Canham Consulting

Structural Civil Building Engineers

Flood Risk Assessment

Project Ref:	**213692**
Document Ref:	**213692-CCL-XX-00-01000**
Site:	**Guysfield Care Home, Willian Road, Letchworth, Herts, SG6 2AB**
Client:	**Caring Homes Group**
Prepared By:	**Matthew Herring MEng CEng MICE**
Date of Report:	**24th July 2025**
Revision:	**P05**
Status Code:	**S3**

Canham Consulting Ltd | Consultants to the Construction Industry
Second Floor, 69-75 Thorpe Road, Norwich, Norfolk, NR1 1UA
Registered in England & Wales | Company Registration No 02710417
01603 430650 | clientservice@canhamconsulting.co.uk | www.canhamconsulting.co.uk

Document Issue Record

The table below provides a record of document issue and revision history:

Revisions					
Rev	**Description**	**Prepared By**	**Checked By**	**Approved By**	**Date**
P1	Preliminary Issue	Morgan Harris	Alyssa Morrell	Michelle Robinson	30.09.2019
P2	Updated for revised layout	Joshua Pitcher	Emily Harcourt	David Redstall	05.05.2020
P3	Update for modified layout	Matthew Herring	Alyssa Powell	Matthew Herring	26.06.2024
P4	Update based on LLFA comments	MH	JL	MR	21.05.2025
P5	Option 2 Update	MH	JL	MR	24.07.2025

Contents

1 INTRODUCTION 6
2 PLANNING POLICY 7
2.1 Overview 7
2.2 National Policy 7
2.2.1 National Planning Policy Framework (NPPF) 7
2.2.2 Flood Risk and Flood Probability 7
2.2.3 The Flood and Water Management Act 2010 9
2.3 NPPF 9
2.4 LLFA Summary Guidance for Developers 10
2.5 Climate Change Allowance Note 10
2.6 Lead Local Flood Authority SuDS Policy Statement 10
2.7 SuDS Design Guidance for Hertfordshire 10
2.8 Local Flood Risk Management Strategy (LFRMS) 10
2.9 North Hertfordshire District Council Strategic Flood Risk Assessment 11
2.10 North Hertfordshire Local Plan 11
3 DEVELOPMENT DESCRIPTION & LOCATION 12
3.1 Type of Development with Location 12
3.2 Vulnerability Classification 13
3.3 Sequential Test 13
4 SOURCES OF FLOODING 14
4.1 Flooding from Rivers 14
4.2 Flooding from The Sea 14
4.3 Flooding from The Land 14
4.4 Flooding from The Ground 15
4.5 Flooding from Artificial Sources 16
5 CLIMATE CHANGE 17
6 DETAILED DEVELOPMENT PROPOSAL 18
6.1 Introduction 18
6.2 Proposed Surface Water Drainage Strategy 18
6.2.1 SuDS Hierarchy 18
6.2.2 SuDS Selection 19
6.2.3 SuDs Design 20
6.3 Drainage Modelling 23
6.3.1 Exceedance Event 24
6.3.2 Four Pillars 24
6.4 Proposed Foul Water Strategy 25
6.5 Drainage Drawings 25
7 FLOOD RISK MANAGEMENT MEASURES 26
7.1 Level Strategy 26
7.2 SuDS Maintenance 26

8 RESIDUAL RISKS 27
8.1 Lack of Maintenance 27
8.2 Construction Surface Water Run-Off 27
8.3 Exceedance Event 27
9 OFF SITE IMPACTS 28
9.1 Impact of Surface Water Drainage 28
9.2 Impact of Development on Hydrological Morphology 28
10 SUMMARY 29

Appendices

Appendix A - Proposed Development Plan
Appendix B - Topographic Survey
Appendix C - Geotechnical Site Investigation - Including Infiltration Testing
Appendix D - Anglian Water Asset Plan
Appendix E - Impermeable Areas Plan
Appendix F - Evidence of Existing Drainage
Appendix G - Option 1 Design Microdrainage Calculations
Appendix H - Option 1 Design Surface Water Drainage Layout
Appendix I - Anglian Water Pre-Planning Report
Appendix J - Exceedance Flow Plan
Appendix K - Maintenance Strategy
Appendix L - Greenfield Runoff
Appendix M - Option 2 Design

List of Figures

Figure 1 - Site Location Plan
Figure 2 - Surface Water Flood Map

List of Tables

Table 1 - Fluvial Flood Zone Definition
Table 2 - Definition of AEP and 'Return Period' Flood Events
Table 3 - Sequential Test
Table 4 - Groundwater Sensitivity Classification
Table 5 - SuDS Component Assessment
Table 6 - Pollution Hazard Indices

Table 7 - Indices Suitability Comparison

Table 8 - Four Pillars of SuDS Design

1 INTRODUCTION

Canham Consulting Ltd have been commissioned by Caring Homes Group to produce a Flood Risk Assessment (FRA) and Drainage Strategy (DS) to support of a full planning application for a residential Care Home. The proposed development intends to demolish an existing care home located onsite and construct a new care home alongside retention of an existing building; with refurbishment and new build forming the overall care home facility. A plan of the development can be found in Appendix A.

This FRA and DS will provide information on the flood risks associated with the proposed development, identify mitigation measures for the site and enable the development to meet the relevant design criteria to proceed through planning. These objectives will be achieved by ensuring that the proposed development is safe from flooding to an appropriate degree as specified in current planning policy. This FRA and DS will demonstrate how the proposed development proposals will not increase the risk of flooding within the proposed development site or to third parties.

This report follows the guidance set out in National Planning Policy Framework (NPPF), the National Planning Policy Guidance (NPPG), alongside other relevant Local Authority policies and guidance notes from authorities such as the Environment Agency (EA), Anglian Water, CIRIA, The SuDS Manual (C753) and Hertfordshire County Council's Guidance for Developers on SuDS (Sustainable Drainage Systems) Design.

The following data was collected as part of this FRA:

- Topographic Survey
- Geotechnical Information – Including Infiltration Rates
- Confirmation of How the Site Currently Drains
- Anglian Water Wastewater Sewer Asset Plan
- Anglian Water Pre-Planning Report

2 PLANNING POLICY

2.1 Overview

This Level 1 FRA has been undertaken using the following legislation and guidance:

- National Planning Policy Framework
- Planning Practice Guidance
- Flood and Water Management Act
- Environment Agency - Broadland Rivers Catchment Flood Management Plan
- Strategic Flood Risk Assessment

2.2 National Policy

2.2.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) is a key part of the government's reform to make the planning system less complex and more accessible; to protect the environment and to promote sustainable growth.

In addition, the Technical Guidance to the NPPF published by the Department for Communities and Local Government has also been reviewed in relation to Flood Risk. This document provides additional guidance to ensure the effective implementation of the planning policy set out in the NPPF on development in areas at risk of flooding.

Local Authorities should only consider development in flood risk areas appropriate where informed by a site-specific FRA, based upon the Environment Agency's Standing Advice on flood risk. The FRA should identify and assess the risks of all forms of flooding to and from the development and demonstrate how flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

Government guidance states that development should be directed as far as practicable towards Flood Zone 1 areas (Low Probability (less than 0.1 % Annual Exceedance Probability (AEP) of fluvial/ sea flooding)) to avoid fluvial flood risks wherever this is possible.

For development proposed in Flood Zone 1, if the development area is greater than 1 hectare an FRA will still be required to address design issues related to the control of surface water runoff and climate change, as well as considering any other potential sources of flood risk for the development site.

2.2.2 Flood Risk and Flood Probability

The risk framework outlined in the NPPF defines the flood risk using the categories in Table 2.1. The fluvial extent map in the SFRA2 defines the geographical extent of Flood Zones 1, 2, 3a and 3b.

Flood Zone	Further Assessments and Consultation to be Undertaken	Potential Residual Effects
1	At risk from a flood event greater than the 1 in 1000-year event (greater than 0. 1% annual probability)	Low Probability
2	At risk from flood event between the 1 in 100 and 1 in 1000-year event (between 0. 1% and 1% annual probability).	Medium Probability
3a	At risk from a flood event less than or equal to 1 in 100-year event.	High Probability
3b	Land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0. 1%) flood or otherwise defined by the Local Planning Authority. This zone also comprises land where water must flow or be stored during periods of flooding.	Functional Floodplain

Table 1: Fluvial Flood Zone Definition

Flooding is a natural process that can present a range of different risks depending on its form. Flood practitioners and professionals define the risks presented by flooding according to an Annual Exceedance Probability (AEP), or as having a 'return period.'

Flood risk includes the statistical probability of an event occurring and the scale of the potential consequences. Flood risk is estimated from historical data and expressed in terms of the expected frequency of a flood of a given magnitude. The 10-year, 50-year, 100-year, and the 200-year return period floods have a 10 %, 2 %, 1 % and 0.5 % chance of occurring in any given year, respectively. However, over a longer period the probability of flooding is considerably greater.

For example, for the 100-year return period flood:

- There is a 1 % chance of the 100-year flood occurring or being exceeded at least once in any single year.
- A 26 % chance of it occurring or being exceeded at least once in a 30-year period; and
- A 51 % chance of it occurring or being exceeded at least once in a 70-year period.

Table 2 below provides a summary of the relevant AEP and corresponding return period events of a particular sensitivity:

AEP (%)	Return Period (Years)
100	1 in 1
10	1 in 10
2	1 in 50
1	1 in 100
0.5	1 in 200
0.1	1 in 1000

Table 2: Definition of AEP and 'Return Period' Flood Events

2.2.3 The Flood and Water Management Act 2010

The Flood and Water Management Act (2010) determined the need for flood risk to be managed within the framework of National Strategies for England and Wales and within Local Strategies for each Local Flood Authority Area. The national strategy for England sets out the principles for flood risk management and which organisations are responsible for implementation.

In accordance with the national strategy for England, Lead Local Flood Authorities (LLFAs) have been allocated responsibility for developing independent Local Flood Risk Management Strategies (LFRMS) to address sources of local flooding. Each LFRMS identifies which local organisation is accountable for managing flood risk and establishes partnership agreements, as well as undertaking an assessment of flood risk and developing plans/actions, for tackling these risks.

2.3 NPPF

Chapter 14 of the NPPF states 'The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.'

Within Chapter 14 of the NPPF under the sub heading Planning and flood risk are further paragraphs suitable to the proposed development.

- Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
- Strategic policies should be informed by a strategic flood risk assessment and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.
- All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change – so to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk by:
  a) applying the sequential test and then, if necessary, the exception test as set out below;
  b) safeguarding land from development that is required, or likely to be required, for current or future flood management;
  c) using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); and
  d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.
- When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
b) the development is appropriately flood resistant and resilient;
c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
d) any residual risk can be safely managed; and
e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan

- Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used 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 for the lifetime of the development; and
  d) where possible, provide multifunctional benefits.
  e) The NPPF is explicit in that it directs any proposed development away from sites which are at risk of flooding. Additionally, it states that any proposed development should not increase the risk of flooding within the site boundary or to third parties.
  f) Ensuring there is a suitable level of flood risk is done in the first instance using the sequential test which is detailed within the NPPF Technical Guidance.

2.4 LLFA Summary Guidance for Developers

Hertfordshire County Council have produced a document for developers providing guidance on what is required to produce a satisfactory Flood Risk Assessment and Drainage Assessment for a proposed development.

This FRA and DS report has considered the contents of the LLFA Summary Guidance for Developers and its Appendix checklist. It is understood that the necessary information for the council is available within this FRA and DS.

2.5 Climate Change Allowance Note

Hertfordshire County Council have produced a document outlining what climate change levels need to be considered when designing surface water systems for developments. This report includes modelling using the maximum recommended climate change consideration of 40%.

2.6 Lead Local Flood Authority SuDS Policy Statement

Hertfordshire County Council produced a document outlining SuDS policies proposed developments should abide by. The SuDS proposed within this report abide by the standards outlined in this document.

2.7 SuDS Design Guidance for Hertfordshire

Hertfordshire County Council have produced a document which outlined guidance for SuDS design. This information has been taken into consideration when designing the proposed surface water network for the proposed development.

2.8 Local Flood Risk Management Strategy (LFRMS)

Hertfordshire County Council produced their first Local Flood Risk Management Strategy (LMRMS) in February 2013. The updated 2019 document goes into detail regarding flood risk in the county. Additionally, Section 5 of the document outlines policies relevant to flood risk for developments in the County.

2.9 North Hertfordshire District Council Strategic Flood Risk Assessment

North Hertfordshire District Council undertook a Strategic Flood Risk Assessment (SFRA) for the district of North Hertfordshire. The SFRA was undertaken to provide updated information on the SFRA undertaken in 2008, including information such as updated flood risk mapping. The proposed development site is not noted within the report as being at a risk of flooding.

2.10 North Hertfordshire Local Plan

The proposed development falls within the Letchworth Garden City area of North Hertfordshire. The local policy map for this area shows that the proposed development is within 'Landscape and Open Space Pattern Wildlife and Nature: Policy 14'. In addition to this, the proposed development is partly within a 'Conservation area'.

3 DEVELOPMENT DESCRIPTION & LOCATION

3.1 Type of Development with Location

The proposed development is for the demolition of an existing care home and the construction of a new care home alongside retention of Guys House (part of the current care home function) which will be refurbished. The site is located on the northern side of Willian Road, Willian, Letchworth Garden City, SG6 2AB, as indicated below on Figure 1. The site is centred on Grid Reference: TL 22155 30705.

Figure 1: Site Location Plan

The site is bounded to the north by a suburban residential estate. To the south, the site is bounded by Willian Road, beyond this is agricultural land. The site is bounded to the east by agricultural land, additionally, Willian Pond is located to the east of the site. The site is bounded to the west by suburban residences, Letchworth Lane, and a golf course.

The site is currently used as a residential care home and Guys House will remain as such.

A Topographic Survey of the existing site is included within Appendix B. The topographic survey indicates that the proposed development is in an area with a maximum ground level of approximately 86.92m AOD in the north of the site and a minimum ground level of approximately 81.28m AOD in the south-east of the site. The topographic survey shows the general fall of the site is from the north to the south.

The existing site area is approximately 8,365m². Of this area, impermeable surfaces account for roughly 2,194m². The impermeable areas onsite consist of the existing care home building and, the tarmac driveway and parking area. The remaining site area is understood to have permeable surfaces.

3.2 Vulnerability Classification

The categories of built development are classified in national planning policy against flood risk vulnerability. Table 2 within the NPPG provides a list of which categories of development fall into five flood risk vulnerability classifications. The list is recognised as not being exclusive, however, it provides guidance on the various land uses and their associated Flood Risk Vulnerability Classifications.

The proposed development can be categorised as a residential institution which falls into the '**More Vulnerable**' classification.

3.3 Sequential Test

The online long-term flood maps, available on the gov.uk website, indicates that the site is located within Flood Zone 1. Table 3 of the Technical Guidance to the NPPF identifies which categories of development are appropriate for each Flood Zone. This information is summarised below in Table 3.

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone Classification	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception test required	✓	✓
	Zone 3a	Exception test required	✓	×	Exception test required	✓
	Zone 3b	Exception test required	✓	×	×	×

✓ Suitable for Development
× Not Suitable for Development

Table 3: Sequential Test

The proposed development is located within Flood Zone 1 and is categorised as a "More Vulnerable" development. From examining Table 3 above, it is understood that the proposed development is suitable from the Sequential Test viewpoint.

4 SOURCES OF FLOODING

As the site is shown within Flood Zone 1 on the online flood maps, the most significant risk of flooding is deemed to be from surface water. For completeness, an analysis of all flood sources has been undertaken to fully consider the flood risks to the proposed development and the surrounding area.

4.1 Flooding from Rivers

Fluvial flooding is caused by rivers and occurs when the river channel capacity is exceeded by its flow. Most rivers have a natural floodplain which, in built up areas undergoes development.
The online long-term flood risk maps (provided by gov.uk) show the proposed development site is located inside Flood Zone 1 and therefore at a very low risk of fluvial flooding.

The closest watercourse to the site is a ditch approximately 90m south-east of the site. The drainage ditch is an ordinary watercourse.

Considering the information above, the risk of fluvial flooding posed to the proposed development is understood to be **low**.

4.2 Flooding from The Sea

Tidal flooding from the sea occurs when high tides and/or storm surges raise the level of tidal waters above the level of the shore or riverbank. This type of flooding can be sudden and severe, although, it is dependent upon several factors. There are two ways in which the sea could potentially flood the site:

a) Open Coast – risk from the sea

The proposed development is significantly far inland from the sea. The risk of flooding is therefore understood to be **Low.**

b) Tidal Influence of Rivers

The watercourses outlined above are not considered to be influenced by the tides at the site location and the risk of flooding from tidal influence is considered to be **Low.**

4.3 Flooding from The Land

Within urban regions where there are large areas of impermeable surfacing (e.g. roof areas, car parking and roads), high intensity rainfall events can overwhelm manmade drainage systems and lead to flooding. Additionally, in areas with permeable surfaces, flooding can occur if water cannot infiltrate quickly enough to prevent ponding on the surface.

The severity of flooding from the land is dependant, to an extent, on the gradient of the surrounding land. On a macro scale, the OS Explorer series map contours show an 85m contour line running through the centre of the site, an 80m contour running immediately south of the site and a 90m contour running immediately to the north of the proposed development.

The topographic survey (Appendix B) shows the site falls from north to south with a land gradient of approximately 1:17.

Considering the above, the risk from overland flow is considered to be **Low-Medium**.

Figure 2 below illustrates the surface water flood risk at the site and shows the site is at a very low risk of surface water flooding for the majority of the site area however, there is an area of low surface water flood risk adjacent to the north and west of the existing care home. Figure 2 is an extract of the long-term flood risk map available on the gov.uk website. When the topographic survey (Appendix B) is examined, it is considered that the surface water flooding indicated to the north of the care home on Figure 2 would likely occur, as this is a low area.

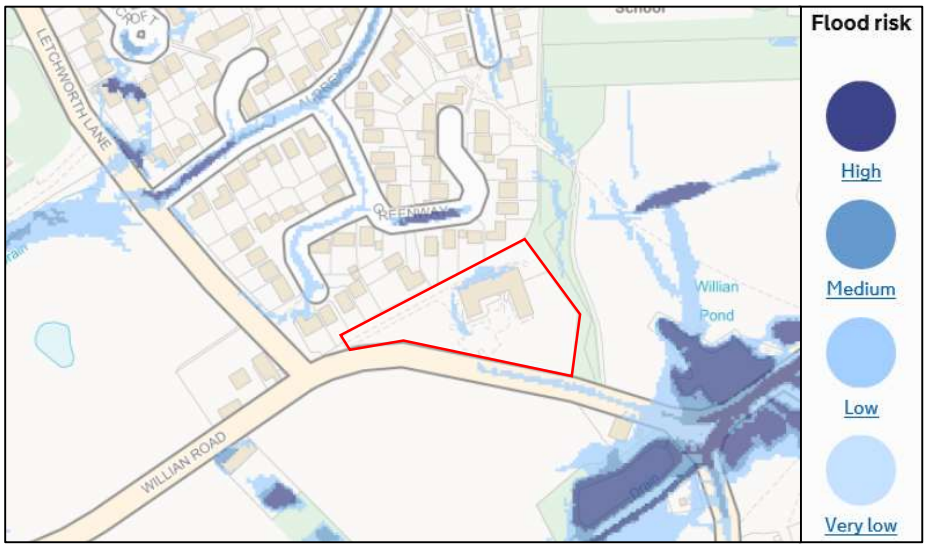


Figure 2: Surface Water Flood Map

The risk of flooding from the land is considered to be **Low-Medium.**

4.4 Flooding from The Ground

In areas where the level of groundwater is high, rainfall that soaks into the ground can raise groundwater to a level where structures within the ground are at risk of flooding. Structures such as basements or detention ponds can be at risk, although this is dependent upon the ground conditions of the site.

British Geological Survey (BGS) maps indicates that the onsite geology varies. In the south-eastern corner of the site there is a bedrock of Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) – Chalk over superficial deposits of Glaciofluvial Deposits, Mid Pleistocene – Sand and Gravel. In the remainder of the site there is a bedrock of Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) – Chalk over superficial deposits of Lowestoft Formation – Diamicton.

There were no BGS borehole logs recorded close to the site location.

Site investigation conducted by Soiltechnics, August 2019 (Appendix C), dug trial pits to a depth of 2.20m below ground level (bgl). No groundwater was encountered in these trial pits. Further to this, the site investigation revealed that the is a strong presence of clay within the examined soil stratigraphy.

The environmental sensitivity of the ground conditions at the site location has been examined using the online DEFRA Magic Map service. A summary of this information can be seen in Table 4 below.

Classification	Classification at the site
Nitrate Vulnerable Zone (NVZ)	Nitrate Vulnerable Zone 2017 Designation
Source Protection Zone	Zone III – Total Catchment
Aquifer (Bedrock)	Principal
Aquifer (Superficial)	Secondary A & Secondary (undifferentiated)
Groundwater Vulnerability	Major Aquifer Intermediate

Table 4: Groundwater Sensitivity Classification

Therefore, the flood risk from groundwater is considered to be **low.**

4.5 Flooding from Artificial Sources

Flooding from artificial sources includes flooding from sewers (adopted and private), reservoirs and canals. Sewer flooding occurs when the quantity of water flowing into the sewers exceeds its capacity, sewerage backs up and exits the drainage system via manholes or gullies. Alternatively, and more commonly, sewers flood when a blockage occurs in a pipe causing water to back up. Blockages are more likely in private sewers, but the resulting flood is usually less severe than flooding from public sewers which are often larger than private networks.

Adopted drains; Anglian Water has surface water and foul sewers in the vicinity of the proposed development site in all directions. The location of these existing sewers is contained within Appendix D. The majority of the adopted sewers are downhill (east, south and west) of the proposed development. To the north, an adopted surface water and foul water sewer run east to west, it is considered that if theses sewers were to flood the flow path would be down towards the existing highway. It is possible that if these sewers were to flood that water would reach the proposed development, however, there are multiple barriers between these sewers and the site (including houses). Based upon this information, flooding from adopted sewers is considered to be **Low.**

Private Drainage; There is an existing residential care home located onsite and has private drainage associated with it. The existing surface water drainage will be grubbed out as part of the proposed development. New private drainage will be constructed as part of the development proposals. Any drainage constructed as part of the proposed development will be constructed to the relevant standards and should therefore not to pose a risk of flooding to the proposed development.

Considering the above, it is understood that the risk of flooding from private drainage is Low.

Flooding from Canals; There are no canals in the vicinity of the site and the risk of flooding from canals is therefore considered to be **Low.**

Flooding from Reservoirs; There are no reservoirs in the vicinity of the site and the risk of flooding from reservoirs is therefore considered to be **Low.**

5 CLIMATE CHANGE

Due to the location of the site, the climate change factors, as defined by NPPF Technical Guidance, should be applied to the peak rainfall intensity. A 100-year lifespan for the development has been considered as residential.

National Guidance on Flood Risk Assessments and climate change allowances, shown in Table 2 of the national climate change, shows that in small and urban catchments a central level of 20% and upper end of 40% peak rainfall intensity allowance should be used to assess the range of impacts.

For the purposes of this report it is proposed that a conservative approach is considered and that a climate change factor of +40% is utilised on all drainage calculations. The +40% climate change factor used within the drainage calculations is in line with the Climate Change Allowance Note produced by Hertfordshire County Council.

6 DETAILED DEVELOPMENT PROPOSAL

6.1 Introduction

The proposed development is for a replacement residential care home located within Flood Zone 1. The site is shown to be at a low risk of surface water flooding in locations near to the existing care home.

The existing development consists of approximately 2,194m^2 of impermeable area which is predominately comprised of hard standing and roof area.

The proposed development proposes approximately 1,065m^2 of impermeable roof area with the existing Guys House contributing a further 150m^2 impermeable roof. The access road and parking areas (1,221m^2) are proposed to be constructed from permeable paving. The proposed impermeable areas plan for the proposed development is available within Appendix E. If the proposed access road and parking areas were to be constructed out of a permeable surface such as permeable paving, the proposed development will reduce the total impermeable area onsite by 978m^2.

6.2 Proposed Surface Water Drainage Strategy

6.2.1 SuDS Hierarchy

In identifying SuDS options, it is important to understand how the site can meet the following drainage hierarchy:

i. Infiltration
ii. Disposal to a watercourse
iii. Disposal to a public sewer

The existing development discharges its surface water via infiltration. A number of ring soakaways have been confirmed to be located onsite. Evidence proving the existence of ring soakaways is available in Appendix F.

Infiltration testing included within Appendix C shows that infiltration rates onsite vary significantly. Three trial pits were dug, two shallow (~1.0m bgl) and one deep (~2.2m bgl). Two of these trial pits failed to provide a passable BRE 365 infiltration test result. One of the shallow trial pits (TP02) provided a passable BRE 356 infiltration rate of 5.80x10^{-6}m/s (0.02088m/hr). The fact that one of the shallow tests provided a suitable infiltration rate and the other was far from doing so, raises questions regarding the suitability of infiltration as a means of surface water discharge for the proposed development. However, as the site currently discharges via infiltration, it is likely that the infiltration testing was not undertaken at a deep enough level to access the favourable infiltration material and an infiltration-based solution should be available to the proposed development. Guys House, as part of the existing development, is expected to continue to discharge surface water via the existing soakaways. This is the primary aim for the design and further testing will be undertaken to confirm that this is a feasible approach.

If infiltration is not found to be possible, discharge to a watercourse has also been considered. There are no watercourses immediately bounding the proposed development with the closest watercourse running adjacent Wymondley Road, approximately 90m south-east of the site. To access this watercourse, the proposed development would need to undertake works under the public highway to lay approximately 120m of pipe extending to the ditch. Both the topographic survey and online Explorer series maps suggest that a gravity connection can be made from the site to the existing watercourse. It is considered that these works would be expensive and

disruptive. In addition to this, the Anglian Water surface water sewers (as shown in Appendix D) connect into the nearby watercourses. Therefore, it would make sense to connect into one of the Anglian Water surface water pipe runs instead of laying a new pipe to the watercourse. This is the proposed option in the event that the infiltration does not work and is presented within Appendix M.

Disposal to a public sewer has also been considered as an alternative to infiltration and disposal to a watercourse. Anglian Water and Thames Water both own assets in the district of North Herts and were contacted to discuss whether they had any assets in the vicinity of the site location. As discussed above, and available within Appendix D, Anglian Water do own surface water sewers in the vicinity of the site. An Anglian Water Pre-Planning Report was undertaken for the proposed development (see Appendix I). The report demonstrated that the existing Anglian Water sewer network has capacity to support the proposed development and a connection of 5l/s would be allowable, should evidence be provided that the drainage hierarchy has been followed. The Pre-Planning Report was undertaken in 2019 and has expired but we would assume that the approval and advice is still relevant and post planning, would recommend an early S106 submission to secure Anglian Water acceptance for the proposals. Despite the Anglian Water acceptance of 5l/s, the proposals put forward in Appendix M seek to reduce the site discharge to 2l/s (based on the standard Anglian Water policy of greenfield runoff rate or 2l/s, whichever is higher); the calculation for greenfield runoff is included in Appendix L.

Considering the above, it is believed that the most suitable way forward for the proposed development is to use infiltration; Option 1. Additional site investigation will be necessary to confirm the suitability of infiltration at the location of the proposed infiltrating features. Should infiltration be revealed as unsuitable, then disposal to the public sewer will be considered as a second preference, given that there is not an accessible watercourse; Option 2. These two options are presented in Appendix H and Appendix M for Options 1 and 2 respectively.

6.2.2 SuDS Selection

The suitability of the SuDS detailed within Table 7.1 of the SuDS Manual has been considered for the proposed development. Table 5 below summarises this information.

SuDS Element	Collection Mechanism	Design Criteria						Suitable	Reason
		Water Quantity			Water Quality	Amenity	Biodiversity		
		Peak Run off Rate	Runoff Volume						
			Small Events	Large Events					
Rainwater Harvesting Systems	P		●	●		●		Y	
Green Roofs	S	○	●		●	●	●	N	Financially constraining to the proposed development
Infiltration Systems	P	●	●	●	●	●	●	Y	Limited suitability
Proprietary Treatment Systems	P				●			Y	
Filter Strips	L		●		●	○	○	Y	Limited infiltration suitability
Filter Drains	L	●			●	○	○	Y	Limited infiltration suitability
Swales	L	●	●	●	●	●	●	Y	Limited infiltration suitability
Bio-retention Systems	P	●	●	●	●	●	●	Y	
Trees	P	●	●		●	●	●	Y	
Pervious Pavements	S	●	●	●	●	○	○	Y	Limited infiltration suitability
Attenuation Storage Tanks	P	●						Y	
Detention Basins	P	●	●		●	●	●	Y	
Ponds and Wetlands	P	●			●	●	●	Y	

Key: P = Point, L=Lateral, S=Surface, ●=Likely Valuable Contribution, ○=Some potential contribution

Table 5: SuDS Component Assessment

It is important to consider the environmental sensitivity of the surrounding area. Table 5 above summarises environmental sensitivity information about the site. It is considered that site is situated in a region which is environmentally sensitive, therefore, suitable forms of pollution treatment will be essential to ensure that the proposed development does not negatively impact the environment.

6.2.3 SuDs Design

Option 1 - Infiltration Strategy

As infiltration has been demonstrated to be limited onsite it is important to examine the Trial Pit records to understand these limitations (Appendix C). TP02 is the trial pit that provided the usable infiltration rate onsite. The stratigraphy of TP02 was a mixture of made ground, sand, gravel etc. to a depth of 0.5m bgl and sandy light gravelly clay between 0.5m bgl to 1.0m bgl. The calculated infiltration rates are based upon the water level drop over time in the middle 50% of the water depth between the maximum water level during the test and the bottom of the trial pit. For TP02, this meant that the infiltration rate is based upon water between the range of 0.6m bgl to 0.8m bgl which is mostly within the slightly sandy gravelly clay region of the soil stratigraphy. From examining the infiltration graphs for TP02 it can be seen that water dropped more rapidly in the made ground than within the clay. This is important to note because it suggests that a shallow infiltration system installed at a depth above 0.6m bgl would infiltrate at a higher rate than suggested from the TP02 test. Further to this, TP02 suggests that permeable paving will be a suitable SuDS choice for managing surface water associated with the access road and parking areas.

When TP03 is examined, it is evident why the infiltration test failed. The maximum water level in the TP03 test was at 1.4m bgl, which is the same depth that the clay is found in this trial pit. Above the clay in TP03 is made ground. As TP03 is located close to TP02, it is reasonable to assume that the infiltration characteristics of the made ground are similar to the infiltration characteristics of the made ground in TP02.

