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Technical Note

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.

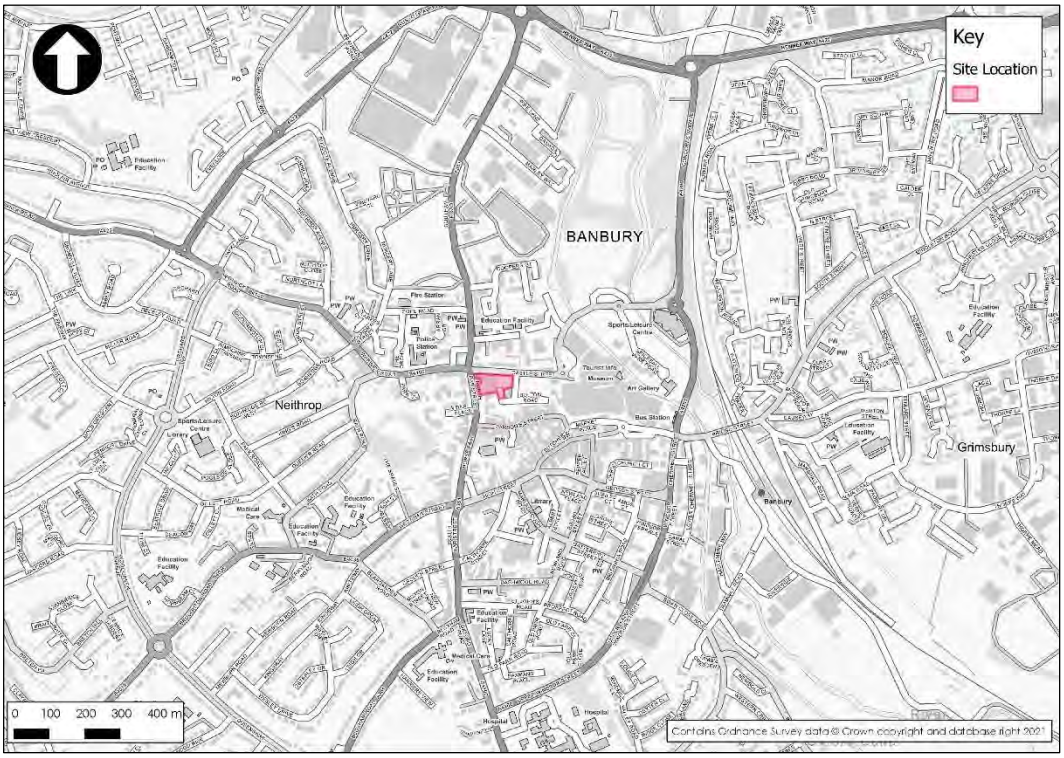
1.2 This technical note has been revised to take account of Oxfordshire County Council's consultation response for this application (21/04202/F) dated 25 May 2022, specifically related to comments received from the Lead Local Flood Authority (LLFA) dated 20 April 2022 (included in Appendix M for ease 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

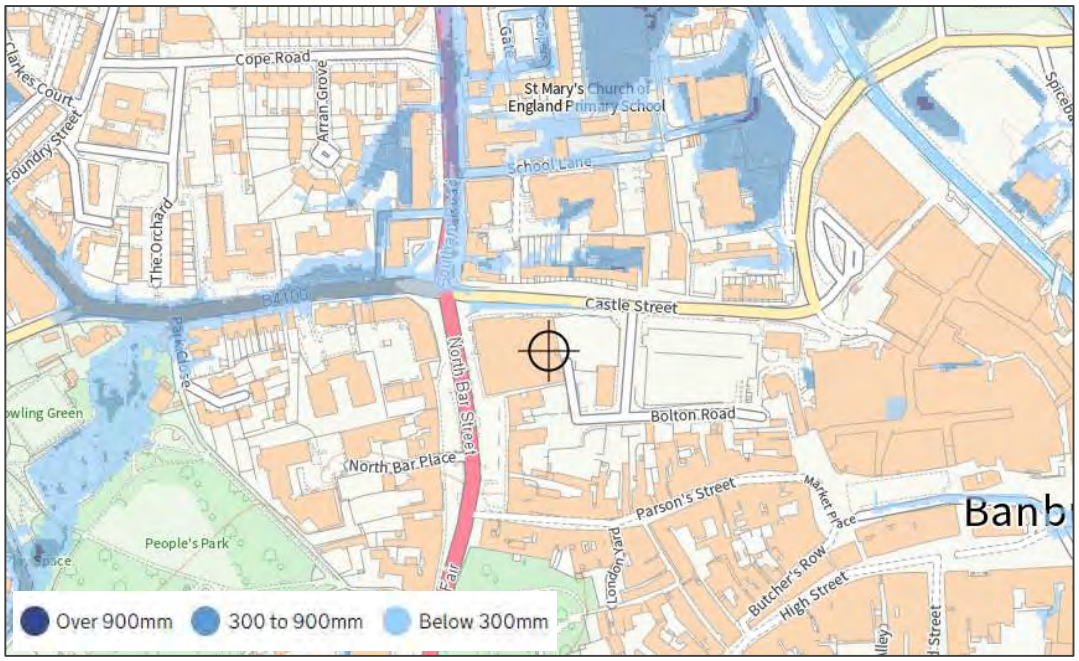
Pluvial sources (surface water flooding)

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.

