

Building Futures Together

Private Client

New Apartments, Land to Rear
of Banyers Hotel, Royston

Drainage Validation Report

P24-0782

January 2025



Barker



Private Client
Land to the Rear of Banyers Hotel, Royston
Drainage Validation Report

Drainage Validation Report

New Apartments,
Land to Rear of Banyers Hotel, Royston

Prepared For and on Behalf of:

Private Client

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1 Introduction

The following Drainage Validation Report has been prepared on behalf of a new apartment development on land at the rear of Banyers Hotel, Royston to validate the March 2024 Flood Risk Assessment (FRA) prepared by Encon Associates, which can be seen in Appendix A, for the proposed residential development on the same site.

This report will validate the FRA against a revised layout, to the parameters defined by the Environmental Agency (EA) mapping as audited within the FRA for the project.

2 Site Description

2.1 Existing Site

As defined within the FRA, the site located centrally within Royston is bound by residential dwelling to the west and south, with a commercial yard in the north and agricultural land in the east. Currently the site is open grassland with dense vegetation along its boundaries. Levels across the site vary by 61.400m AOD to 60.000m AOD.

2.2 Proposed Site

In accordance with the FRA, the proposed development consists of 10-residential dwellings and supporting vehicle access via King James Way. The site usage remains within the flood risk vulnerability classification as ‘more vulnerable’ within a Flood Zone 01 setting.

3 Validation of Flood Risk Assessment

As defined in the FRA document, the site continues to maintain the following flood risk classification:

Environment Agency Flood Zone Definition.	Flood Zone 01
Flooding Risk from Rivers and Sea	Very Low Risk (<0.1%)
Groundwater Flooding	Unlikely (Proposed FFLs +150mm)
Reservoir Flooding	Unlikely
Surface Water Flooding	Majority - Low – Very Low Risk Access – High Risk (<300mm depth) (Proposed FFLs +150mm)

With the proposed application of residential development, the proposed development continues to pass criteria defined within the NPPF for successful conclusion of the sequential test.

4 Validation of Drainage Design

4.1 Surface Water Drainage Proposal

As defined within the baseline FRA, the surface water network through ground infiltration offers the development an optimum solution of management and groundwater regeneration.

The proposed strategy for the site as defined in Appendix B, proposes to integrate the site's constraints such as levels and arboricultural protection zones into the design and offer an enhancement to surface water management.

A revised layout with repositioned houses allows the site to manage arboricultural constraints, which ensures the defined FFL requirements of existing ground level plus 150mm are achieved.

Permeable paved car parks, with localised root protection subbase replacement cell systems will ensure the protection of root systems, while ensuring the effectiveness of infiltration through this area for storms up to and including the 100-year plus 40% climate change intensity.

Half drain times proposed 943-minutes. (<1440-minutes), are therefore acceptable (refer to Appendix C).

4.2 Foul Water Drainage Proposal

The proposed foul water drainage will connect to the existing Thames Water network running through the adjacent highway as confirmed within the FRA.

5 Conclusion

This validation report has been prepared to confirm the proposed RMA flood risk management strategy and drainage design aligns with the principles defined in the Encon FRA.

Validated and bettered via design development and risk mitigation of known parameters, including arboricultural root protection zones, this document has provided evidence that the proposed development does not provide an increased risk of drainage failure of surface water flooding to that defined within the full Flood Risk Assessment (attached) as carried out in March 2024.

Appendix A:
Encon Associates Flood Risk Assessment



Barker



Flood Risk Assessment

Proposed Residential Development
King James Way, Royston

March 2024

ENVIRONMENTAL AND
SUSTAINABILITY CONSULTANTS

Document Control

Date of first Issue	Revision	Date of Revision	Issued By	Checked by
08 March 2024				

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1.00 Introduction

- 1.00 Encon Associates have prepared this Flood Risk Assessment to support the planning application for a proposed residential development within Royston, Hertfordshire. The site lies within the administrative area of the North Hertfordshire District Council (NHDC) as the Local Planning Authority (LPA) and Hertfordshire County Council as the Lead Local Flood Authority (LLFA). The local water services provider is Affinity Water, and the local sewerage services provider is Anglian Water.
- 1.01 The National Planning Policy Framework (NPPF) requires site-specific Flood Risk Assessment (FRA) for new developments proposed on the floodplains of rivers, at risk from other sources of flooding, or over one hectare in area. To comply with the NPPF, the FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users and the foreseeable impacts of climate change, without increasing flood risk elsewhere and where possible reducing overall flood risk. The site is within Flood Zone 1, an area indicated as being at low risk from rivers and the sea. The FRA also appraises flood risk from other sources such as surface water and groundwater and proposes a multi-functional Sustainable Drainage System (SuDS) for the management of surface water run-off over the lifetime of the development to reduce flood risk to the development and the surrounding area to as low as reasonably practicable.
- 1.02 Throughout this report references are made to the:
- North Hertfordshire District Council Strategic Flood Risk Assessment (SFRA) dated July 2008
 - North Hertfordshire District Council Strategic Flood Risk Assessment Update dated September 2016
 - North Hertfordshire District Surface Water Management Plan (SWMP) dated March 2017
 - Building Regulations Approved Document H
 - DEFRA Non-Statutory Technical Standards for SuDS dated March 2015
 - CIRIA SuDS Manual 2015 (C753)
 - Water UK Sewerage Sector Guidance.

2.00 Site Context

Topography

- 2.00 The site is located centrally within Royston, approximately 12 miles south-west of Cambridge city centre. The site is bounded by residential dwellings to the west and south, a commercial yard and premises are situated to the north and agricultural land extends to the east, as shown in **Figure 1**.



Figure 1: Site boundary on aerial imagery (Google Earth)

- 2.01 Currently the site consists of open grassland with dense vegetation located along the north, west and southern boundary. The site resides within an urban area, with residential and commercial development surrounding the site on all sides.
- 2.02 Topographic data indicates that the land slopes from north-west to north-east with levels ranging from 61.4m to 60.0m respectively. A Topographic Survey is included as Appendix A.

Geology

- 2.03 According to BGS 1:50,000 scale mapping, the underlying geology is comprised of Holywell Nodular Chalk Formation - Chalk.

Hydrogeology

- 2.04 The Aquifer Designation Map for England shows the site to be within a principal aquifer zone for both bedrock and superficial drift. Additionally, the site lies within an area mapped as High Groundwater Vulnerability.
- 2.05 The Cranfield Soil and Agrifood Institute Soilscales map indicates that the site is within Soilscale 3, described as “*shallow lime-rich soils over chalk or limestone*”.

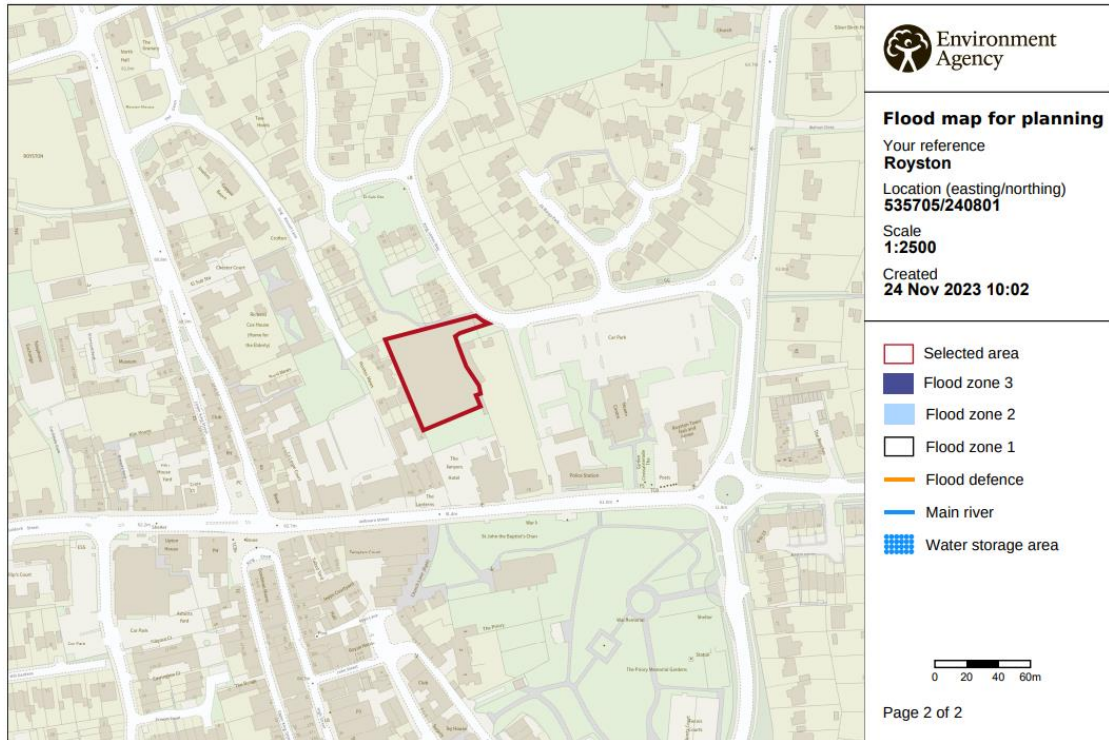
3.00 Development Proposal

- 3.00 The development proposals include the provision of ten new dwellings (in the form of apartments) and associated vehicular access via an existing dropped kerb access from King James Way, Royston.
- 3.01 The use of the site for private residential premises firmly places the development in the flood risk vulnerability classification of 'more vulnerable'. 'More vulnerable' development is deemed appropriate for Flood Zone 1.
- 3.02 The proposed site layout is contained in Appendix B.

4.00 Flood Risk Assessment

Fluvial and Tidal Flooding

- 4.00 As shown in **Figure 2**, the site falls within Flood Zone 1, which is classed as an area with a low probability of flooding.



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Figure 2: EA Flood Map for Planning extract

- 4.01 According to the long-term flood risk mapping service provided by the EA (**Figure 3**), the site is in an area with very low risk of flooding from rivers (fluvial) and the sea (tidal). Very low risk means that the area has an annual chance of flooding of less than 0.1%.

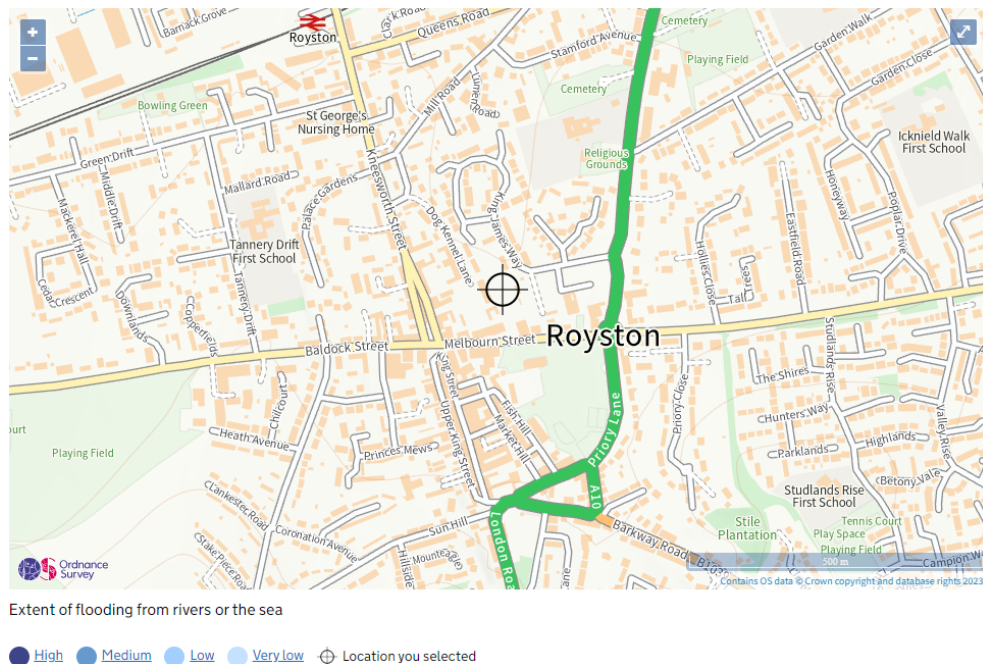


Figure 3: EA long term flood risk map

Groundwater Flooding

- 4.02 Groundwater flooding can occur due to prolonged rainfall in low-lying areas where highly permeable strata are present at shallow depth below ground. This type of flooding is associated with the water table rising above ground level, leading to more persistent inundation. Groundwater flooding can also occur due to ceasing of groundwater abstractions, resulting in groundwater rebound.
- 4.03 The NHDC SFRA records an historical event along Melbourne Road, in close proximity to the Site, where depth of groundwater flooding reached 315mm. However, the SFRA also states there has been “no significant flooding in previous 30 years” and the site is not specifically recorded as having experienced groundwater flooding.
- 4.04 The geological and hydrogeological conditions suggest that groundwater is likely to be present at the Site and further investigation should be undertaken to ascertain its depth below ground.
- 4.05 Due to the ground profile of the site, if any groundwater were to exceed the surface level, overland flows would be conveyed easterly towards King James Way (a public highway) where public sewers are present to convey surface water flows away from the site.
- 4.06 The finished ground floor level should be set above the surrounding ground level by at least 150mm to reduce the risk of any residual groundwater flooding from entering the building. As such, there is a low risk of groundwater flooding to the proposed development.

