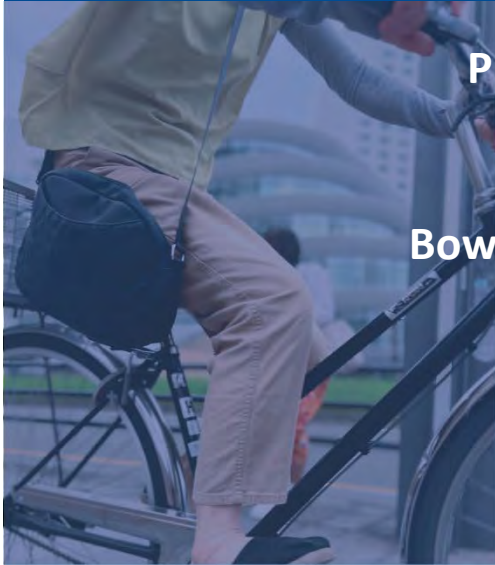


- Infrastructure Design
- Development Planning
- Geotechnical & Environmental
- Structural Engineering
- Professional Advice
- Surveying



Proposed Residential Development Land north-east of Harpenden, between Lower Luton Road, Bower Heath Lane and Common Lane, Harpenden



Flood Risk Assessment and Drainage Strategy

Revision G: March 2026
R-FRA-28236-01-G



JPP Consulting Ltd Registered in England 11117245

Registered office

NORTHAMPTON

Grand Union Works
Whilton Locks
Daventry
Northamptonshire
NN11 2NH
01604 781811
T01 - 8

KETTERING

Unit 7
Orion Park | Orion Way
Kettering
Northamptonshire
NN15 6PP
01536 737224

MILTON KEYNES

Unit B2A Denbigh Business Centre
23 First Avenue | Denbigh
Milton Keynes
Buckinghamshire
MK1 1DN
01908 889433

POOLE

Suite 8 Branksome Park House
Branksome Business Park
Bourne Valley Road | Poole
Dorset
BH12 1ED
01202 540888

**Proposed Residential Development
Land north-east of Harpenden,
between Lower Luton Road,
Bower Heath Lane and Common Lane,
Harpenden**

Flood Risk Assessment and Drainage Strategy

JPP Consulting Ltd., Grand Union Works, Whilton Locks, Daventry, Northamptonshire, NN11 2NH

T: 01604 781811

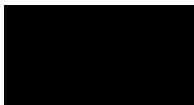
E: mail@jppuk.net

W: jppuk.net

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Report Originators

Prepared by



Thomas Kirk BSc (Hons)
Engineer
thomas.kirk@jppuk.net

Reviewed by



Katherine Rose BSc (Hons) CEnv MEnvSc MCIHT
Associate
katherine.rose@jppuk.net

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0	12 th August 2025	Issue	Thomas Kirk	Katherine Rose
A	14 th October 2025	Updated Parameter Plans	Katherine Rose	Katherine Rose
B	23 rd October 2025	Updated Parameter Plans and development description	Katherine Rose	Katherine Rose
C	6 th November 2025	Revised to reflect latest drainage strategy arrangement.	Thomas Kirk	Katherine Rose
D	27 th November 2025	Additional maintenance information included	Thomas Kirk	Katherine Rose
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F	26 th February 2026	Updated Site Boundary	Thomas Kirk	Katherine Rose
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1.0 Introduction

1.1 Background

1.1.1 This report is a Flood Risk Assessment and Drainage Strategy which has been prepared by JPP Consulting Limited on behalf of Crest Nicholson Ltd for a proposed residential development. The benefit of this report is to our instructing Client.

1.1.2 The proposed residential development is located at land north-east of Harpenden between Lower Luton Road, Bower Heath Lane and Common Lane, as shown in Figure 1.1 below and enclosed in **Appendix A**. Harpenden is located circa 7km north of St Albans and 8km south-east of Luton. The approximate National Grid Reference for the site is E514435 N216015. The proposed development has a total development area of 32.937ha.

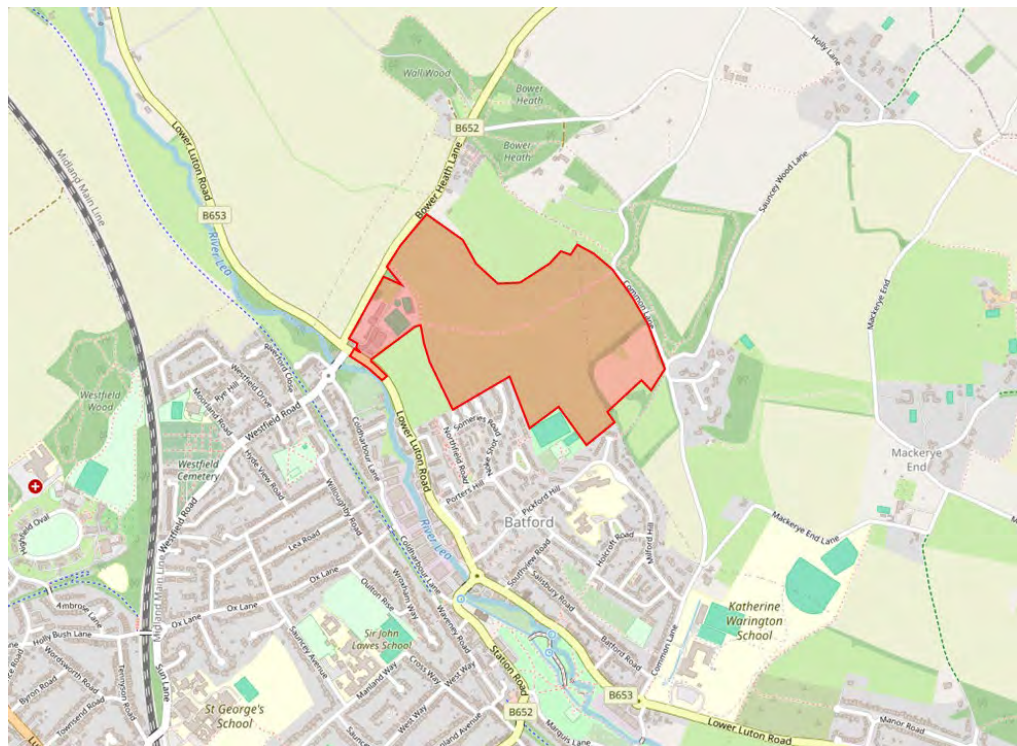


Figure 1.1 Site Location Plan
Source: OpenStreetMap, obtained 23.02.2026

1.2 Objectives

1.2.1 The objective of this report is to advise interested parties regarding the potential risk of flooding and the management of surface water run-off arising from the proposals.

1.2.2 This report has been prepared to support an outline planning application, set out as follows:

Outline Application for demolition of existing buildings and structures and construction of a mixed-use development comprising residential dwellings (including affordable housing), children's home, elderly extra care facility, local centre (flexible retail/ health/ community use), sports pitches and associated building, green infrastructure and landscaping works (to include public open space and community growing space); primary school with early years provision, vehicular and active travel infrastructure (including pedestrian and cycle access) and diversion of Bower Heath Lane; drainage works; and related infrastructure. All matters reserved save for access from Lower Luton Road.

- 1.2.3 The preparation of this Flood Risk Assessment and Drainage Strategy has been informed by pre-application discussions with Hertfordshire County Council as the Lead Local Flood Authority (LLFA).

2.0 Policy review

2.1 Introduction

- 2.1.1 The following section of the report details key national and local policies relating to flood risk and drainage, which will inform the assessment of the proposed development.

2.2 Reference documents

- 2.2.1 This report has been prepared with reference to the following publications:-

- Department for Environment, Food and Rural Affairs (updated July 2025), National standards for sustainable drainage systems (SuDS)
- Ministry of Housing, Communities and Local Government (March 2012, updated December 2024), National Planning Policy Framework
- Ministry of Housing, Communities and Local Government (March 2014, updated August 2022), Planning Practice Guidance 'Flood Risk and Coastal Change'
- Environment Agency (March 2014, updated April 2025), Planning Practice Guidance 'Flood risk assessments: applying for planning permission'
- Environment Agency (February 2016, updated May 2022), Planning Practice Guidance 'Flood risk assessments: climate change allowances'
- Environment Agency (October 2013), Delivering benefits through evidence: Rainfall runoff management for developments
- HM Government (2010), The Building Regulations (2010), Drainage and Waste Disposal, Approved Document H, The NBS, Newcastle Upon Tyne
- Wilson, Bray, Cooper (2004), Sustainable drainage systems: Hydraulic, structural and water quality advice, C609, CIRIA, London
- Woods-Ballard et al (2015), The SUDS Manual, C753, CIRIA, London
- CIRIA Report C624 Development and flood risk
- National SUDS Working Group (2004), Interim Code of Practice for Sustainable Drainage Systems,
- Institute of Hydrology (1999), Flood Estimation Handbook, Institute of Hydrology, Wallingford
- BS EN 752:2008 Drain and sewer systems outside buildings. Hydraulic design and environmental considerations
- BS 8533:2011 Assessing and managing flood risk in development – Code of Practice
- CIRIA Report C635 Designing for exceedance in urban drainage – good practice
- St Albans District Council Level 2 Strategic Flood Risk Assessment (July 2024)
- Hertfordshire County Council: Local Flood Risk Management Strategy 2 (February 2019)
- Hertfordshire County Council: LLFA Summary Guidance for developers (August 2021)

- St Albans City and District Council Draft Local Plan – Regulation 19 Publication (September 2024)

2.3 National policy

2.3.1 National Planning Policy Framework (NPPF)

2.3.1.1 The revised NPPF was published in December 2024, superseding all previous versions, however the presumption in favour of sustainable development remains as the core objective of the document. The document sets out the Government’s planning policies for England and details how they are expected to be applied.

2.3.1.2 The paragraphs of most relevance to flood risk and drainage are captured within Chapter 14: Meeting the challenge of climate change, flooding and coastal change. The paragraphs presented within Chapter 14 are categorised as follows:

- 161
- 162 to 169: Planning for climate change
- 170 to 182: Planning and flood risk
- 183 to 186: Coastal

2.3.2 Planning Practice Guidance (PPG)

2.3.2.1 In 2016, the Government published the PPG, which provides further information and guidance to support the NPPF. Sections of the PPG relevant to the preparation of this report include:

- Flood risk assessments: applying for planning permission;
- Flood risk and climate change; and.
- Flood risk assessments: climate change allowances.

2.3.3 National standards for sustainable drainage systems

2.3.3.1 The National standards for sustainable drainage systems (SuDS), as published by DEFRA and updated in July 2025, set out the following Standards:

1. Runoff destinations
2. Management of everyday rainfall (interception)
3. Management of extreme rainfall and flooding
4. Water quality
5. Amenity
6. Biodiversity
7. Design of drainage for construction, operation, maintenance, decommissioning and structural integrity.

2.3.3.2 The above standards are underpinned by eleven principles, categorised as follows:

- Natural approach to managing water (1, 2, 3)
- Early and integrated design (4, 5, 6, 7, 8)
- Links with development planning (9, 10, 11)

2.4 Local policy

2.4.1 Hertfordshire County Council: Local Flood Risk Management Strategy 2 (2019-2029)

2.4.1.1 Hertfordshire County Council's Local Flood Risk Management Strategy (LFRMS) 2 includes details regarding the principles of flood risk management in Hertfordshire. These principles are set out as follows:

- Principle 1: Taking a risk-based approach to local flood risk management
- Principle 2: Working in partnership to manage flood risk in the county
- Principle 3: Improving our understanding of flood risk to better inform decision making
- Principle 4: Supporting those at risk of flooding to manage that risk
- Principle 5: Working to reduce the likelihood of flooding where possible
- Principle 6: Ensuring that flood risk arising from new developments is managed appropriately.

2.4.2 Hertfordshire County Council: LLFA summary guidance for developers

2.4.2.1 The LLFA factsheet sets out the technical requirements for the management of surface water drainage, including details of the following:

1. Runoff rates
2. Storage volumes
3. Sustainable drainage techniques
4. Residual risk
5. Climate change allowances
6. Infiltration rates

2.4.3 St Albans City and District Council Local Plan

2.4.3.1 The draft St Albans City and District Council Local Plan is currently out for examination. The site has been outlined as one of the proposed areas to be released from the greenbelt, for the provision of residential development.

2.4.3.2 The site comprises 32.85 hectares of the wider North East Harpenden allocation. The land to the south west is under the control of Miller Homes. The land to the south east is under the control of M E Simons Trust & Wimms, the land located to the south of this is under the control of Sauncey View Lodge.

2.4.3.3 The emerging new Local Plan includes the Site within the North East Harpenden Broad Location B2 for:

- A comprehensive mixed-use development;
- Residential (circa 750 homes, plus Extra Care provision);
- 2 Form Entry Primary School (inc. Early Years);
- Local Centre;
- On-site sports provision;
- Other green infrastructure; and
- Improvements to transport infrastructure, including links to Katherine Warrington Secondary School.

2.4.3.4 This document considers the policies set out within the draft Local Plan, and sets out the intentions with regards to managing surface water drainage at the site. The policies within the draft Local Plan in relation to flood risk and sustainable drainage are set out below.

Strategic Policy SP2 – Responding to the Climate Emergency (page 16-17)

‘The Council recognises the urgent need to respond to Climate Change through mitigation and adaptation. The Council will support proposals that help combat Climate Change where the proposals:’

- *‘Are designed to improve resilience to Climate Change, including resilience to increasing temperatures, more frequent drought, more intense storms and wind speeds and heavy rainfall events;*
- *Mitigate increasing flood risk; and*
- *Include Sustainable Drainage Schemes (SuDS) where appropriate.’*

NEB8 – Managing Flood Risk (page 100-102)

‘Surface Water Management.’

- *‘All major development should incorporate sustainable drainage systems (SuDS) into proposals, and manage surface water run-off to achieve greenfield run-off rates where feasible;*
- *SuDS should be green, provide multiple benefits, such as biodiversity and integrate into the green infrastructure network; and*
- *Development proposals incorporating SuDS will need to include management and maintenance plans for the proposed SuDS, with appropriate contributions sought where necessary.’*

3.0 Description and history of the site and development proposals

3.2 Location and description of the site

- 3.2.1 The proposed residential development is located land north-east of Harpenden between Lower Luton Road, Bower Heath Lane and Common Lane, as shown in Figure 1.1 above and enclosed in **Appendix A**. The Site is bound by the B652/Bower Heath Lane to the north-west and fields directly north. Common Lane runs adjacent to the eastern boundary. To the south of the site is Porters Hill Park and residential development. The B653/Lower Luton Road and fields are located on the western boundary.

3.3 History of the site

- 3.3.1 The majority of the site is currently comprised of open fields, as shown on the topographical survey enclosed in **Appendix B**. A small area within the western parcel of the site is currently comprised of an equestrian centre. A telecommunication mast and Electrical Substation is located near the centre of the site.
- 3.3.2 Aerial imagery dating back to December 2000 shows that the site has remained comparable over the past 25 years, see Figure 3.1 and Figure 3.2 below.



Figure 3.1 Aerial Imagery dated December 2000
Source: Google Earth Pro, obtained 07.07.2025



Figure 3.2 Aerial Imagery dated May 2024
Source: Google Earth Pro, obtained 07.07.2025

3.4 Proposed development

3.4.1 The development proposals comprise the following:

Outline planning application with all matters reserved except access for a mixed use development comprising up to 500 residential dwellings (Class C3), children's home (Class C2), elderly extra care facility (Class C2), local centre (up to 1,200 sq.m GIA of flexible Class E(a) to E(f) and F2(b)), sports pitches, and associated building, primary school with early years provision, public open space, community growing space, vehicular access from Lower Luton Road, diversion of Bower Heath Lane, pedestrian and cycle access, landscaping and related infrastructure. An Environmental Statement has been submitted with the application under the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 (as amended).

3.4.2 The application is supported by a set of parameter plans: Land Use, Access and Movement, Storey Heights, and Green Infrastructure. These plans are enclosed in **Appendix C**.

3.5 Site topography

3.5.1 The topographical survey indicates that a ridge line intersects the site, broadly in a north-south orientation. Levels fall from the north-east corner of the site (at approximately 130.8m) towards both the south-east and south-west corners of the site (lowest points of approximately 112.5m and 88.8m respectively). The topographical survey is shown on the plan enclosed in **Appendix B**.

3.6 Existing drainage infrastructure

- 3.6.1 Thames Water's asset plan is enclosed in **Appendix D**. The asset plan identifies no existing adopted drainage infrastructure within the site boundary. There are no surface water sewers shown in the vicinity of the development site.
- 3.6.2 The asset plan identifies a number of foul water sewer networks located to the southern side of the site, including:
- Foul raising main in Lower Luton Road (B653) to the south-west of the site, flowing from north to south (connecting into foul network at manhole 2501);
 - A 150mm diameter foul sewer alongside Someries Road to the south of the site, flowing from north to south (head of run at manholes 3705);
 - Two 150mm diameter foul sewers associated with Noke Shot to the south of the site, flowing from north to south (head of runs at manholes 3800 and 4800);
 - 150mm diameter foul sewer associated with Whitings Close to the south-east of the site, flowing from north to south (head of run at manhole 7701);
 - 150mm diameter foul sewer between Pickford Hill and the allotments, to the south-east of the site, flowing from east to west (head of run at manhole 6704); and
 - 150mm diameter foul sewer in Common Lane to the south-east of the site, flowing from north to south (head of run at manhole 9315).
- 3.6.3 The topographical survey, shown on the plan enclosed in **Appendix B**, identifies a number of existing manholes located at the south-western corner of the site, within the vicinity of the equestrian centre.

3.7 Geology of the site and ground investigation data

- 3.7.1 Inspection of the geological maps show that the uppermost superficial deposits at the site are comprised of Clay-with-Flints-Formation, located beneath the eastern extent of the site. There are no superficial deposits recorded for the western extent of the site. The bedrock geology which underlies the site is comprised of Lewis Nodular Chalk Formation and Seaford Chalk Formation. It is noted that a small extent of Chalk Rock Member, Holywell Nodular Chalk and New Pit Chalk Formation intersects the western extent of the site.
- 3.7.2 Initial soakage testing was undertaken on the site in October 2024, to determine infiltration potential. A preliminary ground investigation has followed, with the works undertaken in February and March 2025.
- 3.7.3 Initial soakage testing**
- 3.7.3.1 Southern Testing Environmental & Geotechnical have completed a soakage test report on the site. This investigation included site visits undertaken between 7th and 11th October 2024.

- 3.7.3.2 The report outlines the underlying geology consists of Clay with Flints, Seaford & Newhaven and Lewis Nodular Chalk Formations (Upper Chalk), Chalk Rock Member, New Pit and Holywell Nodular Chalk Formation (Middle Chalk). Details of the encountered ground conditions are summarised in Table 3.1 below.

Summary of Ground Investigation Information

Strata	Depths (m bgl)
Topsoil	Ground Level to circa 0.9m
Clay	To circa 2.8m
Chalk	To base of pit, maximum 3.0m

Source: Southern Testing Environmental & Geotechnical Project ID: JN1933-PERM

Table 3.1 Ground Investigation Information (Southern Testing)

- 3.7.3.3 No significant groundwater was encountered in any of the trial pits during the investigation. It should be noted that a slight seepage was noted in SA07 at 1.2m bgl.

- 3.7.3.4 Fourteen trial pits were excavated across the site for the purposes of soakaway testing, in accordance with BRE365. The results are summarised in Table 3.2 below.

Summary of Infiltration Testing

Trial Pit Position	Base Depth of Trial Pit (m bgl)	Infiltration Rate (m/sec)
SA1	2.70	2.24×10^{-6}
		2.00×10^{-6}
		1.77×10^{-6}
SA2	2.70	7.02×10^{-5}
		4.65×10^{-5}
		3.96×10^{-5}
SA3	2.70	8.13×10^{-4}
		5.02×10^{-4}
		4.07×10^{-4}
SA4	2.20	9.33×10^{-4}
		9.80×10^{-4}
		8.66×10^{-4}
SA5	2.75	9.89×10^{-5}
		7.27×10^{-5}
		5.99×10^{-5}

SA6	2.70	6.99×10^{-6}
		5.25×10^{-6}
		7.94×10^{-6}
SA7	2.65	Insufficient Rate Achieved
SA8	2.80	5.92×10^{-5}
		3.51×10^{-5}
		2.96×10^{-5}
SA9	2.80	1.09×10^{-6} Incomplete
SA10	3.00	Insufficient Rate Achieved
SA11	2.80	5.15×10^{-4}
		5.53×10^{-4}
		4.77×10^{-4}
SA12	3.00	1.62×10^{-7} Incomplete
SA13	3.00	Insufficient Rate Achieved
SA14	3.00	1.33×10^{-7} Incomplete

Source: Source: Southern Testing Environmental & Geotechnical Project ID: JN1933-PERM

Table 3.2 Infiltration Testing Information

3.7.3.5 The soakaway testing found the underlying ground conditions suitable for infiltration; achieving rates ranging between 9.80×10^{-4} m/s and 1.77×10^{-6} m/s within the areas of chalk across the site. It is noted that the area of the site underlain by clays provided insufficient rates for infiltration.

3.7.4 Preliminary Ground Investigation

3.7.4.1 RPS have completed a preliminary ground investigation report on the site. This investigation included site visits undertaken between 27th February and 13th March 2025. The investigation undertaken consisted of 25 trial pits. The report shows that ground conditions are comprised of Topsoil, Clay with Flints and Chalk Bedrock, as was the case for the previous GI works. Details of the encountered ground conditions are summarised in Table 3.3 below.

Summary of Ground Investigation Information	
Strata	Depths (m bgl)
Topsoil	Ground Level to circa 0.3m
Clay	To circa 3.0m
Chalk	To base of pit, maximum 3.7m

Source: RPS Group: 794-DES-CAS-31270 Geotechnical Report 01

Table 3.3 Ground Investigation Information (RPS)

- Clay With Flints – Extended below depths on 3m, particularly to the east.
- Chalk Bedrock – Encountered in 15 of the 25 trial pits, mainly to the west.

3.7.4.2 No significant groundwater was encountered in any of the trial pits during the investigation. It should be noted that a slight seepage was noted in SA07 at 1.2m bgl.

3.7.4.3 The report mentions the following on groundwater.

“At the time of the investigation in February 2025 several of the shallow depression features had water present at the surface and in shallow soils.

“Most of the trial pits did not encounter any groundwater it is indicated in the Desk Study that the water table is likely to be generally at least 10m below the ground surface”.

3.7.4.4 The report mentions the following on soakaway potential.

“The results of soakage infiltration testing indicates that the chalk will be capable of providing means of disposal of stormwater. The results of the tests by Southern Testing and by RPS indicate infiltration rates of the chalk in the west of the site of around 4×10^{-5} to 9×10^{-5} m/s”.

3.7.2 With regards to the chalk strata identified at the site, the RPS report states:

The site is located over chalk bedrock with evidence for the presence of solution features. In accordance with the recommendations of CIRIA document ‘Engineering in Chalk’ it is recommended that any soakaways are located at least 20m from buildings. It would be recommended also that soakaways are located away from main roads – say by at least 10m distance”.

3.8 Development proposals and flood risk vulnerability

3.8.1 The proposed residential development is set to include the following:

- 500 residential dwellings (Class C3)
- Children’s home (Class C2)
- Elderly extra care facility (Class C2)
- Local centre (up to 1200 sq.m GIA of flexible Class E(a) to E(f) and F2(b))
- Sports pitches, and associated building
- Primary school with early years provision

3.8.2 With reference to Annex 3 of the National Planning Policy Framework (NPPF), the proposed residential and educational elements of the development would be classed as More Vulnerable development. The proposed local centre would be classed as Less Vulnerable development, whilst the sports pitches would be classed as Water Compatible development.

3.8.3 An extract from Annex 3 is replicated below in Table 3.4 with the proposed development type highlighted.

Flood Risk Vulnerability Classification	
Vulnerability	Development Types
More Vulnerable	Hospitals.
	Residential institutions such as residential care homes , children's homes, social services homes, prisons and hostels.
	Buildings used for dwelling houses , student halls of residence, drinking establishments, nightclubs and hotels.
	Non-residential uses for health services, nurseries and educational establishments .
	Landfill and sites used for waste management facilities for hazardous waste.
Less Vulnerable	Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
	Police, ambulance and fire stations which are not required to be operational during flooding.
	Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'More Vulnerable' class; and assembly and leisure.
	Land and buildings used for agriculture and forestry.
	Waste treatment (except landfill and hazardous waste facilities).
	Minerals working and processing (except for sand and gravel working).
	Water treatment works which do not need to remain operational during times of flood.
	Sewage treatment works, if adequate measures to control pollution and manage sewage during flood events are in place.
	Car parks.
	Flood control infrastructure.
Water-Compatible Development	Water transmission infrastructure and pumping stations.
	Sewage transmission infrastructure and pumping stations.
	Sand and gravel working.
	Docks, marinas and wharves.
	Navigation facilities.
	Ministry of Defence installations.
	Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
	Water-based recreation (excluding sleeping accommodation).

Lifeguard and coastguard stations

Amenity open space, nature conservation and biodiversity,
**outdoor sports and recreation and essential facilities such as
changing rooms.**

Essential ancillary sleeping or residential accommodation for staff
required by uses in this category, subject to a specific warning and
evacuation plan.

Source: National Planning Policy Framework - 2012

Table 3.4 Flood Risk Vulnerability Classification

4.0 Flood risk

4.2 Fluvial / Tidal flooding

- 4.2.1 An extract of the Environment Agency's Flood Map for Planning (Flood Zones) is provided below in Figure 4.1. The flood map was extracted from the GOV.UK website on 23rd February 2026. The approximate application site boundary is shown in red. The map indicates that the majority of the development site is located within Flood Zone 1 and at a low probability of fluvial flood risk. The south-west corner of the site, along Lower Luton Road and in closest proximity to the River Lea, is located in an area within Flood Zone 2 (Medium Probability).