Considering the site currently drains via infiltration and the above, it is believed there is scope for the proposed development to utilise a shallow infiltration system such as permeable paving would be available to the proposed development, however, further tests around the site would likely be required to confirm suitability in these locations. The open space in the east of the site poses the challenge of steep ground levels. The topographic survey within Appendix B shows a slope as much as 1:8 in the southern part of the open space. These surface levels reduce the viability of a structure such as a shallow infiltration basin. The site currently uses deeper infiltration to manage surface water associated with the existing care home roof, as evidenced in Appendix F. Therefore, it is considered that surface water associated with the proposed residential roof will discharge via infiltration and surface water associated with the access road and parking areas could utilise shallow infiltration.

It is envisaged that the infiltration testing could be taken immediately after planning award and a suitably worded condition used to demonstrate the intent to line up with the drainage hierarchy.

A Microdrainage Network model has been created to evidence the viability of infiltrating surface water drainage network for the proposed development. The surface water drains to a cellular storage soakaway in the south of the site, located near to an existing ring soakaway and at the same depth (2.0m) below ground level. The Microdrainage model revealed that a cellular storage soakaway sized 15.0m x 10.0m x 0.8m would be required for the 1-in-100-year event plus 40% climate change. The soakaway was sized using the infiltration rate from TP02 of 0.02088m/hr and meets the half-drain-time. It is likely that during the detailed design, and following further site investigation onsite, that the infiltration rate will alter and therefore the size of this storage may need to be reviewed. However, given the current information available, the soakaway size above demonstrates that an infiltration option could be available to the proposed development. Calculations for the Microdrainage model are available in Appendix G and a drawing of the proposed surface water drainage layout is available in Appendix H. An impermeable areas plan showing the areas considered within the calculations is included within Appendix E.

The Microdrainage model shows no flooding during the 1-in-30-year event. The Microdrainage model shows a minor volume of flooding during the 1-in-100-year, plus climate change, event (a total of 6.8m^3 across the site area). It is considered that this flooding can be contained within the site and will not increase the risk of flooding to third parties.

This approach is consistent with the Hertfordshire County Council LLFA Guidance for Developers which advises as follows:
The site will not flood from surface water up to a 1 in 100 chance in any year including an allowance for climate change event, OR surface water flooding will be safely contained on site up to this event, ensuring that surface water runoff will not increase flood risk to the development or third parties. There should be no flooding within the site for up to and including the 1 in 30 chance in any year rainfall event.

<u>Option 2 - Connection to a Public Sewer</u>
As there is a possibility that infiltration will not be a viable option for the proposed development, given that some of the infiltration tests failed, an attenuation option has also been considered for

the proposed development. This attenuation option would support a restricted outfall to an Anglian Water surface water sewer. Discharge to a sewer rather than watercourse is considered as there is not a watercourse in the immediate vicinity of the site.

An Anglian Water Pre-Planning Report from 2019 (included in Appendix I) reveals that Anglian Water would accept a release rate of 5l/s from the proposed development. Our proposal uses an outfall rate of 2l/s and the drainage infrastructure is sized accordingly. It is proposed that permeable paving would be used on the access road and parking area and these areas are included in the overall site discharge although there should be infiltration in these shallow areas to limit the ultimate flow. Calculations for the Causeway Flow model are included in Appendix M.

The connection to the public sewer will be on the footpath adjacent to Willian Road.

Summary

From the information presented above, it is apparent that the proposed development has options available in regard to surface water drainage. Based upon the available site investigation information, the likelihood is that infiltration will be a viable option for the proposed development (Option 1). Additional site investigation will be provided to ascertain whether infiltration is suitable for the proposed development or not. If the additional testing reveals that infiltration is unsuitable then an attenuation and disposal to a public sewer option is available for the proposed development (Option 2).

Pollution Treatment

Table 26.1 of the SuDS Manual (C753) indicates that a simple index approach is suitable for assessing the risk to ground water. Table 26.2 indicates the pollution indices associated with different land uses. Table 6 below summarises the pollution indices that are relevant for the proposed development.

Land Use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways and residential car parking with infrequent change	Low	0.5	0.4	0.4

Table 6: Pollution Hazard Indices

Table 7 below compares the level of treatment offered by the proposed SuDS elements associated with the proposed surface water strategy (outlined above) against the pollution indices shown above in Table 6.

	Total Suspended Solids	Metals	Hydro-carbons
Residential Roofs	0.2	0.2	0.05
Infiltration or Attenuation	Pollution associated with residential roofs is very low, it is understood that treatment of residential roof water (beyond removal of grass solids and sediments) is not required prior to discharge from the site. Should infiltration be deemed suitable for the proposed development, a level of treatment will be applied whilst the water percolates through the soil.		
Suitable Level of Treatment?	Yes	Yes	Yes
Individual Property Driveways & Car Parking	0.5	0.4	0.4
Permeable Paving	0.7	0.6	0.7
Suitable Level of Treatment?	Yes	Yes	Yes

Table 7: Indices Suitability Comparison

Based upon the information outlined above, it is believed a suitable level of treatment will be provided to the surface water prior to its discharge across both options. The permeable paving will serve as treatment for the access road and parking areas to ensure that a suitable level of treatment is applied to the surface water.

Rain garden pods and green wall areas will be used alongside the drainage provision in both scenarios to support attenuation and improvement of the quality of the flow delivering on the SuDS intent. These elements are shown on both design option drawings.

6.3 Drainage Modelling

The Microdrainage modelling is included for Option 1 in Appendix G and for Option 2 in Appendix M.

As noted above, the method for discharge of the surface water is either going to be discharge via infiltration or to the Anglian Water network having been restricted to 2l/s. On that basis, to enable a design solution, we have established the following design assumptions which were appropriate at the time of the design:

- Traditional gullies, linear drains taking roof and hardstanding drainage to below ground surface water drainage network or via overland flow to the appropriate point.
- Design storms of up to 1 in 100 plus 40% climate change allowance with no flooding.
- Global time of entry allowance of 5 minutes.
- FSR Rainfall Data used for Drainage calculations.
- Runoff coefficient CV of 1
- Storms from 15 minute up to and including the 2,880 minute storm calculated for specified return periods/AEP events demonstrating no flooding and no impact offsite.
- 40% climate change allowed for in 3.33% and 1% AEP events in line with applicable standards at the time of the design.
- Green roof areas and rain garden pods included on drawings but not in calculations or drawing based on the assumption that both are full to consider onerous scenario.
- Factor of safety in accordance with Table 25.2 of SuDS Manual 2015 taken as 1.5 based on site area and consequences of failure (no damage or inconvenience)

- All new drainage installations have been designed in accordance with the current Building Regulations – Part H and in line with the Anglian Water requirements, as defined by the current details outlined in Design and Construction Guidance published by Water UK.

6.3.1 Exceedance Event

Should a storm greater than the critical design storm (1-in-100-year plus 40% climate change event) occur, the site will likely flood. This possibility has been considered and an exceedance flow plan has been produced for the proposed development indicating surface water overland flow routes (Appendix J). The surface water flood map (Figure 2) shows that there is flooding on the northern side of the care home, this flooding likely results from the ground levels to the north of the existing building sloping towards the existing building. This situation will remain with the proposed residential care home however, measures will be in place to ensure that surface water runoff does not enter the proposed care home building. These measures will include ensuring the finished floor level of the proposed development is at least 150mm about the surrounding ground level and, the installation of structures such as channel drains to convey surface water around the sides of the building.

6.3.2 Four Pillars

As for any new development, it is appropriate to demonstrate how the design has addressed the four pillars of SuDS across our drainage strategy; this is as outlined in Table 8 below:

Pillar	Demonstration of Pillar
Water Quantity – Control the quantity of run off	Irrespective of the solution, the quantity of flow will be restricted on site and controlled so that it demonstrates betterment compared to the existing situation. The current brownfield site discharge rate will be improved in either scenario.
Water Quality – Manage the quality of the runoff	The solutions have been demonstrated to address the pollution mitigation indices as outlined within the SuDS Manual accounting for the various sources and methods deployed as demonstrated in Tables 4 and 5. In both designs, permeable paving will be used to deliver improvements of the water quality and where relevant, SuDS planters will be used to deliver further enhancement.
Amenity – Create and sustain better places for people	The proposals will reduce the impact of surface water drainage on adjacent sites and provide an example for the development of similar sites elsewhere. The site will remain in its current use however the provision will be improved and the footprint of the SuDS will be expanded more widely across the site.
Biodiversity – Create and sustain better places for nature	New garden areas will be provided as part of the development alongside SuDS planters to some of the downpipes and this will deliver improved biodiversity across the site.

Table 8: Four Pillars of SuDS Design

The detail outlined above outlines how the development will embrace SuDS provision to address the Four Pillars and improve the current situation across each of the four aspects.

6.4 Proposed Foul Water Strategy

It is proposed that foul water will discharge from the site in a similar manner to the existing development. The existing development discharges foul water from the site into a foul water sewer located along Willian Road, adjacent to the south of the development. It is understood that existing foul water pipes within the site will be grubbed out and new foul water pipes will be laid. The Anglian Water Pre-Planning Report (included in Appendix I) confirms that the Anglian Water foul water network currently has capacity to support the proposed development. Further to this, the Anglian Water Pre-Planning Report confirms that the Letchworth Water Recycling Centre has capacity to treat foul water flows from the proposed development.

6.5 Drainage Drawings

The proposed drainage design is outlined across drawing ref 213692-CCL-XX-00-DR-C-3000 included in Appendix G. All new drainage installations have been designed in accordance with the current Building Regulations – Part H and in line with the Anglian Water requirements, as defined by the current details outlined in Design and Construction Guidance published by Water UK. The construction details can be seen in Appendix H outlining the specification of the drainage designs.

7 FLOOD RISK MANAGEMENT MEASURES

The proposed development would see a reduction in impermeable areas associated with the site and therefore reduces the runoff generated from the site. In addition to this, flood risk management measures will be undertaken as part of the proposed scheme as outlined in the section below.

7.1 Level Strategy

To mitigate the flood risk presented by overland flow, where possible, the external ground levels will fall away from building entrances. This will ensure that should the drainage system fail, the flood flow paths flow away from the buildings. The details of the levels strategy will be a function of the detailed design, however, finished floor levels of will be constructed 150mm above the surrounding ground level. An exceedance flow plan showing the proposed overland flow routes can be seen in Appendix J.

7.2 SuDS Maintenance

SuDS schemes require more maintenance than traditional piped drainage systems and as such it is imperative that a suitable maintenance regime is established to ensure that the features are maintained and function as required.

The exact maintenance requirements of the SuDS will depend upon the product or SuDS provided as a function of detailed design. A maintenance strategy has been be completed for the site outlining the maintenance requirements of the proposed SuDS system. This maintenance strategy can be found in Appendix K.

In terms of responsibility for the maintenance of the SuDS, it is proposed that either the management of the proposed residential care home, or a maintenance company operating on their behalf will be responsible for the SuDS maintenance.

8 RESIDUAL RISKS

The residual risks to the development are considered as:

8.1 Lack of Maintenance

As mentioned above, SuDS drainage systems are more likely to fail due to lack of maintenance than traditional piped networks. In order to minimise this risk, it is proposed that the management of the proposed residential care home or a maintenance company operating on their behalf will be responsible for maintaining the propose SuDS.

The proposed levels regime means that should the SuDS fail through lack of maintenance, then the areas which will flood will be non-critical areas.

8.2 Construction Surface Water Run-Off

During construction, the SuDS will not be installed and therefore the contractor should account for exceedance events and contaminated run off. This is necessary to suitably manage surface water onsite during construction and to prevent construction related pollution entering the ground.

As the approach different contractors have towards this matter varies, it is proposed that if required this item is conditioned to ensure that these risks are appropriately mitigated.

8.3 Exceedance Event

Should a rainfall event greater than the 1-in-100-year plus climate change event occur, then surface water flooding will happen. The finished floor levels will be designed to ensure that building thresholds are kept safe from this flooding. Appendix J contains an exceedance flow plan showing overland flow routes for the proposed development. It is not anticipated that the proposed development will significantly alter the exceedance flow routes onsite as the proposed care home is located in the same position as the existing care home. As the land to the north of the proposed residential care home slopes towards the building. Measures will be put in place to ensure that surface water is directed away from entrances to the building. These measures will be subject to the detailed design however, they are likely to be a channel drain or similar.

9 OFF SITE IMPACTS

9.1 Impact of Surface Water Drainage

The introduction of a strategy to cope with the 1-in-100-year event, plus climate change, offers an improvement to the existing scenario as the existing impermeable hard standing areas will be replaced by permeable surfaces (if infiltration is feasible) which will reduce the volume of overland flow. The area of impermeable surfacing will be reduced (so long as the access road and parking areas are infiltrating via permeable paving). Therefore, the impact of the Surface Water Drainage System is considered to be **positive.**

9.2 Impact of Development on Hydrological Morphology

The proposed infiltration surface water drainage system will not impinge on the hydrological morphology of the area and therefore the site is considered as **neutral**. Should the proposed development need to make a connection into the existing sewer, which discharges to the watercourse, then there may be minor implication to the hydrological morphology of the area. However, the site is within the catchment of the watercourse, so there will be little impact.

10 SUMMARY

The proposed development is for the demolition of an existing care home and the construction of a new care home alongside retention of Guys House (part of the current care home function) which will be refurbished.

The site is at a low risk of flooding from most sources, with the most significant risk of flooding being from surface water. The sequential test determines that the site is suitable from a flood risk perspective.

The suitability of infiltration onsite requires further investigation. During the recent site investigation, two of the three infiltration tests failed, with only one shallow test providing a usable rate. It has been confirmed that the site currently infiltrates and therefore an infiltration scheme should be available to the proposed development. Calculations demonstrating the suitability of a scheme for both infiltration option and discharge to the Anglian Water sewer have been undertaken. If infiltration is feasible, this will be the preference.

Should infiltration be demonstrated to be unsuitable, it is proposed that the site discharges surface water to the public sewer which has been accepted by Anglian Water.

Appendix A
Proposed Development Plan

1 Proposed Site Layout
1 : 200

INVESTORS IN PEOPLE | Gold

HEALTH AND SAFETY RISK ASSESSMENT CONSEQUENCE TABLE		Consequences				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	Almost Certain 5	5	10	15	20	25
	Likely 4	4	8	12	16	20
	Possible 3	3	6	9	12	15
	Unlikely 2	2	4	6	8	10
	Rare 1	1	2	3	4	5

AREA ANALYSIS

Site Area: 0.84Ha / 2.09Acres

Existing Footprint: ***816.5m2***
Proposed Footprint: ***1060m2***

Existing Building GIFA: 1858m2
Proposed GIFA: ***3738m2***

Total No of Bedrooms: 70 No.

Refurbishment of 'Guys House'
Total GIFA: **350m2**

Parking Provision:

In accordance with North Hertfordshire District Council parking standards:

Resident/Visitors: **18no. Spaces**
0.25 spaces per resident bed space

Staff : **9no. spaces**
circa. 1 space per 5 staff (non-resident)

Total: **27no. Spaces**
Incl. 2no. Disabled Bays
Excl. 1no Dedicated Ambulance Bay

Cycle Storage Provision:

In accordance with North Hertfordshire District Council parking standards:

Staff : **9no. spaces**
circa. 1 space per 5 staff (non-resident)

For New Care Home Proposals
Refer to Drawings:

4870-ORA-01-ZZ-DR-A-32100
4870-ORA-01-ZZ-DR-A-32101

For 'Guys House'
Refer to Drawing:

4870-ORA-02-ZZ-DR-A-32100

Rev	Description	Auth	Date
K	Updated to 'Planning' Status	AN	05/06/24
J	General update for Pre-Application Advice submission.	GDC	27/09/23

REVISION

STAMP
PLANNING

PROJECT STATUS
Developed Design

DRAWING TITLE
Proposed Site Layout

PROJECT
Guysfield Care Home at
Willian Road, Willian, Letchworth for
Caring Homes Group Ltd

DATE CREATED	DESIGNER	SCALE @ A0
07/08/21	GDC	As indicated

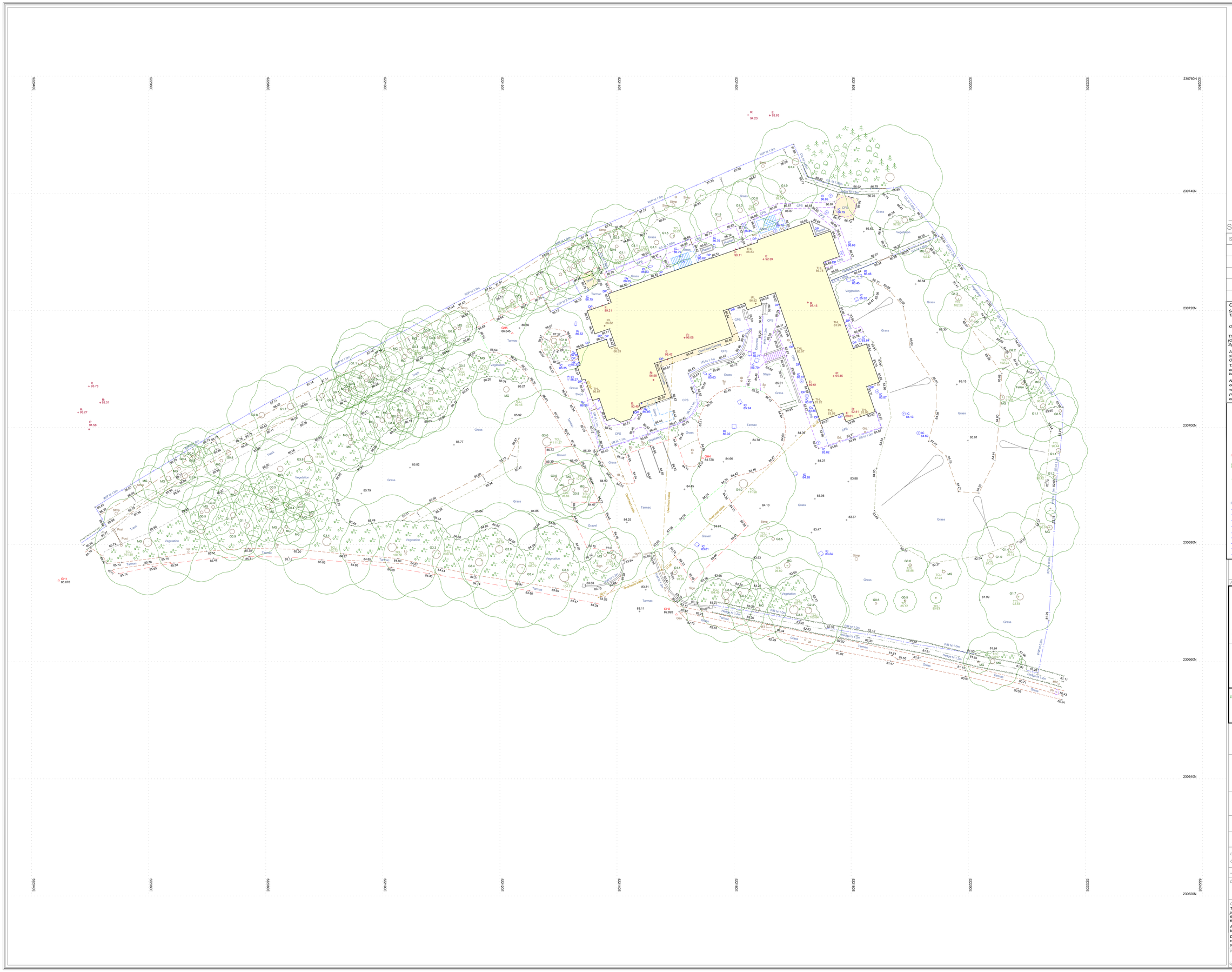
ORIGINATOR PROJECT NUMBER
4870

ISO DOCUMENT REF.
4870-ORA-ZZ-XX-DR-A-31004

REV.
K

oliver + robb architects
Pitreavie Drive, Dunfermline
KY11 8UH
T: 01383 621621
W : www.oliverandrobb.co.uk
Members: Brian A Robb David M Fibbs
Associates: Gary D Caudrey Graeme S Gallagher

Appendix B
Topographic Survey



Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	522044.655	230673.893	85.678
GH2	522150.146	230668.081	82.892
GH3	522246.409	230639.130	79.078
GH4	522154.606	230694.799	84.728
GH5	522122.107	230716.101	86.645

OS Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey tile is to be used as a guide only.

OS Buildings *Surveyed Buildings*

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Legend:

Buildings; Wall; Kerb line; Drop kerb; Drop back; Centre line; Top of bank; 100.000 Station and Name; Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; R: Ridge Level; E: Eaves Level; F: Flat Roof Level; Gate

Fence types: IW Interwoven; IR Iron Railings; WM Wire Mesh; PR Post & Rail; PW Post & Wire; CL Chain Link; WP Wooden Panels; CB Close Boarded; BP Steel Palisade

Overhead Cable; Concrete edge; Tarmac edge; Grass verge; Gravel/Overhead Cable; Verge; Bottom of bank; Station and Name

IC Inspection chamber; Pipe Pipe invert; Gy Gully; Bg Back gully; Dp Down pipe; Pipe Pipe above ground; MH Manhole; WL Water level; Fl Flood light; Lp Lamp post; Tp Telegraph post; Ep Electricity post; Tl Traffic light; Bus Bus stop; Sv Stop valve; St Stop tap; Er Earth rod; Wm Water meter; Gas Gas valve; Av Air valve; IC(u) Unidentified inspection; Wo Wash out; Re Rodding eye; BB Beltelle beacon; CTV Cable tv; Mkr Marker post; Gmk Gas marker post; So Soffit; Fh Fire hydrant

Bo Bollard; IB Illuminated bollard; Bin Rubbish bin; Vp Vent pipe; Gl Ground light; Lbox Letter box; Stump Tree Stump; Sty Stile; IFL Internal floor level; THL Threshold level; Sp Sign post; TM Trialhole; BH Borehole; ELC Electric; BT British Telecom; Cbox Control box; TT Tactile; PB Brick paved; CPS Concrete paving slabs; CVR Cover; Retaining wall; TWL Top of Wall Level; TCL Tree canopy level; G Girth; MG Multi girth; IC Inspection chamber; CL Cover level; IL Invert level; UTL Unable to lift

Rev	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

Rowan House
Duffield Road
Little Eaton
Derby
DE21 5DR
Tel (01332) 830044 Fax (01332) 830055
admin@greenhatch-group.co.uk
www.greenhatch-group.co.uk

St Albans: Unit B, The Courtyard, Alban Park, St Albans, Hertfordshire, AL4 0LA, t. (01727) 854481
Newcastle: 24 Riverside Studios, Amethyst Road, Newcastle Bus. Park, Newcastle-U-Tyne, NE4 7YL, t. (01912) 736391
London: 27, Cornwall Terrace Mews, Regents Park, London, NW1 5LL, t. (02072) 241806

CLIENT
Caring Home Group

PROJECT
Guysfield Care Home, Willian Road, Nr Letchworth, SG6 2AB

TITLE
Topographical Survey

SCALE	DATE
A0@ 1: 200	17th September 2018
DRAWN	QUALITY REF
ER	GH3679

Level datum	See note
Grid orientation	See note
Job number	31409
Drawing No.	31409_T
Rev.	0

Comments

This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore should be treated as approximate only.

Notes:

© Copyright Greenhatch Group, 06/07/23

Appendix C
Geotechnical Site Investigation - Including Infiltration Testing

Soiltechnics Limited
Registered in England 2680759
Registered office: Cedar Barn, NN6 9PY

soiltechnics
environmental ▪ geotechnical ▪ building fabric

Cedar Barn
White Lodge
Walgrave
Northamptonshire
NN6 9PY

t: 01604 781877
f: 01604 781007
e: mail@soiltechnics.net
w: www.soiltechnics.net

Date: 30th August 2019
Your Ref:
Our Ref: L-STR4848-001

Canham Consulting Limited
The Old School
School Lane
Norwich
NR7 0EP

Dear Mr Harris

RE: Infiltration testing at Guysfield Care Home, Willian Road, Willian SG6 2AB

Introduction and brief

Further to our correspondence of 31st July 2019, and your subsequent instructions, we confirm completion of investigations at the above site and can now offer the following report.

We confirm our brief was to determine the permeability of the natural Lowestoft Formation in accordance with the BRE Digest 365 guidelines.

Our liability

Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the manpower, resources, investigations and testing devoted to it by agreement with our Client. This report is confidential to our Client and Soiltechnics accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

Site location and description

The site is located at the western end of Willian, approximately 1.9km to the south of Letchworth Garden City and consists of a 2-3 storey brick care home with associated parking and soft landscaping areas.

soiltechnics

Geology

We have reviewed geological mapping of the area produced by the British Geological Survey (BGS) at a scale of 1: 50,000. A summary of the recorded geological information for the site is presented in the table below:

Summary of Geology and likely aquifer containing strata					
Strata	**Bedrock or superficial**	**Approximate thickness**	**Typical soil type**	**Likely permeability**	**Aquifer designation**
Lowestoft Formation	Bedrock	<10m	Diamicton	Low	Secondary 'undifferentiated' aquifer
Holywell Nodular Chalk Formation	Bedrock	>60m	Siltstone, mudstone and sandstone	Moderate - High	Principal aquifer
Table 2.1					

Fieldwork

Fieldwork was carried out on 16th August 2019 and comprised infiltration testing in three trial pit locations. The trial pits were excavated to a depth of between 1.0 – 2.2m using a JCB 3CX. Sampling and logging was carried out as the trial pit excavation proceeded but the trial pits were not entered at any time.

Soil infiltration tests were carried out within each trial pit. The infiltration tests were carried out following the procedures described in the Building Research Establishment (BRE) 365 (2016) "Soakaway Design"

On completion of the infiltration testing, the excavation was backfilled with excavated material compacted using the back of the excavator bucket. Whilst we attempted to reinstate the excavation to its original condition some short-term settlement of the backfilling materials may occur. A Geotechnical Engineer supervised the excavations.

The position of exploratory points relative to site features is presented on Drawing 02. The position of exploratory points shown on these plans is approximate only. The extent of works, including location and approximate depth of test positions, were determined by the Client.

Ground conditions

TP01 in the west encountered topsoil to 0.35m over Lowestoft Formation. The topsoil comprised dark brown, sandy silt over brown, silty, slightly gravelly sand with gravels of fine to medium angular to sub-rounded chalk, flint and rare fragments of decayed timber. The Lowestoft Formation soils comprised firm to stiff, friable, light grey and light brown, slightly sandy, slightly gravelly clay with gravels of fine to medium angular to sub-rounded flint and weak chalk.

TP02 and TP03 in the east encountered Made Ground to between 0.50 and 1.40m over Lowestoft Formation. Made Ground comprised dark brown sandy silt, brown, silty, slightly gravelly sand and firm to stiff, light grey and light brown, slightly sandy, slightly gravelly clay with gravels of flint, chalk, brick and rare ash. The Lowestoft Formation soils comprised firm to stiff friable light grey and light brown slightly sandy slightly gravelly clay with gravels of fine to medium angular to sub-rounded flint and weak chalk.

No groundwater was encountered in the trial pit and the sides remained upright and stable throughout the infiltration test.

Results

Records of test results and calculations to determine a soil infiltration rate are presented in Appendix B. In summary, we completed 2 full cycles and a third part cycle at TP02. The calculated rates for cycles 1 and 2 were 1.30×10^{-5}m/s and 9.47×10^{-6}m/s. An estimated rate of 5.80×10^{-6}m/s was derived for cycle 3 using extrapolated data, but it should be noted that this is an estimated rate and not a measured rate, and likely optimistic.

The water level in trial pits TP01 and TP03 during the initial cycle failed to dissipate sufficiently during the observation period to calculate an infiltration rate.

In view of the above, the ground conditions are considered variable in terms of permeability and moreover, the continuity and extent of more permeable soils is currently unknown. Should soakaways be pursued further as a means of storm water disposal then precaution is advised together with careful consideration to the location and placement of such. Accordingly, we would also recommend specifically targeted testing using larger volumes of water over a period of days/weeks to ensure the measured values are reliable for long term design.

We trust this report provides you with the information you require. If you have any queries please do not hesitate to contact us.

Yours sincerely,

Prepared by

[redacted]

Michael Maynard B.Sc, (Hons)

[redacted]

Geo-environmental Engineer, Soiltechnics Limited

Supervised by

[redacted]

Ian Dunkley AMIEnvSc., FGS

[redacted]

Senior geo-environmental Engineer, Soiltechnics Limited

Reviewed by

[redacted]

Seb Crolla B.Sc, (Hons), MIEnvSc., FGS

[redacted]

Associate Director, Soiltechnics Limited

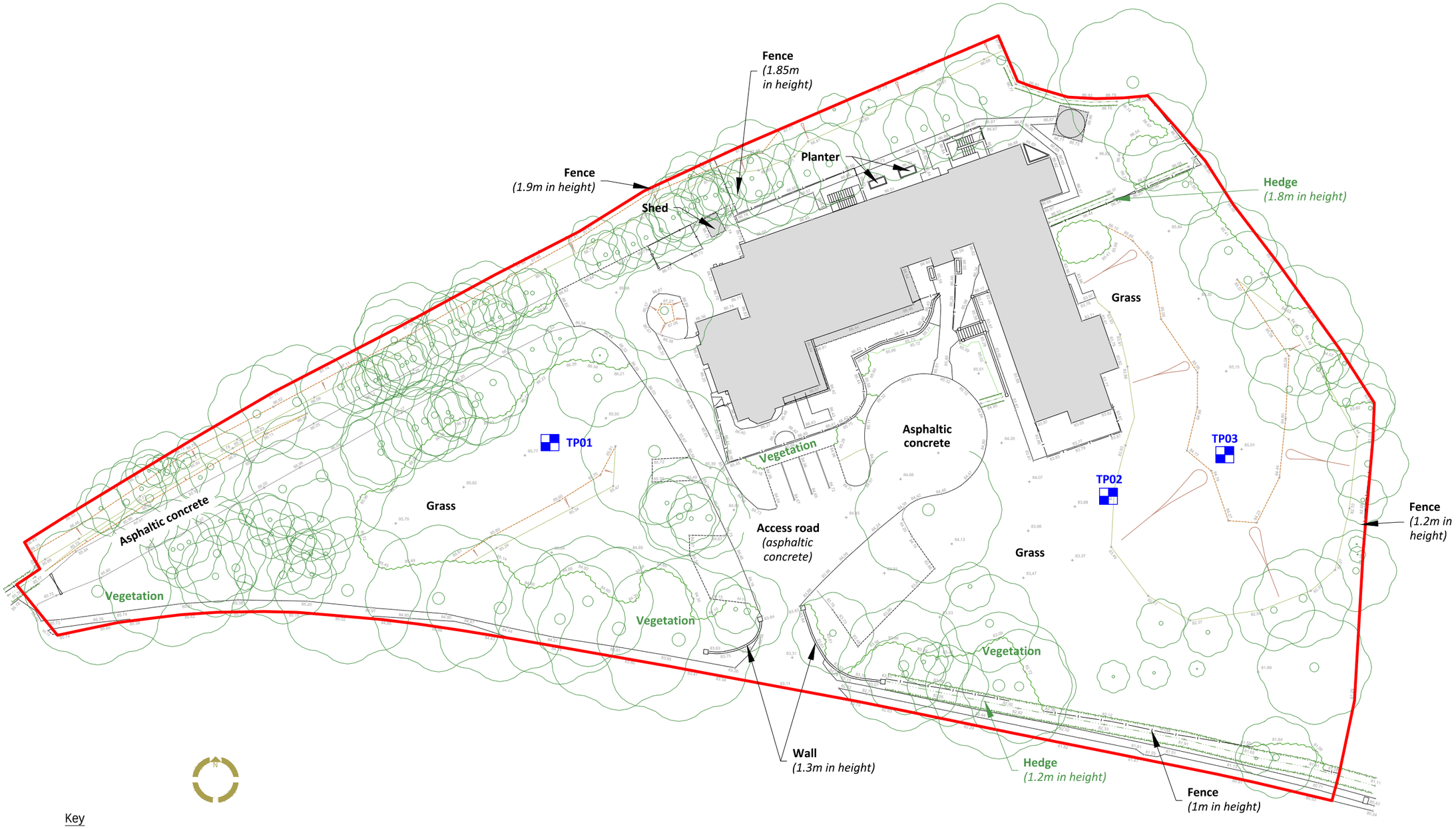
Encs.