Reservoir Flooding

- 4.07 As there are no reservoirs in the local area, the site is not at risk of flooding from this potential source, as shown in **Figure 4** below.

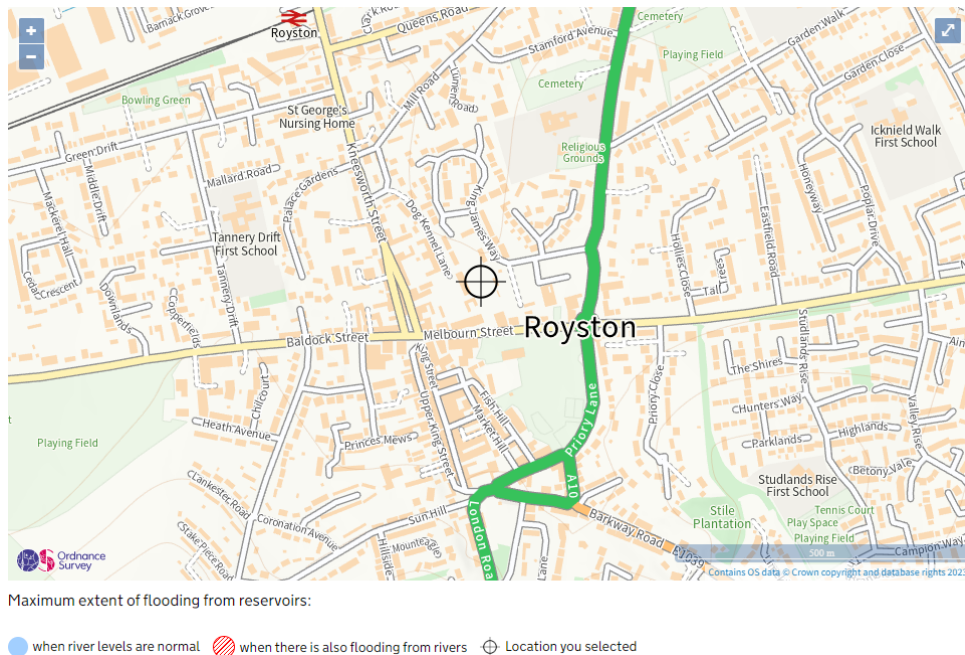


Figure 4: EA Flood Risk from Reservoirs

Sewer Flooding

- 4.08 Sewer flooding can occur due to pipe network capacity being overwhelmed in low-lying areas, where storm water mixes with foul water within combined sewers, or where overland flows enter the foul sewer network. Public sewer records have been provided by Anglian Water and illustrate foul and surface water public sewers are present within the vicinity of the site.
- 4.10 The sewers within King James Way have cover levels that are at a similar elevation than the existing site levels, this suggests a risk of flooding to the site from overwhelmed sewers. This risk is mitigated by a proposal to situate dwellings at the higher ground across the site as well as the raising of finished floor levels by 150mm.
- 4.11 The NHDC SFRA does not specifically record the site, nor the wider Royston area, as having historically experienced sewer flooding.
- 4.12 The finished ground floor level should be set above the surrounding ground level by at least 150mm to reduce the risk of any residual sewer flood water from entering the building. As such, there is a low risk of sewer flooding to the proposed development.

Surface Water Flooding

- 4.13 Surface water flooding can occur when drainage systems become overwhelmed by intense or prolonged rainfall, with the result that runoff accumulates in low-lying areas. As shown by **Figure 5** and according to the Environment Agency updated Flood Map for Surface Water (uFMfSW), the majority of the site is shown to be at low and very low risk from this type of flooding, where annual probability of flooding ranges from 0.1-1% and <0.1%, respectively.
- 4.14 At the sites existing access along the north eastern boundary, a strip of land is shown to lay within an area of medium to high risk of surface water flooding, where annual probability of flooding ranges from 1-3.3% and >3.3%, respectively. It is likely the presence of public sewers at this location are responsible for this variation and the risks associated with this are mitigated by locating the dwellings at a suitable distance from such boundary and the raising of finished floor levels by 150mm.

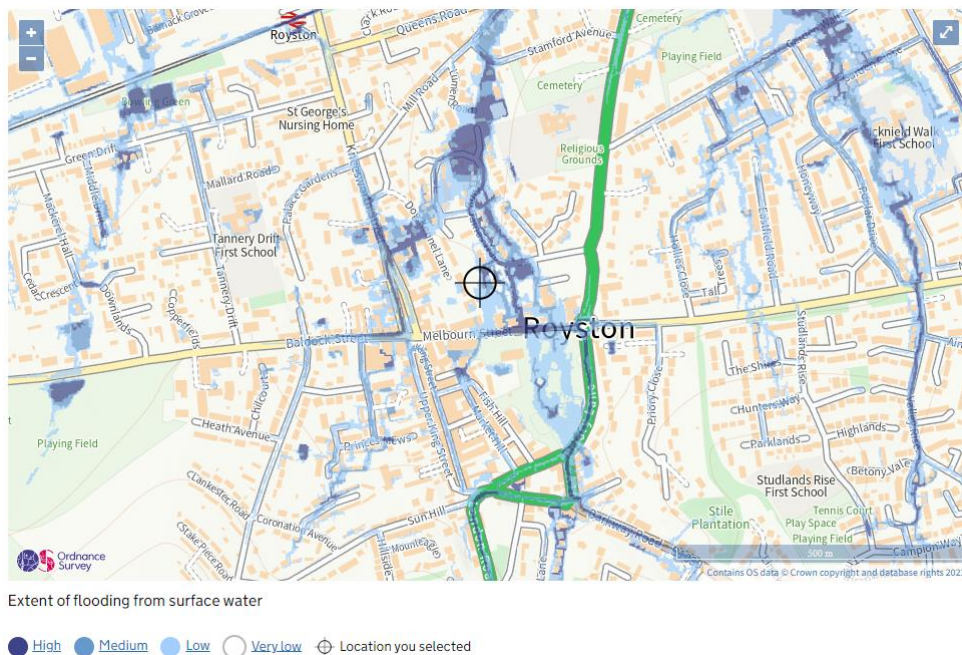


Figure 5: EA updated Flood Map for Surface Water

- 4.15 In general terms, the surface water flood map alone should not be used to assess flood risk at an individual site level. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can affect the probability and severity of flooding. When used to consider catchment-wide surface water flows, the maps are a useful tool in determining generalised flood risk to an area. As such, the map indicates that the flooding from surface water will be retained at its eastern boundary, to which the site naturally falls, and thus overland flows will be conveyed away from the site, via the public sewers present within King James Way.
- 4.16 The finished ground floor level should be set above the surrounding ground level by at least 150mm to reduce the risk of any residual surface water flooding from

entering the building. As such, there is a low risk of sewer flooding to the proposed development.

Overall Flood Risk

- 4.17 Overall flood risk from all sources is considered to be low with the exception being the higher risk from surface water flooding.
- 4.18 The development would benefit from having a finished floor level of at least 150mm above the surrounding ground level to mitigate against the residual effects of flooding from surface water, groundwater and sewers. This achieves a finished floor level of 60.575m AoD.
- 4.19 Flood risk is considered to be reduced even further through the use of a SuDS based surface water management strategy as well as the strategic placement of dwellings ensuring development is situated at the higher ground.

5.00 Surface Water Management

5.00 Management of surface water run-off from the development will need to be provided to ensure that the development proposals do not increase (and ideally, reduce) the risk of flooding from surface water to the site and the wider catchment. In addition to providing flood risk reduction, the management of surface water run-off should follow the principals of SuDS (Sustainable Drainage Systems) and aim to provide multi-functional benefits, as follows:

- Improvement to water quality
- Enhanced amenity value
- Increased biodiversity

Existing Surface Water Drainage

5.01 Currently the site consists of open grassland and is classified as a greenfield development. Historic mapping shows the site has not been previously developed and so there are no records of sewerage present at the site.

Surface Water Disposal Options

5.02 In accordance with Building Regulations Approved Document H and DEFRA's Non-Statutory Technical Standards for SuDS, disposal of curtilage surface water run-off should be directed to the following, in order of preference:

- Infiltration to ground;
- Disposal to a watercourse;
- Disposal to a surface water sewer;
- Disposal to a combined sewer.

5.03 The ground conditions outlined in Section 2 of this report are indicative of conditions suitable for infiltration. The site soils are anticipated to consist of underlying chalk, which should provide good permeability for the disposal of surface water.

5.04 A Pre-Planning Enquiry (PPE) response has also been received from Anglian Water which states that there are no surface water sewers in the vicinity of the site, and that alternative methods of surface water disposal should be investigated. This, combined with the presence of a permeable soil type, alludes to infiltration being the ideal means of surface water disposal. Infiltration testing (to BRE Digest 365) and groundwater monitoring should be undertaken to confirm this. A copy of the PPE response is included as Appendix C.

- 5.05 In order to confirm the principals of the drainage design, whilst awaiting the infiltration test results, an infiltration rate of $1.0 \times 10^{-6} \text{m/s}$ has been used as proxy for the actual design infiltration rate and is indicative of the lowest acceptable rate.

Hydraulic Design

- 5.06 Preliminary hydraulic modelling using Causeway Flow hydraulic simulation software has been undertaken to provide initial sizing of the combined attenuation and infiltration features. Hydraulic modelling has been undertaken to simulate storm return period events of 1 in 1 year, 1 in 30 year, and 1 in 100 year plus climate change allowance (CCA).
- 5.07 The results demonstrate that there is sufficient space within the Site to accommodate surface water drainage systems and the associated volumes and areas for infiltration and attenuation features.
- 5.08 Permeable paving has been specified to meet storage requirements for the Site. It is proposed for the car parking area within the frontage of the property and has been designed to attenuate flows up to and including a 1 in 100 year storm event, plus an additional allowance for climate change. Surface water flows will be attenuated within a 150mm layer of Type 3 sub base with 30% void ratio, which is to be impermeably wrapped in order to convey flows towards an area designated for infiltration. This central area has been specified to meet the 5m offset requirement for a soakaway from buildings or roads, in accordance with Building Regulations Approved Document H. This infiltration area is also to be formed from a 150mm layer of Type 3 sub base with 30% void ratio, and wrapped in a permeable membrane to allow surface water flows to infiltrate to the ground. The storage volume provided equates to approximately 115m^3 .
- 5.09 The drainage system is required to function without any flooding of surface water for storm return periods up to and including 1 in 30 year and without any flood water leaving the site for storm return periods up to and including 1 in 100 year plus an allowance for climate change. Climate change allowance has been specified based on the upper end of the total potential change anticipated for the '2070s', which equates to 40%.
- 5.10 A drainage strategy meeting the above criteria is presented in Appendix D, with supporting hydraulic calculations in Appendix E.
- 5.11 In the event of a drainage system blockage or a storm in excess of the design parameters, there may not be sufficient capacity within the drainage system to accommodate collected surface water run-off below ground level or within the site. Under these circumstances, minor flooding may be expected on site, which may lead

to overland flows being directed off of the site. Finished ground levels should be designed to allow overland flows to be directed away from building thresholds and to follow the natural, pre-development, flow paths for surface water. Proposed exceedance flow routes are indicated on the drawings within Appendix F.

Water Quality

- 5.12 The disposal of surface water is proposed to be discharged to the underlying water table and, ultimately, to large bodies of water. In order to safeguard these waters and, ideally, improve overall water quality, SuDS that provide the removal of contaminants from the proposed development have been implemented where possible. This includes the use of permeable paving within the car parking area.
- 5.13 Permeable paving assists with; filtration of silt and attached pollutants; biodegradation of organic pollutants, such as hydrocarbons, within the pavement construction; adsorption of pollutants; and settlement and retention of suspended solids. The treatment design should ensure that the surface layer has sufficiently small voids to enable the entrapment of silt and attached pollutants within the upper 30mm of the surface, but still provide sufficient permeability to enable water to flow to the sub-base. Porous asphalt, porous concrete, reinforced grass, resin bound gravel and concrete block permeable paving with 2-6mm nominally sized jointing material should all meet this requirement.

Table 1: Water quality requirements and treatment measures

Minimum water quality management requirements for discharges to receiving surface waters and groundwater (SuDS Manual, 2015, Table 4.3)				
Land use	Pollution hazard level	Requirement for discharge to surface waters and groundwater		
Residential roofs	Very low	Removal of gross solids and sediments only		
Individual property driveways, residential car parks, low traffic roads...	Low	Simple index approach		
Pollution hazard indices for different land use classifications (SuDS Manual, 2015, Table 26.2)				
Land use	Pollution hazard level	Total suspended solids TSS	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads...	Low	0.5	0.4	0.4
Indicative SuDS mitigation indices for discharges to surface waters (SuDS Manual, 2015, Table 26.3)				
SuDS components		TSS	Metals	Hydrocarbons
Permeable paving		0.7	0.6	0.7

Amenity

- 5.14 Permeable paving can provide amenity value in the usefulness of the material - providing both a use of space and surface water management - in addition to the visual appearance of the surfacing materials. There are no specific design requirements to achieve visual amenity value over and above the general requirements for planning and landscape architecture design.