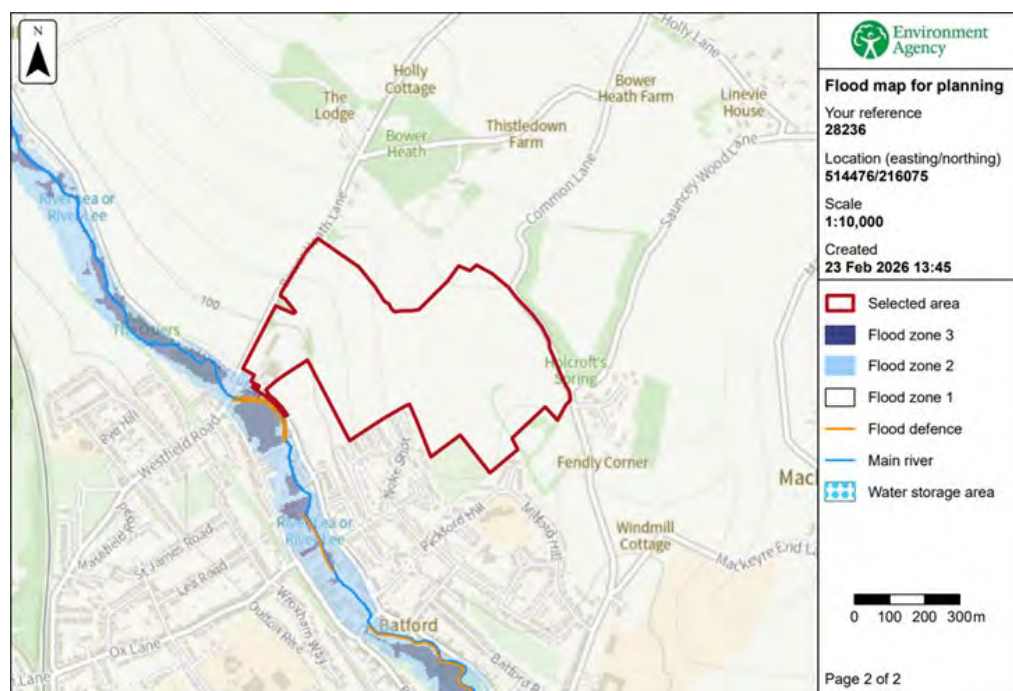


Figure 4.1 Flood Map for Planning (Rivers & Sea)
Source: GOV.UK website, obtained 23.02.2026

- 4.2.2 The latest mapping also includes an allowance for climate change (2070 to 2125), as shown in Figure 4.2 below. The mapping depicts Flood Zone extent associated with the allowance for climate change encroaching the south-eastern extent of the site.



Figure 4.2 Flood Map for Planning plus Climate Change (2070 to 2125)
Source: GOV.UK website, obtained 23.02.2026

4.2.3

Flood information has been obtained from the Environment Agency, in the form of spatial mapping files (Product 6 Data). This data has been interrogated within GIS software, providing site specific flood risk data. An extract of the data provided is shown in Figure 4.3 below.

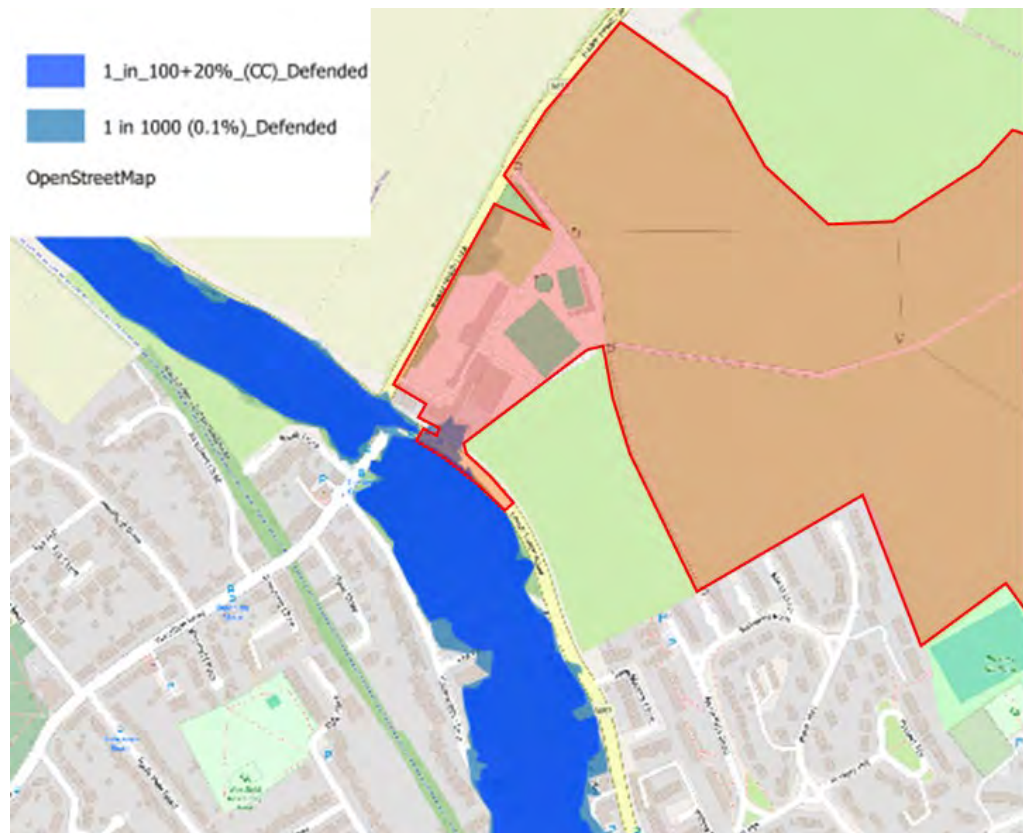


Figure 4.3 Site Specific Flood Risk Data
Source: Environment Agency (product 6 data) (QGIS output)

4.2.4 As shown within Figure 4.3 above, both the 1 in 100 year (Flood Zone 3) and 1 in 1000 year (Flood Zone 2) scenarios show linear flood extents spanning along Lower Luton Road. Consistent with the Flood Map for Planning, an area of Flood Zone 2 encroaches into the south-west corner of the site, which comprises the proposed site access and areas of Public Open Space.

4.2.5 The peak river flow climate change requirements are shown in Table 4.1 below, as obtained from GOV.UK for the relevant management catchment.

Peak River Flow Allowances by Management Catchment			
Upper Lea Management Catchment	Central	Higher	Upper
2020s	3%	9%	23%
2050s	-1%	7%	27%
2080s	10%	22%	59%

Source: GOV.UK website, 08.07.2025

Table 4.1 Peak River Flow Allowances by River Basin District

4.2.6 As a small area of the proposed residential development is located in Flood Zone 2, and the proposals are classified as a more vulnerable development, the Central climate change allowances are applicable. In relation to the Upper Lea Management Catchment, this requires a climate change increase of 10%.

4.2.7 The dataset from the Environment Agency includes a climate change allowance of 20%, therefore presenting an additional allowance of 10% beyond the 10% Central allowance requirement. Based on this worst-case assessment, the mapping presented in Figure 4.3 above confirms that the site is located outside of Flood Zone 3.

4.2.8 We would note that the fluvial flood risk identified along Lower Luton Road represents the existing and established scenario, which applies to current road users, including emergency vehicles. This scenario will remain comparable post-development.

4.2.8 Flood defences

4.2.8.1 The site benefits from fluvial flood defences, as indicated in yellow in Figure 4.1 above. Online asset management information provided by the Environment Agency shows defences spanning the northern bank of the River Lea within the vicinity of the site. These assets are identified to comprise of an embankment and natural high ground. The flood extents shown on Figure 4.3 above consist of the defended scenarios.

4.2.9 Flood Zone definitions

4.2.9.1 Table 4.2 below is a copy of Table 1 from Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework which defines Flood Zones. The proposed development is located predominantly within Flood Zones 1 and marginally within Flood Zone 2, for which the definitions are set out below.

Flood Zone Definitions

Flood Zone	Definition
Zone 1: Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding.
Zone 2: Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding.
Zone 3a: High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Zone 3b: The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

Source: Planning Practice Guidance - 2022

Table 4.2 Flood Zone Definitions

4.2.10 Flood resilience measures and warnings

- 4.2.10.1 Acknowledging the existing extent of Flood Zone 2 associated with Lower Luton Road, residents will be advised about the Environment Agency flood warning system and how to check for any flood warnings which may affect them.

4.3 Flooding from surface water

- 4.3.1 An extract of the Environment Agency's Long term flood risk map for Surface Water is provided below in Figure 4.4. The approximate application site boundary is shown in red. The site is shown to be predominantly located in an area of very low (less than 0.1%) chance of surface water flooding in a given year.

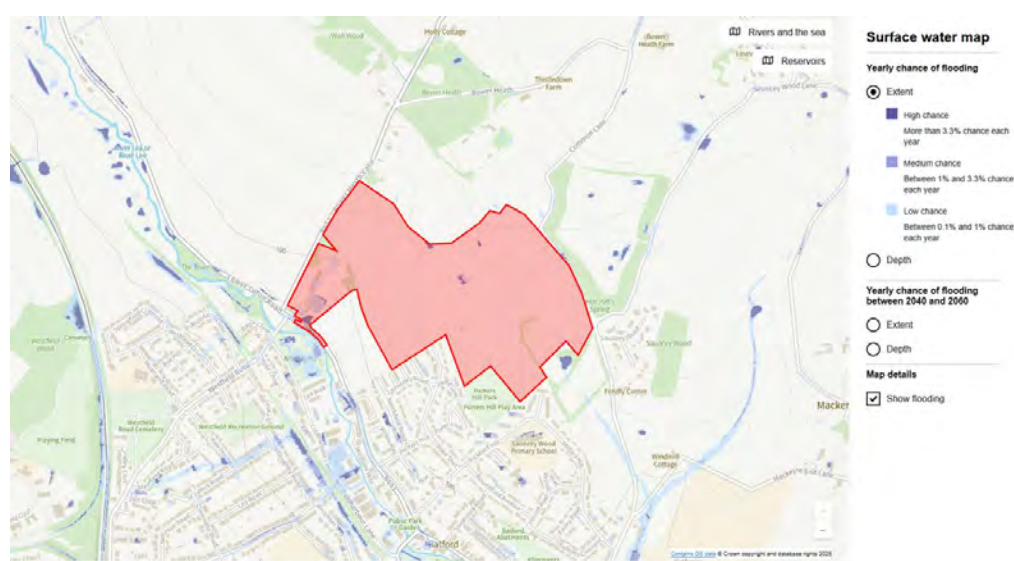


Figure 4.4 Chance of Flooding from Surface Water (given year)

Source: GOV.UK website, obtained 23.02.2026

- 4.3.2 The latest mapping also indicates an allowance for climate change (2040 to 2060), as shown in Figure 4.5 below. The extent of the yearly chance of flooding is comparable to the non-climate change scenario.

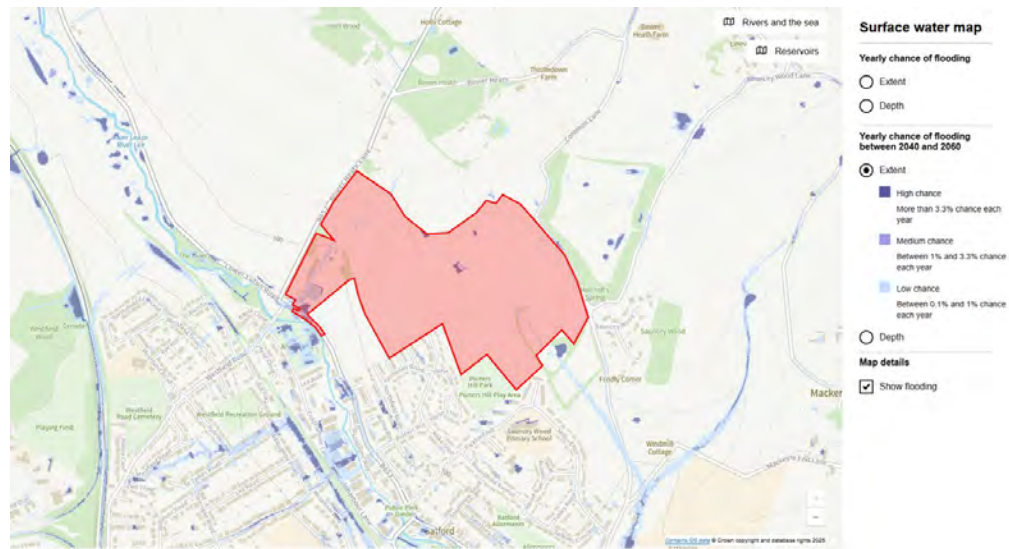


Figure 4.5 Chance of Flooding from Surface Water (2040 to 2060)

Source: GOV.UK website, obtained 23.02.2026

- 4.3.3 Small areas of the site are shown to be located at a low (0.1% to 1.0%), medium (1% to 3.3%) and high (more than 3.3%) chance of surface water flooding in a given year, both without and with climate change allowances.
- 4.3.4 The areas of low, medium and high chance of surface water flooding risk are isolated and located entirely within the development site. It is likely these areas are anomalous based on low spots from the ground level data used by the Environment Agency when producing the maps. These areas are not considered to constitute a surface water flow route originating from offsite that needs to be maintained.
- 4.3.5 The development proposals will result in the site becoming positively drained, to include allowances for climate change, therefore providing a betterment on the existing site conditions relating to flood risk and drainage. The levels of the site will be designed such that the dwellings and buildings are not at risk of surface water flooding.
- 4.3.6 It should be noted that the above mapping is generated using a broad methodology applied at the national scale. The model utilises generalised information on infiltration, sewerage infrastructure, rainfall events and catchment topography to route rainfall over a ground surface model. As such, the analysis does not take account of site-scale factors / characteristics that may exert an influence upon surface water flood depths and extents. The map therefore only provides a guide regarding the areas that may be vulnerable to this source of flooding.

4.4 Flooding from groundwater

- 4.4.1 The St Albans Level 2 Strategic Flood Risk Assessment (SFRA) outlines information in relation to groundwater flooding and emergencies. The SFRA does not provide information on groundwater flooding in or within the vicinity of the proposed residential development site.
- 4.4.2 As outlined in Section 3.7 above, the soakage testing included the excavation of fourteen trial pits across the site to a maximum depth of 3.0m bgl. The report concluded that no significant groundwater encountered, albeit a slight seepage in one trial pit (SA7).
- 4.4.3 The information available at the time of preparing this report, and the nature of the underlying geology, suggests that groundwater emergence at the surface is unlikely, such that groundwater flood risk does not constitute a constraint in this instance.

4.5 Flooding from sewers

- 4.5.1 Thames Water's asset plan is enclosed in **Appendix D**. The asset plan identifies that there are no existing adopted sewers within the proposed site boundary.
- 4.5.2 The St Albans Level SFRA outlines information in relation to flooding from sewers. The SFRA does not provide information on sewer flooding in or within the vicinity of the proposed residential development site.
- 4.5.3 We therefore do not consider the risk of flooding from sewers to be a significant risk to the proposed development.

4.6 Flooding from reservoirs, canals and other artificial sources

- 4.6.1 We are not aware of any canals or artificial water sources that may result in flooding of this site.
- 4.6.2 The EA provides maps (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/>) showing the area that may be affected by flooding as a result of a breach of a large, raised reservoir (i.e. capable of storing over 25,000 cubic metres of water above the natural level of any part of the surrounding land).
- 4.6.3 An extract of the Environment Agency map 'Risk of Flooding from Reservoirs' is provided below in Figure 4.6. It can be seen that the majority of the proposed residential development site, shown in red, is not at a risk of flooding from reservoirs.

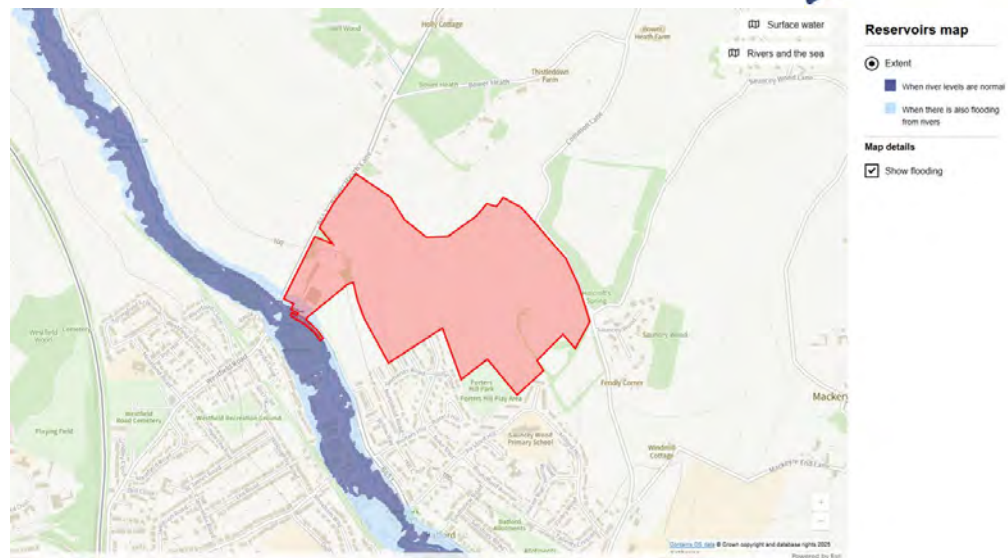


Figure 4.6 Risk of Flooding from Reservoirs
Source: GOV.UK website, obtained 23.02.2026

- 4.6.4 The south-western corner of the site is located in an area at risk from reservoir flooding, when there is both flooding from rivers and when river levels are normal.
- 4.6.5 It is generally acknowledged that reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by qualified civil engineers (referred to as Panel Engineers) and, as the enforcement authority for the Reservoirs Act 1975, the Environment Agency ensures that reservoirs are inspected regularly and essential safety work is carried out.
- 4.6.6 It can therefore be concluded that whilst there is a residual risk of flooding from reservoirs, the actual risk is low.

4.7 Historic flooding

- 4.7.1 Figure 4.7 below displays a map showing historic flooding events surrounding north Harpenden, as published by the Environment Agency. As demonstrated, the mapping shows no recorded flooding incidents within the proposed development boundary. The mapping indicates that one or more historic flooding events have taken place within the vicinity of the site, located along Lower Luton Road. The flooding extent runs linear to the River Lea.

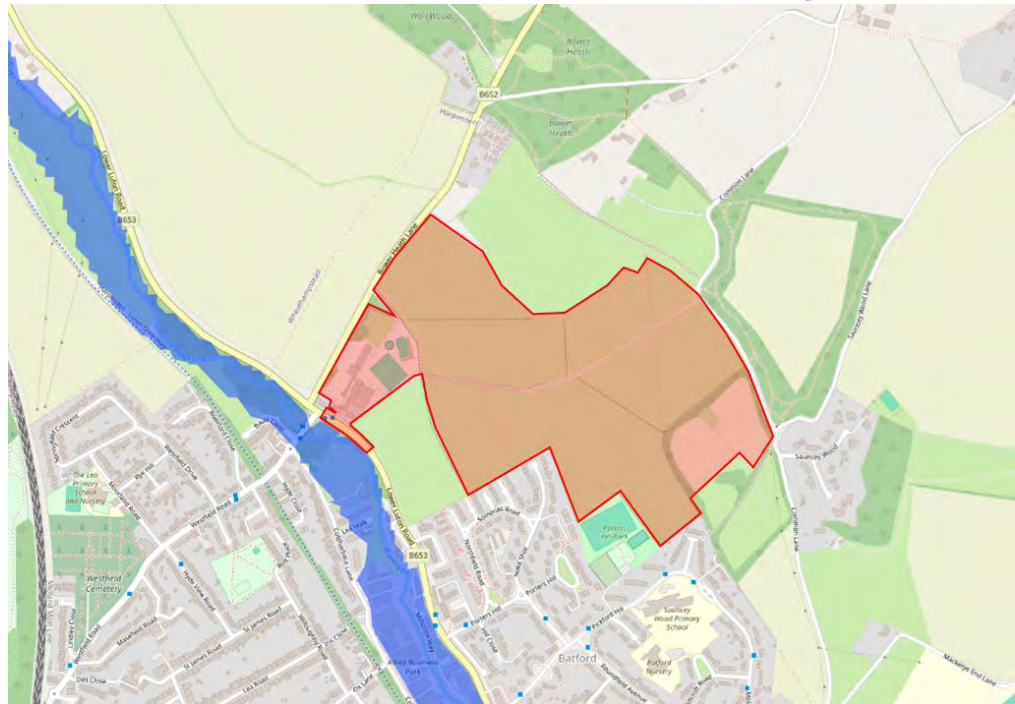


Figure 4.7 Historical Flood Mapping

Source: Historic Flood Map – data.gov.uk, obtained 23.02.2026

4.8 Flood risk vulnerability and flood zone compatibility

- 4.8.1 Based on the above assessment of the site being located predominantly within Flood Zone 1 and partially within Flood Zone 2, classified as a More Vulnerable development, and with reference to Table 4.3 below (Planning Practice Guidance for 'Flood Risk and Coastal Change' to the National Planning Policy Framework, Table 2), the proposed development of this site would be considered "appropriate". A copy of Table 2 is presented below highlighting the above.

Table 2 – Flood Risk Vulnerability and Flood Zone Compatibility					
Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatibility	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	X	Exception test required	✓
Zone 3b	Exception test required	✓	X	X	X
✓ = Development is appropriate			X = Development should not be permitted		
Source: Planning Practice Guidance - 2022					

Table 4.3 Flood Risk Vulnerability and Flood Zone Compatibility

4.8.2 Sequential Test

4.8.2.1 The aim of the sequential test is to steer development to areas with the lowest probability of flooding.

4.8.2.2 As mentioned above in Section 2.3, the site has been outlined within the draft St Albans City and District Council Local Plan as part of a wider draft allocation for North East Harpenden. The Local Plan states the following on the sequential test:

‘The sequential and exception tests have already been applied to sites designated for development in this Plan.’

4.8.2.3 As such, the site is deemed to have passed the sequential test.

4.9 Flood compensation

4.9.1 Flood compensation measures will not be required as the site is located outside of Flood Zone 3.

4.10 Access and egress

4.10.1 Vehicular access and egress will be via the proposed development’s access road off Lower Luton Road to the south-west of the site, with additional connectivity provided for pedestrians and cyclists elsewhere across the site.

4.10.2 With reference to the fluvial flood risk identified along Lower Luton Road (see Section 4.2 above), we would note that this represents the existing and established scenario, which will remain comparable post-development.

5.0 Management of surface water

5.2 Current conditions

- 5.2.1 The majority of the site is predominately open with no existing development. The south-west corner currently comprises an equestrian centre, with manholes identified on the topographical survey.

5.3 Surface water drainage outfalls

- 5.3.1 It is a requirement of The Building Regulations (2010), Drainage and Waste Disposal, Approved Document H, to dispose of surface water collected by a development in accordance with the following, listed in order of priority:-

1. Infiltration systems where ground condition permit
2. To watercourses
3. To sewers

- 5.3.2 Further, Standard 1 of the National standards for SuDS requires runoff to be managed in accordance with the below hierarchy:

- Priority 1: collected for non-potable use
- Priority 2: infiltrated to ground
- Priority 3: discharge to an above ground surface water body
- Priority 4: discharged to a surface water sewer, or another piped surface water drainage system
- Priority 5: discharged to a combined sewer.

- 5.3.3 Each of these is considered separately below:

5.3.4 Non-potable use

- 5.3.4.1 Rainwater butts will be implemented for dwellings on a plot-by-plot basis, subject to detailed design. Options for use for the commercial elements of the development will be considered further at detailed design stage.

5.3.5 Infiltration systems

- 5.3.5.1 The geology of the site is described in Section 3.7 above. Infiltration test results show that soakaways are a viable method for managing surface water at the site. As such, surface water will be managed via infiltration techniques and therefore in accordance with Priority 2 set out above.

5.3.6 Watercourses / Main River

- 5.3.6.1 There are no watercourses located within the site boundary of the development site.
- 5.3.6.2 The River Lea is located to the south-west of the site, just beyond Lower Luton Road.

5.3.6.3 Draining the site via infiltration techniques is a viable option, therefore discharging surface water via a watercourse will not be considered further.

5.3.7 Sewers

5.3.7.1 Thames Water's asset plan identifies no existing adopted surface water sewers within the vicinity of the site. Draining the site via infiltration techniques is a viable option, therefore the use of surface water sewers will not be considered further.

5.4 Surface water drainage strategy

5.4.1 Surface water from the development will drain via infiltration techniques and be managed in four separate drainage catchments, as informed by the existing site topography. Surface water will be managed via a combination of infiltration basins, offline attenuation basins, infiltration tanks and attenuation tanks. Tanked permeable paving shall be provided to shared private drives where levels permit, for the interception of surface water and to provide a level of surface water treatment.

5.4.2 An indicative surface water layout plan is enclosed in **Appendix F**. The drawing shows that surface water attenuation can be accommodated on the site and the method of discharge on the basis that infiltration techniques are viable. The detailed design parameters of the drainage are described below.

5.5 SUDS assessment

5.5.1 We have considered the suitability of SUDS for use on the development site. The review is set out in Table 5.1 below.