Drawing(s)	Principal coverage
01	Site location plan
02	Plan showing existing site features and location of exploratory points
Appendices	**Principal coverage**
A	Trial pit records
B	Infiltration test results

Site location

Title	Scale	Drawing number
Site location plan	Not to scale	01

soiltechnics
environmental ▪ geotechnical ▪ building fabric



Key

TP — Approximate location of trial pit excavation with infiltration testing

Approximate site boundary

Title	Scale	Drawing number
Plan showing existing site features and location of exploratory points	1:500 at A3	02

soiltechnics
environmental ▪ geotechnical ▪ building fabric

Key to legends

Composite materials, soils and lithology

	Topsoil		Made Ground		Boulders
	Chalk		Clay		Coal
	Cobbles		Cobbles & Boulders		Concrete
	Gravel		Limestone		Mudstone
	Peat		Sand		Sand and Gravel
	Sandstone		Silt		Silt / Clay
					Siltstone

Note: Composite soil types are signified by combined symbols.

Key to 'test results' and 'sampling' columns

Test result	
Depth	Records depth that the test was carried out (i.e.: at 2.10m or between 2.10m and 2.55m)
Result	PP – Pocket penetrometer result (kN/m^2) SV – Hand held shear vane result (kN/m^2) PP result converted to an equivalent undrained shear strength by applying a factor of 50. Where at least 3 results obtained at same depth then an average value may be reported.

Sampling		
From (m) To (m)	Records depth of sampling	
Type	D	Disturbed sample
	B	Bulk disturbed sample
	ES	Environmental sample comprising plastic and/or glass container
	W	Water sample
	CBR	Undisturbed sample in mould (California Bearing Ratio)

Water observations

Described at foot of log and shown in the 'water strike' column.

▼	= water level observed after specified delay in excavation
▽	= water strike

soiltechnics
environmental ▪ geotechnical ▪ building fabric

STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
[Loose] dark brown sandy SILT. (TOPSOIL)	0.20								
[Loose] brown silty slightly gravelly SAND. Gravel consists of fine to medium angular to sub-rounded chalk, flint and rare decayed timber. (TOPSOIL)	0.35								
Firm to stiff friable light grey and light brown slightly sandy slightly gravelly CLAY. Gravel consists of fine to medium angular sub-rounded flint and weak density chalk. (LOWESTOFT FORMATION)					PP 0.50	PP=67			
	1.00				PP 1.00	PP=83			
TRIAL PIT TERMINATED AT 1.00m									

Key

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

Notes

Trial pit sides remained upright and stable upon completion.

Groundwater observations

No groundwater encountered.

Title Trial pit record	**Dimensions (w x l)** 0.30m x 2.00m	
Method Machine excavator	**Logged by** MM	**Date(s)** 16/08/2019
Level (m OD) -	**Compiled by** SA	**Sheet number** Sheet 1 of 1
Co-ordinates -	**Checked by**	**TP01**

Report ref: STR4848-G01 **Revision:** 0

soiltechnics
environmental ▪ geotechnical ▪ building fabric

STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
[Loose] dark brown sandy SILT. (MADE GROUND)	0.20								
[Loose] light brown silty SAND and GRAVEL. Gravel consists of fine to medium angular to sub-rounded flint, chalk, brick, slate and rare asphaltic concrete. (MADE GROUND)	0.50						0.40		ES
Firm to stiff friable light grey and brown slightly sandy slightly gravelly CLAY. Gravel consists of fine to medium angular to sub-rounded flint and weak density chalk. (LOWESTOFT FORMATION)	1.00				PP 0.60 PP 1.00	PP=75 PP=100			
TRIAL PIT TERMINATED AT 1.00m									

Key

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

Notes
Trial pit sides remained upright and stable upon completion.

Groundwater observations
No groundwater encountered.

Title Trial pit record	**Dimensions (w x l)** 0.30m x 1.80m	
Method Machine excavator	**Logged by** MM	**Date(s)** 16/08/2019
Level (m OD) -	**Compiled by** SA	**Sheet number** Sheet 1 of 1
Co-ordinates -	**Checked by**	**TP02**

Report ref: STR4848-G01 **Revision:** 0

soiltechnics
environmental ▪ geotechnical ▪ building fabric

STRATA				WATER STRIKES	IN SITU TESTING		SAMPLING		
DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
[Loose] dark brown sandy SILT. (MADE GROUND)	0.15								
[Loose] brown silty slightly gravelly SAND. Gravel consists of fine to medium angular to sub-rounded flint, chalk and rare brick. (MADE GROUND)	0.40								
Firm to stiff light grey light brown slightly sandy slightly gravelly CLAY. Gravel consists of flint, chalk, brick and rare ash. (MADE GROUND)					PP 0.50	PP=42	0.50		ES
					PP 1.00	PP=83			
							1.20		ES
Firm to stiff dark grey slightly sandy CLAY. (LOWESTOFT FORMATION)	1.40				PP 1.50	PP=83			
					PP 2.00	PP=92			
TRIAL PIT TERMINATED AT 2.20m	2.20								

Key

D Small Disturbed Sample
B Bulk Disturbed Sample
ES Environmental Sample
W Water Sample
C Core sample
UT Undisturbed Sample

S Standard Penetration Test
C Standard Penetration Test (solid cone)

PP Pocket Penetrometer test
SV Shear Vane test
PID Photo Ionisation Detector test

Notes

Trial pit sides remained upright and stable upon completion.

Groundwater observations

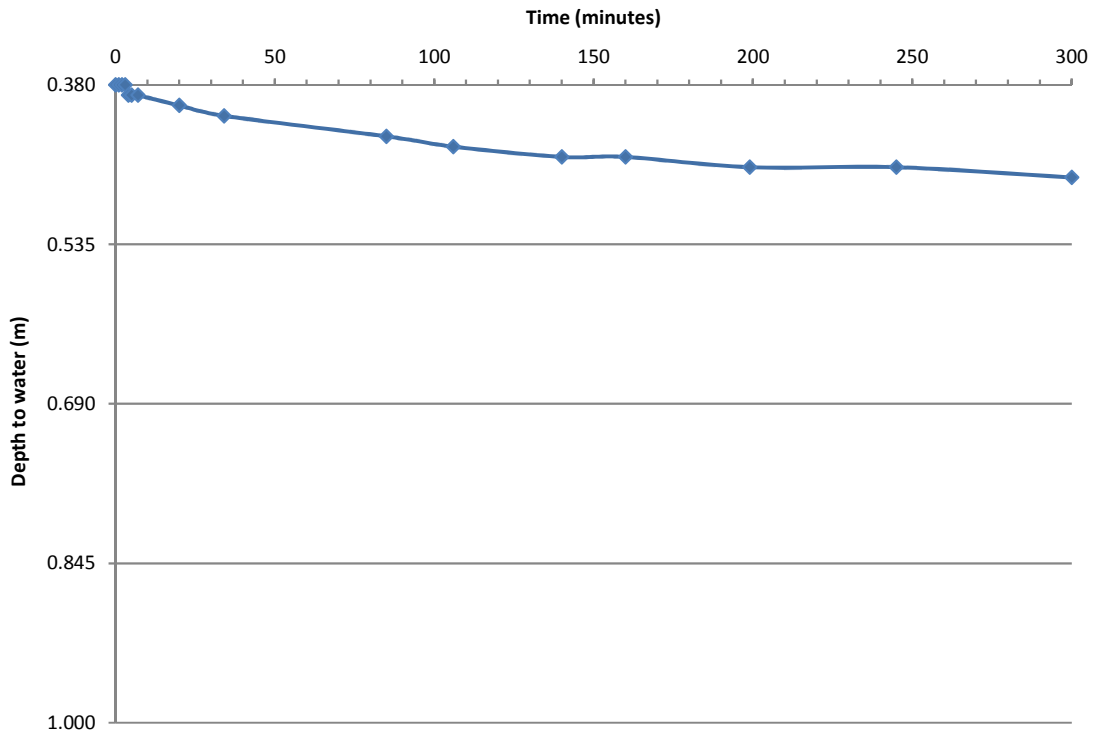
No groundwater encountered.

Title Trial pit record	**Dimensions (w x l)** 0.30m x 2.40m	
Method Machine excavator	**Logged by** MM	**Date(s)** 16/08/2019
Level (m OD) -	**Compiled by** SA	**Sheet number** Sheet 1 of 1
Co-ordinates -	**Checked by**	**TP03**

Report ref: STR4848-G01 **Revision:** 0

soiltechnics
environmental • geotechnical • building fabric

Plot showing time against depth to water:



Test observations:

TIME (mins)	DEPTH TO WATER (m)	TIME (mins)	DEPTH TO WATER (m)
0	0.38		
1	0.38		
2	0.38		
3	0.38		
4	0.39		
5	0.39		
7	0.39		
20	0.40		
34	0.41		
85	0.43		
106	0.44		
140	0.45		
160	0.45		
199	0.46		
245	0.46		
300	0.47		

Calculations:

Insufficient infiltration over 300 minutes of monitoring therefore unable to calculate soil infiltration rate.

Groundwater observations
No groundwater encountered.

Geology unit under test
Lowestoft Formation

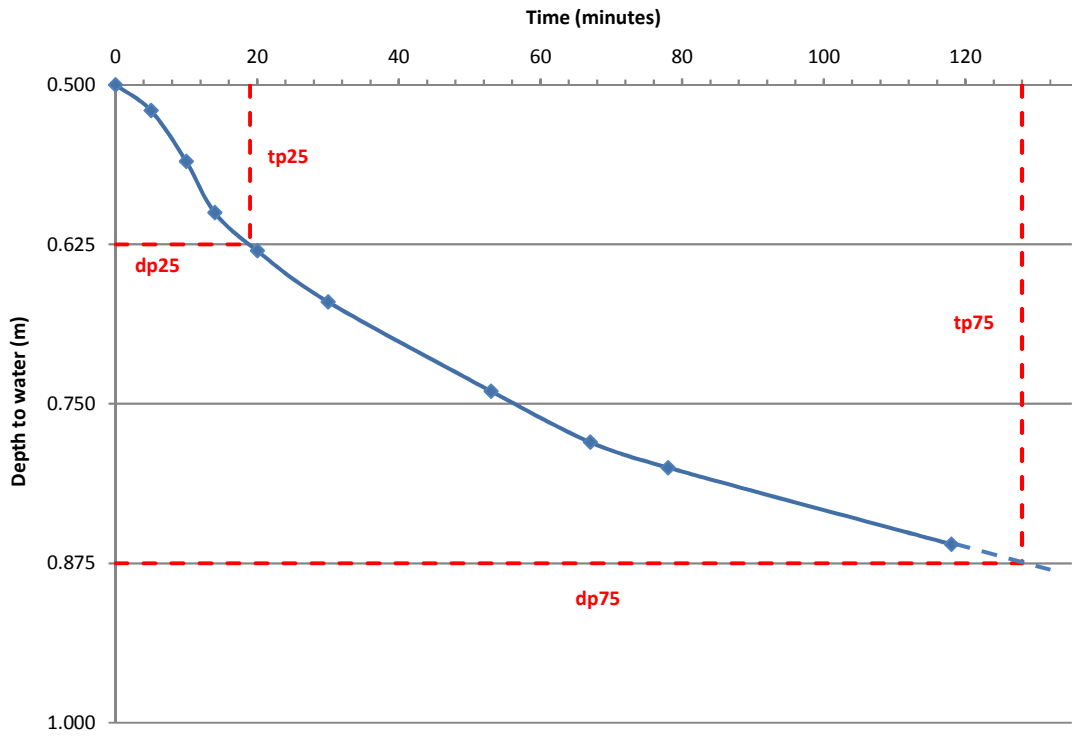
Depth of trial pit at start of test (m)
1

Title
Soil infiltration test (following BRE Digest 365 2016)

Dimensions	Co-ordinates	Ground level
0.3m x 2m	-	N/A

Trial pit number	Cycle number	Date of excavation
TP01	1	16/08/2019

Plot showing time against depth to water:



Test observations:

TIME (mins)	DEPTH TO WATER (m)	TIME (mins)	DEPTH TO WATER (m)
0	0.50		
5	0.52		
10	0.56		
14	0.60		
20	0.63		
30	0.67		
53	0.74		
67	0.78		
78	0.80		
118	0.86		

Calculations:

Soil infiltration rate (SIR), $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

V_{p75-25} = *effective storage volume of water in the trial pit between 75% (d_{p75}) and 25% (d_{p25}) effective depth*

= ***0.135m³***

a_{p50} = *the internal surface area of the trial pit up to 50% effective depth and including the base*

= ***1.59m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*

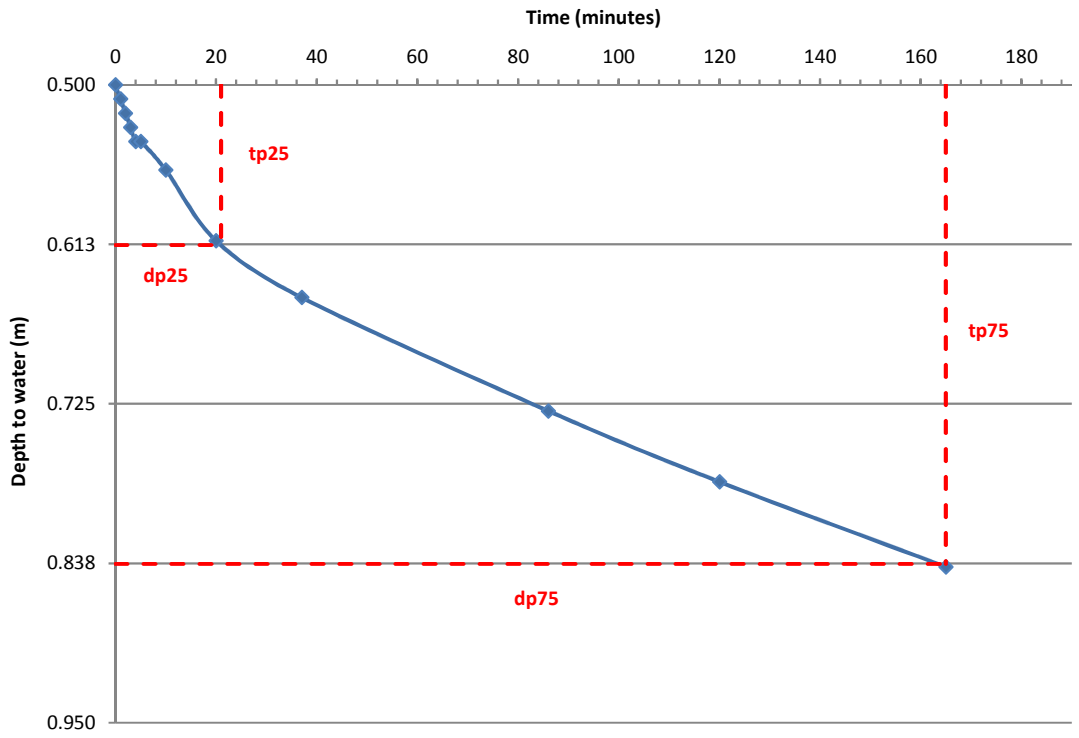
= ***109 (minutes)***

= ***6540 (seconds)***

f = 1.30E-05 m/s

Groundwater observations			Title		
No groundwater encountered.			Soil infiltration test (following BRE Digest 365 2016)		
Geology unit under test			Dimensions	Co-ordinates	Ground level
Lowestoft Formation			0.3m x 1.8m	-	N/A
Depth of trial pit at start of test (m)			Trial pit number	Cycle number	Date of excavation
1			TP02	1	16/08/2019

Plot showing time against depth to water:



Test observations:

TIME (mins)	DEPTH TO WATER (m)	TIME (mins)	DEPTH TO WATER (m)
0	0.50		
1	0.51		
2	0.52		
3	0.53		
4	0.54		
5	0.54		
10	0.56		
20	0.61		
37	0.65		
86	0.73		
120	0.78		
165	0.84		

Calculations:

Soil infiltration rate (SIR), $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

V_{p75-25} = *effective storage volume of water in the trial pit between 75% (d_{p75}) and 25% (d_{p25}) effective depth*
= ***0.1215m³***

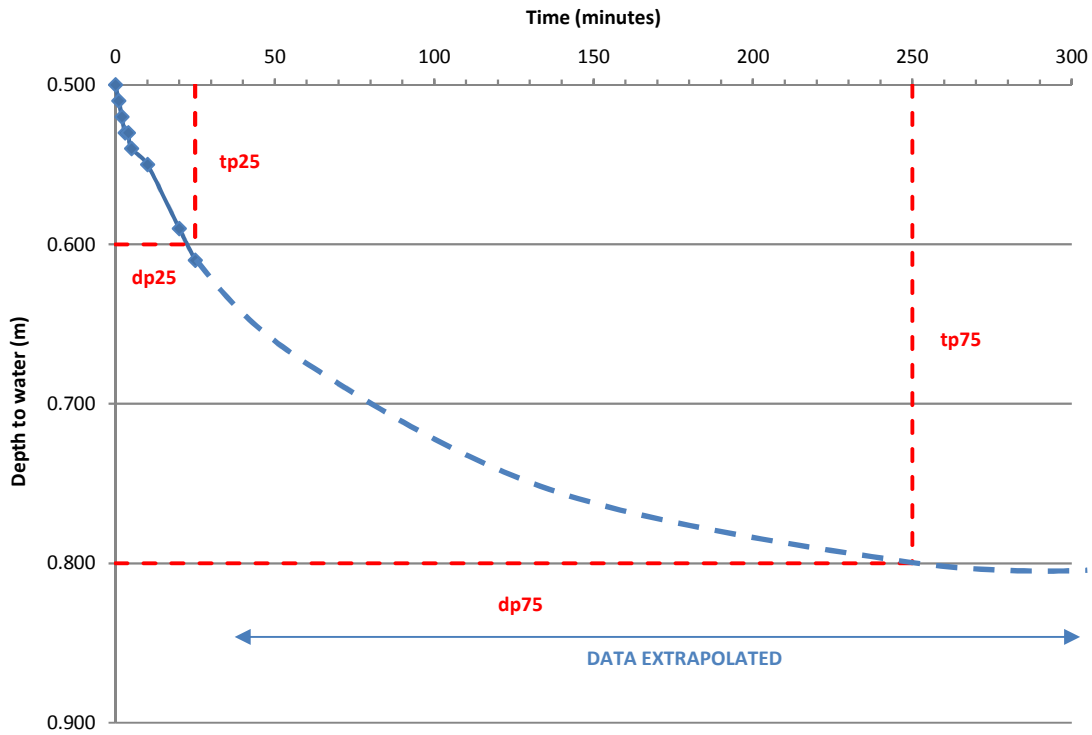
a_{p50} = *the internal surface area of the trial pit up to 50% effective depth and including the base*
= ***1.485m²***

$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*
= ***144 (minutes)***
= ***8640 (seconds)***

f = 9.47E-06 m/s

Groundwater observations			Title		
No groundwater encountered.			Soil infiltration test (following BRE Digest 365 2016)		
Geology unit under test			Dimensions	Co-ordinates	Ground level
Lowestoft Formation			0.3m x 1.8m	-	N/A
Depth of trial pit at start of test (m)			Trial pit number	Cycle number	Date of excavation
0.95			TP02	2	16/08/2019

Plot showing time against depth to water:



Test observations:

TIME (mins)	DEPTH TO WATER (m)	TIME (mins)	DEPTH TO WATER (m)
0	0.50		
1	0.51		
2	0.52		
3	0.53		
4	0.53		
5	0.54		
10	0.55		
20	0.59		
25	0.61		

Calculations:

Soil infiltration rate (SIR), $f = \dfrac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

V_{p75-25} = *effective storage volume of water in the trial pit between 75% (d_{p75}) and 25% (d_{p25}) effective depth*
= ***0.108m³***

a_{p50} = *the internal surface area of the trial pit up to 50% effective depth and including the base*
= ***1.38m²***

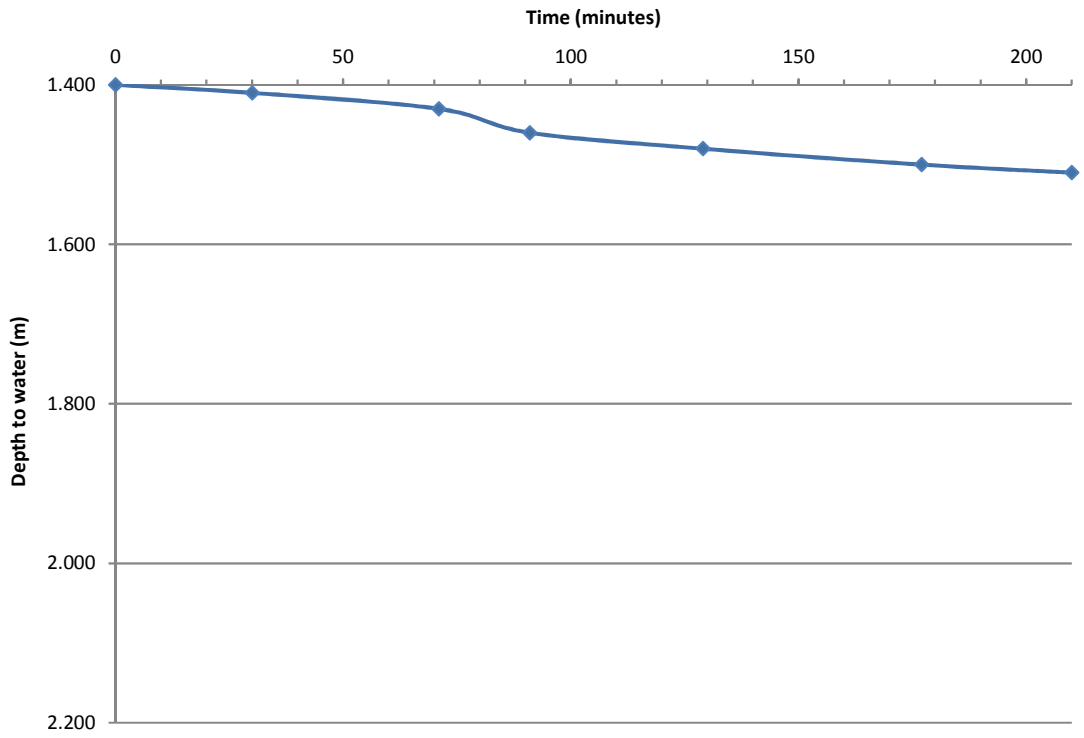
$t_{p75} - t_{p25}$ = *the time for the water level to fall from 75% to 25% effective depth*
= ***225 (minutes)***
= ***13500 (seconds)***

f = 5.80E-06 m/s

Groundwater observations			Title
No groundwater encountered.			Soil infiltration test (following BRE Digest 365 2016)
Geology unit under test	**Dimensions**	**Co-ordinates**	**Ground level**
Lowestoft Formation	0.3m x 1.8m	-	N/A
Depth of trial pit at start of test (m)	**Trial pit number**	**Cycle number**	**Date of excavation**
0.9	TP02	3	16/08/2019

soiltechnics
environmental • geotechnical • building fabric

Plot showing time against depth to water:



Test observations:

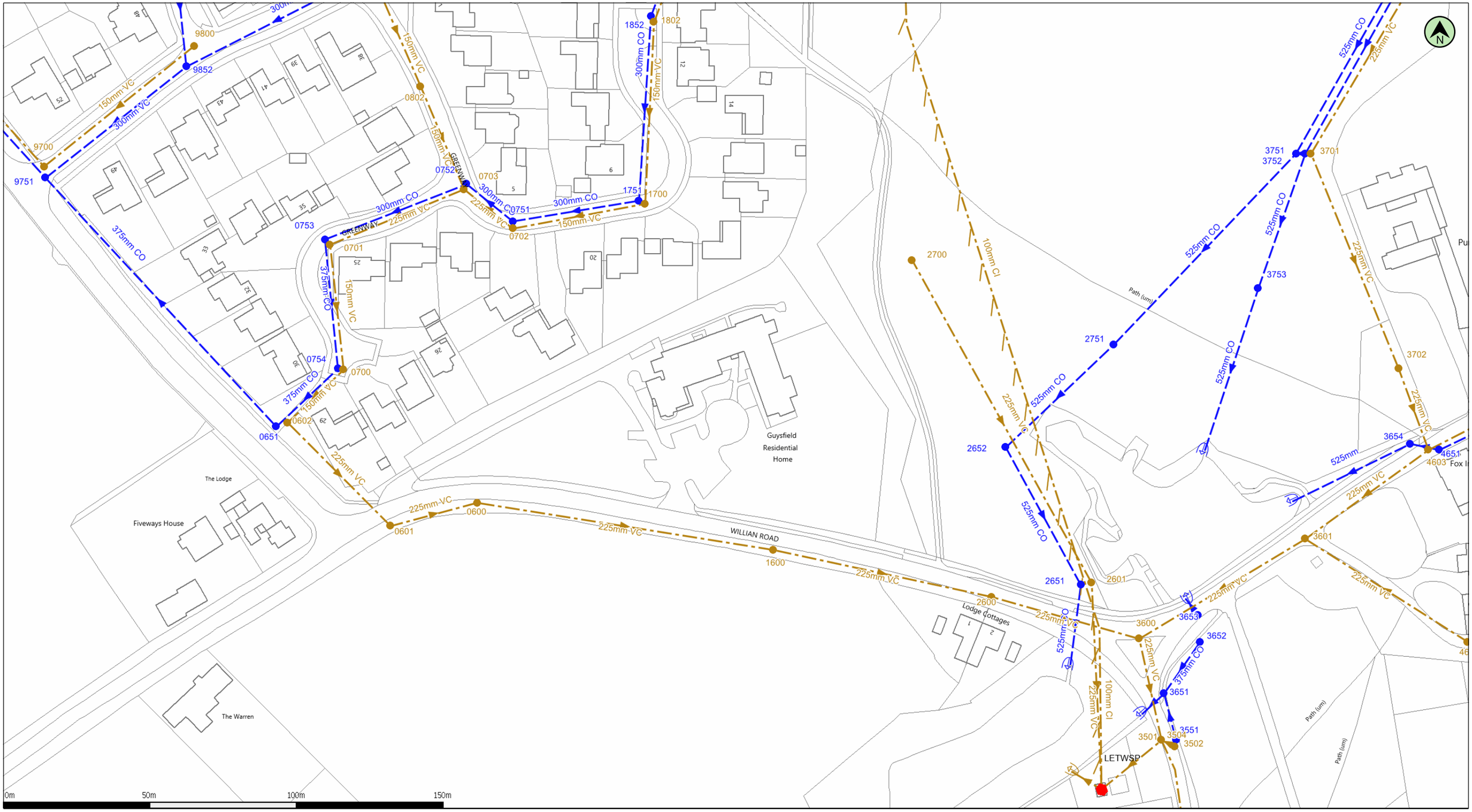
TIME (mins)	DEPTH TO WATER (m)	TIME (mins)	DEPTH TO WATER (m)
0	1.40		
30	1.41		
71	1.43		
91	1.46		
129	1.48		
177	1.50		
210	1.51		

Calculations:

Insufficient infiltration over 210 minutes of monitoring therefore unable to calculate soil infiltration rate.