Biodiversity

- 5.15 Permeable paving does not directly provide biodiversity benefits; however, the treatment and control of flows enables biodiversity benefits in receiving watercourses and waterbodies.

Maintenance

- 5.16 SuDS require regular maintenance and should be inspected regularly for the preservation of infiltration efficacy. Typical operation and maintenance requirements for permeable paving have been included within **Table 2** below.

Table 2: Permeable Pavement Maintenance Requirements

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 - particular attention to be paid to areas where water runs directly onto pervious surface from adjacent impermeable areas as this 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 that, through vegetation maintenance or soil slip has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10-15 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 hours after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

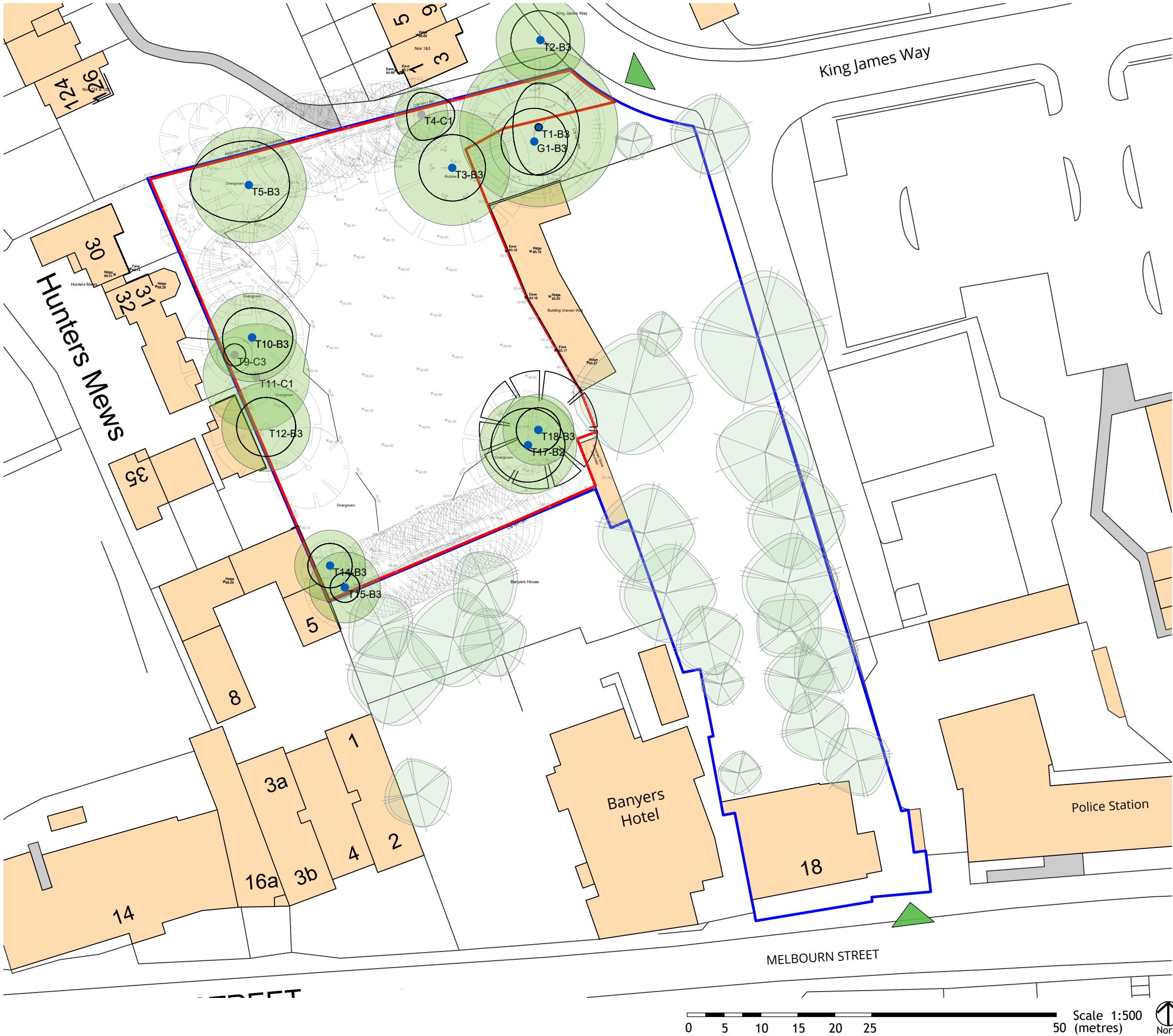
6.00 Foul Water Management

- 6.01 Foul water from the development should be disposed of to the existing Anglian Water public foul water sewer system within King James Way, a public highway which fronts the site.
- 6.02 A PPE response from Anglian Water has been received and illustrates the presence of a 150mm diameter foul water public sewer at the east of the site, running in a northerly direction. The Anglian Water manhole [reference] 7801 has been stated as the preferred point of connection.
- 6.03 The depth of sewers within public highways is typically sufficient to provide protection from vehicle loading as well as connection from proposed developments. Due to this, it is likely the depth of the Anglian Water sewer within King James Way will be conducive for a gravity connection from the Site, as confirmed within Appendix D.
- 6.04 Prior to making a connection to the public sewer, a S106 Connection Agreement with Anglian Water will need to be approved.

7.00 Conclusion

- 7.01 Encon Associates have prepared this Flood Risk Assessment to support the planning application for the proposed residential development outlined within this report.
- 7.02 The site is located in Flood Zone 1. Overall, flood risk from all sources is considered to be low with the exception being the higher risk from surface water flooding. The limited area at medium to high risk from surface water flooding is likely due to the presence of public sewers at the eastern boundary. The risks associated with this are mitigated by the development proposals; The dwellings are to be located at the higher ground across the site, and the access road and car parking areas are to be located at the lower ground. This is to channel flows towards the eastern boundary, in keeping with the fall of the site, and towards the public highway.
- 7.03 The development would benefit from having finished floor level of the dwellings set above the surrounding ground level by at least 150mm to mitigate against the residual effects of flooding from surface water, groundwater, and sewers. Flood risk is considered to be reduced even further through the use of a SuDS based surface water management strategy.
- 7.04 Surface water is to be disposed of via infiltration. The infiltration rate and viability of this are to be confirmed by infiltration testing.
- 7.05 Foul water is to be discharged to a public sewer under the ownership of Anglian Water and is located within the adjacent public highway, King James Way.
- 7.06 A maintenance strategy has also been provided, with the preferred strategy being that drainage systems will be maintained by the Applicant/Landlord.
- 7.07 This Flood Risk Assessment concludes that the development will be safe for its lifetime, taking account of the vulnerability of its users without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

APPENDIX A
TOPOGRAPHIC SURVEY



© THIS DRAWING IS A COPYRIGHT OF BARKER ASSOCIATES.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL ENGINEERS AND MECHANICAL AND ELECTRICAL ENGINEERS DRAWINGS, DETAILS AND SPECIFICATIONS.

Revisions:	
#	[Revision Text] [dd/mm/yy]

- Application Site
- Boundary of Ownership
- Tree positioned from aerial imagery
- Tree positioned from topographical Survey (DB Surveys dwg. 20-069-TS)
- Vehicle/ Pedestrian access

Please note any trees shown outside of the application site area have been plotted from aerial imagery and therefore location is subject to a topographical survey

Status:
Pre-Planning Application



Majesty House
Avenue West
Skyline 120
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Client:
Borno

Project:
New residential units
18 Melbourn Street
Royston
Hertfordshire
SG8 7BZ

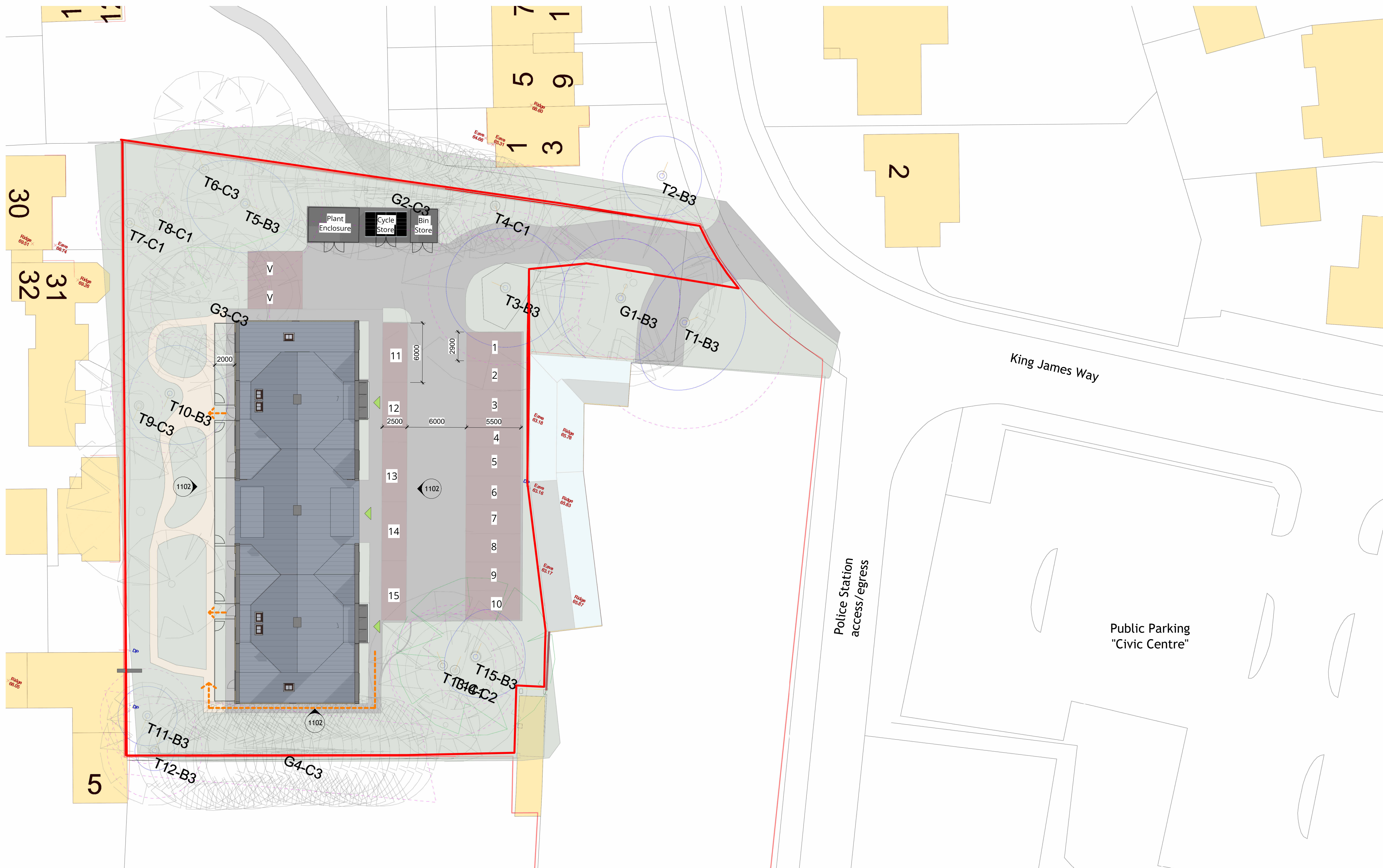
Title:
Site Plan as Existing

Scale @A3:	Date:	Drawn:	Checked:
1:500	March 2022	HB/PP	SB

Drawing no.:	Revision:
BA / P22-0595- 005	

APPENDIX B

PROPOSED SITE LAYOUT



-
- Permeable block paving to parking bays
- Block Paving to roadway
- Soft Landscaping
- Gravel path - Communal outdoor space
- Building access
- Pedestrian movement
-
- Canopy
- Root Protection Area

NOTE
Levels shown are as existing.
Tree locations are subject to review by
arboriculturalist .

Drawing Status:			
PRELIMINARY			
P01	Preliminary Design	19/12/23	HB
Rev	Description	Date	By
		MAJESTY HOUSE, AVENUE WEST SKYLINE 120, BRAINTREE, ESSEX, CM77 7AA T: 01279 647111 E: mail@barker-associates.co.uk W: www.barker-associates.co.uk	
Client			
BARKER ASSOCIATES			
Contract Title			
New Apartments, Land to Rear of Banyers Hotel, Royston, SG8 7BZ			
Drawing Title			
Proposed Block Plan Hard Standing Areas			
Drawn	Checked	Scale	Date
HB		As indicated @ A1	Dec.23
ARCHITECTURAL			
Model Name	P231014-BA-A1-ZZ-M3-A-0001	Project No.	P23-10
Drawing Number		Status	Revision
BNR001-BA-A1-ZZ-DR-A-1006		S0	P01

1 Proposed Block Plan
Scale 1 : 200

APPENDIX C

ANGLIAN WATER PRE-PLANNING ENQUIRY RESPONSE



Pre-Planning Assessment Report

Land To The Rear Of Banyers Hotel, King James Way, Royston, Hertfordshire, SG8 7BZ

InFlow Reference: PPE-0198909

Assessment Type: Used Water

Report published: 14/11/2023



Thank you for submitting a pre-planning enquiry.

