifetime, the amount of deterioration in performance that could occur over time is prevented or limited. This ensures that the feature will continue to work at full capacity as required in the design.
- 3.2 The type of required maintenance is determined by many factors, including;
 - Type of SuDS scheme.
 - The size of the contributing catchment relating to each SuDS component.
 - Land-use associated with contributing catchment.
 - Level of construction ongoing within the contributing catchment.
 - Planting types.
 - Habitat types that have been created.
 - Amenity and visual requirements of the area.

- 3.3 Maintenance regimes should be regularly assessed to make sure that the approach is still meeting the drainage, landscape and any other objectives.
- 3.4 In accordance with CIRIA C753 – 'The SuDS Manual', maintenance can be split into three main categories; Regular maintenance (including inspections and monitoring), Occasional maintenance and Remedial maintenance.
- 3.5 Regular maintenance covers basic tasks which are carried out on a predictable and frequent schedule. Such activities include inspections, vegetation management and litter/debris removal.
- 3.6 Occasional maintenance includes tasks which are likely to be required infrequently and cannot be predicted as easily as regular maintenance tasks. This covers tasks such as sediment removal.
- 3.7 Remedial maintenance covers tasks which are required to resolve faults within the system found during regular inspections. Although in good design the requirement of this type of maintenance is limited, faults still occur. These faults and the corresponding maintenance actions required are generally site specific and difficult to predict.
- 3.8 Detailed information for the maintenance required for the SuDS features applicable to this project can be found in the following sections of this document.

4 Private Drainage

- 4.1 Private drainage must be designed and installed in accordance with the approved Building Regulations Part H. Once the drainage has been signed-off by Building Control it must be maintained by the respective property owner(s) or appointed Management Company.

Ownership/Responsibility

- 4.2 Private drainage for the commercial residential property will become the responsibility of the building operator or appointed management company and must be maintained by them, or other persons on their behalf in perpetuity.

Maintenance Regime

4.3 This private drainage will be maintained using the following regime;

| Maintenance Schedule | Required Action | Recommended Frequency |
|------------------------|---|--|
| Regular Maintenance | Inspect and identify any areas that are not operating correctly. Take remedial action where required. | Monthly for 3 months, then six monthly |
| | Remove debris from gullies, manholes and flow controls. | Every 6 months |
| | Remove debris from catchpits upstream of private attenuation/soakaways. | Every 6 months |
| | Inspect gullies, manholes, flow controls, attenuation and soakaways. | Annually |
| | Jetting of pipes. | Every 5 years |
| | Internal inspection of pipes (CCTV). | Every 10 years |
| Occasional Maintenance | Repair/rehabilitate gullies, pipes, manholes and flow controls. | As required |
| | Repair/rehabilitate private attenuation/soakaways. | As required |

5 Geocellular/Modular Attenuation systems

5.1 Modular high void ratio, plastic geocellular systems used to create an underground storage structure.

Ownership/Responsibility

5.2 On-site Geocellular Attenuation will be retained under private ownership of the the building operator or appointed management company, who will be responsible for its future operation and maintenance in perpetuity.

Maintenance Regime

- 5.3 Geocellular/modular systems are designed in accordance with CIRIA guidelines and should be maintained using the following regime;

| Maintenance Schedule | Required Action | Recommended Frequency |
|----------------------|--|--|
| Regular Maintenance | Inspect and identify any areas that are not operating correctly. If required, take remedial action. | Monthly for 3 months, then six monthly |
| | Debris removal from catchment surface (where may cause risks to performance). | Monthly |
| | Where rainfall infiltrates into blocks from above, check surface or filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary. | Monthly (and after large storms) |
| | Remove sediment from pre-treatment structures. | Annually, or as required |
| Remedial Actions | Repair/ rehabilitation of inlets, outlet, overflows and vents. | As required |
| Monitoring | Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed. | Annually and after large storms |

6 Pervious Pavements

Pervious Pavements must be specified to accord with the respective site conditions and must be installed in accordance with the manufacturer recommendations.

Ownership/Responsibility

- 6.1 On-site pervious pavements will be retained under private ownership of the building operator or appointed management company who will be responsible for its future operation and maintenance in perpetuity.

Maintenance Regime

- 6.2 The operation and maintenance of pervious pavements should also be to the manufacturers recommendations. However, this is expected to be generally in line with the following regime as per CIRIA C753 – 'The SuDS Manual'.

| Maintenance Schedule | Required Action | Recommended Frequency |
|------------------------|---|---|
| Regular Maintenance | Brushing and vacuuming. | Once a year, after autumn leaf fall or reduced frequency as required, based on site-specific observations of clogging or manufacturers recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this is most likely to collect sediment. |
| Occasional Maintenance | Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying. | As required – once per year on less frequently used pavements |
| | Stabilise and mow contributing and adjacent areas. | As required |
| Remedial Actions | Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users. | As required |
| | Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving. | As required |
| | Rehabilitation of surface and upper sub-structure by remedial sweeping. | Very 10 – 15 years or as required (if infiltration performance is |

| Maintenance Schedule | Required Action | Recommended Frequency |
|----------------------|---|---|
| | | reduced due to significant clogging) |
| Monitoring | Initial Inspection. | Monthly for three months after installation |
| | Inspect for evidence of poor operation and/or weed growth/. If required take remedial action. | 3-monthly, 48 h after large storms |
| | Inspect Silt accumulation rates and establish appropriate brushing frequencies. | Annually |
| | Monitor inspection chambers. | Annually |