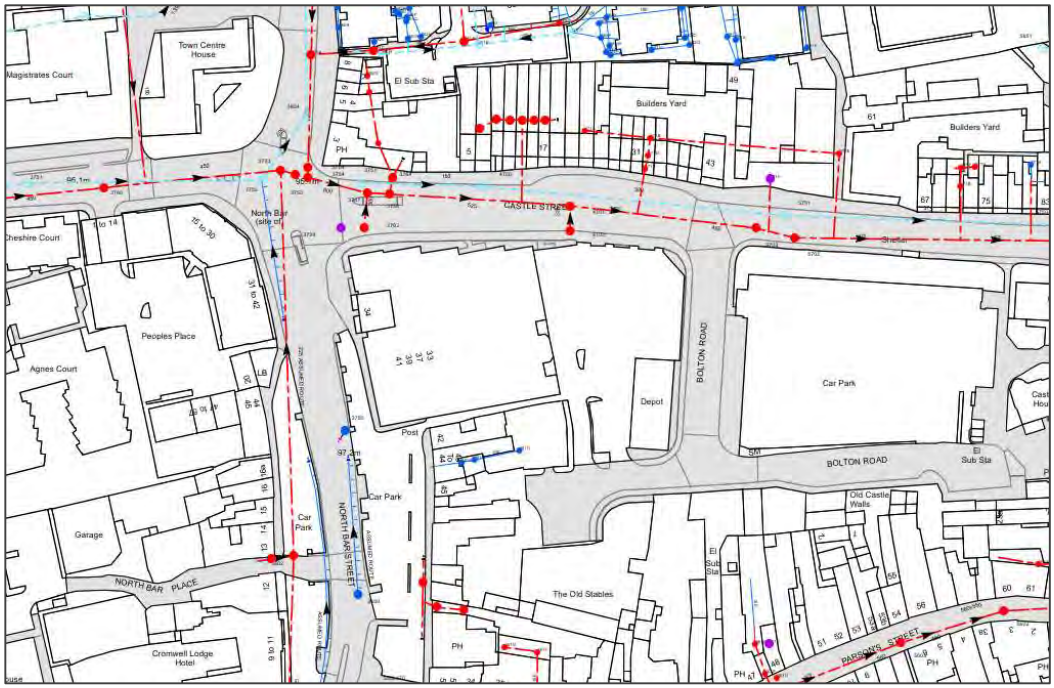
2.10 Groundwater was encountered at depths of 4.1m and 5.2m in two exploratory holes. The investigation also identified localised perched groundwater at the time of the investigation and noted damp materials at depths approximately 2.5m below ground level. Therefore, based on the recorded groundwater 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 Trewlawn 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

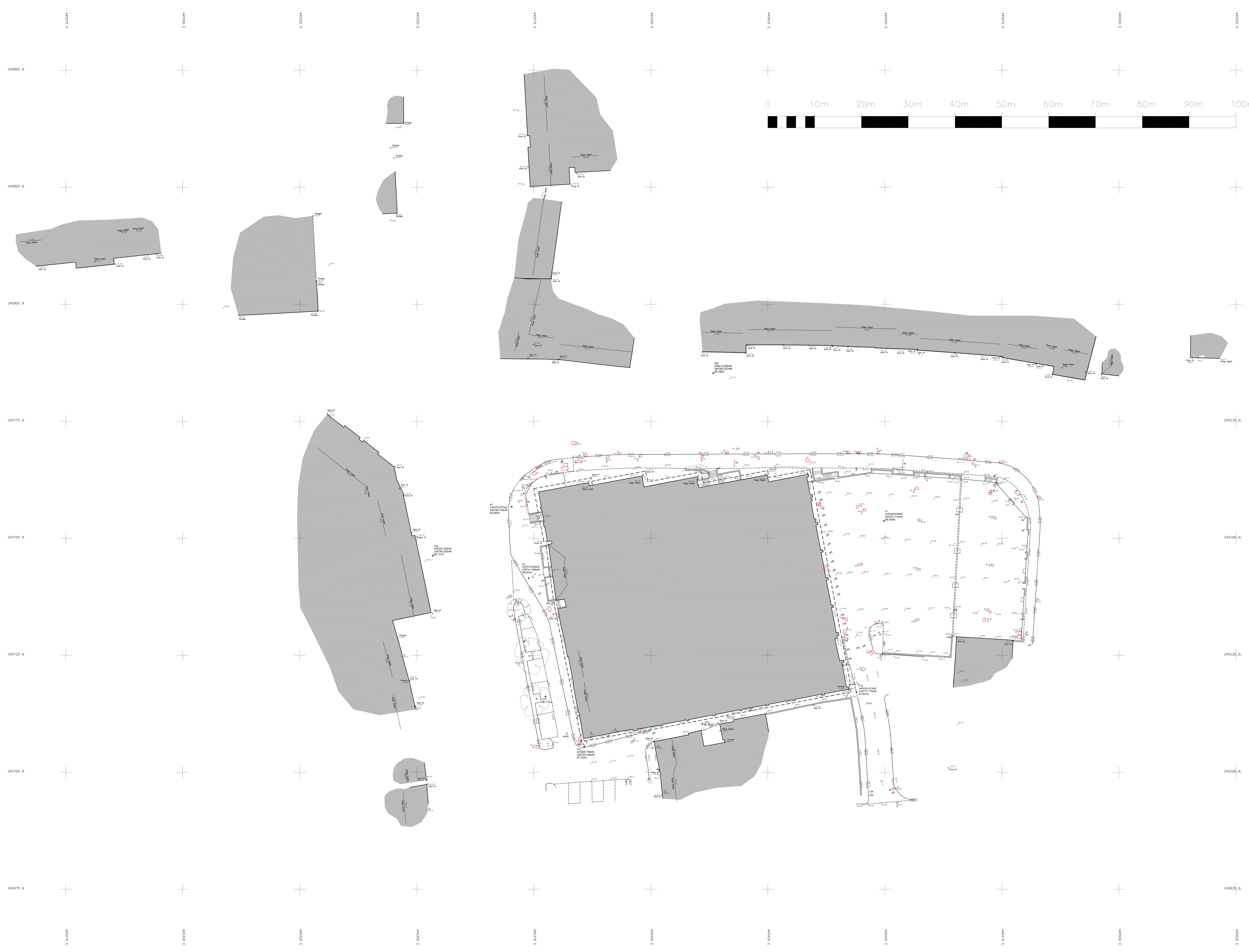
8.11 In response to LLFA comments, dated 20 April 2022 (provided in Appendix M), additional information has been provided as a revision to this drainage technical note. A summarised response to key issues raised within the comments received is provided below for ease of reference.

