

115 CHATHAM STREET,
READING, RG1 7JX

SURFACE WATER DRAINAGE STRATEGY

Archel Homes

PROJECT NUMBER: 21002

ISSUE DATE: February 2021

STATUS: FINAL



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This Sustainable Drainage Systems Strategy report was commissioned by Archel Homes in January 2021 to develop a Sustainable Drainage Strategy for the proposed development on the site at 115 Chatham Street.

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GLOSSARY

AOD	Above Ordnance Datum
ACD	Area of Critical Drainage
BGL	Below Ground Level
BGS	British Geological Survey
DEFRA	Department for Environment Food and Rural Affairs
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
RBC	Reading Borough Council
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan

EXECUTIVE SUMMARY

The proposed development site is located at 115 Chatham Street, Reading, RG1 7JX. The site is currently occupied by a single building and an associated parking area. The proposed development includes the demolition of the existing building on the site and the erection of a new five storey block of flats to provide 54 new residential dwellings.

The site is 0.162ha in size and is entirely hardstanding. In line with the Reading Borough Council's Local Plan, surface water for the proposed development will be managed through the implementation of Sustainable Drainage Systems (SuDS).

The SuDS strategy presented in this report has been produced to achieve the requirements of local policy to reduce surface water runoff post development to greenfield runoff rates wherever possible. The proposed SuDS strategy will, for the 1 in 100 years plus 40% climate change allowance rainfall event, reduce surface water runoff to 2l/s, the minimum practical rate using flow controls.

A SuDS scheme has been developed for the site, in accordance with the SuDS hierarchy, which will include the use of permeable paving with a porous sub-base, and an underground storage tank, which will be lined with an impermeable material. This storage tank will allow for the safe storage and discharge of surface water runoff generated by the site. The drainage strategy is based on the collection and conveyance of all roof and parking drainage to the buried storage tank, which will provide a total of 106.4m³ of surface water storage. This calculation neglects the provision of storage within the porous sub-base to the permeable paving, which will serve to reduce the storage volume required. All surface water will discharge via a flow control to the Thames Water surface water sewer which runs under Chatham Street at a maximum rate of 2l/s.

The geology of the site may be suitable for infiltration; however this has not been confirmed by a site specific ground investigation, which will be undertaken at the next stage of design. Although there is insufficient space on the site to safely implement point-infiltration techniques, it may be possible to infiltrate in a diffuse manner across the proposed car park area, subject to confirmation by a geotechnical engineer. This should be investigated at detailed design stage.

Due to the reduction in surface water runoff rates post development, and the provision of long-term surface water storage on the site to release excess volume at a "trickle" rate of 2l/s, the risk of surface water flooding elsewhere will be reduced by relieving the pressure on existing surface water drainage infrastructure. The use of permeable paving and a porous sub-base will provide water quality benefits by filtering the surface water runoff from the site.

Full drainage details of the surface water network for the proposed development will be carried out at the detailed design stage. The Management and Maintenance plan will also be developed at the detailed design stage.

1 INTRODUCTION

General Information

- 1.1 The site is located at 115 Chatham Street, Reading, RG1 7JX. The site is currently occupied by a small building and an accompanying car parking area.
- 1.1 The site has an area of 0.162ha and the proposed development is for the creation of 54 residential dwellings which means that, as outlined in The Town and Country Planning Order¹, the proposal is classed as "Major Development". Therefore, a Sustainable Drainage Strategy (SuDS) is required to inform an application for planning permission.
- 1.2 This report has been compiled to meet the requirements of the National Planning Policy Framework (NPPF) 2019, associated Planning Practice Guidance for Flood Risk and Coastal Change (PPG), and all local planning requirements.

Scope of Study

- 1.3 The main objectives of this study are to:
 - Provide a short flood risk assessment for the site, assessing the risk and implications of all types of flooding (proportionate to the level of risk);
 - Consideration of the pre- and post-development drainage systems and calculation of pre- and post-development runoff rates and volumes based on standard methodologies;
 - Provide advice and guidance on the management of surface water runoff at the site to ensure the risk of surface water flooding on the site and on nearby sites does not increase post-development;
 - Provide strategic design details for the surface water drainage system elements and appropriate connection locations;
 - Provide guidance on the future management and maintenance requirements for proposed SuDS elements.

¹ The Town and Country Planning (Development Management Procedure) (England) Order 2015, UK Statutory Instruments, 2015 No. 595 Part 1 Article 2

2 SITE DESCRIPTION

Location

- 2.1 The site is located at 115 Chatham Street in Reading, as shown in Figure 1.

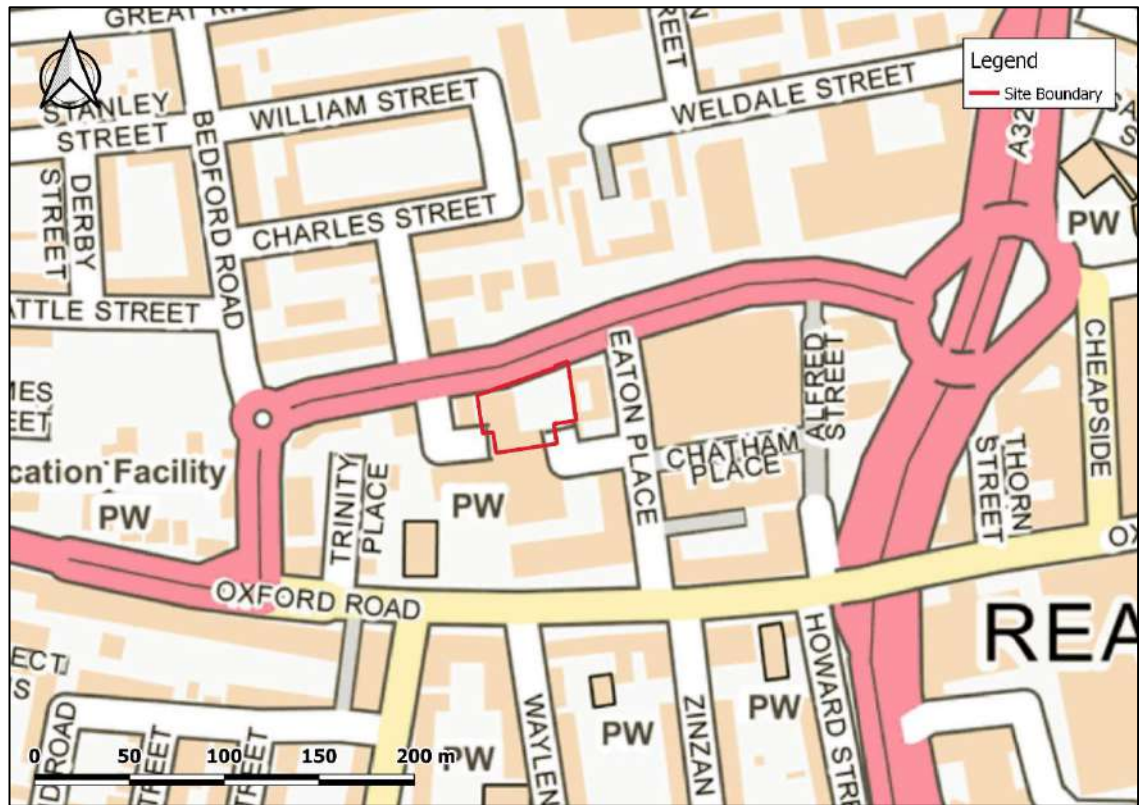


Figure 1 - Location of proposed development site²

- 2.2 The site lies within the jurisdiction of Reading Borough Council (RBC) which fulfils the role of Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA).

Topographic Survey

- 2.3 A topographic survey (Appendix A) has been conducted and shows that levels on the site vary between 42.83m AOD (above ordnance datum) at the north-western corner of the site and 44.43m AOD at the south-east corner of the site.

Existing Development

- 2.4 The site covers a total area of 0.162ha and is currently made up entirely of hardstanding areas associated with the existing building and parking area on the site. The site is bounded by Chatham Street to the north and urban developments to the south, east, and west.

Proposed Development

- 2.5 The proposed development involves the demolition of the existing building on the site and the erection a new five story housing block providing 54 residential dwellings. The plans include a

² Map Data © Ordnance Survey GB Overview Maps

small amenity garden area at the south of the site as well as parking and refuse areas on the ground floor. Drawings for the proposed development are provided in Appendix A.

- 2.6 The proposed development use is classified as 'more vulnerable' to flood risk according to Table 2: Flood risk vulnerability classification of the PPG³. As the development is to provide more than 10 new dwellings, the development is deemed to be 'Major'⁴. A SuDS statement is required for all Major development in Reading.
- 2.7 The development includes the use of permeable paving and an underground geocellular storage tank as a sustainable measure to reduce surface water runoff rates and provide long-term storage for additional volume of rainwater above greenfield.

³ <https://www.gov.uk/government/collections/planning-practice-guidance> Accessed 10/2020

⁴ <https://data.gov.uk> Planning Applications Decisions - Major and Minor Developments, England, District by Outcome (last updated August 2015)

3 PLANNING POLICY

National Planning Policy Framework

3.1 The National Planning Policy Framework (NPPF) was updated in February 2019⁵ and sets out the Government's planning policies for England and how these are expected to be applied. The NPPF requires that "major development" incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate, as required by the House of Commons Written Statement (HCWS161) set down in December 2014. Paragraph 165 requires that all drainage systems should:

- a) take account of advice from the lead local flood authority;*
- b) have appropriate proposed minimum operational standards;*
- c) have maintenance arrangements in place to ensure an acceptable standard of operation of the lifetime of the development; and*
- d) where possible, provide multifunctional benefits*

3.2 The accompanying Planning Practice Guidance⁶ (PPG) for Flood Risk and Coastal Change introduces the drainage discharge hierarchy (paragraph 080) which prioritises discharge of surface water to the ground and local watercourses prior to discharge to existing piped networks. The PPG requires consideration of the arrangements for maintenance of drainage systems, and refers ultimately to the Non-statutory Technical Standards for sustainable drainage systems⁷ in providing the framework for SuDS design, but does introduce the following exceptions (paragraph 083):

- where compliance with the Standards would be more expensive than simply complying with building regulations, it is considered that it is "unlikely to be reasonably practicable" to comply with the Standards and therefore building regulations would be acceptable; and
- where compliance with the discharge hierarchy would cost more to design (including maintenance) and construct than a discharge route further down the hierarchy (for example connection to the public sewer would cost less than construction of soakaways), then it is normally considered "not reasonably practicable".

Non-statutory Technical Standards for Sustainable Drainage Systems

3.3 The NPPF requires the use of the Non-statutory Technical Standards for all drainage design related to "major development", except where it is "not reasonably practicable" to comply. The Technical Standards set out the required flow and volume restrictions, as well as requirements relating to flood risk, "so far as is reasonably practicable" as follows:

- Peak flows to drains or surface water bodies for the 1 year and 100 year return period rainfall events should never exceed the peak discharge rate prior to development, i.e. should not exceed greenfield peak flows for greenfield sites, and should be as close as reasonably practicable to greenfield for previously developed sites.
- Total runoff volumes to drains or surface water bodies in the 100 year return period, 6 hour rainfall event should never exceed the runoff volume prior to development, i.e. should not exceed greenfield volumes for greenfield sites, and should be as close as reasonably

⁵ Ministry of Housing, Communities and Local Government (February 2019), updated National Planning Policy Framework

⁶ Communities and Local Government, Planning Practice Guidance, 2014

⁷ Department for Environment, Food and Rural Affairs (March 2015), Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems

practicable to greenfield for previously developed sites. In addition, where it is not possible to prevent additional volume leaving the site, additional volume must be discharged at a rate that does not affect flood risk.

- Unless specifically designed to hold or convey water above ground, drainage systems must be designed to contain below ground the 30 year return period rainfall event, to prevent any flooding of buildings or susceptible infrastructure in the 100 year return period rainfall event, and to provide exceedance routes for greater return period events that minimise the risks to people and property.
- The drainage system should be designed with sufficient structural integrity for the lifetime of the development for the anticipated loading conditions, should minimise the use of pumps, and should be constructed in such a way to avoid damage to existing drainage systems.

Sequential and Exception Tests

- 3.4 The Flood Risk and Coastal Change section of the Planning Practice Guidance recommends that a risk-based Sequential Test should be applied to development with consideration of flood risk in order to steer new development to areas at the lowest probability of flooding.
- 3.5 According to the latest GOV.UK Flood Zone maps, the site is located entirely within Flood Zone 1, which is an area identified as having the lowest probability of flooding from rivers and the sea (less than 1 in 1,000 annual probability of flooding). Therefore, the application of the Sequential Test is not required for this scheme, since the development would pass by default.
- 3.6 Table 3 of the PPG for Flood Risk and Coastal Change indicates that 'More Vulnerable' uses are compatible with Flood Zone 1. Therefore, the Exception Test is not required for this proposed development.

Local Planning Policy

- 3.7 Reading Borough Council (RBC) fulfils the role of Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA).
- 3.8 The RBC new Local Plan⁸ was adopted on 4th November 2019. This document sets out the RBC's planning policies for development in Reading up to 2036 and is the main consideration in deciding planning applications.
- 3.9 Policy EN18: Flooding and Sustainable Drainage Systems of the RBC Local Plan states that:

"All major developments must incorporate sustainable drainage systems (SuDS) as appropriate and in line with the Governments Technical Standards. Smaller schemes are encouraged to incorporate SuDS, where possible. Runoff rates should aim to reflect greenfield conditions and, in any case, must be no greater than the existing conditions of the site. Schemes should ensure that the movement of water through vertical infiltration as well as horizontal run-off does not worsen contamination effects. Wherever possible, SuDS provision should maximise ecological benefits, link into the existing Green Network, incorporate tree planting and landscaping and avoid damage to existing significant trees including through changes to the site hydrology. All new developments in areas of flood risk should give priority to SuDS."

⁸ Reading Borough Council, Reading Borough Local Plan, Adopted November 2019

- 3.10 The RBC Local Plan, as well as other local policy relating to flooding and drainage such as the RBC Strategic Flood Risk Assessment⁹ (SFRA), refer to the NPPF and associated Non-statutory Technical Standards for details on the design guidance of major development SuDS strategies.

⁹ Reading Borough Council, Strategic Flood Risk Assessment, June 2017

4 FLOOD RISK AND HYDRAULIC FEATURES

- 4.1 According to the topographic survey, the existing site is situated at a minimum level of 42.83m AOD. LiDAR of the area shows the surrounding ground levels to fall to the north, east and west of the site and rise to the south.
- 4.2 Due to the local topography, which places the site well above any nearby river levels, the site is not at any significant risk of flooding. However, the relevant flood risk mapping has been reviewed to confirm this assessment.
- 4.3 The site is located approximately 950m south west of the River Thames, 600m north west of the Holy Brook, and 750m north west of the River Kennet. The site falls within Flood Zone 1 as shown on the latest Flood Map for Planning, presented in Figure 2. The nearest floodplain to the site is that of the River Thames. However, the site is over 7m higher than the Thames river level nearest to the site (based on LiDAR) and therefore, the risk of flooding from rivers and sea is less than 0.1% in any year.