SUDS Assessment		
SUDS Technique	Suitability	Justification
Rain Water Harvesting	Maybe	Rainwater butts will be implemented upon a plot-by-plot basis. Rain water harvesting will be considered further for communal elements of the development to reduce potable water requirements. This will be considered further at detailed design stage.
Green Roofs	Maybe	Green roofs are generally only viable on flat roofs. We understand that the proposed dwellings are to have pitched roofs. Green roofs could be implemented for the local centre, care home facility and primary school, subject to future design.
Infiltration	Yes	Soakaways are to be used.
Filter Strips / Filter Drains	Yes	Filter drains to be provided along the southern site boundaries. Additional provision to be considered at detailed design stage with reference to site constraints.

Swales	No	Based on an assessment of site levels, swales are not considered viable due to steep gradients.
Bioretention Systems	No	Rain gardens have been considered, but have been discounted due to the need for extensive earthworks, in addition to soakaways requiring a 10m stand off from structures.
Trees	Yes	A number of existing trees will be retained, plus new landscaped areas are proposed.
Pervious Pavements	Yes	Tanked permeable shall be provided to sharded private drives where levels permit, for interception and to provide a level of surface water treatment.
Attenuation Tanks	Yes	Supplementary attenuation tanks will be used to provide addition attenuation.
Detention Basin	Yes	Five basins will be utilised to facilitate either infiltration or attenuation.
Ponds and Wetlands	No	Surface water will be managed via basins, along with tanked permeable paving.
Trapped Drainage	Maybe	Where appropriate, proprietary treatment will be implemented to provide additional surface water treatment, subject to detailed design stage.

Table 5.1 SUDS Assessment

5.6 Water quality

Chapter 26 of The SuDS Manual 2015 (CIRIA 753) provides guidance on the methods that should be used to design SuDS to meet the water quality design criteria and good practice design standards. Based on the simple index approach, the pollution hazard indices for different land use classifications are listed in Table 26.2, Chapter 26 of the SuDS Manual. Table 5.2 below summarises the pollution hazard indices that are applicable for the proposed development.

Pollution Hazard Indices for Different Land Use Classifications				
Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential Roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg school, offices) ie <300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Source: Table 26.2 of The SuDS Manual				

Table 5.2 Pollution Hazard Indices for Different Land Use Classifications

- 5.6.1 Tanked permeable paving will be provided to shared private drives for the interception of surface water and to provide a level of surface water treatment. Surface water will ultimately be managed via infiltration techniques, facilitated via infiltration basins and tanks.
- 5.6.2 Table 26.3 of The SuDS Manual shows the mitigation indices for a range of SuDS components for discharges to surface waters. An extract of this is provided in Table 5.3 below for the components relevant to the proposed development.

Indicative SuDS Mitigation Indices for Discharges to Surface Waters			
Type of SuDS Component	Mitigation Indices		
	TSS	Metals	Hydro-carbons
Permeable pavement	0.7	0.6	0.7
Source: Table 26.3 of The SuDS Manual			

Table 5.3 Indicative SuDS Mitigation Indices for Discharges to Surface Waters

- 5.6.3 Table 26.4 of The SuDS Manual shows the mitigation indices for a range of SuDS components for discharges to groundwaters. An extract of this is provided in Table 5.4 below for the components relevant to the proposed development.

Indicative SuDS Mitigation Indices for Discharges to Groundwaters			
Characteristics of the material overlying the proposed infiltration surface, through which the run-off percolates	Mitigation Indices		
	TSS	Metals	Hydro-carbons
A soil with good contaminant attenuation potential of at least 300mm in depth	0.4	0.3	0.3
Source: Table 26.4 of The SuDS Manual			

Table 5.4 Indicative SuDS Mitigation Indices for Discharges to Groundwaters

5.6.4 As set out in The SuDS Manual, where two or more components are utilised, “a factor of 0.5 is used to account for the reduced performance of the secondary or tertiary components”. This will therefore need to be considered where multiple SUDS components are proposed.

5.6.5 Based on the information and assessment set out above, a proprietary system will be implemented where appropriate to provide sufficient water treatment for the development proposals. This will be subject to the detailed design stage.

5.7 Surface water drainage design and management

5.7.1 Proposals are to design the surface water drainage system to accommodate storms up to the 1 in 100 year event plus an allowance of 40% for climate change. The design life of a residential development is considered to be greater than 60 years. The Planning Practice Guidance ‘Flood risk assessments: climate change allowances’ to the National Planning Policy Framework defines the climate change allowances per catchment area, as set out on DEFRA map of ‘climate change allowances for peak rainfall in England’. Table 5.5 below sets out the peak rainfall allowances for the Upper Lea Management Catchment which the site is located within.

Peak Rainfall Intensity Allowance: Upper Lea Management Catchment			
Rainfall Event	Epoch	Central Allowance	Upper End Allowance
3.3%	2050s	20%	35%
	2070s	20%	35%
1%	2050s	20%	40%
	2070s	25%	40%
Source: Planning Practice Guidance - 2022			

Table 5.5 Peak Rainfall Intensity Allowance

5.8 Infiltration rates

5.8.1 Indicative infiltration rates have been used to derive the drainage requirements for each of the four catchments. The rates associated with each catchment vary based upon the soakaway potential of the underlying ground conditions, mentioned above in Section 3.7. Rates for each catchment are outlined as follows:

- Catchment 1 = 6.50×10^{-5} m/s
(Tetra Tech Geotechnical Report 794-DES-CAS-31270)
- Catchment 2 = 4.07×10^{-4} m/s
(Southern Testing Report JN1933)
- Catchment 3 = 400 l/s
(Assumed Rate)
- Catchment 4 = 400 l/s
(Assumed Rate)

5.9 Infiltration requirements

5.9.1 Surface water from each of the four catchments will be managed via the associated soakaway arrangement, as outlined in Section 5.4 above. The strategies have been designed based on the following parameters.

- Contributing drained area (including 10% Urban Creep)
- Indicative infiltration rate for the outfall location
- Designed to accommodate for flows up to and including the 1 in 100 year plus 40% climate change scenario.

5.9.2 The requirements for each catchment are outlined below.

Catchment 1:

- Contributing drained area = 1.656ha
- Infiltration facilitated via two infiltration tanks.
- Two offline detention basins and three infiltration/attenuation tanks to provide required attenuation.
- Total attenuation volume provided = $1,184\text{m}^3$

Catchment 2:

- Contributing drained area = 2.354ha
- Infiltration basin to facilitate infiltration and attenuation.
- Total attenuation volume provided = $1,287\text{m}^3$

Catchment 3:

- Contributing drained area = 3.165ha
- Infiltration facilitated via Deep Bore Soakaways.
- Offline detention basin to provide required attenuation.
- Total attenuation volume provided = 2,429m³

Catchment 4:

- Contributing drained area = 2.974ha
- Infiltration facilitated via Deep Bore Soakaways.
- Offline detention basin to provide required attenuation.
- Attenuation tanks to provide supplementary attenuation.
- Total attenuation volume provided = 3,033m³

5.9.3 The indicative surface water drainage layout incorporating the attenuation is shown on the plan enclosed in **Appendix F**.

5.9.4 Full infiltration calculations can be found enclosed in **Appendix G**.

5.10 Overland flows

5.10.1 Proposals are to design the surface water drainage to accommodate the 1 in 100 year storm event taking into account the predicted future effects of climate. Clearly there is a risk of this storm event being exceeded, albeit this risk is considered very low. In such an event the proposed drainage systems will become overwhelmed and overland flows could occur.

6.0 Foul water drainage strategy

- 6.1 Thames Water's asset plan is enclosed in **Appendix D**. As set out in Section 3.6 above, a number of foul water sewers are located in the roads that surround the south of the site.
- 6.2 A pre-planning enquiry has been undertaken with Thames Water (see response enclosed in **Appendix E**). It is noted that, at the time of undertaking the enquiry, Thames Water does not have capacity to accommodate the proposed foul water flows generated by the development, such that modelling work will be required. Whilst the site has been identified for allocation within the draft St Albans City and District Council Local Plan, Thames Water require the site to be granted outline planning approval prior to undertaking the required modelling.
- 6.3 With reference to existing site levels and proximity to the existing Thames Water foul water infrastructure, the proposed foul drainage strategy proposes a foul pumping station for each of the two drainage catchments. Points of connection to the existing sewer network have been identified in Common Lane (for the eastern catchment), and Lower Luton Road (for the western catchment). Thames Water note that, in principle, the suggested points of connection are suitable, subject to modelling of the network.

7.0 Maintenance

7.2 Surface water drainage maintenance

7.2.1 The drainage system will be designed to minimise maintenance requirements, however, a full maintenance scheme will be established for those elements not being offered for adoption. The areas will be maintained as set out in Table 7.1 below.

Maintenance Areas – Surface Water	
Aspect	Maintainer
Private Drains	Home owner
SUDS – Private	Home owner
SUDS – Communal	Management Company
Adopted Sewers	Thames Water

Table 7.1 Maintenance Areas – Surface Water

7.2.2 Additional maintenance information is provided below for the various surface water drainage components.

7.2.3 Infiltration systems

7.2.3.1 Surface water is to be managed via infiltration techniques. Operation and maintenance requirements for soakaways are outlined in Table 7.2 below.

Operation and Maintenance: Soakaways		
Maintenance schedule	Required action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based in inspection
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs.	As required
	Replacement of clogged geotextile (will require construction of soakaway)	As required

Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Source: Table 13.1 from Source: The SuDs Manual - 2015

Table 7.2 Operation and Maintenance: Soakaways

7.2.3.2 Operation and maintenance requirements for infiltration basins are outlined in Table 7.3 below.

Operation and Maintenance: Infiltration Basins		
Maintenance schedule	Required action	Typical Frequency
Regular Maintenance	Remove litter, debris and trash	Monthly
	Cut grass – for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass – meadow grass in and around basin	Half-yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional Maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeding or returfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	Monthly
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Half yearly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Monthly
	Inspect infiltration surfaces for compaction and ponding	

Source: Table 13.2 from Source: The SuDs Manual - 2015

Table 7.3 Operation and Maintenance: Infiltration Basins

7.2.4 Attenuation storage tanks

7.2.4.1 Operation and maintenance requirements for attenuation storage tanks are outlined in Table 7.4 below.

Operation and Maintenance: Attenuation storage tanks		
Maintenance schedule	Required action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where is may cause risks to perform)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of 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
Source: Table 21.3 from Source: The SuDs Manual – 2015		

Table 7.4 Operation and Maintenance: Attenuation storage tanks

7.2.5 Pervious pavements

7.2.5.1 Operation and maintenance requirements for pervious pavements are outlined in Table 7.5 below.

Operation and Maintenance: Pervious Pavements		
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 manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable area 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 direct 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 50mm of the level of 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	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	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 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Source: Table 20.15 from The SuDs Manual - 2015

Table 7.5 Operation and Maintenance: Pervious Pavements

7.2.6 Filter drains

7.2.6.1 Operation and maintenance requirements for filter drains are outlined in Table 7.6 below.

Operation and Maintenance: Filter Drains

Maintenance schedule	Required action	Typical Frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly or as required

Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 2998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Source: Table 16.1 from Source: The SuDs Manual - 2015

Table 7.6 Operation and Maintenance: Filter Drains

7.2.7 Sewers

7.2.7.1 Operation and maintenance requirements for sewers are outlined in Table 7.7 below.

Operation and Maintenance: Sewers		
Maintenance schedule	Required action	Typical Frequency
Regular maintenance	Inspect and identify areas that are not operating correctly. If required take remedial action	Monthly for the first 3 months then six monthly
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment from Hydrobrake	Annually or as required
	Cleaning/jetting of annually, or as required, pipes, rodding eyes and manholes	As required

Table 7.7 Operation and Maintenance: Sewers

7.3 Foul water drainage maintenance

7.3.1 The drainage system will be designed to minimise maintenance requirements, however, a full maintenance scheme will be established for those elements not being offered for adoption. The areas will be maintained as set out in Table 7.8 below.

Maintenance Areas – Foul Water	
Aspect	Maintainer
Private Drains	Home owner
Adopted Sewers	Thames Water

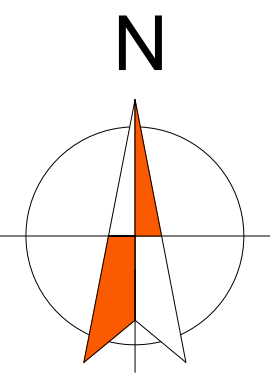
Table 7.8 Maintenance Areas – Foul Water

8.0 Summary and conclusions

- 8.1 The proposed residential development is located land north-east of Harpenden between Lower Luton Road, Bower Heath Lane and Common Lane. The Site is bound by the B652/Bower Heath Lane to the north-west and fields directly north. Common Lane runs adjacent to the eastern boundary. To the south of the site is Porters Hill Park and residential development. The B653/Lower Luton Road and fields are located on the western boundary.
- 8.2 The development proposals comprise the following:
- Outline Application for demolition of existing buildings and structures and construction of a mixed-use development comprising residential dwellings (including affordable housing), children's home, elderly extra care facility, local centre (flexible retail/ health/ community use), sports pitches and associated building, green infrastructure and landscaping works (to include public open space and community growing space); primary school with early years provision, vehicular and active travel infrastructure (including pedestrian and cycle access) and diversion of Bower Heath Lane; drainage works; and related infrastructure. All matters reserved save for access from Lower Luton Road.*
- 8.3 The proposed residential development site is predominately located within Flood Zone 1 and at a low risk of flooding from rivers or the sea. An area of Flood Zone 2 encroaches into the south-west corner of the site, which comprises the proposed site access and areas of Public Open Space. We would note that the fluvial flood risk identified along Lower Luton Road represents the existing and established scenario, which applies to current road users, including emergency vehicles. This scenario will remain comparable post-development.
- 8.4 The site is shown to predominately be at a low risk of flooding from surface water, reservoirs and sewers, and at a moderate risk of flooding from groundwater.
- 8.5 Ground investigation works have been undertaken for the site which identifies, Topsoil, Clay and Chalk. The investigation report identifies that infiltration is a viable form of drainage for the proposed development.
- 8.6 Surface water from the development will drain via infiltration techniques and be managed in four separate drainage catchments, as informed by the existing site topography. Surface water will be managed via a combination of infiltration basins, offline attenuation basins, infiltration tanks and attenuation tanks. Tanked permeable shall be provided to sharded private drives where levels permit, for the interception of surface water and to provide a level of surface water treatment.
- 8.7 Due to the nature of levels on-site, the proposed foul drainage strategy centres on two pumping stations, both positioned at low points of the site. As such, two foul water outfalls are proposed. Points of connection to the existing sewer network have been identified in Common Lane (for the eastern catchment), and Lower Luton Road (for the western catchment). Thames Water note that, in principle, the suggested points of connection are suitable, subject to modelling of the network.



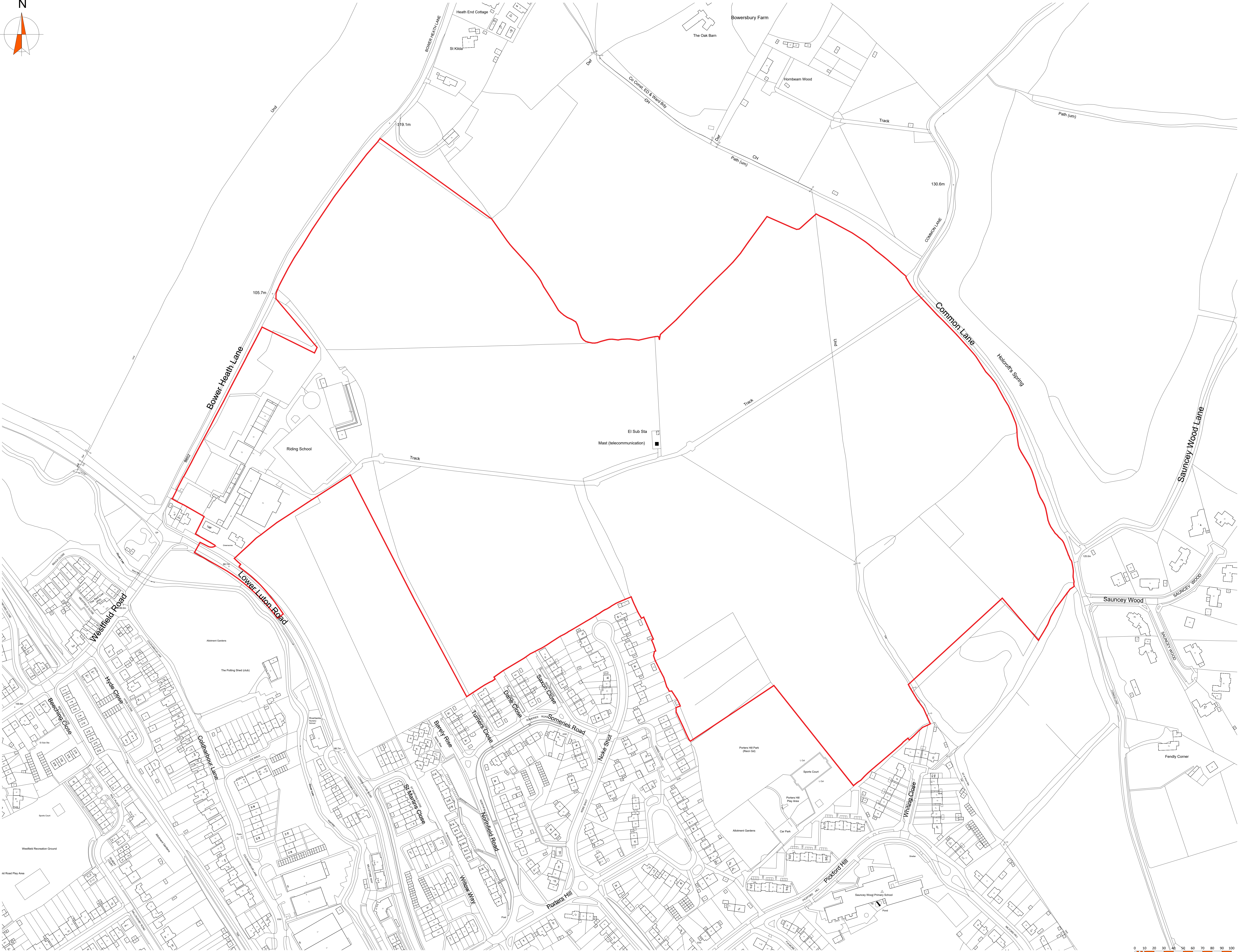
Appendix A
Site Location Plan
IDP drawing no. 001_01 Rev A



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all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.
do not scale.
any and all elements relating to the fire safety of the building will require separate confirmation and approval by a fully accredited fire engineering consultant who has to be appointed by the Client.

notes:

Red Line Boundary



A	10.02.2026	Revised to include access	TNB	TNB
rev:	date:	commentary:	name:	check:



status: **PLANNING** RIBA Stage: 1

client: **Crest Nicholson**

job: **Lower Luton Road, Harpenden**

title: **Site Location Plan**

drawn: **SM** date: **11.07.2025**

checked: **TKB** scale @ a0: **1:1250**

job no: **C6017** drg no: **001_01 Rev A**

IDP GROUP 27 SPON STREET COVENTRY CV1 3BA
T: +44 (0)24 7652 7600 E: info@idpgroup.com
www.weareidp.com



Appendix B

Topographical Survey



ABBREVIATIONS & SYMBOLS			
AB	Anti-Heel Line	ED	ED-Transformer
AB	AB	FD	Flow Board
AC	Access Panel	FD	Flow Board
AD	AD	FD	Flow Board
AE	AE	FD	Flow Board
AF	AF	FD	Flow Board
AG	AG	FD	Flow Board
AH	AH	FD	Flow Board
AI	AI	FD	Flow Board
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EK	EK	FD	Flow Board
EL	EL	FD	Flow Board

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Description heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type and roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to start of work.

Detail, services and features may not have been surveyed if obstructed or reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

1000

General

The contractor must check and verify all site and building dimensions, level, utilities and drainage details and connections prior to commencing work. All errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

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This drawing should only be scaled using digital methods.

SURVEY CONTROL CO-ORDINATES				
STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST27	514148.340	216195.740	99.774	PK Nail
ST28	514035.293	216088.618	93.789	PK Nail
ST29	514035.009	216018.234	99.259	PK Nail
ST30	514021.499	216020.791	99.182	PK Nail
ST31	513989.153	216042.536	99.782	PK Nail
ST32	513968.417	216021.566	99.047	PK Nail
ST33	513948.597	216055.334	98.925	PK Nail
ST34	514041.493	215975.525	88.903	PK Nail

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.00

The level datum established for this survey is related to Ordnance Survey (OS) datum using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

REV	DESCRIPTION	DRAWN	APPR	DATE
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LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

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IPSWICH BEDFORD BIRMINGHAM BRISTOL COVENTRY CRAWLEY GLASGOW
LONDON-CENTRAL LONDON-EAST MANCHESTER NORWICH NOTTINGHAM THAMES VALLEY

PROJECT TITLE
LOWER LUTON ROAD, HARPENDEN,
HERTFORDSHIRE, AL6 5EC

DRAWING DETAIL

TOPOGRAPHICAL SURVEY
Sheet 2 of 5

CLIENT	SCALE
CREST NICHOLSON	1:500

SURVEYOR GB/EF	SURVEY DATE 29/05/24	CHECKED BY RH	APPROVED BY MB	DWG ST FINAL
DRAWING NUMBER 65958BWLS-02			REVISION	ISSUE C 06/06/24





TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

AA	Arch Wood Lead	EF	Exterior Flasher	RSJ	Rebar Studs Out
AB	Arch Back	FS	Flower Box	RSD	Rebar Studs In
AC	Arch Cap	FC	Flower Case	SC	Shower
AD	Arch Air	FBD	Flow Board	SD	Shower St/L
AE	Arch Edge	FB	Flow Box	SE	Shower St
AF	Arch Face	FBF	Flow Face	SV	Shower St/L
AG	Arch Hole	FBP	Flow Pipe	SW	Shower Water
AH	Arch Line	FW	Flow Water	SWC	Shower Water Case
AI	Arch Lip	FWF	Flow Water Face	SWD	Shower Water Drain
AL	Arch Lip	GF	Gully Core	TA	Tailor
AM	Arch Lip	GG	Gully Core	TC	Tailor Case
AN	Arch Lip	GH	Gully Head	TD	Tailor Drain
AW	Arch Wood Face	HH	Head Hole	TE	Tailor Edge
AX	Arch Wood	HL	Head Lip	TF	Tailor Face
AY	Arch Wood	IS	Iron Sheet	TFB	Tailor Face Box
BA	Arch Wood Face	I	Iron Level	TL	Tailor Lip
BB	Arch Wood	ISL	Iron Sheet Lip	TLF	Tailor Lip Face
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CO	Arch Wood Face	ISL	Iron Sheet Lip	TLF	Tailor Lip Face
CP	Arch Wood Face	ISL	Iron Sheet Lip	TLF	Tailor Lip Face</

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any

The accuracy of the digital data is the same as the plotting scale implies. All

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This drawing should only be scaled using digital methods.

SURVEY CONTROL CO-ORDINATES				
STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST27	516448.340	216165.740	99.774	PK Nail
ST28	516475.153	216488.018	93.109	PK Nail
ST29	516335.026	216918.204	86.259	PK Nail
ST30	516021.469	216820.701	88.789	PK Nail
ST31	515990.153	216442.530	86.702	PK Nail
ST32	515906.417	216021.556	89.047	PK Nail
ST33	515888.897	216026.236	88.805	PK Nail
ST34	516041.495	215979.329	86.903	PK Nail

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out point from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

REV	DESCRIPTION	DRAWN	APPR	DATE
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**LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING**

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD BIRMINGHAM BRISTOL COVENTRY CRAWLEY GLASGOW
LONDON-CENTRAL LONDON-EAST MANCHESTER NORWICH NOTTINGHAM THAMES VALLEY

PROJECT TITLE
LOWER LUTON ROAD, HARPENDEN

HERTFORDSHIRE, AL5 5EG

DRAWING DETAIL

TOPOGRAPHICAL SURVEY
Sheet 3 of 5

CLIENT
CREST NICHOLSON

SURVEYOR	SURVEY DATE	CHECKED BY
GB/EF	29/06/24	RH

65958BWLS-03





BRITISH
CARTOGRAPHIC
SOCIETY

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

[illegible]

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx. 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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This drawing should only be scaled using digital methods.

SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST27	514148.340	216180.740	69.774	PK Nail
ST28	514205.250	216088.616	69.769	PK Nail
ST29	514205.009	216018.234	69.259	PK Nail
ST30	514221.499	216020.751	69.182	PK Nail
ST31	513980.153	216042.336	69.792	PK Nail
ST32	515068.417	216021.556	69.047	PK Nail
ST33	515068.597	216035.308	68.952	PK Nail
ST34	514641.695	215975.525	68.903	PK Nail

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

REV	DESCRIPTION	DRAWN	APPR
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LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING

0845 040 5969
survey-solutions.co

IPSWICH BEDFORD BIRMINGHAM BRISTOL COVENTRY CRAWLEY GLASGOW
LONDON (CENTRAL) LONDON (EAST) MANCHESTER NORWICH NOTTINGHAM THAMES

CONDUCTANCE	CONDUCTANCE	SPRINGFIELD	HOUSTON	PORTLAND	SPRINGFIELD

PROJECT TITLE
LOWER LUTON ROAD, HARPENDEN,
HERTS

HERTFORDSHIRE, AL5 5EG

DRAWING DETAIL

TOPOGRAPHICAL SURVEY
Sheet 4 of 5

CLIENT	SCALE
CREST NICHOLSON	1:20

SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG NO.
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GB/EF	29/06/24	RH	MB	FINAL
DRAWING NUMBER			REVISION	ISSUE

65958BWS-04		06/01
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BRITISH
CARTOGRAPHIC

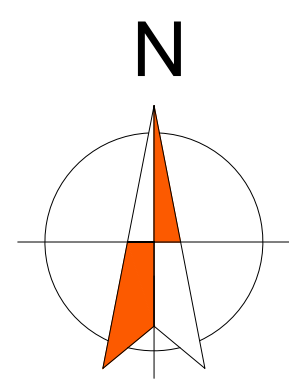
ISO
14001 : 2015

SOCIETY
protecting people and the planet

REGISTERED



Appendix C
**Parameter Plans: Land Use, Storey Heights, Open Green Infrastructure and
Access & Movement**
IDP drawing no. PP02A, 03A, 04A and 05A



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all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.
do not scale.

any and all elements relating to the fire safety of the building will require separate confirmation and approval by a fully accredited fire engineering consultant who has to be appointed by the Client.

notes:

Red line boundary

Residential Development Area
(includes streets)

Public Open Space

Local Centre

Extra Care

School

Existing Trees and Vegetation

Allotments, Orchard and Growing

Sport Pitches

A 18.02.2026 Red line updated
rev: date: comment(s)
TKB TKB
name: check

IDP ARCHITECTS.
URBAN DESIGNERS.
PROJECT MANAGERS.
LANDSCAPE ARCHITECTS.
WE ARE IDP.

status: **PLANNING** RIBA Stage: **2**

client: **Crest Nicholson**

job: **Lower Luton Road, Harpenden**

title: **Land Use Parameter Plan**

drawn: **SM**

date: **13.11.2025**

checked: **TKB**

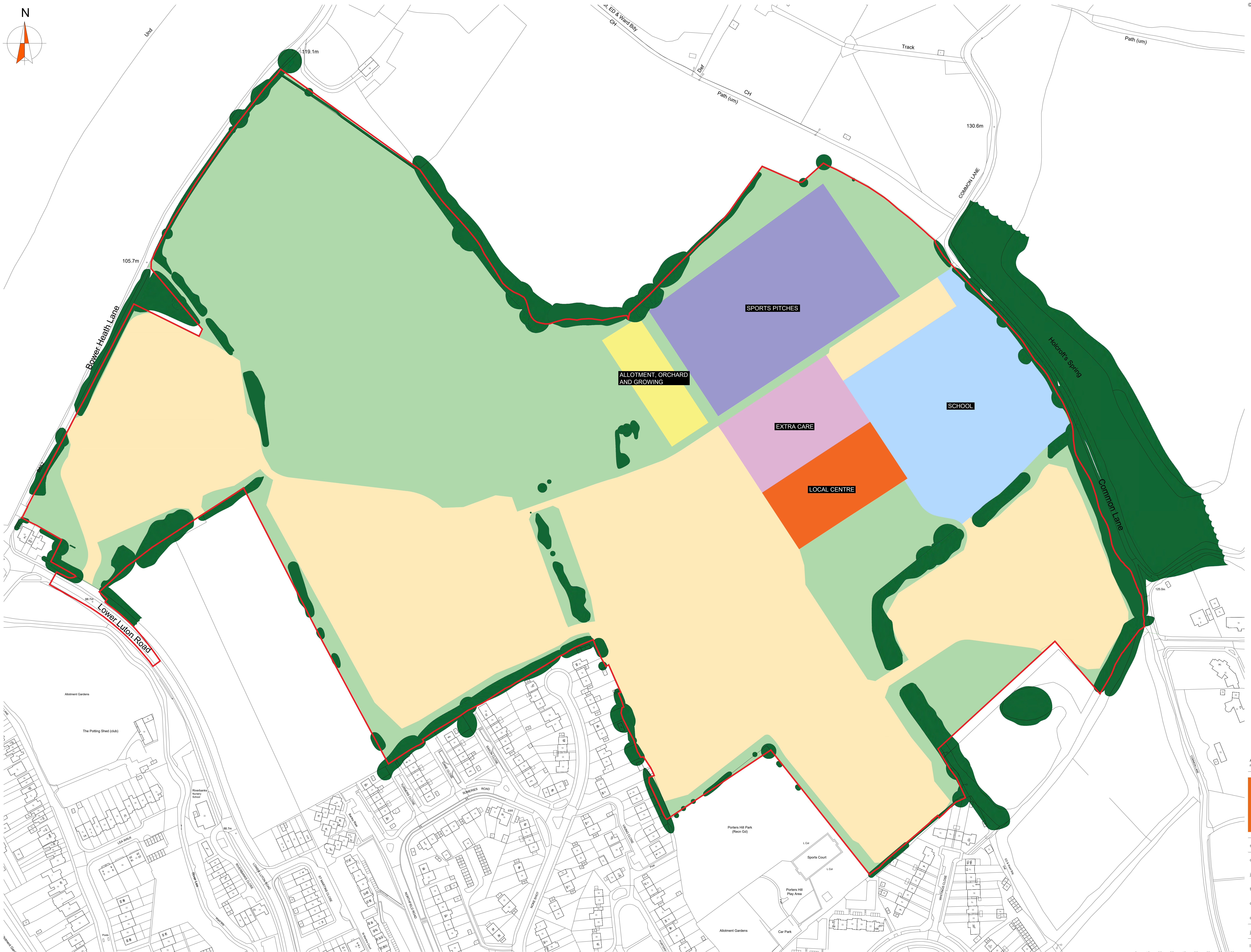
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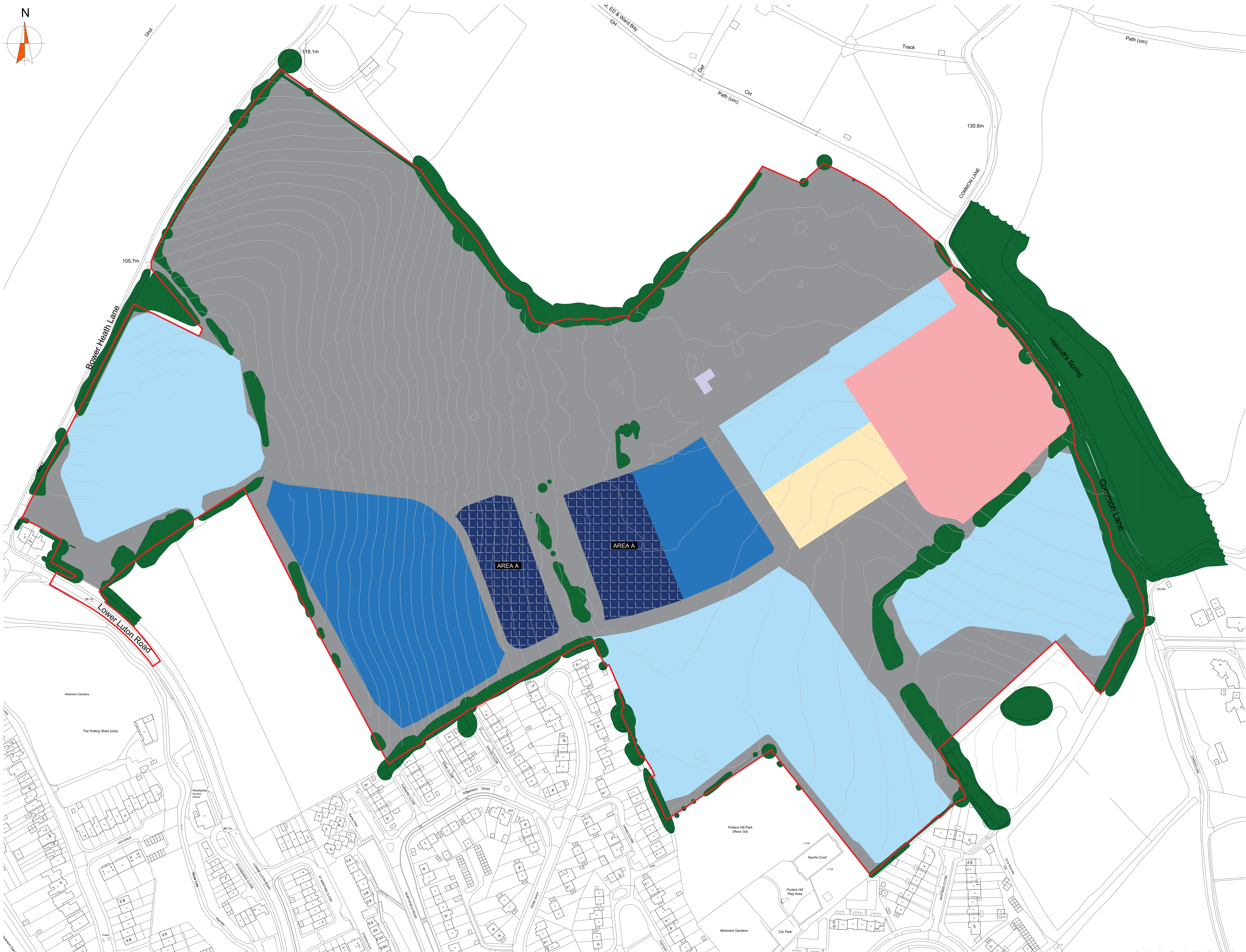
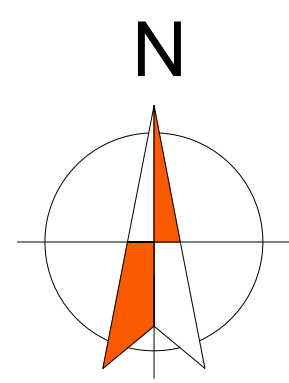
job no: **C6017**

drg no: **PP02 Rev A**

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www.wearedp.com

0 10 20 30 40 50 60 70 80
metres
scale 1:1000





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all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.

do not scale.

any and all elements relating to the fire safety of the building will require separate confirmation and approval by a fully accredited fire engineering consultant who has to be appointed by the Client.

notes:

- Red line boundary
- Public Open Space
- Existing Trees and Vegetation
- Area A - Residential - Generally 2 storey with ridge heights not exceeding 8.5m with an allowable tolerance of + 2m to this area only
- Residential - Generally 2.5 storey with ridge heights not exceeding 9.6m
- Residential - Generally 3 storey with ridge heights not exceeding 11.2m
- School - Ridge heights up to 12m
- Local Centre - Ridge heights up to 12m
- Pavilion - Ridge heights up to 5m
- Existing Contours AOD

All ridge heights shall be measured from the existing ground level. Given the challenging existing topography, an allowable tolerance of +3m to ridge heights is permitted outside the marked 'Area A'.

Storey heights may be increased where this can be justified from a design and placemaking perspective, but must not exceed the allowable ridge heights.

This parameter plan ensures buildings do not exceed allowable ridge heights. It does not specify any limits for lowering existing ground levels, this should be agreed with the Local Authority during the detailed design stage.

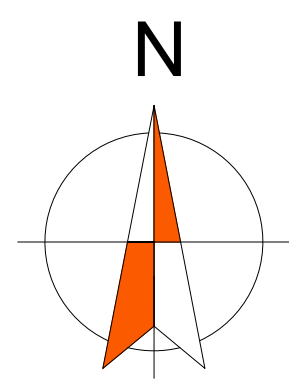
A	18.02.2026	Red line updated	TKB	TKB
rev:	date:	comment(s):	name:	check:

ARCHITECTS.
URBAN DESIGNERS.
PROJECT MANAGERS.
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status:	PLANNING	RIBA Stage: 2
client:	Crest Nicholson	
job:	Lower Luton Road, Harpenden	
title:	Storey Heights Parameter Plan	
drawn:	SM	date: 13.11.2025
checked:	TKB	scale @ a0: 1:1000
job no:	C6017	drg no: PP03 Rev A

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metres
scale 1:1000

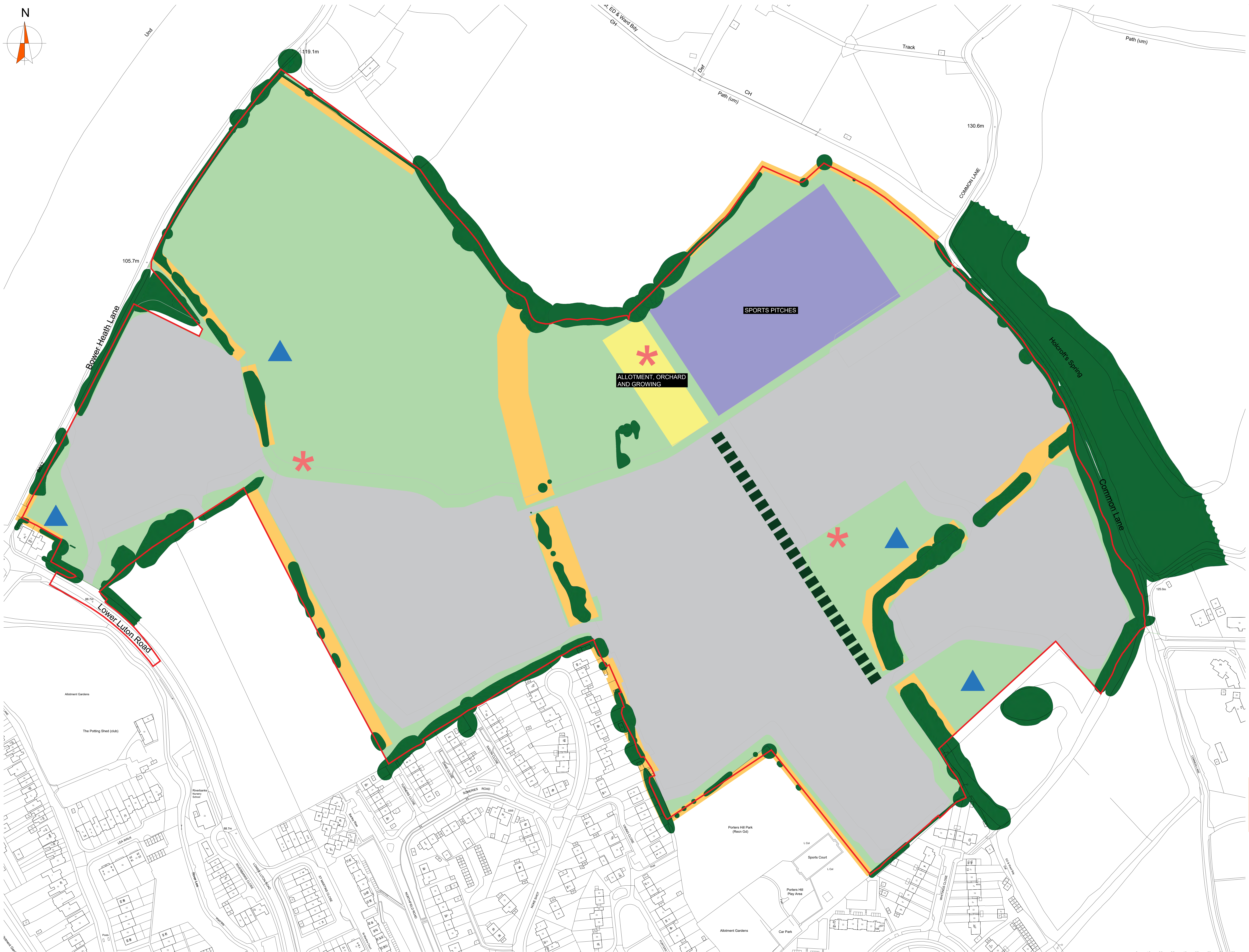


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all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.
do not scale.

any and all elements relating to the fire safety of the building will require separate confirmation and approval by a fully accredited fire engineering consultant who has to be appointed by the Client.

notes:

- Red line boundary
- Public Open Space
- Existing Trees and Vegetation
- Development Area
- Proposed Landscape Buffer Planting
- Green Corridor
- Indicative Play Areas
- Indicative Attenuation Basins
- Allotments, Orchard and Growing
- Sports Pitches



A	18.02.2026	Red line updated	TNB
rev.	date	comment(s)	name
			check



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PROJECT MANAGERS.
LANDSCAPE ARCHITECTS.
WE ARE IDP.

status: **PLANNING** RIBA Stage: **2**

client: **Crest Nicholson**

job: **Lower Luton Road, Harpenden**

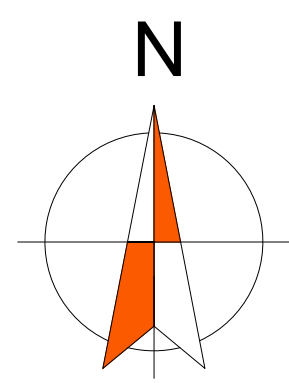
title: **Open Green Infrastructure Parameter Plan**

drawn: **SM** date: **13.11.2025**

checked: **TKB** scale @ a0: **1:1000**

job no: **C6017** drg no: **PP04 Rev A**

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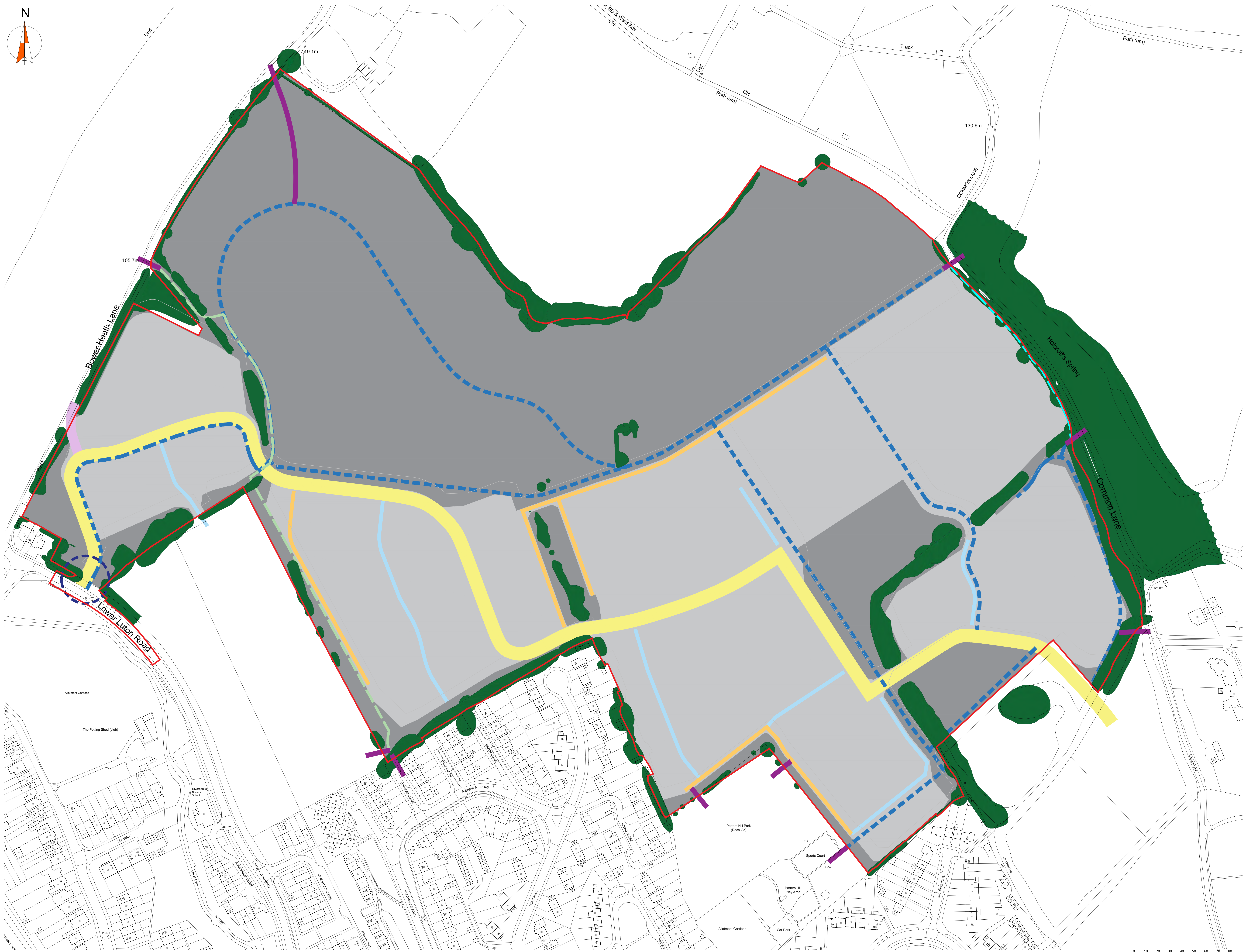


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all dimensions to be checked on site and architect notified of any discrepancies prior to commencement.
do not scale.

any and all elements relating to the fire safety of the building will require separate confirmation and approval by a fully accredited fire engineering consultant who has to be appointed by the Client.

notes:

- Red line boundary
- Public Open Space
- Existing Trees and Vegetation
- Development Area
- Primary Street
- Extension of Bower Heath Lane
- Indicative Secondary Streets
- Indicative Perimeter Streets
- Active Travel
- Bower Heath PRoW
- New Track
- Wider Pedestrian Access Points
- Primary Access



A 18.02.2026 Red line updated
rev: date: comment(s)
TKB TKB
name: check



ARCHITECTS.
URBAN DESIGNERS.
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LANDSCAPE ARCHITECTS.
WE ARE IDP.

status: **PLANNING** RIBA Stage: **2**

client: **Crest Nicholson**

job: **Lower Luton Road, Harpenden**

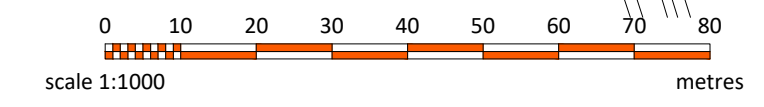
title: **Access and Movement Parameter Plan**

drawn: **SM** date: **13.11.2025**

checked: **TKB** scale @ a0: **1:1000**

job no: **C6017** drg no: **PP05 Rev A**

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www.wearedp.com





Appendix D
Thames Water Asset Plan



GCM Consultancy Services
GCM Consultancy Services
59 Hawthorn Avenue
MAWSLEY
NN14 1TD

Search address supplied Land at Lower Luton Road, Harpenden

Your reference Harpenden

Our reference ALS/ALS Standard/2024_5020397

Search date 17 July 2024

Notification of Price Changes

From 1st April 2024 Thames Water Property Searches will be increasing the prices of its CON29DW Residential and Commercial searches along with the Asset Location Search. Costs will rise in line with RPI as per previous years, which is sat at 6%.

Customers will be emailed with the new prices by February 28th 2024.

Any orders received with a higher payment prior to the 1st April 2024 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk.