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

Bank
Building
Kerb
Foliage
Hedge
Pipe
Verge
Wall
Track
Fence
Telephone
Electric
Water line
Tree
Spread/Trunk Dia/Height
Manhole
SWS (Estimated Size From Surface)
FWS (Estimated Size From Surface)
Grid Cross

LEGEND

AV	Air Valve	RS	Road Sign
BL	Bollard	SC	Stop Cock
BM	Bench Mark	Str	Strainer
BP	Boundary Point	SV	Stop Valve
BT	British Telecom Cover	TL	Threshold Level
CATV	Cable Television Cover	TP	Telephone Pole
CL	Cover Level	WM	Water Meter
EP	Electric Power Pole	WO	Wash Out
EV	Eave Level	UTL	Unable To Lift
FH	Fire Hydrant		Fence Descriptions
FL	Floor Level	B/W	Barbed Wire
FP	Fence Post	C/B	Close Board
G	Gully	C/I	Corrugated Iron
GP	Gate Post	C/L	Chain Link
GV	Gas Valve	C/P	Chestnut Paling
IC	Inspection Chamber	C/W	Chicken Wire
IL	Invert Level	I/R	Iron Railings
KO	Kerb Outlet	P/R	Post & Rail
LC	Basement Light	P/W	Post & Wire
LP	Lamp Post		Rock Face
M	Meter		Glass Roofed
MH	Manhole Cover		Buildings & Walls
MK	Marker		Double Gates
MS	Milestone		Single Gate
RG	Ridge Level		

D&H Surveys Ltd

The Manor Stables, Great Somerford, Chippenham
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Topographic Surveys
Elevation Surveys
Floor Plan Surveys
Volumetric Surveys
As Built Drainage Surveys

Site Setting Out
Co-ordination Of Site Layouts
Rectified Photo Elevations
C.A.D Plotting Bureau

Project Name:
Castle Street
Banbury

Drawing Title:
Topographic Survey

Client:
Churchill Retirement Living

Agent:

Date:		Scale:	
July 2021		1:250@A0	
Drawn	Surveyor	Dwg No	Revision
P.J-S	S.C.B	SU-01	

Site Datum	OSBM Reference
OSGM-15	
Grid Orientation	Sheet ID
OS Grid	Churchill-Banbury-July 2021

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

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

Asset location search

Property Searches

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 searchprovides 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

Asset location search

Thames Water Property Searches

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

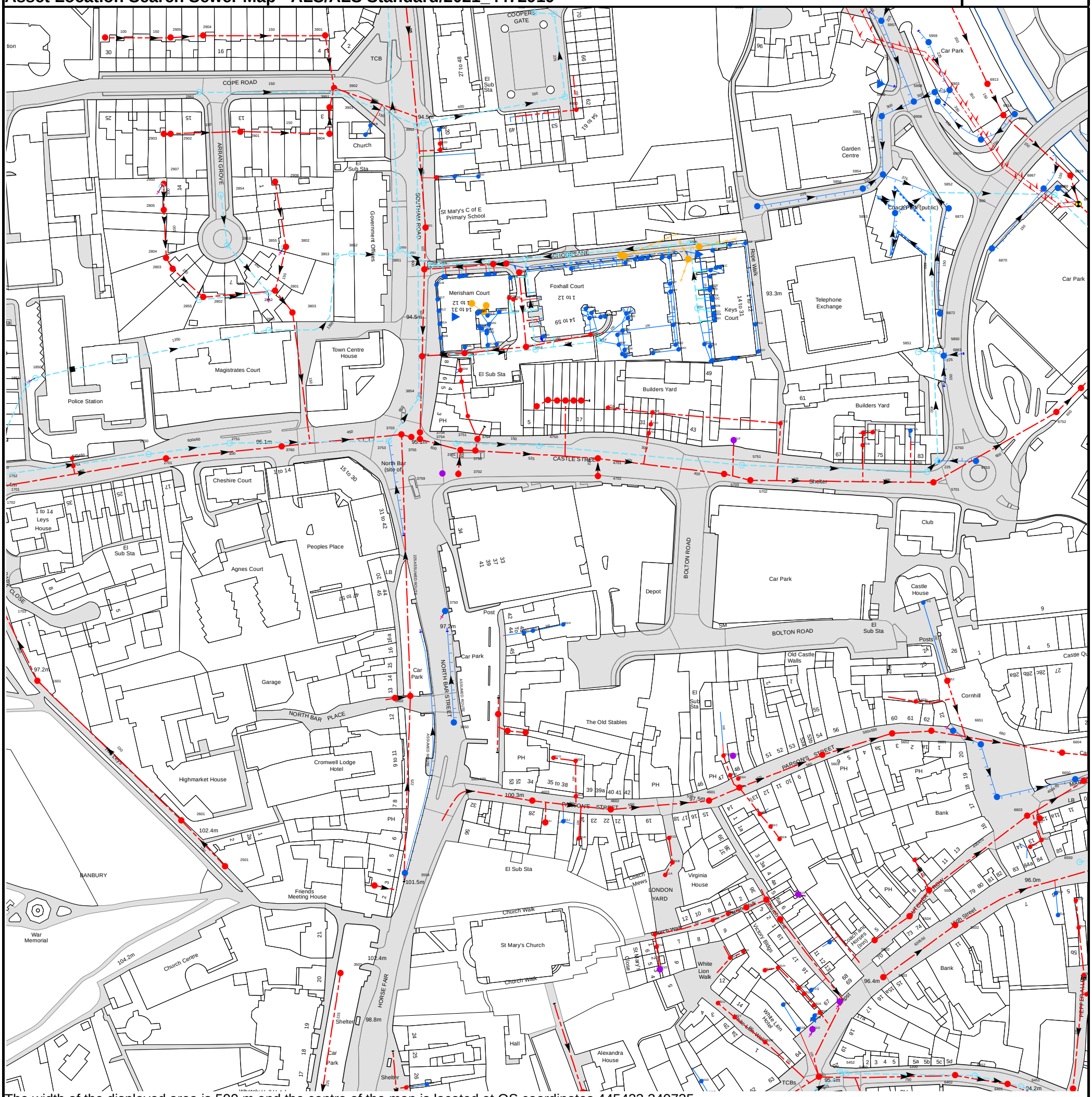
Clean Water queries

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.