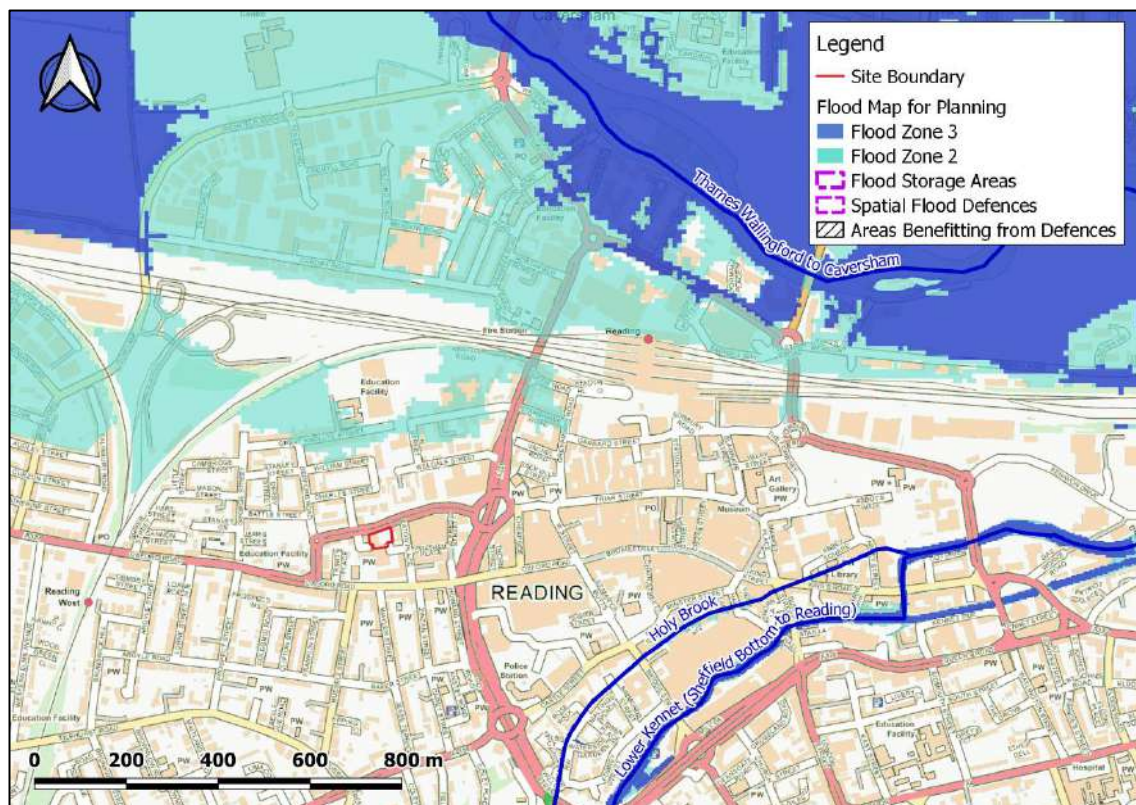


Figure 2- Flood Map for Planning¹⁰

- 4.4 Similarly, the gov.uk long term risk mapping, as presented in Figure 3 shows that the site is not at significant risk of flooding due to heavy rainfall that is unable to infiltrate into the ground (i.e. surface water flooding). The surface water flood map shows areas to the north (Great Knollys Street) and east (Castle Street) forming localised overland flood paths towards the River Thames. These localised overland flood paths are not shown to affect the site. As a result, the risks from this source are low and any raised thresholds should be sufficient to mitigate the risk of internal

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flooding due to overland flow of floodwater. Surface water falling on the site area will be managed on-site such that there is no significant risk of flooding to proposed building in the 100 year return period event including an allowance for climate change.

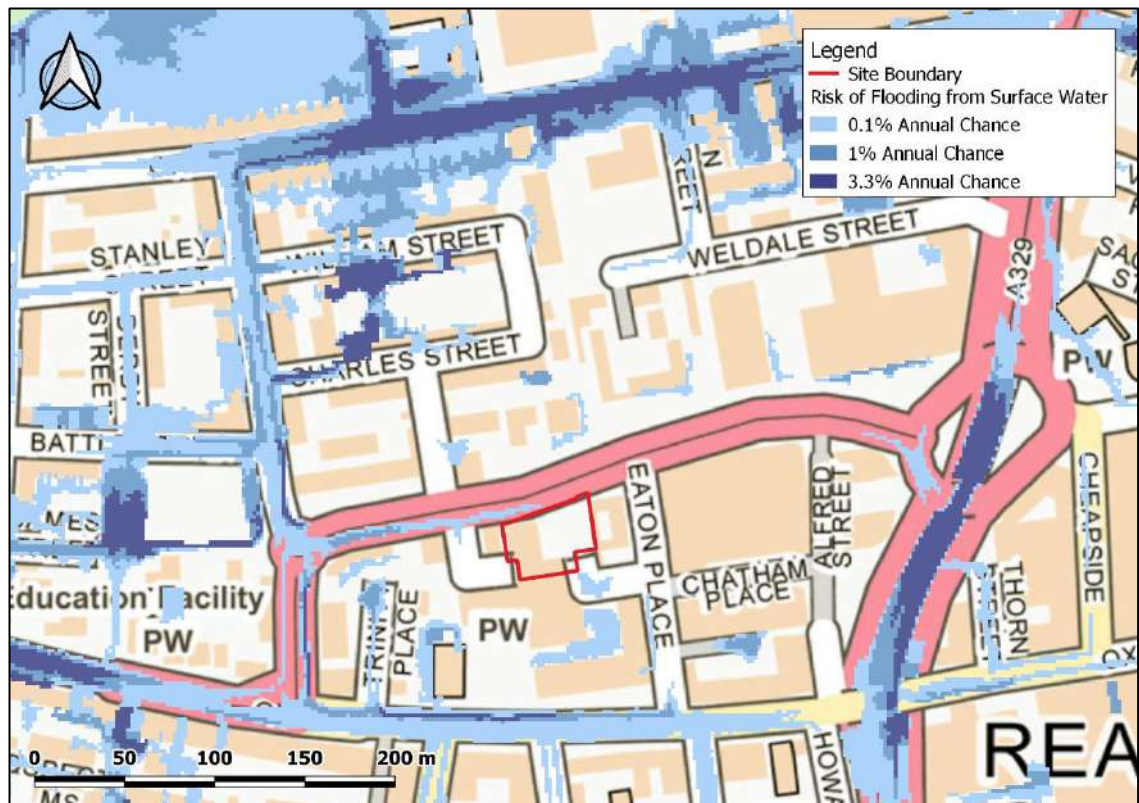


Figure 3 – Surface Water Flood Risk Map¹¹

- 4.5 Thames Water has confirmed there is no known or reported risk of flooding to the site from overloaded sewers. A review of the gov.uk reservoir flood risk map has also found the site not to be at risk due to reservoir flooding.
- 4.6 The online 1:50k British Geology Society (BGS) map¹² indicates that the site is underlain by superficial deposits of Taplow Gravel – Sand and Gravel. Beneath the Taplow Gravel is the Seaford Chalk formation And Newhaven Chalk Formation (undifferentiated). Both the superficial and bedrock strata can support groundwater. The Taplow Gravel superficial deposits are classified as a Secondary Aquifer type A, defined as a permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers. The Seaford Chalk Formation and Newhaven Chalk Formation bedrock is classified as a principal aquifer, defined as layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. Principal aquifers may support water supply and/or river base flow on a strategic scale.
- 4.7 The nearest, relevant borehole data is located on Chatham Street, approximately 50m east of the site. Borehole SU77SW810, indicated on the BGS map, shows two superficial strata present; a superficial brown silty clayey sand atop a dense brown silty sandy chalky gravel. This borehole shows these superficial deposits are present up to an approximate depth of 2.85m which is

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¹² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> accessed 20/01/2021

underlain by a firm to stiff remoulded chalk bedrock. Groundwater was found at a depth of approximately 8m BGL (Appendix C).

- 4.8 The RBC SFRA estimates the groundwater level to be approximately 40m AOD along the northern and western boundaries of the Borough, falling to approximately 30m AOD along the south eastern boundary of the Borough. The SFRA also confirms that the chalk aquifer is in hydraulic continuity with the River Thames and River Kennet.
- 4.9 Therefore, the primary mechanism for elevated groundwater at the site are associated with periods of above average rainfall in permeable superficial deposits and the hydraulic continuity of the bedrock aquifer with high river water levels.
- 4.10 Given the depth to groundwater seen in nearby borehole data, and the elevation of the site above the River Thames, the risk of groundwater emergence as a result of high river water levels is considered to be low.
- 4.11 As the general area is predominantly hard paved urban development, there is limited opportunity for rainfall to infiltrate directly and raise groundwater levels, and similarly for groundwater to emerge at the surface. In the unlikely event of groundwater emergence at the surface it would likely follow localised flow paths and be conveyed via the roadways towards the River Thames.
- 4.12 The site is considered to be at low risk of flooding from all sources with the exception of rainfall runoff generated directly on the site. This will be managed in a suitable collection system such that there will be no flooding of the site up to and including the 100 year return period rainfall event including a 40% allowance for future climate change to 2121. Consequently, there are no significant risks of flooding to the site.

5 SURFACE WATER MANAGEMENT

- 5.1 In accordance with the NPPF, surface water runoff rates and volumes should not increase as a result of development. The RBC is the LLFA and requires the following for previously developed sites:

For previously developed sites, the peak discharge rate must be as close as reasonably practicable to the equivalent greenfield runoff rate for the site. It should never exceed the rate of discharge from the site prior to redevelopment.

- 5.2 The RBC local policy requires that all development refer to the NPPF which requires no increase of surface water runoff post development. Surface water on the site will be managed through the implementation of SuDS techniques.

Ground Conditions

- 5.3 Ground conditions are important to understand whether infiltration measures for sustainable drainage are feasible to discharge surface water runoff post development.
- 5.4 The ground conditions on the site have been discussed in detail in the previous section. A borehole log from nearby to the site shows a permeable superficial deposit of sands and gravel on the site (2.85m thick) atop a permeable chalk bedrock. This shows that there is potential to allow for the infiltration of surface water drainage into the ground. The DEFRA Magic Maps show that the site is not located in a groundwater Source Protection Zone (SPZ).
- 5.5 Due to time constraints, no ground investigation has yet been undertaken on site. The site is likely to be suitable for the use of diffuse infiltration subject to spatial constraints, which would reduce both rates and volumes of surface water discharge. The implementation of any infiltration SuDS should only be pursued once a full ground investigation has been performed, which will occur on site as part of the detailed design stage. Prior to confirmed infiltration potential, and the absence of site contamination, it should be assumed that the site is not suitable for infiltration and therefore an alternative strategy is considered to demonstrate feasibility.
- 5.6 Groundwater contamination will be fully accounted for during the detailed design stage if infiltration SuDS are implemented in the final design. This will involve contacting the Environment Agency to discuss any potential infiltration constraints. However, it is assumed, in line with policy, that the infiltration of surface water from the development will be constrained at a maximum depth of 1 m above the groundwater level in accordance with the SuDS manual.
- 5.7 In the absence of a suitable ground investigation to confirm infiltration rates, the strategy presented herein will focus on non-infiltrating drainage components. Should infiltration be found to be practicable, the final design should discharge to ground, where ground stability constraints allow, which will reduce the total volume of water discharging from the site.

Existing Site Runoff

- 5.8 The site boundary encloses an area of 0.162ha and is currently occupied by a single building and an accompanying parking area. There is no known existing attenuation storage infrastructure on site. However, as the site is entirely hard paved it is assumed that runoff from the site drains to surface water sewers which serve the area.
- 5.9 The existing peak storm runoff rates and rainfall runoff volumes have been calculated for a range of event probabilities up to the 1 in 100 years rainfall. The calculations were completed using MicroDrainage and are based on an impermeable area of 0.162ha and FEH 2013 rainfall data at

the site location obtained from the FEH Webservice. Table 1 summarises these results. The Full MicroDrainage calculations are provided in Appendix B.

Table 1 - Existing Runoff Rates

Event Scarcity	Existing Runoff Rate (l/s)
1 in 2 years	18.4
1 in 30 years	42.5
1 in 100 years	54.9
1 in 100 years + 40% Climate change	76.8

Existing Site Drainage

- 5.10 Thames Water sewer records, attached in Appendix A, show multiple existing public sewers in the immediate vicinity of the site.
- 5.11 The nearest public sewer is a surface water sewer which runs east to west along Chatham Street, less than 10m north of the site. There are multiple surface water sewers running along Chatham Street, as well as a surface water sewer running north to south along Eaton Place. There is also a foul water sewer running east to east along Chatham Street, originating slightly to the north-west of the site.
- 5.12 Given there are many public surface water sewers serving the area immediately surrounding the site it is assumed that surface water runoff from many of the surrounding existing buildings discharges to these surface water sewers. This suggests that few properties in the immediate vicinity of the site discharge surface water via soakaway into the ground.

Greenfield Runoff Rate

- 5.13 The greenfield runoff rates from the site were calculated using the UK SuDS online tool¹³ and the Flood Estimation Handbook (FEH) statistical method (Appendix B). The greenfield runoff rates have been calculated based on the existing impermeable site area of 0.162ha. The 1-year, 30-year and 100-year return period events result in a greenfield discharge rate of 0.1l/s, 0.26l/s and 0.37l/s respectively.

Climate Change

- 5.14 The current best practice for climate change allowance is the National Planning Policy Framework (NPPF), which defers to the PPG¹⁴ to specify climate change allowances. The Environment Agency recommends an increase in river flows and rainfall intensity depending on which river basin district the site lies in and the type of development.
- 5.15 The range of allowances is based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it. The central allowance is based on the 50th percentile, the higher central is based on the 70th percentile and the upper end is based on the 90th percentile.
- 5.16 In this context, the Environment Agency anticipated changes in extreme rainfall intensity in small and urban catchments, which are shown in Table 2:

¹³ <http://www.uksuds.com/drainage-calculation-tools/> Accessed: 11/02/2021

¹⁴ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Table 2 – Peak Rainfall intensity in small and urban catchments

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper End	10%	20%	40%
Central	5%	10%	20%

- 5.17 The planned lifetime for the proposed development is assumed to be 100 years, in accordance with the PPG¹⁵ for Flood Risk and Coastal Change.
- 5.18 The proposed development is classified as 'More vulnerable' and therefore it is recommended that the 'Upper End' allowance should be used to assess the future impacts of climate change on peak rainfall intensity. A 40% increase in peak rainfall intensities has been adopted as the allowance for climate change in the design calculations, which is considered to be a precautionary approach.

Proposed Site Runoff

- 5.19 The total proposed development area is 0.162ha. Although there are some small areas of soft landscaping at the front and rear of the development, for the purpose of this assessment the entire site area is considered to be impermeable and the full area of 0.162ha has been used as the drained area for the basis of the calculations.
- 5.20 It is proposed to limit the peak storm runoff for the 1 in 100 years rainfall event plus 40% allowance for future climate change to 2l/s, the minimum practical rate to minimise the chance of blockage, using flow control devices.
- 5.21 Analysis has been undertaken in MicroDrainage in order to propose a SuDS strategy, in accordance with sustainable drainage principles, which limits the surface water runoff from the development to the proposed rates.

Sustainable Drainage Principles

- 5.22 The aim of Sustainable Drainage Systems (SuDS) is to emulate natural processes with the result that watercourses and storage areas receive the hydrological profiles under which they evolved, and that water quality in local ecosystems is protected or improved. The best practice guide states that a sustainable drainage system will¹⁶:
- reduce the impact of additional urbanisation on the frequency and size of floods;
 - protect or enhance river and groundwater quality;
 - be sympathetic to the needs of the local environment and community; and
 - encourage natural groundwater recharge.

¹⁵ <https://www.gov.uk/government/collections/planning-practice-guidance> Accessed 10/2020

¹⁶ CIRIA C523 – Sustainable Urban Drainage Systems – Best Practice Manual

- 5.23 The SuDS hierarchy (shown in Figure 4) sets out a hierarchy of SuDS solutions from the most sustainable drainage methods to the least sustainable methods.

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviers	✓	✓	
	Tanked systems - over-sized pipes/tanks - storms cells	✓		
Least Sustainable				

Figure 4 – SuDS Hierarchy¹⁷

- 5.24 Any development of land will need to be compliant with the requirements of the NPPF and local planning policies. As a minimum requirement, surface water runoff will need to be attenuated to existing rates, thus ensuring no detrimental impact on the frequency and extent of flooding elsewhere because of development.
- 5.25 The SuDS hierarchy was applied specifically to the site to determine the most suitable methods for the addition of SuDS post-development. The application of the SuDS hierarchy is summarised in Table 3 below:

¹⁷ Environment Agency Development Control Technical Specialists (October 2006) SUDS A Practical Guide. Development Control Thames Region

Table 3 - Application of the SuDS hierarchy to the proposed development

	SuDS Technique	Suitable	Justification
Most Sustainable	Living Roofs	No	The design of the proposed scheme includes a mixture of pitched and flat roofs. The flat roof includes many skylight features which limits the potential and feasibility of a living roof. The significant costs of building and maintaining a living roof, relative to the potential benefits, are therefore deemed prohibitive.
	Basins and ponds 1. Constructed wetlands 2. Balancing ponds 3. Detention basins 4. Retention ponds	No No No No	Insufficient space
	Filter strips and swales	No	Insufficient space
	Infiltration devices 1. Soakaways 2. Infiltration trenches & basins	No No	There is insufficient space to successfully implement soakaways on the site. Diffuse infiltration, for example from permeable paving, may be acceptable but this must be confirmed through a site specific ground investigation
	Permeable surfaces and filter drains 1. Gravelled areas 2. Solid block paving 3. Porous pavements	Yes Yes Yes	Permeable surfaces represent a suitable option and have been suggested as a solution for the proposed parking areas on the site.
	Tanked Systems 1. Over-sized pipes/tanks 2. Box storage systems	Yes Yes	There is suitable space on the site for tanked storage with a flow control device.
Least Sustainable			

- 5.26 In accordance with UK Building Regulations¹⁸, soakaways are to be built a minimum of 5 m away from all buildings and 2.5 m away from the site boundary. The proximity of the proposed building to the site boundary means there is insufficient space to implement soakaways on the site.
- 5.27 The use of permeable paving for the proposed parking area on the site represents a sustainable and viable option for the site. This system could provide attenuation volume to reduce peak runoff rates via a lined granular sub-base that will be constructed beneath the permeable paving. Further, if distributed infiltration is found to be feasible following a detailed ground investigation, unlined permeable paving could be used to promote infiltration and reduce total volumes of rainfall leaving the site.
- 5.28 Buried storage systems are to be considered, to discharge surface water to the surface water sewer which runs under Chatham Street. Buried storage would be used as an alternative to, or to supplement, storage in permeable paving where sufficient area is not available and/or half-drain times would generate an increased risk of flooding due to successive rainfall events. Therefore, the strategy presented will focus on calculating the storage required, which will ultimately be split between crated storage and paving sub-base storage, at the detailed design stage. These measures allow for the proposed development to be sustainably drained and to reduce pressure on the local sewer system.
- 5.29 The drainage strategy for the proposed scheme is summarised in the following paragraph.