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



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



0800 009 4540

Search address supplied: Land at Lower Luton Road, Harpenden,

Dear Sir / Madam

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

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

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

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

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

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

Contact Us

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

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

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TL1315NE
TL1316SE
TL1415NW
TL1416SW
TL1415SE
TL1415NE
TL1515SW
TL1515NW

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

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

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

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

The following quartiles have not been printed as they contain no assets:

TL1416SE

For your guidance:

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

Clean Water Services

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

Following examination of our statutory maps, Thames Water has been unable to find any plans of water mains within this area. If you require a connection to the public water supply system, please write to:

New Connections / Diversions
Thames Water
Network Services Business Centre
Brentford
Middlesex
TW8 0EE

Tel: 0845 850 2777

Fax: 0207 713 3858

Email: developer.services@thameswater.co.uk

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact the water company indicated below:

TL1315NE	Affinity Water
TL1316SE	Affinity Water
TL1415NW	Affinity Water
TL1416SW	Affinity Water
TL1415SE	Affinity Water
TL1415NE	Affinity Water
TL1416SE	Affinity Water
TL1515SW	Affinity Water
TL1515NW	Affinity Water

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0345 3572401

For your guidance:

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



Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

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

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

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

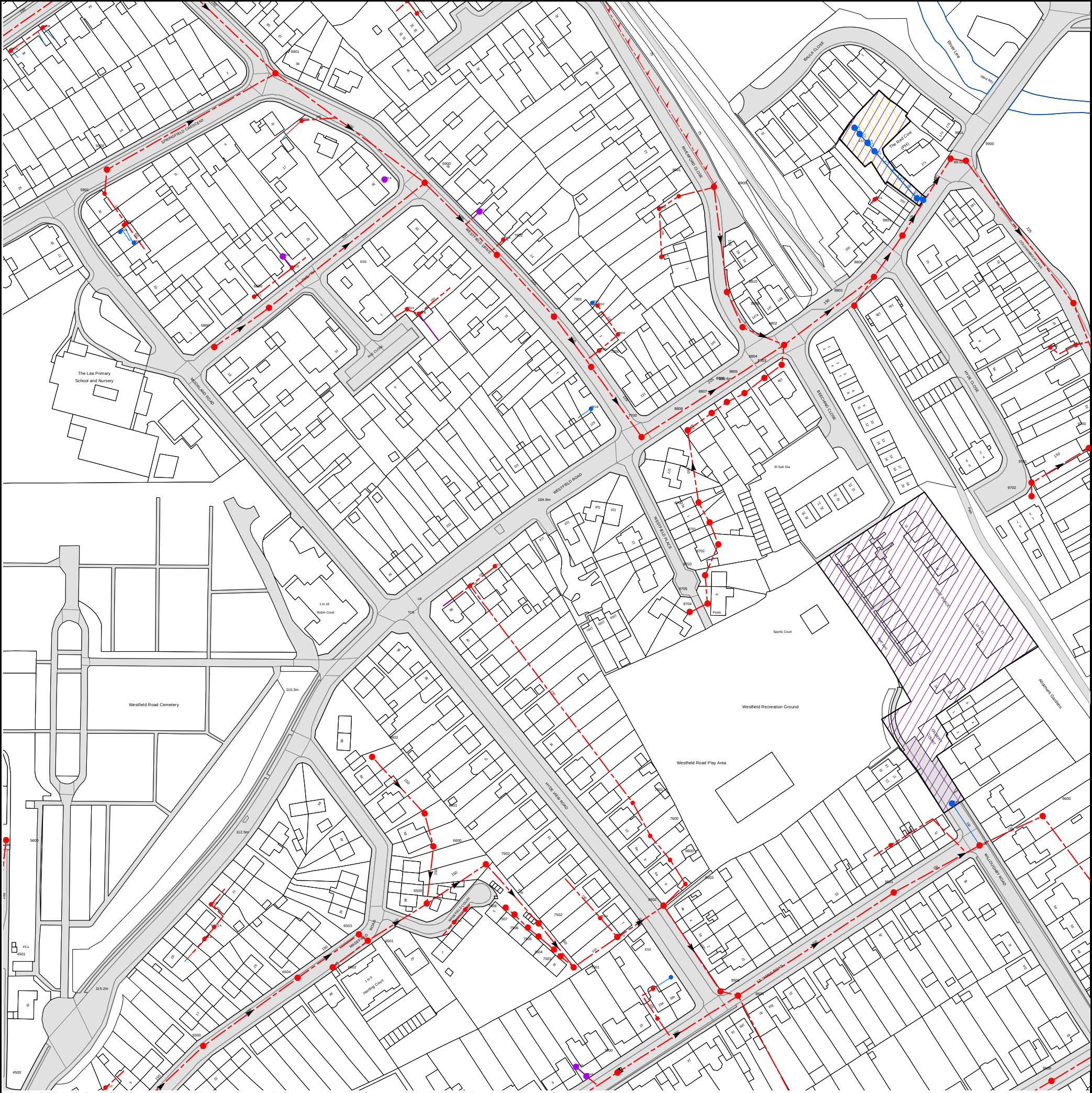
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

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

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

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



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 513750,215750

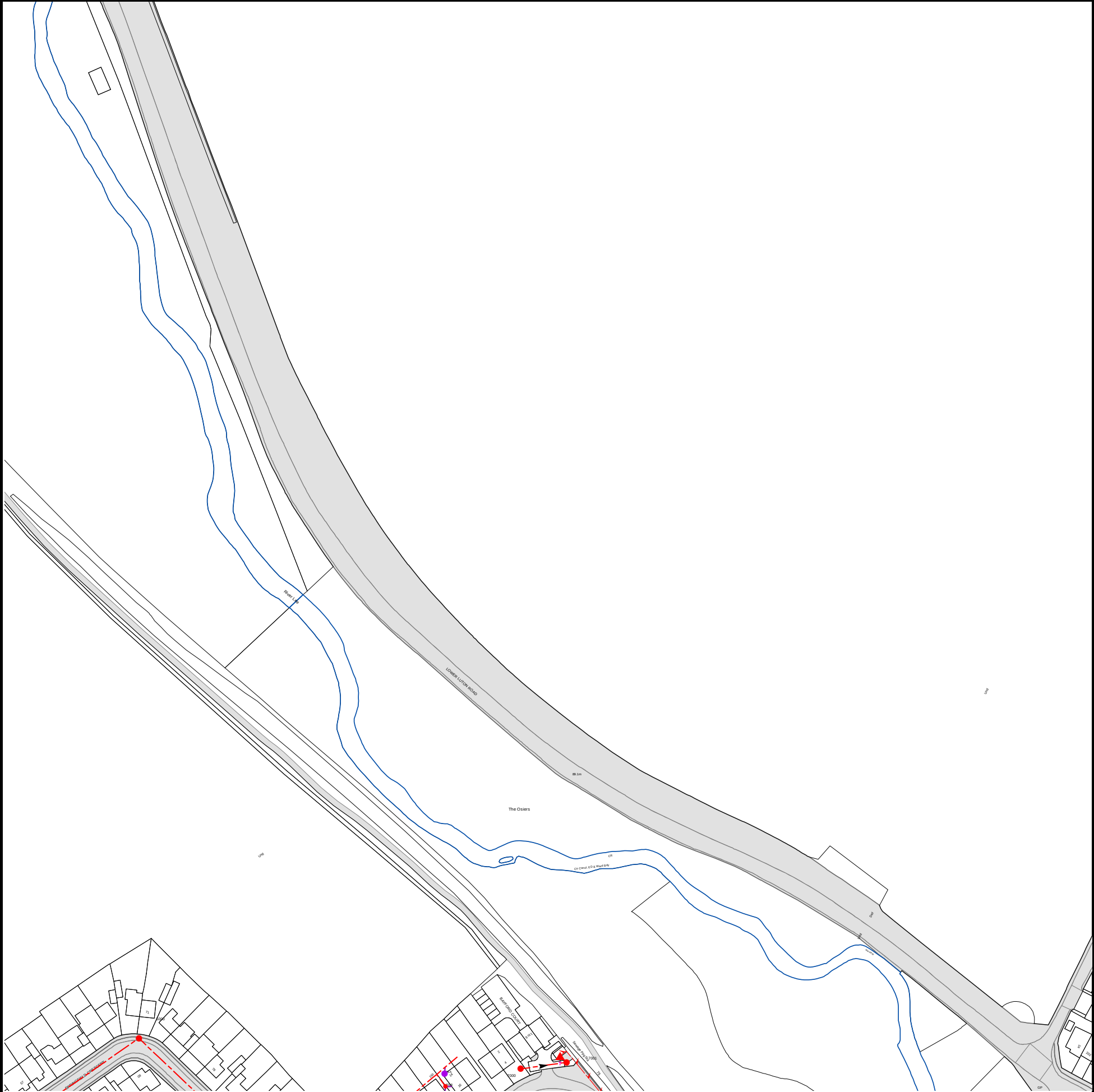
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NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
681B	n/a	n/a
681A	n/a	n/a
8801	94.96	93.43
9800	88.53	87.81
8810	99.32	96.25
8800	93.99	93.02
681E	n/a	n/a
881A	n/a	n/a
7802	102.08	100.38
781A	n/a	n/a
9801	92.32	90.66
791A	n/a	n/a
8902	98.54	97.13
891A	n/a	n/a
8901	98.36	96.85
8900	97.51	96.63
6900	102.62	100.82
691A	n/a	n/a
9900	89.19	88.05
9901	89.58	88.8
691D	n/a	n/a
9500	97.27	95.56
9501	96.09	94.31
8806	100.75	99.34
8805	100.45	99.01
8804	99.34	98.68
8803	98.78	97.64
981A	n/a	n/a
8802	97.75	95.85
981B	n/a	n/a
8809	98.76	96.12
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
n/a	n/a	n/a
8702	n/a	n/a
961C	n/a	n/a
961A	94.22	93.26
961B	n/a	93.11
9702	92.2	90.61
9701	92.13	90.41
9600	92.93	91.79
9700	90.21	89.36
6601	107.61	106.78
6500	106.65	105.27
6600	107.36	106.27
751D	n/a	n/a
751E	n/a	n/a
7602	n/a	n/a
7508	103.81	103.08
7507	103.64	102.86
7506	103.5	102.55
7502	103.18	101.66
751H	n/a	n/a
7601	102.71	101.84
7600	101.63	100.72
8502	101.12	99.9
8600	101.15	100.37
8503	101.2	100.2
6602	109.55	108.71
8705	102.59	101.77
8704	102.55	101.57
771B	n/a	n/a
8703	102.58	101.32
771A	n/a	n/a
8701	102.75	100.84
8700	102.79	100.69
7700	102.76	99.63
8808	101.82	100.04
8807	101.52	99.63
781B	n/a	n/a
7800	103.04	99.79
781D	n/a	n/a
781E	n/a	n/a
7801	102.49	99.88
781F	n/a	n/a
781C	n/a	n/a
751F	n/a	n/a
7500	103.97	100.79
751A	n/a	n/a
<Null>	n/a	n/a
8500	100.53	99.5
8501	100.79	99.68
<Null>	n/a	n/a
6504	n/a	n/a
<Null>	n/a	n/a
6502	108.55	n/a
7501	102.34	101.03
7503	102.43	101.56

Manhole Reference	Manhole Cover Level	Manhole Invert Level
7504	102.6	101.76
6501	107.93	105.75
751G	n/a	n/a
7505	102.88	102.09
6503	107.9	106.15
551C	n/a	n/a
5500	110.34	n/a
551A	n/a	n/a
651A	n/a	n/a
551B	n/a	n/a
5600	119.26	117.75
5800	109.59	108.01
6800	107.73	106.1
681C	n/a	n/a
681D	n/a	n/a
581B	n/a	n/a
581A	n/a	n/a
591A	n/a	n/a
591B	n/a	n/a
5901	109.47	108.06
5900	108.92	107.27
591C	n/a	n/a
591D	n/a	n/a
6901	104.92	102.02
691B	n/a	n/a
691C	n/a	n/a
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 513750,216250

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
7000	95.25	93.97
7001	94.42	93.07
5000	104.74	102.66
701A	n/a	n/a
701B	n/a	n/a
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Manhole Reference	Manhole Cover Level	Manhole Invert Level
4501	102.09	100.75
4502	104.78	102.41
4500	106.77	104.69
461A	n/a	n/a
4602	113.04	110.34
4603	n/a	n/a
2603	99	97.53
3600	110.71	108.92
2604	98.93	97.65
2605	98.93	97.87
4700	114.8	113.12
371A	n/a	n/a
4702	115.66	113.84
3707	105.63	104.14
4701	119.1	117.39
3701	109.23	106.94
3706	116.16	114.3
2711	105.52	102.58
3702	111.73	109.43
3703	111.89	111.12
3704	114.04	111.73
3705	114.21	113.37
4810	118.27	116.66
4804	119.09	117.01
4809	119.08	117.15
4803	119.98	118.66
4802	120.81	119.43
4808	118.98	117.27
4807	118.96	117.31
4806	n/a	n/a
4801	121.38	119.65
4805	n/a	n/a
481B	n/a	n/a
3800	118.96	117.78
481A	n/a	n/a
3502	92.86	91.18
3504	97.36	96
2500	90.59	87.39
3505	97.43	96.07
3506	97.51	96.22
3503	93.02	91.66
3507	97.54	96.31
3508	97.63	96.51
3509	97.68	96.61
3500	96.84	93.69
3510	97.63	96.71
4503	105.83	103.54
451A	n/a	n/a
2505	92.81	90.92
2506	93.05	92.29
2507	93.85	92.5
3501	97.56	94.34
4600	109.35	107.31
3601	99.61	97.54
3602	99.62	97.82
3603	99.56	97.93
3604	99.52	97.97
3605	99.39	98.12
3606	102.96	101.03
4601	109.24	108.13
2602	97.29	94.93
3609	99.04	97.2
3607	105.72	103.85
3610	98.97	97.25
3608	105.73	104.22
2612	98.95	97.4
081A	n/a	n/a
081C	n/a	n/a
071I	n/a	n/a
0605	88.13	87.64
0603	88.16	87.39
081B	n/a	n/a
161A	n/a	n/a
171A	n/a	n/a
1700	93.28	92.22
2701	90.94	90.02
2700	90.84	89.89
2702	92.19	90.37
2703	92.04	90.51
2600	91.57	89.3
2704	92.16	90.56
2601	91.9	89.6
2705	92.26	90.64
2706	92.68	90.73
2707	92.61	90.81
271A	n/a	n/a
2709	98.19	96.17
2708	97.48	95.73
2710	100.57	98.22
2712	99.56	98.09

Manhole Reference	Manhole Cover Level	Manhole Invert Level
2713	99.49	98.17
2714	99.41	98.27
2715	99.36	98.4
151C	n/a	n/a
151B	n/a	n/a
151A	n/a	n/a
2501	90.2	87.94
2502	91.25	88.2
0501	88.2	86.93
151E	n/a	n/a
2504	91.5	90.74
2611	91.47	90.64
0600	88.22	87.1
2610	91.42	90.54
161B	88.08	87.41
2609	91.33	90.4
161C	87.72	87.26
2608	91.35	89.86
2607	91.53	89.28
051A	n/a	n/a
0500	92.59	89.98
071C	n/a	n/a
071A	n/a	n/a
0800	88.61	87.69
0700	89.01	87.54
071B	n/a	n/a
071E	n/a	n/a
071F	n/a	n/a
071D	n/a	n/a
071G	n/a	n/a
0601	88.59	87.23
071H	n/a	n/a
0602	88.33	87.31
0604	88.21	87.55
4800	122.19	119.86
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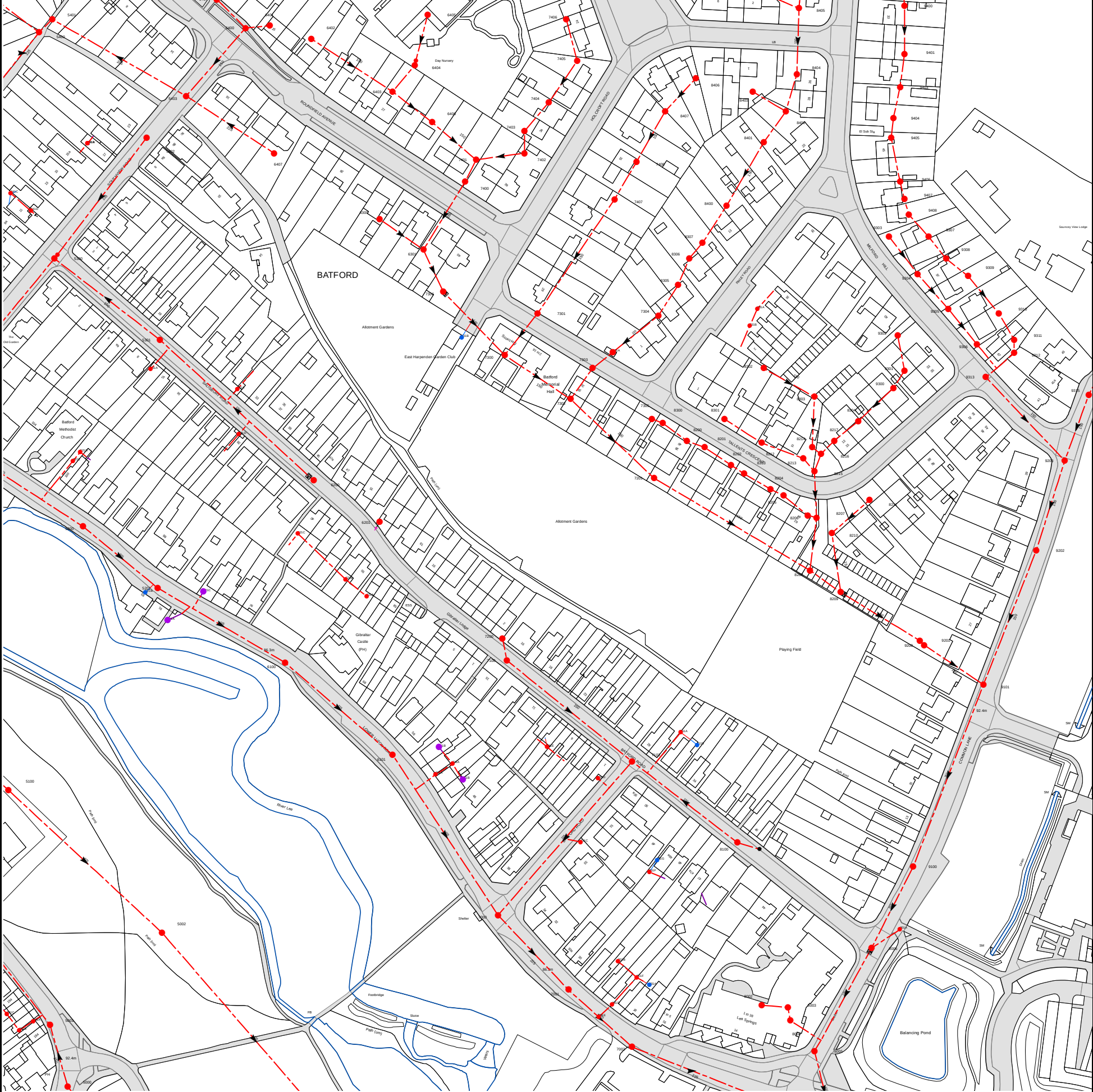
The width of the displayed area is 500m and the centre of the map is located at OS coordinates 514250,216250

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
001A	n/a	n/a
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 514750,215250

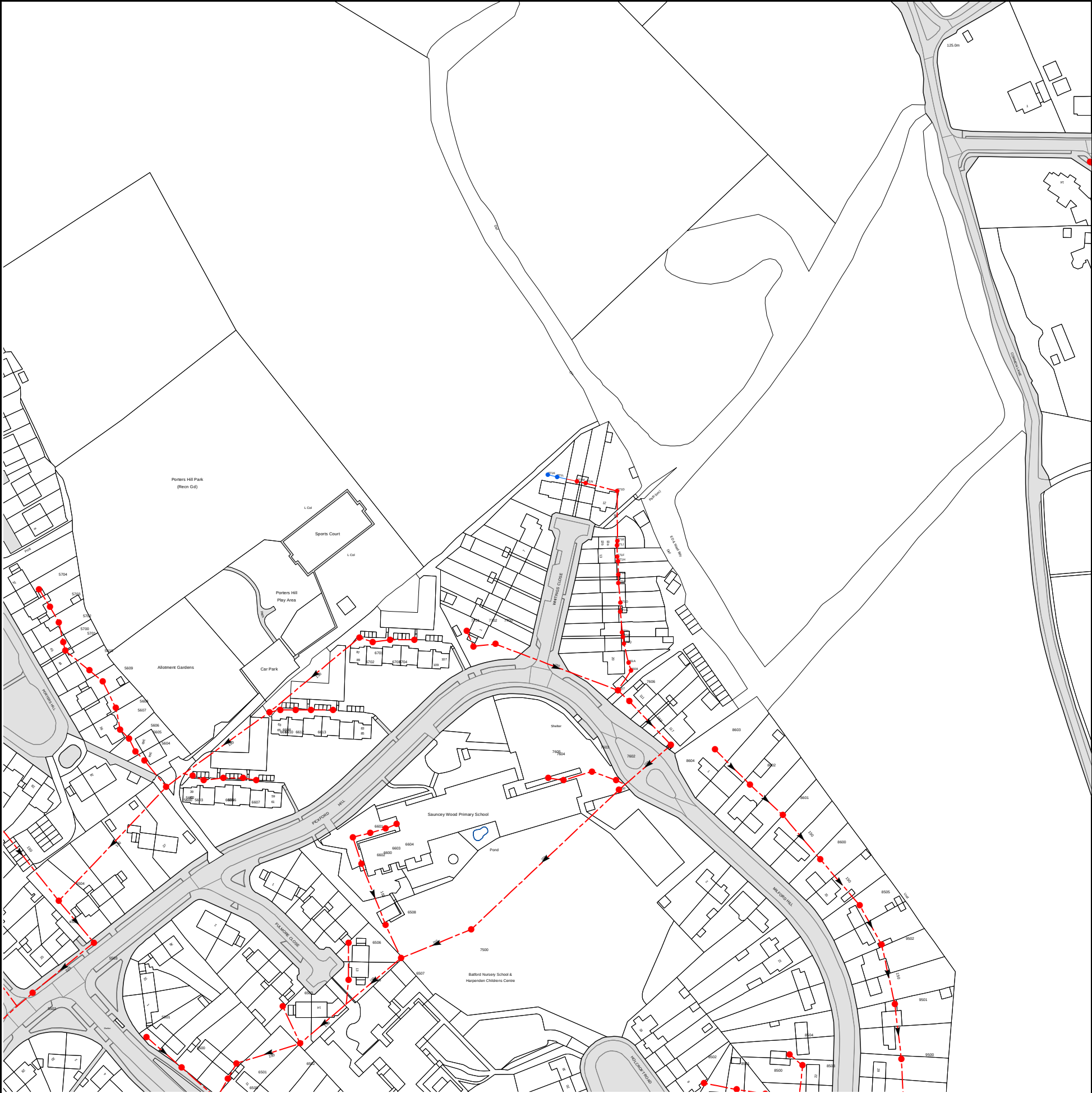
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Manhole Reference	Manhole Cover Level	Manhole Invert Level
521E	n/a	n/a
521D	n/a	n/a
621D	n/a	n/a
541D	n/a	n/a
541C	n/a	n/a
5402	101.02	98.88
5403	103.28	102.17
5400	102.15	100.33
5401	102.98	101.18
5404	107.26	105.99
6400	107.12	105.69
6401	107.3	105.95
6402	107.33	106.39
6403	107.73	106.07
6404	108.71	106.81
6405	109.75	108.77
6406	107.07	105.81
7403	107.39	105.87
7404	107.39	106.8
731A	n/a	n/a
831B	n/a	n/a
7304	102.21	101.29
831A	n/a	n/a
8305	104.39	103.4
8306	104.72	103.74
8307	105.16	104.05
9303	103.27	101.75
8400	106.07	104.7
7407	106.03	104.93
7408	106.98	105.82
8401	106.73	105.52
8407	108.08	106.87
8402	106.99	105.78
8403	107.69	106.5
8406	108.67	n/a
8404	107.6	106.18
7405	109.32	108.22
7406	109.98	109
8405	108.59	107.06
9405	104.73	103.62
9404	105.07	103.88
9300	99.78	98.7
9302	101.25	100.27
9403	105.47	104.24
9406	104.46	102.71
9401	105.9	104.56
9407	103.53	102.29
9301	100	99.1
9400	106.61	105.48
9408	103.4	101.88
9304	101.84	100.66
9307	102.56	101.3
9308	101.85	100.7
9305	101.18	99.57
9309	101.27	99.91
9306	100.06	98.96
9313	98.8	97.18
9310	99.92	98.61
9312	98.82	97.55
9311	99.26	97.71
9202	94.33	92.59
9203	95.43	93.82
9315	96.21	94.86
8209	96.94	95.35
8208	n/a	n/a
8210	98.03	95.94
8207	98.63	97.54
8206	99.07	97.72
8211	98.05	96.31
8205	99.33	98.1
8204	99.82	98.27
7201	100.02	98.86
8203	99.83	98.66
8215	99.65	97.87
8202	100.48	98.81
8213	100.35	99.01
8216	99.81	98.05
8214	100.48	99.58
8201	100.5	99.17
8212	100.76	99.57
8217	99.95	98.19
8200	100.9	99.37
8300	100.97	99.72
8304	99.94	98.46
7305	101.31	99.85
8301	101.2	100.37
7302	101.28	100.05
8303	101.59	100.59
8302	102.58	101.7
7303	102.29	100.99