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

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

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

Gulley

Culverted Watercourse

Proposed

Abandoned Sewer

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 '0' on a manhole level indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. 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.

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.

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

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')

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: Indiates 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

UTILITY SURVEYS LTD.

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

REGISTER OF APPENDICES

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

6 6 16 2 0

Total DRB Grades for Project

5 7 2

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

6 6 16 2 0

Total DRB Grades for Project

5 7 2

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/recomendations 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.

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

6 6 16 2 0

Total DRB Grades for Project

5 7 2

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: PI1**	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**

Site: BOLTON ROAD, BANBURY

Section 1

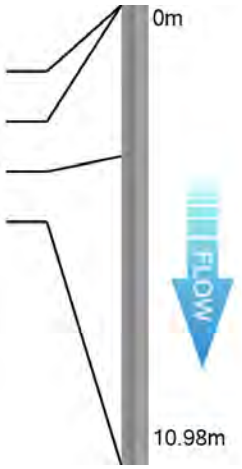
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0 0 0 0 0

DRB Grade for Section

A

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	

Site: BOLTON ROAD, BANBURY

Section 2

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

3	4	0	0	0

DRB Grade for Section

A

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 

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

Site: BOLTON ROAD, BANBURY

Section 3

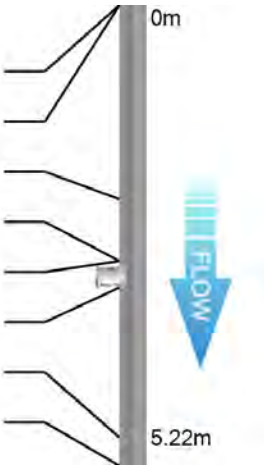
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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			



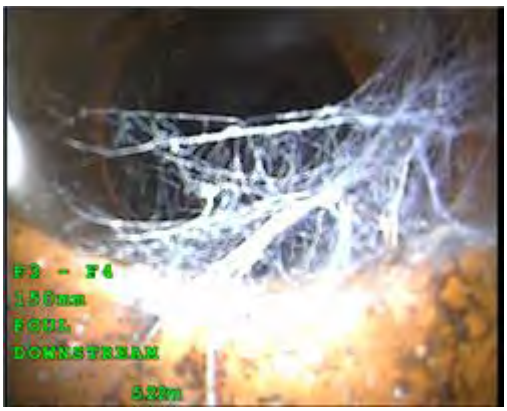
Total Defects for section

0	0	1	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 4

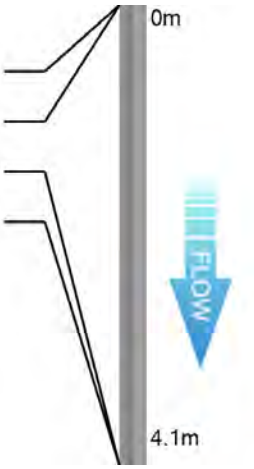
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

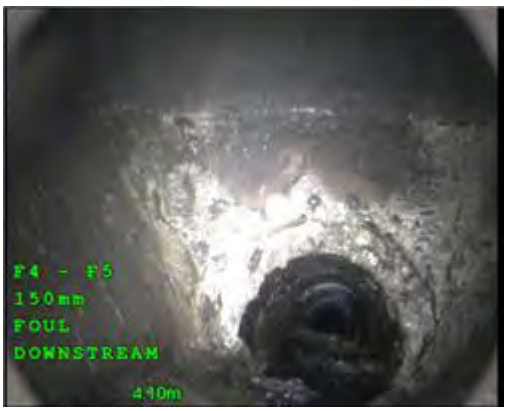
0 0 0 0 0

DRB Grade for Section

A

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	Image Provided - Ref: 3_2 
04.10m		MHF	Finish node type, manhole F5	

Total Defects for section

0 0 0 0 0

DRB Grade for Section

A

Site: BOLTON ROAD, BANBURY

Section 5

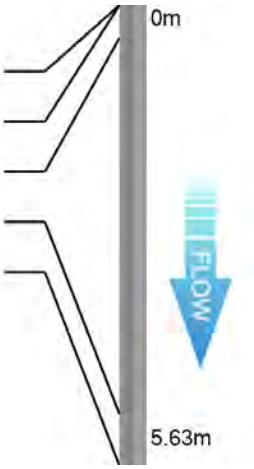
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0	0	2	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 6

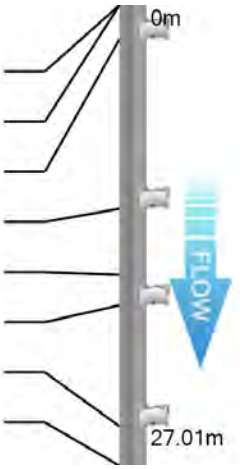
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0	0	1	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 7

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

0 0 0 0 0

DRB Grade for Section

A

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	

Site: BOLTON ROAD, BANBURY

Section 8

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

0 0 0 0 0

DRB Grade for Section

A

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	

Site: BOLTON ROAD, BANBURY

Section 9

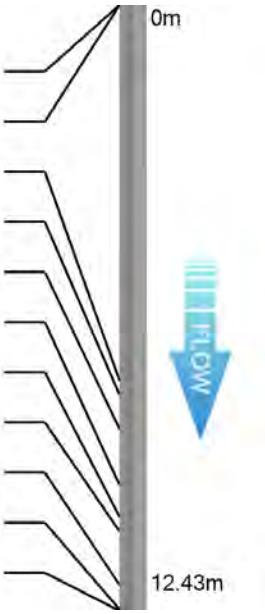
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0	0	3	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 10

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

1	2	4	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 11

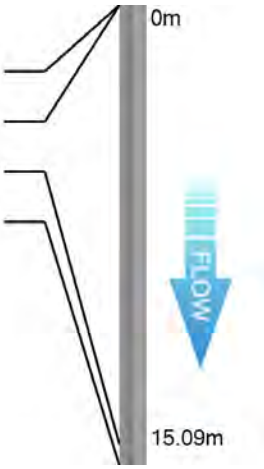
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0	0	1	0	0