Proposed Surface Water Drainage Strategy

- 5.30 For the strategic assessment, the following principles have been assumed:
- The proposed site layout is that shown on the drawings provided by DHA Architecture, Drawing numbers 022014-ARC-E1, 022014-ARC-APT-P1, 022014-ARC-01 (Appendix A).
 - The site levels are assumed to be those presented in the topographic survey provided completed by Warner Surveys dated May 2020, Drawing number RT/220/0534/P/000/1 (Appendix A).
 - There is sufficient capacity in the Thames Water Sewer which runs under Chatham Street to accommodate the additional flow of 2l/s from the site. This has been confirmed by Thames Water (Appendix A).
- 5.31 Based on these design principles and constraints a strategic design has been completed in line with the SuDS hierarchy. The proposed SuDS strategy can be seen within the drawings in Appendix A and includes the following proposed measures:
- Porous asphalt or permeable block paving, with an associated porous sub-base, is suggested for use on the shared parking area, eliminating the need for road gullies and reducing maintenance requirements. The area for the suggested permeable paving is approximately 264 m²;
 - All surface water drainage from the proposed roof area, amenity gardens and shared parking area will be collected and conveyed into the proposed underground geocellular attenuation storage unit with a base area of 120m². For the purpose of this strategy, and to demonstrate feasibility, it has been assumed that the ACO Stormbrixx¹⁹ system will be used, with a depth of 0.914m and a void ratio of 0.97, to give a total storage volume of

¹⁸ The Building Regulations 2010, H Drainage and waste disposal

¹⁹ ACO StormBrixx - Stormwater attenuation and infiltration system, Specification and technical data www.stormbrixx.co.uk

106.4m³. The geocellular storage unit will be lined with an impermeable material on its sides and base.

- The invert level of the storage unit will be approximately 42.09m AOD, 1.51m below ground level to ensure the appropriate level of cover and sufficient self-cleansing gradients for all incoming and outgoing pipes.
- The storage unit will connect to the surface water sewer under Chatham Street via a gravity connection to the TW manhole 8553, which has an invert level of 41.78m AOD (see Appendix A). The storage unit outflow will be fitted with a flow control device such that stormwater from the proposed development will be discharged at a rate of 2l/s, the lowest practical rate for the use of flow controls.

- 5.32 The design principles set out above are subject to review at the detailed design stage but serve to demonstrate a feasible drainage solution for the purpose of this assessment.
- 5.33 Appendix B includes a detailed MicroDrainage analysis of the proposed surface water sewer system, which demonstrates how flows can be attenuated through the use of a buried geocellular storage tank. In the 100 year plus 40% climate change surface water flood event flows will be fully contained in the storage tank and the half drain time of the storage tank has been calculated as 454 minutes.
- 5.34 The suggested permeable paving area has not been included in the MicroDrainage model. This is a conservative approach to sizing the buried geocellular storage tank, as any additional storage provided by the porous paving and its associated sub-base is omitted in the analysis. Further, the potential reduction in surface volume discharging from the site due to potential infiltration has conservatively not been considered in the calculations.
- 5.35 The surface water runoff of runoff criterion, which requires no increase in total runoff volumes from the site post-development, is satisfied by providing long-term storage to enable flows to be discharged at the minimum acceptable runoff rate ("trickle rate").
- 5.36 Permeable surfaces are also recommended for use at the front of the property and in the Amenity Gardens area. The exact area of these permeable surfaces will be dependent on the final landscaping design.

SuDS Management and Maintenance

- 5.37 Management and maintenance of the drainage network will be the responsibility of the freeholder of the site. Management and maintenance agreements and plans will be arranged prior to completion of development.
- 5.38 The SuDS Manual (CIRIA Guide)²⁰ provides details for maintaining permeable paving and attenuation storage, as presented in Table 4 and Table 5, respectively. Management and maintenance of the drainage should be carried out in accordance with the permeable paving supplier's guidance and specification.

²⁰ CIRIA, CIRIA C753 The SuDS Manual, London 2015

Table 4 - Maintenance requirements for permeable paving areas

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required)
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost joining material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation	Annually
	Monitor inspection chambers	Annually

Table 5 - Maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface or filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlets, 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
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

6 CONCLUSIONS

- 6.1 The report concludes that the proposed development, located within Flood Zone 1 of the Environment Agency Flood Map for Planning, is safe from flooding from all sources.
- 6.2 Flood risk on the site and elsewhere will be reduced by the implementation of the proposed drainage strategy. The proposed development incorporates SuDS techniques, such as permeable surfaces and an underground storage tank, to prevent surface water flooding on the site up to the 1 in 100-year event including a 40% allowance for climate change.
- 6.3 The proposed scheme will need to implement a total storage volume of 106.4m³. This will be supplied by a buried geocellular storage tank with a base area of 120m². This storage will ensure that all surface water can be attenuated for the 1 in 100 years plus 40% climate change event. Stored water will discharge via a flow control to the Thames Water surface water sewer which runs under Chatham Street at a maximum rate of 2l/s. Thames Water have agreed to this discharge rate, which represents a significant improvement on the existing surface water discharge rate for the same 1 in 100 year plus 40% climate change event.
- 6.4 Permeably paving is proposed for the parking area on the site, providing filtration of the surface water through the permeable blocks and granular subbase. The permeably paved area, and the remaining hardstanding area of the site would discharge to the crated storage tank. The permeable sub-base, and any infiltration through the base, where feasible, has conservatively been ignored in the calculation of the required storage, to demonstrate feasibility.
- 6.5 Full drainage modelling of the surface water network for the proposed development will be carried out at the detailed design stage. The Management and Maintenance plan will also be developed at the detailed design stage.

APPENDIX A - DRAWINGS

Topographic Survey, Warner Surveys, Drawing no. RT/220/0534/P/000/1

Proposed development drawings, DHA Architecture, Drawing no. 022014-ARC-01, 022014-ARC-E1, 022014-ARC-APT-P1

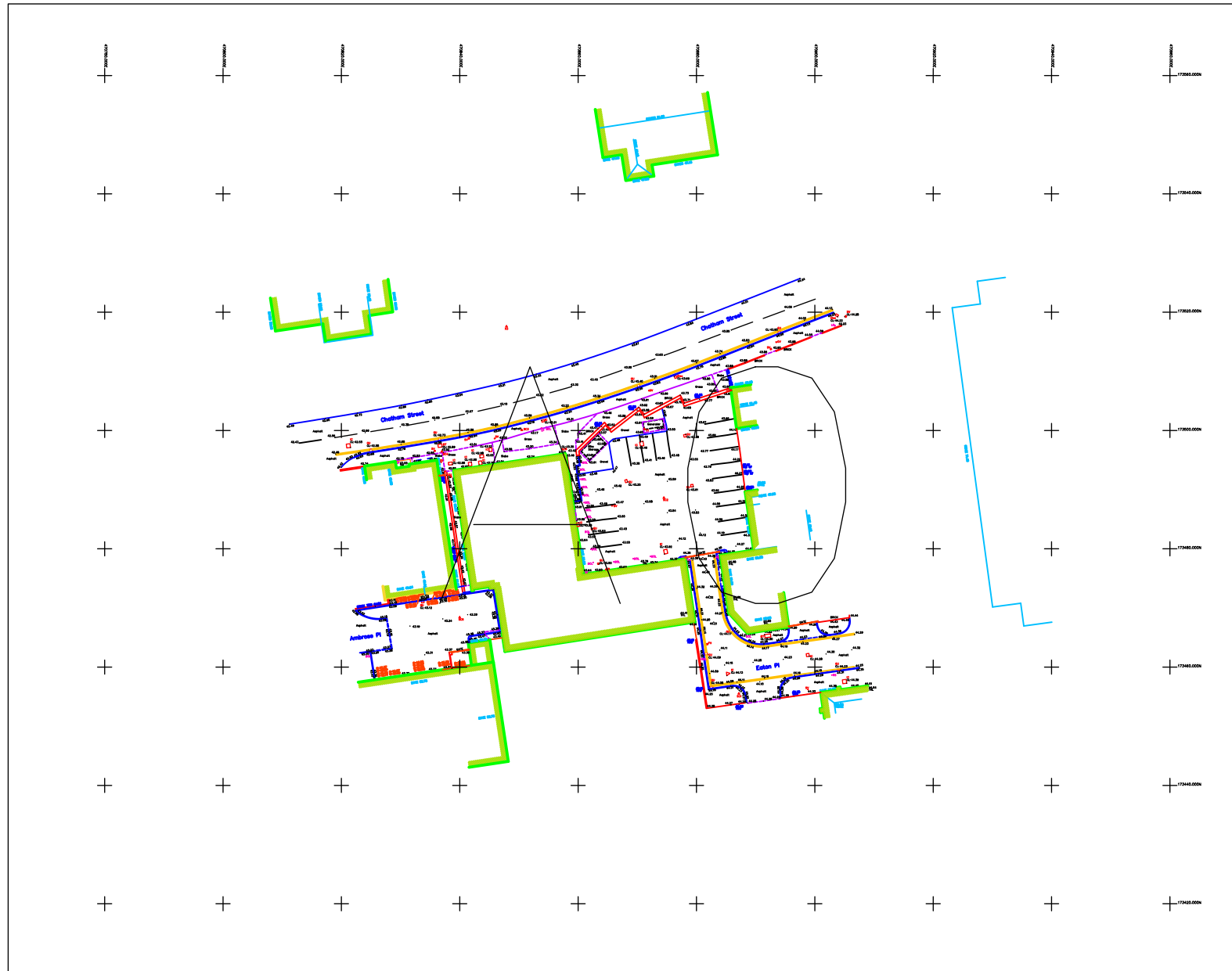
SuDS Strategy, Water Environment Ltd, Drawing no. 21002-SK01

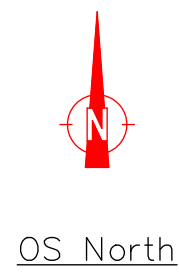
Thames Water Asset Location Search, ALS/ALS Standard/2021_4336197

Thames Water Sewer Flooding Enquiry

Thames Water Correspondence, Developer Services Capacity Check

DRAWING SHEETS ARE IN LAYOUT TABS





Building Abbreviations

BL	Basement Level	RWP	Rain Water Pipe
BSL	Beam Soffit Level	SL	Soffit Level
HD	Heating Duct	SVP	Soil and Vent Pipe
DP	Down Pipe	VP	Vent Pipe
DPC	Damp Proof Course	C	Cill Height from FFL
FFL	Finished Floor Level	W	Window Height from Cill
FCL	Finished Ceiling Level	H	Door Height
FCL	Floor to Ceiling Height	↖	Direction of Floor Joist Span

Topographical Abbreviations

A/R	Assumed Route	MWR	Marker
BH	Borehole	MT	Mercury Telecom Cover
BOL	Bollard	OHC	Overhead Cable
BT	British Telecom Cover	OHP	Overhead Pipe
BW	Barbed Wire Fence	OSBM	Ordnance Survey Bench Mark
BWK	Brickwork	PB	Post Box
CATV	Cable TV Cover	PDM	Permanent Ground Marker
CB	Close Boarded Fence	PR	Post & Rail Fence
CCTV	Closed Circuit TV	PW	Post & Wire Fence
CHLK	Chainlink Fence	PMW	Post & Wire Mesh Fence
CHPL	Chestnut Paling Fence	RE	Ridding Eye
CL	Cover Level	RG	Road Gully
CM	Cable Marker	RN	Road Name
CP	Catch Pit	RS	Road Sign
CPL	Catch Pit Base Level	RW	Retaining Wall
DIA	Diameter	RWP	Rain Water Pipe
DK	Down Pipe	SAP	Sagging
DP	Drop Kerb	SC	Stop Cock
EP	Electricity Junction Box	SPR	Spread
EC	Electricity Cover	STA	Traverse Station
EP	Electricity Pole	SV	Stop Valve
ER	Earthing Rod	SVP	Soil Vent Pipe
FCL	Finished Ceiling Level	SW	Storm Water
FI	Fire Hydrant	TB	Telephone Box
FIG	Feed into Ground	TBM	Temporary Bench Mark
FW	Foul Water	TR	Taken from Records
GU	Gully	TJB	Telephone Junction Box
GV	Gas Valve	TP	Trid Pin
H	Height	TL	Traffic Light
IC	Inspection Cover	TP	Telephone Pole
IL	Invert Level	UTL	Unable to Lift
R	Iron Rolling Fence	UTL	Unable to Lift
KO	Kerb Outlet	VP	Vent Pipe
LB	Litter Bin	WV	Water Key Hole
LC	Lamp Column	WM	Water Meter
LP	Lamp Post	WV	Water Valve
MH	Manhole		

SURVEY STATIONS		
Name	Easting	Northing
SC1	470887.161	173455.526
SC2	470874.496	173488.617
SC3	470850.494	173500.076
SC4	470836.974	173496.428
SC5	470839.988	173468.412
X1	470871.210	173500.236
X2	470885.819	173506.832
X3	470847.898	173517.587

Notes

The survey has been oriented to Ordnance Survey (OS) National Grid (OSGB36) using industry Standard Network RTK GPS equipment utilising the OS Active Network (OS Net). A true OSGB36 coordinate has been established on site using the OSN15 (transformation) & OSGB15 (geoid) models. The survey detail has been correlated to this point and a further one (or more) OSGB36 points established to produce a true OS bearing for angle orientation. Scale factor 1.0 has been applied therefore the survey coordinates are shown on a pseudo OS grid. All levels are in metres unless otherwise specified.

5	-	-	-
4	-	-	-
3	-	-	-
2	-	-	-
1	-	-	-
0	NJH	First Complete Issue	27.05.20
Prelim	-	Preliminary - Not Complete	-

Rev	Svyr	QA Check	Description	Date
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5th Floor 1 Temple Way BRISTOL, BS2 0BY T +44 (0)117 301 8131
Unit G9, The Arch, 48-52 Floodgate St BIRMINGHAM, B5 5SL T +44(0)121 752 1220

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SURVEYED	TR	ARCHEL HOMES LIMITED
DRAWN	TR	
SCALE	1:1000	

115 Chatham Street

TOPOGRAPHICAL SURVEY

JOB No	DRAWING NUMBER
RT / 220 / 0534	RT / 220 / 0534 / P / 000 / 1

A0 Sheet - 1,189mm X 841mm

Copyright © 2020 DHA Architecture Ltd. All rights reserved. Limited reproduction and distribution permitted for the sole purpose of the planning of this named development only.

Ordnance Survey data © Crown Copyright. All rights reserved. Licence number 100042157.

Do not scale other than for Local Authority Planning purposes.

This drawing is produced for presentation purposes, and should be read in conjunction with drawing 02, which contains supporting layout information.