This has been produced for AAH Planning Consultants.

Your reference number is **PPE-0198909**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on **07929 786 955** or email planningliaison@anglianwater.co.uk

Section 1 - Proposed development

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
Dwellings	10

The anticipated residential build rate is:

Year	Y1
Build rate	10

Development type: Greenfield
Planning application status: Unknown
Site grid reference number: TL3570540800

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 effluent quality arising from your development.

Water recycling centre

The foul drainage from the proposed development is in the catchment of Royston 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. We have assessed your preferred connection point which is to the 150mm at MH7801 located in King James Way at National Grid reference TL 35741 40837. The cover level is 60.1 and the invert level is 57.61. 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

Whilst there are public surface water sewers within the vicinity of the site, they do not have the capacity to drain your site without creating a high risk of flooding. Therefore, Anglian Water will be unable to provide the site with a feasible solution of surface water disposal within the current assets. Alternative methods of surface water disposal will need to be investigated such as infiltration techniques or a discharge to a watercourse in accordance with the surface water management hierarchy as outlined in Building Regulations Part H. The alternative is that a new surface water sewer is constructed which is used to convey your surface water to a watercourse or as part of a SuDs scheme, where appropriate. Subject to the sewer being designed in accordance with the current version of Sewers For Adoption, the sewer can be put forward for adoption by Anglian Water under Section 104 of the Water Industry Act 1991. If the outfall is to a watercourse, the applicant will be required to obtain consent to discharge via the appropriate body. If your site has no means of drainage due to third party land then you may be able to requisition Anglian Water, under Section 98, to provide a connection to the public sewer for domestic drainage purposes. As part of this option, you may wish to enter into a works agreement in accordance with Section 30 of the Anglian Water Authority Act 1977. This will allow you to design and construct the public sewer using Anglian Waters' statutory powers in accordance with Section 159/168 of the Water Industry Act 1991.

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](#). 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 that 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](#)

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

Your development site will be required to pay an Infrastructure charge for each new property connecting to the public water and sewerage network that benefits from Full planning permission. The infrastructure charge replaces the zonal charge as previously identified.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991.

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

- The Infrastructure Charge is based on the cost of any reinforcement and upgrades to our existing network (“Network Reinforcements”), whether designed to address strategic or local capacity issues. For more information on our Infrastructure Charge, please see the ‘Useful Information’ section of this report.

Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage).

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 400	10	£4,000.00

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the “relevant multiplier” method of calculating the charge and the relevant multiplier will be applied to the figures set out in our 2023-24 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our [website](#).

Section 4 – Connection point map

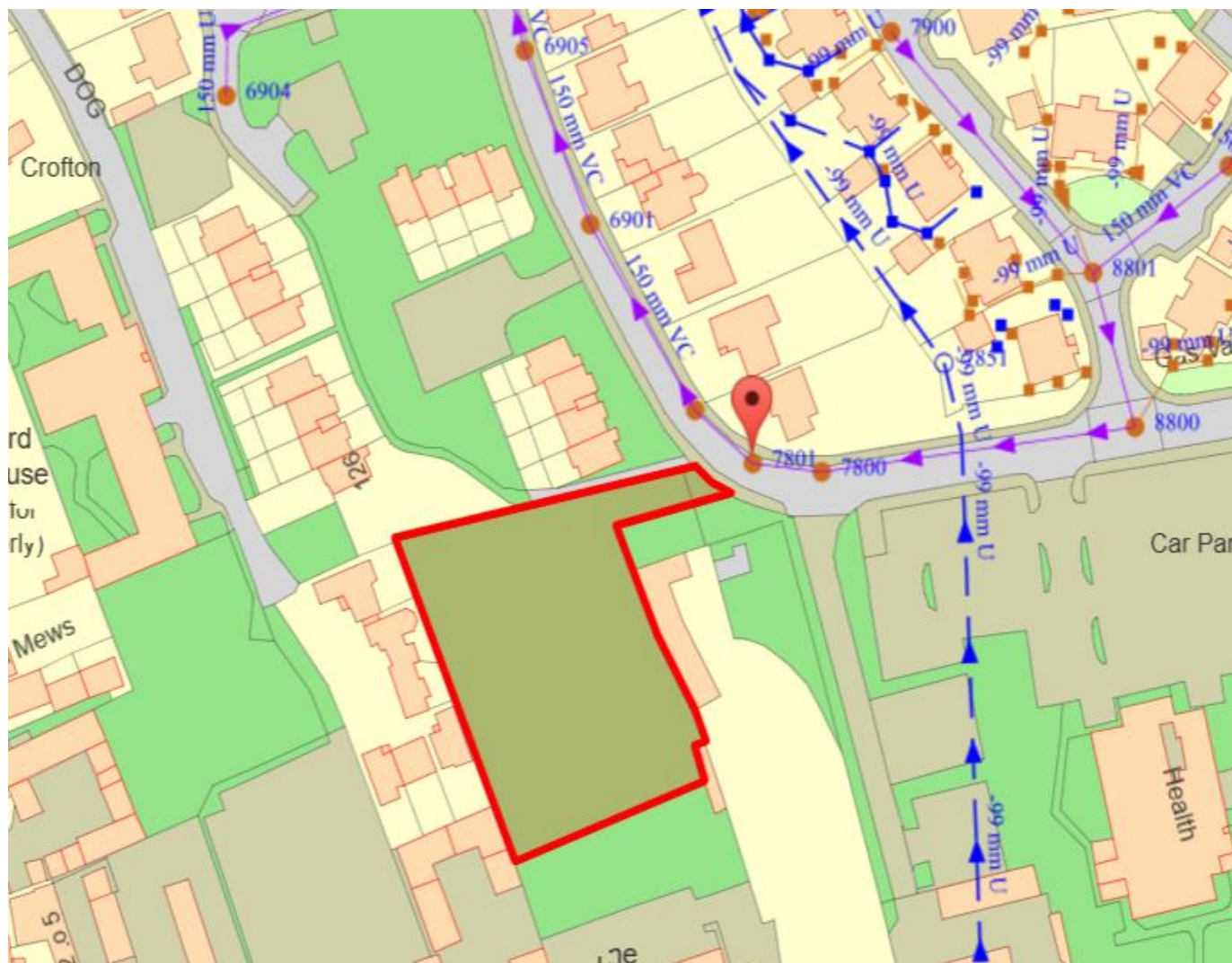


Figure 1: Showing your water recycling foul water point of connection.

Section 5- Useful information

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](#) or via our Development Services team on **0345 60 66 087**.

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. .

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or 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](#)

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site 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 do 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.

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](#)

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 [digdat](#)

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](#)

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our [website](#)

Section 5 - 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.

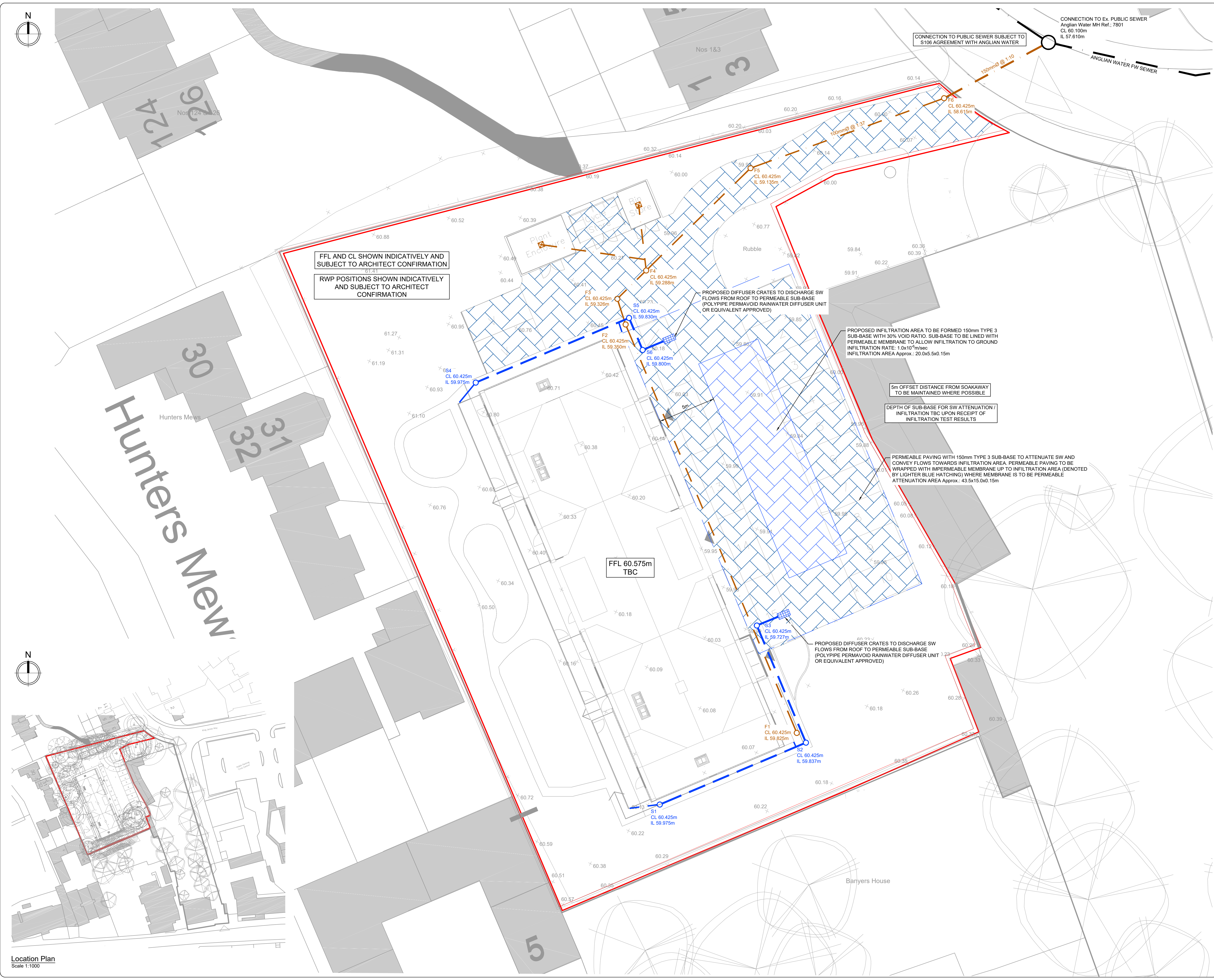
No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content.

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 from the date issued 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). Our pre-planning reports are valid for 12 months, however please note Anglian Water cannot reserve capacity and available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

APPENDIX D

INDICATIVE DRAINAGE STRATEGY



Encon Associates - DISCLAIMER:

- This drawing is copyright and shall not be reproduced nor used for any other purpose without the written permission of Encon Associates - This drawing must be read in conjunction with all other related drawings and documentation - It is the contractors responsibility to ensure full compliance with the relevant Regulations - Until technical approval has been obtained from the relevant Authorities it should be understood that all drawings issued are PRELIMINARY and NOT for Construction - Should the contractor start site work prior to approval been given, it is entirely at his own risk - Do not scale from this drawing, use figured dimensions only - It is the contractors responsibility to check and verify all dimensions on site - Any discrepancies to be reported to Encon Associates immediately - All survey information is provided by the surveying company and Encon Associates cannot accept any liability for any discrepancies there in - All survey information to be verified on site by Contractor - For our Standard Terms and Conditions, please visit www.enconassociates.co.uk/terms - Alternatively, a hard copy can be posted to you

Notes:

1. This drawing to be read in conjunction with all relevant architects and engineers drawings and specifications.

2. Levels shown are metres above ordnance datum, dimensions are in millimetres, unless noted otherwise. Positions of rwp and discharge stacks are shown indicatively and are assumed based on preliminary floor layouts.

3. All drainage works to be carried out in accordance with the requirements of the local authority, the drainage undertaker and in conjunction with part h of the building regulations, all relevant British standards, codes of practice and any addendums as appropriate (to include BS EN 752). All drainage works to be inspected and approved by building control prior to back filling.

4. The invert levels, position and dimensions of surface water drainage must be determined by the watercourse level to the south of the site and confirmed to the satisfaction of the site engineer prior to construction of the drainage network.

5. The invert levels and positions existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.

6. All new drainage to be jetted and CCTV surveyed on completion, contractor to ensure that the drainage is fully operational.

7. Any part of the existing drainage system to be retained as part of the new scheme, including downstream from proposed connections to outfall, shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means, existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 225mm.

PIPEWORK

8. All foul and surface water connections shall be 100mm diameter (foul) and 150mm diameter (surface) and fall at a gradient of at least 1 in 40 (foul water) and 1 in 100 (surface water) unless otherwise noted. Runs to be laid soffit to soffit unless otherwise noted.