DRB Grade for Section

B

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	

Site: BOLTON ROAD, BANBURY

Section 12

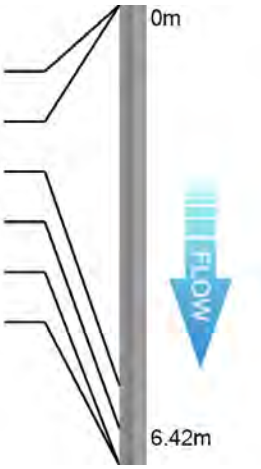
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0 0 1 1 0

DRB Grade for Section

C

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	

Site: BOLTON ROAD, BANBURY

Section 13

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

2	0	1	1	0

DRB Grade for Section

C

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	Image Provided - Ref: 12_9 
16.29m		WRF	Finish node type, major connection without manhole JOINS MAIN	

Total Defects for section

2	0	1	1	0

DRB Grade for Section

C

Site: BOLTON ROAD, BANBURY

Section 14

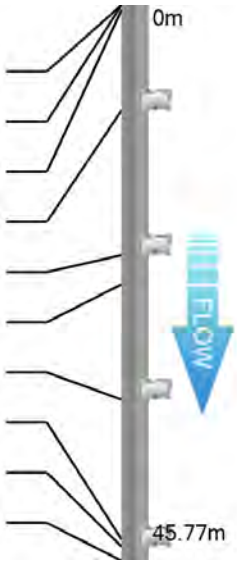
Client:	Location (Street Name):	City/Town/Village	Cust Job Ref.	Surveyors Name:	Date:
CHURCHILL RETIREMENT PLC	BOLTON ROAD	BANBURY		Simon Gardiner	10/08/2021

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

0	0	2	0	0

DRB Grade for Section

B

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	

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 Effulent
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	Cacth Pit	CPF
OC	Other Special Chamber	OCF
OF	Outfall	OFF
OS	Oil Seperator	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	

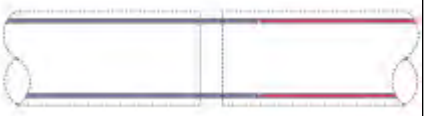
CX(I)	Defective Connection (Intruding)	Defective by intrusion or damage due to factors including: cracks, fractures, obstruction, position etc	Described by clock reference position and diameter (+ % intrusion)	
CU	Loss of Vision	Lens of camera is obscured by debris, water etc. Operator is unable to see drain clearly	'W' can be added if loss of vision is due to wate	
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

0	0	2	0	0

DRB Grade for Section

B

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	

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

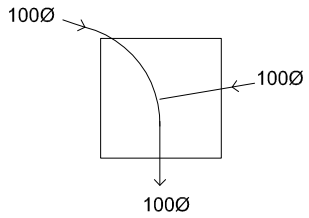
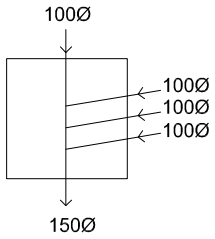
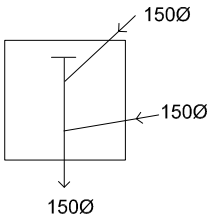
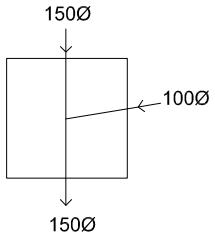
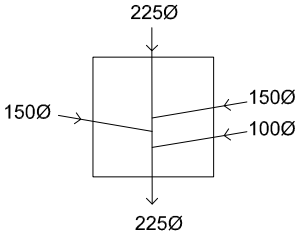
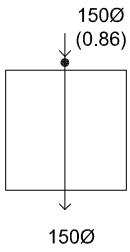
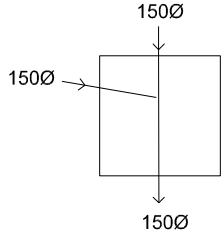
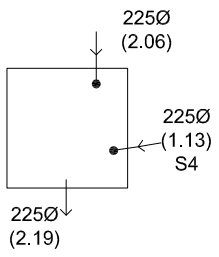
C. ANNOTATED SITE DRAWINGS

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.	

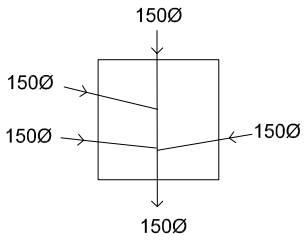
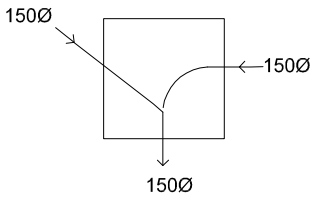
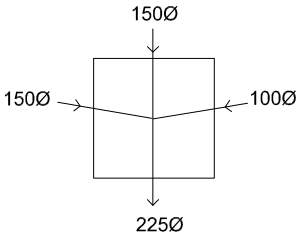
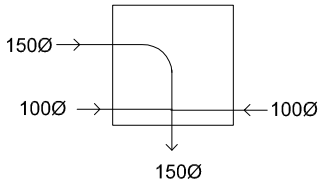
KEY:			
	C - Circular	L - Light Duty	Co - Concrete
	S - Square	M - Medium Duty	Br - Brick
	T - Triangular	H - Heavy Duty	R - Rectangular

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 Start	Manhole Finish	Sewer dia.	Recorded Metreage	Survey Abandoned	Remarks
F1	F2	100	10-98		
F2	F3	100	24-15		
F3	FA	150	5-22		
FA	F5	150	A-10		
S1	S2	150	5-63		DEBRIS
S3	S4	150	27-01		
S4	S5	225	23-23		
S5	S6	150	22-60		
S4	S7	225	12-43		
S9	S8	150	24-87	/	ENCRUSTATION
S9	S10	150	15-09		
S10	P11	225	6-42		
S7	MAIN	225	16-29		JOINS MAIN
S11	S5	150	45-77		
		TOTAL			

Standing Time | Meterage check: X | Length: OK

Reason for standing time

Remarks: F1 MATA LIVE CONNECTION TO LAND T/RE SERVICE
F1 MATB 100% MUD
S8-S9 50% ENCRUSTATION
S1-S2 UNABLE TO CLEAR NO ACCESS FROM DOWNSTREAM END