Manhole Reference	Manhole Cover Level	Manhole Invert Level
521B	n/a	n/a
521C	n/a	n/a
5201	86.46	84.42
621B	n/a	n/a
621C	n/a	n/a
5200	86.36	84.62
6201	94.12	92.63
6200	93.97	91.09
631A	n/a	n/a
531A	n/a	n/a
7300	101.63	100.45
5301	94.62	90.64
731B	n/a	n/a
7301	103.01	101.69
7306	102.29	100.94
5300	95.06	90.16
6301	103.55	101.65
6300	103.66	102.19
7400	105.74	103.76
7401	106.39	104.29
7402	106.59	105.14
6407	103.81	102.5
541B	n/a	n/a
541A	n/a	n/a
5100	82.52	81.2
5001	92.12	n/a
5000	93.1	n/a
5002	86.79	84.92
521A	n/a	n/a
6100	86.34	84.18
621A	n/a	n/a
6101	86.22	83.88
611A	n/a	n/a
611B	n/a	n/a
711A	n/a	n/a
711B	n/a	n/a
501C	n/a	n/a
501B	n/a	n/a
501A	n/a	n/a
701A	n/a	n/a
701F	n/a	n/a
701B	n/a	n/a
7000	86.67	83.58
711F	n/a	n/a
711G	n/a	n/a
8100	92.56	91.01
711C	n/a	n/a
711D	n/a	n/a
7102	93.64	90.55
711E	n/a	n/a
811B	n/a	n/a
811A	n/a	n/a
7100	93.88	91.72
7200	94.3	93.2
8005	86.43	85.02
7002	86.89	83.22
8004	87.87	86.55
701E	n/a	n/a
8003	87.89	86.76
8002	88.43	87.39
701D	n/a	n/a
7001	86.85	83.39
8006	87.9	86.56
901A	n/a	n/a
9100	90.19	88.34
9200	94.53	93.01
9201	94.38	n/a
9101	92.59	91.11
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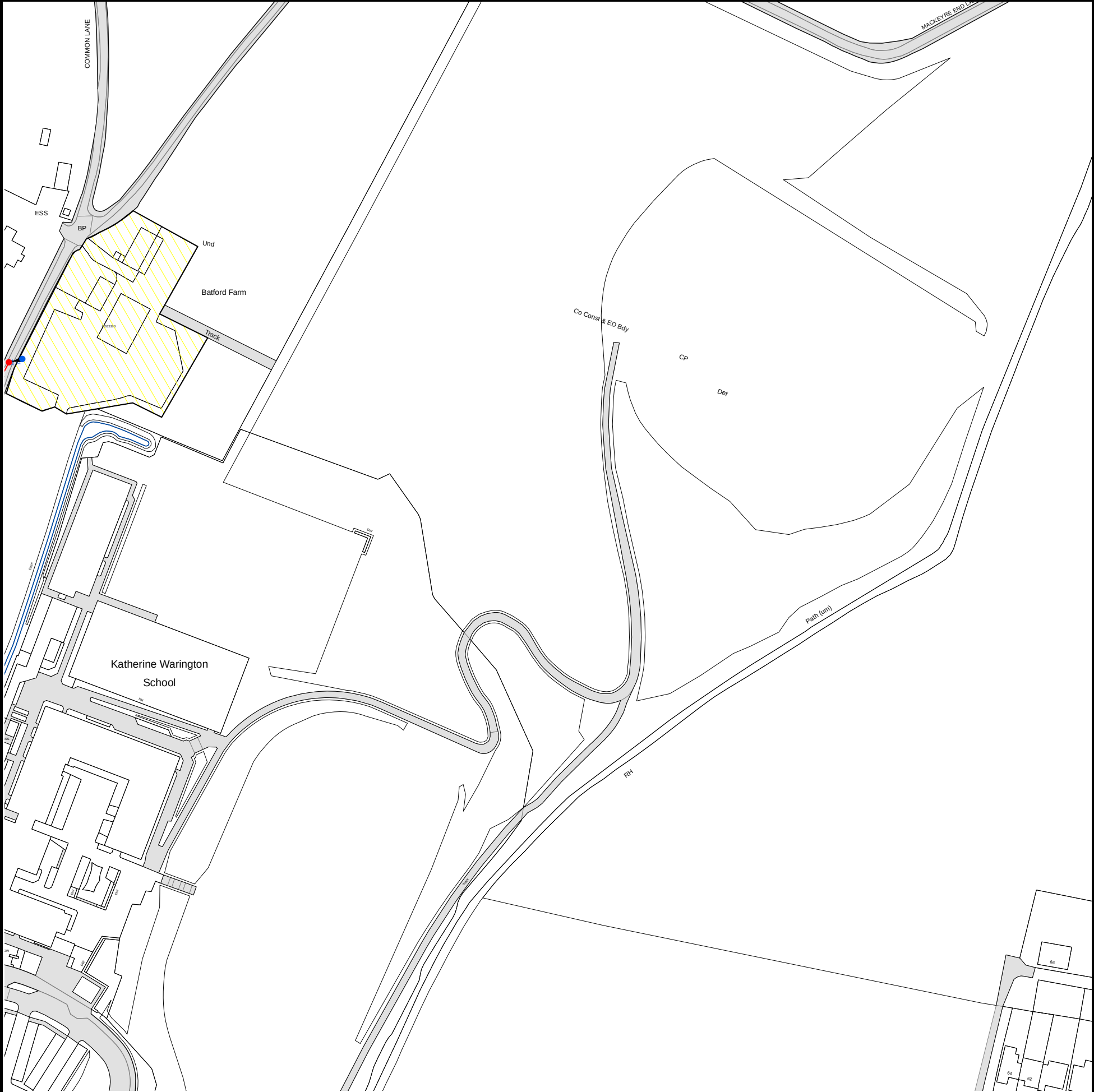
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Manhole Reference	Manhole Cover Level	Manhole Invert Level
6500	108.22	106.65
5500	107.49	106.3
6501	108.48	106.8
5501	107.74	106.73
5502	106.3	105.03
5503	109.28	107.08
5504	110.67	108.54
5600	115.91	113.77
5603	115.84	114.68
6605	115.85	114.81
6606	115.93	115.01
5602	115.79	114.6
5604	116.66	114.99
5605	116.71	115.37
5606	116.82	115.71
5607	116.98	116
6613	118.06	117.29
5608	117.73	116.32
5609	117.86	116.53
5610	118.17	116.72
5700	118.23	117.05
7701	119.51	117.8
7700	119.35	117.37
5701	118.21	117.11
6702	119.24	118.35
6703	119.28	118.44
6704	119.33	118.59
6701	119.2	118.27
7702	119.52	117.86
5702	118.92	117.52
5703	119.17	117.72
5704	119.2	118.42
771K	n/a	n/a
8600	111.57	110.48
8601	112.65	111.6
8602	113.71	112.52
7604	115.85	114.55
7602	115.74	114.26
7603	116.1	114.33
8603	114.55	113.37
8604	115.72	114.52
7606	116.6	115.06
7607	n/a	n/a
7608	117.03	115.84
771O	n/a	n/a
771C	n/a	n/a
771B	n/a	n/a
771H	n/a	n/a
771F	n/a	n/a
771J	n/a	n/a
771E	n/a	n/a
771D	n/a	n/a
771N	n/a	n/a
771M	n/a	n/a
771L	n/a	n/a
6607	115.97	115.13
6608	118.41	116.83
6610	117.95	117.07
6503	111.77	110.24
6611	117.98	117.12
6502	110.49	108.99
6612	118.01	117.2
6506	113.46	112.25
6505	113.35	110.78
6601	115.9	113.72
6600	115.93	n/a
6602	115.85	113.86
6508	114.23	112.91
6603	115.92	114.01
6604	115.97	114.1
6507	n/a	n/a
7500	n/a	n/a
7605	115.85	114.68
8500	109.3	107.93
8501	109.57	108.3
8502	110.18	108.87
8503	108.83	107.65
8504	109.2	107.98
9502	109.3	108.11
8505	110.17	109.24
9501	107.9	106.76
9500	n/a	n/a
991A	n/a	n/a
7600	115.65	114.16
761A	n/a	n/a
771Q	n/a	n/a
771P	n/a	n/a
771I	n/a	n/a
771G	n/a	n/a

Manhole Reference	Manhole Cover Level	Manhole Invert Level
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 515250,215250

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Manhole Reference	Manhole Cover Level	Manhole Invert Level
031A n/a	n/a n/a	n/a n/a
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The width of the displayed area is 500m and the centre of the map is located at OS coordinates 515250,215750

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
091A	n/a	n/a
091B	n/a	n/a
081A	n/a	n/a
081B	n/a	n/a
091C	n/a	n/a
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Scale: 1:7160
Width: 2000m
Printed By: Krishna1
Print Date: 18/07/2024
Map Centre: 514504,215934
Grid Reference: TL1415NE

Comments:

ALS/ALS Standard/2024_5020397

NB: Level quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates no Survey information is available.

REFERENCE	COVER LEVEL	INVERT LEVEL
6507		
071G		
0104	106.69	
9702	92.2	90.61
9301	101.26	98.19
9500	97.27	95.56
3103	92.63	90.61
4807	118.96	117.31
4810	118.27	116.66
4702	115.66	113.84
4809	119.08	117.15
7605	115.85	114.68
7406	109.98	109
7302	101.28	100.05
5200	86.36	84.62
5503	109.28	107.08
5303	121.57	120.59
5200	124.69	123.18
1301	97.91	96.25
1404		
1005	106.58	103.82
1200	97.41	95.86
1310	91.22	89.24
1306	93.06	91.01
2210	96.67	95.48
5300	95.06	90.16
5701	118.21	117.11
8212	100.76	99.57
3601	99.61	97.54
3404	91.75	89.65
3702	111.73	109.43
3102	92.89	90.94
3006	95.33	94.2
4805		
7000	86.67	83.58
7300	101.63	100.45
7402	106.59	105.14
7305	101.31	99.85
9901	89.58	88.8
3604	99.52	97.97
3400	89.35	85.8
3401	90.34	88.3
6301	119.8	118.22
5203	123.26	121.97
5502	106.3	105.03
5704	119.2	118.42
5703	119.17	117.72
8603	114.55	113.37
8202	100.48	98.81
8203	99.83	98.66
8403	107.69	106.5
6601	115.9	113.72
4952	96.77	
3202	87.29	85.76
3501	97.56	94.34
3100	92.69	91.82
7400	105.74	103.76
7500		
5401	113.29	111.91
1312	90.91	89.48
5000	127.33	125.87
0405	94.46	93.74
0402	93.82	92.87
0404	92.58	90.54
1201	94.82	93.41
1313	90.78	89.57
1314	90.59	89.87
4500	106.77	104.69
3608	105.73	104.22
6604	115.97	114.1
6704	119.33	118.59
6405	109.75	108.77
4602	113.04	110.34
8604	115.72	114.52
8200	100.9	99.37
8406	108.67	
8502	110.18	108.87
6902	84.6	82.48
8700	102.79	100.69
2003	99.11	96.86
3610	98.97	97.25

REFERENCE	COVER LEVEL	INVERT LEVEL
071F		
9300	102.78	100.8
4305	89.12	88.18
9701	92.13	90.41
9600	92.93	91.79
9302		
3606	102.96	101.03
4000	94.56	93.84
4808	118.98	117.27
4804	119.09	117.01
7404	107.39	106.8
7604	115.85	114.55
7001	86.85	83.39
5000	93.1	
5610	118.17	116.72
5202	122.78	121.63
5302	121.53	120.26
5402	111.04	109.82
1302	91.97	90.08
1303	93.17	91.61
1304	93.04	91.47
1406	91.18	89.14
1305	93.03	91.21
2201	93.2	92.13
2202	93.84	92.24
5702	118.92	117.52
5700	118.23	117.05
8302	102.58	101.7
3602	99.62	97.82
3405	92.67	90.39
3500	96.84	93.69
6600	115.93	
4302	88.33	86.61
7700	119.35	117.37
7200	94.3	93.2
7100	93.88	91.72
7403	107.39	105.87
7201	100.02	98.86
9900	89.19	88.05
3101	92.67	91.76
3603	99.56	97.93
6202	121.27	119.7
5002	127.34	126.05
5204	124.75	123.4
5400	102.15	100.33
5001	92.12	
5401	102.98	101.18
8400	106.07	104.7
8501	109.57	108.3
8602	113.71	112.52
6506	113.46	112.25
7401	106.39	104.29
4901	96.94	94.94
3701	109.23	106.94
3605	99.39	98.12
6613	118.06	117.29
7702	119.52	117.86
7701	119.51	117.8
5301		
1308	92.93	91.41
0102	106.72	104.99
0602	88.33	87.31
0403	92.58	89.54
0103	106.73	
1202	94.8	93.06
1309	91.54	90.72
4400	96.87	95.05
4800	122.19	119.86
3705	114.21	113.37
6404	108.71	106.81
6301	103.55	101.65
7301	103.01	101.69
8300	100.97	99.72
8305	104.39	103.4
8306	104.72	103.74
8307	105.16	104.05
6611	117.98	117.12
6406	107.07	105.81
8900	97.51	96.63
2612	98.95	97.4
3403	90.27	86.99

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REFERENCE	COVER LEVEL	INVERT LEVEL
3609	99.04	97.2
3200	92.26	90.22
3703	111.89	111.12
3704	114.04	111.73
3300	87.54	85.47
6402	107.33	106.39
6200	93.97	91.09
9315	96.21	94.86
0500	92.59	89.98
8502	101.12	99.9
8400	108.95	107.22
5300		
6200	123.99	122.58
6901	104.92	102.02
2701	90.94	90.02
2700	90.84	89.89
8801	94.96	93.43
9501	96.09	94.31
9801	92.32	90.66
0301	97.76	95.86
0200		
0303	96.04	95.38
0105	107.11	104.76
0601	88.59	87.23
0304	95.48	93.89
3504	97.36	96
3800	118.96	117.78
3900	101.89	96.57
3408	91.75	90.16
4502	104.78	102.41
4701	119.1	117.39
7600	115.65	114.16
7606	116.6	115.06
7608	117.03	115.84
8401	106.73	105.52
8205	99.33	98.1
8904	85.88	83.01
8504	109.2	107.98
6602	115.85	113.86
8901	84.63	82.66
8304	99.94	98.46
4600	109.35	107.31
6300	103.66	102.19
6603	115.92	114.01
6403	107.73	106.07
8211	98.05	96.31
9502	109.3	108.11
9405	104.73	103.62
9404	105.07	103.88
5800	109.59	108.01
9800	88.53	87.81
0603	88.16	87.39
1300	97.86	96.52
1405	91.25	88.81
4304	89.76	88.54
4104		
4306	91.04	89.8
4801	121.38	119.65
7202	115.72	111.82
7203	115.82	114.52
2500	90.59	87.39
1315	90.62	89.92
1316		
1207	95.8	94.21
1206	94.97	93.8
1208	96.33	94.67
8501	100.79	99.68
0300	99.29	97.59
6000	125.55	124.19
6302	116.19	114.71
7800	103.04	99.79
8500	100.53	99.5
8100	116.41	112.45
8802	97.75	95.85
0400	95.97	94.41
3509	97.68	96.61
3104	93.46	91.82
3507	97.54	96.31
3506	97.51	96.22
3505	97.43	96.07
4803	119.98	118.66

REFERENCE	COVER LEVEL	INVERT LEVEL
3707	105.63	104.14
3503	93.02	91.66
3002	95.04	93.18
3607	105.72	103.85
8407	108.08	106.87
6612	118.01	117.2
9203	95.43	93.82
4951	97.64	96.21
7600	101.63	100.72
8600	101.15	100.37
8503	101.2	100.2
5900	108.92	107.27
6800	107.73	106.1
6201	122.55	121.14
2200	92.78	91.45
8401	102.82	98.94
8800	93.99	93.02
9000	115.39	113.11
9400	101.3	98.77
0106	107.81	
0302		
0100	107.82	105.79
0101	106.9	105.44
0107		
0401	93.77	91.91
3600	110.71	108.92
3706	116.16	114.3
3301	89.94	88.65
4103	90.27	88.63
4603		
4003	90.51	88.72
7607		
7002	86.89	83.22
7408	106.98	105.82
8500	109.3	107.93
8601	112.65	111.6
8402	106.99	105.78
8404	107.6	106.18
6702	119.24	118.35
8209	96.94	95.35
4105	91.5	89.87
4001	92.41	89.97
6508	114.23	112.91
6703	119.28	118.44
8505	110.17	109.24
8006	87.9	86.56
9303	103.27	101.75
9300	99.78	98.7
9302	101.25	100.27
9900	116.11	114.48
9700	90.21	89.36
0600	88.22	87.1
1402	90.33	88.42
1209	101.52	
4601	109.24	108.13
4503	105.83	103.54
4802	120.81	119.43
7201	115.79	114.23
7601	102.71	101.84
2715	99.36	98.4
1100	101.92	97.28
1203	92.3	90.98
1204	92.45	
1400	88.26	86.29
1205	92.32	91.43
5100	82.52	81.2
8810	99.32	96.25
0108		
6502	108.55	
6602	109.55	108.71
7500	103.97	100.79
8809	98.76	96.12
8300	113.3	111.27
0700	89.01	87.54
3406	95.15	92.2
3508	97.63	96.51
3003	96.32	94.91
3407	90.27	89.19
3004	96.72	95.86
7306	102.29	100.94
4700	114.8	113.12

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REFERENCE	COVER LEVEL	INVERT LEVEL
7405	109.32	108.22
7407	106.03	104.93
6701	119.2	118.27
5404	111.44	110.67
8210	98.03	95.94
6900	102.62	100.82
7400	109.83	107.59
7401	111.56	109.86
7802	102.08	100.38
2102	97.26	96.33
2709	98.19	96.17
2002	99.34	97.95
2300	87.7	86.04
2608	91.35	89.86
2610	91.42	90.54
5900	92.12	90.75
5500	107.49	106.3
8217	99.95	98.19
5201	86.46	84.42
2203	93.83	
2101	97.59	95.97
2600	91.57	89.3
2704	92.16	90.56
2705	92.26	90.64
2706	92.68	90.73
2000		
2605	98.93	97.87
2602	97.29	94.93
2603	99	97.53
6501	108.48	106.8
6400	107.12	105.69
6401	107.3	105.95
6407	103.81	102.5
5606	116.82	115.71
5604	116.66	114.99
8213	100.35	99.01
6610	117.95	117.07
6100	86.34	84.18
9313	98.8	97.18
9202	94.33	92.59
8902	84.7	82.76
8208		
8005	86.43	85.02
8303	101.59	100.59
8216	99.81	98.05
9305	101.18	99.57
9306	100.06	98.96
7801	102.49	99.88
7001	94.42	93.07
7501	102.34	101.03
2710	100.57	98.22
2712	99.56	98.09
2713	99.49	98.17
2207	91.36	89.02
2506	93.05	92.29
7000	95.25	93.97
7505	102.88	102.09
5403	103.28	102.17
5603	115.84	114.68
6605	115.85	114.81
9406	104.46	102.71
9500		
9407	103.53	102.29
9400	106.61	105.48
9304	101.84	100.66
9201	94.38	
101A		
1307	91.36	90.35
711C		
8808	101.82	100.04
6100	125.36	123.61
3510	97.63	96.71
1401	87.86	86.58
7700	102.76	99.63
9310	99.92	98.61
4004	98.01	96.61
5504	110.67	108.54
5609	117.86	116.53
4900	100.36	96.39
0800	88.61	87.69
4900	97.44	95.88

REFERENCE	COVER LEVEL	INVERT LEVEL
7603	116.1	114.33
7602	115.74	114.26
8905	86.04	83.01
5000	104.74	102.66
6601	107.61	106.78
6500	106.65	105.27
7200	119.77	118.36
7602		
7508	103.81	103.08
2607	91.53	89.28
2501	90.2	87.94
5901	92.54	91.88
2205	91.34	90.44
2609	91.33	90.4
5301	94.62	90.64
5600	115.91	113.77
8903	85.61	82.91
5501	107.74	106.73
2702	92.19	90.37
2703	92.04	90.51
2100	96.57	95.65
2204	94.15	92.69
2601	91.9	89.6
2900	104	102.02
2707	92.61	90.81
5608	117.73	116.32
2604	98.93	97.65
2711	105.52	102.58
2208	87.17	85.86
6606	115.93	115.01
6607	115.97	115.13
6608	118.41	116.83
5607	116.98	116
5605	116.71	115.37
5402	101.02	98.88
8600	111.57	110.48
6503	111.77	110.24
9101	92.59	91.11
9312	98.82	97.55
8503	108.83	107.65
8206	99.07	97.72
8214	100.48	99.58
8215	99.65	97.87
8207	98.63	97.54
9308	101.85	100.7
9309	101.27	99.91
7504	102.6	101.76
7503	102.43	101.56
7301	114.7	113.26
2708	97.48	95.73
2611	91.47	90.64
2504	91.5	90.74
2206	91.52	89.54
2714	99.41	98.27
7507	103.64	102.86
7506	103.5	102.55
7502	103.18	101.66
5602	115.79	114.6
5404	107.26	105.99
6500	108.22	106.65
9403	105.47	104.24
9301	100	99.1
9401	105.9	104.56
9100	90.19	88.34
9200	94.53	93.01
9307	102.56	101.3
431B		
531A		
2103	92.1	91.24
3008	97.7	96.44
5201	124.36	122.78
5901	109.47	108.06
9311	99.26	97.71
7300	113.69	112.03
781A		
0605	88.13	87.64
3502	92.86	91.18
9501	107.9	106.76
8100	92.56	91.01
2505	92.81	90.92
4100	87.42	85.31

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REFERENCE	COVER LEVEL	INVERT LEVEL
8204	99.82	98.27
1311	91.18	89.39
8704	102.55	101.57
8002	88.43	87.39
8004	87.87	86.55
1700	93.28	92.22
8705	102.59	101.77
8701	102.75	100.84
8805	100.45	99.01
5304		117.95
8804	99.34	98.68
5408		117.25
611A		
521B		
981A		
091A		
091C		
991A		
051A		
041B		
711A		
611B		
751D		
891A		
3201	92.03	89.7
8201	100.5	99.17
3005	97.89	96.19
6600	107.36	106.27
2507	93.85	92.5
8301	101.2	100.37
6504		
721A		
881A		
931B		
791A		
151B		
151C		
4301		
331A		
5500	110.34	
301A		
3303	87.69	86.13
691B		
931C		
831B		
7304	102.21	101.29
551A		
551B		
541B		
701A		
621B		
141A		
621C		
681A		
551C		
591C		
031A		
1002	107.74	106.64
1004	107.49	104.13
0003	108.81	107.58
1001	107.98	106.77
081C		
501A		
201A		
4501	102.09	100.75
541A		
781B		
521D		
521A		
701A		
701D		
701F		
151E		
081A		
631A		
201F		
201D		
201E		
9001	114.9	113.81
811A		
071B		

REFERENCE	COVER LEVEL	INVERT LEVEL
6505	113.35	110.78
0604	88.21	87.55
8803	98.78	97.64
8003	87.89	86.76
6201	94.12	92.63
8807	101.52	99.63
8703	102.58	101.32
8806	100.75	99.34
5406		117.5
5409		117.5
5407		117.17
5305		
171A		
8702		
981B		
091B		
081B		
081A		
041A		
691A		
611A		
711B		
751E		
431A		
9408	103.4	101.88
6502	110.49	108.99
7102	93.64	90.55
4806		
2502	91.25	88.2
1006	104.31	101.23
6501	107.93	105.75
8902	98.54	97.13
8901	98.36	96.85
451A		
151A		
521A		
4300	86.64	84.92
3302	86.96	85.3
6503	107.9	106.15
3007		
161A		
691C		
931A		
831A		
731A		
7303	102.29	100.99
651A		
541A		
591A		
101B		
841A		
621A		
691D		
681B		
811B		
091A		
0001	110.2	109.02
1003	107.63	106.41
0002	109.2	107.88
1000	108.71	107.34
081B		
931D		
5400	114.29	112.4
271A		
5403	116.26	114.64
731B		
521B		
521E		
521C		
701B		
701E		
0501	88.2	86.93
071A		
751A		
521C		
201C		
201B		
6101	86.22	83.88
901A	9.85	8.77
8405	108.59	107.06
071C		

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REFERENCE	COVER LEVEL	INVERT LEVEL
071D		
071H		
681C		
711D		
591D		
6900	85.49	84.56
771B		
201G		
771E		
461A		
771F		
591E		
771H		
771J		
771L		
771N		
771P		
761A		
191B	50.46	49.27
591A		
901A		
991A	116.88	116.04
991C	117.75	117.22
991H	117.26	116.84
501B		
591C		
581B		
431D		
751H		
311A		
711E		
961A	94.22	93.26
541C		
091B		
711G		
481B		
701B		
781C		
781D		
341B		
161C	87.72	87.26
131B		
521E		
771B		
371A		
211B		

REFERENCE	COVER LEVEL	INVERT LEVEL
071E		
681E		
681D		
071I		
3203	87.89	85.51
5002	86.79	84.92
771C		
771D		
631A		
001A		
771G		
811A		
771I		
771K		
771M		
771O		
771Q		
191A	51.7	49.8
191F	51.15	49.02
591B		
431C		
991B	117.75	117.27
991G	117.3	116.92
991I	117.22	116.62
751F		
581A		
591D		
751G		
811B		
621D		
961B		93.11
591F		
541D		
131A		
711F		
481A		
501C		
781E		
781F		
101C		
161B	88.08	87.41
131C		
521D		
771A		
961C		



Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

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

Other Sewer Types (Not operated and maintained by Thames Water)

	Sewer
	Culverted Watercourse
	Proposed
	Decommissioned Sewer
	Content of this drainage network is currently unknown
	Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

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

	Air Valve		Meter
	Dam Chase		Vent
	Fitting		

Operational Controls

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

	Ancillary		Drop Pipe
	Control Valve		Well

End Items

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

	Inlet		Outfall
	Undefined End		

Other Symbols

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

	Change of Characteristic Indicator		Public / Private Pumping Station
	Invert Level		Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Chamber
	Operational Site

Ducts or Crossings

	Casement	Ducts may contain high voltage cables. Please check with Thames Water.
	Conduit Bridge	
	Subway	
	Tunnel	

5) 'na' or '0' on a manhole indicates that data is unavailable.

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

Payment Terms and Conditions

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

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

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

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 980 8800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking
Please Call 0800 009 4540 quoting your invoice number starting CBA or ADS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number

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



Appendix E
Thames Water Pre-Planning Enquiry



Thomas Kirk

JPP CONSULTING
GRAND UNION WORKS
WHILTON LOCKS
DAVENTRY
NORTHAMPTONSHIRE
NN11 2NH

**Wastewater
pre-planning**



Our ref **DS6130260/DTS75351**

20 January 2025

Pre-planning enquiry: Capacity concerns

Site: LAND NORTH-EAST OF LOWER LUTON ROAD, HARPENDEN, HERTFORDSHIRE, AL5 5EG

Dear Thomas

Thank you for providing information on your development.

Proposed site: The proposed total units of the development (which will total up to 500 units) additional provision have been put forward as part of the development proposals. This includes plans for a 60+ unit extra-care scheme, a 2 FE primary school and a new neighbourhood centre (to comprise of a health care facility).

Proposed foul water: The Eastern catchment = c.290 units 150 litres x 5 people, x 290 units = 217,500 litres/day at 2.5 l/s and 60+ unit extra-care scheme 350 litres x 60 rooms x 2 occupants = 42,000 litres/day at 0.5l/s. TL14152501. PFC 20% pump rate too low (150mm FWS) Western catchment = c.200 units 150 litres x 5 people x 200 units = 150,000 litres/day at 1.7 l/s and 2 FE primary school, 90 litres x 420 students = 37,800 litres/day at 0.4l/s... The discharge point of Western outfall is to Manhole TL1515031A. PFC 14% Pump rate too low (150mm FWS) The proposed total units of the development (which will total up to 500 units) additional provision have been put forward as part of the development proposals. This includes plans for a 60+ unit extra-care scheme, a 2 FE primary school and a new neighbourhood centre (to comprise of a health care facility). All foul water to be pumped. Eastern catchment = c.290 units 150 litres x 5 people, x 290 units = 217,500 litres/day at 2.5 l/s and 60+ unit extra-care scheme 350 litres x 60 rooms x 2 occupants = 42,000 litres/day at 0.5l/s. Western catchment = c.200 units 150 litres x 5 people x 200 units = 150,000 litres/day at 1.7 l/s and 2 FE primary school, 90 litres x 420 students = 37,800 litres/day at 0.4l/s... The discharge point of Western outfall is to Manhole TL1515031A. Eastern outfall Potential connection to the network in this location, in the vicinity of Manhole TL14152501.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

We've assessed your **foul water** proposals and concluded that our sewerage network will have enough capacity for you to connect the first 0 properties, but unfortunately, we're unable to meet the needs of your **full** development at this time.

In order to ensure we make the appropriate upgrades – or ‘off-site reinforcement’ – to serve the remainder of your development, we’ll need to carry out modelling work, design a solution and build the necessary improvements. This work is done at our cost.