9. All private drainage to be laid using flexible jointed pipes, either upvc to BS EN 13476 and BS EN 13598 or vitrified clayware to BS EN 295 and be kitemarked.

10. Generally pipes to have granular bed and surround in accordance with the manufacturers recommendations, ensuring adequate protection with respect to depth and location.

11. Where new sewers/drains are to be constructed within 5m of a new or existing tree, with inadequate cover, or 1m from or lower than structural foundation loading the sewer/drain shall be encased in concrete to guard against subsidence or and root intrusion. Encased pipework to have class z concrete surround.

-Minimum concrete grade GBN3 (C20 strength)

-Lay concrete blinding 25mm over full trench and allow to set

-Lay pipes on blinding on folded wedges of compressible board not less than 100mm above blinding

-Form vertical construction joints in surround at face of pipe joint using 18mm compressible board pre-cut to profile of pipe (all pipes less than 450mm diameter). Fill any gap between segment and socket with resilient material to prevent entry of concrete.

-After initial testing, place and compact more concrete across full width of trench to encase pipe to the greater of 100mm above crown or level with structural foundations.

12. At least one soil pipe at the head of each foul run shall vent to the atmosphere, all drain runs from sumps, stub stacks, or fire gullies to be laid at 1:40 gradient unless otherwise noted.

13. All rainwater pipes (rwp) to be laid at minimum 1:60 gradient unless otherwise stated, access panels are to be provided to all rwp, max 60mm above finished ground level.

14. Rodding eyes are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.

CHAMBERS

15. Covers and frames shall be to BS EN 124 and shall be kitemarked, covers and frames shall be heavy duty (D400) in carriageways and vehicular areas, medium duty (B125) in footways and soft landscaping and light duty (A15) in private non trafficked areas. In blocked/concrete paved areas, covers shall be recessed fabricated steel and orientated 'square' with paving to minimise cut slips or blocks. All recessed covers shall be in accordance with the facta association gradings.

16. Cover levels shown are approximate only and are to be adjusted to suit finished ground levels.

17. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.

SELECTED FILL MATERIAL

18. This should consist of uniform readily compactible material, free from tree roots, vegetable matter, building rubbish and frozen soil. When used as fill the material should not contain large clay lumps or cobbles. As dug material may be used provide that it is readily compatible and provides stable embedment.

WORKMANSHIP

19. All below ground drainage workmanship to be carried out in strict accordance with BS 8000, 'Workmanship of Building Sites, Part 14: Code of Practice for Below Ground Drainage'. The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation. Operatives shall have received full and appropriate training for the operations they are to undertake.

HEALTH AND SAFETY

20. All work shall be carried out in accordance with all pertinent health and safety regulations.

21. Existing below ground services are to be accurately located prior to excavation. Appropriate clearances and methods as required by the asset owners guidance shall be maintained to avoid strikes, damage or undermining.

Key:

Proposed Permeable Paving for Attenuation (To be Impermeably Wrapped)

Proposed Permeable Paving for Infiltration (To be Permeably Wrapped)

Proposed Surface Water Sewer (All pipework to be 150mmØ @ 1:100)

Proposed Foul Water Sewer (All pipework to be 100mmØ @ 1:60 UNO)

Proposed Foul Water Gully

Existing Foul Water Sewer

Rev	Date	Description	Drawn	Checked
		Client		
		Mr H Borno		
		Project		
		Residential Development, King James Way, Royston.		
		Title		
		Indicative Drainage Strategy		
		Drawing Status		
		For Approval		
Drawn	EL	Checked	RH	
Date	08/03/24	Scale (A1)	1:500	

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Sustainable Buildings Consultancy

BREEAM - Landscape Architecture - Arboriculture - Ecology - Traffic & Transportation
Sweep Path Analysis - Energy Assessment - SAP - EPC - SBEM - Thermal Modelling - Daylighting

Job Number	Drawing Number	Rev
A5992	DR-D-1001	A

APPENDIX E

SURFACE WATER HYDRAULIC CALCULATIONS



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.300
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)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.015	5.00	60.425	450	535708.288	240776.127	0.450
2	0.015	5.00	60.425	450	535720.982	240781.500	0.588
3			60.425	450	535716.718	240791.671	0.698
B			60.425	450	535718.538	240792.431	0.718
4	0.015	5.00	60.425	450	535692.306	240812.766	0.450
5	0.015	5.00	60.425	450	535705.624	240818.377	0.595
6			60.425	450	535706.799	240815.599	0.625
A			60.425	450	535708.616	240816.355	0.645
Permeable Paving	0.077	5.00	60.000	450	535720.048	240805.629	0.501
J1			60.000		535723.782	240807.295	0.526

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	13.784	0.600	59.975	59.837	0.138	100.0	150	5.23	50.0
1.001	2	3	11.029	0.600	59.837	59.727	0.110	100.0	150	5.41	50.0
1.002	3	B	1.972	0.600	59.727	59.707	0.020	100.0	150	5.44	50.0
1.003	B	Permeable Paving	13.284	0.600	59.707	59.574	0.133	100.0	150	5.66	50.0
2.000	4	5	14.452	0.600	59.975	59.830	0.145	100.0	150	5.24	50.0
2.001	5	6	3.016	0.600	59.830	59.800	0.030	100.0	150	5.29	50.0
2.002	6	A	1.968	0.600	59.800	59.780	0.020	100.0	150	5.32	50.0
2.003	A	Permeable Paving	15.676	0.600	59.780	59.623	0.157	100.0	150	5.58	50.0
1.004	Permeable Paving	J1	4.089	0.600	59.499	59.474	0.025	163.6	225	5.73	49.7

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	1.005	17.8	2.0	0.300	0.438	0.015	0.0	34	0.670
1.001	1.005	17.8	4.1	0.438	0.548	0.030	0.0	49	0.818
1.002	1.005	17.8	4.1	0.548	0.568	0.030	0.0	49	0.818
1.003	1.005	17.8	4.1	0.568	0.276	0.030	0.0	49	0.818
2.000	1.005	17.8	2.0	0.300	0.445	0.015	0.0	34	0.670
2.001	1.005	17.8	4.1	0.445	0.475	0.030	0.0	49	0.818
2.002	1.005	17.8	4.1	0.475	0.495	0.030	0.0	49	0.818
2.003	1.005	17.8	4.1	0.495	0.227	0.030	0.0	49	0.818
1.004	1.019	40.5	18.5	0.276	0.301	0.137	0.0	107	0.997



Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

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 %)
2	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Permeable Paving Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	59.499	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	14	Depth (m)	0.150
Safety Factor	2.0	Width (m)	15.000	Inf Depth (m)	
Porosity	0.30	Length (m)	43.500		

Node Permeable Paving Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	59.499	Slope (1:X)	300.0
Side Inf Coefficient (m/hr)	0.00360	Time to half empty (mins)	16	Depth (m)	0.150
Safety Factor	2.0	Width (m)	5.500	Inf Depth (m)	
Porosity	0.30	Length (m)	20.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	60.008	0.033	2.0	0.0053	0.0000	OK
15 minute winter	2	10	59.886	0.049	3.9	0.0078	0.0000	OK
15 minute winter	3	11	59.781	0.054	3.8	0.0086	0.0000	OK
15 minute winter	B	11	59.756	0.049	3.8	0.0078	0.0000	OK
15 minute winter	4	10	60.008	0.033	2.0	0.0053	0.0000	OK
15 minute winter	5	10	59.884	0.054	3.9	0.0085	0.0000	OK
15 minute winter	6	11	59.854	0.054	3.8	0.0085	0.0000	OK
15 minute winter	A	11	59.829	0.049	3.8	0.0077	0.0000	OK
15 minute winter	Permeable Paving	14	59.569	0.070	17.2	4.4979	0.0000	OK
15 minute winter	J1	14	59.540	0.066	7.8	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 winter	1	1.000	2	1.9	0.495	0.110	0.0545	
15 minute winter	2	1.001	3	3.8	0.727	0.215	0.0582	
15 minute winter	3	1.002	B	3.8	0.724	0.215	0.0105	
15 minute winter	B	1.003	Permeable Paving	3.8	0.789	0.216	0.0647	
15 minute winter	4	2.000	5	1.9	0.459	0.109	0.0619	
15 minute winter	5	2.001	6	3.8	0.682	0.215	0.0169	
15 minute winter	6	2.002	A	3.8	0.729	0.214	0.0104	
15 minute winter	A	2.003	Permeable Paving	3.8	0.791	0.216	0.0759	
15 minute winter	Permeable Paving	1.004	J1	7.8	0.771	0.192	0.0413	8.1
15 minute winter	Permeable Paving	Infiltration		0.1				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	60.034	0.059	5.9	0.0094	0.0000	OK
15 minute winter	2	10	59.933	0.096	11.7	0.0153	0.0000	OK
15 minute winter	3	11	59.833	0.106	11.5	0.0168	0.0000	OK
15 minute winter	B	11	59.801	0.094	11.4	0.0149	0.0000	OK
15 minute winter	4	10	60.034	0.059	5.9	0.0094	0.0000	OK
15 minute winter	5	10	59.940	0.110	11.7	0.0175	0.0000	OK
15 minute winter	6	11	59.905	0.105	11.5	0.0167	0.0000	OK
15 minute winter	A	11	59.872	0.092	11.3	0.0147	0.0000	OK
15 minute winter	Permeable Paving	14	59.626	0.127	52.1	14.0681	0.0000	OK
15 minute winter	J1	14	59.593	0.119	22.7	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 winter	1	1.000	2	5.8	0.633	0.328	0.1267	
15 minute winter	2	1.001	3	11.5	0.918	0.648	0.1381	
15 minute winter	3	1.002	B	11.4	0.929	0.642	0.0245	
15 minute winter	B	1.003	Permeable Paving	11.5	1.036	0.648	0.1476	
15 minute winter	4	2.000	5	5.8	0.570	0.328	0.1465	
15 minute winter	5	2.001	6	11.5	0.852	0.646	0.0406	
15 minute winter	6	2.002	A	11.3	0.936	0.638	0.0242	
15 minute winter	A	2.003	Permeable Paving	11.5	1.040	0.646	0.1727	
15 minute winter	Permeable Paving	1.004	J1	22.7	1.020	0.560	0.0909	24.5
15 minute winter	Permeable Paving	Infiltration		0.1				

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	60.042	0.067	7.5	0.0107	0.0000	OK
15 minute winter	2	10	59.954	0.117	14.9	0.0186	0.0000	OK
15 minute winter	3	11	59.858	0.131	14.7	0.0209	0.0000	OK
15 minute winter	B	11	59.819	0.112	14.6	0.0178	0.0000	OK
15 minute winter	4	10	60.042	0.067	7.5	0.0107	0.0000	OK
15 minute winter	5	11	59.969	0.139	14.9	0.0221	0.0000	OK
15 minute winter	6	11	59.930	0.130	14.6	0.0206	0.0000	OK
15 minute winter	A	11	59.891	0.111	14.5	0.0176	0.0000	OK
30 minute winter	Permeable Paving	23	59.646	0.147	51.9	18.3033	0.0000	OK
30 minute winter	J1	23	59.611	0.137	28.3	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 winter	1	1.000	2	7.4	0.656	0.419	0.1545	
15 minute winter	2	1.001	3	14.7	0.953	0.825	0.1704	
15 minute winter	3	1.002	B	14.6	0.964	0.822	0.0300	
15 minute winter	B	1.003	Permeable Paving	14.7	1.083	0.826	0.1798	
15 minute winter	4	2.000	5	7.4	0.591	0.419	0.1780	
15 minute winter	5	2.001	6	14.6	0.887	0.821	0.0501	
15 minute winter	6	2.002	A	14.5	0.974	0.817	0.0296	
15 minute winter	A	2.003	Permeable Paving	14.6	1.087	0.821	0.2101	
30 minute winter	Permeable Paving	1.004	J1	28.3	1.073	0.697	0.1077	40.5
30 minute winter	Permeable Paving	Infiltration		0.1				