SCHEDULE OF ACCOMMODATION	
Description	Qty
Private Ground Floor	
2BA1 - 2 Bed Apartment	1
2BA2 - 2 Bed Apartment	1
2BA3 - 2 Bed Apartment	1
Private First Floor	
1BA1 - 1 Bed Apartment	4
1BA2 - 1 Bed Apartment	1
2BA2 - 2 Bed Apartment	1
2BA4 - 2 Bed Apartment	1
2BA5 - 2 Bed Apartment	1
2BA6 - 2 Bed Apartment	1
Private Second Floor	
1BA1 - 1 Bed Apartment	4
1BA2 - 1 Bed Apartment	1
2BA2 - 2 Bed Apartment	1
2BA4 - 2 Bed Apartment	1
2BA5 - 2 Bed Apartment	1
2BA6 - 2 Bed Apartment	1
Private Third Floor	
1BA1 - 1 Bed Apartment	4
1BA2 - 1 Bed Apartment	1
2BA2 - 2 Bed Apartment	1
2BA4 - 2 Bed Apartment	1
2BA5 - 2 Bed Apartment	1
2BA6 - 2 Bed Apartment	1
Private Fourth Floor	
1BA3 - 1 Bed Apartment	1
1BA4 - 1 Bed Apartment	1
1BA5 - 1 Bed Apartment	3
2BA7 - 2 Bed Apartment	1
2BA8 - 2 Bed Apartment	1
2BA9 - 2 Bed Apartment	1
Total Private	38
Affordable Ground Floor	
1BWC1 - 1 Bed Apartment M4(3)	3
1BWC2 - 1 Bed Apartment M4(3)	1
Affordable First Floor	
1BF1 - 1 Bed Apartment	1
2BF1 - 2 Bed Apartment	1
2BF2 - 2 Bed Apartment	1
2BF3 - 2 Bed Apartment	1
Affordable Second Floor	
1BF1 - 1 Bed Apartment	1
2BF1 - 2 Bed Apartment	1
2BF2 - 2 Bed Apartment	1
2BF3 - 2 Bed Apartment	1
Affordable Third Floor	
3BF1 - 3 Bed Apartment	1
3BF2 - 3 Bed Apartment	1
Affordable Fourth Floor	
1BF2 - 2 Bed Apartment	1
2BF4 - 2 Bed Apartment	1
Total Affordable	16
Overall Total	54



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e. surname@dhaarchitecture.co.uk
w. www.dhaarchitecture.co.uk



115 chatham street, reading

rev date by details

Presentation Planning Layout

reference 022014-ARC-01

23.02.2021 created
1:200 @ A2 scaling
JeH contact

- revision

presentation planning layout

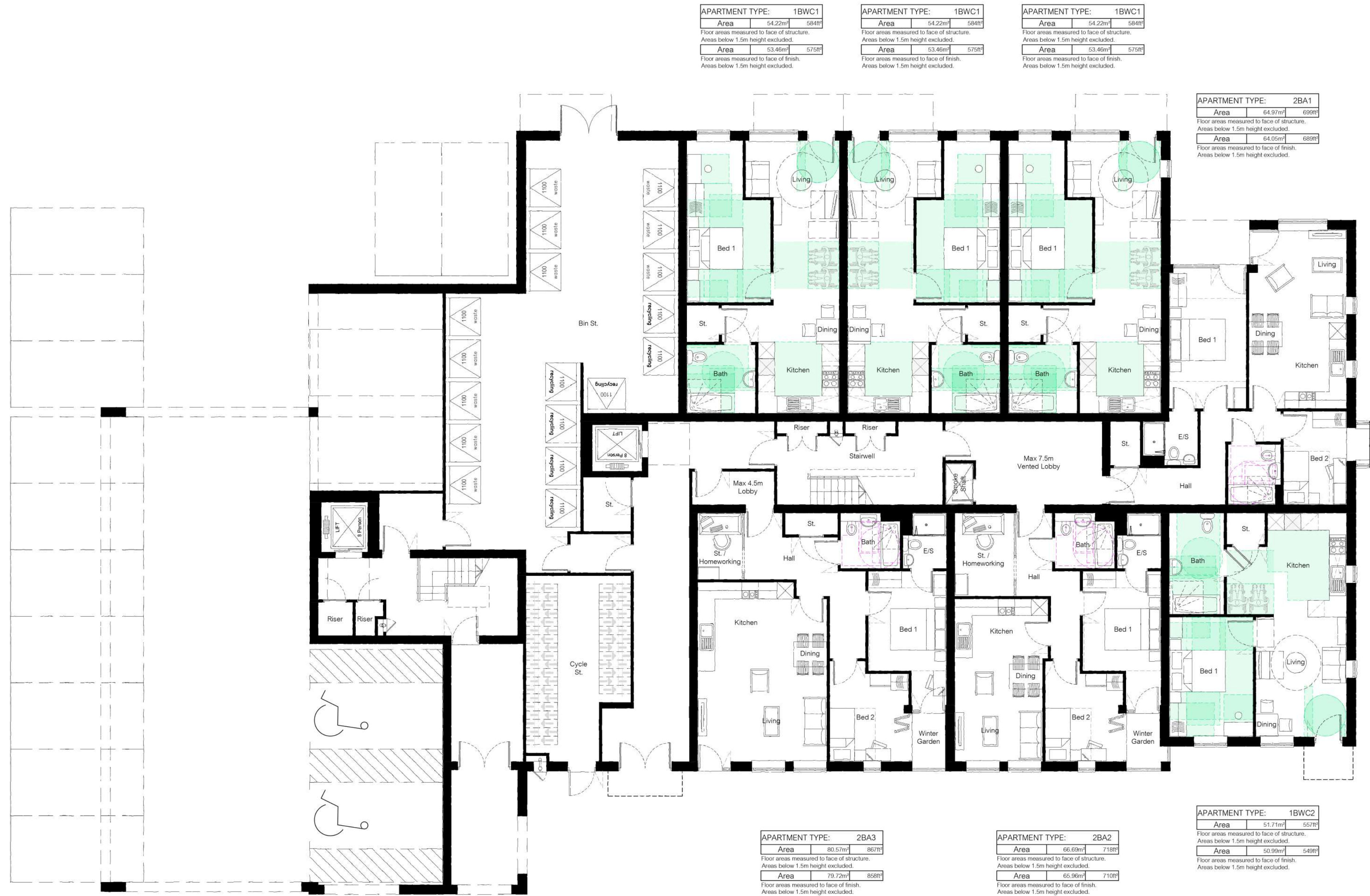


Front Elevation

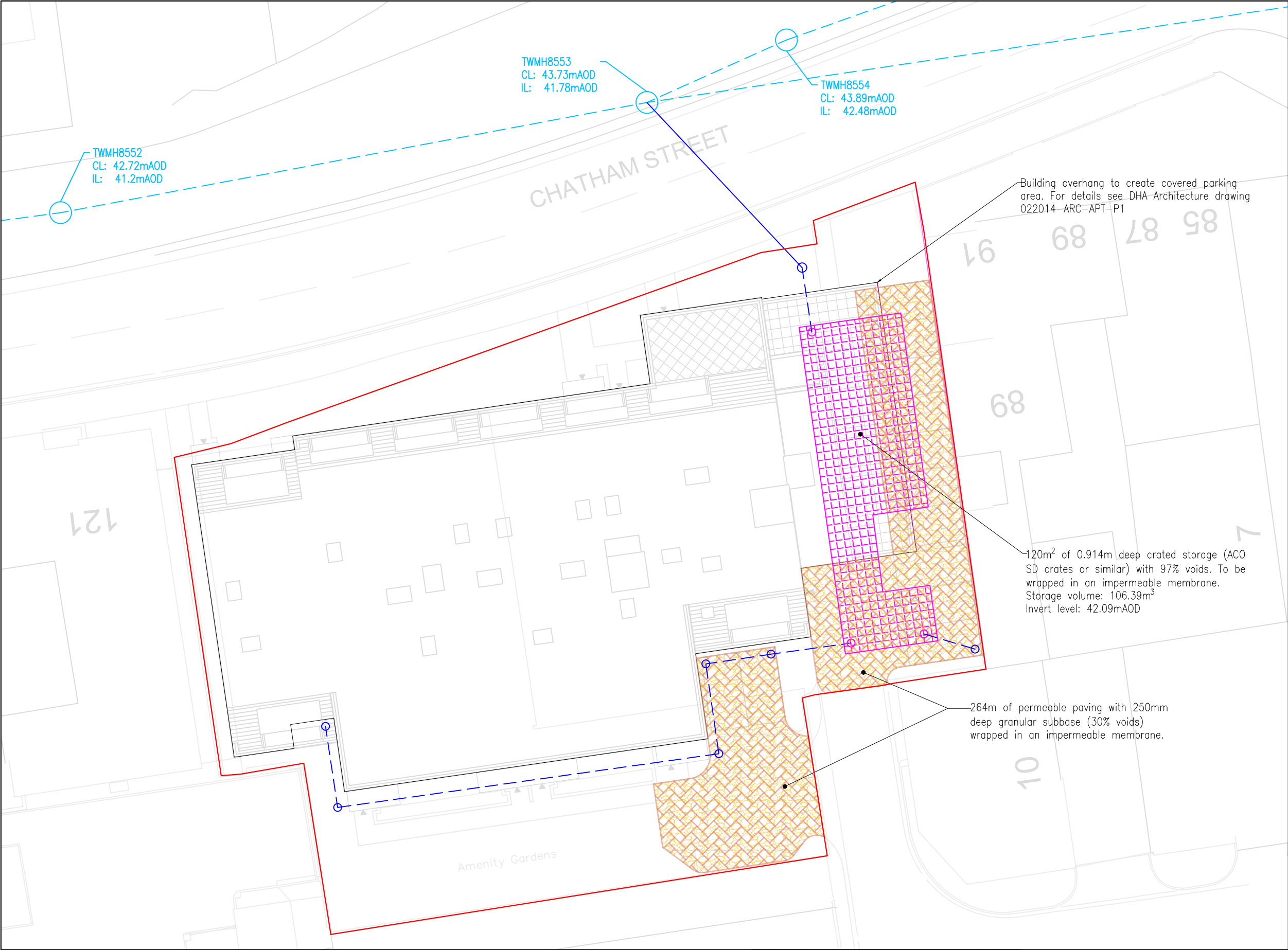
proposed elevations



Side Elevation



Ground Floor Plan



LEGEND

SITE BOUNDARY

EXISTING THAMES WATER SURFACE

WATER SEWER

PROPOSED SURFACE WATER DRAINAGE

SURFACE WATER SEWER PROPOSED FOR ADOPTION

INSPECTION CHAMBER

PERMEABLE PAVING

POROUS SUB-BASE

GEOCELLULAR STORAGE

WE WATER ENVIRONMENT 6 Coppergate Mews · Brighton Road · Surbiton · London · KT6 5NE Tel: 020 8545 9720 Email: contact@waterenvironment.co.uk Web: www.waterenvironment.co.uk	NOTES 1. This drawing is for planning only. Not for construction. 2. This drawing is not to be scaled 3. Site layout as per DHA Architecture drawing 022014-ARC-01 4. Surface water drainage strategy designed using MicroDrainage Source Control. Calculations do not include Permeable Paving Sub-Base 5. All pipes shown are indicative and subject to detailed design 6. Thames Water asset details taken from Thames Water asset plans	REV		DATE	AMENDMENTS	DR	AP	CLIENT: Archel Homes	SCALE @A3: 1:250	DATE: 24/02/2021	
								PROJECT: 115 Chatham Street	DRAWN: NB	CHECKED: FdM	APPROVED: FdM
								DRAWING: SuDS Strategy	DRAWING NO: 21002 - SK01		REVISION:

Asset location search



Property Searches

Water Environment Ltd
Coppergate Mews
6Brighton Road
LONDON
KT6 5NE

Search address supplied 115
Chatham Street
Reading
RG1 7JX

Your reference 21002

Our reference ALS/ALS Standard/2021_4336197

Search date 11 January 2021

Knowledge of features below the surface is essential for every development

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

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

Contact us to find out more.



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



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



0800 009 4540

Search address supplied: 115, Chatham Street, Reading, RG1 7JX

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

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

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

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

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

For your guidance:

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

Clean Water Services

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

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

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



For your guidance:

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

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

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

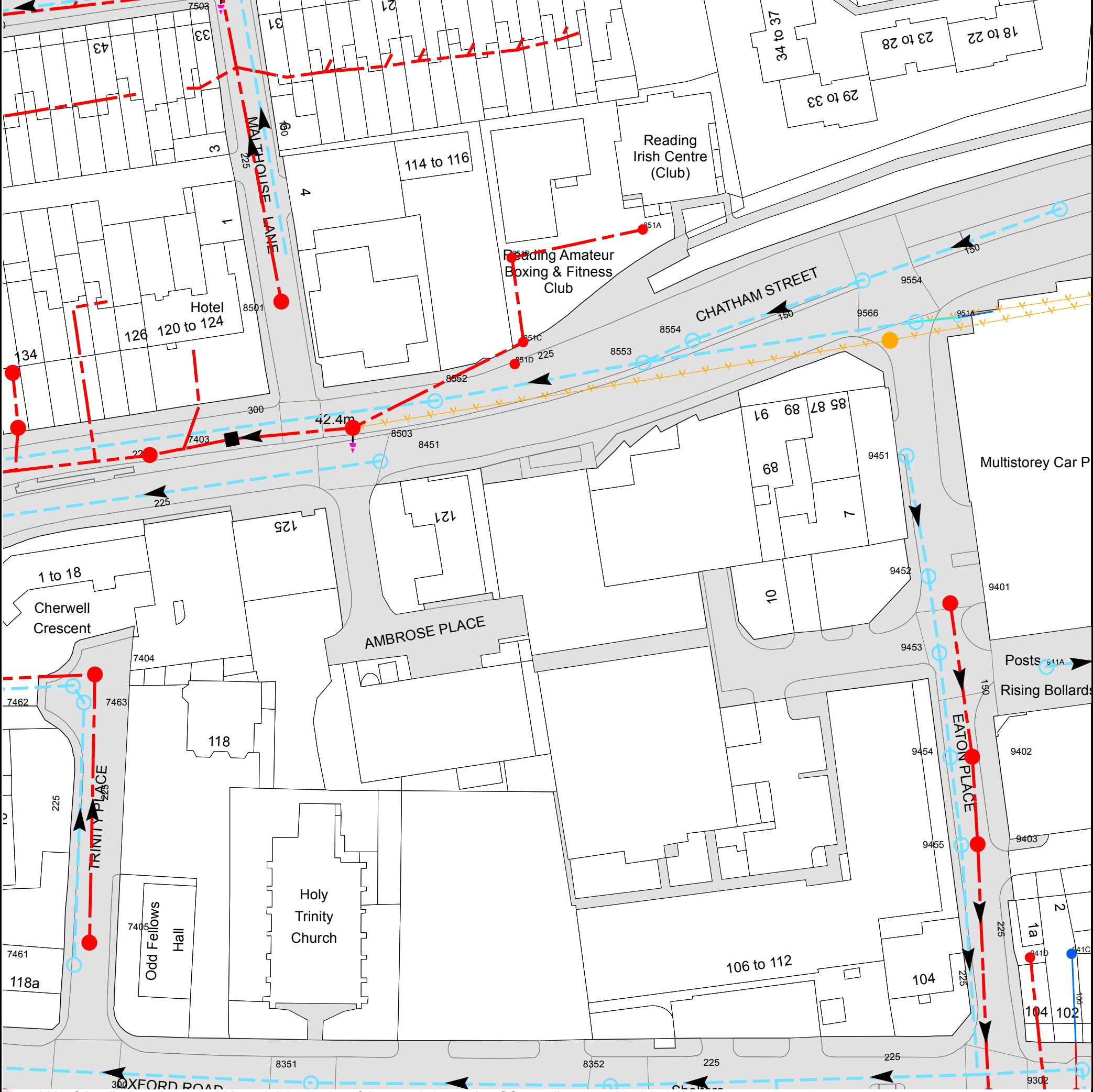
Clean Water queries

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

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

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

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4336197



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 470851,173483
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

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

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
941D	n/a	n/a
941C	n/a	n/a
9403	44.2	41.3
9455	44.15	42.77
9454	44.32	42.95
9402	44.35	41.7
941A	n/a	n/a
9453	44.4	43.06
9401	44.4	42.22
9452	44.36	43.14
9451	44.41	43.25
8352	43.59	42.11
9351	43.81	42.63
8351	43.41	41.75
7461	n/a	n/a
7405	43.21	n/a
7463	n/a	n/a
7462	n/a	n/a
7404	42.75	39.79
8553	43.73	41.78
851C	n/a	n/a
8554	43.89	42.48
9566	n/a	n/a
951A	n/a	n/a
9554	44.65	43.23
851A	n/a	n/a
9552	45.24	43.87
8451	42.54	41.01
7403	41.94	n/a
75JJ	n/a	n/a
8503	42.44	39.34
8552	42.72	41.2
75JK	n/a	n/a
851D	n/a	n/a
8501	41.62	38.82
851B	n/a	n/a
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

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

Notes:

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

Sewer Fittings

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

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

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

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

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

	Outfall
	Undefined End
	Inlet

Other Symbols

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

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

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

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

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

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

The map displays a network of streets including Malthouse Lane, Chatham Street, Ambrose Place, Trinity Place, Eaton Place, and Oxford Road. Buildings are shown with their footprints and some are labeled with numbers or names, such as 'Hotel 120 to 124', 'Reading Irish Centre (Club)', 'Reading Amateur Boxing & Fitness Club', 'Holy Trinity Church', 'Odd Fellows Hall', and 'Multistorey Car Park'. A proposed route is highlighted with a red line and a blue line. A distance of 42.4m is marked on Chatham Street. The map also shows various street features like 'Posts', 'Rising Bollards', and 'Shelters'.

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

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



ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

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

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

Valves

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

Hydrants

- Single Hydrant

Meters

- Meter

End Items

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

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

Operational Sites

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

Other Symbols

- Data Logger

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

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

Terms and Conditions

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

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
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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.