Special Instructions; Site Contact –

Checked

ROADWORKS & LANE CLOSED

UNABLE TO LIFT MANHOLES IN ROAD

JOINS MAIN

s4
445370.277mE
240756.745mN
95.585m

s3
445373.946mE
240741.489mN
96.091m

s1
445449.829mE
240753.710mN
96.555m

s1a
445443.912mE
240717.175mN
97.837m

s1b
98.381m

s1c
445385.768mE
240705.428mN
97.232m

s1d
96.717m

S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11

F1 F2 F3 F4 F5

MH@45m

MH@23m

BEND UP

MH@10m

MH@6m

SMALL SHALLOW CHAMBER FULL OF WATER

DEBRIS

METERS X2

LIVE CONNECTIONS FROM LAND TYRE SERVICE

LIVE CONNECTION

RWP

WATER

Eave Ht

Ridge Height

Conc

Appendix E Greenfield Runoff Calculation

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Letisha Blackmore
Site name:	1260 Banbury
Site location:	Banbury, Oxfordshire

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:	52.06326° N
Longitude:	1.3391° W
Reference:	936039756
Date:	Nov 08 2021 15:47

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 0.371

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.572
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.14

Hydrological characteristics	Default	Edited
SAAR (mm):	654	654
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	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/SPRHOST ≤ 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):		0.81
1 in 1 year (l/s):		0.69
1 in 30 years (l/s):		1.86
1 in 100 year (l/s):		2.58
1 in 200 years (l/s):		3.02

Appendix F Proposed Site Plan

REVISIONS

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

NORTH

0 5 10 15 20
scale bar - metres

Castle Street

Bolton Road

North Bar Street

Car Park

Trelawn House

Land Tyre Service

Access Road

area of public realm

metal gate

landscaping feature tbc

railings

1.2m metal railings with planting behind

1.2m metal railings with planting behind

1.2m metal railings with planting behind

1.2m metal railings atop dwarf brick wall

s4
445370.277mE
240756.745mN
95.585m

s3a
445353.456mE
240746.293mN
96.131m

s3
445373.946mE
240741.489mN
96.091m

s1d
96.717m

s1c
445385.768mE
240705.428mN
97.232m

OWNERS LOUNGE

patio

main ent.

RECEPTION

OFFICE

LOBBY

CIRCULATION

GROUND FLOOR OWNERS PLANT ROOM

BUGGY & CYCLES STORE

REFUSE STORE

GROUND FLOOR COMMS PLANT ROOM

27 residents car parking spaces (1:3 ratio)

1.8m high electric timber gates

electric pass gate

1.8m timber fence

existing brick wall with new 1.8m c/b timber fence atop

new brick-faced retaining wall with 1.2m metal railings atop

retain existing metal railing and brick wall

retain existing brick wall

bollards

Ridge Height

Parapet

Eave Ht

WATER

+95.05 +95.25 +95.85 +96.00 +96.25 +96.50 +96.60 +96.70 +96.75 +96.85 +97.00 +97.05 +97.10 +97.15 +97.20 +97.30 +97.35 +97.50 +97.74 +97.80 +98.00 +98.18 +98.35 +99.38

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planning issues
TOWN PLANNING AND ARCHITECTURAL DESIGN
Rob Jackson RIBA
Design Director - South West
Churchill House * Parkside
Ringwood * Hampshire BH24 3SG
Telephone: (01425) 462372
Fax : (01425) 462101
E-mail 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.			Rev.
10116BB - PA01			D

Appendix G MicroDrainage Network Calculations

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

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

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

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

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
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 Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009		96.490	94.270	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	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 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	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

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

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 (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
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

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 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	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 (m^3)	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

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 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	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 Name	Discharge Vol (m^3)	Pipe Flow (l/s)	Status
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

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 (m^3)	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

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

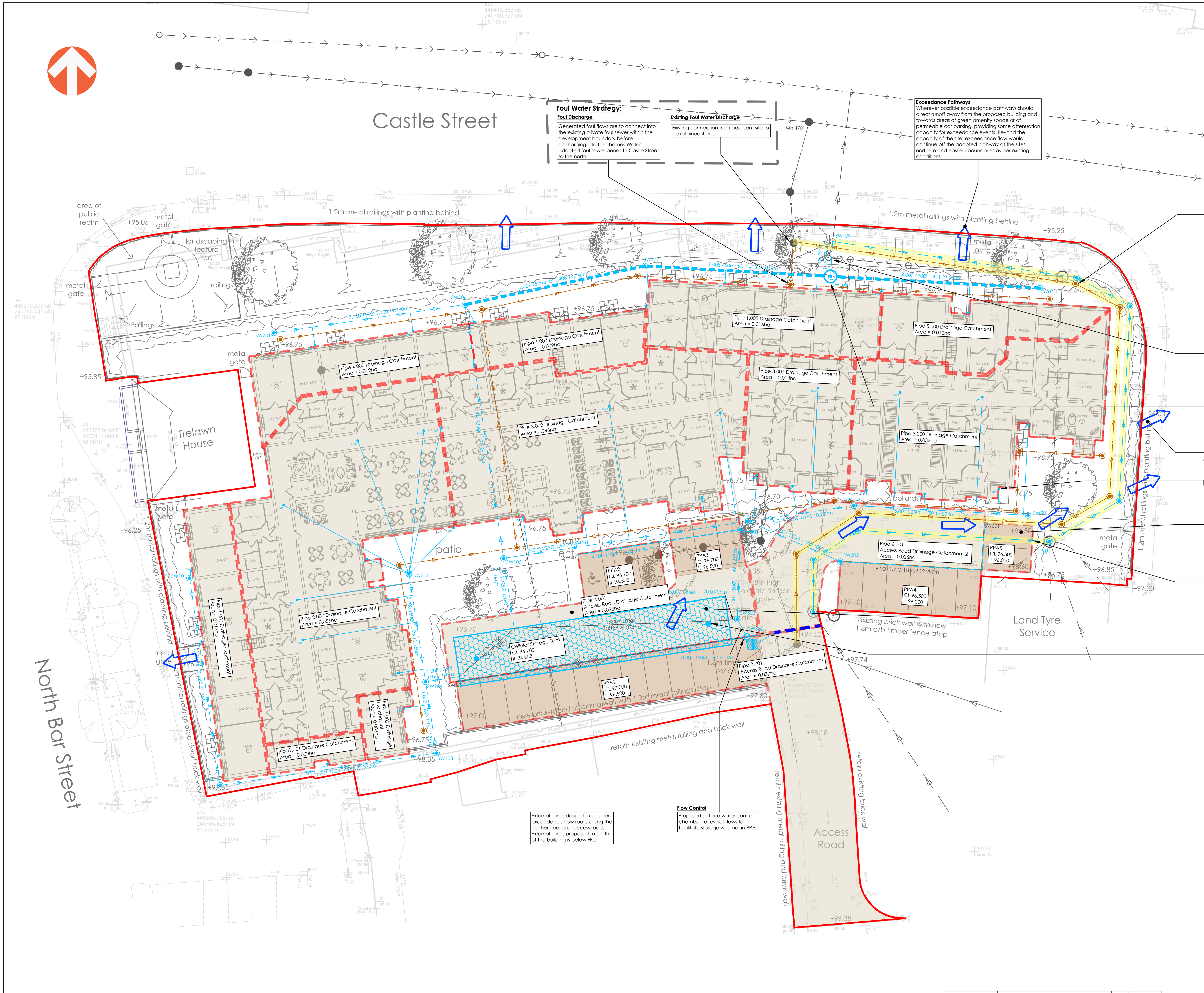
Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100, 200
Climate Change (%)	40, 40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (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 (m^3)	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