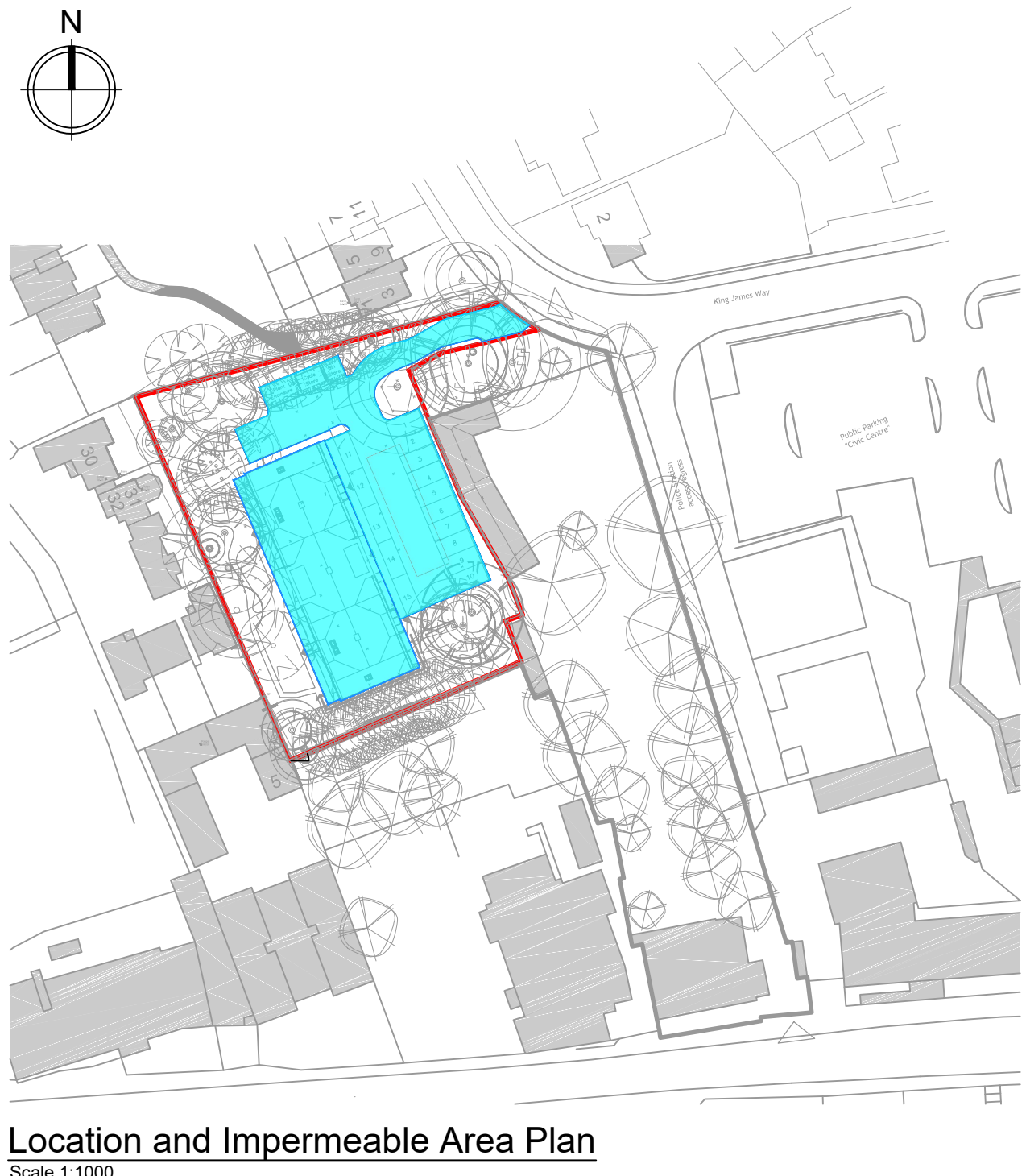
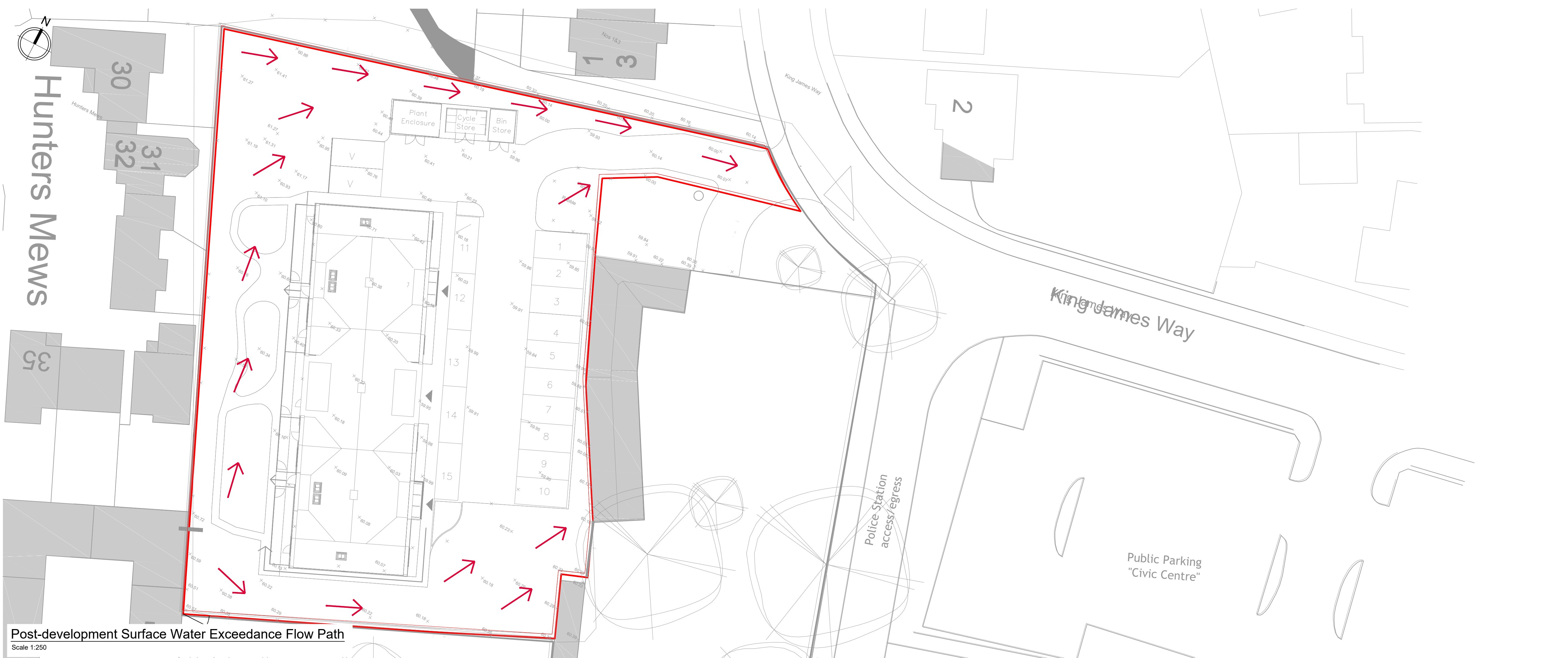
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	60.157	0.182	10.5	0.0289	0.0000	FLOOD RISK
15 minute winter	2	12	60.120	0.283	19.5	0.0450	0.0000	SURCHARGED
15 minute winter	3	12	60.000	0.273	19.1	0.0435	0.0000	SURCHARGED
15 minute winter	B	12	59.962	0.255	18.7	0.0405	0.0000	SURCHARGED
15 minute winter	4	12	60.128	0.153	10.5	0.0243	0.0000	FLOOD RISK
15 minute winter	5	12	60.089	0.259	19.8	0.0412	0.0000	SURCHARGED
15 minute winter	6	12	60.038	0.238	19.2	0.0378	0.0000	SURCHARGED
15 minute winter	A	12	59.996	0.216	18.9	0.0344	0.0000	SURCHARGED
15 minute winter	Permeable Paving	12	59.823	0.324	89.6	19.1916	0.0000	FLOOD RISK
15 minute winter	J1	12	59.686	0.212	75.1	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 winter	1	1.000	2	9.6	0.674	0.543	0.2427	
15 minute winter	2	1.001	3	19.1	1.083	1.074	0.1942	
15 minute winter	3	1.002	B	18.7	1.065	1.056	0.0347	
15 minute winter	B	1.003	Permeable Paving	18.4	1.090	1.036	0.2339	
15 minute winter	4	2.000	5	9.5	0.622	0.537	0.2544	
15 minute winter	5	2.001	6	19.2	1.093	1.083	0.0531	
15 minute winter	6	2.002	A	18.9	1.076	1.067	0.0346	
15 minute winter	A	2.003	Permeable Paving	18.7	1.093	1.054	0.2760	
15 minute winter	Permeable Paving	1.004	J1	75.1	1.890	1.854	0.1607	43.0
15 minute winter	Permeable Paving	Infiltration		0.1				

APPENDIX F

SURFACE WATER EXCEEDANCE PLAN



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- This drawing is copyright and shall not be reproduced nor used for any other purpose without the written permission of Encon Associates - This drawing must be read in conjunction with all other related drawings and documentation - It is the contractors responsibility to ensure full compliance with the relevant Regulations - Until technical approval has been obtained from the relevant Authorities it should be understood that all drawings issued are PRELIMINARY and NOT for Construction - Should the contractor start site work prior to approval been given, it is entirely at his own risk - Do not scale from this drawing, use figured dimensions only - It is the contractors responsibility to check and verify all dimensions on site - Any discrepancies to be reported to Encon Associates immediately - All survey information is provided by the surveying company and Encon Associates cannot accept any liability for any discrepancies there in - All survey information to be verified on site by Contractor - For our Standard Terms and Conditions, please visit www.enconassociates.co.uk/terms - Alternatively, a hard copy can be posted to you

Key:

Pre-development Surface Water Exceedance Flow Path

Post-development Surface Water Exceedance Flow Path

Contributing Impermeable Area

Proposed Site Boundary

Rev	Date	Description	Drawn	Checked
Client				
Mr H Borno				
Project				
Residential Development, King James Way, Royston.				
Title				
Surface Water Exceedance Plan				
Drawing Status				
For Approval				
Drawn	EL	Checked	RH	
Date	08/03/24	Scale (A1)	As Noted	
encon associates 10 Chapel Lane Arnold Nottingham NG5 7DR T: 0115 967 55 99 E: enquiries@enconassociates.co.uk W: www.enconassociates.co.uk Sustainable Buildings Consultancy - BREEAM - Landscape Architecture - Arboriculture - Ecology - Traffic & Transportation - Sweep Path Analysis - Energy Assessment - SAP - EPC - SBEM - Thermal Modelling - Daylighting				
Job Number	Drawing Number	Rev		
A5992	DR-D-1000	A		

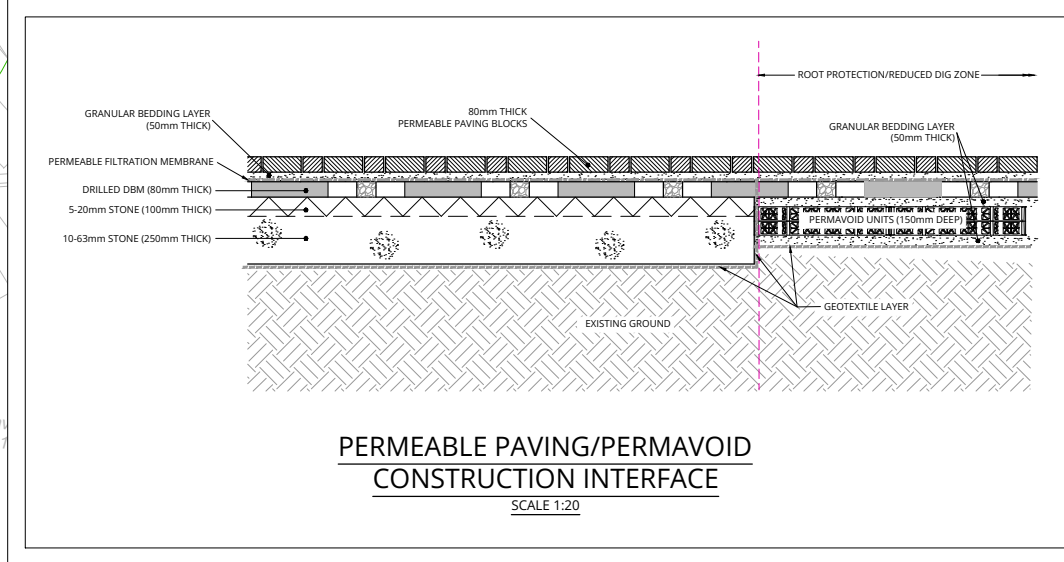
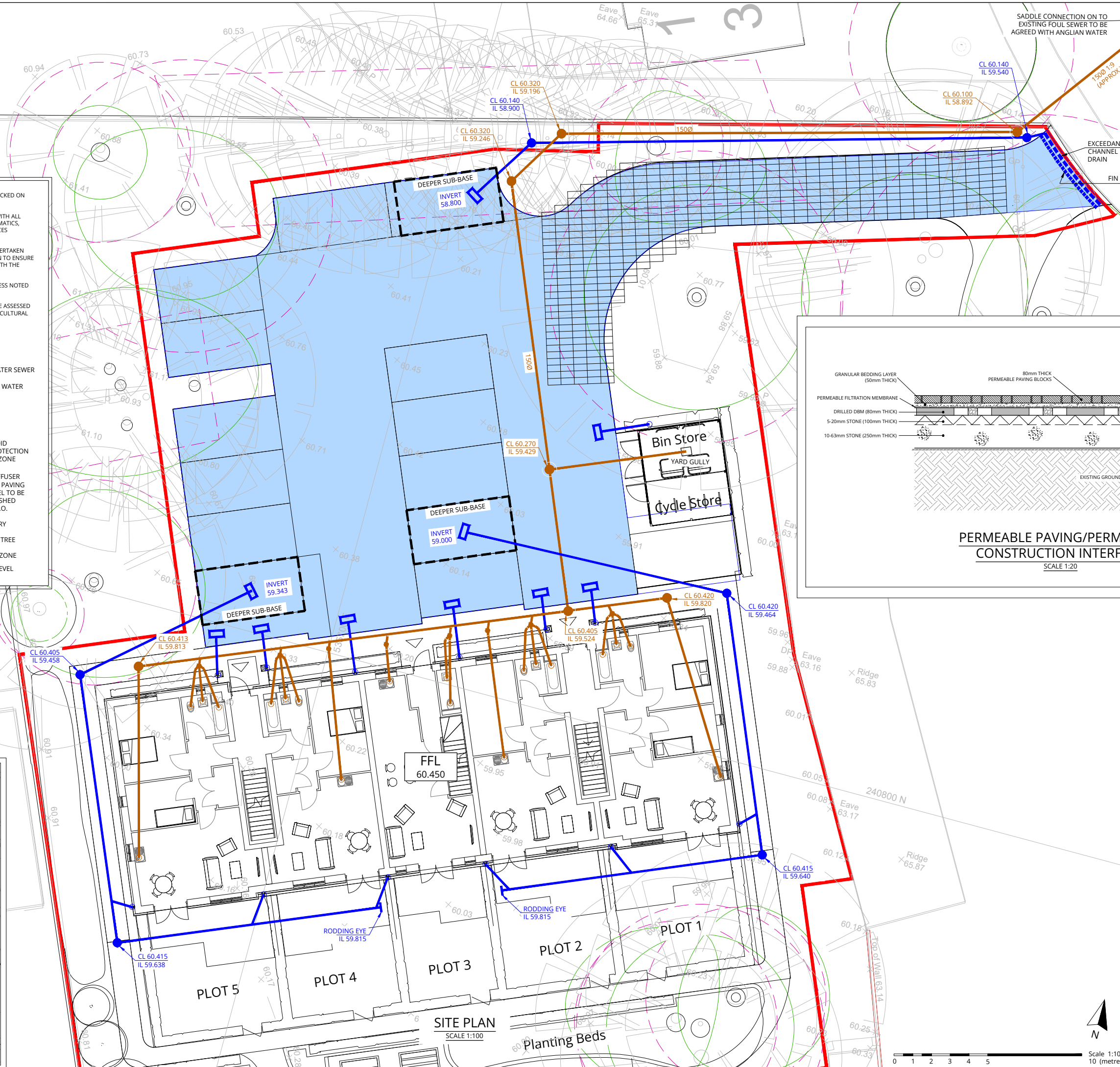
Appendix B: Drainage Strategy Drawing