Groundwater observations			Title
No groundwater encountered.			Soil infiltration test (following BRE Digest 365 2016)
Geology unit under test	**Dimensions**	**Co-ordinates**	**Ground level**
Lowestoft Formation	0.3m x 2.4m	-	N/A
Depth of trial pit at start of test (m)	**Trial pit number**	**Cycle number**	**Date of excavation**
2.2	TP03	1	16/08/2019

Appendix D
Anglian Water Asset Plan



(c) Crown copyright and database rights 2019 Ordnance Survey 100022432

Date: 09/09/19

Scale: 1:1250

Map Centre: 522164,230704

Data updated: 02/09/19

Our Ref: 332221 - 1

Wastewater Plan A3

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2019 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

morganharris@canhamconsulting.co.uk

213692-Guysfield

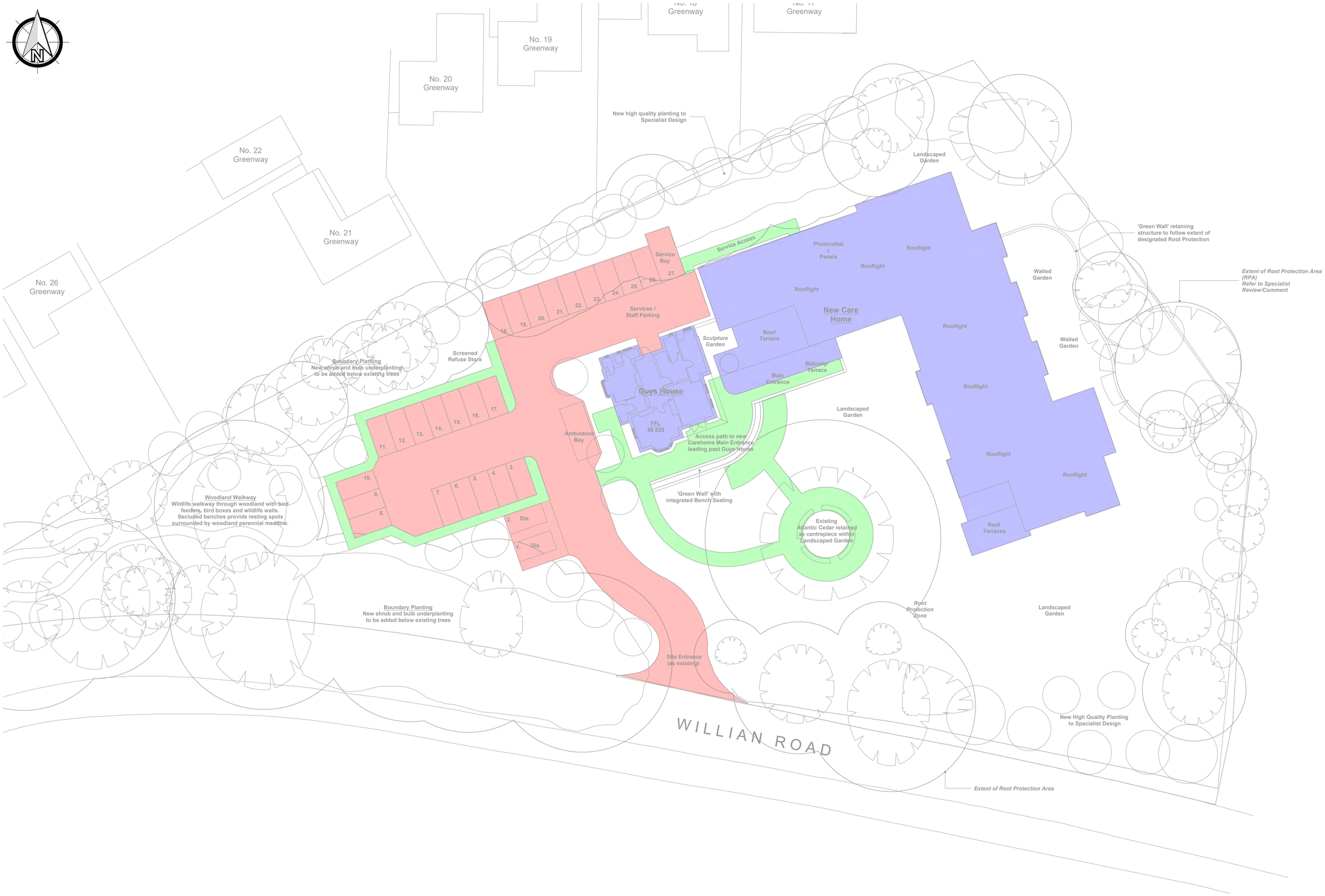
love every drop anglianwater

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0600	F	80.121	78.72	1.401
0601	F	82.01	80.31	1.7
0602	F	86.422	84.032	2.39
0700	F	86.726	84.626	2.1
0701	F	87.538	85.088	2.45
0702	F	88.863	86.303	2.56
0703	F	89.018	86.148	2.87
0802	F	89.66	88.27	1.39
1600	F	80.205	78.59	1.615
1700	F	88.765	86.705	2.06
1802	F	90.778	88.358	2.42
2600	F	79.901	78.341	1.56
2601	F	78.89	76.235	2.655
2700	F	79.21	76.59	2.62
3501	F	78.795	76.155	2.64
3502	F	78.806	77.886	0.92
3504	F	-	-	-
3600	F	78.91	76.25	2.66
3601	F	78.401	76.591	1.81
3701	F	81.94	80.7	1.24
3702	F	78.03	76.89	1.14
4603	F	78.53	76.73	1.8
4604	F	78.895	77.205	1.69
9700	F	84.217	81.697	2.52
9800	F	87.182	84.562	2.62
0651	S	86.409	84.909	1.5
0751	S	88.88	86.9	1.98
0752	S	89.04	86.77	2.27
0753	S	87.54	85.53	2.01
0754	S	86.726	85.126	1.6
1751	S	88.77	87.15	1.62
1852	S	90.83	88.88	1.95
2651	S	78.101	76.673	1.428
2652	S	79.131	76.791	2.34
2751	S	80.312	78.53	1.782
3551	S	78.81	78.29	0.52
3651	S	78.683	77.783	0.9
3652	S	78.895	78.17	0.725
3653	S	77.927	76.89	1.037
3654	S	-	-	-
3751	S	82.01	79.22	2.79
3752	S	81.96	78.47	3.49
3753	S	79.53	76.19	3.34
4651	S	78.66	77.84	0.82
9751	S	84.234	82.044	2.19
9852	S	86.919	84.649	2.27

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix E
Impermeable Areas Plan



PLANNING GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT OTHER DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
4. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
5. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
6. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER + ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 05.06.2024.
7. THE TOPOGRAPHICAL INFORMATION REPRODUCED ON THIS DRAWING IS SHOWN FOR CO-ORDINATION AND DESIGN PURPOSES ONLY AND TAKEN FROM THE GREENHATCH GROUP DRAWING 31409_T, DATED 17.09.2018. LIABILITY FOR THIS INFORMATION REMAINS WITH GREENHATCH GROUP: CANHAM CONSULTING LTD CANNOT ACCEPT ANY LIABILITY FOR THE CONTENT AND ACCURACY OF THE TOPOGRAPHIC SURVEY.
8. THE INFORMATION SHOWN DOES NOT CONSTITUTE TECHNICAL APPROVAL FROM THE RELEVANT AUTHORITIES AND COULD BE SUBJECT TO CHANGE POST PLANNING.

LEGEND

- PROPOSED ROOF AREA: 1268m²
- PROPOSED ACCESS ROAD AND PARKING PERMEABLE AREA: 992m²
- PROPOSED PERMEABLE EXTERNAL SURFACE AREA: 444m²

TOTAL PROPOSED IMPERMEABLE AREA: 1268m²
TOTAL PROPOSED PERMEABLE AREA: 1436m²

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

SCALE 1:250m
0m 5m 10m 15m 20m 25m
SCALE BAR FOR INFORMATION ONLY

rev	date	details	drawn	checked
P03	25.06.24	SITE LAYOUT UPDATED	SAH	MH
P02	05.06.20	SITE LAYOUT UPDATED	JDP	DR
P01	30.09.19	PRELIMINARY ISSUE	MH	MR

Canham Consulting
Structural Engineers | Civil Engineers | Building Surveyors

+44 (0)1603 430650 | mail@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP

architect
OLIVER + ROBB ARCHITECTS

project
GUYSFIELD CARE HOME, WILLIAN ROAD, WILLIAN

title
IMPERMEABLE AREAS PLAN

CCL ref:	drawn	design	checked	scale	size	date
213692	MH	MH	MR	1:250	A1 (L)	30.09.2019

status:
S0 - WORK IN PROGRESS

drawing number: GCH-CCL-XX-XX-DR-C-0002
revision: P03

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

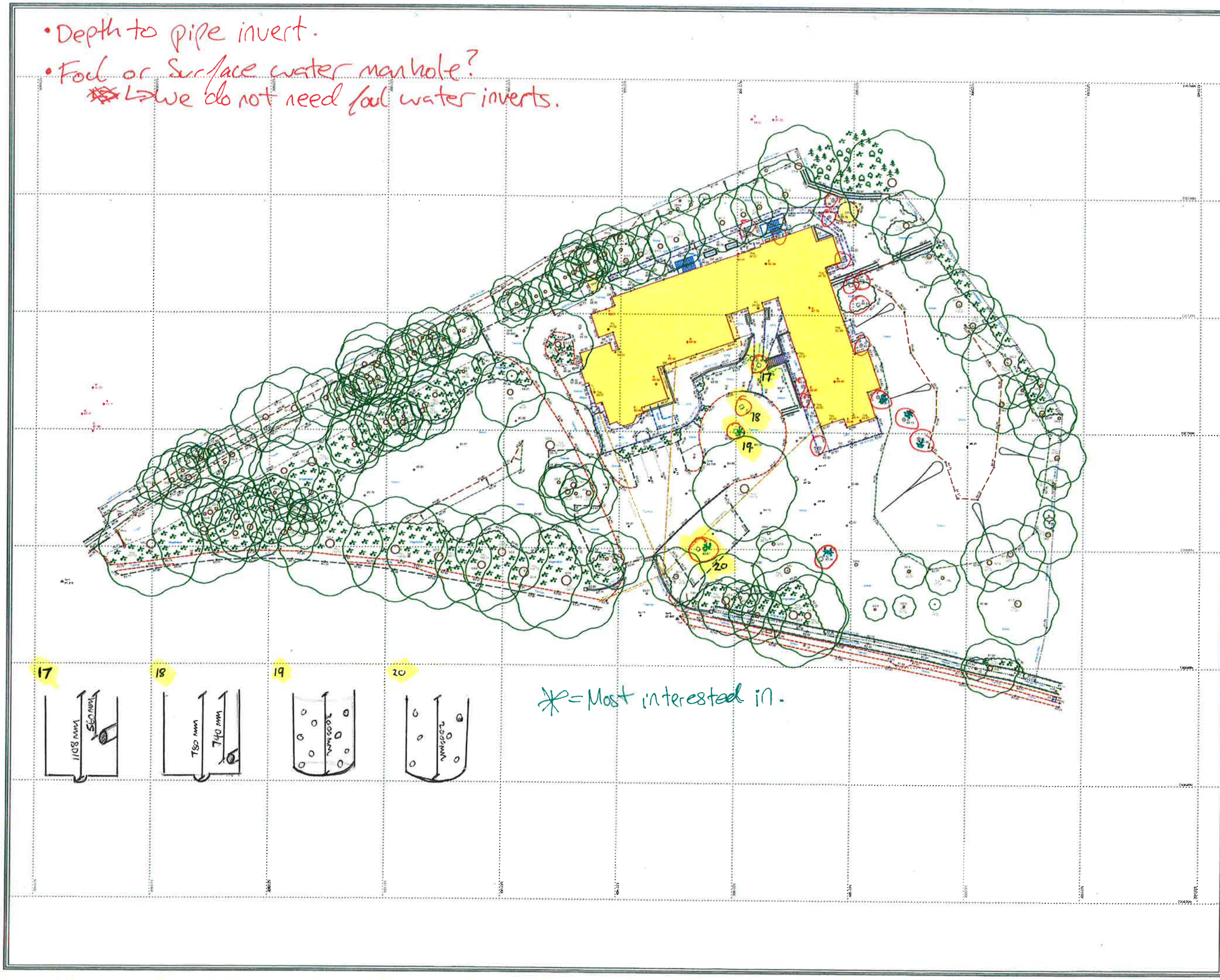
THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE. REGULATIONS 2, 9 AND 11 - INSOFAR AS THEY RELATE TO THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.

Appendix F
Evidence of Existing Drainage

• Depth to pipe invert.

• Foul or Surface water manhole?

↳ we do not need foul water inverts.



Station Information

Station	Eastings	Northing	Height
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

OS Note:

Some services may have been omitted due to parked vehicles. The Ordnance Survey file is to be used as a guide only.

OS Buildings | Surveyed Buildings

This survey has been orientated to the Ordnance Survey O.S. National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15/OS & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.

Please refer to Survey Station Table in order establishment of the on-site grid and datum.

Legend:

greenhatch group

Topographical Surveys
Site Engineering
Utility / CCTV Surveys

Measured Building Surveys
3D Laser Scanning
Rock & Soil Mechanics

Rowan House
Duffield Road
Little Eaton
Derby
DE21 5DR

Tel (01332) 830066 Fax (01332) 830055
admin@greenhatch-group.co.uk
www.greenhatchgroup.co.uk

St Albans: Unit B, The Old Church, Abbey Park, St Albans, Hertfordshire AL4 9QX, T: (01727) 838481
Newcastle: 24 Knowsley Buildings, Amethyst Road, Newcastle Ind. Park, Newcastle-under-Lyme, Staffs ST5 7QY, T: (01782) 790760
London: 27 Farringdon Street, Farringdon, London EC4A 4HL, T: (020) 3475 [illegible]

CLIENT
Caring Home Group

PROJECT
Guysfield Care Home,
Willian Road,
Nr Letchworth, SG6 2AB

TITLE
Topographical Survey

SCALE	DATE
A0@ 1: 200	17th September 2018
DRAWN	CHECKED
ER	OH/JB/TB

Level datum: Base units
Field operations: Base date
Job number: 31409

Drawing No: 31409_T
Issue: 0

Comments
This plan should only be used for its original purpose. Greenhatch Group accepts no responsibility for this plan if supplied to any party other than the original client.
All dimensions should be checked on site prior to design and construction.
Drainage information (where applicable) has been directly interpreted from the surface and therefore should be treated as approximate only.

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Appendix G
Option 1 Design Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	10
FEH Rainfall Version	2013
Site Location	GB 522159 230714 TL 22159 30714
Data Type	Point
Maximum Rainfall (mm/hr)	75
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.091	4-8	0.022

Total Area Contributing (ha) = 0.112

Total Pipe Volume (m³) = 3.132

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	11.259	0.193	58.5	0.005	5.00	0.0	0.600	o	100	Pipe/Conduit	
S1.001	8.394	0.144	58.5	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.002	7.858	0.134	58.5	0.007	0.00	0.0	0.600	o	100	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	75.00	5.19	85.525	0.005	0.0	0.0	0.0	1.01	7.9	1.1
S1.001	75.00	5.32	85.332	0.012	0.0	0.0	0.0	1.01	7.9	2.5
S1.002	75.00	5.45	85.189	0.019	0.0	0.0	0.0	1.01	7.9	3.9

©1982-2020 Innovyze

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.003	9.372	0.160	58.5	0.006	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.004	15.717	0.269	58.5	0.003	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.005	11.388	0.195	58.5	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.006	12.451	0.693	18.0	0.000	0.00	0.0	0.600	o	100	Pipe/Conduit	
S1.007	38.601	0.950	40.6	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.008	5.606	0.209	26.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	10.036	0.125	80.0	0.008	5.00	0.0	0.600	o	100	Pipe/Conduit	
S2.001	8.148	0.102	80.0	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.002	18.532	0.463	40.0	0.012	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.003	24.463	1.189	20.6	0.008	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.000	16.038	1.950	8.2	0.012	5.00	0.0	0.600	o	100	Pipe/Conduit	
S3.001	15.656	0.267	58.6	0.016	0.00	0.0	0.600	o	150	Pipe/Conduit	
S3.002	17.231	0.454	38.0	0.013	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.009	1.724	0.121	14.3	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
S1.010	1.724	0.121	14.3	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.003	75.00	5.61	85.055	0.025	0.0	0.0	0.0	1.01	7.9	5.0
S1.004	75.00	5.87	84.894	0.028	0.0	0.0	0.0	1.01	7.9	5.7
S1.005	75.00	6.06	84.626	0.028	0.0	0.0	0.0	1.01	7.9	5.7
S1.006	75.00	6.17	84.431	0.028	0.0	0.0	0.0	1.83	14.4	5.7
S1.007	75.00	6.58	83.688	0.028	0.0	0.0	0.0	1.58	28.0	5.7
S1.008	75.00	6.62	82.738	0.028	0.0	0.0	0.0	1.95	34.5	5.7
S2.000	75.00	5.19	84.409	0.008	0.0	0.0	0.0	0.86	6.8	1.7
S2.001	75.00	5.31	84.234	0.017	0.0	0.0	0.0	1.12	19.9	3.4
S2.002	75.00	5.51	84.132	0.029	0.0	0.0	0.0	1.60	28.2	5.9
S2.003	75.00	5.69	83.718	0.037	0.0	0.0	0.0	2.23	39.4	7.6
S3.000	75.00	5.10	85.200	0.012	0.0	0.0	0.0	2.71	21.3	2.4
S3.001	75.00	5.30	83.200	0.028	0.0	0.0	0.0	1.32	23.3	5.6
S3.002	75.00	5.47	82.983	0.041	0.0	0.0	0.0	1.64	29.0	8.3
S1.009	75.00	6.64	82.529	0.112	0.0	0.0	0.0	2.68	47.4	22.8
S1.010	75.00	6.65	82.408	0.112	0.0	0.0	0.0	2.68	47.4	22.8

©1982-2020 Innovyze

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	86.850	1.325	Open Manhole	450	S1.000	85.525	100				
S2	86.746	1.414	Open Manhole	450	S1.001	85.332	100	S1.000	85.332	100	
S3	86.792	1.603	Open Manhole	450	S1.002	85.189	100	S1.001	85.189	100	
S4	86.623	1.569	Open Manhole	450	S1.003	85.055	100	S1.002	85.055	100	
S5	86.574	1.680	Open Manhole	450	S1.004	84.894	100	S1.003	84.894	100	
S6	86.909	2.283	Open Manhole	450	S1.005	84.626	100	S1.004	84.626	100	
S7	86.056	1.625	Open Manhole	450	S1.006	84.431	100	S1.005	84.431	100	
S8	85.063	1.375	Open Manhole	450	S1.007	83.688	150	S1.006	83.738	100	
S9	83.663	0.925	Open Manhole	450	S1.008	82.738	150	S1.007	82.738	150	
S10	86.021	1.612	Open Manhole	450	S2.000	84.409	100				
S11	85.422	1.189	Open Manhole	450	S2.001	84.234	150	S2.000	84.284	100	
S12	85.183	1.051	Open Manhole	450	S2.002	84.132	150	S2.001	84.132	150	
S13	84.446	0.778	Open Manhole	450	S2.003	83.718	150	S2.002	83.668	150	
S14	85.928	0.728	Open Manhole	450	S3.000	85.200	100				
S15	83.977	0.778	Open Manhole	450	S3.001	83.200	150	S3.000	83.250	100	
S16	83.903	0.971	Open Manhole	450	S3.002	82.983	150	S3.001	82.933	150	
S17	83.332	0.803	Open Manhole	450	S1.009	82.529	150	S1.008	82.529	150	
								S2.003	82.529	150	1
								S3.002	82.529	150	
S18	83.190	0.782	Open Manhole	450	S1.010	82.408	150	S1.009	82.408	150	
S	83.090	0.803	Open Manhole	0		OUTFALL		S1.010	82.287	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	522177.615	230737.616	522177.615	230737.616	Required	
S2	522166.986	230733.903	522166.986	230733.903	Required	
S3	522159.094	230731.043	522159.094	230731.043	Required	
S4	522151.674	230728.456	522151.674	230728.456	Required	
S5	522142.845	230725.314	522142.845	230725.314	Required	

©1982-2020 Innovyze

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S6	522130.829	230715.182	522130.829	230715.182	Required	
S7	522132.816	230703.969	522132.816	230703.969	Required	
S8	522138.319	230692.800	522138.319	230692.800	Required	
S9	522176.276	230685.779	522176.276	230685.779	Required	
S10	522189.611	230728.149	522189.611	230728.149	Required	
S11	522193.287	230718.810	522193.287	230718.810	Required	
S12	522196.286	230711.234	522196.286	230711.234	Required	
S13	522203.707	230694.253	522203.707	230694.253	Required	
S14	522153.599	230708.957	522153.599	230708.957	Required	
S15	522168.770	230714.160	522168.770	230714.160	Required	
S16	522174.309	230699.517	522174.309	230699.517	Required	
S17	522181.552	230683.881	522181.552	230683.881	Required	
S18	522182.105	230682.248	522182.105	230682.248	Required	
S	522182.658	230680.615			No Entry	

©1982-2020 Innovyze

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	100	S1	86.850	85.525	1.225	Open Manhole	450
S1.001	o	100	S2	86.746	85.332	1.314	Open Manhole	450
S1.002	o	100	S3	86.792	85.189	1.503	Open Manhole	450
S1.003	o	100	S4	86.623	85.055	1.469	Open Manhole	450
S1.004	o	100	S5	86.574	84.894	1.580	Open Manhole	450
S1.005	o	100	S6	86.909	84.626	2.183	Open Manhole	450
S1.006	o	100	S7	86.056	84.431	1.525	Open Manhole	450
S1.007	o	150	S8	85.063	83.688	1.225	Open Manhole	450
S1.008	o	150	S9	83.663	82.738	0.775	Open Manhole	450
S2.000	o	100	S10	86.021	84.409	1.512	Open Manhole	450
S2.001	o	150	S11	85.422	84.234	1.039	Open Manhole	450
S2.002	o	150	S12	85.183	84.132	0.901	Open Manhole	450
S2.003	o	150	S13	84.446	83.718	0.578	Open Manhole	450
S3.000	o	100	S14	85.928	85.200	0.628	Open Manhole	450
S3.001	o	150	S15	83.977	83.200	0.628	Open Manhole	450
S3.002	o	150	S16	83.903	82.983	0.771	Open Manhole	450
S1.009	o	150	S17	83.332	82.529	0.653	Open Manhole	450
S1.010	o	150	S18	83.190	82.408	0.632	Open Manhole	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	11.259	58.5	S2	86.746	85.332	1.314	Open Manhole	450
S1.001	8.394	58.5	S3	86.792	85.189	1.503	Open Manhole	450
S1.002	7.858	58.5	S4	86.623	85.055	1.469	Open Manhole	450
S1.003	9.372	58.5	S5	86.574	84.894	1.580	Open Manhole	450
S1.004	15.717	58.5	S6	86.909	84.626	2.183	Open Manhole	450
S1.005	11.388	58.5	S7	86.056	84.431	1.525	Open Manhole	450
S1.006	12.451	18.0	S8	85.063	83.738	1.225	Open Manhole	450
S1.007	38.601	40.6	S9	83.663	82.738	0.775	Open Manhole	450
S1.008	5.606	26.8	S17	83.332	82.529	0.653	Open Manhole	450
S2.000	10.036	80.0	S11	85.422	84.284	1.039	Open Manhole	450
S2.001	8.148	80.0	S12	85.183	84.132	0.901	Open Manhole	450
S2.002	18.532	40.0	S13	84.446	83.668	0.628	Open Manhole	450
S2.003	24.463	20.6	S17	83.332	82.529	0.652	Open Manhole	450
S3.000	16.038	8.2	S15	83.977	83.250	0.628	Open Manhole	450
S3.001	15.656	58.6	S16	83.903	82.933	0.821	Open Manhole	450
S3.002	17.231	38.0	S17	83.332	82.529	0.653	Open Manhole	450
S1.009	1.724	14.3	S18	83.190	82.408	0.632	Open Manhole	450
S1.010	1.724	14.3	S	83.090	82.287	0.653	Open Manhole	0

©1982-2020 Innovyze

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.005	0.005	0.005
1.001	User	-	100	0.007	0.007	0.007
1.002	User	-	100	0.007	0.007	0.007
1.003	User	-	100	0.006	0.006	0.006
1.004	User	-	100	0.003	0.003	0.003
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
1.008	-	-	100	0.000	0.000	0.000
2.000	User	-	100	0.008	0.008	0.008
2.001	User	-	100	0.008	0.008	0.008
2.002	User	-	100	0.012	0.012	0.012
2.003	User	-	100	0.008	0.008	0.008
3.000	User	-	100	0.012	0.012	0.012
3.001	User	-	100	0.016	0.016	0.016
3.002	User	-	100	0.013	0.013	0.013
1.009	User	-	100	0.006	0.006	0.006
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.112	0.112	0.112

©1982-2020 Innovyze

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	100	1.211	1.314	Unclassified	450	0	1.225	Unclassified
S1.001	S2	100	1.314	1.503	Unclassified	450	0	1.314	Unclassified
S1.002	S3	100	1.321	1.503	Unclassified	450	0	1.503	Unclassified
S1.003	S4	100	1.435	1.580	Unclassified	450	0	1.469	Unclassified
S1.004	S5	100	1.580	2.183	Unclassified	450	0	1.580	Unclassified
S1.005	S6	100	1.525	2.183	Unclassified	450	0	2.183	Unclassified
S1.006	S7	100	1.225	2.029	Unclassified	450	0	1.525	Unclassified
S1.007	S8	150	0.775	1.225	Unclassified	450	0	1.225	Unclassified
S1.008	S9	150	0.618	0.775	Unclassified	450	0	0.775	Unclassified
S2.000	S10	100	1.039	1.512	Unclassified	450	0	1.512	Unclassified
S2.001	S11	150	0.901	1.039	Unclassified	450	0	1.039	Unclassified
S2.002	S12	150	0.628	1.008	Unclassified	450	0	0.901	Unclassified
S2.003	S13	150	0.578	0.882	Unclassified	450	0	0.578	Unclassified
S3.000	S14	100	0.628	1.785	Unclassified	450	0	0.628	Unclassified
S3.001	S15	150	0.628	0.821	Unclassified	450	0	0.628	Unclassified
S3.002	S16	150	0.653	0.930	Unclassified	450	0	0.771	Unclassified
S1.009	S17	150	0.632	0.653	Unclassified	450	0	0.653	Unclassified
S1.010	S18	150	0.632	0.653	Unclassified	450	0	0.632	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	S	83.090	82.287	0.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	10
FEH Rainfall Version	2013
Site Location	GB 522168 230706 TL 22168 30706
Data Type	Point

©1982-2020 Innovyze

Synthetic Rainfall Details

Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

©1982-2020 Innovyze

Online Controls for Storm

Pump Manhole: S18, DS/PN: S1.010, Volume (m³): 0.1

Invert Level (m) 82.408

©1982-2020 Innovyze

Storage Structures for Storm

Cellular Storage Manhole: S18, DS/PN: S1.010

Invert Level (m) 81.524 Safety Factor 1.5
Infiltration Coefficient Base (m/hr) 0.02088 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.02088

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	150.0	150.0	0.801	0.0	190.0
0.800	150.0	190.0			

©1982-2020 Innovyze

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

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

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 522159 230714 TL 22159 30714
Data Type Point
Cv (Summer) 0.750
Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 150.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 2, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+40%	100/15 Summer				86.587
S1.001	S2	15 Winter	100	+40%	30/15 Summer				86.566
S1.002	S3	15 Winter	100	+40%	30/15 Summer				86.480
S1.003	S4	15 Winter	100	+40%	30/15 Summer				86.272
S1.004	S5	15 Winter	100	+40%	30/15 Summer				85.876
S1.005	S6	15 Winter	100	+40%	30/15 Summer				85.099
S1.006	S7	15 Winter	100	+40%					84.508
S1.007	S8	15 Winter	100	+40%					83.760
S1.008	S9	15 Winter	100	+40%	30/15 Summer				83.372
S2.000	S10	15 Winter	100	+40%					84.481
S2.001	S11	15 Winter	100	+40%					84.321
S2.002	S12	15 Winter	100	+40%					84.227
S2.003	S13	15 Winter	100	+40%					83.833
S3.000	S14	15 Winter	100	+40%					85.242
S3.001	S15	15 Winter	100	+40%	100/15 Summer				83.905
S3.002	S16	15 Winter	100	+40%	100/15 Summer				83.730

©1982-2020 Innovyze

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

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.962	0.000	0.38			2.8	SURCHARGED	
S1.001	S2	1.134	0.000	0.79			5.8	SURCHARGED	
S1.002	S3	1.191	0.000	1.23			8.9	SURCHARGED	
S1.003	S4	1.117	0.000	1.55			11.4	SURCHARGED	
S1.004	S5	0.882	0.000	1.69			12.8	SURCHARGED	
S1.005	S6	0.374	0.000	1.71			12.7	SURCHARGED	
S1.006	S7	-0.023	0.000	0.94			12.7	OK	
S1.007	S8	-0.078	0.000	0.47			12.7	OK	
S1.008	S9	0.484	0.000	0.58			16.6	SURCHARGED	
S2.000	S10	-0.028	0.000	0.85			5.4	OK	
S2.001	S11	-0.063	0.000	0.63			11.0	OK	
S2.002	S12	-0.054	0.000	0.72			19.1	OK	
S2.003	S13	-0.036	0.000	0.65			24.3	OK	
S3.000	S14	-0.058	0.000	0.37			7.6	OK	
S3.001	S15	0.555	0.000	0.79			16.9	FLOOD RISK	
S3.002	S16	0.597	0.000	0.92			24.7	SURCHARGED	

©1982-2020 Innovyze

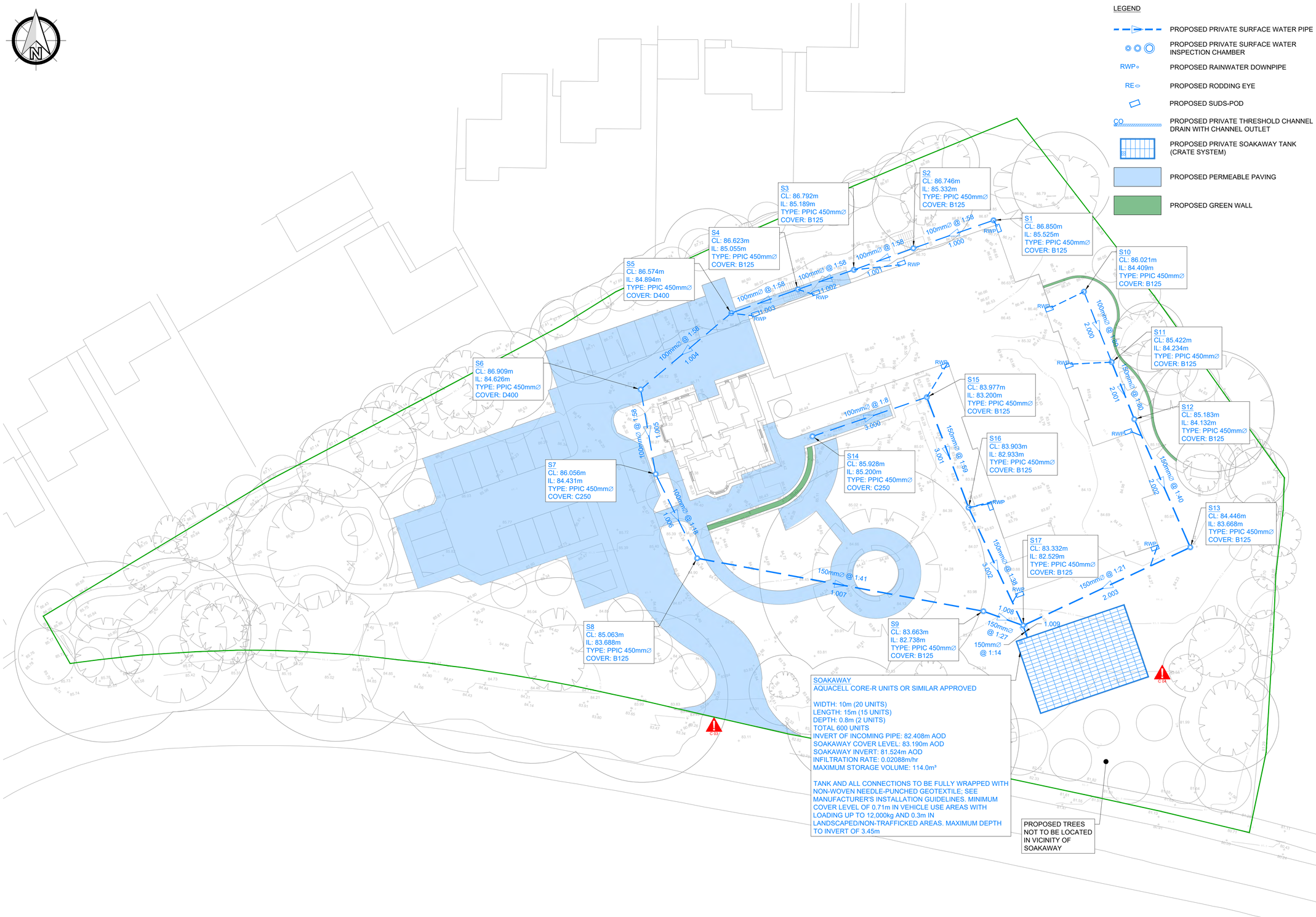
Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.009	S17	15 Winter	100	+40%	30/15 Summer				83.330
S1.010	S18	480 Winter	100	+40%					82.029

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.009	S17	0.651	0.000	2.54			55.3	FLOOD RISK	
S1.010	S18	-0.529	0.000	0.00		927	0.0	OK	

©1982-2020 Innovyze

Appendix H
Option 1 Design Surface Water Drainage Layout



LEGEND

- PROPOSED PRIVATE SURFACE WATER PIPE
- PROPOSED PRIVATE SURFACE WATER INSPECTION CHAMBER
- RWP — PROPOSED RAINWATER DOWNPIPE
- RE — PROPOSED RODDING EYE
- PROPOSED SUDS-POD
- CO — PROPOSED PRIVATE THRESHOLD CHANNEL DRAIN WITH CHANNEL OUTLET
- PROPOSED PRIVATE SOAKAWAY TANK (CRATE SYSTEM)
- PROPOSED PERMEABLE PAVING
- PROPOSED GREEN WALL

PLANNING GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT OTHER DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
4. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
5. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
6. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER + ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 05.06.2024.
7. THE TOPOGRAPHICAL INFORMATION REPRODUCED ON THIS DRAWING IS SHOWN FOR CO-ORDINATION AND DESIGN PURPOSES ONLY AND TAKEN FROM THE GREENHATCH GROUP DRAWING 31409_T, DATED 17.09.2018. LIABILITY FOR THIS INFORMATION REMAINS WITH GREENHATCH GROUP: CANHAM CONSULTING LTD CANNOT ACCEPT ANY LIABILITY FOR THE CONTENT AND ACCURACY OF THE TOPOGRAPHIC SURVEY.
8. THE INFORMATION SHOWN DOES NOT CONSTITUTE TECHNICAL APPROVAL FROM THE RELEVANT AUTHORITIES AND COULD BE SUBJECT TO CHANGE POST PLANNING.