Once we’ve begun modelling, we may need to contact you to discuss changing the connection point for capacity reasons. Please note that we’ll pay the cost of covering any extra distance if the connection needs to be made at a point further away than the nearest practicable point of at least the same diameter.

How long could modelling and reinforcement take?

Typical timescales for a development of your size are:

Modelling: 9-12 months

Design: 6 months

Construction: Up to 18 months*

Total: Up to 36 months

*(dependent on Traffic Management, Local Authority and Third-Party Landowners)

If the time you’re likely to take from planning and construction through to first occupancy is longer than this, we’ll be able to carry out the necessary upgrades in time for your development. If it’s shorter, we may seek planning conditions, please contact me on the number below to discuss the timing of our activities.

What do you need to tell us before we start modelling?

We will only carry out modelling once we’re confident that your development will proceed. In order to have this confidence, we’ll need to know that you **own the land and have either outline or full planning permission**. Please email this information to us as soon as you have it.

If the modelling shows we need to carry out reinforcement work, then before we start construction, we’ll need you to supply us with notification that you’ve confirmed your F10 – Notification of construction project - submission to the Health and Safety Executive.

What do I need to do next?

If you’ve satisfied the points above, then you should compare your own timeline with the typical timescales we’ve suggested for our activities. If the time you’re likely to take from planning and construction through to first occupancy is **more** than the total time we’re likely to take, we’ll be able to carry out the necessary upgrades in time for your development.

If you’ve any further questions, please contact me on XXXX.

Yours sincerely

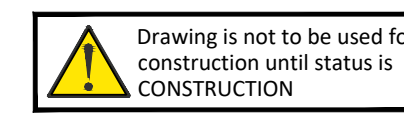
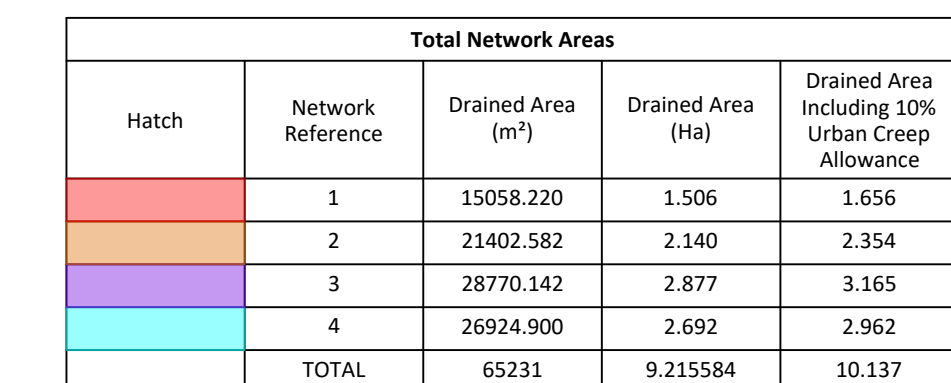
Steve Knight

Adoption Engineer

Developer Services – Adoptions Engineer, Sewer Adoptions Team



Appendix F
Proposed Drainage Strategy
JPP Consulting drawing no. 28961-SK04-C





Appendix G

Infiltration Calculations



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
54	0.090	125.600	1200	514482.557	215950.019	1.430
55	0.014	124.010	1200	514455.665	215945.950	1.425
63	0.038	123.275	1200	514435.587	215953.961	1.575
56	0.050	123.110	1200	514440.808	215941.090	1.660
57	0.034	121.000	1200	514408.577	215925.733	1.650
58	0.017	120.275	1350	514397.075	215925.280	1.680
59	0.078	119.600	1350	514388.851	215931.840	1.640
60	0.147	116.970	1350	514373.260	215973.209	1.650
61	0.113	114.380	1350	514357.885	216014.547	1.650
62	0.039	113.280	1350	514349.379	216031.446	1.650
50	0.096	126.045	1200	514500.363	216014.165	1.425
51	0.074	125.570	1200	514477.594	216006.862	1.500
52	0.080	125.075	1350	514454.551	215998.787	1.610
33	0.098	126.985	1200	514530.380	216088.211	1.460
34	0.085	126.765	1200	514510.424	216078.715	1.440
35	0.101	125.665	1200	514470.491	216065.584	1.520
36	0.106	124.040	1350	514435.469	216053.497	1.730
53	0.066	123.150	1200	514422.203	215995.112	1.475
37	0.042	122.710	1350	514405.977	216042.800	2.100
38		122.700	1350	514403.077	216049.727	3.165
39	0.086	113.700	1350	514355.764	216047.371	1.575
40	0.040	112.165	1500	514335.449	216044.874	1.820
41	0.097	110.900	1500	514316.360	216055.649	1.845
64	0.040	114.145	1200	514339.968	215884.949	1.545
65	0.138	113.000	1200	514328.677	215903.738	1.730
66	0.075	111.460	1200	514317.284	215944.314	2.025
67	0.103	110.750	1200	514305.630	215965.790	1.635
68	0.122	108.705	1350	514287.624	216011.167	1.690
69	0.056	108.700	1350	514285.716	216027.266	1.830
42	0.084	109.245	1500	514288.270	216059.879	2.645
43	0.110	106.375	1500	514239.747	216065.317	2.030
70	0.136	106.660	1200	514271.369	215909.902	1.435
71	0.128	105.715	1200	514240.916	215964.572	1.495
72	0.119	102.375	1500	514213.043	216016.925	1.895
73	0.036	103.440	1500	514197.896	216045.280	3.170
12		103.954	1500	514198.101	216059.166	3.744
44	0.077	104.115	1800	514201.957	216070.691	4.020
46	0.021	103.050	1800	514200.798	216091.611	3.025
47		101.720	1800	514214.116	216100.956	1.750
48		101.720	1800	514198.020	216182.990	2.029
49		106.615	1800	514216.329	216196.113	6.954



Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
96	0.119	125.675	1200	514508.150	215920.335	1.575
97	0.148	124.815	1200	514526.849	215872.366	1.505
98	0.090	124.060	1350	514543.978	215830.402	1.580
99	0.116	123.865	1350	514552.419	215820.268	1.680
110	0.042	125.245	1200	514539.852	215906.247	1.445
111	0.053	124.700	1200	514571.256	215916.106	1.500
112	0.054	124.490	1200	514577.047	215902.049	1.640
113	0.067	124.125	1200	514592.566	215875.116	1.515
100	0.081	123.940	1350	514605.803	215861.893	1.980
101	0.126	123.530	1350	514615.250	215871.764	1.655
114	0.223	122.820	1200	514651.667	215959.425	1.520
102	0.230	121.315	2100	514680.398	215914.540	2.020
103	0.108	120.890	1500	514689.910	215901.126	1.880
104	0.079	120.550	1500	514699.339	215893.033	1.890
132	0.078	124.780	1200	514882.231	215997.593	4.230
133	0.050	122.850	1200	514894.822	215965.691	2.095
134	0.090	122.380	1200	514891.587	215945.287	1.500
123	0.113	125.850	1200	514809.184	216043.882	1.800
124	0.044	125.125	1200	514824.109	216024.368	1.560
131	0.024	123.795	1200	514859.100	215990.813	3.390
125	0.109	122.885	1350	514835.957	215983.882	2.775
126	0.051	121.780	1350	514841.711	215963.252	1.800
127	0.021	121.085	1500	514839.127	215948.254	1.840
128	0.180	120.560	1500	514831.886	215929.944	2.835
139	0.061	123.360	1200	514775.551	216022.806	1.490
140	0.182	121.895	1350	514770.462	215998.532	1.635
141	0.077	120.180	1350	514780.419	215970.511	1.870
142	0.079	119.250	1500	514777.045	215937.715	1.970
28	0.071	118.880	1500	514766.690	215937.637	1.810
129	0.053	118.250	1500	514742.561	215921.676	2.250
130		117.380	1500	514751.282	215908.483	1.450
117	0.087	123.355	1200	514631.752	215832.797	1.435
122	0.088	122.355	1200	514674.549	215779.934	1.535
118	0.096	122.210	1200	514680.067	215773.250	1.505
119	0.145	118.940	1350	514740.350	215822.612	2.185
120	0.037	118.700	1350	514741.834	215834.078	2.050
105	0.000	119.235	1350	514726.079	215853.403	2.665
45	0.076	119.795	1200	514714.861	215870.433	1.675
106	0.176	119.435	1350	514722.102	215859.419	2.890
107		117.380	1350	514752.516	215880.090	1.450
108		117.380	1500	514778.931	215892.577	1.600
109		117.380	1500	514795.279	215875.295	1.875
74	0.086	127.100	1200	514623.535	216149.144	1.500
75	0.044	127.600	1350	514592.393	216128.661	2.300
76	0.399	127.315	1350	514558.069	216106.085	2.190
83	0.109	126.120	1200	514554.412	216035.396	1.520
77	0.137	126.460	1350	514589.636	216057.949	2.335
84	0.082	125.995	1200	514518.185	215959.549	1.450
85	0.105	125.675	1200	514539.605	215966.449	1.530
86	0.184	125.010	1500	514581.548	215984.504	1.745
78	0.189	124.445	1500	514621.107	216008.490	1.915



Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
79	0.111	123.210	1500	514643.230	215970.704	1.860
80		125.000	1500	514667.221	215983.628	3.820
87	0.143	128.000	1200	514735.850	216205.139	1.500
88	0.143	126.800	1350	514673.295	216163.933	1.975
89	0.079	126.365	1350	514664.606	216158.209	1.755
90	0.357	125.795	1500	514686.821	216123.951	1.730
91	0.220	125.230	1500	514709.010	216090.493	1.810
92	0.220	125.025	1500	514716.861	216078.096	2.090
95	0.098	124.845	1200	514750.771	216040.120	1.455
93	0.331	124.740	1500	514739.018	216045.246	2.330
94		125.000	1500	514725.935	216032.577	3.820
81		122.705	1500	514712.350	216001.618	1.600
82		122.705	1500	514726.704	215992.387	1.875
13	0.075	99.880	1200	514126.922	216187.129	1.425
14	0.030	100.310	1200	514120.108	216190.592	1.900
15	0.068	99.530	1200	514114.640	216178.347	1.775
16	0.050	98.250	1200	514117.615	216136.483	1.755
1	0.085	102.485	1200	514184.357	216089.880	1.495
2	0.043	101.180	1200	514178.867	216111.362	1.680
3	0.105	100.235	1200	514165.717	216122.749	1.500
4	0.081	97.875	1350	514124.154	216115.153	1.645
20	0.055	96.440	1200	514103.748	216095.120	1.505
5	0.080	96.360	1350	514099.586	216106.919	2.125
6	0.106	95.395	1350	514067.886	216092.674	1.750
17	0.048	100.835	1200	514075.103	216191.350	1.435
18	0.071	98.010	1200	514053.874	216148.193	1.515
19	0.049	95.915	1200	514038.428	216115.661	1.540
7	0.048	94.935	1350	514039.115	216089.586	2.210
8	0.028	94.025	1350	514025.245	216074.902	1.660
9	0.053	92.625	1350	514032.196	216052.827	1.710
10		91.700	1350	514019.507	216044.656	1.600
11		91.700	1350	514005.791	216047.665	1.650
21	0.027	96.395	1200	514115.052	216065.251	1.495
29	0.035	96.075	1200	514129.129	216048.747	1.525
22	0.081	96.217	1200	514123.645	216054.213	1.802
23	0.058	94.600	1200	514095.132	216031.125	1.905
24	0.027	90.600	1200	514060.899	216017.811	1.705
31	0.048	89.160	1200	514045.670	215992.910	1.425
32	0.010	89.585	1200	514049.882	216003.736	1.950
30	0.069	90.785	1200	514043.000	216023.599	1.785
25	0.005	89.920	1200	514047.722	216009.723	2.400
26		89.055	1200	514032.859	216003.705	1.600
27		89.055	1200	514025.880	216006.899	1.635



Links (Input)

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	54	55	27.198	0.600	124.170	122.585	1.585	17.2	225	5.14	50.0
1.001	55	56	15.632	0.600	122.585	121.525	1.060	14.7	225	5.22	50.0
2.000	63	56	13.890	0.600	121.700	121.525	0.175	79.4	225	5.16	50.0
1.002	56	57	35.703	0.600	121.450	119.350	2.100	17.0	300	5.37	50.0
1.003	57	58	11.511	0.600	119.350	118.670	0.680	16.9	300	5.42	50.0
1.004	58	59	10.520	0.600	118.595	117.960	0.635	16.6	375	5.46	50.0
1.005	59	60	44.209	0.600	117.960	115.395	2.565	17.2	375	5.63	50.0
1.006	60	61	44.105	0.600	115.320	112.730	2.590	17.0	450	5.78	50.0
1.007	61	62	18.919	0.600	112.730	111.630	1.100	17.2	450	5.84	50.0
1.008	62	40	19.348	0.600	111.630	110.495	1.135	17.0	450	5.91	50.0
3.000	50	51	23.912	0.600	124.620	124.145	0.475	50.3	225	5.22	50.0
3.001	51	52	24.417	0.600	124.070	123.540	0.530	46.1	300	5.39	50.0
3.002	52	36	57.942	0.600	123.465	122.310	1.155	50.2	375	5.77	50.0
4.000	33	34	22.100	0.600	125.525	125.325	0.200	110.5	225	5.30	50.0
4.001	34	35	42.037	0.600	125.325	124.220	1.105	38.0	225	5.63	50.0
4.002	35	36	37.049	0.600	124.145	122.385	1.760	21.1	300	5.81	50.0
3.003	36	37	31.372	0.600	122.310	120.610	1.700	18.5	375	5.93	50.0
5.000	53	37	50.373	0.600	121.675	120.760	0.915	55.1	225	5.48	50.0
3.004	37	38	7.510	0.600	120.610	119.535	1.075	7.0	375	5.95	50.0
3.005	38	39	47.372	0.600	119.535	112.125	7.410	6.4	375	6.06	50.0
3.006	39	40	20.468	0.600	112.125	110.570	1.555	13.2	375	6.12	50.0
1.009	40	41	21.920	0.600	110.345	109.055	1.290	17.0	600	6.19	50.0
1.010	41	42	28.407	0.600	109.055	106.615	2.440	11.6	600	6.25	50.0
6.000	64	65	21.921	0.600	112.600	111.345	1.255	17.5	225	5.12	50.0
6.001	65	66	42.145	0.600	111.270	109.435	1.835	23.0	300	5.33	50.0
6.002	66	67	24.434	0.600	109.435	109.115	0.320	76.4	300	5.56	50.0
6.003	67	68	48.819	0.600	109.115	107.090	2.025	24.1	300	5.81	50.0
6.004	68	69	16.212	0.600	107.015	106.945	0.070	231.6	375	6.04	50.0
6.005	69	42	32.713	0.600	106.870	106.750	0.120	272.6	450	6.48	50.0
1.011	42	43	48.827	0.600	106.600	104.345	2.255	21.7	600	6.64	50.0
1.012	43	44	38.170	0.600	104.345	100.245	4.100	9.3	600	6.72	50.0
7.000	70	71	62.580	0.600	105.225	104.295	0.930	67.3	225	5.65	50.0
7.001	71	72	59.311	0.600	104.220	100.780	3.440	17.2	300	5.91	50.0
7.002	72	73	32.147	0.600	100.480	100.345	0.135	238.1	600	6.25	50.0
7.003	73	12	13.888	0.600	100.270	100.210	0.060	231.5	675	6.39	50.0
7.004	12	44	12.153	0.600	100.210	100.170	0.040	303.8	675	6.52	50.0
1.013	44	46	20.952	0.600	100.095	100.025	0.070	299.3	750	6.93	50.0
1.014	46	47	16.270	0.600	100.025	99.970	0.055	295.8	750	7.10	50.0
1.015	47	48	83.598	0.600	99.970	99.691	0.279	299.6	750	7.96	50.0
1.016	48	49	22.526	0.600	99.691	99.661	0.030	750.9	750	8.33	50.0
8.000	96	97	51.485	0.600	124.100	123.310	0.790	65.2	300	5.44	50.0
8.001	97	98	45.325	0.600	123.310	122.555	0.755	60.0	300	5.81	50.0
8.002	98	99	13.189	0.600	122.480	122.260	0.220	59.9	375	5.91	50.0
8.003	99	100	67.694	0.600	122.185	121.960	0.225	300.9	450	6.87	50.0
9.000	110	111	32.915	0.600	123.800	123.200	0.600	54.9	225	5.31	50.0
9.001	111	112	15.203	0.600	123.200	122.925	0.275	55.3	225	5.45	50.0
9.002	112	113	31.084	0.600	122.850	122.610	0.240	129.5	300	5.83	50.0
9.003	113	100	18.710	0.600	122.610	122.110	0.500	37.4	300	5.95	50.0
8.004	100	101	13.663	0.600	121.960	121.875	0.085	160.7	450	7.01	50.0
8.005	101	102	77.936	0.600	121.875	119.445	2.430	32.1	450	7.38	50.0
10.000	114	102	53.293	0.600	121.300	119.595	1.705	31.3	300	5.31	50.0
8.006	102	103	16.444	0.600	119.295	119.085	0.210	78.3	600	7.48	50.0
8.007	103	104	12.426	0.600	119.010	118.660	0.350	35.5	675	7.52	50.0



Links (Input)

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)
8.008	104	129	51.851	0.600	118.660	116.000	2.660	19.5	675	7.67	50.0
11.000	134	133	20.659	0.600	120.880	120.755	0.125	165.3	300	5.28	50.0
11.001	133	132	34.297	0.600	120.755	120.550	0.205	167.3	300	5.75	50.0
11.002	132	131	24.104	0.600	120.550	120.405	0.145	166.2	300	6.08	50.0
12.000	123	124	24.567	0.600	124.050	123.565	0.485	50.7	300	5.18	50.0
12.001	124	125	42.184	0.600	123.565	120.405	3.160	13.3	300	5.35	50.0
11.003	131	125	24.159	0.600	120.405	120.260	0.145	166.6	300	6.42	50.0
11.004	125	126	21.417	0.600	120.110	119.980	0.130	164.7	450	6.64	50.0
11.005	126	127	15.219	0.600	119.980	119.320	0.660	23.1	450	6.70	50.0
11.006	127	128	19.690	0.600	119.245	117.800	1.445	13.6	525	6.75	50.0
11.007	128	142	55.389	0.600	117.725	117.280	0.445	124.5	600	7.18	50.0
13.000	139	140	24.802	0.600	121.870	120.410	1.460	17.0	225	5.13	50.0
13.001	140	141	29.737	0.600	120.260	118.310	1.950	15.2	375	5.24	50.0
13.002	141	142	32.969	0.600	118.310	117.505	0.805	41.0	375	5.43	50.0
11.008	142	28	10.355	0.600	117.280	117.070	0.210	49.3	600	7.23	50.0
11.009	28	129	28.930	0.600	117.070	116.075	0.995	29.1	600	7.33	50.0
8.009	129	130	15.816	0.600	116.000	115.930	0.070	225.9	675	7.82	50.0
8.010	130	108	31.897	0.600	115.930	115.780	0.150	212.6	675	8.12	50.0
14.000	117	122	68.015	0.600	121.920	120.895	1.025	66.4	225	5.71	50.0
14.001	122	118	8.667	0.600	120.820	120.705	0.115	75.4	300	5.78	50.0
14.002	118	119	77.914	0.600	120.705	116.830	3.875	20.1	300	6.15	50.0
14.003	119	120	11.562	0.600	116.755	116.725	0.030	385.4	375	6.36	50.0
14.004	120	105	24.933	0.600	116.650	116.570	0.080	311.7	450	6.73	50.0
14.005	105	106	7.212	0.600	116.570	116.545	0.025	288.5	450	6.83	50.0
15.000	45	106	13.181	0.600	118.120	116.845	1.275	10.3	225	5.05	50.0
14.006	106	107	36.774	0.600	116.545	115.930	0.615	59.8	450	7.06	50.0
14.007	107	108	29.218	0.600	115.930	115.780	0.150	194.8	450	7.40	50.0
8.011	108	109	23.789	0.600	115.780	115.505	0.275	86.4	675	8.26	50.0
16.000	74	75	37.274	0.600	125.600	125.375	0.225	165.7	300	5.51	50.0
16.001	75	76	41.083	0.600	125.300	125.125	0.175	234.8	375	6.09	50.0
16.002	76	77	57.563	0.600	125.125	124.275	0.850	67.7	375	6.53	50.0
17.000	83	77	41.825	0.600	124.600	124.275	0.325	128.7	300	5.50	50.0
16.003	77	78	58.623	0.600	124.125	122.680	1.445	40.6	450	6.83	50.0
18.000	84	85	22.504	0.600	124.545	124.220	0.325	69.2	225	5.24	50.0
18.001	85	86	45.664	0.600	124.145	123.490	0.655	69.7	300	5.64	50.0
18.002	86	78	46.263	0.600	123.265	122.605	0.660	70.1	525	5.93	50.0
16.004	78	79	43.786	0.600	122.530	121.350	1.180	37.1	600	7.01	50.0
16.005	79	80	27.251	0.600	121.350	121.255	0.095	286.8	600	7.33	50.0
16.006	80	81	48.583	0.600	121.180	121.105	0.075	647.8	675	8.12	50.0
19.000	87	88	74.907	0.600	126.500	124.900	1.600	46.8	300	5.54	50.0
19.001	88	89	10.405	0.600	124.825	124.685	0.140	74.3	375	5.62	50.0
19.002	89	90	40.830	0.600	124.610	124.140	0.470	86.9	450	5.94	50.0
19.003	90	91	40.147	0.600	124.065	123.495	0.570	70.4	525	6.19	50.0
19.004	91	92	14.674	0.600	123.420	122.935	0.485	30.3	600	6.24	50.0
19.005	92	93	39.624	0.600	122.935	122.410	0.525	75.5	600	6.48	50.0
20.000	95	93	12.822	0.600	123.390	122.785	0.605	21.2	225	5.07	50.0
19.006	93	94	18.212	0.600	122.410	121.255	1.155	15.8	600	6.53	50.0
19.007	94	81	33.808	0.600	121.180	121.105	0.075	450.8	675	6.99	50.0
16.007	81	82	17.066	0.600	121.105	120.830	0.275	62.1	675	8.21	50.0
21.000	13	14	7.643	0.600	98.455	98.410	0.045	169.9	225	5.13	50.0
21.001	14	15	13.410	0.600	98.410	97.755	0.655	20.5	225	5.20	50.0
21.002	15	16	41.970	0.600	97.755	96.570	1.185	35.4	225	5.52	50.0



Links (Input)

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)
21.003	16	4	22.310	0.600	96.495	96.305	0.190	117.4	300	5.78	50.0
22.000	1	2	22.172	0.600	100.990	99.575	1.415	15.7	225	5.11	50.0
22.001	2	3	17.395	0.600	99.500	98.735	0.765	22.7	300	5.20	50.0
22.002	3	4	42.251	0.600	98.735	96.305	2.430	17.4	300	5.38	50.0
21.004	4	5	25.911	0.600	96.230	94.785	1.445	17.9	375	5.88	50.0
23.000	20	5	12.512	0.600	94.935	94.460	0.475	26.3	225	5.08	50.0
21.005	5	6	34.754	0.600	94.235	93.645	0.590	58.9	450	6.10	50.0
21.006	6	7	28.936	0.600	93.645	92.725	0.920	31.5	450	6.23	50.0
24.000	17	18	48.096	0.600	99.400	96.570	2.830	17.0	225	5.25	50.0
24.001	18	19	36.013	0.600	96.495	94.375	2.120	17.0	300	5.41	50.0
24.002	19	7	26.084	0.600	94.375	92.875	1.500	17.4	300	5.52	50.0
21.007	7	8	20.199	0.600	92.725	92.365	0.360	56.1	450	6.35	50.0
21.008	8	9	23.144	0.600	92.365	90.915	1.450	16.0	450	6.43	50.0
21.009	9	10	15.092	0.600	90.915	90.100	0.815	18.5	450	6.48	50.0
21.010	10	11	14.042	0.600	90.100	90.050	0.050	280.8	450	6.68	50.0
25.000	21	22	13.988	0.600	94.900	94.490	0.410	34.1	225	5.10	50.0
26.000	29	22	7.743	0.600	94.550	94.490	0.060	129.0	225	5.11	50.0
25.001	22	23	36.689	0.600	94.415	92.695	1.720	21.3	300	5.29	50.0
25.002	23	24	36.731	0.600	92.695	88.895	3.800	9.7	300	5.41	50.0
25.003	24	25	15.461	0.600	88.895	87.520	1.375	11.2	300	5.47	50.0
27.000	31	32	11.617	0.600	87.735	87.635	0.100	116.2	225	5.16	50.0
27.001	32	25	6.365	0.600	87.635	87.595	0.040	159.1	225	5.26	50.0
28.000	30	25	14.657	0.600	89.000	87.595	1.405	10.4	225	5.06	50.0
25.004	25	26	16.035	0.600	87.520	87.455	0.065	246.7	300	5.73	50.0
25.005	26	27	7.675	0.600	87.455	87.420	0.035	219.3	300	5.86	50.0

Simulation Settings

Rainfall Methodology	FEH-99	E (1km)	0.325	Skip Steady State	x
C (1km)	-0.029	F (1km)	2.408	Drain Down Time (mins)	60
D1 (1km)	0.341	Summer CV	1.000	Additional Storage (m³/ha)	20.0
D2 (1km)	0.297	Winter CV	1.000	Check Discharge Rate(s)	x
D3 (1km)	0.303	Analysis Speed	Normal	Check Discharge Volume	x

Storm Durations

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	40	0	0
100	40	5	0

Node 10 Online Orifice Control

Flap Valve	x	Design Depth (m)	5.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	90.100	Diameter (m)	0.004		



Node 26 Online Orifice Control

Flap Valve	x	Design Depth (m)	5.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	87.455	Diameter (m)	0.004		