NOTES:

1. ALL LEVELS, ANGLES AND DIMENSIONS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT BARKER ASSOCIATES DRAWINGS, SCHEMATICS, ARCHITECTS, STRUCTURAL AND ALL OTHER SERVICES DRAWINGS, SPECIFICATIONS AND SCHEDULES.
3. ALL ON SITE ENGINEERING WORKS SHALL BE UNDERTAKEN WITH ADEQUATE CLIENT APPOINTED SUPERVISION TO ENSURE SAFE AND CORRECT DELIVERY IN ACCORDANCE WITH THE APPROVED DRAWINGS AND SPECIFICATIONS.
4. ALL PIPEWORK TO BE 100mmØ, LAID AT 1:80 UNLESS NOTED OTHERWISE.
5. ALL WORKS WITHIN TREE INFLUENCE ZONES TO BE ASSESSED AND CONFIRMED BY SUITABLY QUALIFIED ARBORICULTURAL CONSULTANT.

LEGEND

- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- PERMEABLE PAVING
- EXTENT OF PERMAVOID SYSTEM IN ROOT PROTECTION AREA/REDUCED DIG ZONE
- SURFACE WATER DIFFUSER LAID AT PERMEABLE PAVING INVERT, INVERT LEVEL TO BE 50mm BELOW FINISHED GROUND LEVEL U.N.O.
- PLANNING BOUNDARY
- EXTENT OF EXISTING TREE ROOT PROTECTION AREA/REDUCED DIG ZONE
- EXISTING GROUND LEVEL



Drawing Status:			
PLANNING			
P01	ISSUED FOR PLANNING	09.01.25	BWL
Rev	Description	Date	By
Barker Majesty House, Avenue West Skyline 120, Braintree Essex, CM77 7AA T: 01279 647111 W: www.barker-associates.co.uk E: mail@barker-associates.co.uk © THIS DRAWING IS A COPYRIGHT OF BARKER ASSOCIATES.			
Client			
PRIVATE CLIENT			
Project Title			
NEW APARTMENTS, LAND TO THE REAR OF BANYERS HOTEL, ROYSTON SG8 7BZ			
Drawing Title			
PROPOSED DRAINAGE STRATEGY			
CIVILS			
Project No. P24-0782	Date Nov.24	Drawn BWL	Checked GW
Scale: AS SHOWN @A1	Status S4	Revision	P01
Drawing Number			
LCP-BNR001-BA-A1-ZZ-DR-C-2007			

Appendix C: Hydraulic Modelling Report



Barker

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM	Date: 06/01/2025		
	Designed by: GarethWebber	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Barker Associates Main Office CM77 7AA		





Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	60.200
Depth (m)	0.560
Base Level (m)	59.640
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	4.0
Porosity (%)	30
Length (m)	39.720
Long. Slope (1:X)	100.00
Width (m)	14.559
Total Volume (m³)	83.272

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Advanced

Base Infiltration Rate (m/hr)	0.0036
Side Infiltration Rate (m/hr)	0.0036
Safety Factor	2.0
Conductivity (m/hr)	500.0

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025			
		Designed by: GarethWebber	Checked by:		Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (1)	Porous Paving		Time of Concentration	0.045	100	0	100	0.045
TOTAL		0.0		0.055				0.055

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM	Date: 06/01/2025		
	Designed by: GarethWebber	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address: Barker Associates Main Office CM77 7AA		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025			
		Designed by: GarethWebber	Checked by:		Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA			



Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Summer	0.01	6.4	2.866
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Summer	0.04	26.8	12.081

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025			
		Designed by: GarethWebber	Checked by:		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA			



Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 100 years: +40 %: 480 mins: Winter	60.309	59.958	0.272	0.318	3.2	30.110	0.000	14.380	0.0	0.000	63.841	OK

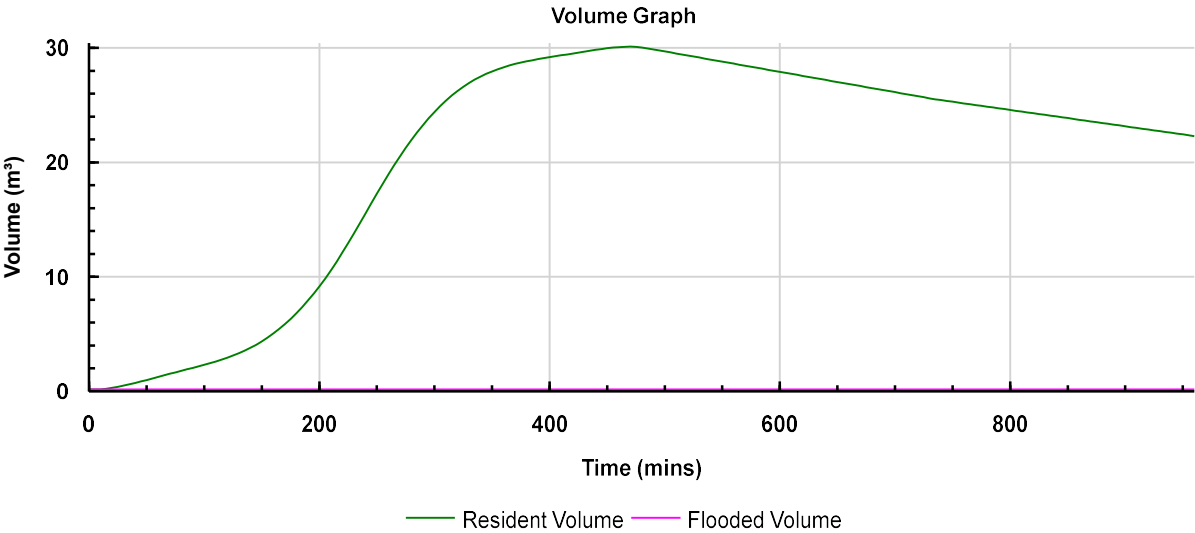
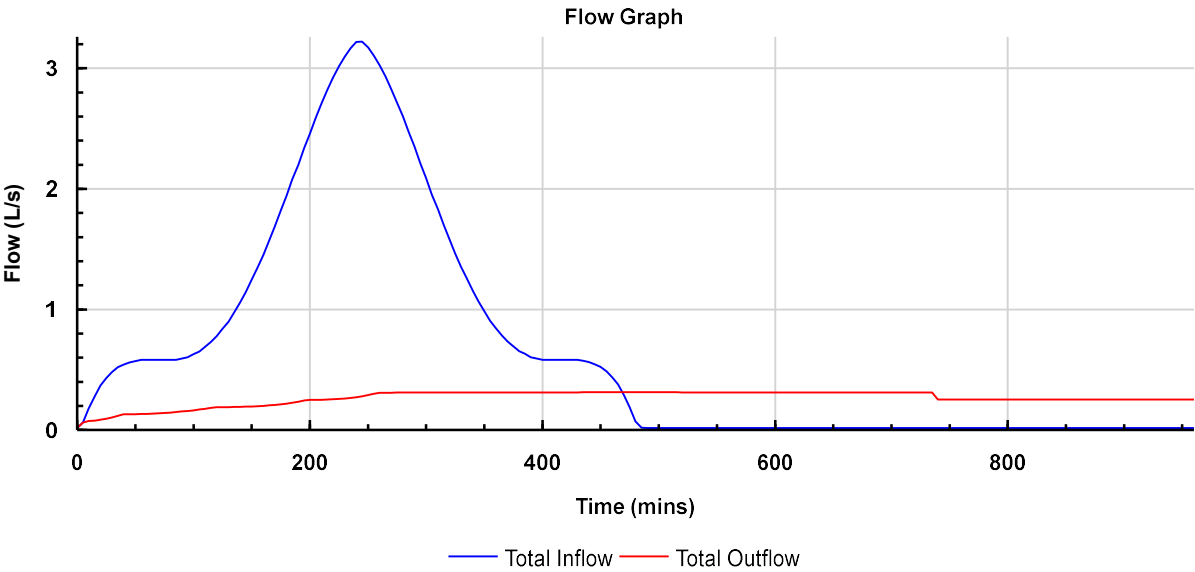
Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM	Date: 06/01/2025		
	Designed by: GarethWebber	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Barker Associates Main Office CM77 7AA		



Porous Paving
Critical Storm: FSR: 100 years: Increase Rainfall (%): +40: 480 mins: Winter

Type : Porous Paving

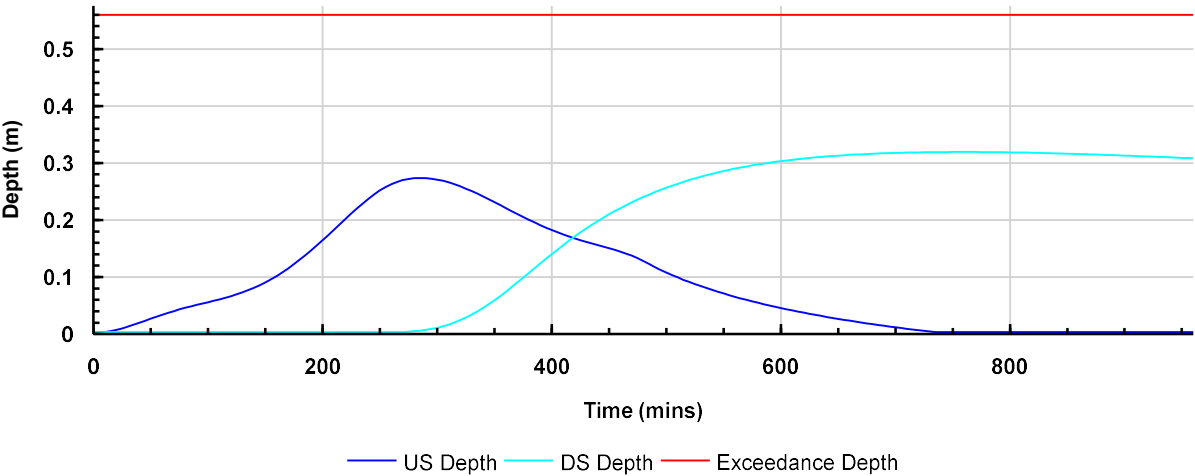
Graphs



Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM	Date: 06/01/2025		
	Designed by: GarethWebber	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Barker Associates Main Office CM77 7AA		



Depth Graph



Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM	Date: 06/01/2025		
	Designed by: GarethWebber	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: Barker Associates Main Office CM77 7AA		