PRIVATE DRAINAGE NOTES:

1. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
2. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
3. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
5. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
6. INSPECTION CHAMBERS TO BE WAVIN 450 IC RANGE, OR SIMILAR APPROVED.
7. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER + ROBB ARCHITECTS.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.

RESIDUAL RISKS:

C 01 — CONTACT WITH LIVE SERVICES (SITE-WIDE RISK). LOCATION OF ALL EXISTING BURIED SERVICES TO BE VERIFIED & VISUALLY MARKED ON SITE - APPROPRIATE HEALTH & SAFETY PROTECTIVE MEASURES AND WORK PRACTICES TO BE INSTATED

C 02 — DAMAGE TO EXISTING SERVICE INFRASTRUCTURE (SITE-WIDE RISK). LOCATION OF ALL EXISTING BURIED SERVICES TO BE VERIFIED & VISUALLY MARKED ON SITE - APPROPRIATE HEALTH & SAFETY PROTECTIVE MEASURES AND WORK PRACTICES TO BE INSTATED

C 03 — CONTACT WITH LIVE TRAFFIC & PEDESTRIANS - APPROPRIATE TRAFFIC MANAGEMENT & PEDESTRIAN MANAGEMENT TO BE INSTATED

C 04 — THE NEW SEWER SYSTEMS INCORPORATE LARGE AND DEEP CONCRETE MANHOLE STRUCTURES AND LARGE DIAMETER CONCRETE PIPES THAT WILL BE CONSTRUCTED IN DEEP EXCAVATIONS. AT ALL STAGES OF CONSTRUCTION APPROPRIATE SECURE FENCING MUST BE INSTALLED AROUND THE DEEP EXCAVATION WITH SUFFICIENT OFFSET TO PREVENT FALLS AND PREVENT COLLAPSE DUE TO UNPLANNED LATERAL LOADING FROM CONSTRUCTION PLANT. THE CONTRACTOR MUST ENSURE FULL HEALTH & SAFETY CONSIDERATION IN THE PLANNING AND EXECUTION OF THE SEWER INSTALLATION WORKS.

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

SCALE 1:250m
0m 5m 10m 15m 20m 25m
SCALE BAR FOR INFORMATION ONLY

rev	date	details	drawn	checked
P03	24.07.25	REVISED IN LINE WITH COMMENTS	KS	MH
P02	21.06.24	REVISED IN LINE WITH DESIGN DEVELOPMENTS	GPC	MH

Canham Consulting
Structural Engineers | Civil Engineers | Building Surveyors

+44 (0)1603 430650 | mail@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP

architect
OLIVER + ROBB ARCHITECTS

project
GUYSFIELD CARE HOME, WILLIAN ROAD, WILLIAN

title
PROPOSED SURFACE WATER DRAINAGE LAYOUT

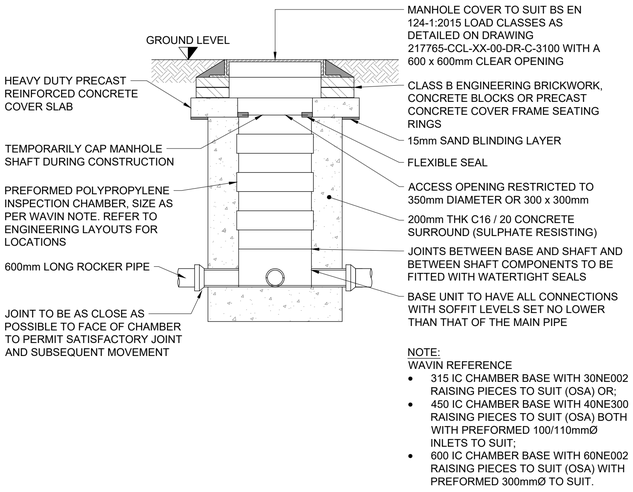
CCL ref:	drawn	design	checked	scale	size	date
213692	MJWH	MH	MR	1:250	A1 (L)	30.09.2019

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: GCH-CCL-XX-XX-DR-C-0001
revision: P03

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

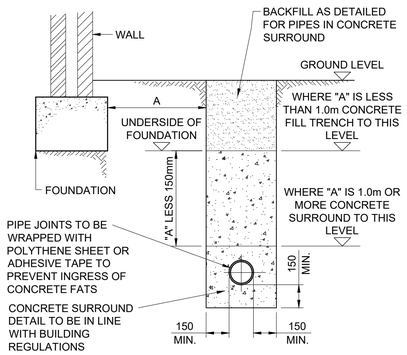
THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE. REGULATIONS 2, 9 AND 11 - THOSE ALTERING THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.



NOTE:
WAVIN REFERENCE
- 315 IC CHAMBER BASE WITH 30NE002 RAISING PIECES TO SUIT (OSA) OR;
- 450 IC CHAMBER BASE WITH 40NE300 RAISING PIECES TO SUIT (OSA) BOTH WITH PREFORMED 100/110mmØ INLETS TO SUIT;
- 600 IC CHAMBER BASE WITH 60NE002 RAISING PIECES TO SUIT (OSA) WITH PREFORMED 300mmØ TO SUIT.

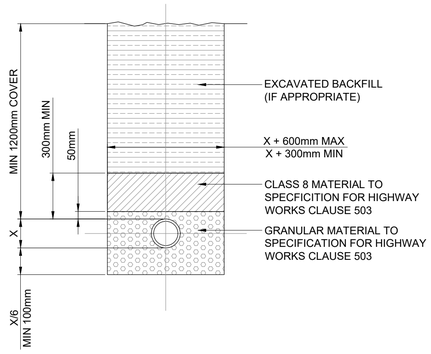
TYPICAL INSPECTION CHAMBER DETAIL (IC): 315, 450 & 600mm DIAMETER

SCALE 1:20



PIPE RUNS NEAR BUILDINGS

NOT TO SCALE



CLASS S BEDDING (PIPES UP TO 600mm)

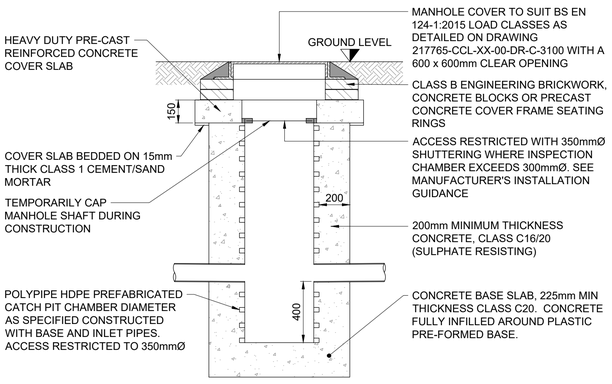
NOT TO SCALE

PRIVATE DRAINAGE NOTES:

1. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
2. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
3. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
5. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
6. INSPECTION CHAMBERS TO BE WAVIN 450 IC RANGE, OR SIMILAR APPROVED.
7. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER + ROBB ARCHITECTS.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.

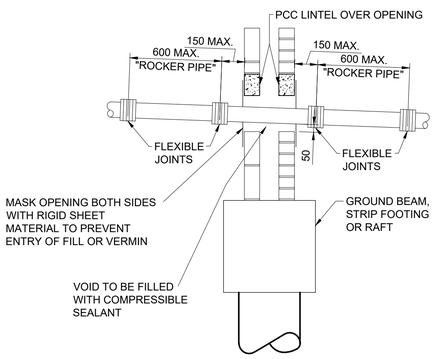
PLANNING GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT OTHER DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
4. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
5. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
6. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER + ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 05.06.2024.
7. THE TOPOGRAPHICAL INFORMATION REPRODUCED ON THIS DRAWING IS SHOWN FOR CO-ORDINATION AND DESIGN PURPOSES ONLY AND TAKEN FROM THE GREENHATCH GROUP DRAWING 31409_T, DATED 17.09.2018. LIABILITY FOR THIS INFORMATION REMAINS WITH GREENHATCH GROUP: CANHAM CONSULTING LTD CANNOT ACCEPT ANY LIABILITY FOR THE CONTENT AND ACCURACY OF THE TOPOGRAPHIC SURVEY.
8. THE INFORMATION SHOWN DOES NOT CONSTITUTE TECHNICAL APPROVAL FROM THE RELEVANT AUTHORITIES AND COULD BE SUBJECT TO CHANGE POST PLANNING.



TYPICAL CATCHPIT DETAIL (CP): 315, 450 & 600mm DIAMETER

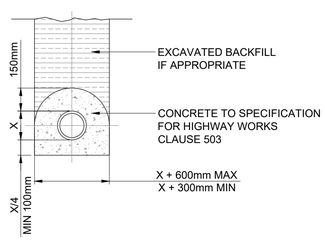
SCALE 1:20



PIPE PENETRATING WALLS

ARCH OR LINTELLED OPENING TO GIVE 50mm SPACE ALL ROUND PIPE

NOT TO SCALE



CLASS Z BEDDING (PIPES UP TO 600mm)

NOT TO SCALE

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

rev	date	details	drawn	checked
P01	25.06.24	PRELIMINARY ISSUE	SAH	MH

Canham Consulting
Structural Engineers | Civil Engineers | Building Surveyors

+44 (0)1603 430650 | mail@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP

architect
OLIVER + ROBB ARCHITECTS

project
GUYSFIELD CARE HOME, WILLIAN ROAD, WILLIAN

title
DRAINAGE CONSTRUCTION DETAILS
SHEET 1 OF 2

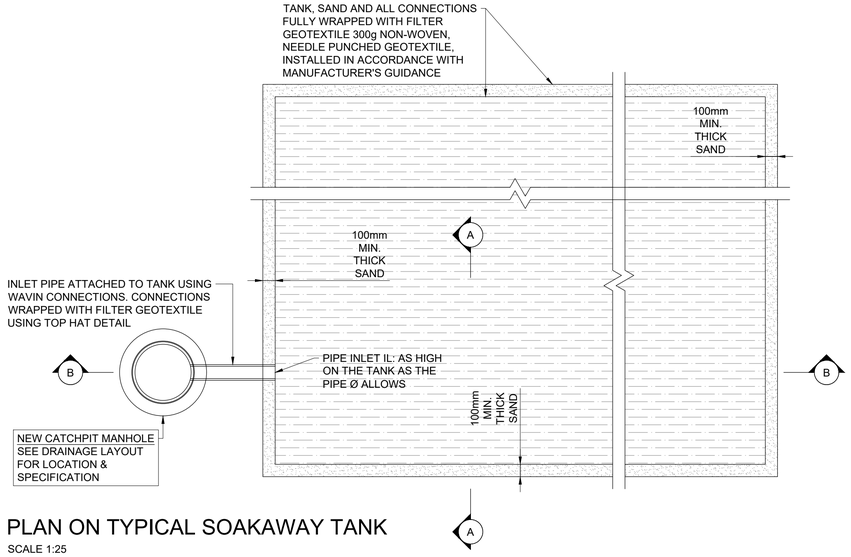
CCL ref:	drawn	design	checked	scale	size	date
213692	SAH	MH	MH	AS SHOWN	A1 (L)	25.06.2024

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: GCH-CCL-XX-XX-DR-C-0005
revision: P01

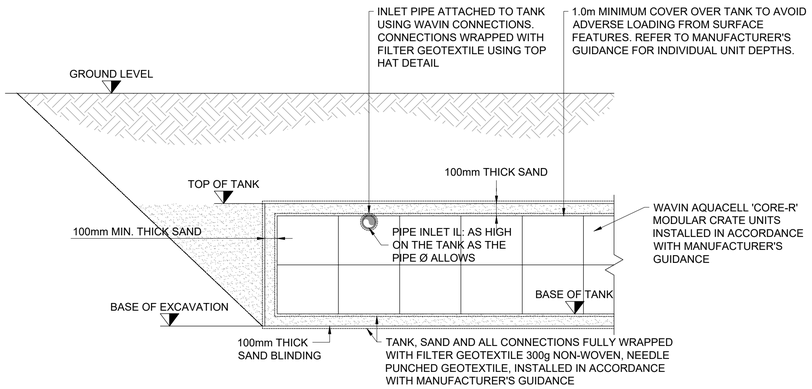
© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE. REGULATIONS 2, 9 AND 11 - THOSE ALTERING THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.



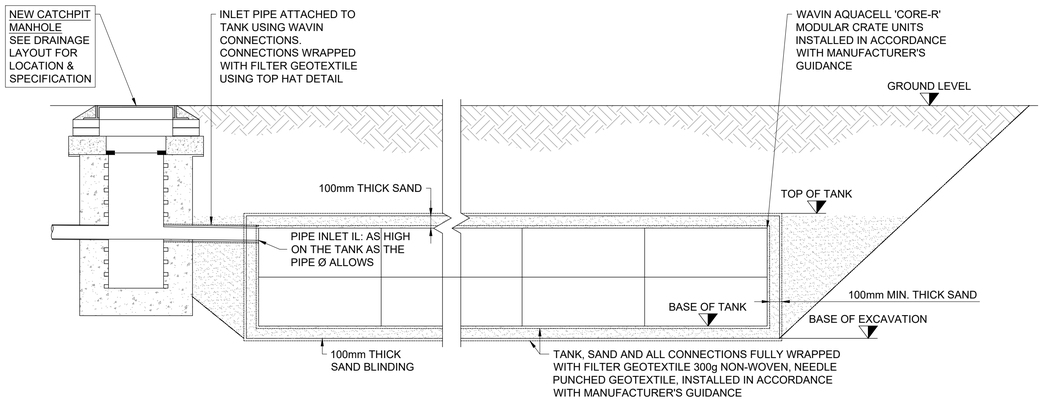
PLAN ON TYPICAL SOAKAWAY TANK

SCALE 1:25



TYPICAL SECTION A-A

SCALE 1:25



TYPICAL SECTION B-B

SCALE 1:25

SOAKAWAYS
ALL SOAKAWAYS TO BE WAVIN AQUACELL CORE-R.

FOR SIZE AND LOCATION OF ALL SOAKAWAY TANKS REFER TO DRAINAGE LAYOUT.

TOP OF TANK TO BE 1.0m BELOW GROUND TO AVOID ADVERSE LOADING FROM SURFACE FEATURES.

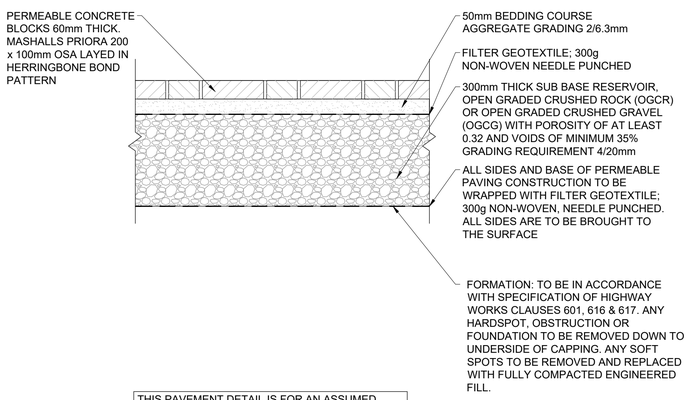
TANK AND ALL CONNECTIONS FULLY WRAPPED WITH FILTER GEOTEXTILE 300g NON-WOVEN, NEEDLE PUNCHED GEOTEXTILE, INSTALLED IN ACCORDANCE WITH MANUFACTURER'S GUIDANCE

PRIVATE DRAINAGE NOTES:

1. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
2. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
3. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
5. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
6. INSPECTION CHAMBERS TO BE WAVIN 450 IC RANGE, OR SIMILAR APPROVED.
7. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER + ROBB ARCHITECTS.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.

PLANNING GENERAL NOTES:

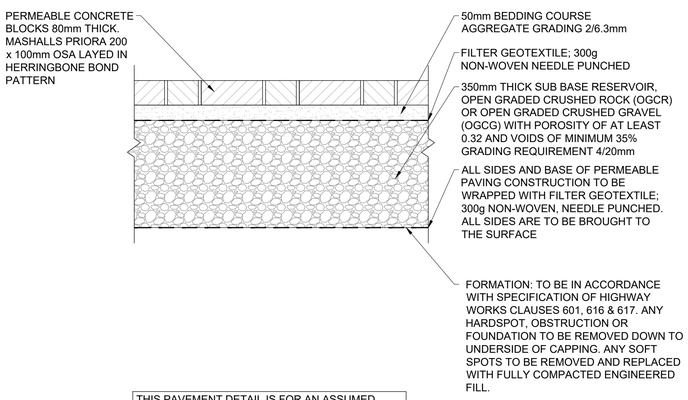
1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT OTHER DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
4. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
5. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
6. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER + ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 05.06.2024.
7. THE TOPOGRAPHICAL INFORMATION REPRODUCED ON THIS DRAWING IS SHOWN FOR CO-ORDINATION AND DESIGN PURPOSES ONLY AND TAKEN FROM THE GREENHATCH GROUP DRAWING 31409_T, DATED 17.09.2018. LIABILITY FOR THIS INFORMATION REMAINS WITH GREENHATCH GROUP: CANHAM CONSULTING LTD CANNOT ACCEPT ANY LIABILITY FOR THE CONTENT AND ACCURACY OF THE TOPOGRAPHIC SURVEY.
8. THE INFORMATION SHOWN DOES NOT CONSTITUTE TECHNICAL APPROVAL FROM THE RELEVANT AUTHORITIES AND COULD BE SUBJECT TO CHANGE POST PLANNING.



THIS PAVEMENT DETAIL IS FOR AN ASSUMED C.B.R. OF 5%. FOR A C.B.R VALUE DIFFERENT TO THIS PLEASE INFORM CANHAM CONSULTING

PERMEABLE PAVING DETAIL - PATHS

SCALE 1:10



THIS PAVEMENT DETAIL IS FOR AN ASSUMED C.B.R. OF 5%. FOR A C.B.R VALUE DIFFERENT TO THIS PLEASE INFORM CANHAM CONSULTING

PERMEABLE PAVING DETAIL - CAR PARK

SCALE 1:10

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

rev	date	details	drawn	checked
P03	10.04.24	FLOW CONTROL CHAMBER DETAIL ADDED, PERMEABLE PAVING DETAILS MOVED TO DWG.NO. 218995-CCL-XX-00-DR-C-3900	SAH	MH
P02	14.03.24	SOAKAWAY DETAIL ADDED, ATTENUATION TANK DETAIL DELETED	SAH	MH
P01	31.08.23	PRELIMINARY ISSUE	SAH	MH

Canham Consulting

Structural Engineers | Civil Engineers | Building Surveyors

+44 (0)1603 430650 | mail@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
VERTEX ARCHITECTURE

architect
VERTEX ARCHITECTURE

project
LEZIATE PARK COUNTRY CLUB
BROW OF THE HILL, LEZIATE, NORFOLK

title
DRAINAGE CONSTRUCTION DETAILS
SHEET 2 OF 2

CCL ref:	drawn	design	checked	scale	size	date
218995	SAH	MH	MH	AS SHOWN	A1 (L)	29.08.23

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: 218995-CCL-XX-00-DR-C-3901
revision: P03

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE. REGULATIONS 2, 9 AND 11. THOSE ALTERING THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.

Appendix I
Anglian Water Pre-Planning Report

love every drop
anglianwater

Pre-Planning
Assessment Report

GUYSFIELD CARE HOME 151491/903865154/1/0067764

Report published 24/09/2019

Section 1: Proposed development

Thank you for submitting a pre-planning enquiry. This has been produced for Canham Consulting Ltd. Your reference number is **151491/903865154/1/0067764**. If you have any questions upon receipt of this report, please contact the Pre-Development team on 03456 066087 or email planningliaison@anglianwater.co.uk.

The response within this report has been based on the following information which was submitted as part of your application:

List of planned developments	
Type of development	**No. Of units**
Non-residential	1

The anticipated residential build rate is:

Year	Y1
Build rate	1

Site grid reference no.

TL2214430702

Development type

Brownfield

Planning application status

Unknown

The comments contained within this report relate to the public water mains and sewers indicated on our records. Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2: Assets affected

Our records indicate that there are no public water mains/public sewers or other assets owned by Anglian Water within the boundary of your development site. However, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3: Water recycling services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and influent quality arising from your development.

Water recycling centre

The foul drainage from the proposed development is in the catchment of Letchworth Water Recycling Centre, which currently has capacity to treat the flows from your development site. Anglian Water cannot reserve capacity and the available capacity at the water recycling centre can be reduced at any time due to growth, environmental and regulation driven changes.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 225mm diameter sewer at manhole 1600 in Willian Road at National Grid Reference NGR TL2217630654. Anglian water has assessed the impact of gravity flows from the planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

In principle, your proposed method of surface water disposal is acceptable to Anglian Water. It is our understanding that the evidence to confirm compliance with the surface water hierarchy is not available. Once the evidence has been confirmed, then a connection point may be made to manhole 2652 in Willian Road at NGR TL2225530690 at a rate of 5 l/s. Our assessment has been based on development flows connecting to the nearest surface water sewer of the same size or greater pipe diameter. It is your responsibility to provide the evidence to confirm that all alternative methods of surface water disposal have been explored and these will be required before your connection can be agreed. This is subject to satisfactory evidence which shows the surface water management hierarchy as outlined in Building Regulations Part H has been explored. This would encompass the results from the site specific infiltration testing and/or confirmation that the flows cannot be discharged to a watercourse. Anglian Water's surface water policy follows the Surface Water hierarchy, outlined in Part H of the Building Regulations. Should your assumptions or evidence change then an alternative solution, connection point or flow rate may be required. You are therefore advised to update Anglian Water with the key supporting evidence at your earliest convenience.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website at http://www.anglianwater.co.uk/developers/suds.aspx. We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating than the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website at: http://www.anglianwater.co.uk/developers/suds.aspx

The proposed method of surface water disposal is not relevant to Anglian Water; we suggest that you contact the relevant Local Authority, Lead Local Flood Authority, the Environment Agency or the Internal Drainage Board, as appropriate.

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

As a result of the recent charging rules published by Ofwat, our charging regime has changed. Your development site will be required to pay a Zonal charge for each new property connecting to the public sewer that benefits from Full planning permission.

Payment of the Zonal charge must be made before premises are connected to the public sewer. More information on the Zonal charge can be found at http://www.anglianwater.co.uk/developers/charges

The Zonal charge consists of two elements. The first is called the 'Fixed Element' which is the same in nature to the Infrastructure charge applied prior to April 2018. The second is called the 'Variable Element' which may vary each financial year.

The elements are combined together to create the 2018/19 Zonal charge for Sewerage:

Fixed Element	£ 370
Variable Element	£ 101

In most circumstances zonal charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non-household premises, the fixed element is calculated according to the number and type of water fittings in the premises.This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our web-page: http://www.anglianwater.co.uk/developers/charges/

It has been assumed that the onsite used water network will be provided under a section 104 Water Industry Act application.

It is recommended that you also budget for connection costs. Please note that we offer alternative types of connections depending on your needs and these costs are available at our website.

Section 4: Map of Proposed Connection Points

Figure 1:Showing your used water point of connection

Figure 2:Showing your surface water point of connection

Section 5: Useful Information

Used water

Water Industry Act – Key Used Water Sections:

Section 98:

This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185:

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website at http://www.anglianwater.co.uk/developers or via our Development Services team on 03456 066087.

Sustainable drainage systems:

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. Therefore our preferred method of surface water disposal is through the use of Sustainable Drainage Systems (SuDS). SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website at http://www.anglianwater.co.uk/developers/suds.aspx . We also recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for the area to discuss your application.

Private sewer transfers:

Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

- Surface water sewers and lateral drains that did not discharge to the public sewer, e.g. those that discharged to a watercourse.
- Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.
- Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

Encroachment:

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website at http://anglianwater.co.uk/developers/encroachment.aspx

Locating our assets:

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from . All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge. We have more information on our website at: http://www.anglianwater.co.uk/developers/our-assets/

Summary of charges:

A summary of this year's water and used water connection and infrastructure charges can be found at http://www.anglianwater.co.uk/developers/charges

Disclaimer:

The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water, or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content. Furthermore in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid for the date printed and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s).

Appendix J
Exceedance Flow Plan

PLANNING GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT OTHER DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
4. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
5. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
6. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER + ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 05.06.2024.
7. THE TOPOGRAPHICAL INFORMATION REPRODUCED ON THIS DRAWING IS SHOWN FOR CO-ORDINATION AND DESIGN PURPOSES ONLY AND TAKEN FROM THE GREENHATCH GROUP DRAWING 31409_T, DATED 17.09.2018. LIABILITY FOR THIS INFORMATION REMAINS WITH GREENHATCH GROUP: CANHAM CONSULTING LTD CANNOT ACCEPT ANY LIABILITY FOR THE CONTENT AND ACCURACY OF THE TOPOGRAPHIC SURVEY.
8. THE INFORMATION SHOWN DOES NOT CONSTITUTE TECHNICAL APPROVAL FROM THE RELEVANT AUTHORITIES AND COULD BE SUBJECT TO CHANGE POST PLANNING.

LEGEND

EXCEEDANCE FLOW DIRECTION

rev	date	details	drawn	checked
P03	25.06.24	SITE LAYOUT UPDATED	SAH	MH
P02	05.06.20	SITE LAYOUT UPDATED	JDP	DR
P01	27.09.19	PRELIMINARY ISSUE	MH	MR

Canham Consulting

Structural Engineers | Civil Engineers | Building Surveyors

+44 (0)1603 430650 | mail@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP

architect
OLIVER + ROBB ARCHITECTS

project
GUYSFIELD CARE HOME, WILLIAN ROAD, WILLIAN

title
EXCEEDANCE FLOW PLAN

CCL ref:	drawn	design	checked	scale	size	date
213692	MH	MH	MR	1:250	A1 (L)	27.09.2019

status:
S0 - WORK IN PROGRESS

drawing number: GCH-CCL-XX-XX-DR-C-0003
revision: P03

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE, REGULATIONS 2, 9 AND 11. THOSE ALTERING THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE.
IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

SCALE 1:250m
0m 5m 10m 15m 20m 25m
SCALE BAR FOR INFORMATION ONLY

Appendix K
Maintenance Strategy

Maintenance Strategy

on:

Guysfield Care Home,
Willian Road,
Willian,
NR Letchworth,
Herts,
SG6 2AB

for:

Caring Homes Group

Structural Engineers | Civil Engineers | Building Surveyors

Canham Consulting

Guysfield Care Home, Willian Road, Willian
Maintenance Strategy
213692

Contents Amendment Record

This report has been issued and amended as follows:

Rev	Description	Prepared	Checked	Date
P1	First Issue	MH	MR	27.09.19

Canham Consulting Ltd
The Old School
School Lane
Thorpe St. Andrew
Norwich
NR7 0EP

T: 01603 430650
office@canhamconsulting.co.uk

F: 01603 430672
www.canhamconsulting.co.uk

Consultants to the Construction Industry

Chairman: Peter French BSC Hons CEng MICE MAE
Managing Director: Rob Panter Eur Ing CEng MICE MIStructE
Directors: Chris Dewick | Jon Cutress FCA **Consultant:** Anthony Canham CEng FICE FCIArb FAE QDR MCIHT
Registered in England & Wales Company Registration No 2710417 **Registered Office:** Canham Consulting Limited The Old School School Lane Norwich NR7 0EP

INVESTORS IN PEOPLE
Constructionline

CONTENTS

1 INTRODUCTION 1
2 SUDS COMPONENTS WITHIN THE DEVELOPMENT 1
3 SUMMARY OF DESIGN INTENT 1
4 INSPECTIONS 2
5 OPERATION AND MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING 3
6 OPERATION AND MAINTENANCE REQUIREMENTS FOR SOAKAWAY 4
7 OPERATION AND MAINTENANCE REQUIREMENTS FOR CATCHPIT 5
5 OPERATION AND MAINTENANCE REQUIREMENTS FOR ATTENUATION TANK 6
8 EMERGENCY ACTION IN CASE OF SPILLAGES 7

Appendices

Appendix A - SuDS Maintenance Inspection Checklist

1 INTRODUCTION

This SuDS Operation and Maintenance Strategy has been produced in line with the recommendations of the CIRIA SuDS Manual (C753) and includes a number of extracts from that document.

For further information please refer to the full document, which can be downloaded free of charge at:
http://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

In addition to the recommendations in this manual, please also refer to the specific maintenance guidelines provided by the manufacturers of any proprietary products that have been used in the construction of the SuDS.

2 SUDS COMPONENTS WITHIN THE DEVELOPMENT

The development contains a number of SuDS components that will require on-going inspection and maintenance. The primary components are as follows:

- **Permeable Paving** (a surface suitable for pedestrian and/or vehicular traffic, that provides a treatment medium and allows rainwater to be temporarily stored and infiltrate into the ground);
- **Soakaway** (below ground structures, designed to promote infiltration);
- **Catch Pit** (chambers to facilitate the collection of sediment);
- **Attenuation Tank** (a purpose-built tank, designed to store rainwater in high intensity storms);

3 SUMMARY OF DESIGN INTENT

The proposed development is for the demolition of an existing residential care home and the construction of a new care home. The proposed access road and parking spaces will be constructed from permeable paving which will treat and infiltrate the surface water associated with these areas. The proposed roof water will discharge to a soakaway in the south of the site. A catchpit will be located immediately upstream of the soakaway.