7 Trenches/ Filter Drains

- 7.1 Trenches/Filter Drains create temporary subsurface storage in shallow excavations filled with rubble or stone.
- 7.2 Can be used to store either infiltration or filtration of stormwater runoff. Ideally they receive lateral inflow from an adjacent impermeable surface but can be used with point source inflows

Ownership/Responsibility

- 7.3 On-site trenches/ filter drains will be retained under private ownership of the building operator or appointed management company, who will be responsible for its future operation and maintenance in perpetuity.

Maintenance Regime

- 7.4 Trenches are designed in accordance with CIRIA guidelines and should be maintained using the following regime;

| Maintenance Schedule | Required Action | Recommended Frequency |
|------------------------|---|----------------------------|
| Regular Maintenance | Litter and debris removal from trench surface, access chambers and pre-treatment devices. | Monthly (or as required) |
| | Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage | Monthly |
| | Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies | Six monthly |
| | Removal of sediment from pre-treatment devices. | Six monthly |
| Occasional Maintenance | Remove tree roots or trees that grow close to the trench. | As required |
| | At locations with high pollution loads, remove surface geotextile and replace, and wash or replace filter media. | Five yearly or as required |
| | Clear perforated pipework of blockages. | As required |
| Remedial Actions | Rehabilitate infiltration or filtration surfaces. | As required |
| | Replace geotextiles and clean and replace filter media, if clogging occurs. | As required |
| | Excavate trench walls to expose clean soils if infiltration performance reduces to unacceptable levels. | As required |

8 Schedule of Changes

- 8.1 This schedule has been provided to enable those responsible for maintenance of the drainage systems to document changes made to the actions and frequencies of maintenance, in direct response to changing site/drainage conditions;

| Drainage Feature | Change of Action | Change of Frequency | Comments |
|------------------|------------------|---------------------|----------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Appendix L LLFA comments (February 2022)

Application no: 21/04202/F

Location: Former Buzz Bingo, Bolton Road, Banbury,

Lead Local Flood Authority

Recommendation:

Objection

Key issues:

- Drainage strategy drawing not detailed.
- Microdrainage calculations not detailed.
- Existing drainage not shown on the drainage strategy drawing.
- Remedial works for existing drainage pipes not identified on plan drawings.
- Surface water catchment plan not provided.
- Detailed SuDS maintenance schedule not provided.
- Surface water exceedance plan not provided.
- Public sewer technical approval not provided.
- Ground investigation report does not show the infiltration testing results.

Detailed comments:

As part of a full application drawings and calculations are expected to be detailed. Drainage strategy drawing should show invert and cover levels for all proposed drainage infrastructure and SuDS feature. All surface water pipes needs to be numbered and sized which should correlate with the Microdrainage calculations. Calculations required for the whole surface water network.

Existing drainage to be shown on drainage strategy drawings. Existing pipes that are being retained should be clearly identified. Also all the maintenance requirements for the existing retained pipes needs to be identified on plan drawings.

Surface water catchment plan required to demonstrate how the site will drain and to which drainage features. The proposed areas needs to be clearly shown and the existing areas.

A detailed maintenance schedule required for all proposed drainage infrastructure and SuDS features. All the maintenance requirements needs to be clearly identified.

Surface water exceedance plan to be provided to demonstrate how the site will drain in an event where the surface water network fails. All surface water should be kept away from structures and within the site boundary.

Technical approval from the public sewer undertaker required in order to make drainage connections.

Ground investigation report states infiltration not feasible however the infiltration testing results and location of testing are not provided.

Officer's Name: Kabier Salam

Officer's Title: LLFA Planning Engineer

Date: 25 February 2022

Appendix M LLFA comments (April 2022)

Application no: 21/04202/F

Location: Former Buzz Bingo, Bolton Road, Banbury,

Lead Local Flood Authority

Recommendation:

Objection

Key issues:

- Drainage strategy drawing not detailed.
- Surface water catchment plan.
- Surface water exceedance plan.

Detailed comments:

As part of a full application drawings and calculations are expected to be detailed. Drainage strategy drawing should show invert and cover levels for all proposed drainage infrastructure and SuDS features. Attenuation tank and permeable paving details not provided. The tank and permeable paving details should reflect the calculations.

Surface water catchment plan required to demonstrate how the site will drain and to which drainage features. The proposed areas needs to be clearly shown and the existing areas. The impermeable area on the catchment plan is different to the area used in the calculations. Please clarify. The catchment plan should also show the area going into the proposed surface water network.

Surface water exceedance plan to be provided to demonstrate how the site will drain in an event where the surface water network fails. All surface water should be kept away from structures and within the site boundary, currently some of the flow arrows shows surface water leading outside the side boundary. How is the surface water being picked up in these areas.

Officer's Name: Kabier Salam

Officer's Title: LLFA Planning Engineer

Date: 20 April 2022