Sewer Flooding

History Enquiry



Property
Searches

Water Environment Ltd

Brighton Road

Search address supplied 115
Chatham Street
Reading
RG1 7JX

Your reference 21002

Our reference SFH/SFH Standard/2021_4336199

Received date **11 January 2021**

Search date **11 January 2021**



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

Sewer Flooding

History Enquiry



Property
Searches

Search address supplied: 115,Chatham Street,Reading,RG1 7JX

This search is recommended to check for any sewer flooding in a specific address or area

TWUL, trading as Property Searches, are responsible in respect of the following:-

- (i) any negligent or incorrect entry in the records searched;
- (ii) any negligent or incorrect interpretation of the records searched;
- (iii) and any negligent or incorrect recording of that interpretation in the search report
- (iv) compensation payments



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0800 009 4540

History of Sewer Flooding

Is the requested address or area at risk of flooding due to overloaded public sewers?

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website www.thameswater.co.uk



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



DEVELOPER.SERVICES@THAMESWATER.CO.U <DEVELOPER.SERVICES@THAMESWATER.CO.UK>
To Noah Bennett

↩ Reply

↩ Reply All

➡ Forward

⋮

Mon 22/02/2021 17:14

Dear Noah

Surface water gravity connection to MH 8553 At 2l/s maximum discharge.

Surface Water

Please note that discharging surface water to the public sewer network should only be considered after all other methods of disposal have been investigated and proven to not be viable. In accordance with the Building Act 2000 Clause H3.3, positive connection to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. The disposal hierarchy being: 1st Soakaways; 2nd Watercourses; 3rd Sewers.

If your proposals progress in line with the details above, we’re pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul sewer 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.

Regards

Dan Rees BSc
[MIWater](#)
Developer Services – Adoptions Engineer
Mobile: 07747642033
developer.services@thameswater.co.uk
Clearwater Court, Vastern Road, Reading, RG1 8DB
Find us online at developers.thameswater.co.uk

APPENDIX B - CALCULATIONS

Greenfield runoff rate estimation

Existing site runoff rate

Proposed site drainage strategy calculations

Calculated by:	Water Environment
Site name:	Chatham Street
Site location:	Reading

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:	51.45601° N
Longitude:	0.9815° W
Reference:	439632287
Date:	Feb 11 2021 10:25

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):	0.162
-----------------------	-------

Methodology

Q _{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.821
Q _{MED} (l/s):	
Q _{BAR} / Q _{MED} factor:	1.14

Hydrological characteristics

	Default	Edited
SAAR (mm):	642	642
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 $Q_{\text{BAR}} < 2.0$ 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 $\text{SPR}/\text{SPRHOST} \leq 0.3$?

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):		0.11
1 in 1 year (l/s):		0.1
1 in 30 years (l/s):		0.26
1 in 100 year (l/s):		0.37
1 in 200 years (l/s):		0.43

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

Water Environment Ltd					Page 1	
6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street			
Date 24/02/2021 18:23 File Existing.SRCX			Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage			Source Control 2017.1.2			
<u>Summary of Results for 2 year Return Period</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		43.150	0.150	18.1	0.4	O K
30 min Summer		43.151	0.151	18.4	0.4	O K
60 min Summer		43.144	0.144	16.5	0.3	O K
120 min Summer		43.131	0.131	13.6	0.3	O K
180 min Summer		43.118	0.118	11.3	0.2	O K
240 min Summer		43.109	0.109	9.7	0.2	O K
360 min Summer		43.096	0.096	7.5	0.2	O K
480 min Summer		43.087	0.087	6.2	0.1	O K
600 min Summer		43.080	0.080	5.3	0.1	O K
720 min Summer		43.074	0.074	4.6	0.1	O K
960 min Summer		43.067	0.067	3.8	0.1	O K
1440 min Summer		43.057	0.057	2.8	0.1	O K
2160 min Summer		43.049	0.049	2.0	0.1	O K
2880 min Summer		43.044	0.044	1.6	0.1	O K
4320 min Summer		43.036	0.036	1.2	0.0	O K
5760 min Summer		43.032	0.032	1.0	0.0	O K
7200 min Summer		43.030	0.030	0.9	0.0	O K
8640 min Summer		43.029	0.029	0.8	0.0	O K
10080 min Summer		43.027	0.027	0.8	0.0	O K
15 min Winter		43.150	0.150	18.2	0.4	O K
30 min Winter		43.149	0.149	17.9	0.4	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		34.432	0.0	13.9	15	
30 min Summer		22.026	0.0	17.8	22	
60 min Summer		13.579	0.0	22.0	36	
120 min Summer		9.139	0.0	29.6	66	
180 min Summer		7.124	0.0	34.6	96	
240 min Summer		5.888	0.0	38.2	126	
360 min Summer		4.389	0.0	42.7	188	
480 min Summer		3.548	0.0	46.0	248	
600 min Summer		3.001	0.0	48.6	306	
720 min Summer		2.615	0.0	50.8	364	
960 min Summer		2.099	0.0	54.4	480	
1440 min Summer		1.543	0.0	60.0	722	
2160 min Summer		1.134	0.0	66.2	1064	
2880 min Summer		0.916	0.0	71.2	1460	
4320 min Summer		0.688	0.0	80.3	2184	
5760 min Summer		0.568	0.0	88.4	2888	
7200 min Summer		0.494	0.0	96.1	3624	
8640 min Summer		0.444	0.0	103.5	4424	
10080 min Summer		0.407	0.0	110.9	5016	
15 min Winter		34.432	0.0	13.9	13	
30 min Winter		22.026	0.0	17.8	21	
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE		21002 Chatham Street			
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Micro Drainage		Source Control 2017.1.2			
<u>Summary of Results for 2 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	43.132	0.132	13.7	0.3	O K
120 min Winter	43.111	0.111	10.0	0.2	O K
180 min Winter	43.099	0.099	8.1	0.2	O K
240 min Winter	43.091	0.091	6.6	0.2	O K
360 min Winter	43.077	0.077	5.0	0.1	O K
480 min Winter	43.070	0.070	4.1	0.1	O K
600 min Winter	43.065	0.065	3.5	0.1	O K
720 min Winter	43.060	0.060	3.0	0.1	O K
960 min Winter	43.053	0.053	2.4	0.1	O K
1440 min Winter	43.046	0.046	1.8	0.1	O K
2160 min Winter	43.038	0.038	1.3	0.0	O K
2880 min Winter	43.033	0.033	1.1	0.0	O K
4320 min Winter	43.028	0.028	0.8	0.0	O K
5760 min Winter	43.026	0.026	0.7	0.0	O K
7200 min Winter	43.024	0.024	0.6	0.0	O K
8640 min Winter	43.023	0.023	0.5	0.0	O K
10080 min Winter	43.023	0.023	0.5	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	13.579	0.0	22.0	36	
120 min Winter	9.139	0.0	29.6	68	
180 min Winter	7.124	0.0	34.6	94	
240 min Winter	5.888	0.0	38.2	126	
360 min Winter	4.389	0.0	42.7	184	
480 min Winter	3.548	0.0	46.0	246	
600 min Winter	3.001	0.0	48.6	306	
720 min Winter	2.615	0.0	50.8	366	
960 min Winter	2.099	0.0	54.4	500	
1440 min Winter	1.543	0.0	60.0	712	
2160 min Winter	1.134	0.0	66.2	1096	
2880 min Winter	0.916	0.0	71.2	1484	
4320 min Winter	0.688	0.0	80.3	2044	
5760 min Winter	0.568	0.0	88.4	2928	
7200 min Winter	0.494	0.0	96.1	3528	
8640 min Winter	0.444	0.0	103.5	4536	
10080 min Winter	0.407	0.0	110.9	5296	
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:23 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.054		0.054		0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:23 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Model Details</u> Storage is Online Cover Level (m) 44.000 <u>Pipe Structure</u> Diameter (m) 0.300 Length (m) 100.000 Slope (1:X) 100.000 Invert Level (m) 43.000 <u>Orifice Outflow Control</u> Diameter (m) 0.300 Discharge Coefficient 0.600 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street			
Date 24/02/2021 18:24 File Existing.SRCX			Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage			Source Control 2017.1.2			
<u>Summary of Results for 30 year Return Period</u>						
Storm Event		Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer		43.243	0.243	40.9	0.9	O K
30 min Summer		43.248	0.248	42.5	1.0	O K
60 min Summer		43.232	0.232	38.3	0.8	O K
120 min Summer		43.186	0.186	28.1	0.6	O K
180 min Summer		43.164	0.164	22.3	0.4	O K
240 min Summer		43.152	0.152	18.7	0.4	O K
360 min Summer		43.134	0.134	14.0	0.3	O K
480 min Summer		43.118	0.118	11.2	0.2	O K
600 min Summer		43.107	0.107	9.4	0.2	O K
720 min Summer		43.100	0.100	8.2	0.2	O K
960 min Summer		43.089	0.089	6.5	0.2	O K
1440 min Summer		43.074	0.074	4.6	0.1	O K
2160 min Summer		43.064	0.064	3.3	0.1	O K
2880 min Summer		43.056	0.056	2.6	0.1	O K
4320 min Summer		43.048	0.048	1.9	0.1	O K
5760 min Summer		43.042	0.042	1.6	0.1	O K
7200 min Summer		43.038	0.038	1.3	0.0	O K
8640 min Summer		43.035	0.035	1.2	0.0	O K
10080 min Summer		43.033	0.033	1.1	0.0	O K
15 min Winter		43.244	0.244	41.4	0.9	O K
30 min Winter		43.244	0.244	41.3	0.9	O K
Storm Event		Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer		78.219	0.0	31.7	13	
30 min Summer		50.983	0.0	41.3	21	
60 min Summer		31.752	0.0	51.4	36	
120 min Summer		18.892	0.0	61.2	66	
180 min Summer		14.012	0.0	68.1	98	
240 min Summer		11.282	0.0	73.1	126	
360 min Summer		8.182	0.0	79.5	186	
480 min Summer		6.480	0.0	84.0	248	
600 min Summer		5.396	0.0	87.4	308	
720 min Summer		4.642	0.0	90.2	364	
960 min Summer		3.656	0.0	94.8	486	
1440 min Summer		2.609	0.0	101.4	730	
2160 min Summer		1.865	0.0	108.7	1100	
2880 min Summer		1.475	0.0	114.7	1460	
4320 min Summer		1.073	0.0	125.2	2172	
5760 min Summer		0.865	0.0	134.6	2880	
7200 min Summer		0.739	0.0	143.7	3648	
8640 min Summer		0.655	0.0	152.8	4368	
10080 min Summer		0.594	0.0	161.8	4984	
15 min Winter		78.219	0.0	31.7	14	
30 min Winter		50.983	0.0	41.3	21	
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street			
Date 24/02/2021 18:24 File Existing.SRCX			Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage			Source Control 2017.1.2			
<u>Summary of Results for 30 year Return Period</u>						
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	
60 min Winter	43.204	0.204	32.1	0.7	O K	
120 min Winter	43.159	0.159	20.7	0.4	O K	
180 min Winter	43.142	0.142	15.7	0.3	O K	
240 min Winter	43.126	0.126	12.7	0.3	O K	
360 min Winter	43.106	0.106	9.3	0.2	O K	
480 min Winter	43.095	0.095	7.4	0.2	O K	
600 min Winter	43.087	0.087	6.2	0.1	O K	
720 min Winter	43.080	0.080	5.3	0.1	O K	
960 min Winter	43.071	0.071	4.2	0.1	O K	
1440 min Winter	43.060	0.060	3.0	0.1	O K	
2160 min Winter	43.051	0.051	2.2	0.1	O K	
2880 min Winter	43.045	0.045	1.7	0.1	O K	
4320 min Winter	43.036	0.036	1.2	0.0	O K	
5760 min Winter	43.033	0.033	1.1	0.0	O K	
7200 min Winter	43.030	0.030	0.9	0.0	O K	
8640 min Winter	43.028	0.028	0.8	0.0	O K	
10080 min Winter	43.026	0.026	0.7	0.0	O K	
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)		
60 min Winter	31.752	0.0	51.4	36		
120 min Winter	18.892	0.0	61.2	66		
180 min Winter	14.012	0.0	68.1	100		
240 min Winter	11.282	0.0	73.1	126		
360 min Winter	8.182	0.0	79.5	184		
480 min Winter	6.480	0.0	84.0	240		
600 min Winter	5.396	0.0	87.4	304		
720 min Winter	4.642	0.0	90.2	370		
960 min Winter	3.656	0.0	94.8	484		
1440 min Winter	2.609	0.0	101.4	722		
2160 min Winter	1.865	0.0	108.7	1108		
2880 min Winter	1.475	0.0	114.7	1448		
4320 min Winter	1.073	0.0	125.2	2116		
5760 min Winter	0.865	0.0	134.6	2816		
7200 min Winter	0.739	0.0	143.7	3560		
8640 min Winter	0.655	0.0	152.8	4376		
10080 min Winter	0.594	0.0	161.8	5000		
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Water Environment Ltd		Page 3
6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:24 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.054	4	8	0.054
				8	12
					0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:24 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Model Details</u> Storage is Online Cover Level (m) 44.000 <u>Pipe Structure</u> Diameter (m) 0.300 Length (m) 100.000 Slope (1:X) 100.000 Invert Level (m) 43.000 <u>Orifice Outflow Control</u> Diameter (m) 0.300 Discharge Coefficient 0.600 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street			
Date 24/02/2021 18:25 File Existing.SRCX			Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage			Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period</u>						
Storm Event			Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³) Status
15 min Summer			43.280	0.280	52.3	1.2 O K
30 min Summer			43.289	0.289	54.9	1.3 O K
60 min Summer			43.272	0.272	49.7	1.1 O K
120 min Summer			43.220	0.220	35.5	0.8 O K
180 min Summer			43.186	0.186	28.0	0.6 O K
240 min Summer			43.167	0.167	23.2	0.5 O K
360 min Summer			43.147	0.147	17.4	0.4 O K
480 min Summer			43.134	0.134	14.0	0.3 O K
600 min Summer			43.121	0.121	11.8	0.3 O K
720 min Summer			43.111	0.111	10.1	0.2 O K
960 min Summer			43.099	0.099	8.1	0.2 O K
1440 min Summer			43.083	0.083	5.7	0.1 O K
2160 min Summer			43.069	0.069	4.0	0.1 O K
2880 min Summer			43.062	0.062	3.2	0.1 O K
4320 min Summer			43.052	0.052	2.3	0.1 O K
5760 min Summer			43.047	0.047	1.8	0.1 O K
7200 min Summer			43.043	0.043	1.6	0.1 O K
8640 min Summer			43.039	0.039	1.4	0.0 O K
10080 min Summer			43.036	0.036	1.2	0.0 O K
15 min Winter			43.282	0.282	52.8	1.2 O K
30 min Winter			43.283	0.283	53.1	1.2 O K
Storm Event			Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer			99.871	0.0	40.4	14
30 min Summer			65.803	0.0	53.3	21
60 min Summer			41.135	0.0	66.6	36
120 min Summer			23.984	0.0	77.7	66
180 min Summer			17.635	0.0	85.7	96
240 min Summer			14.137	0.0	91.6	126
360 min Summer			10.214	0.0	99.3	184
480 min Summer			8.071	0.0	104.6	248
600 min Summer			6.709	0.0	108.7	306
720 min Summer			5.761	0.0	112.0	368
960 min Summer			4.521	0.0	117.2	482
1440 min Summer			3.203	0.0	124.5	732
2160 min Summer			2.262	0.0	131.9	1076
2880 min Summer			1.774	0.0	137.9	1464
4320 min Summer			1.275	0.0	148.7	2140
5760 min Summer			1.019	0.0	158.4	2872
7200 min Summer			0.863	0.0	167.8	3592
8640 min Summer			0.759	0.0	177.0	4288
10080 min Summer			0.684	0.0	186.3	5048
15 min Winter			99.871	0.0	40.4	14
30 min Winter			65.803	0.0	53.3	21
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Water Environment Ltd				Page 2	
6 Coppergate Mews Brighton Road Surbiton KT6 5NE		21002 Chatham Street			
Date 24/02/2021 18:25 File Existing.SRCX		Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage		Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	43.245	0.245	41.6	0.9	O K
120 min Winter	43.178	0.178	26.3	0.5	O K
180 min Winter	43.155	0.155	19.7	0.4	O K
240 min Winter	43.143	0.143	16.0	0.3	O K
360 min Winter	43.120	0.120	11.6	0.3	O K
480 min Winter	43.106	0.106	9.2	0.2	O K
600 min Winter	43.097	0.097	7.7	0.2	O K
720 min Winter	43.090	0.090	6.6	0.2	O K
960 min Winter	43.079	0.079	5.2	0.1	O K
1440 min Winter	43.067	0.067	3.7	0.1	O K
2160 min Winter	43.055	0.055	2.6	0.1	O K
2880 min Winter	43.049	0.049	2.1	0.1	O K
4320 min Winter	43.041	0.041	1.5	0.1	O K
5760 min Winter	43.035	0.035	1.2	0.0	O K
7200 min Winter	43.032	0.032	1.0	0.0	O K
8640 min Winter	43.030	0.030	0.9	0.0	O K
10080 min Winter	43.028	0.028	0.8	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	41.135	0.0	66.6	36	
120 min Winter	23.984	0.0	77.7	66	
180 min Winter	17.635	0.0	85.7	98	
240 min Winter	14.137	0.0	91.6	124	
360 min Winter	10.214	0.0	99.3	186	
480 min Winter	8.071	0.0	104.6	246	
600 min Winter	6.709	0.0	108.7	304	
720 min Winter	5.761	0.0	112.0	358	
960 min Winter	4.521	0.0	117.2	488	
1440 min Winter	3.203	0.0	124.5	716	
2160 min Winter	2.262	0.0	131.9	1096	
2880 min Winter	1.774	0.0	137.9	1436	
4320 min Winter	1.275	0.0	148.7	2184	
5760 min Winter	1.019	0.0	158.4	2912	
7200 min Winter	0.863	0.0	167.8	3592	
8640 min Winter	0.759	0.0	177.0	4368	
10080 min Winter	0.684	0.0	186.3	5024	
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:25 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.054	4	8	0.054
				8	12
					0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:25 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Model Details</u> Storage is Online Cover Level (m) 44.000 <u>Pipe Structure</u> Diameter (m) 0.300 Length (m) 100.000 Slope (1:X) 100.000 Invert Level (m) 43.000 <u>Orifice Outflow Control</u> Diameter (m) 0.300 Discharge Coefficient 0.600 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street			
Date 24/02/2021 18:26 File Existing.SRCX			Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage			Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period (+40%)</u>						
Storm Event			Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³) Status
15 min Summer			43.347	0.347	73.3	1.7 O K
30 min Summer			43.358	0.358	76.8	1.8 O K
60 min Summer			43.335	0.335	69.5	1.6 O K
120 min Summer			43.272	0.272	49.9	1.1 O K
180 min Summer			43.236	0.236	39.2	0.9 O K
240 min Summer			43.206	0.206	32.5	0.7 O K
360 min Summer			43.171	0.171	24.3	0.5 O K
480 min Summer			43.155	0.155	19.6	0.4 O K
600 min Summer			43.145	0.145	16.6	0.4 O K
720 min Summer			43.135	0.135	14.2	0.3 O K
960 min Summer			43.117	0.117	11.2	0.2 O K
1440 min Summer			43.099	0.099	8.0	0.2 O K
2160 min Summer			43.082	0.082	5.6	0.1 O K
2880 min Summer			43.073	0.073	4.4	0.1 O K
4320 min Summer			43.062	0.062	3.2	0.1 O K
5760 min Summer			43.056	0.056	2.6	0.1 O K
7200 min Summer			43.051	0.051	2.2	0.1 O K
8640 min Summer			43.048	0.048	1.9	0.1 O K
10080 min Summer			43.045	0.045	1.7	0.1 O K
15 min Winter			43.349	0.349	73.8	1.8 O K
30 min Winter			43.350	0.350	74.2	1.8 O K
Storm Event			Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer			139.820	0.0	56.6	14
30 min Summer			92.124	0.0	74.6	21
60 min Summer			57.590	0.0	93.3	36
120 min Summer			33.577	0.0	108.8	66
180 min Summer			24.689	0.0	120.0	96
240 min Summer			19.792	0.0	128.3	126
360 min Summer			14.299	0.0	139.0	188
480 min Summer			11.300	0.0	146.4	248
600 min Summer			9.392	0.0	152.2	304
720 min Summer			8.065	0.0	156.8	366
960 min Summer			6.330	0.0	164.1	488
1440 min Summer			4.484	0.0	174.3	722
2160 min Summer			3.167	0.0	184.7	1076
2880 min Summer			2.483	0.0	193.1	1428
4320 min Summer			1.785	0.0	208.1	2188
5760 min Summer			1.426	0.0	221.8	2920
7200 min Summer			1.208	0.0	234.9	3672
8640 min Summer			1.062	0.0	247.8	4320
10080 min Summer			0.958	0.0	260.8	5016
15 min Winter			139.820	0.0	56.6	14
30 min Winter			92.124	0.0	74.6	21
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE		21002 Chatham Street			
Date 24/02/2021 18:26 File Existing.SRCX		Designed by Noah Bennett Checked by Fiona de Mauny			
Micro Drainage		Source Control 2017.1.2			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	43.299	0.299	58.2	1.4	O K
120 min Winter	43.225	0.225	36.7	0.8	O K
180 min Winter	43.184	0.184	27.5	0.5	O K
240 min Winter	43.164	0.164	22.3	0.4	O K
360 min Winter	43.144	0.144	16.3	0.3	O K
480 min Winter	43.127	0.127	12.9	0.3	O K
600 min Winter	43.115	0.115	10.7	0.2	O K
720 min Winter	43.106	0.106	9.2	0.2	O K
960 min Winter	43.094	0.094	7.2	0.2	O K
1440 min Winter	43.078	0.078	5.1	0.1	O K
2160 min Winter	43.066	0.066	3.7	0.1	O K
2880 min Winter	43.059	0.059	2.9	0.1	O K
4320 min Winter	43.050	0.050	2.1	0.1	O K
5760 min Winter	43.044	0.044	1.7	0.1	O K
7200 min Winter	43.040	0.040	1.4	0.1	O K
8640 min Winter	43.036	0.036	1.2	0.0	O K
10080 min Winter	43.034	0.034	1.1	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	57.590	0.0	93.3	36	
120 min Winter	33.577	0.0	108.8	66	
180 min Winter	24.689	0.0	120.0	96	
240 min Winter	19.792	0.0	128.3	128	
360 min Winter	14.299	0.0	139.0	190	
480 min Winter	11.300	0.0	146.4	244	
600 min Winter	9.392	0.0	152.2	298	
720 min Winter	8.065	0.0	156.8	372	
960 min Winter	6.330	0.0	164.1	480	
1440 min Winter	4.484	0.0	174.3	736	
2160 min Winter	3.167	0.0	184.7	1096	
2880 min Winter	2.483	0.0	193.1	1424	
4320 min Winter	1.785	0.0	208.1	2196	
5760 min Winter	1.426	0.0	221.8	2928	
7200 min Winter	1.208	0.0	234.9	3632	
8640 min Winter	1.062	0.0	247.8	4416	
10080 min Winter	0.958	0.0	260.8	4808	
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:26 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From: 0	To: 4	From: 4	To: 8	From: 8	To: 12
0.054		0.054		0.054	