Surface Water Strategy:

Surface Water Discharge

Retained private surface water connection to the existing surface water network, subject to remedial works to correct a joint displacement at connection.

Flow Control

Proposed surface water control chamber to restrict flows up to 100yr return period and discharge up to 5.0 l/s (or 'as close to greenfield as practicable'). Controlled flows are proposed to discharge into the surface water network to the north within the Castle Street. 450Ø oversized pipe to enable surcharged runoff to back up to the attenuation tank and permeable paving within the parking court.

Exceedance Flows

Beyond the capacity of the site, flows would continue off-site as per existing brownfield conditions, albeit at a reduced rate and not or volume.

Rainwater Down Pipes

Indicative locations for RWP only

Underdrained Permeable Paving

Proposed underdrained permeable paving to receive surface runoff from access road and parking court. To provide treatment and further storage upstream of proposed cellular attenuation tank with fin drain to convey flows into the surface water network.

Additional capacity within PPA2-5 allocated for some exceedance storage.

PPA5 Exceedance Route

Cover level of PPA5, or part there of, to be 96.50mAOD to act as low point within private surface water network to allow re-emergence beyond the 200yr+40%CC event.

Cellular Attenuation

Cellular tank to receive flows from external hard paving and roof catchments. Chambers immediately upstream of tank to include silt traps.

Maintenance

Geocellular Attenuation to be fitted with access turrets for maintenance of feature. Minimum 1no. cover to be vented in accordance with manufacturer recommendations.

Area Summary Schedule

Exist. Impermeable Catchment 0.477 ha
Prop. Impermeable Catchment 0.308 ha

Equivalent Brownfield rate:

Existing brownfield based on max discharge of the existing 225Ø laid at minimum grade:

Brownfield Discharge Rate: 39.8 l/s

Equivalent Greenfield Runoff Rates

The greenfield runoff rates have been assessed for the net developable area using the FEH Method. The calculation excludes large areas of open space which will remain undeveloped.

Return Period	Greenfield Rate (l/s)
2yr	0.7
30yr	1.9
100yr	2.6

As far as practicable the site will seek to limit back to greenfield runoff rates based max discharge of 5.0 l/s as agreed with Thames Water

Attenuation Summary

PPA 1 Porous Paving

Catchment	0.037 ha
Hydraulic Control	50Ø Orifice @IL+0.000m
Porous Paving Porosity	30%
Porous Paving Dimensions	174m^2 x 0.5m deep

Complex Storage

Catchment	0.271 ha
Hydraulic Control	Hydrobrake @IL+0.000m Ref: MD-SHE-0101-5000-1300-5000
Cellular storage Porosity	95%
Cellular storage Dimensions	5.0 m x 27.0m x 1.0m deep
Over Sized Pipe Dimensions	450Ø X 60m
PPA 2-5 Porous Paving Porosity	30%
PPA 2-3 Porous Paving Dimensions	78m^2 x 0.5m deep
PPA 4-5 Porous Paving Dimensions	96m^2 x 0.5m deep

100yr+40% Volume Required: **148.5 m^3**
100yr+40% Discharge Rate: **5.0 l/s (87% betterment over existing brownfield conditions)**

Notes:

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.
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.
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.
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.
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.
6. The impermeable drained catchment will reduce though the development, also reducing the peak rates and volumes of runoff from the site.
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.
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.
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.
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.
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.
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.
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 Trewlawn House roof catchment.
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.
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.

Manhole Information		
Manhole Name	Cover Level	Invert Level
S101	96.750	95.500
S102	97.350	95.170
S103	98.350	95.000
S104	96.750	94.876
S105	96.750	94.775
S106	96.750	94.629
S107	96.750	94.583
S108	96.750	94.537
S109	96.490	94.270
S201	96.750	95.040
S301	96.750	95.250
S302	96.750	95.120
S303	96.750	95.040
S401	96.750	94.840
S501	96.750	94.589
S1	97.470	96.350
S8	96.660	95.450
F1	97.540	96.670
F4	96.650	93.230

Proposed and retained existing private drainage maintenance schedule (to be undertaken by building operator or appointed management company):

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

Key

Site Boundary

Existing Utilities
- Adopted Foul Water Sewer
- Private Surface Water Sewer
- Private Foul Water Sewer
- Existing Abandoned Drain
- Existing Surface Water Sewer