Following further testing onsite, should infiltration be found unsuitable to manage surface water, an attenuation option will be utilised. The attenuation option would see the surface water associated with the proposed care home roof (and potentially with the access road and parking area) discharge to a cellular storage crate which will in

turn discharge to an existing Anglian Water surface water sewer at a restricted outfall rate.

4 INSPECTIONS

As part of the on-going management of most SuDS components there is a need for regular inspections to ensure that blockages, silt and excess litter are not adversely affecting the component or scheme. It is important that this is carried out and time is allowed for corrective action to be taken.

Routine inspections should be carried out once a month for most components, particularly for the first year after installation. This frequency can then be reviewed (and if appropriate reduced). It is proposed that either the individual property owners or a maintenance company operating on their behalf will maintain the proposed permeable paving. It is proposed that Anglian Water or a maintenance company operating on their behalf will maintain all other SuDS associated with the proposed development.

Recurring attendance by the same person ensures monitoring of the drainage system, a rapid response to problems and “ownership” of the SuDS components. The inspections should be recorded on a maintenance record.

5 OPERATION AND MAINTENANCE REQUIREMENTS FOR PERMEABLE PAVING

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, based on site-specific observations of clogging or manufacturers' recommendations. Pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	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 jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

6 OPERATION AND MAINTENANCE REQUIREMENTS FOR SOAKAWAY

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

7 OPERATION AND MAINTENANCE REQUIREMENTS FOR CATCHPIT

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Removal of litter and debris.	6 monthly.
Occasional Maintenance	Change of filter media.	As required.
	Removal of sediment, oil, grease and floatables.	As required.
Remedial Actions	Clear perforated pipework blockages.	As required.
Monitoring	Inspect for evidence of poor operation.	Six monthly.
	Inspect filter media and establish appropriate replacement frequencies.	Six monthly.
	Inspect sediment accumulation rates and establish appropriate replacement frequencies.	Monthly during first half year of operation, then every six months.

5 OPERATION AND MAINTENANCE REQUIREMENTS FOR ATTENUATION TANK

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, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

8 EMERGENCY ACTION IN CASE OF SPILLAGES

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of substances that are known to be harmful to the environment should be removed where possible using soak mats as recommended by the Environment Agency, with residual spillage allowed to bioremediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or closely woven fabric.)

Contact the Environment Agency immediately on the following number.

24-hour incident hotline – 0800 80 70 60

Or if less urgent contact the regional office:

Alchemy, Bessemer Road, Welwyn Garden City, Hertfordshire, Al7 1HE. Tel. 03708506506

Queries regarding a design feature – In the event of a concern or failure of a SuDS design feature contact:

Canham Consulting
The Old School, School Lane, Thorpe St Andrew, Norwich, NR7 0EP
T: (01603) 430650
E: mail@canhamconsulting.co.uk
W: www.canhamconsulting.co.uk

APPENDIX A

SuDS MAINTENANCE INSPECTION CHECKLIST

APPENDIX B - SuDS maintenance inspection checklist

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference(s)	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (eg biodiversity, wildlife and visual aspects)	

Inspection date

	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date Completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (eg rutting, spreading of blocks or signs of ponding water)?								
Silt/sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (eg underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
System blockages and litter build-up								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Vegetation								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (Check against approved planting regime.)								
Does any part of the system require weeding, pruning or mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species becoming established? If yes, state action required								
Infrastructure								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (eg wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
Other observations								
Information appended (eg photos)								
Suitability of current maintenance regime								
Continue as current								
Increase maintenance								
Decrease maintenance								
Next inspection								
Proposed date for next inspection								

Appendix L
Greenfield Runoff

Greenfield runoff rate estimation tool

hr wallingford www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

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.

Project details

Date	14/05/2025
Calculated by	MH
Reference	213692
Model version	2.0.0

Location

Site name	Guysfield Carehome
Site location	Letchworth

Site easting	522146
Site northing	230717

Site details

Total site area (ha)	0.8365 ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value	
SAAR (mm)	600	mm		600
BFIHOST	0.429			
QMed-QBar conversion	1.124			1.124
QMed (l/s)	1.93	l/s		
QBar (FEH statistical) (l/s)	2.2	l/s		

Growth curve factors

	My value	Map value
Hydrological region	5	5
1 year growth factor	0.87	
2 year growth factor	0.89	
10 year growth factor	1.65	
30 year growth factor	2.45	
100 year growth factor	3.56	
200 year growth factor	4.21	

Results

Method	FEH statistical	
Flow rate 1 year (l/s)	1.9	l/s
Flow rate 2 year (l/s)	1.9	l/s
Flow rate 10 years (l/s)	3.6	l/s
Flow rate 30 years (l/s)	5.3	l/s
Flow rate 100 years (l/s)	7.7	l/s
Flow rate 200 years (l/s)	9.1	l/s

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.0.0) developed by HR Wallingford and available at uksuds.com (https://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 uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix M
Option 2 Design

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	0.76
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	70.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.007	5.00	86.850	450	522177.615	230737.616	1.265
2	0.004	5.00	86.746	450	522166.986	230733.903	1.274
3	0.007	5.00	86.792	450	522159.094	230731.043	1.404
4	0.006	5.00	86.623	450	522151.674	230728.456	1.364
5			86.574	450	522142.845	230725.314	1.377
6			86.627	450	522120.579	230717.388	1.926
7		5.00	86.299	450	522102.685	230705.589	0.700
8			86.453	450	522122.444	230711.990	2.323
9		5.00	85.996	450	522100.938	230695.973	0.825
10			86.012	450	522127.420	230705.124	2.805
11		5.00	83.268	450	522147.964	230671.284	0.900
12			85.475	450	522129.792	230694.577	3.205
13		5.00	85.611	450	522110.383	230690.518	0.825
14			85.617	450	522131.155	230697.247	3.357
15			86.462	450	522149.445	230703.171	4.266
16	0.015	5.00	86.332	450	522151.011	230708.070	4.153
17	0.019	5.00	83.977	450	522168.770	230714.160	1.861
18	0.013	5.00	83.903	450	522174.309	230699.517	1.839
19		5.00	86.021	450	522189.611	230728.149	0.700
20	0.007	5.00	85.422	450	522193.287	230718.810	0.702
21	0.009	5.00	85.183	450	522196.286	230711.234	0.700
22	0.017	5.00	84.446	450	522203.707	230694.253	1.000
23	0.008	5.00	83.332	450	522181.552	230683.881	2.482
24			83.090	450	522182.658	230680.615	2.251
25			83.125	1200	522208.600	230687.764	2.376
25_OUT			79.131	1200	522255.758	230690.033	2.306

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	11.259	0.600	85.585	85.472	0.113	100.0	100	5.24	70.0
1.001	2	3	8.394	0.600	85.472	85.388	0.084	100.0	100	5.43	70.0
1.002	3	4	7.858	0.600	85.388	85.309	0.079	100.0	100	5.60	70.0
1.003	4	5	9.371	0.600	85.259	85.197	0.062	150.0	150	5.79	70.0
1.004	5	6	23.635	0.600	85.197	84.701	0.496	47.7	150	6.06	70.0
1.005	6	8	5.711	0.600	84.701	84.130	0.571	10.0	150	6.09	70.0
2.000	7	8	20.770	0.600	85.599	84.180	1.419	14.6	100	5.17	70.0
1.006	8	10	8.480	0.600	84.130	83.282	0.848	10.0	150	6.13	70.0
3.000	9	10	28.019	0.600	85.171	83.207	1.964	14.3	225	5.13	70.0
1.007	10	14	8.718	0.600	83.207	82.335	0.872	10.0	225	6.17	70.0
4.000	11	12	29.543	0.600	82.368	82.270	0.098	300.0	300	5.55	70.0
4.001	12	14	2.998	0.600	82.270	82.260	0.010	300.0	300	5.60	70.0
5.000	13	14	21.835	0.600	84.786	82.335	2.451	8.9	225	5.08	70.0
1.008	14	15	19.225	0.600	82.260	82.196	0.064	300.0	300	6.52	70.0
1.009	15	16	5.143	0.600	82.196	82.179	0.017	300.0	300	6.62	70.0
1.010	16	17	18.774	0.600	82.179	82.116	0.063	300.0	300	6.96	70.0
1.011	17	18	15.656	0.600	82.116	82.064	0.052	300.0	300	7.25	70.0
1.012	18	23	17.232	0.600	82.064	80.850	1.214	14.2	300	7.32	70.0
6.000	19	20	10.036	0.600	85.321	84.720	0.601	16.7	100	5.09	70.0
6.001	20	21	8.148	0.600	84.720	84.483	0.237	34.4	100	5.19	70.0
6.002	21	22	18.532	0.600	84.483	83.496	0.987	18.8	100	5.36	70.0
6.003	22	23	24.463	0.600	83.446	81.000	2.446	10.0	150	5.49	70.0
1.013	23	24	3.448	0.600	80.850	80.839	0.011	300.0	300	7.38	70.0
1.014	24	25	26.909	0.600	80.839	80.749	0.090	300.0	300	7.88	70.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.769	6.0	1.8	1.165	1.174	0.007	0.0	37	0.667
1.001	0.769	6.0	2.9	1.174	1.304	0.011	0.0	49	0.761
1.002	0.769	6.0	4.7	1.304	1.214	0.019	0.0	66	0.848
1.003	0.818	14.5	6.7	1.214	1.227	0.027	0.0	72	0.803
1.004	1.461	25.8	13.2	1.227	1.776	0.052	0.0	76	1.468
1.005	3.204	56.6	14.1	1.776	2.173	0.056	0.0	51	2.678
2.000	2.029	15.9	2.6	0.600	2.173	0.010	0.0	27	1.484
1.006	3.204	56.6	17.8	2.173	2.580	0.070	0.0	58	2.844
3.000	3.482	138.4	5.6	0.600	2.580	0.022	0.0	30	1.709
1.007	4.161	165.5	24.8	2.580	3.057	0.098	0.0	58	3.012
4.000	0.902	63.8	5.0	0.600	2.905	0.020	0.0	57	0.542
4.001	0.902	63.8	5.0	2.905	3.057	0.020	0.0	57	0.542
5.000	4.410	175.3	4.5	0.600	3.057	0.018	0.0	25	1.921
1.008	0.902	63.8	36.1	3.057	3.966	0.143	0.0	161	0.929
1.009	0.902	63.8	36.8	3.966	3.853	0.145	0.0	164	0.934
1.010	0.902	63.8	41.0	3.853	1.561	0.162	0.0	175	0.956
1.011	0.902	63.8	45.7	1.561	1.539	0.181	0.0	188	0.979
1.012	4.194	296.4	49.0	1.539	2.182	0.194	0.0	82	3.124
6.000	1.899	14.9	0.0	0.600	0.602	0.000	0.0	0	0.000
6.001	1.320	10.4	1.8	0.602	0.600	0.007	0.0	29	0.995
6.002	1.790	14.1	4.2	0.600	0.850	0.016	0.0	37	1.557
6.003	3.204	56.6	8.4	0.850	2.182	0.033	0.0	39	2.308
1.013	0.902	63.8	59.5	2.182	1.951	0.235	0.0	231	1.020
1.014	0.902	63.8	59.5	1.951	2.076	0.235	0.0	231	1.020

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.015	25	25_OUT	47.213	0.600	80.749	76.825	3.924	12.0	300	8.05	70.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.015	4.556	322.1	59.5	2.076	2.006	0.235	0.0	87	3.511

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	11.259	100.0	100	PRIV_PIPE	86.850	85.585	1.165	86.746	85.472	1.174
1.001	8.394	100.0	100	PRIV_PIPE	86.746	85.472	1.174	86.792	85.388	1.304
1.002	7.858	100.0	100	PRIV_PIPE	86.792	85.388	1.304	86.623	85.309	1.214
1.003	9.371	150.0	150	PRIV_PIPE	86.623	85.259	1.214	86.574	85.197	1.227
1.004	23.635	47.7	150	PRIV_PIPE	86.574	85.197	1.227	86.627	84.701	1.776
1.005	5.711	10.0	150	PRIV_PIPE	86.627	84.701	1.776	86.453	84.130	2.173
2.000	20.770	14.6	100	PRIV_PIPE	86.299	85.599	0.600	86.453	84.180	2.173
1.006	8.480	10.0	150	PRIV_PIPE	86.453	84.130	2.173	86.012	83.282	2.580
3.000	28.019	14.3	225	PRIV_PIPE	85.996	85.171	0.600	86.012	83.207	2.580
1.007	8.718	10.0	225	PRIV_PIPE	86.012	83.207	2.580	85.617	82.335	3.057
4.000	29.543	300.0	300	PRIV_PIPE	83.268	82.368	0.600	85.475	82.270	2.905
4.001	2.998	300.0	300	PRIV_PIPE	85.475	82.270	2.905	85.617	82.260	3.057
5.000	21.835	8.9	225	PRIV_PIPE	85.611	84.786	0.600	85.617	82.335	3.057
1.008	19.225	300.0	300	PRIV_PIPE	85.617	82.260	3.057	86.462	82.196	3.966
1.009	5.143	300.0	300	PRIV_PIPE	86.462	82.196	3.966	86.332	82.179	3.853
1.010	18.774	300.0	300	PRIV_PIPE	86.332	82.179	3.853	83.977	82.116	1.561
1.011	15.656	300.0	300	PRIV_PIPE	83.977	82.116	1.561	83.903	82.064	1.539
1.012	17.232	14.2	300	PRIV_PIPE	83.903	82.064	1.539	83.332	80.850	2.182
6.000	10.036	16.7	100	PRIV_PIPE	86.021	85.321	0.600	85.422	84.720	0.602

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	450	Manhole	Adoptable	2	450	Manhole	PRIV_MANHOLE
1.001	2	450	Manhole	PRIV_MANHOLE	3	450	Manhole	PRIV_MANHOLE
1.002	3	450	Manhole	PRIV_MANHOLE	4	450	Manhole	PRIV_MANHOLE
1.003	4	450	Manhole	PRIV_MANHOLE	5	450	Manhole	PRIV_MANHOLE
1.004	5	450	Manhole	PRIV_MANHOLE	6	450	Manhole	PRIV_MANHOLE
1.005	6	450	Manhole	PRIV_MANHOLE	8	450	Manhole	PRIV_MANHOLE
2.000	7	450	Manhole	PRIV_MANHOLE	8	450	Manhole	PRIV_MANHOLE
1.006	8	450	Manhole	PRIV_MANHOLE	10	450	Manhole	PRIV_MANHOLE
3.000	9	450	Manhole	PRIV_MANHOLE	10	450	Manhole	PRIV_MANHOLE
1.007	10	450	Manhole	PRIV_MANHOLE	14	450	Manhole	PRIV_MANHOLE
4.000	11	450	Manhole	PRIV_MANHOLE	12	450	Manhole	PRIV_MANHOLE
4.001	12	450	Manhole	PRIV_MANHOLE	14	450	Manhole	PRIV_MANHOLE
5.000	13	450	Manhole	PRIV_MANHOLE	14	450	Manhole	PRIV_MANHOLE
1.008	14	450	Manhole	PRIV_MANHOLE	15	450	Manhole	PRIV_MANHOLE
1.009	15	450	Manhole	PRIV_MANHOLE	16	450	Manhole	PRIV_MANHOLE
1.010	16	450	Manhole	PRIV_MANHOLE	17	450	Manhole	PRIV_MANHOLE
1.011	17	450	Manhole	PRIV_MANHOLE	18	450	Manhole	PRIV_MANHOLE
1.012	18	450	Manhole	PRIV_MANHOLE	23	450	Manhole	PRIV_MANHOLE
6.000	19	450	Manhole	PRIV_MANHOLE	20	450	Manhole	PRIV_MANHOLE

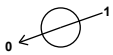
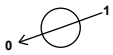
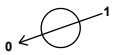
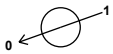
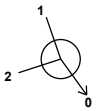
Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
6.001	8.148	34.4	100	PRIV_PIPE	85.422	84.720	0.602	85.183	84.483	0.600
6.002	18.532	18.8	100	PRIV_PIPE	85.183	84.483	0.600	84.446	83.496	0.850
6.003	24.463	10.0	150	PRIV_PIPE	84.446	83.446	0.850	83.332	81.000	2.182
1.013	3.448	300.0	300	PRIV_PIPE	83.332	80.850	2.182	83.090	80.839	1.951
1.014	26.909	300.0	300	PRIV_PIPE	83.090	80.839	1.951	83.125	80.749	2.076
1.015	47.213	12.0	300	ADOPT_PIPE	83.125	80.749	2.076	79.131	76.825	2.006

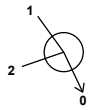
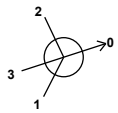
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
6.001	20	450	Manhole	PRIV_MANHOLE	21	450	Manhole	PRIV_MANHOLE
6.002	21	450	Manhole	PRIV_MANHOLE	22	450	Manhole	PRIV_MANHOLE
6.003	22	450	Manhole	PRIV_MANHOLE	23	450	Manhole	PRIV_MANHOLE
1.013	23	450	Manhole	PRIV_MANHOLE	24	450	Manhole	PRIV_MANHOLE
1.014	24	450	Manhole	PRIV_MANHOLE	25	1200	Manhole	PRIV_MANHOLE
1.015	25	1200	Manhole	PRIV_MANHOLE	25_OUT	1200	Manhole	ADOPT_MH

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	522177.615	230737.616	86.850	1.265	450				
						0	1.000	85.585	100
2	522166.986	230733.903	86.746	1.274	450	1	1.000	85.472	100
									
						0	1.001	85.472	100
3	522159.094	230731.043	86.792	1.404	450	1	1.001	85.388	100
									
						0	1.002	85.388	100
4	522151.674	230728.456	86.623	1.364	450	1	1.002	85.309	100
									
						0	1.003	85.259	150
5	522142.845	230725.314	86.574	1.377	450	1	1.003	85.197	150
									
						0	1.004	85.197	150
6	522120.579	230717.388	86.627	1.926	450	1	1.004	84.701	150
						0	1.005	84.701	150
7	522102.685	230705.589	86.299	0.700	450				
						0	2.000	85.599	100
8	522122.444	230711.990	86.453	2.323	450	 1	1.005	84.130	150
						2	2.000	84.180	100
						0	1.006	84.130	150

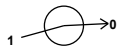
Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	522100.938	230695.973	85.996	0.825	450				
						0	3.000	85.171	225
10	522127.420	230705.124	86.012	2.805	450		1	1.006	83.282	150
							2	3.000	83.207	225
						0	1.007	83.207	225
11	522147.964	230671.284	83.268	0.900	450				
						0	4.000	82.368	300
12	522129.792	230694.577	85.475	3.205	450		1	4.000	82.270	300
						0	4.001	82.270	300
13	522110.383	230690.518	85.611	0.825	450				
						0	5.000	84.786	225
14	522131.155	230697.247	85.617	3.357	450		1	4.001	82.260	300
							2	1.007	82.335	225
							3	5.000	82.335	225
						0	1.008	82.260	300
15	522149.445	230703.171	86.462	4.266	450		1	1.008	82.196	300
						0	1.009	82.196	300
16	522151.011	230708.070	86.332	4.153	450		1	1.009	82.179	300
						0	1.010	82.179	300
17	522168.770	230714.160	83.977	1.861	450		1	1.010	82.116	300
						0	1.011	82.116	300
18	522174.309	230699.517	83.903	1.839	450		1	1.011	82.064	300
						0	1.012	82.064	300
19	522189.611	230728.149	86.021	0.700	450				
						0	6.000	85.321	100
20	522193.287	230718.810	85.422	0.702	450		1	6.000	84.720	100
						0	6.001	84.720	100
21	522196.286	230711.234	85.183	0.700	450		1	6.001	84.483	100
						0	6.002	84.483	100

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
22	522203.707	230694.253	84.446	1.000	450		1	6.002	83.496	100
							0	6.003	83.446	150
23	522181.552	230683.881	83.332	2.482	450		1	6.003	81.000	150
							2	1.012	80.850	300
							0	1.013	80.850	300
24	522182.658	230680.615	83.090	2.251	450		1	1.013	80.839	300
							0	1.014	80.839	300
25	522208.600	230687.764	83.125	2.376	1200		1	1.014	80.749	300
							0	1.015	80.749	300
25_OUT	522255.758	230690.033	79.131	2.306	1200		1	1.015	76.825	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
10	45	0	0
30	45	0	0
100	45	0	0

Node 25 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	80.749	Product Number	CTL-SHE-0062-2000-1428-2000
Design Depth (m)	1.428	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 24 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	80.839	Depth (m)	1.200
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	840	Inf Depth (m)	
Safety Factor	1.5	Pit Width (m)	10.000	Number Required	1
Porosity	0.95	Pit Length (m)	17.000		

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	62.397	17.656	10 year +45% CC 1440 minute winter	7.805	3.112
1 year 15 minute winter	43.787	17.656	30 year +45% CC 15 minute summer	407.402	115.281
1 year 30 minute summer	39.557	11.193	30 year +45% CC 15 minute winter	285.896	115.281
1 year 30 minute winter	27.759	11.193	30 year +45% CC 30 minute summer	261.087	73.879
1 year 60 minute summer	25.864	6.835	30 year +45% CC 30 minute winter	183.219	73.879
1 year 60 minute winter	17.184	6.835	30 year +45% CC 60 minute summer	171.215	45.247
1 year 120 minute summer	21.068	5.568	30 year +45% CC 60 minute winter	113.751	45.247
1 year 120 minute winter	13.997	5.568	30 year +45% CC 120 minute summer	108.236	28.604
1 year 180 minute summer	17.853	4.594	30 year +45% CC 120 minute winter	71.910	28.604
1 year 180 minute winter	11.605	4.594	30 year +45% CC 180 minute summer	83.004	21.360
1 year 240 minute summer	14.771	3.904	30 year +45% CC 180 minute winter	53.955	21.360
1 year 240 minute winter	9.813	3.904	30 year +45% CC 240 minute summer	64.965	17.168
1 year 360 minute summer	11.636	2.994	30 year +45% CC 240 minute winter	43.161	17.168
1 year 360 minute winter	7.564	2.994	30 year +45% CC 360 minute summer	48.222	12.409
1 year 480 minute summer	9.218	2.436	30 year +45% CC 360 minute winter	31.345	12.409
1 year 480 minute winter	6.125	2.436	30 year +45% CC 480 minute summer	36.966	9.769
1 year 600 minute summer	7.540	2.062	30 year +45% CC 480 minute winter	24.560	9.769
1 year 600 minute winter	5.152	2.062	30 year +45% CC 600 minute summer	29.568	8.087
1 year 720 minute summer	6.695	1.794	30 year +45% CC 600 minute winter	20.202	8.087
1 year 720 minute winter	4.499	1.794	30 year +45% CC 720 minute summer	25.815	6.919
1 year 960 minute summer	5.449	1.435	30 year +45% CC 720 minute winter	17.349	6.919
1 year 960 minute winter	3.609	1.435	30 year +45% CC 960 minute summer	20.494	5.397
1 year 1440 minute summer	3.894	1.044	30 year +45% CC 960 minute winter	13.576	5.397
1 year 1440 minute winter	2.617	1.044	30 year +45% CC 1440 minute summer	14.150	3.792
10 year +45% CC 15 minute summer	312.240	88.353	30 year +45% CC 1440 minute winter	9.510	3.792
10 year +45% CC 15 minute winter	219.116	88.353	100 year +45% CC 15 minute summer	513.688	145.356
10 year +45% CC 30 minute summer	197.654	55.929	100 year +45% CC 15 minute winter	360.483	145.356
10 year +45% CC 30 minute winter	138.705	55.929	100 year +45% CC 30 minute summer	332.540	94.097
10 year +45% CC 60 minute summer	128.940	34.075	100 year +45% CC 30 minute winter	233.361	94.097
10 year +45% CC 60 minute winter	85.665	34.075	100 year +45% CC 60 minute summer	219.212	57.931
10 year +45% CC 120 minute summer	84.497	22.330	100 year +45% CC 60 minute winter	145.639	57.931
10 year +45% CC 120 minute winter	56.138	22.330	100 year +45% CC 120 minute summer	135.394	35.781
10 year +45% CC 180 minute summer	65.678	16.901	100 year +45% CC 120 minute winter	89.953	35.781
10 year +45% CC 180 minute winter	42.693	16.901	100 year +45% CC 180 minute summer	102.974	26.499
10 year +45% CC 240 minute summer	51.785	13.685	100 year +45% CC 180 minute winter	66.936	26.499
10 year +45% CC 240 minute winter	34.405	13.685	100 year +45% CC 240 minute summer	80.317	21.225
10 year +45% CC 360 minute summer	38.754	9.973	100 year +45% CC 240 minute winter	53.361	21.225
10 year +45% CC 360 minute winter	25.191	9.973	100 year +45% CC 360 minute summer	59.525	15.318
10 year +45% CC 480 minute summer	29.872	7.894	100 year +45% CC 360 minute winter	38.693	15.318
10 year +45% CC 480 minute winter	19.846	7.894	100 year +45% CC 480 minute summer	45.599	12.050
10 year +45% CC 600 minute summer	23.982	6.560	100 year +45% CC 480 minute winter	30.295	12.050
10 year +45% CC 600 minute winter	16.386	6.560	100 year +45% CC 600 minute summer	36.442	9.968
10 year +45% CC 720 minute summer	20.995	5.627	100 year +45% CC 600 minute winter	24.899	9.968
10 year +45% CC 720 minute winter	14.110	5.627	100 year +45% CC 720 minute summer	31.786	8.519
10 year +45% CC 960 minute summer	16.717	4.402	100 year +45% CC 720 minute winter	21.362	8.519
10 year +45% CC 960 minute winter	11.074	4.402	100 year +45% CC 960 minute summer	25.171	6.628
10 year +45% CC 1440 minute summer	11.613	3.112	100 year +45% CC 960 minute winter	16.674	6.628

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +45% CC 1440 minute summer	17.312	4.640	100 year +45% CC 1440 minute winter	11.634	4.640

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	85.608	0.023	0.7	0.0062	0.0000	OK
15 minute summer	2	11	85.501	0.029	1.1	0.0065	0.0000	OK
15 minute summer	3	11	85.427	0.039	1.8	0.0102	0.0000	OK
15 minute summer	4	11	85.301	0.042	2.3	0.0102	0.0000	OK
15 minute summer	1.003:50%	11	85.271	0.043	2.5	0.0000	0.0000	OK
15 minute summer	5	11	85.229	0.032	2.5	0.0050	0.0000	OK
15 minute summer	1.004:50%	11	84.997	0.048	5.0	0.0000	0.0000	OK
15 minute summer	6	11	84.732	0.031	5.0	0.0050	0.0000	OK
15 minute summer	1.005:50%	11	84.448	0.032	5.4	0.0000	0.0000	OK
15 minute summer	7	1	85.599	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2.000:50%	11	84.907	0.017	1.0	0.0025	0.0000	OK
15 minute summer	8	11	84.165	0.035	6.4	0.0056	0.0000	OK
15 minute summer	1.006:50%	11	83.743	0.037	6.8	0.0000	0.0000	OK
15 minute summer	9	1	85.171	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3.000:50%	10	84.209	0.020	2.3	0.0055	0.0000	OK
15 minute summer	10	11	83.244	0.037	9.0	0.0058	0.0000	OK
15 minute summer	1.007:50%	11	82.809	0.038	9.6	0.0000	0.0000	OK
15 minute summer	11	1	82.368	0.000	0.0	0.0000	0.0000	OK
15 minute summer	4.000:50%	12	82.357	0.038	2.0	0.0119	0.0000	OK
15 minute summer	12	11	82.356	0.086	1.9	0.0137	0.0000	OK
15 minute summer	13	1	84.786	0.000	0.0	0.0000	0.0000	OK
15 minute summer	5.000:50%	10	83.577	0.016	1.8	0.0007	0.0000	OK
15 minute summer	14	11	82.356	0.096	12.9	0.0153	0.0000	OK
15 minute summer	1.008:50%	11	82.327	0.099	13.5	0.0000	0.0000	OK
15 minute summer	15	12	82.304	0.108	13.4	0.0171	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	0.7	0.443	0.116	0.0181	
15 minute summer	2	1.001	3	1.1	0.473	0.182	0.0196	
15 minute summer	3	1.002	4	1.8	0.656	0.296	0.0214	
15 minute summer	4	1.003	1.003:50%	2.3	0.561	0.159	0.0192	
15 minute summer	4	1.003	5	2.5	0.736	0.173	0.0160	
15 minute summer	5	1.004	1.004:50%	2.5	0.682	0.097	0.0449	
15 minute summer	5	1.004	6	5.0	1.335	0.194	0.0448	
15 minute summer	6	1.005	1.005:50%	5.0	1.837	0.088	0.0078	
15 minute summer	6	1.005	8	5.4	1.831	0.095	0.0084	
15 minute summer	7	2.000	2.000:50%	0.0	0.000	0.000	0.0046	
15 minute summer	7	2.000	8	1.0	1.124	0.063	0.0092	
15 minute summer	8	1.006	1.006:50%	6.4	1.981	0.113	0.0137	
15 minute summer	8	1.006	10	6.8	2.099	0.120	0.0137	
15 minute summer	9	3.000	3.000:50%	0.0	0.000	0.000	0.0122	
15 minute summer	9	3.000	10	2.3	0.839	0.016	0.0412	
15 minute summer	10	1.007	1.007:50%	9.0	2.076	0.054	0.0189	
15 minute summer	10	1.007	14	9.6	2.209	0.058	0.0189	
15 minute summer	11	4.000	4.000:50%	0.0	0.000	0.000	0.0387	
15 minute summer	11	4.000	12	1.9	0.278	0.030	0.1613	
15 minute summer	12	4.001	14	2.1	0.137	0.034	0.0542	
15 minute summer	13	5.000	5.000:50%	0.0	0.000	0.000	0.0069	
15 minute summer	13	5.000	14	1.8	1.383	0.010	0.0167	
15 minute summer	14	1.008	1.008:50%	12.8	0.645	0.201	0.1911	
15 minute summer	14	1.008	15	13.4	0.627	0.210	0.2064	
15 minute summer	15	1.009	1.009:50%	13.4	0.600	0.211	0.0576	