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:26 File Existing.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Model Details</u> Storage is Online Cover Level (m) 44.000 <u>Pipe Structure</u> Diameter (m) 0.300 Length (m) 100.000 Slope (1:X) 100.000 Invert Level (m) 43.000 <u>Orifice Outflow Control</u> Diameter (m) 0.300 Discharge Coefficient 0.600 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:20 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 2 year Return Period</u>								
Half Drain Time : 111 minutes.								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.199	0.109	0.0	1.7	0.0	1.7	12.6	O K
30 min Summer	42.224	0.134	0.0	1.8	0.0	1.8	15.6	O K
60 min Summer	42.244	0.154	0.0	1.9	0.0	1.9	17.9	O K
120 min Summer	42.275	0.185	0.0	1.9	0.0	1.9	21.5	O K
180 min Summer	42.288	0.198	0.0	2.0	0.0	2.0	23.1	O K
240 min Summer	42.293	0.203	0.0	2.0	0.0	2.0	23.6	O K
360 min Summer	42.288	0.198	0.0	2.0	0.0	2.0	23.0	O K
480 min Summer	42.279	0.189	0.0	1.9	0.0	1.9	22.0	O K
600 min Summer	42.268	0.178	0.0	1.9	0.0	1.9	20.7	O K
720 min Summer	42.257	0.167	0.0	1.9	0.0	1.9	19.4	O K
960 min Summer	42.237	0.147	0.0	1.9	0.0	1.9	17.1	O K
1440 min Summer	42.206	0.116	0.0	1.8	0.0	1.8	13.5	O K
2160 min Summer	42.179	0.089	0.0	1.6	0.0	1.6	10.4	O K
2880 min Summer	42.166	0.076	0.0	1.4	0.0	1.4	8.8	O K
4320 min Summer	42.151	0.061	0.0	1.1	0.0	1.1	7.1	O K
5760 min Summer	42.144	0.054	0.0	1.0	0.0	1.0	6.3	O K
7200 min Summer	42.140	0.050	0.0	0.9	0.0	0.9	5.8	O K
8640 min Summer	42.137	0.047	0.0	0.8	0.0	0.8	5.4	O K
10080 min Summer	42.134	0.044	0.0	0.7	0.0	0.7	5.1	O K
15 min Winter	42.199	0.109	0.0	1.7	0.0	1.7	12.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
15 min Summer	34.432	0.0	13.6	0.0	24			
30 min Summer	22.026	0.0	17.5	0.0	36			
60 min Summer	13.579	0.0	21.8	0.0	62			
120 min Summer	9.139	0.0	29.4	0.0	102			
180 min Summer	7.124	0.0	34.4	0.0	136			
240 min Summer	5.888	0.0	38.0	0.0	170			
360 min Summer	4.389	0.0	42.5	0.0	238			
480 min Summer	3.548	0.0	45.8	0.0	306			
600 min Summer	3.001	0.0	48.4	0.0	372			
720 min Summer	2.615	0.0	50.6	0.0	438			
960 min Summer	2.099	0.0	54.2	0.0	562			
1440 min Summer	1.543	0.0	59.7	0.0	802			
2160 min Summer	1.134	0.0	66.0	0.0	1148			
2880 min Summer	0.916	0.0	71.1	0.0	1504			
4320 min Summer	0.688	0.0	80.0	0.0	2212			
5760 min Summer	0.568	0.0	88.3	0.0	2944			
7200 min Summer	0.494	0.0	96.0	0.0	3672			
8640 min Summer	0.444	0.0	103.4	0.0	4400			
10080 min Summer	0.407	0.0	110.6	0.0	5136			
15 min Winter	34.432	0.0	13.6	0.0	24			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:20 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 2 year Return Period</u>								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	42.224	0.134	0.0	1.8	0.0	1.8	15.6	O K
60 min Winter	42.244	0.154	0.0	1.9	0.0	1.9	17.9	O K
120 min Winter	42.273	0.183	0.0	1.9	0.0	1.9	21.3	O K
180 min Winter	42.285	0.195	0.0	2.0	0.0	2.0	22.7	O K
240 min Winter	42.287	0.197	0.0	2.0	0.0	2.0	22.9	O K
360 min Winter	42.275	0.185	0.0	1.9	0.0	1.9	21.6	O K
480 min Winter	42.260	0.170	0.0	1.9	0.0	1.9	19.8	O K
600 min Winter	42.245	0.155	0.0	1.9	0.0	1.9	18.0	O K
720 min Winter	42.230	0.140	0.0	1.8	0.0	1.8	16.3	O K
960 min Winter	42.204	0.114	0.0	1.8	0.0	1.8	13.3	O K
1440 min Winter	42.175	0.085	0.0	1.6	0.0	1.6	9.9	O K
2160 min Winter	42.156	0.066	0.0	1.2	0.0	1.2	7.7	O K
2880 min Winter	42.146	0.056	0.0	1.0	0.0	1.0	6.5	O K
4320 min Winter	42.137	0.047	0.0	0.8	0.0	0.8	5.4	O K
5760 min Winter	42.131	0.041	0.0	0.6	0.0	0.6	4.8	O K
7200 min Winter	42.128	0.038	0.0	0.6	0.0	0.6	4.4	O K
8640 min Winter	42.126	0.036	0.0	0.5	0.0	0.5	4.2	O K
10080 min Winter	42.124	0.034	0.0	0.5	0.0	0.5	4.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
30 min Winter	22.026	0.0	17.5	0.0	36			
60 min Winter	13.579	0.0	21.8	0.0	62			
120 min Winter	9.139	0.0	29.4	0.0	104			
180 min Winter	7.124	0.0	34.4	0.0	142			
240 min Winter	5.888	0.0	38.0	0.0	180			
360 min Winter	4.389	0.0	42.5	0.0	254			
480 min Winter	3.548	0.0	45.8	0.0	326			
600 min Winter	3.001	0.0	48.4	0.0	392			
720 min Winter	2.615	0.0	50.6	0.0	456			
960 min Winter	2.099	0.0	54.2	0.0	578			
1440 min Winter	1.543	0.0	59.7	0.0	804			
2160 min Winter	1.134	0.0	66.0	0.0	1156			
2880 min Winter	0.916	0.0	71.1	0.0	1504			
4320 min Winter	0.688	0.0	80.0	0.0	2216			
5760 min Winter	0.568	0.0	88.3	0.0	2992			
7200 min Winter	0.494	0.0	96.0	0.0	3672			
8640 min Winter	0.444	0.0	103.4	0.0	4416			
10080 min Winter	0.407	0.0	110.6	0.0	5048			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:20 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.054	4	8	0.054
				8	12
					0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:20 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Model Details

Storage is Online Cover Level (m) 43.600

Cellular Storage Structure

Invert Level (m) 42.090 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.97
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	0.0	0.915	0.0	0.0
0.914	120.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0069-2000-0900-2000
Design Head (m) 0.900
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 69
Invert Level (m) 42.090
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.0
Flush-Flo™	0.278	2.0
Kick-Flo®	0.568	1.6
Mean Flow over Head Range	-	1.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.2	6.500	5.0		

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:20 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Weir Overflow Control</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:19 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 30 year Return Period</u> Half Drain Time : 228 minutes.								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.346	0.256	0.0	2.0	0.0	2.0	29.8	O K
30 min Summer	42.418	0.328	0.0	2.0	0.0	2.0	38.2	O K
60 min Summer	42.484	0.394	0.0	2.0	0.0	2.0	45.9	O K
120 min Summer	42.526	0.436	0.0	2.0	0.0	2.0	50.7	O K
180 min Summer	42.541	0.451	0.0	2.0	0.0	2.0	52.5	O K
240 min Summer	42.542	0.452	0.0	2.0	0.0	2.0	52.6	O K
360 min Summer	42.527	0.437	0.0	2.0	0.0	2.0	50.9	O K
480 min Summer	42.507	0.417	0.0	2.0	0.0	2.0	48.6	O K
600 min Summer	42.486	0.396	0.0	2.0	0.0	2.0	46.1	O K
720 min Summer	42.465	0.375	0.0	2.0	0.0	2.0	43.6	O K
960 min Summer	42.424	0.334	0.0	2.0	0.0	2.0	38.9	O K
1440 min Summer	42.355	0.265	0.0	2.0	0.0	2.0	30.9	O K
2160 min Summer	42.281	0.191	0.0	1.9	0.0	1.9	22.2	O K
2880 min Summer	42.233	0.143	0.0	1.9	0.0	1.9	16.7	O K
4320 min Summer	42.185	0.095	0.0	1.7	0.0	1.7	11.0	O K
5760 min Summer	42.167	0.077	0.0	1.4	0.0	1.4	9.0	O K
7200 min Summer	42.158	0.068	0.0	1.3	0.0	1.3	7.9	O K
8640 min Summer	42.151	0.061	0.0	1.1	0.0	1.1	7.1	O K
10080 min Summer	42.147	0.057	0.0	1.0	0.0	1.0	6.6	O K
15 min Winter	42.346	0.256	0.0	2.0	0.0	2.0	29.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
15 min Summer	78.219	0.0	31.3	0.0	25			
30 min Summer	50.983	0.0	40.9	0.0	39			
60 min Summer	31.752	0.0	51.2	0.0	68			
120 min Summer	18.892	0.0	61.0	0.0	124			
180 min Summer	14.012	0.0	67.9	0.0	182			
240 min Summer	11.282	0.0	72.9	0.0	220			
360 min Summer	8.182	0.0	79.3	0.0	278			
480 min Summer	6.480	0.0	83.8	0.0	342			
600 min Summer	5.396	0.0	87.2	0.0	408			
720 min Summer	4.642	0.0	90.0	0.0	476			
960 min Summer	3.656	0.0	94.5	0.0	608			
1440 min Summer	2.609	0.0	101.1	0.0	864			
2160 min Summer	1.865	0.0	108.6	0.0	1220			
2880 min Summer	1.475	0.0	114.6	0.0	1564			
4320 min Summer	1.073	0.0	124.9	0.0	2252			
5760 min Summer	0.865	0.0	134.5	0.0	2944			
7200 min Summer	0.739	0.0	143.6	0.0	3680			
8640 min Summer	0.655	0.0	152.6	0.0	4408			
10080 min Summer	0.594	0.0	161.5	0.0	5136			
15 min Winter	78.219	0.0	31.3	0.0	25			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:19 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 30 year Return Period</u>								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	42.418	0.328	0.0	2.0	0.0	2.0	38.2	O K
60 min Winter	42.485	0.395	0.0	2.0	0.0	2.0	46.0	O K
120 min Winter	42.526	0.436	0.0	2.0	0.0	2.0	50.8	O K
180 min Winter	42.543	0.453	0.0	2.0	0.0	2.0	52.7	O K
240 min Winter	42.543	0.453	0.0	2.0	0.0	2.0	52.7	O K
360 min Winter	42.521	0.431	0.0	2.0	0.0	2.0	50.2	O K
480 min Winter	42.495	0.405	0.0	2.0	0.0	2.0	47.1	O K
600 min Winter	42.466	0.376	0.0	2.0	0.0	2.0	43.8	O K
720 min Winter	42.437	0.347	0.0	2.0	0.0	2.0	40.3	O K
960 min Winter	42.381	0.291	0.0	2.0	0.0	2.0	33.9	O K
1440 min Winter	42.292	0.202	0.0	2.0	0.0	2.0	23.6	O K
2160 min Winter	42.213	0.123	0.0	1.8	0.0	1.8	14.3	O K
2880 min Winter	42.178	0.088	0.0	1.6	0.0	1.6	10.2	O K
4320 min Winter	42.155	0.065	0.0	1.2	0.0	1.2	7.5	O K
5760 min Winter	42.145	0.055	0.0	1.0	0.0	1.0	6.3	O K
7200 min Winter	42.139	0.049	0.0	0.8	0.0	0.8	5.7	O K
8640 min Winter	42.135	0.045	0.0	0.7	0.0	0.7	5.3	O K
10080 min Winter	42.133	0.043	0.0	0.7	0.0	0.7	5.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
30 min Winter	50.983	0.0	40.9	0.0	39			
60 min Winter	31.752	0.0	51.2	0.0	66			
120 min Winter	18.892	0.0	61.0	0.0	122			
180 min Winter	14.012	0.0	67.9	0.0	178			
240 min Winter	11.282	0.0	72.9	0.0	232			
360 min Winter	8.182	0.0	79.3	0.0	288			
480 min Winter	6.480	0.0	83.8	0.0	362			
600 min Winter	5.396	0.0	87.2	0.0	436			
720 min Winter	4.642	0.0	90.0	0.0	508			
960 min Winter	3.656	0.0	94.5	0.0	644			
1440 min Winter	2.609	0.0	101.1	0.0	894			
2160 min Winter	1.865	0.0	108.6	0.0	1232			
2880 min Winter	1.475	0.0	114.6	0.0	1536			
4320 min Winter	1.073	0.0	124.9	0.0	2248			
5760 min Winter	0.865	0.0	134.5	0.0	2992			
7200 min Winter	0.739	0.0	143.6	0.0	3664			
8640 min Winter	0.655	0.0	152.6	0.0	4416			
10080 min Winter	0.594	0.0	161.5	0.0	5136			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
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Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	30
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.054	4	8	0.054
				8	12
					0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
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Micro Drainage Source Control 2017.1.2		