Existing Foul Water Sewer

Proposed Drainage
- Impermeable Drainage Catchment
- Underdrained Permeable Paving
- Cellular Storage Tank
- Private Surface Water Sewer
- Diverted Sewer
- Fin Drain
- Ø450 Surface Water Sewer
- Private Channel Drain
- Private Surface Water Inspection Chamber
- Flow Control
- Private Foul Water Drain
- Overland Exceedance
- Permavoid or similar approved
- Private Foul Inspection Chamber

REV	DATE	DESCRIPTION	BY	CHK	APD
E	28.06.2022	UPDATED TO SUIT LATEST CLIENT COMMENTS	TMR	LB	CY
D	14.06.2022	UPDATED TO SUIT LATEST CLIENT COMMENTS	VS	LB	CY
C	01.04.2022	UPDATED TO SUIT LATEST CLIENT COMMENTS	TMR	LB	CY
B	07.12.2021	UPDATED TO SUIT NEW LAYOUT	RF	LB	CY
A	15.11.2021	INITIAL ISSUE	RF	LB	CY

CLIENT: CHURCHILL RETIREMENT LIVING

DRAWING STATUS: PLANNING APPLICATION

PROJECT: CASTLE STREET, BANBURY

TITLE: PRELIMINARY DRAINAGE LAYOUT

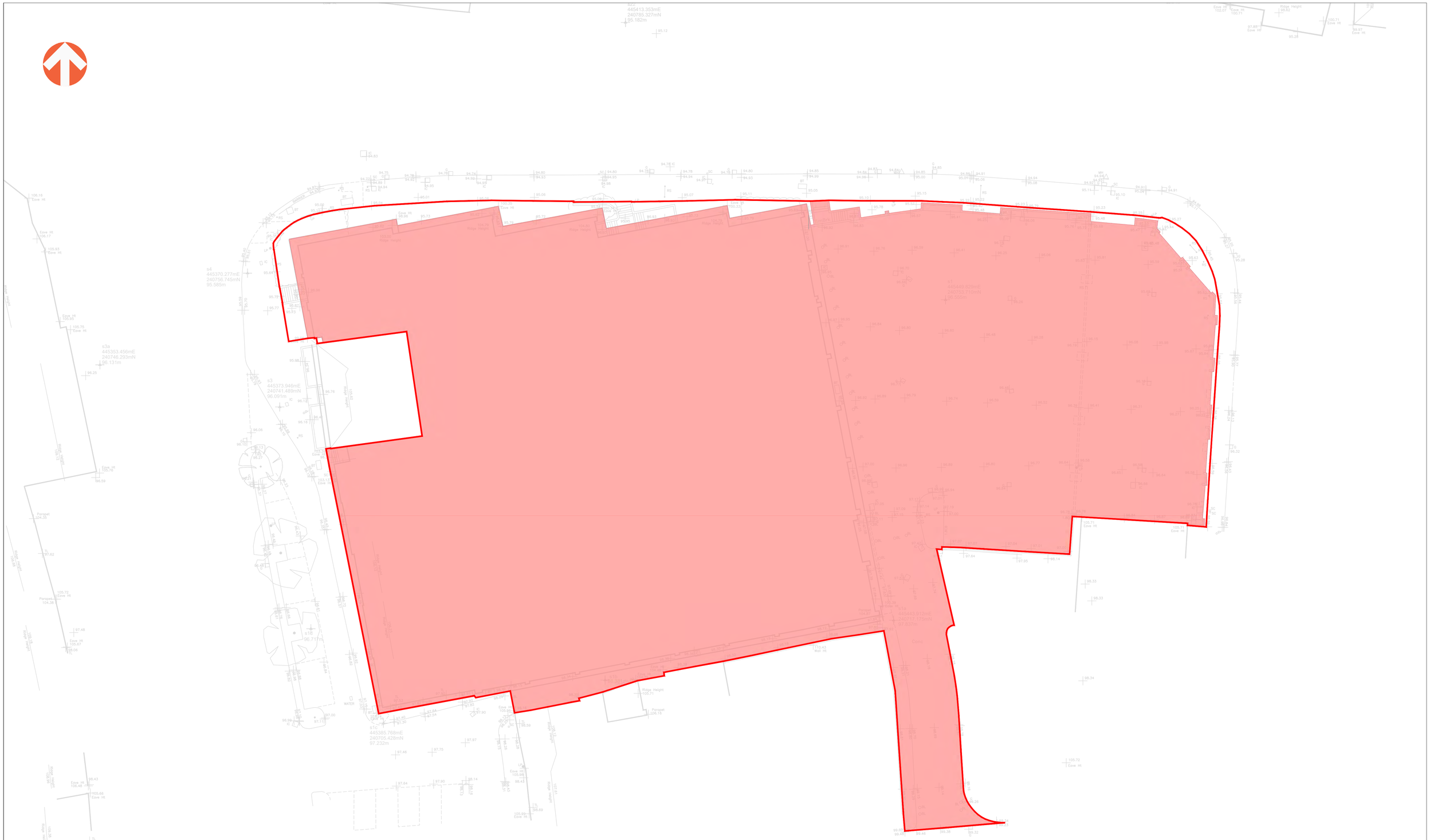
PROJECT No: 1260 | DRAWING No: 01-PDL-1001 | REV: E

SCALE @ A1: 1:200 (0–10 metres)

DESIGN BY:

awcockward partnership
Awcock Ward Partnership, Ada House, Pynes Hill, Exeter, EX2 5TU
Tel: 01392 409007 Web: www.awpexeter.com

Appendix I Existing Impermeable Areas Plan



Key

Site Boundary

Existing Impermeable Areas Catchments

Area Summary Schedule

Exist. Impermeable Catchment 0.477 ha

REV	DATE	DESCRIPTION	BY	CHK	APD
A	01.04.2022	INITIAL ISSUE	RF	LB	CY

CLIENT: CHURCHILL RETIREMENT LIVING

DRAWING STATUS: PLANNING APPLICATION

PROJECT: CASTLE STREET, BANBURY

TITLE: PRE-DEVELOPMENT IMPERMEABLE AREAS PLAN

PROJECT No:	DRAWING No:	REV:
1260	01-PDL-1002	A

SCALE @ A1: 0 1:200 10 metres

DESIGN BY:

awcockward partnership

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 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 calcuations. 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