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1.009:50%	12	82.293	0.106	13.6	0.0000	0.0000	OK
15 minute summer	16	12	82.283	0.104	14.9	0.0237	0.0000	OK
15 minute summer	1.010:50%	12	82.251	0.104	15.1	0.0071	0.0000	OK
15 minute summer	17	12	82.220	0.104	16.7	0.0376	0.0000	OK
15 minute summer	18	12	82.114	0.050	17.7	0.0149	0.0000	OK
15 minute summer	19	1	85.321	0.000	0.0	0.0000	0.0000	OK
15 minute summer	20	11	84.738	0.018	0.7	0.0064	0.0000	OK
15 minute summer	21	10	84.507	0.024	1.7	0.0101	0.0000	OK
15 minute summer	22	10	83.471	0.025	3.4	0.0122	0.0000	OK
15 minute summer	23	10	81.118	0.268	21.2	0.0600	0.0000	OK
360 minute summer	24	248	80.969	0.130	7.2	21.0638	0.0000	OK
360 minute summer	25	248	80.969	0.220	1.9	0.2493	0.0000	OK
15 minute summer	25_OUT	1	76.825	0.000	1.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	15	1.009	16	13.7	0.627	0.214	0.0561	
15 minute summer	16	1.010	1.010:50%	14.9	0.693	0.234	0.2025	
15 minute summer	16	1.010	17	15.2	0.701	0.238	0.2034	
15 minute summer	17	1.011	18	16.7	1.176	0.262	0.2296	
15 minute summer	18	1.012	23	17.8	1.129	0.060	0.6245	
15 minute summer	19	6.000	20	0.0	0.000	0.000	0.0047	
15 minute summer	20	6.001	21	0.7	0.613	0.068	0.0095	
15 minute summer	21	6.002	22	1.7	1.189	0.118	0.0258	
15 minute summer	22	6.003	23	3.3	1.670	0.059	0.2047	
15 minute summer	23	1.013	24	35.3	1.652	0.553	0.1150	
360 minute summer	24	1.014	25	1.9	0.173	0.030	1.1411	
360 minute summer	25	Hydro-Brake®	25_OUT	1.6				39.1

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 10 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	12	85.663	0.078	3.6	0.0210	0.0000	OK
15 minute summer	2	12	85.636	0.164	5.6	0.0373	0.0000	SURCHARGED
15 minute summer	3	11	85.568	0.180	8.4	0.0474	0.0000	SURCHARGED
15 minute summer	4	11	85.364	0.105	10.8	0.0255	0.0000	OK
15 minute summer	1.003:50%	11	85.330	0.102	11.9	0.0000	0.0000	OK
15 minute summer	5	11	85.269	0.072	12.0	0.0114	0.0000	OK
15 minute summer	1.004:50%	11	85.080	0.131	24.4	0.0000	0.0000	OK
15 minute summer	6	11	84.778	0.077	24.5	0.0123	0.0000	OK
15 minute summer	1.005:50%	11	84.495	0.080	26.3	0.0000	0.0000	OK
15 minute summer	7	1	85.599	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2.000:50%	10	84.930	0.040	5.2	0.0135	0.0000	OK
15 minute summer	8	11	84.217	0.087	31.3	0.0138	0.0000	OK
15 minute summer	1.006:50%	11	83.800	0.094	33.4	0.0000	0.0000	OK
15 minute summer	9	1	85.171	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3.000:50%	10	84.232	0.043	11.3	0.0252	0.0000	OK
15 minute summer	10	11	83.294	0.087	44.3	0.0139	0.0000	OK
15 minute summer	1.007:50%	11	82.853	0.082	47.2	0.0000	0.0000	OK
15 minute summer	11	12	82.576	0.208	2.9	0.0331	0.0000	OK
15 minute summer	4.000:50%	12	82.575	0.256	10.0	0.5292	0.0000	OK
15 minute summer	12	12	82.572	0.302	13.8	0.0481	0.0000	SURCHARGED
15 minute summer	13	1	84.786	0.000	0.0	0.0000	0.0000	OK
15 minute summer	5.000:50%	10	83.595	0.035	9.1	0.0033	0.0000	OK
15 minute summer	14	12	82.571	0.311	58.8	0.0495	0.0000	SURCHARGED
15 minute summer	1.008:50%	12	82.535	0.307	61.6	0.0000	0.0000	SURCHARGED
15 minute summer	15	12	82.497	0.301	61.7	0.0478	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	3.4	0.608	0.569	0.0809	
15 minute summer	2	1.001	3	5.0	0.634	0.822	0.0657	
15 minute summer	3	1.002	4	8.1	1.039	1.346	0.0598	
15 minute summer	4	1.003	1.003:50%	10.8	0.833	0.749	0.0609	
15 minute summer	4	1.003	5	12.0	1.140	0.833	0.0494	
15 minute summer	5	1.004	1.004:50%	11.9	1.046	0.461	0.1456	
15 minute summer	5	1.004	6	24.5	1.877	0.949	0.1507	
15 minute summer	6	1.005	1.005:50%	24.5	2.628	0.433	0.0266	
15 minute summer	6	1.005	8	26.3	2.619	0.465	0.0287	
15 minute summer	7	2.000	2.000:50%	0.0	0.000	0.000	0.0152	
15 minute summer	7	2.000	8	5.1	1.784	0.323	0.0300	
15 minute summer	8	1.006	1.006:50%	31.3	2.822	0.553	0.0470	
15 minute summer	8	1.006	10	33.4	3.098	0.591	0.0457	
15 minute summer	9	3.000	3.000:50%	0.0	0.000	0.000	0.0373	
15 minute summer	9	3.000	10	11.2	1.202	0.081	0.1362	
15 minute summer	10	1.007	1.007:50%	44.4	3.258	0.268	0.0594	
15 minute summer	10	1.007	14	47.2	2.576	0.285	0.1149	
15 minute summer	11	4.000	4.000:50%	-2.9	-0.220	-0.046	0.8586	
15 minute summer	11	4.000	12	13.8	0.341	0.217	0.9933	
15 minute summer	12	4.001	14	15.9	0.271	0.249	0.2111	
15 minute summer	13	5.000	5.000:50%	0.0	0.000	0.000	0.0211	
15 minute summer	13	5.000	14	9.1	1.442	0.052	0.2370	
15 minute summer	14	1.008	1.008:50%	58.8	0.836	0.923	0.6769	
15 minute summer	14	1.008	15	61.7	0.876	0.967	0.6767	
15 minute summer	15	1.009	1.009:50%	61.7	0.878	0.967	0.1803	

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 10 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1.009:50%	12	82.479	0.291	62.8	0.0000	0.0000	OK
15 minute summer	16	12	82.460	0.281	68.6	0.0644	0.0000	OK
15 minute summer	1.010:50%	12	82.412	0.265	69.4	0.0464	0.0000	OK
15 minute summer	17	12	82.356	0.240	77.0	0.0866	0.0000	OK
15 minute summer	18	12	82.171	0.107	82.5	0.0323	0.0000	OK
15 minute summer	19	1	85.321	0.000	0.0	0.0000	0.0000	OK
15 minute summer	20	10	84.761	0.041	3.6	0.0147	0.0000	OK
15 minute summer	21	10	84.540	0.057	8.4	0.0245	0.0000	OK
15 minute summer	22	10	83.502	0.056	16.9	0.0278	0.0000	OK
360 minute winter	23	360	81.500	0.650	16.5	0.1456	0.0000	SURCHARGED
360 minute winter	24	360	81.500	0.661	16.2	106.8463	0.0000	SURCHARGED
360 minute winter	25	360	81.500	0.751	1.9	0.8492	0.0000	SURCHARGED
15 minute summer	25_OUT	1	76.825	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	15	1.009	16	62.8	0.908	0.985	0.1780	
15 minute summer	16	1.010	1.010:50%	68.6	1.020	1.076	0.6309	
15 minute summer	16	1.010	17	69.5	1.104	1.090	0.5924	
15 minute summer	17	1.011	18	77.3	1.828	1.211	0.6501	
15 minute summer	18	1.012	23	82.6	1.846	0.279	0.7483	
15 minute summer	19	6.000	20	0.0	0.000	0.000	0.0150	
15 minute summer	20	6.001	21	3.6	0.939	0.345	0.0311	
15 minute summer	21	6.002	22	8.3	1.824	0.590	0.0844	
15 minute summer	22	6.003	23	16.8	1.891	0.297	0.2558	
360 minute winter	23	1.013	24	16.2	0.868	0.254	0.2428	
360 minute winter	24	1.014	25	1.9	0.189	0.029	1.8949	
360 minute winter	25	Hydro-Brake®	25_OUT	1.6				139.3

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	12	85.819	0.234	4.6	0.0629	0.0000	SURCHARGED
15 minute summer	2	12	85.769	0.297	6.4	0.0673	0.0000	SURCHARGED
15 minute summer	3	12	85.664	0.276	10.2	0.0725	0.0000	SURCHARGED
15 minute summer	4	12	85.386	0.127	13.4	0.0307	0.0000	OK
15 minute summer	1.003:50%	12	85.352	0.124	14.7	0.0000	0.0000	OK
15 minute summer	5	12	85.305	0.108	14.5	0.0171	0.0000	OK
15 minute summer	1.004:50%	11	85.242	0.293	30.1	0.0000	0.0000	SURCHARGED
15 minute summer	6	11	84.789	0.088	29.6	0.0139	0.0000	OK
15 minute summer	1.005:50%	11	84.507	0.091	32.0	0.0000	0.0000	OK
15 minute summer	7	1	85.599	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2.000:50%	10	84.935	0.046	6.7	0.0177	0.0000	OK
15 minute summer	8	11	84.231	0.101	38.4	0.0160	0.0000	OK
15 minute summer	1.006:50%	11	83.816	0.110	41.1	0.0000	0.0000	OK
15 minute summer	9	1	85.171	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3.000:50%	10	84.238	0.049	14.8	0.0329	0.0000	OK
15 minute summer	10	10	83.305	0.098	55.2	0.0156	0.0000	OK
15 minute summer	1.007:50%	12	82.889	0.118	58.9	0.0000	0.0000	OK
15 minute summer	11	12	82.755	0.387	5.9	0.0615	0.0000	SURCHARGED
15 minute summer	4.000:50%	12	82.751	0.432	16.4	1.5058	0.0000	SURCHARGED
15 minute summer	12	12	82.749	0.479	20.6	0.0761	0.0000	SURCHARGED
15 minute summer	13	1	84.786	0.000	0.0	0.0000	0.0000	OK
15 minute summer	5.000:50%	10	83.600	0.039	11.8	0.0043	0.0000	OK
15 minute summer	14	12	82.748	0.488	73.7	0.0776	0.0000	SURCHARGED
15 minute summer	1.008:50%	12	82.690	0.462	77.3	0.0000	0.0000	SURCHARGED
15 minute summer	15	12	82.626	0.430	77.2	0.0684	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	3.7	0.639	0.606	0.0881	
15 minute summer	2	1.001	3	6.0	0.769	0.996	0.0657	
15 minute summer	3	1.002	4	9.9	1.270	1.646	0.0608	
15 minute summer	4	1.003	1.003:50%	13.2	0.874	0.911	0.0738	
15 minute summer	4	1.003	5	14.5	1.163	1.005	0.0683	
15 minute summer	5	1.004	1.004:50%	15.0	1.100	0.581	0.1840	
15 minute summer	5	1.004	6	29.6	1.872	1.148	0.1672	
15 minute summer	6	1.005	1.005:50%	29.6	2.709	0.523	0.0313	
15 minute summer	6	1.005	8	32.0	2.702	0.564	0.0340	
15 minute summer	7	2.000	2.000:50%	0.0	0.000	0.000	0.0182	
15 minute summer	7	2.000	8	6.7	1.871	0.421	0.0382	
15 minute summer	8	1.006	1.006:50%	38.4	2.900	0.678	0.0561	
15 minute summer	8	1.006	10	41.1	3.205	0.725	0.0542	
15 minute summer	9	3.000	3.000:50%	0.0	0.000	0.000	0.0451	
15 minute summer	9	3.000	10	14.7	1.299	0.106	0.1619	
15 minute summer	10	1.007	1.007:50%	55.3	3.338	0.334	0.0803	
15 minute summer	10	1.007	14	58.4	2.522	0.353	0.1327	
15 minute summer	11	4.000	4.000:50%	-5.9	-0.188	-0.092	1.0402	
15 minute summer	11	4.000	12	20.6	0.375	0.323	1.0402	
15 minute summer	12	4.001	14	22.9	0.326	0.360	0.2111	
15 minute summer	13	5.000	5.000:50%	0.0	0.000	0.000	0.0254	
15 minute summer	13	5.000	14	11.8	1.417	0.067	0.2425	
15 minute summer	14	1.008	1.008:50%	73.6	1.045	1.154	0.6769	
15 minute summer	14	1.008	15	77.2	1.096	1.210	0.6769	
15 minute summer	15	1.009	1.009:50%	77.0	1.094	1.208	0.1811	

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1.009:50%	12	82.597	0.410	78.5	0.0000	0.0000	SURCHARGED
15 minute summer	16	12	82.568	0.389	86.0	0.0892	0.0000	SURCHARGED
15 minute summer	1.010:50%	12	82.490	0.343	86.9	0.0778	0.0000	SURCHARGED
15 minute summer	17	12	82.414	0.298	96.6	0.1075	0.0000	OK
15 minute summer	18	12	82.185	0.121	103.2	0.0365	0.0000	OK
15 minute summer	19	1	85.321	0.000	0.0	0.0000	0.0000	OK
15 minute summer	20	10	84.767	0.047	4.7	0.0171	0.0000	OK
15 minute summer	21	10	84.552	0.069	10.9	0.0293	0.0000	OK
15 minute summer	22	10	83.511	0.065	21.9	0.0321	0.0000	OK
360 minute winter	23	360	81.696	0.846	20.3	0.1896	0.0000	SURCHARGED
360 minute winter	24	360	81.696	0.857	19.9	138.6174	0.0000	SURCHARGED
360 minute winter	25	360	81.696	0.947	1.9	1.0715	0.0000	SURCHARGED
15 minute summer	25_OUT	1	76.825	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	15	1.009	16	78.4	1.113	1.229	0.1811	
15 minute summer	16	1.010	1.010:50%	85.9	1.220	1.346	0.6610	
15 minute summer	16	1.010	17	86.8	1.232	1.360	0.6606	
15 minute summer	17	1.011	18	96.4	1.897	1.512	0.7592	
15 minute summer	18	1.012	23	103.3	1.849	0.349	0.8364	
15 minute summer	19	6.000	20	0.0	0.000	0.000	0.0183	
15 minute summer	20	6.001	21	4.7	0.991	0.450	0.0382	
15 minute summer	21	6.002	22	10.7	1.920	0.763	0.1036	
15 minute summer	22	6.003	23	21.9	1.825	0.386	0.3027	
360 minute winter	23	1.013	24	19.9	0.900	0.312	0.2428	
360 minute winter	24	1.014	25	1.9	0.203	0.030	1.8949	
360 minute winter	25	Hydro-Brake®	25_OUT	1.7				160.4

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	12	86.041	0.456	5.9	0.1226	0.0000	SURCHARGED
15 minute summer	2	12	85.981	0.509	7.5	0.1157	0.0000	SURCHARGED
15 minute summer	3	12	85.868	0.480	11.8	0.1261	0.0000	SURCHARGED
15 minute summer	4	12	85.556	0.297	14.8	0.0719	0.0000	SURCHARGED
15 minute summer	1.003:50%	12	85.515	0.287	15.8	0.0000	0.0000	SURCHARGED
15 minute summer	5	12	85.464	0.267	16.7	0.0425	0.0000	SURCHARGED
15 minute summer	1.004:50%	11	85.357	0.408	34.2	0.0000	0.0000	SURCHARGED
15 minute summer	6	11	84.797	0.096	33.5	0.0152	0.0000	OK
15 minute summer	1.005:50%	11	84.516	0.100	36.5	0.0000	0.0000	OK
15 minute summer	7	1	85.599	0.000	0.0	0.0000	0.0000	OK
15 minute summer	2.000:50%	10	84.941	0.052	8.5	0.0228	0.0000	OK
15 minute summer	8	11	84.244	0.114	44.6	0.0182	0.0000	OK
15 minute summer	1.006:50%	11	83.835	0.129	48.0	0.0000	0.0000	OK
15 minute summer	9	1	85.171	0.000	0.0	0.0000	0.0000	OK
15 minute summer	3.000:50%	10	84.244	0.055	18.6	0.0414	0.0000	OK
15 minute summer	10	12	83.317	0.110	65.8	0.0175	0.0000	OK
15 minute summer	1.007:50%	12	83.045	0.274	70.3	0.0000	0.0000	SURCHARGED
15 minute summer	11	12	82.958	0.590	7.1	0.0937	0.0000	SURCHARGED
15 minute summer	4.000:50%	12	82.947	0.628	26.4	3.1808	0.0000	SURCHARGED
15 minute summer	12	12	82.943	0.673	25.1	0.1070	0.0000	SURCHARGED
15 minute summer	13	1	84.786	0.000	0.0	0.0000	0.0000	OK
15 minute summer	5.000:50%	10	83.605	0.044	14.9	0.0053	0.0000	OK
15 minute summer	14	12	82.942	0.682	83.8	0.1084	0.0000	SURCHARGED
15 minute summer	1.008:50%	12	82.867	0.639	87.7	0.0000	0.0000	SURCHARGED
15 minute summer	15	12	82.785	0.589	88.3	0.0936	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	4.2	0.606	0.696	0.0881	
15 minute summer	2	1.001	3	6.9	0.887	1.149	0.0657	
15 minute summer	3	1.002	4	10.9	1.390	1.801	0.0615	
15 minute summer	4	1.003	1.003:50%	14.5	0.878	1.002	0.0825	
15 minute summer	4	1.003	5	16.7	1.133	1.156	0.0825	
15 minute summer	5	1.004	1.004:50%	19.8	1.136	0.767	0.2080	
15 minute summer	5	1.004	6	33.5	2.063	1.299	0.1743	
15 minute summer	6	1.005	1.005:50%	33.5	2.755	0.591	0.0348	
15 minute summer	6	1.005	8	36.4	2.753	0.643	0.0384	
15 minute summer	7	2.000	2.000:50%	0.0	0.000	0.000	0.0213	
15 minute summer	7	2.000	8	8.5	1.932	0.530	0.0484	
15 minute summer	8	1.006	1.006:50%	44.5	2.930	0.786	0.0646	
15 minute summer	8	1.006	10	48.0	3.249	0.847	0.0623	
15 minute summer	9	3.000	3.000:50%	0.0	0.000	0.000	0.0531	
15 minute summer	9	3.000	10	18.5	1.421	0.134	0.1859	
15 minute summer	10	1.007	1.007:50%	65.8	3.350	0.397	0.1287	
15 minute summer	10	1.007	14	68.3	2.507	0.413	0.1734	
15 minute summer	11	4.000	4.000:50%	-7.1	-0.176	-0.112	1.0402	
15 minute summer	11	4.000	12	25.1	0.399	0.393	1.0402	
15 minute summer	12	4.001	14	27.3	0.392	0.428	0.2111	
15 minute summer	13	5.000	5.000:50%	0.0	0.000	0.000	0.0299	
15 minute summer	13	5.000	14	14.9	1.506	0.085	0.2470	
15 minute summer	14	1.008	1.008:50%	84.3	1.198	1.322	0.6769	
15 minute summer	14	1.008	15	88.3	1.254	1.385	0.6769	
15 minute summer	15	1.009	1.009:50%	89.2	1.267	1.399	0.1811	

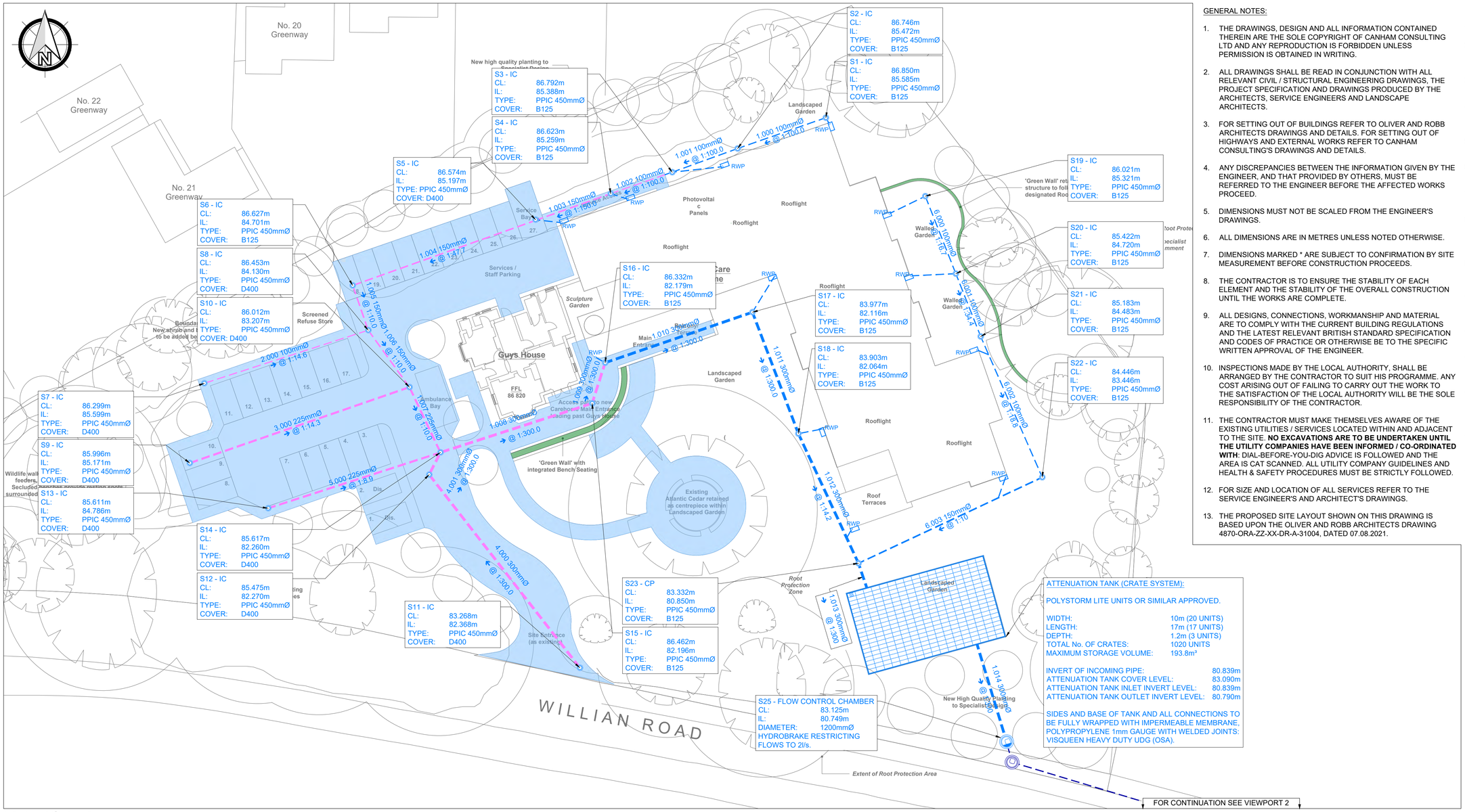
Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.89%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1.009:50%	12	82.748	0.560	90.3	0.0000	0.0000	SURCHARGED
15 minute summer	16	12	82.711	0.532	98.3	0.1218	0.0000	SURCHARGED
15 minute summer	1.010:50%	12	82.609	0.461	99.5	0.1409	0.0000	SURCHARGED
15 minute summer	17	12	82.505	0.389	111.8	0.1404	0.0000	SURCHARGED
15 minute summer	18	12	82.196	0.132	120.5	0.0397	0.0000	OK
15 minute summer	19	1	85.321	0.000	0.0	0.0000	0.0000	OK
15 minute summer	20	10	84.775	0.055	6.0	0.0200	0.0000	OK
15 minute summer	21	10	84.567	0.084	13.8	0.0358	0.0000	OK
15 minute summer	22	10	83.521	0.075	28.0	0.0370	0.0000	OK
360 minute winter	23	360	81.929	1.079	25.3	0.2417	0.0000	SURCHARGED
360 minute winter	24	360	81.929	1.090	24.8	176.1879	0.0000	SURCHARGED
360 minute winter	25	360	81.929	1.180	1.9	1.3343	0.0000	SURCHARGED
15 minute summer	25_OUT	1	76.825	0.000	1.6	0.0000	0.0000	OK

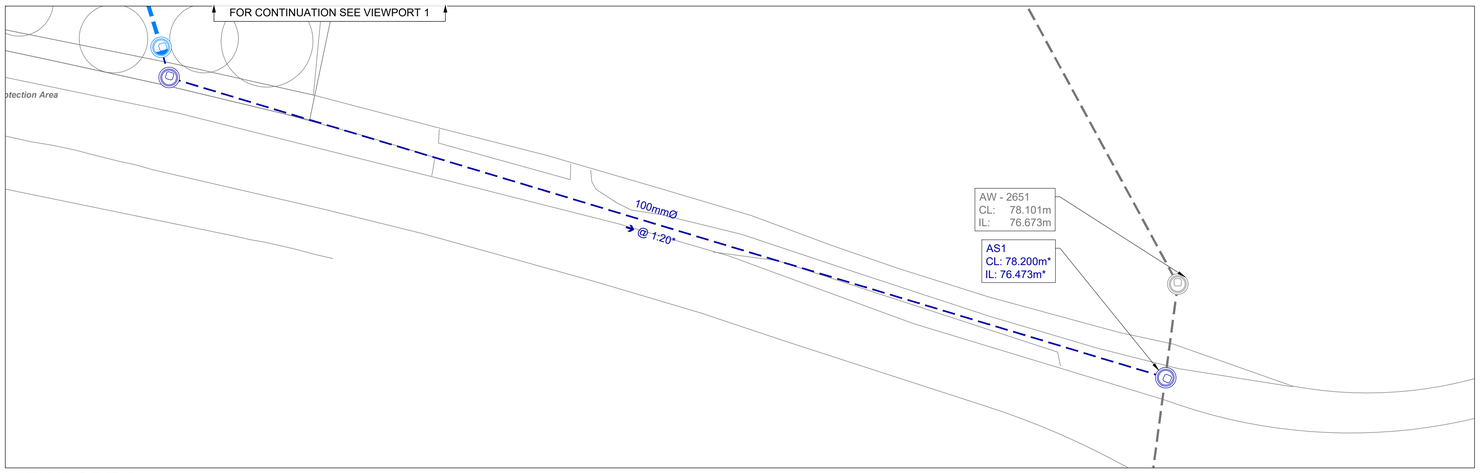
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	15	1.009	16	91.2	1.295	1.430	0.1811	
15 minute summer	16	1.010	1.010:50%	98.2	1.395	1.540	0.6610	
15 minute summer	16	1.010	17	99.5	1.413	1.560	0.6610	
15 minute summer	17	1.011	18	111.9	1.923	1.755	0.7849	
15 minute summer	18	1.012	23	120.6	2.071	0.407	0.8639	
15 minute summer	19	6.000	20	0.0	0.000	0.000	0.0223	
15 minute summer	20	6.001	21	5.9	1.034	0.573	0.0467	
15 minute summer	21	6.002	22	13.9	1.955	0.992	0.1375	
15 minute summer	22	6.003	23	28.0	1.876	0.494	0.3221	
360 minute winter	23	1.013	24	24.8	0.938	0.390	0.2428	
360 minute winter	24	1.014	25	1.9	0.205	0.030	1.8949	
360 minute winter	25	Hydro-Brake®	25_OUT	1.8				165.8

Flow+ v12.0 Copyright © 1988-2025 Causeway Technologies Ltd



VIEWPORT 1

SCALE 1:250



VIEWPORT 2

SCALE 1:250

SCALE 1:250m

0m 5m 10m 15m 20m 25m

SCALE BAR FOR INFORMATION ONLY

GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CIVIL / STRUCTURAL ENGINEERING DRAWINGS, THE PROJECT SPECIFICATION AND DRAWINGS PRODUCED BY THE ARCHITECTS, SERVICE ENGINEERS AND LANDSCAPE ARCHITECTS.
3. FOR SETTING OUT OF BUILDINGS REFER TO OLIVER AND ROBB ARCHITECTS DRAWINGS AND DETAILS. FOR SETTING OUT OF HIGHWAYS AND EXTERNAL WORKS REFER TO CANHAM CONSULTING'S DRAWINGS AND DETAILS.
4. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
5. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
6. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
7. DIMENSIONS MARKED * ARE SUBJECT TO CONFIRMATION BY SITE MEASUREMENT BEFORE CONSTRUCTION PROCEEDS.
8. THE CONTRACTOR IS TO ENSURE THE STABILITY OF EACH ELEMENT AND THE STABILITY OF THE OVERALL CONSTRUCTION UNTIL THE WORKS ARE COMPLETE.
9. ALL DESIGNS, CONNECTIONS, WORKMANSHIP AND MATERIAL ARE TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND THE LATEST RELEVANT BRITISH STANDARD SPECIFICATION AND CODES OF PRACTICE OR OTHERWISE BE TO THE SPECIFIC WRITTEN APPROVAL OF THE ENGINEER.
10. INSPECTIONS MADE BY THE LOCAL AUTHORITY, SHALL BE ARRANGED BY THE CONTRACTOR TO SUIT HIS PROGRAMME. ANY COST ARISING OUT OF FAILING TO CARRY OUT THE WORK TO THE SATISFACTION OF THE LOCAL AUTHORITY WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
11. THE CONTRACTOR MUST MAKE THEMSELVES AWARE OF THE EXISTING UTILITIES / SERVICES LOCATED WITHIN AND ADJACENT TO THE SITE. **NO EXCAVATIONS ARE TO BE UNDERTAKEN UNTIL THE UTILITY COMPANIES HAVE BEEN INFORMED / CO-ORDINATED WITH**: DIAL-BEFORE-YOU-DIG ADVICE IS FOLLOWED AND THE AREA IS CAT SCANNED. ALL UTILITY COMPANY GUIDELINES AND HEALTH & SAFETY PROCEDURES MUST BE STRICTLY FOLLOWED.
12. FOR SIZE AND LOCATION OF ALL SERVICES REFER TO THE SERVICE ENGINEER'S AND ARCHITECT'S DRAWINGS.
13. THE PROPOSED SITE LAYOUT SHOWN ON THIS DRAWING IS BASED UPON THE OLIVER AND ROBB ARCHITECTS DRAWING 4870-ORA-ZZ-XX-DR-A-31004, DATED 07.08.2021.

PRIVATE DRAINAGE NOTES:

1. EACH DWELLING TO HAVE AT LEAST ONE SOIL VENT PIPE (SVP).
2. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
4. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
5. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
6. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
7. INSPECTION CHAMBERS TO BE TURTLE ENVIRO ACCESSO, OR SIMILAR APPROVED.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.
9. SOIL VENT PIPES, STUB STACKS & GULLY LOCATIONS ARE AS PER OLIVER AND ROBB ARCHITECTS DRAWING4870-ORA-ZZ-XX-DR-A-31004, DATED 07.08.2021.
10. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER AND ROBB ARCHITECTS.
11. FOR MANHOLE DETAILS REFER TO CANHAM CONSULTING LTD DRAWINGS 213692-CCL-XX-00-DR-C-1900.
12. FOR PIPE BEDDING CLASS, TRENCH BACK-FILL AND REINSTATEMENT DETAILS, REFER TO CANHAM CONSULTING LTD DRAWING 213692-CCL-XX-00-DR-C-1900.
13. CLASS S BEDDING & SURROUND TO BE USED WHEN DEPTH TO SOFFIT OF PIPE IS EQUAL TO OR GREATER THAN 1.2m IN TRAFFICKED AREAS AND 0.9m IN NON-TRAFFICKED AREAS. OTHERWISE CLASS Z BEDDING DETAIL TO BE USED.
14. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY ALTERATIONS / DEVIATIONS IDENTIFIED ON SITE FROM THE INFORMATION SHOWN ON THIS DRAWING.
15. THE CONTRACTOR MUST CONFIRM THE CONNECTION INVERT LEVELS AND DETAILS OF ALL EXISTING PIPES AND MANHOLES ONTO WHICH NEW CONNECTIONS SHALL BE MADE **PRIOR TO ANY CONSTRUCTION**. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THE INFORMATION PROVIDED ON THIS DRAWING AND INFORMATION DETERMINED ON SITE. THE CONNECTION MUST REMAIN AS SOFFIT TO SOFFIT.