Model Details

Storage is Online Cover Level (m) 43.600

Cellular Storage Structure

Invert Level (m) 42.090 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.97
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	0.0	0.915	0.0	0.0
0.914	120.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0069-2000-0900-2000
 Design Head (m) 0.900
 Design Flow (l/s) 2.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 69
 Invert Level (m) 42.090
 Minimum Outlet Pipe Diameter (mm) 100
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.0
Flush-Flo™	0.278	2.0
Kick-Flo®	0.568	1.6
Mean Flow over Head Range	-	1.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.2	6.500	5.0		

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:19 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage		Source Control 2017.1.2
<u>Weir Overflow Control</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:16 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period</u> Half Drain Time : 309 minutes.								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	42.420	0.330	0.0	2.0	0.0	2.0	38.4	O K
30 min Summer	42.520	0.430	0.0	2.0	0.0	2.0	50.1	O K
60 min Summer	42.614	0.524	0.0	2.0	0.0	2.0	61.0	O K
120 min Summer	42.668	0.578	0.0	2.0	0.0	2.0	67.2	O K
180 min Summer	42.694	0.604	0.0	2.0	0.0	2.0	70.3	O K
240 min Summer	42.702	0.612	0.0	2.0	0.0	2.0	71.2	O K
360 min Summer	42.685	0.595	0.0	2.0	0.0	2.0	69.2	O K
480 min Summer	42.659	0.569	0.0	2.0	0.0	2.0	66.3	O K
600 min Summer	42.631	0.541	0.0	2.0	0.0	2.0	62.9	O K
720 min Summer	42.603	0.513	0.0	2.0	0.0	2.0	59.8	O K
960 min Summer	42.553	0.463	0.0	2.0	0.0	2.0	53.9	O K
1440 min Summer	42.466	0.376	0.0	2.0	0.0	2.0	43.8	O K
2160 min Summer	42.364	0.274	0.0	2.0	0.0	2.0	31.9	O K
2880 min Summer	42.294	0.204	0.0	2.0	0.0	2.0	23.7	O K
4320 min Summer	42.217	0.127	0.0	1.8	0.0	1.8	14.7	O K
5760 min Summer	42.182	0.092	0.0	1.7	0.0	1.7	10.7	O K
7200 min Summer	42.169	0.079	0.0	1.5	0.0	1.5	9.2	O K
8640 min Summer	42.160	0.070	0.0	1.3	0.0	1.3	8.2	O K
10080 min Summer	42.154	0.064	0.0	1.2	0.0	1.2	7.5	O K
15 min Winter	42.420	0.330	0.0	2.0	0.0	2.0	38.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
15 min Summer	99.871	0.0	40.0	0.0	25			
30 min Summer	65.803	0.0	52.8	0.0	40			
60 min Summer	41.135	0.0	66.4	0.0	68			
120 min Summer	23.984	0.0	77.5	0.0	126			
180 min Summer	17.635	0.0	85.5	0.0	184			
240 min Summer	14.137	0.0	91.4	0.0	242			
360 min Summer	10.214	0.0	99.0	0.0	336			
480 min Summer	8.071	0.0	104.4	0.0	394			
600 min Summer	6.709	0.0	108.4	0.0	444			
720 min Summer	5.761	0.0	111.7	0.0	504			
960 min Summer	4.521	0.0	116.9	0.0	634			
1440 min Summer	3.203	0.0	124.2	0.0	892			
2160 min Summer	2.262	0.0	131.8	0.0	1260			
2880 min Summer	1.774	0.0	137.8	0.0	1616			
4320 min Summer	1.275	0.0	148.4	0.0	2296			
5760 min Summer	1.019	0.0	158.4	0.0	2952			
7200 min Summer	0.863	0.0	167.7	0.0	3680			
8640 min Summer	0.759	0.0	176.9	0.0	4408			
10080 min Summer	0.684	0.0	186.0	0.0	5144			
15 min Winter	99.871	0.0	40.0	0.0	25			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:16 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period</u>								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	42.520	0.430	0.0	2.0	0.0	2.0	50.1	O K
60 min Winter	42.614	0.524	0.0	2.0	0.0	2.0	61.0	O K
120 min Winter	42.668	0.578	0.0	2.0	0.0	2.0	67.3	O K
180 min Winter	42.695	0.605	0.0	2.0	0.0	2.0	70.4	O K
240 min Winter	42.703	0.613	0.0	2.0	0.0	2.0	71.3	O K
360 min Winter	42.685	0.595	0.0	2.0	0.0	2.0	69.3	O K
480 min Winter	42.650	0.560	0.0	2.0	0.0	2.0	65.2	O K
600 min Winter	42.616	0.526	0.0	2.0	0.0	2.0	61.2	O K
720 min Winter	42.581	0.491	0.0	2.0	0.0	2.0	57.2	O K
960 min Winter	42.514	0.424	0.0	2.0	0.0	2.0	49.3	O K
1440 min Winter	42.396	0.306	0.0	2.0	0.0	2.0	35.7	O K
2160 min Winter	42.275	0.185	0.0	1.9	0.0	1.9	21.5	O K
2880 min Winter	42.209	0.119	0.0	1.8	0.0	1.8	13.9	O K
4320 min Winter	42.166	0.076	0.0	1.4	0.0	1.4	8.9	O K
5760 min Winter	42.152	0.062	0.0	1.2	0.0	1.2	7.2	O K
7200 min Winter	42.145	0.055	0.0	1.0	0.0	1.0	6.3	O K
8640 min Winter	42.140	0.050	0.0	0.9	0.0	0.9	5.8	O K
10080 min Winter	42.137	0.047	0.0	0.8	0.0	0.8	5.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
30 min Winter	65.803	0.0	52.8	0.0	39			
60 min Winter	41.135	0.0	66.4	0.0	68			
120 min Winter	23.984	0.0	77.5	0.0	124			
180 min Winter	17.635	0.0	85.5	0.0	180			
240 min Winter	14.137	0.0	91.4	0.0	238			
360 min Winter	10.214	0.0	99.0	0.0	346			
480 min Winter	8.071	0.0	104.4	0.0	400			
600 min Winter	6.709	0.0	108.4	0.0	462			
720 min Winter	5.761	0.0	111.7	0.0	534			
960 min Winter	4.521	0.0	116.9	0.0	674			
1440 min Winter	3.203	0.0	124.2	0.0	936			
2160 min Winter	2.262	0.0	131.8	0.0	1284			
2880 min Winter	1.774	0.0	137.8	0.0	1612			
4320 min Winter	1.275	0.0	148.4	0.0	2252			
5760 min Winter	1.019	0.0	158.4	0.0	2944			
7200 min Winter	0.863	0.0	167.7	0.0	3656			
8640 min Winter	0.759	0.0	176.9	0.0	4416			
10080 min Winter	0.684	0.0	186.0	0.0	5024			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:16 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	4	8	8	12
	0.054		0.054		0.054

Time Area Diagram

Total Area (ha) 0.000

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

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
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Micro Drainage Source Control 2017.1.2		

Model Details

Storage is Online Cover Level (m) 43.600

Cellular Storage Structure

Invert Level (m) 42.090 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.97
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	0.0	0.915	0.0	0.0
0.914	120.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0069-2000-0900-2000
Design Head (m) 0.900
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 69
Invert Level (m) 42.090
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.0
Flush-Flo™	0.278	2.0
Kick-Flo®	0.568	1.6
Mean Flow over Head Range	-	1.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.2	6.500	5.0		