Tables

Half Drain Down Time (mins)	943
--------------------------------	-----

Time (mins)	Total Inflow (L/s)	US Depth (m)	DS Depth (m)	Resident Volume(m³)	Flooded Volume (m³)	Total Outflow (L/s)
0	0.0	0.000	0.000	0.000	0.000	0.0
5	0.0	0.000	0.000	0.000	0.000	0.0
10	0.2	0.000	0.000	0.012	0.000	0.1
15	0.3	0.002	0.000	0.057	0.000	0.1
20	0.4	0.004	0.000	0.129	0.000	0.1
25	0.4	0.007	0.000	0.222	0.000	0.1
30	0.5	0.010	0.000	0.329	0.000	0.1
35	0.5	0.013	0.000	0.446	0.000	0.1
40	0.5	0.017	0.000	0.569	0.000	0.1
45	0.5	0.020	0.000	0.696	0.000	0.1
50	0.6	0.024	0.000	0.827	0.000	0.1
55	0.6	0.027	0.000	0.961	0.000	0.1
60	0.6	0.031	0.000	1.096	0.000	0.1
65	0.6	0.034	0.000	1.231	0.000	0.1
70	0.6	0.037	0.000	1.365	0.000	0.1
75	0.6	0.040	0.000	1.499	0.000	0.1
80	0.6	0.043	0.000	1.631	0.000	0.1
85	0.6	0.045	0.000	1.763	0.000	0.1
90	0.6	0.048	0.000	1.894	0.000	0.1
95	0.6	0.050	0.000	2.027	0.000	0.1
100	0.6	0.053	0.000	2.164	0.000	0.1
105	0.6	0.055	0.000	2.307	0.000	0.2
110	0.7	0.058	0.000	2.457	0.000	0.2
115	0.7	0.061	0.000	2.616	0.000	0.2
120	0.8	0.064	0.000	2.787	0.000	0.2
125	0.8	0.067	0.000	2.972	0.000	0.2
130	0.9	0.070	0.000	3.176	0.000	0.2
135	1.0	0.074	0.000	3.400	0.000	0.2
140	1.0	0.078	0.000	3.648	0.000	0.2
145	1.1	0.083	0.000	3.920	0.000	0.2
150	1.2	0.088	0.000	4.220	0.000	0.2
155	1.3	0.093	0.000	4.550	0.000	0.2
160	1.4	0.099	0.000	4.910	0.000	0.2
165	1.6	0.106	0.000	5.303	0.000	0.2
170	1.7	0.113	0.000	5.731	0.000	0.2
175	1.8	0.120	0.000	6.195	0.000	0.2
180	1.9	0.128	0.000	6.695	0.000	0.2
185	2.1	0.136	0.000	7.232	0.000	0.2
190	2.2	0.144	0.000	7.805	0.000	0.2
195	2.3	0.153	0.000	8.414	0.000	0.2
200	2.5	0.162	0.000	9.061	0.000	0.2
205	2.6	0.171	0.000	9.744	0.000	0.2
210	2.7	0.181	0.000	10.464	0.000	0.2
215	2.8	0.190	0.000	11.219	0.000	0.2
220	2.9	0.200	0.000	12.007	0.000	0.2
225	3.0	0.209	0.000	12.824	0.000	0.2
230	3.1	0.218	0.000	13.667	0.000	0.2
235	3.2	0.227	0.000	14.530	0.000	0.3
240	3.2	0.235	0.000	15.411	0.000	0.3
245	3.2	0.243	0.000	16.299	0.000	0.3
250	3.2	0.250	0.000	17.178	0.000	0.3

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025	
		Designed by: GarethWebber	Checked by: Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA	



Time (mins)	Total Inflow (L/s)	US Depth (m)	DS Depth (m)	Resident Volume(m³)	Flooded Volume(m³)	Total Outflow (L/s)
255	3.1	0.256	0.000	18.036	0.000	0.3
260	3.0	0.261	0.000	18.869	0.000	0.3
265	2.9	0.265	0.000	19.676	0.000	0.3
270	2.8	0.268	0.000	20.453	0.000	0.3
275	2.7	0.270	0.001	21.197	0.000	0.3
280	2.6	0.272	0.002	21.906	0.000	0.3
285	2.5	0.272	0.003	22.579	0.000	0.3
290	2.3	0.272	0.004	23.214	0.000	0.3
295	2.2	0.271	0.006	23.810	0.000	0.3
300	2.1	0.269	0.008	24.366	0.000	0.3
305	1.9	0.267	0.010	24.884	0.000	0.3
310	1.8	0.264	0.013	25.363	0.000	0.3
315	1.7	0.261	0.017	25.804	0.000	0.3
320	1.6	0.257	0.021	26.208	0.000	0.3
325	1.5	0.253	0.026	26.575	0.000	0.3
330	1.3	0.249	0.031	26.908	0.000	0.3
335	1.2	0.244	0.036	27.209	0.000	0.3
340	1.1	0.240	0.043	27.479	0.000	0.3
345	1.1	0.235	0.049	27.721	0.000	0.3
350	1.0	0.229	0.056	27.937	0.000	0.3
355	0.9	0.224	0.064	28.130	0.000	0.3
360	0.8	0.219	0.071	28.300	0.000	0.3
365	0.8	0.214	0.079	28.453	0.000	0.3
370	0.7	0.208	0.088	28.588	0.000	0.3
375	0.7	0.203	0.096	28.710	0.000	0.3
380	0.6	0.198	0.104	28.820	0.000	0.3
385	0.6	0.194	0.113	28.920	0.000	0.3
390	0.6	0.189	0.121	29.013	0.000	0.3
395	0.6	0.184	0.129	29.099	0.000	0.3
400	0.6	0.180	0.137	29.183	0.000	0.3
405	0.6	0.176	0.145	29.264	0.000	0.3
410	0.6	0.172	0.153	29.346	0.000	0.3
415	0.6	0.169	0.161	29.427	0.000	0.3
420	0.6	0.165	0.168	29.509	0.000	0.3
425	0.6	0.162	0.176	29.590	0.000	0.3
430	0.6	0.159	0.182	29.672	0.000	0.3
435	0.6	0.156	0.189	29.752	0.000	0.3
440	0.6	0.154	0.196	29.829	0.000	0.3
445	0.5	0.151	0.202	29.902	0.000	0.3
450	0.5	0.148	0.208	29.969	0.000	0.3
455	0.5	0.145	0.213	30.028	0.000	0.3
460	0.4	0.142	0.219	30.073	0.000	0.3
465	0.4	0.139	0.224	30.103	0.000	0.3
470	0.3	0.135	0.229	30.110	0.000	0.3
475	0.2	0.131	0.234	30.089	0.000	0.3
480	0.1	0.126	0.238	30.036	0.000	0.3
485	0.0	0.120	0.243	29.956	0.000	0.3
490	0.0	0.115	0.247	29.866	0.000	0.3
495	0.0	0.110	0.251	29.777	0.000	0.3
500	0.0	0.105	0.255	29.687	0.000	0.3
505	0.0	0.101	0.258	29.598	0.000	0.3
510	0.0	0.096	0.262	29.508	0.000	0.3
515	0.0	0.092	0.265	29.419	0.000	0.3
520	0.0	0.089	0.268	29.329	0.000	0.3
525	0.0	0.085	0.271	29.239	0.000	0.3
530	0.0	0.081	0.274	29.150	0.000	0.3
535	0.0	0.078	0.277	29.060	0.000	0.3

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025	
		Designed by: GarethWebber	Checked by: Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA	



Time (mins)	Total Inflow (L/s)	US Depth (m)	DS Depth (m)	Resident Volume(m³)	Flooded Volume(m³)	Total Outflow (L/s)
540	0.0	0.075	0.279	28.971	0.000	0.3
545	0.0	0.071	0.282	28.881	0.000	0.3
550	0.0	0.068	0.284	28.792	0.000	0.3
555	0.0	0.065	0.286	28.702	0.000	0.3
560	0.0	0.062	0.288	28.613	0.000	0.3
565	0.0	0.060	0.290	28.523	0.000	0.3
570	0.0	0.057	0.292	28.434	0.000	0.3
575	0.0	0.054	0.294	28.344	0.000	0.3
580	0.0	0.052	0.296	28.255	0.000	0.3
585	0.0	0.050	0.297	28.166	0.000	0.3
590	0.0	0.047	0.299	28.076	0.000	0.3
595	0.0	0.045	0.300	27.987	0.000	0.3
600	0.0	0.043	0.302	27.897	0.000	0.3
605	0.0	0.040	0.303	27.808	0.000	0.3
610	0.0	0.038	0.304	27.718	0.000	0.3
615	0.0	0.036	0.305	27.629	0.000	0.3
620	0.0	0.034	0.306	27.540	0.000	0.3
625	0.0	0.032	0.307	27.450	0.000	0.3
630	0.0	0.031	0.308	27.361	0.000	0.3
635	0.0	0.029	0.309	27.271	0.000	0.3
640	0.0	0.027	0.310	27.182	0.000	0.3
645	0.0	0.025	0.311	27.093	0.000	0.3
650	0.0	0.023	0.311	27.003	0.000	0.3
655	0.0	0.022	0.312	26.914	0.000	0.3
660	0.0	0.020	0.313	26.825	0.000	0.3
665	0.0	0.019	0.313	26.735	0.000	0.3
670	0.0	0.017	0.314	26.646	0.000	0.3
675	0.0	0.016	0.314	26.557	0.000	0.3
680	0.0	0.014	0.315	26.468	0.000	0.3
685	0.0	0.013	0.315	26.378	0.000	0.3
690	0.0	0.011	0.316	26.289	0.000	0.3
695	0.0	0.010	0.316	26.200	0.000	0.3
700	0.0	0.009	0.316	26.110	0.000	0.3
705	0.0	0.007	0.316	26.021	0.000	0.3
710	0.0	0.006	0.317	25.932	0.000	0.3
715	0.0	0.005	0.317	25.843	0.000	0.3
720	0.0	0.004	0.317	25.753	0.000	0.3
725	0.0	0.002	0.317	25.664	0.000	0.3
730	0.0	0.001	0.317	25.575	0.000	0.3
735	0.0	0.000	0.318	25.486	0.000	0.3
740	0.0	0.000	0.318	25.412	0.000	0.2
745	0.0	0.000	0.318	25.340	0.000	0.2
750	0.0	0.000	0.318	25.268	0.000	0.2
755	0.0	0.000	0.318	25.197	0.000	0.2
760	0.0	0.000	0.318	25.125	0.000	0.2
765	0.0	0.000	0.318	25.053	0.000	0.2
770	0.0	0.000	0.318	24.981	0.000	0.2
775	0.0	0.000	0.318	24.909	0.000	0.2
780	0.0	0.000	0.318	24.838	0.000	0.2
785	0.0	0.000	0.318	24.766	0.000	0.2
790	0.0	0.000	0.317	24.694	0.000	0.2
795	0.0	0.000	0.317	24.622	0.000	0.2
800	0.0	0.000	0.317	24.550	0.000	0.2
805	0.0	0.000	0.317	24.479	0.000	0.2
810	0.0	0.000	0.317	24.407	0.000	0.2
815	0.0	0.000	0.317	24.335	0.000	0.2
820	0.0	0.000	0.316	24.263	0.000	0.2

Project: New Apartments, Land to Rear of Banyers Hotel, Royston - SWM		Date: 06/01/2025	
		Designed by: GarethWebber	Checked by: Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Company Address: Barker Associates Main Office CM77 7AA	



Time (mins)	Total Inflow (L/s)	US Depth (m)	DS Depth (m)	Resident Volume(m³)	Flooded Volume(m³)	Total Outflow (L/s)
825	0.0	0.000	0.316	24.192	0.000	0.2
830	0.0	0.000	0.316	24.120	0.000	0.2
835	0.0	0.000	0.316	24.048	0.000	0.2
840	0.0	0.000	0.315	23.976	0.000	0.2
845	0.0	0.000	0.315	23.905	0.000	0.2
850	0.0	0.000	0.315	23.833	0.000	0.2
855	0.0	0.000	0.315	23.761	0.000	0.2
860	0.0	0.000	0.314	23.689	0.000	0.2
865	0.0	0.000	0.314	23.618	0.000	0.2
870	0.0	0.000	0.314	23.546	0.000	0.2
875	0.0	0.000	0.313	23.474	0.000	0.2
880	0.0	0.000	0.313	23.403	0.000	0.2
885	0.0	0.000	0.313	23.331	0.000	0.2
890	0.0	0.000	0.312	23.259	0.000	0.2
895	0.0	0.000	0.312	23.188	0.000	0.2
900	0.0	0.000	0.312	23.116	0.000	0.2
905	0.0	0.000	0.311	23.044	0.000	0.2
910	0.0	0.000	0.311	22.973	0.000	0.2
915	0.0	0.000	0.310	22.901	0.000	0.2
920	0.0	0.000	0.310	22.829	0.000	0.2
925	0.0	0.000	0.310	22.758	0.000	0.2
930	0.0	0.000	0.309	22.686	0.000	0.2
935	0.0	0.000	0.309	22.614	0.000	0.2
940	0.0	0.000	0.308	22.543	0.000	0.2
945	0.0	0.000	0.308	22.471	0.000	0.2
950	0.0	0.000	0.308	22.399	0.000	0.2
955	0.0	0.000	0.307	22.328	0.000	0.2
960	0.0	0.000	0.307	22.254	0.000	0.2