LEGEND

- PROPOSED ADOPTABLE SURFACE WATER SEWER
- PROPOSED ADOPTABLE SURFACE WATER MANHOLES
- EXISTING PUBLIC SURFACE WATER MANHOLES
- EXISTING PUBLIC SURFACE WATER PIPE
- PROPOSED PRIVATE SURFACE WATER PIPE
- PROPOSED PRIVATE PERFORATED SURFACE WATER PIPE
- PROPOSED PRIVATE SURFACE WATER INSPECTION CHAMBER
- RWP PROPOSED RAINWATER DOWNPIPE
- PROPOSED SUDS-POD
- PROPOSED PRIVATE ATTENUATION TANK (CRATE SYSTEM)
- PROPOSED PRIVATE SURFACE WATER FLOW CONTROL CHAMBER
- PROPOSED PERMEABLE PAVING
- PROPOSED GREEN WALL

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE. IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

rev	date	details	drawn	check
P02	24.07.2025	REVISED IN LINE WITH COMMENTS	KS	MH
P01	21.05.2025	PRELIMINARY ISSUE	OG	MH

Canham Consulting

+44 (0)1603 430650 | clientservice@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP
COLCHESTER, ESSEX, CO49YQ

architect
OLIVER AND ROB ARCHITECTS
PITREAVIE BUSINESS PARK, DUMFERMLINE

project
GUYSFIELD CARE HOME, WILLIAN ROAD, WILLIAN, NR LETCHWORTH, HERTS, SG6 2AB

title
PRIVATE DRAINAGE:
ATTENUATION OPTION
GENERAL ARRANGEMENT

CCL ref:	drawn	design	checked	scale	size	date
213692	OG	OG	MH	1:250	A1 (L)	21.05.2025

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: 213692-CCL-XX-00-DR-C-1000
revision: P02

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

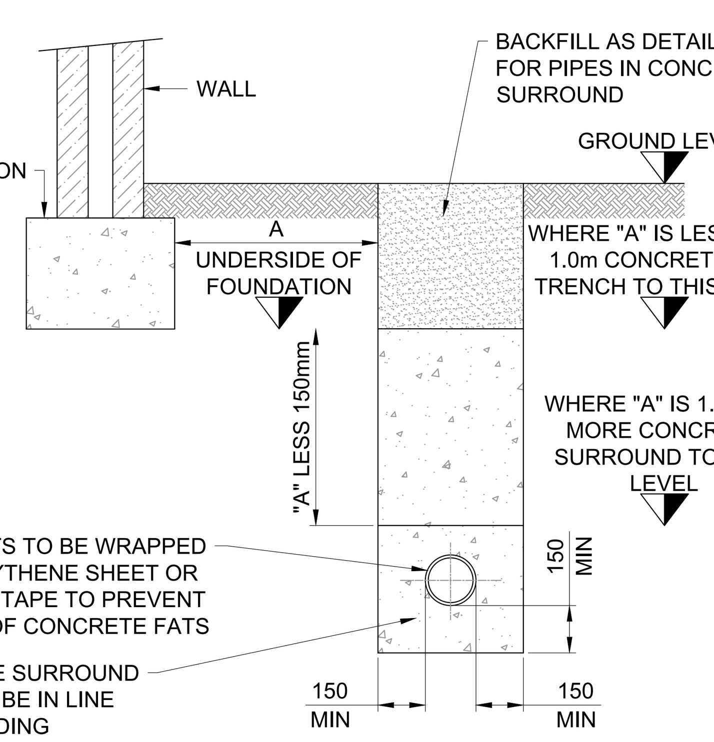
THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE REGULATION 2 AND 13. THESE ARE THE ONLY RISKS OF A NATURE ANTICIPATED BY THE DESIGNER AS BEING INHERENT IN THE DESIGN. ALL OTHER RISKS ARE ANTICIPATED TO BE OBVIOUS TO A SUITABLY QUALIFIED PERSON.

PRIVATE DRAINAGE NOTES:

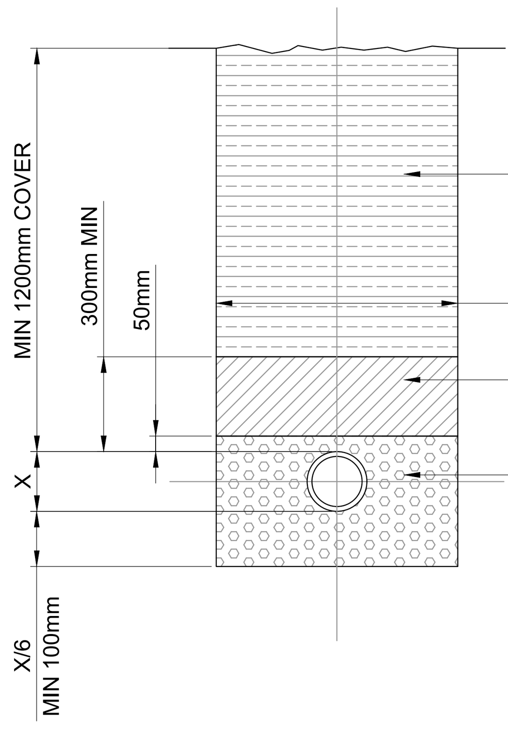
1. EACH DWELLING TO HAVE AT LEAST ONE SOIL VENT PIPE (SVP).
2. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
4. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
5. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
6. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
7. INSPECTION CHAMBERS TO BE TURTLE ENVIRO ACCESSO, OR SIMILAR APPROVED.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.
9. SOIL VENT PIPES, STUB STACKS & GULLY LOCATIONS ARE AS PER OLIVER AND ROBB ARCHITECTS DRAWING4870-ORA-ZZ-XX-DR-A-31004, DATED 07.08.2021.
10. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER AND ROBB ARCHITECTS.
11. FOR MANHOLE DETAILS REFER TO CANHAM CONSULTING LTD DRAWINGS 213692-CCL-XX-00-DR-C-1900.
12. FOR PIPE BEDDING CLASS, TRENCH BACK-FILL AND REINSTATEMENT DETAILS, REFER TO CANHAM CONSULTING LTD DRAWING 213692-CCL-XX-00-DR-C-1900.
13. CLASS S BEDDING & SURROUND TO BE USED WHEN DEPTH TO SOFFIT OF PIPE IS EQUAL TO OR GREATER THAN 1.2m IN TRAFFICKED AREAS AND 0.9m IN NON-TRAFFICKED AREAS. OTHERWISE CLASS Z BEDDING DETAIL TO BE USED.
14. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY ALTERATIONS / DEVIATIONS IDENTIFIED ON SITE FROM THE INFORMATION SHOWN ON THIS DRAWING.
15. THE CONTRACTOR MUST CONFIRM THE CONNECTION INVERT LEVELS AND DETAILS OF ALL EXISTING PIPES AND MANHOLES ONTO WHICH NEW CONNECTIONS SHALL BE MADE **PRIOR TO ANY CONSTRUCTION**. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THE INFORMATION PROVIDED ON THIS DRAWING AND INFORMATION DETERMINED ON SITE. THE CONNECTION MUST REMAIN AS SOFFIT TO SOFFIT.

GENERAL NOTES:

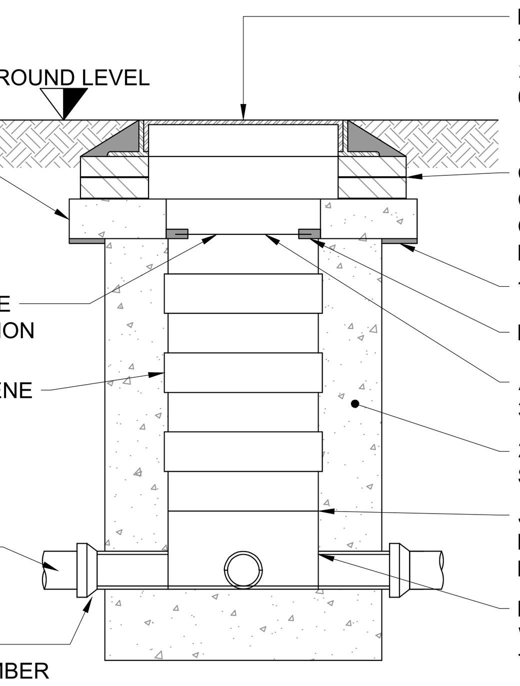
1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CIVIL / STRUCTURAL ENGINEERING DRAWINGS, THE PROJECT SPECIFICATION AND DRAWINGS PRODUCED BY THE ARCHITECTS, SERVICE ENGINEERS AND LANDSCAPE ARCHITECTS.
3. FOR SETTING OUT OF BUILDINGS REFER TO OLIVER AND ROBB ARCHITECTS DRAWINGS AND DETAILS. FOR SETTING OUT OF HIGHWAYS AND EXTERNAL WORKS REFER TO CANHAM CONSULTING'S DRAWINGS AND DETAILS.
4. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
5. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
7. DIMENSIONS MARKED * ARE SUBJECT TO CONFIRMATION BY SITE MEASUREMENT BEFORE CONSTRUCTION PROCEEDS.
8. THE CONTRACTOR IS TO ENSURE THE STABILITY OF EACH ELEMENT AND THE STABILITY OF THE OVERALL CONSTRUCTION UNTIL THE WORKS ARE COMPLETE.
9. ALL DESIGNS, CONNECTIONS, WORKMANSHIP AND MATERIAL ARE TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND THE LATEST RELEVANT BRITISH STANDARD SPECIFICATION AND CODES OF PRACTICE OR OTHERWISE BE TO THE SPECIFIC WRITTEN APPROVAL OF THE ENGINEER.
10. INSPECTIONS MADE BY THE LOCAL AUTHORITY, SHALL BE ARRANGED BY THE CONTRACTOR TO SUIT HIS PROGRAMME. ANY COST ARISING OUT OF FAILING TO CARRY OUT THE WORK TO THE SATISFACTION OF THE LOCAL AUTHORITY WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
11. THE CONTRACTOR MUST MAKE THEMSELVES AWARE OF THE EXISTING UTILITIES / SERVICES LOCATED WITHIN AND ADJACENT TO THE SITE. **NO EXCAVATIONS ARE TO BE UNDERTAKEN UNTIL THE UTILITY COMPANIES HAVE BEEN INFORMED / CO-ORDINATED WITH**: DIAL-BEFORE-YOU-DIG ADVICE IS FOLLOWED AND THE AREA IS CAT SCANNED. ALL UTILITY COMPANY GUIDELINES AND HEALTH & SAFETY PROCEDURES MUST BE STRICTLY FOLLOWED.



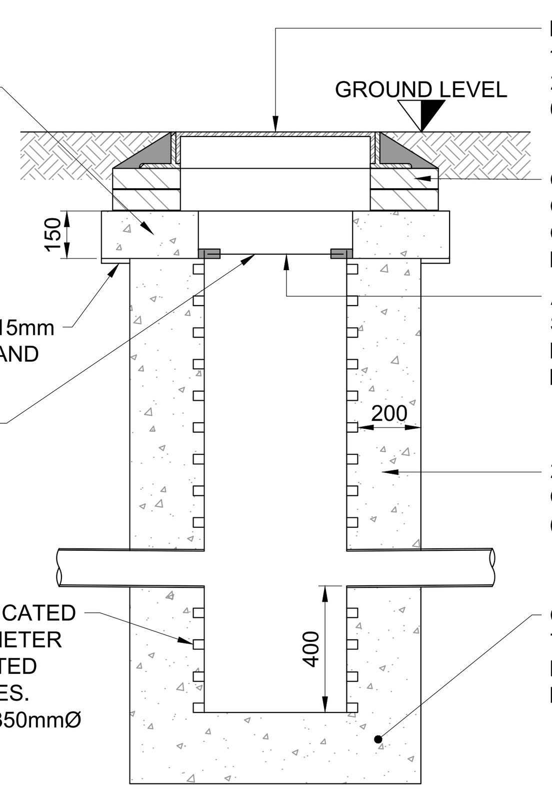
PIPE RUNS NEAR BUILDINGS
NOT TO SCALE



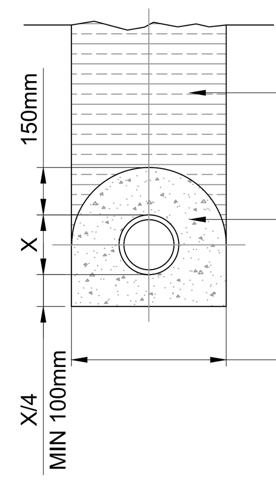
CLASS S BEDDING (PIPES UP TO 600mm)
NOT TO SCALE



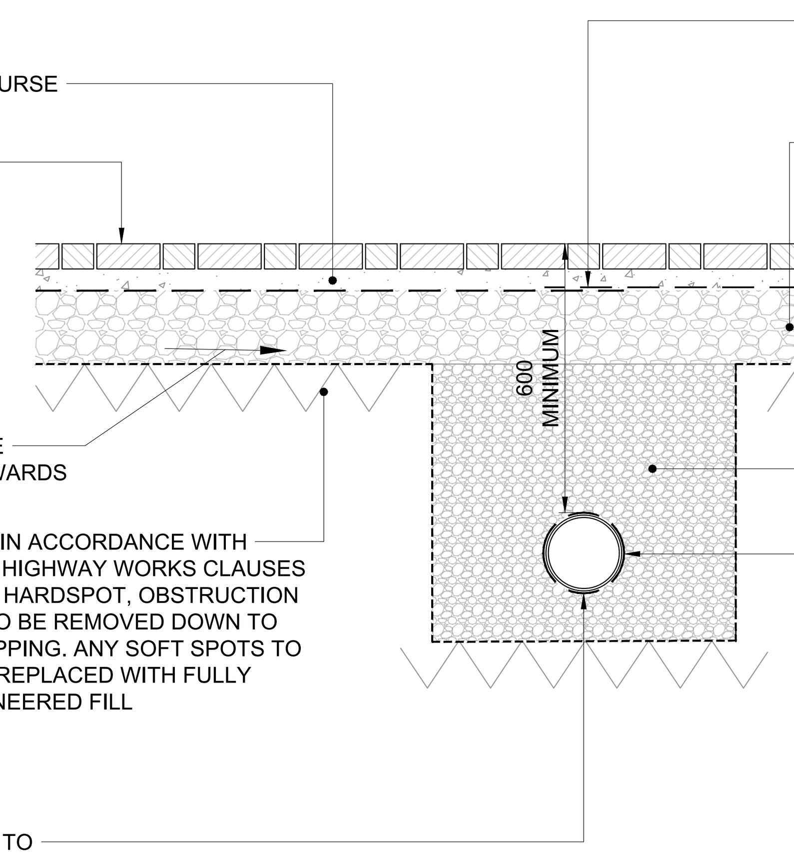
TYPICAL INSPECTION CHAMBER DETAIL (IC): 300, 450 & 600mm DIAMETER
SCALE 1:20



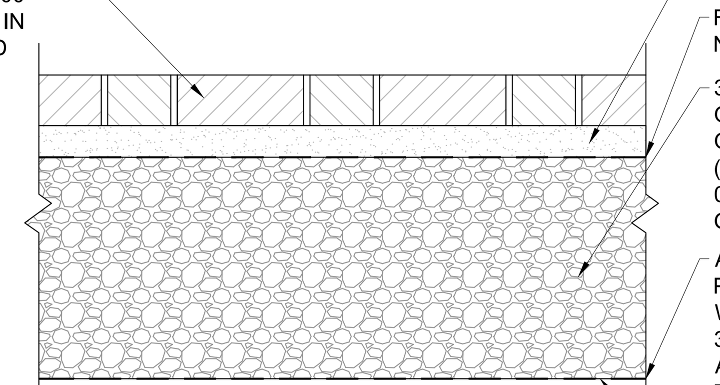
TYPICAL CATCHPIT DETAIL (CP): 300, 450 & 600mm DIAMETER
SCALE 1:20



CLASS Z BEDDING (PIPES UP TO 600mm)
NOT TO SCALE

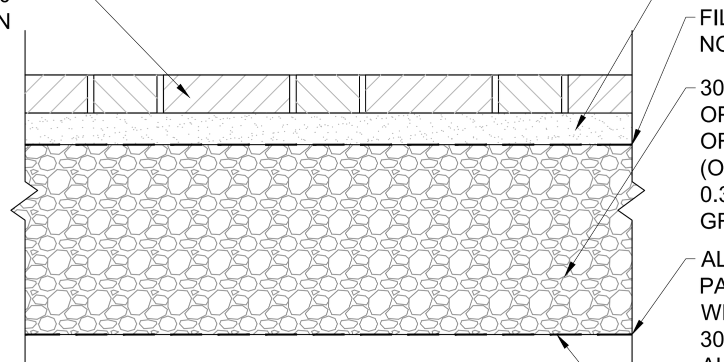


PERMEABLE PAVING / COLLECTOR DRAIN DETAIL
SCALE 1:20



THIS PAVEMENT DETAIL IS FOR AN ASSUMED C.B.R. OF 5%. FOR A C.B.R VALUE DIFFERENT TO THIS PLEASE INFORM CANHAM CONSULTING

PERMEABLE PAVING DETAIL - CAR PARK
SCALE 1:10



THIS PAVEMENT DETAIL IS FOR AN ASSUMED C.B.R. OF 5%. FOR A C.B.R VALUE DIFFERENT TO THIS PLEASE INFORM CANHAM CONSULTING

PERMEABLE PAVING DETAIL - PATHS
SCALE 1:10

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE. IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

rev	date	details	drawn	check
P01	21.05.2025	PRELIMINARY ISSUE	OG	MH

Canham Consulting

+44 (0)1603 430650 | clientservice@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP
COLCHESTER, ESSEX, CO4 9YQ

architect
OLIVER AND ROB ARCHITECTS
PITREAVIE BUSINESS PARK, DUMFERMLINE

project
GUYSFIELD CARE HOME, WILLIAN ROAD,
WILLIAN, NR LETCHWORTH, HERTS, SG6 2AB

title
PRIVATE DRAINAGE:
ATTENUATION OPTION
CONSTRUCTION DETAILS SHEET 1 OF 2

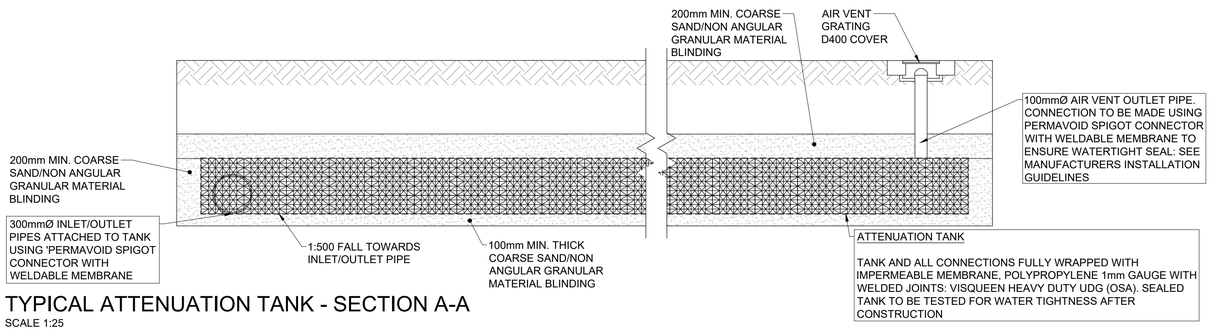
CCL ref:	drawn	design	checked	scale	size	date
213692	OG	OG	MH	AS SHOWN	A1 (L)	21.05.2025

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: 213692-CCL-XX-00-DR-C-1900
revision: P01

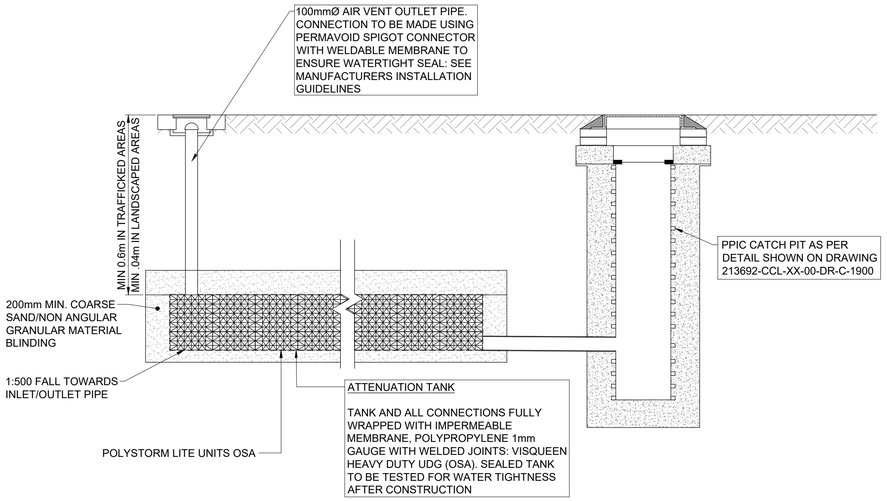
© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

THIS DESIGN IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE, REGULATIONS 2, 9 AND 11. THOSE ALTERING THE DESIGN WITHOUT THE AUTHORITY OF CANHAM CONSULTING LTD SHOULD BE AWARE THEY MAY ALSO ASSUME RESPONSIBILITY FOR THOSE DUTIES.



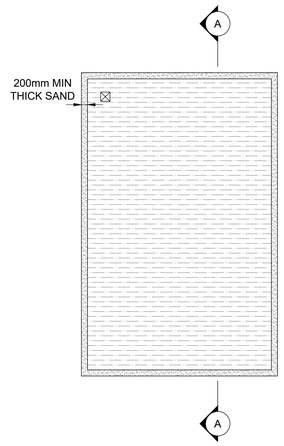
TYPICAL ATTENUATION TANK - SECTION A-A

SCALE 1:25



TYPICAL ATTENUATION TANK & CATCHPIT CONNECTION

SCALE 1:25



TYPICAL ATTENUATION TANK PLAN

1:100

PRELIMINARY DRAWING:
THIS DRAWING IS FOR PRELIMINARY PURPOSES ONLY AND MUST NOT BE READ AS A CONSTRUCTION ISSUE. IT INDICATES DESIGN INTENT ONLY AND IS SUBJECT TO AMENDMENT DURING FINAL DESIGN DEVELOPMENT.

PRIVATE DRAINAGE NOTES:

1. EACH DWELLING TO HAVE AT LEAST ONE SOIL VENT PIPE (SVP).
2. ANY DRAIN BRANCH CONNECTED TO A W.C. WITH NO SVP IS TO BE FITTED WITH A DURGO VALVE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. ALL PIPES BELOW GROUND TO BE 100mm DIAMETER (UNLESS NOTED OTHERWISE).
4. ALL FOUL DRAINS BELOW FLOOR SLABS TO BE 100mm DIAMETER AND LAID AT MINIMUM GRADIENT OF 1:40 (UNLESS NOTED OTHERWISE).
5. ALL PIPE GRADIENTS TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT H.
6. ALL MATERIALS, WORKMANSHIP, ETC, TO COMPLY WITH BUILDING REGULATIONS.
7. INSPECTION CHAMBERS TO BE TURTLE ENVIRO ACCESSO, OR SIMILAR APPROVED.
8. PRIVATE CONNECTIONS TO THE ADOPTABLE SEWERS TO BE LAID SOFFIT TO SOFFIT. NO PLASTIC PIPES ARE TO BE CONNECTED TO ADOPTABLE MANHOLES, ALL CONNECTIONS TO THE PUBLIC SEWER MUST BE CONSTRUCTED IN VITRIFIED CLAY PIPES.
9. SOIL VENT PIPES, STUB STACKS & GULLY LOCATIONS ARE AS PER OLIVER AND ROBB ARCHITECTS DRAWING4870-ORA-ZZ-XX-DR-A-31004, DATED 07.08.2021.
10. THE LOCATION, NUMBER AND SIZES OF ALL SOIL VENT PIPES, STUB STACKS & RAINWATER DOWNPIPES ARE TO BE CONFIRMED BY OLIVER AND ROBB ARCHITECTS.
11. FOR MANHOLE DETAILS REFER TO CANHAM CONSULTING LTD DRAWINGS 213692-CCL-XX-00-DR-C-1900.
12. FOR PIPE BEDDING CLASS, TRENCH BACK-FILL AND REINSTATEMENT DETAILS, REFER TO CANHAM CONSULTING LTD DRAWING 213692-CCL-XX-00-DR-C-1900.
13. CLASS S BEDDING & SURROUND TO BE USED WHEN DEPTH TO SOFFIT OF PIPE IS EQUAL TO OR GREATER THAN 1.2m IN TRAFFICKED AREAS AND 0.9m IN NON-TRAFFICKED AREAS. OTHERWISE CLASS Z BEDDING DETAIL TO BE USED.
14. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY ALTERATIONS / DEVIATIONS IDENTIFIED ON SITE FROM THE INFORMATION SHOWN ON THIS DRAWING.
15. THE CONTRACTOR MUST CONFIRM THE CONNECTION INVERT LEVELS AND DETAILS OF ALL EXISTING PIPES AND MANHOLES ONTO WHICH NEW CONNECTIONS SHALL BE MADE **PRIOR TO ANY CONSTRUCTION**. CANHAM CONSULTING LTD MUST BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THE INFORMATION PROVIDED ON THIS DRAWING AND INFORMATION DETERMINED ON SITE. THE CONNECTION MUST REMAIN AS SOFFIT TO SOFFIT.

GENERAL NOTES:

1. THE DRAWINGS, DESIGN AND ALL INFORMATION CONTAINED THEREIN ARE THE SOLE COPYRIGHT OF CANHAM CONSULTING LTD AND ANY REPRODUCTION IS FORBIDDEN UNLESS PERMISSION IS OBTAINED IN WRITING.
2. ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CIVIL / STRUCTURAL ENGINEERING DRAWINGS, THE PROJECT SPECIFICATION AND DRAWINGS PRODUCED BY THE ARCHITECTS, SERVICE ENGINEERS AND LANDSCAPE ARCHITECTS.
3. FOR SETTING OUT OF BUILDINGS REFER TO OLIVER AND ROBB ARCHITECTS DRAWINGS AND DETAILS. FOR SETTING OUT OF HIGHWAYS AND EXTERNAL WORKS REFER TO CANHAM CONSULTING'S DRAWINGS AND DETAILS.
4. ANY DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER, AND THAT PROVIDED BY OTHERS, MUST BE REFERRED TO THE ENGINEER BEFORE THE AFFECTED WORKS PROCEED.
5. DIMENSIONS MUST NOT BE SCALED FROM THE ENGINEER'S DRAWINGS.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
7. DIMENSIONS MARKED * ARE SUBJECT TO CONFIRMATION BY SITE MEASUREMENT BEFORE CONSTRUCTION PROCEEDS.
8. THE CONTRACTOR IS TO ENSURE THE STABILITY OF EACH ELEMENT AND THE STABILITY OF THE OVERALL CONSTRUCTION UNTIL THE WORKS ARE COMPLETE.
9. ALL DESIGNS, CONNECTIONS, WORKMANSHIP AND MATERIAL ARE TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND THE LATEST RELEVANT BRITISH STANDARD SPECIFICATION AND CODES OF PRACTICE OR OTHERWISE BE TO THE SPECIFIC WRITTEN APPROVAL OF THE ENGINEER.
10. INSPECTIONS MADE BY THE LOCAL AUTHORITY, SHALL BE ARRANGED BY THE CONTRACTOR TO SUIT HIS PROGRAMME. ANY COST ARISING OUT OF FAILING TO CARRY OUT THE WORK TO THE SATISFACTION OF THE LOCAL AUTHORITY WILL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
11. THE CONTRACTOR MUST MAKE THEMSELVES AWARE OF THE EXISTING UTILITIES / SERVICES LOCATED WITHIN AND ADJACENT TO THE SITE. **NO EXCAVATIONS ARE TO BE UNDERTAKEN UNTIL THE UTILITY COMPANIES HAVE BEEN INFORMED / CO-ORDINATED WITH**: DIAL-BEFORE-YOU-DIG ADVICE IS FOLLOWED AND THE AREA IS CAT SCANNED. ALL UTILITY COMPANY GUIDELINES AND HEALTH & SAFETY PROCEDURES MUST BE STRICTLY FOLLOWED.

rev	date	details	drawn	check
P01	21.05.2025	PRELIMINARY ISSUE	OG	MH

Canham Consulting

+44 (0)1603 430650 | clientservice@canhamconsulting.co.uk | www.canhamconsulting.co.uk

client
CARING HOMES GROUP
COLCHESTER, ESSEX, CO4 9YQ

architect
OLIVER AND ROB ARCHITECTS
PITREAVIE BUSINESS PARK, DUMFERMLINE

project
GUYSFIELD CARE HOME, WILLIAN ROAD,
WILLIAN, NR LETCHWORTH, HERTS, SG6 2AB

title
PRIVATE DRAINAGE:
ATTENUATION OPTION
CONSTRUCTION DETAILS SHEET 2 OF 2

CCL ref:	drawn	design	checked	scale	size	date
213692	OG	OG	MH	AS SHOWN	A1 (L)	21.05.2025

status:
S3 - SUITABLE FOR REVIEW & COMMENT

drawing number: 213692-CCL-XX-00-DR-C-1950
revision: P01

© This drawing is copyright and is not to be reproduced without the written permission of Canham Consulting Ltd

THIS DRAWING IS PRODUCED IN ACCORDANCE WITH THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015 INCORPORATING THE APPROVED CODE OF PRACTICE REGULATION 2 (1) AND 11. THESE REGULATIONS ARE DESIGNED TO ASSIST THE CLIENT, DESIGNER AND CONTRACTOR TO FULFILL THEIR RESPONSIBILITIES UNDER THE CDM REGULATIONS. THE CLIENT IS ADVISED THAT IT IS A MATTER OF LAW THAT THEY ACCEPT THE RESPONSIBILITIES IMPOSED ON THEM BY THE REGULATIONS.

Canham Consulting

Structural Civil Building Engineers

Canham Consulting Ltd
Second Floor, 69-75 Thorpe Road
Norwich, Norfolk, NR1 1UA

Tel: 01603 430650
Email: clientservice@canhamconsulting.co.uk
www.canhamconsulting.co.uk