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:16 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Weir Overflow Control</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 43.000		
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE			21002 Chatham Street																																																																																																																																																																																																																																																																																																																																
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Micro Drainage			Source Control 2017.1.2																																																																																																																																																																																																																																																																																																																																
<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 454 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Overflow (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>42.558</td><td>0.468</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>54.5</td><td>O K</td></tr><tr><td>30 min Summer</td><td>42.704</td><td>0.614</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>71.4</td><td>O K</td></tr><tr><td>60 min Summer</td><td>42.841</td><td>0.751</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>87.4</td><td>O K</td></tr><tr><td>120 min Summer</td><td>42.925</td><td>0.835</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>97.2</td><td>O K</td></tr><tr><td>180 min Summer</td><td>42.971</td><td>0.881</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>102.5</td><td>O K</td></tr><tr><td>240 min Summer</td><td>42.991</td><td>0.901</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>104.9</td><td>O K</td></tr><tr><td>360 min Summer</td><td>42.985</td><td>0.895</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>104.2</td><td>O K</td></tr><tr><td>480 min Summer</td><td>42.959</td><td>0.869</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>101.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>42.932</td><td>0.842</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>98.0</td><td>O K</td></tr><tr><td>720 min Summer</td><td>42.905</td><td>0.815</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>94.9</td><td>O K</td></tr><tr><td>960 min Summer</td><td>42.854</td><td>0.764</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>88.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>42.761</td><td>0.671</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>78.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>42.621</td><td>0.531</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>61.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>42.503</td><td>0.413</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>48.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>42.352</td><td>0.262</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>30.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>42.268</td><td>0.178</td><td>0.0</td><td>1.9</td><td>0.0</td><td>1.9</td><td>20.7</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>42.222</td><td>0.132</td><td>0.0</td><td>1.8</td><td>0.0</td><td>1.8</td><td>15.3</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>42.195</td><td>0.105</td><td>0.0</td><td>1.7</td><td>0.0</td><td>1.7</td><td>12.2</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>42.181</td><td>0.091</td><td>0.0</td><td>1.7</td><td>0.0</td><td>1.7</td><td>10.5</td><td>O K</td></tr><tr><td>15 min Winter</td><td>42.558</td><td>0.468</td><td>0.0</td><td>2.0</td><td>0.0</td><td>2.0</td><td>54.5</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Overflow Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>139.820</td><td>0.0</td><td>56.2</td><td>0.0</td><td>26</td></tr><tr><td>30 min Summer</td><td>92.124</td><td>0.0</td><td>74.1</td><td>0.0</td><td>41</td></tr><tr><td>60 min Summer</td><td>57.590</td><td>0.0</td><td>93.1</td><td>0.0</td><td>70</td></tr><tr><td>120 min Summer</td><td>33.577</td><td>0.0</td><td>108.5</td><td>0.0</td><td>128</td></tr><tr><td>180 min Summer</td><td>24.689</td><td>0.0</td><td>119.7</td><td>0.0</td><td>186</td></tr><tr><td>240 min Summer</td><td>19.792</td><td>0.0</td><td>128.0</td><td>0.0</td><td>244</td></tr><tr><td>360 min Summer</td><td>14.299</td><td>0.0</td><td>138.7</td><td>0.0</td><td>360</td></tr><tr><td>480 min Summer</td><td>11.300</td><td>0.0</td><td>146.1</td><td>0.0</td><td>424</td></tr><tr><td>600 min Summer</td><td>9.392</td><td>0.0</td><td>151.8</td><td>0.0</td><td>484</td></tr><tr><td>720 min Summer</td><td>8.065</td><td>0.0</td><td>156.5</td><td>0.0</td><td>548</td></tr><tr><td>960 min Summer</td><td>6.330</td><td>0.0</td><td>163.7</td><td>0.0</td><td>680</td></tr><tr><td>1440 min Summer</td><td>4.484</td><td>0.0</td><td>173.9</td><td>0.0</td><td>958</td></tr><tr><td>2160 min Summer</td><td>3.167</td><td>0.0</td><td>184.6</td><td>0.0</td><td>1360</td></tr><tr><td>2880 min Summer</td><td>2.483</td><td>0.0</td><td>192.9</td><td>0.0</td><td>1708</td></tr><tr><td>4320 min Summer</td><td>1.785</td><td>0.0</td><td>207.8</td><td>0.0</td><td>2420</td></tr><tr><td>5760 min Summer</td><td>1.426</td><td>0.0</td><td>221.7</td><td>0.0</td><td>3072</td></tr><tr><td>7200 min Summer</td><td>1.208</td><td>0.0</td><td>234.8</td><td>0.0</td><td>3752</td></tr><tr><td>8640 min Summer</td><td>1.062</td><td>0.0</td><td>247.7</td><td>0.0</td><td>4424</td></tr><tr><td>10080 min Summer</td><td>0.958</td><td>0.0</td><td>260.5</td><td>0.0</td><td>5144</td></tr><tr><td>15 min Winter</td><td>139.820</td><td>0.0</td><td>56.2</td><td>0.0</td><td>26</td></tr></table>									Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	42.558	0.468	0.0	2.0	0.0	2.0	54.5	O K	30 min Summer	42.704	0.614	0.0	2.0	0.0	2.0	71.4	O K	60 min Summer	42.841	0.751	0.0	2.0	0.0	2.0	87.4	O K	120 min Summer	42.925	0.835	0.0	2.0	0.0	2.0	97.2	O K	180 min Summer	42.971	0.881	0.0	2.0	0.0	2.0	102.5	O K	240 min Summer	42.991	0.901	0.0	2.0	0.0	2.0	104.9	O K	360 min Summer	42.985	0.895	0.0	2.0	0.0	2.0	104.2	O K	480 min Summer	42.959	0.869	0.0	2.0	0.0	2.0	101.1	O K	600 min Summer	42.932	0.842	0.0	2.0	0.0	2.0	98.0	O K	720 min Summer	42.905	0.815	0.0	2.0	0.0	2.0	94.9	O K	960 min Summer	42.854	0.764	0.0	2.0	0.0	2.0	88.9	O K	1440 min Summer	42.761	0.671	0.0	2.0	0.0	2.0	78.1	O K	2160 min Summer	42.621	0.531	0.0	2.0	0.0	2.0	61.8	O K	2880 min Summer	42.503	0.413	0.0	2.0	0.0	2.0	48.1	O K	4320 min Summer	42.352	0.262	0.0	2.0	0.0	2.0	30.5	O K	5760 min Summer	42.268	0.178	0.0	1.9	0.0	1.9	20.7	O K	7200 min Summer	42.222	0.132	0.0	1.8	0.0	1.8	15.3	O K	8640 min Summer	42.195	0.105	0.0	1.7	0.0	1.7	12.2	O K	10080 min Summer	42.181	0.091	0.0	1.7	0.0	1.7	10.5	O K	15 min Winter	42.558	0.468	0.0	2.0	0.0	2.0	54.5	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)	15 min Summer	139.820	0.0	56.2	0.0	26	30 min Summer	92.124	0.0	74.1	0.0	41	60 min Summer	57.590	0.0	93.1	0.0	70	120 min Summer	33.577	0.0	108.5	0.0	128	180 min Summer	24.689	0.0	119.7	0.0	186	240 min Summer	19.792	0.0	128.0	0.0	244	360 min Summer	14.299	0.0	138.7	0.0	360	480 min Summer	11.300	0.0	146.1	0.0	424	600 min Summer	9.392	0.0	151.8	0.0	484	720 min Summer	8.065	0.0	156.5	0.0	548	960 min Summer	6.330	0.0	163.7	0.0	680	1440 min Summer	4.484	0.0	173.9	0.0	958	2160 min Summer	3.167	0.0	184.6	0.0	1360	2880 min Summer	2.483	0.0	192.9	0.0	1708	4320 min Summer	1.785	0.0	207.8	0.0	2420	5760 min Summer	1.426	0.0	221.7	0.0	3072	7200 min Summer	1.208	0.0	234.8	0.0	3752	8640 min Summer	1.062	0.0	247.7	0.0	4424	10080 min Summer	0.958	0.0	260.5	0.0	5144	15 min Winter	139.820	0.0	56.2	0.0	26
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status																																																																																																																																																																																																																																																																																																																											
15 min Summer	42.558	0.468	0.0	2.0	0.0	2.0	54.5	O K																																																																																																																																																																																																																																																																																																																											
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60 min Summer	42.841	0.751	0.0	2.0	0.0	2.0	87.4	O K																																																																																																																																																																																																																																																																																																																											
120 min Summer	42.925	0.835	0.0	2.0	0.0	2.0	97.2	O K																																																																																																																																																																																																																																																																																																																											
180 min Summer	42.971	0.881	0.0	2.0	0.0	2.0	102.5	O K																																																																																																																																																																																																																																																																																																																											
240 min Summer	42.991	0.901	0.0	2.0	0.0	2.0	104.9	O K																																																																																																																																																																																																																																																																																																																											
360 min Summer	42.985	0.895	0.0	2.0	0.0	2.0	104.2	O K																																																																																																																																																																																																																																																																																																																											
480 min Summer	42.959	0.869	0.0	2.0	0.0	2.0	101.1	O K																																																																																																																																																																																																																																																																																																																											
600 min Summer	42.932	0.842	0.0	2.0	0.0	2.0	98.0	O K																																																																																																																																																																																																																																																																																																																											
720 min Summer	42.905	0.815	0.0	2.0	0.0	2.0	94.9	O K																																																																																																																																																																																																																																																																																																																											
960 min Summer	42.854	0.764	0.0	2.0	0.0	2.0	88.9	O K																																																																																																																																																																																																																																																																																																																											
1440 min Summer	42.761	0.671	0.0	2.0	0.0	2.0	78.1	O K																																																																																																																																																																																																																																																																																																																											
2160 min Summer	42.621	0.531	0.0	2.0	0.0	2.0	61.8	O K																																																																																																																																																																																																																																																																																																																											
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4320 min Summer	42.352	0.262	0.0	2.0	0.0	2.0	30.5	O K																																																																																																																																																																																																																																																																																																																											
5760 min Summer	42.268	0.178	0.0	1.9	0.0	1.9	20.7	O K																																																																																																																																																																																																																																																																																																																											
7200 min Summer	42.222	0.132	0.0	1.8	0.0	1.8	15.3	O K																																																																																																																																																																																																																																																																																																																											
8640 min Summer	42.195	0.105	0.0	1.7	0.0	1.7	12.2	O K																																																																																																																																																																																																																																																																																																																											
10080 min Summer	42.181	0.091	0.0	1.7	0.0	1.7	10.5	O K																																																																																																																																																																																																																																																																																																																											
15 min Winter	42.558	0.468	0.0	2.0	0.0	2.0	54.5	O K																																																																																																																																																																																																																																																																																																																											
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)																																																																																																																																																																																																																																																																																																																														
15 min Summer	139.820	0.0	56.2	0.0	26																																																																																																																																																																																																																																																																																																																														
30 min Summer	92.124	0.0	74.1	0.0	41																																																																																																																																																																																																																																																																																																																														
60 min Summer	57.590	0.0	93.1	0.0	70																																																																																																																																																																																																																																																																																																																														
120 min Summer	33.577	0.0	108.5	0.0	128																																																																																																																																																																																																																																																																																																																														
180 min Summer	24.689	0.0	119.7	0.0	186																																																																																																																																																																																																																																																																																																																														
240 min Summer	19.792	0.0	128.0	0.0	244																																																																																																																																																																																																																																																																																																																														
360 min Summer	14.299	0.0	138.7	0.0	360																																																																																																																																																																																																																																																																																																																														
480 min Summer	11.300	0.0	146.1	0.0	424																																																																																																																																																																																																																																																																																																																														
600 min Summer	9.392	0.0	151.8	0.0	484																																																																																																																																																																																																																																																																																																																														
720 min Summer	8.065	0.0	156.5	0.0	548																																																																																																																																																																																																																																																																																																																														
960 min Summer	6.330	0.0	163.7	0.0	680																																																																																																																																																																																																																																																																																																																														
1440 min Summer	4.484	0.0	173.9	0.0	958																																																																																																																																																																																																																																																																																																																														
2160 min Summer	3.167	0.0	184.6	0.0	1360																																																																																																																																																																																																																																																																																																																														
2880 min Summer	2.483	0.0	192.9	0.0	1708																																																																																																																																																																																																																																																																																																																														
4320 min Summer	1.785	0.0	207.8	0.0	2420																																																																																																																																																																																																																																																																																																																														
5760 min Summer	1.426	0.0	221.7	0.0	3072																																																																																																																																																																																																																																																																																																																														
7200 min Summer	1.208	0.0	234.8	0.0	3752																																																																																																																																																																																																																																																																																																																														
8640 min Summer	1.062	0.0	247.7	0.0	4424																																																																																																																																																																																																																																																																																																																														
10080 min Summer	0.958	0.0	260.5	0.0	5144																																																																																																																																																																																																																																																																																																																														
15 min Winter	139.820	0.0	56.2	0.0	26																																																																																																																																																																																																																																																																																																																														
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE				21002 Chatham Street				
Date 24/02/2021 18:11 File PROPOSED.SRCX				Designed by Noah Bennett Checked by Fiona de Mauny				
Micro Drainage				Source Control 2017.1.2				
<u>Summary of Results for 100 year Return Period (+40%)</u>								
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	42.704	0.614	0.0	2.0	0.0	2.0	71.4	O K
60 min Winter	42.841	0.751	0.0	2.0	0.0	2.0	87.4	O K
120 min Winter	42.927	0.837	0.0	2.0	0.0	2.0	97.4	O K
180 min Winter	42.974	0.884	0.0	2.0	0.0	2.0	102.9	O K
240 min Winter	42.996	0.906	0.0	2.0	0.0	2.0	105.5	O K
360 min Winter	42.993	0.903	0.0	2.0	0.0	2.0	105.1	O K
480 min Winter	42.966	0.876	0.0	2.0	0.0	2.0	102.0	O K
600 min Winter	42.932	0.842	0.0	2.0	0.0	2.0	98.0	O K
720 min Winter	42.901	0.811	0.0	2.0	0.0	2.0	94.4	O K
960 min Winter	42.837	0.747	0.0	2.0	0.0	2.0	86.9	O K
1440 min Winter	42.707	0.617	0.0	2.0	0.0	2.0	71.9	O K
2160 min Winter	42.501	0.411	0.0	2.0	0.0	2.0	47.8	O K
2880 min Winter	42.362	0.272	0.0	2.0	0.0	2.0	31.7	O K
4320 min Winter	42.223	0.133	0.0	1.8	0.0	1.8	15.5	O K
5760 min Winter	42.177	0.087	0.0	1.6	0.0	1.6	10.2	O K
7200 min Winter	42.163	0.073	0.0	1.4	0.0	1.4	8.5	O K
8640 min Winter	42.155	0.065	0.0	1.2	0.0	1.2	7.5	O K
10080 min Winter	42.149	0.059	0.0	1.1	0.0	1.1	6.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)			
30 min Winter	92.124	0.0	74.1	0.0	40			
60 min Winter	57.590	0.0	93.1	0.0	68			
120 min Winter	33.577	0.0	108.5	0.0	124			
180 min Winter	24.689	0.0	119.7	0.0	182			
240 min Winter	19.792	0.0	128.0	0.0	238			
360 min Winter	14.299	0.0	138.7	0.0	350			
480 min Winter	11.300	0.0	146.1	0.0	456			
600 min Winter	9.392	0.0	151.8	0.0	496			
720 min Winter	8.065	0.0	156.5	0.0	566			
960 min Winter	6.330	0.0	163.7	0.0	722			
1440 min Winter	4.484	0.0	173.9	0.0	1030			
2160 min Winter	3.167	0.0	184.6	0.0	1408			
2880 min Winter	2.483	0.0	192.9	0.0	1740			
4320 min Winter	1.785	0.0	207.9	0.0	2384			
5760 min Winter	1.426	0.0	221.7	0.0	3000			
7200 min Winter	1.208	0.0	234.8	0.0	3680			
8640 min Winter	1.062	0.0	247.7	0.0	4408			
10080 min Winter	0.958	0.0	260.5	0.0	5144			
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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:11 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 470873 173488 SU 70873 73488
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.162

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	From:	To:	From:	To:
0	4	0.054	4	8	0.054
				8	12
					0.054

Time Area Diagram

Total Area (ha) 0.000

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

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Micro Drainage Source Control 2017.1.2		

Model Details

Storage is Online Cover Level (m) 43.600

Cellular Storage Structure

Invert Level (m) 42.090 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.97
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	120.0	0.0	0.915	0.0	0.0
0.914	120.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0069-2000-0900-2000
 Design Head (m) 0.900
 Design Flow (l/s) 2.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 69
 Invert Level (m) 42.090
 Minimum Outlet Pipe Diameter (mm) 100
 Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.0
Flush-Flo™	0.278	2.0
Kick-Flo®	0.568	1.6
Mean Flow over Head Range	-	1.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.7	1.200	2.3	3.000	3.5	7.000	5.2
0.200	2.0	1.400	2.4	3.500	3.7	7.500	5.3
0.300	2.0	1.600	2.6	4.000	4.0	8.000	5.5
0.400	1.9	1.800	2.7	4.500	4.2	8.500	5.7
0.500	1.8	2.000	2.9	5.000	4.4	9.000	5.8
0.600	1.7	2.200	3.0	5.500	4.6	9.500	6.0
0.800	1.9	2.400	3.1	6.000	4.8		
1.000	2.1	2.600	3.2	6.500	5.0		

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6 Coppergate Mews Brighton Road Surbiton KT6 5NE	21002 Chatham Street	
Date 24/02/2021 18:11 File PROPOSED.SRCX	Designed by Noah Bennett Checked by Fiona de Mauny	
Micro Drainage Source Control 2017.1.2		
<u>Weir Overflow Control</u> Discharge Coef 0.544 Width (m) 1.000 Invert Level (m) 43.000		
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APPENDIX C - GROUND INVESTIGATION

British Geological Survey, Borehole Record, BGS Reference:SU77SW810

DATE: 04.12.01

CHATHAM STREET - READING

DESCRIPTION	HEI.D		DEPTH	LEGEND	SAMPLE		HONES	SPT	REMARKS
	FEET	M			TYPE	DEPTH	M	N	
									471009 173511
Reinforced CONCRETE.....	44.72	0.00					0.30		
RAILROADS.....	44.42	0.30					0.30		
Medium dense brown silty clayey SAND.....	44.12	0.60			D	0.70			-1896 / 2 / 0.7D
Brown slightly gravelly fine SAND.....	43.17	1.55			U100	1.00		0.95	-1896 / 2 / 1.0U
Dense brown silty sandy chalky GRAVEL.....	43.02	1.70			D	1.45		0.15	-1896 / 2 / 1.5D
					D	1.60			-1896 / 2 / 1.6D
					D	2.20			-1896 / 2 / 2.2D
					U100	2.50		1.15	-1896 / 2 / 2.5U
					D	2.70			-1896 / 2 / 2.8D
					D	2.90			-1896 / 2 / 2.9D
Firm to stiff remoulded CHALK with some... intact chalk and flints - Grade 5	41.87	2.85							
					SPT	4.00		13	-1896 / 2 / 4.4D
					D	4.45			
					D	5.50			-1896 / 2 / 5.5D
					SPT	6.50		16	-1896 / 2 / 6.9D
					D	6.95			
							9.15		
			7.90		D	8.00			-Standing water level
			8.90		D	8.90			-1896 / 2 / 8.0D
					SPT	9.00		11	-1896 / 2 / 8.9D
					D	9.45			-1896 / 2 / 9.4D
					D	10.50			-1896 / 2 / 10.5D
Firm to stiff rubbly CHALK with some..... remoulded chalk and flints - Grade 4	32.72	12.00			SPT	12.00		19	-1896 / 2 / 12.4D
					D	12.45			-1896 / 2 / 12.4D
					D	13.50			-1896 / 2 / 13.5D
					SPT	14.50		21	-1896 / 2 / 14.9D
					D	14.95			
					D	16.00		7.50	-1896 / 2 / 16.0D
					SPT	17.00		29	-1896 / 2 / 17.5D
					D	17.45			-1896 / 2 / 17.5D
					D	18.50			-1896 / 2 / 18.5D
Hard white blocky CHALK with flints - Grade 3	25.22	19.50			SPT	19.50		34	-1896 / 2 / 20.0D
					D	19.95			-1896 / 2 / 20.0D
					D	21.00			-1896 / 2 / 21.0D
					SPT	22.00		42	-1896 / 2 / 22.5D
					D	22.45			-1896 / 2 / 22.5D
					D	23.50			-1896 / 2 / 23.5D
Hard white blocky CHALK with some flints - Grade 2	20.22	24.50			SPT	24.50		48	-1896 / 2 / 25.0D
					D	24.95			-1896 / 2 / 25.0D
					D	26.00			-1896 / 2 / 26.0D
					SPT	27.00		60	-1896 / 2 / 27.5D
					D	27.45			-1896 / 2 / 27.5D
					D	28.80			-1896 / 2 / 28.8D
					SPT	29.50		53	-1896 / 2 / 30.0D
					D	29.95			-1896 / 2 / 30.0D
			14.72						50mm standpipe installed to 18.0m, sealed with 1.0m of bentonite and fitted with stopcock cover concreted in.



TERRAMECH INVESTIGATIONS LIMITED
183 LONG LANE TILEHURST READING

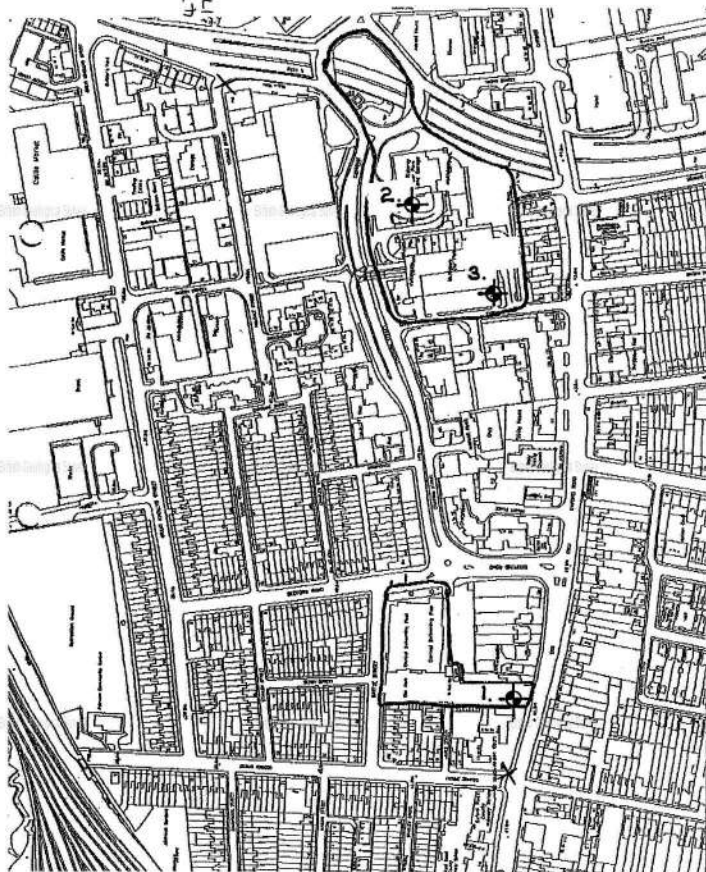
REMARKS: Level = 44.72 AOD

U100-100mm dia. UNDISTURBED SAMPLE
B-BULK SAMPLE W-WATER SAMPLE

U38-38mm dia. UNDISTURBED SAMPLE
SPT-STANDARD PENETRATION TEST

D-SMALL DISTURBED SAMPLE
CPT-CONE PENETRATION TEST

BOREHOLE LAYOUT

471103
473660470360
471360