Node 47 Online Orifice Control

Flap Valve	x	Design Depth (m)	5.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	99.970	Diameter (m)	0.004		

Node 81 Online Orifice Control

Flap Valve	x	Design Depth (m)	5.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	121.105	Diameter (m)	0.004		

Node 108 Online Orifice Control

Flap Valve	x	Design Depth (m)	5.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.1		
Invert Level (m)	115.780	Diameter (m)	0.004		

Node 102 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage		
Replaces Downstream Link	✓	Sump Available	✓		
Invert Level (m)	119.295	Product Number	CTL-SHE-0266-4200-1600-4200		
Design Depth (m)	1.600	Min Outlet Diameter (m)	0.300		
Design Flow (l/s)	42.0	Min Node Diameter (mm)	2100		

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	90.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	162.0	0.0	1.600	502.0	0.0

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.23400	Safety Factor	1.0	Invert Level (m)	89.690
Side Inf Coefficient (m/hr)	0.23400	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	340.0	340.0	2.000	340.0	340.0	2.010	0.0	340.0

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	87.455
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	80.0	0.0	1.600	351.0	0.0

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.23400	Safety Factor	1.0	Invert Level (m)	87.045
Side Inf Coefficient (m/hr)	0.23400	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	51.5	51.5	1.600	51.5	51.5	1.601	0.0	51.5

Node 25 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.0	Invert Level (m)	87.520
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	55.0	0.0	0.800	55.0	0.0	0.801	0.0	0.0

Node 47 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.46500	Safety Factor	1.0	Invert Level (m)	99.970
Side Inf Coefficient (m/hr)	1.46500	Porosity	1.00	Time to half empty (mins)	17

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	682.0	682.0	1.600	1715.0	1443.0

Node 81 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	121.105
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1657.0	0.0	1.600	2637.0	0.0

Node 81 Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	12.00000	Invert Level (m)	121.105	Borehole Diameter	0.300
Side Inf Coefficient (m/hr)	12.00000	Time to half empty (mins)		Borehole Depth (m)	12.000
Safety Factor	2.0	Diameter (m)	3.000	Inf Depth (m)	12.000
Porosity	1.00	Depth (m)	2.000	Number Required	3

Node 108 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	115.780
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1201.0	0.0	1.600	2015.0	0.0



Node 108 Deep Bore Soakaway Storage Structure

Base Inf Coefficient (m/hr)	12.00000	Invert Level (m)	115.780	Borehole Diameter	0.300
Side Inf Coefficient (m/hr)	12.00000	Time to half empty (mins)		Borehole Depth (m)	12.000
Safety Factor	2.0	Diameter (m)	3.000	Inf Depth (m)	12.000
Porosity	1.00	Depth (m)	2.000	Number Required	3

Node 102 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	119.295
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	600.0	0.0	1.600	600.0	0.0	1.601	0.0	0.0



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	54	33	124.214	0.044	10.6	0.1055	0.0000	OK
60 minute summer	55	33	122.632	0.047	12.3	0.0625	0.0000	OK
60 minute summer	63	33	121.743	0.043	4.5	0.0700	0.0000	OK
60 minute summer	56	33	121.508	0.058	22.7	0.1011	0.0000	OK
60 minute summer	57	33	119.417	0.067	26.7	0.1040	0.0000	OK
60 minute summer	58	33	118.658	0.063	28.7	0.1030	0.0000	OK
60 minute summer	59	33	118.032	0.072	37.9	0.1708	0.0000	OK
60 minute summer	60	33	115.400	0.080	55.2	0.2561	0.0000	OK
60 minute summer	61	33	112.823	0.093	68.4	0.2597	0.0000	OK
60 minute summer	62	33	111.727	0.097	72.9	0.1853	0.0000	OK
60 minute summer	50	33	124.681	0.061	11.3	0.1514	0.0000	OK
60 minute summer	51	33	124.143	0.073	20.0	0.1540	0.0000	OK
60 minute summer	52	33	123.546	0.081	29.4	0.1954	0.0000	OK
60 minute summer	33	33	125.601	0.076	11.6	0.1880	0.0000	OK
60 minute summer	34	33	125.404	0.079	21.6	0.1823	0.0000	OK
60 minute summer	35	33	124.222	0.077	33.4	0.1883	0.0000	OK
60 minute summer	36	33	122.415	0.105	75.2	0.2802	0.0000	OK
60 minute summer	53	33	121.726	0.051	7.8	0.1030	0.0000	OK
60 minute summer	37	33	120.709	0.099	87.8	0.1806	0.0000	OK
60 minute summer	38	33	119.618	0.083	87.6	0.1187	0.0000	OK
60 minute summer	39	33	112.238	0.113	97.7	0.2854	0.0000	OK
60 minute summer	40	33	110.487	0.142	174.8	0.3129	0.0000	OK
60 minute summer	41	33	109.175	0.120	186.1	0.3394	0.0000	OK
60 minute summer	64	33	112.630	0.030	4.7	0.0498	0.0000	OK
60 minute summer	65	33	111.331	0.060	21.0	0.1649	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)
60 minute summer	54	1.000	55	10.6	1.846	0.084	0.1562	
60 minute summer	55	1.001	56	12.3	2.095	0.090	0.0918	
60 minute summer	63	2.000	56	4.5	0.861	0.077	0.0726	
60 minute summer	56	1.002	57	22.7	2.121	0.084	0.3824	
60 minute summer	57	1.003	58	26.7	2.366	0.098	0.1299	
60 minute summer	58	1.004	59	28.7	2.141	0.058	0.1412	
60 minute summer	59	1.005	60	37.8	2.617	0.078	0.6382	
60 minute summer	60	1.006	61	55.1	2.604	0.070	0.9345	
60 minute summer	61	1.007	62	68.3	2.807	0.087	0.4603	
60 minute summer	62	1.008	40	72.7	3.023	0.093	0.4655	
60 minute summer	50	3.000	51	11.3	1.325	0.154	0.2038	
60 minute summer	51	3.001	52	20.0	1.558	0.122	0.3133	
60 minute summer	52	3.002	36	29.3	1.380	0.104	1.2368	
60 minute summer	33	4.000	34	11.6	0.960	0.235	0.2671	
60 minute summer	34	4.001	35	21.5	1.766	0.255	0.5127	
60 minute summer	35	4.002	36	33.4	2.403	0.137	0.5145	
60 minute summer	36	3.003	37	75.0	3.097	0.160	0.7599	
60 minute summer	53	5.000	37	7.7	1.165	0.110	0.3350	
60 minute summer	37	3.004	38	87.6	4.270	0.115	0.1545	
60 minute summer	38	3.005	39	87.5	3.826	0.110	1.0898	
60 minute summer	39	3.006	40	97.3	3.660	0.176	0.5447	
60 minute summer	40	1.009	41	174.6	3.847	0.104	0.9969	
60 minute summer	41	1.010	42	185.7	3.599	0.092	1.4758	
60 minute summer	64	6.000	65	4.7	1.503	0.038	0.0685	
60 minute summer	65	6.001	66	21.0	1.338	0.090	0.6730	



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	66	33	109.540	0.105	29.9	0.1957	0.0000	OK
60 minute summer	67	33	109.202	0.087	42.1	0.2073	0.0000	OK
60 minute summer	68	33	107.199	0.184	56.4	0.5293	0.0000	OK
60 minute summer	69	34	107.052	0.182	62.6	0.3722	0.0000	OK
60 minute summer	42	34	106.782	0.182	257.3	0.4363	0.0000	OK
60 minute summer	43	34	104.482	0.137	270.1	0.3911	0.0000	OK
60 minute summer	70	33	105.303	0.078	16.1	0.2350	0.0000	OK
60 minute summer	71	33	104.289	0.069	31.0	0.1970	0.0000	OK
60 minute summer	72	31	100.724	0.244	45.0	0.7364	0.0000	OK
60 minute summer	73	30	100.707	0.437	56.7	0.8721	0.0000	OK
60 minute summer	12	30	100.705	0.494	88.2	0.8737	0.0000	OK
60 minute summer	44	30	100.705	0.610	350.1	1.7855	0.0000	OK
60 minute summer	46	30	100.688	0.663	371.5	1.7806	0.0000	OK
60 minute summer	47	37	100.044	0.074	387.7	52.3595	0.0000	OK
180 minute summer	48	112	99.694	0.003	0.0	0.0079	0.0000	OK
180 minute summer	49	112	99.661	0.000	0.0	0.0000	0.0000	OK
60 minute summer	96	33	124.164	0.064	14.1	0.1698	0.0000	OK
60 minute summer	97	33	123.407	0.097	31.6	0.3006	0.0000	OK
60 minute summer	98	33	122.590	0.110	41.9	0.2835	0.0000	OK
60 minute summer	99	33	122.352	0.167	55.5	0.4689	0.0000	OK
60 minute summer	110	33	123.841	0.040	5.0	0.0693	0.0000	OK
60 minute summer	111	33	123.264	0.063	11.3	0.1167	0.0000	OK
60 minute summer	112	33	122.939	0.089	17.7	0.1596	0.0000	OK
60 minute summer	113	33	122.689	0.079	25.5	0.1592	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)
60 minute summer	66	6.002	67	29.9	1.548	0.235	0.4724	
60 minute summer	67	6.003	68	42.0	2.211	0.185	0.9760	
60 minute summer	68	6.004	69	56.0	1.103	0.427	0.8239	
60 minute summer	69	6.005	42	62.6	1.082	0.321	1.8929	
60 minute summer	42	1.011	43	257.8	4.304	0.174	2.9378	
60 minute summer	43	1.012	44	270.6	3.991	0.119	5.1491	
60 minute summer	70	7.000	71	15.9	1.329	0.251	0.7511	
60 minute summer	71	7.001	72	30.9	2.543	0.115	0.7205	
60 minute summer	72	7.002	73	52.7	0.895	0.119	4.4539	
60 minute summer	73	7.003	12	88.2	0.567	0.144	3.6443	
60 minute summer	12	7.004	44	97.4	0.432	0.182	3.5456	
60 minute summer	44	1.013	46	369.0	1.336	0.518	8.3334	
60 minute summer	46	1.014	47	387.7	2.844	0.541	3.3827	
60 minute summer	47	Orifice	48	0.0				
60 minute summer	47	Infiltration		282.3				
180 minute summer	48	1.016	49	0.0	0.000	0.000	0.0029	0.0
60 minute summer	96	8.000	97	14.1	0.928	0.102	0.7911	
60 minute summer	97	8.001	98	31.3	1.620	0.218	0.8754	
60 minute summer	98	8.002	99	41.8	1.648	0.161	0.3346	
60 minute summer	99	8.003	100	55.2	0.931	0.297	4.0151	
60 minute summer	110	9.000	111	5.0	0.722	0.071	0.2306	
60 minute summer	111	9.001	112	11.3	1.266	0.161	0.1353	
60 minute summer	112	9.002	113	17.6	1.092	0.181	0.5021	
60 minute summer	113	9.003	100	25.4	1.780	0.139	0.2673	



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	100	34	122.154	0.194	89.9	0.4372	0.0000	OK
60 minute summer	101	34	122.006	0.131	104.0	0.3879	0.0000	OK
60 minute summer	114	33	121.374	0.074	26.3	0.3022	0.0000	OK
180 minute summer	102	116	119.525	0.230	81.3	132.3624	0.0000	OK
180 minute summer	103	112	119.085	0.075	35.7	0.2190	0.0000	OK
180 minute summer	104	108	118.722	0.062	38.3	0.1611	0.0000	OK
60 minute summer	132	33	120.668	0.117	25.7	0.1757	0.0000	OK
60 minute summer	133	33	120.844	0.088	16.5	0.1417	0.0000	OK
60 minute summer	134	33	120.952	0.072	10.6	0.1675	0.0000	OK
60 minute summer	123	33	124.112	0.062	13.3	0.1478	0.0000	OK
60 minute summer	124	33	123.616	0.051	18.5	0.0856	0.0000	OK
60 minute summer	131	34	120.529	0.123	28.3	0.1570	0.0000	OK
60 minute summer	125	33	120.267	0.156	59.2	0.3461	0.0000	OK
60 minute summer	126	33	120.081	0.101	65.0	0.2013	0.0000	OK
60 minute summer	127	34	119.329	0.084	67.3	0.1671	0.0000	OK
60 minute summer	128	33	117.879	0.154	88.4	0.4675	0.0000	OK
60 minute summer	139	33	121.907	0.037	7.2	0.0719	0.0000	OK
60 minute summer	140	33	120.320	0.060	28.7	0.2179	0.0000	OK
60 minute summer	141	33	118.400	0.090	37.8	0.2030	0.0000	OK
60 minute summer	142	34	117.454	0.174	134.9	0.4475	0.0000	OK
60 minute summer	28	34	117.203	0.133	142.6	0.3386	0.0000	OK
60 minute summer	129	34	116.291	0.291	184.3	0.6503	0.0000	OK
60 minute summer	130	33	116.207	0.277	185.2	0.4894	0.0000	OK
60 minute summer	117	33	121.981	0.061	10.3	0.1430	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)
60 minute summer	100	8.004	101	89.9	1.739	0.353	0.7103	
60 minute summer	101	8.005	102	104.1	2.758	0.182	2.9429	
60 minute summer	114	10.000	102	26.3	1.960	0.132	0.7142	
180 minute summer	102	Hydro-Brake®	103	33.0				
180 minute summer	103	8.007	104	35.7	1.901	0.023	0.2341	
180 minute summer	104	8.008	129	38.3	1.058	0.018	2.8710	
60 minute summer	132	11.002	131	25.5	0.969	0.297	0.6341	
60 minute summer	133	11.001	132	16.5	0.773	0.192	0.7323	
60 minute summer	134	11.000	133	10.6	0.705	0.123	0.3116	
60 minute summer	123	12.000	124	13.3	1.460	0.085	0.2245	
60 minute summer	124	12.001	125	18.5	2.394	0.060	0.3258	
60 minute summer	131	11.003	125	28.2	1.071	0.329	0.6366	
60 minute summer	125	11.004	126	59.0	1.587	0.235	0.8059	
60 minute summer	126	11.005	127	64.8	2.596	0.096	0.3803	
60 minute summer	127	11.006	128	67.3	3.163	0.051	0.4192	
60 minute summer	128	11.007	142	88.1	1.416	0.143	3.4573	
60 minute summer	139	13.000	140	7.2	1.721	0.057	0.1038	
60 minute summer	140	13.001	141	28.7	1.848	0.056	0.4684	
60 minute summer	141	13.002	142	37.8	1.907	0.120	0.6526	
60 minute summer	142	11.008	28	134.6	2.371	0.137	0.5902	
60 minute summer	28	11.009	129	142.8	2.185	0.112	1.9845	
60 minute summer	129	8.009	130	185.2	1.331	0.298	2.2479	
60 minute summer	130	8.010	108	186.4	2.547	0.291	2.5235	
60 minute summer	117	14.000	122	10.1	1.179	0.159	0.5853	



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	122	33	120.909	0.089	20.5	0.2021	0.0000	OK
60 minute summer	118	33	120.777	0.072	31.8	0.1729	0.0000	OK
60 minute summer	119	33	116.943	0.188	48.8	0.5180	0.0000	OK
60 minute summer	120	33	116.825	0.175	52.9	0.3130	0.0000	OK
60 minute summer	105	34	116.734	0.164	52.7	0.2344	0.0000	OK
60 minute summer	45	33	118.157	0.037	9.0	0.0753	0.0000	OK
60 minute summer	106	33	116.678	0.133	82.1	0.3517	0.0000	OK
60 minute summer	107	33	116.132	0.202	81.8	0.2894	0.0000	OK
120 minute summer	108	94	115.928	0.148	189.3	189.7363	0.0000	OK
60 minute summer	109	1	115.505	0.000	0.0	0.0000	0.0000	OK
60 minute summer	74	33	125.670	0.070	10.2	0.1602	0.0000	OK
60 minute summer	75	33	125.385	0.085	15.3	0.1547	0.0000	OK
60 minute summer	76	33	125.256	0.131	62.3	0.6656	0.0000	OK
60 minute summer	83	33	124.674	0.074	12.9	0.1905	0.0000	OK
60 minute summer	77	33	124.255	0.130	90.6	0.3398	0.0000	OK
60 minute summer	84	33	124.606	0.061	9.7	0.1388	0.0000	OK
60 minute summer	85	33	124.229	0.084	22.1	0.2096	0.0000	OK
60 minute summer	86	33	123.364	0.098	43.7	0.3817	0.0000	OK
60 minute summer	78	33	122.677	0.147	155.6	0.5502	0.0000	OK
60 minute summer	79	34	121.638	0.288	168.3	0.8515	0.0000	OK
60 minute summer	80	33	121.474	0.294	168.3	0.5201	0.0000	OK
60 minute summer	87	33	126.565	0.065	16.9	0.1982	0.0000	OK
60 minute summer	88	33	124.930	0.105	33.6	0.3026	0.0000	OK
60 minute summer	89	33	124.719	0.109	42.9	0.2538	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)
60 minute summer	122	14.001	118	20.5	1.356	0.160	0.1315	
60 minute summer	118	14.002	119	31.7	1.962	0.127	1.4457	
60 minute summer	119	14.003	120	48.5	0.974	0.479	0.5763	
60 minute summer	120	14.004	105	52.7	0.970	0.289	1.3574	
60 minute summer	105	14.005	106	52.9	1.164	0.279	0.3284	
60 minute summer	45	15.000	106	9.0	2.170	0.055	0.0547	
60 minute summer	106	14.006	107	81.8	1.534	0.195	1.9869	
60 minute summer	107	14.007	108	82.9	2.087	0.359	1.2381	
120 minute summer	108	Orifice	109	0.0				0.1
120 minute summer	108	Infiltration		56.9				
60 minute summer	74	16.000	75	10.1	0.819	0.118	0.4604	
60 minute summer	75	16.001	76	15.2	0.578	0.117	1.0905	
60 minute summer	76	16.002	77	61.6	1.837	0.253	1.9308	
60 minute summer	83	17.000	77	12.8	0.960	0.131	0.5583	
60 minute summer	77	16.003	78	89.9	2.422	0.177	2.1805	
60 minute summer	84	18.000	85	9.7	1.131	0.155	0.1929	
60 minute summer	85	18.001	86	22.0	1.394	0.165	0.7207	
60 minute summer	86	18.002	78	43.5	1.587	0.075	1.2671	
60 minute summer	78	16.004	79	155.2	1.697	0.137	4.0878	
60 minute summer	79	16.005	80	168.3	1.336	0.415	3.4317	
60 minute summer	80	16.006	81	169.5	2.088	0.464	4.2290	
60 minute summer	87	19.000	88	16.7	1.497	0.103	0.8375	
60 minute summer	88	19.001	89	33.6	1.424	0.145	0.2456	
60 minute summer	89	19.002	90	42.6	1.483	0.123	1.1742	



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	90	33	124.205	0.140	84.8	0.8239	0.0000	OK
60 minute summer	91	33	123.545	0.125	110.4	0.5236	0.0000	OK
60 minute summer	92	33	123.115	0.180	136.3	0.6981	0.0000	OK
60 minute summer	95	33	123.441	0.051	11.6	0.1252	0.0000	OK
60 minute summer	93	33	122.540	0.130	186.6	0.6004	0.0000	OK
60 minute winter	94	12	121.539	0.359	135.2	0.6342	0.0000	OK
120 minute summer	81	86	121.246	0.141	238.8	245.6601	0.0000	OK
60 minute summer	82	1	120.830	0.000	0.0	0.0000	0.0000	OK
60 minute summer	13	33	98.530	0.075	8.9	0.1637	0.0000	OK
60 minute summer	14	33	98.460	0.050	12.4	0.0718	0.0000	OK
60 minute summer	15	33	97.830	0.075	20.4	0.1424	0.0000	OK
60 minute summer	16	33	96.603	0.108	26.3	0.1838	0.0000	OK
60 minute summer	1	33	101.033	0.043	10.0	0.0968	0.0000	OK
60 minute summer	2	33	99.551	0.051	15.1	0.0844	0.0000	OK
60 minute summer	3	33	98.801	0.066	27.5	0.1664	0.0000	OK
60 minute summer	4	33	96.326	0.096	63.3	0.2318	0.0000	OK
60 minute summer	20	33	94.975	0.040	6.5	0.0740	0.0000	OK
60 minute summer	5	33	94.374	0.139	79.1	0.3032	0.0000	OK
60 minute summer	6	33	93.764	0.119	91.5	0.3149	0.0000	OK
60 minute summer	17	33	99.433	0.033	5.7	0.0588	0.0000	OK
60 minute summer	18	33	96.541	0.046	14.1	0.0956	0.0000	OK
60 minute summer	19	33	94.431	0.056	19.9	0.0996	0.0000	OK
60 minute summer	7	33	92.904	0.179	116.8	0.3345	0.0000	OK
60 minute summer	8	33	92.484	0.119	119.7	0.2111	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)
60 minute summer	90	19.003	91	84.4	1.898	0.146	1.7862	
60 minute summer	91	19.004	92	110.3	1.960	0.088	0.8325	
60 minute summer	92	19.005	93	135.9	2.354	0.171	2.3013	
60 minute summer	95	20.000	93	11.6	1.800	0.102	0.0827	
60 minute summer	93	19.006	94	186.0	2.753	0.107	1.2882	
60 minute winter	94	19.007	81	135.7	2.095	0.309	3.2622	
120 minute summer	81	Orifice	82	0.0				0.1
120 minute summer	81	Infiltration		56.9				
60 minute summer	13	21.000	14	8.9	0.996	0.224	0.0689	
60 minute summer	14	21.001	15	12.4	1.388	0.107	0.1211	
60 minute summer	15	21.002	16	20.4	1.785	0.232	0.4787	
60 minute summer	16	21.003	4	26.2	1.189	0.255	0.4913	
60 minute summer	1	22.000	2	10.0	1.944	0.076	0.1140	
60 minute summer	2	22.001	3	15.1	1.563	0.065	0.1687	
60 minute summer	3	22.002	4	27.5	2.444	0.103	0.4750	
60 minute summer	4	21.004	5	63.2	2.942	0.133	0.5564	
60 minute summer	20	23.000	5	6.5	1.413	0.064	0.0576	
60 minute summer	5	21.005	6	79.0	2.108	0.187	1.3039	
60 minute summer	6	21.006	7	91.2	1.990	0.158	1.3364	
60 minute summer	17	24.000	18	5.7	1.614	0.045	0.1695	
60 minute summer	18	24.001	19	14.1	1.764	0.052	0.2883	
60 minute summer	19	24.002	7	19.8	2.209	0.074	0.2343	
60 minute summer	7	21.007	8	116.4	2.539	0.269	0.9337	
60 minute summer	8	21.008	9	119.5	3.217	0.147	0.8610	



Results for 2 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	9	33	91.052	0.137	125.8	0.2812	0.0000	OK
60 minute summer	10	48	89.934	-0.166	125.5	78.8932	0.0000	OK
60 minute summer	11	1	90.050	0.000	0.0	0.0000	0.0000	OK
60 minute summer	21	33	94.930	0.030	3.2	0.0443	0.0000	OK
60 minute summer	29	33	94.598	0.048	4.1	0.0758	0.0000	OK
60 minute summer	22	33	94.470	0.055	16.9	0.1110	0.0000	OK
60 minute summer	23	33	92.747	0.052	23.7	0.0903	0.0000	OK
60 minute summer	24	33	88.952	0.057	26.9	0.0829	0.0000	OK
60 minute summer	31	33	87.789	0.054	5.7	0.0972	0.0000	OK
60 minute summer	32	33	87.704	0.069	6.9	0.0851	0.0000	OK
60 minute summer	30	33	89.034	0.034	8.1	0.0650	0.0000	OK
60 minute summer	25	35	87.685	0.165	42.5	8.8302	0.0000	OK
180 minute summer	26	140	87.566	0.111	20.8	35.5981	0.0000	OK
60 minute summer	27	1	87.420	0.000	0.0	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)
60 minute summer	9	21.009	10	125.5	3.325	0.166	0.5705	
60 minute summer	10	Orifice	11	0.0				0.0
60 minute summer	10	Infiltration		22.1				
60 minute summer	21	25.000	22	3.2	1.054	0.036	0.0425	
60 minute summer	29	26.000	22	4.1	0.695	0.090	0.0457	
60 minute summer	22	25.001	23	16.9	2.005	0.070	0.3095	
60 minute summer	23	25.002	24	23.7	2.714	0.066	0.3208	
60 minute summer	24	25.003	25	26.9	2.030	0.081	0.3745	
60 minute summer	31	27.000	32	5.7	0.661	0.118	0.1021	
60 minute summer	32	27.001	25	6.9	0.713	0.167	0.0775	
60 minute summer	30	28.000	25	8.1	1.819	0.050	0.1340	
60 minute summer	25	25.004	26	37.3	0.999	0.529	0.5981	
180 minute summer	26	Orifice	27	0.0				0.1
180 minute summer	26	Infiltration		3.3				



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	54	33	124.243	0.073	28.3	0.1748	0.0000	OK
60 minute summer	55	33	122.664	0.079	32.7	0.1052	0.0000	OK
60 minute summer	63	33	121.773	0.073	12.0	0.1172	0.0000	OK
60 minute summer	56	33	121.546	0.096	60.4	0.1656	0.0000	OK
60 minute summer	57	33	119.467	0.117	71.1	0.1802	0.0000	OK
60 minute summer	58	33	118.703	0.108	76.5	0.1759	0.0000	OK
60 minute summer	59	33	118.080	0.119	101.1	0.2847	0.0000	OK
60 minute summer	60	33	115.450	0.130	147.4	0.4190	0.0000	OK
60 minute summer	61	33	112.889	0.159	182.9	0.4449	0.0000	OK
60 minute summer	62	33	111.799	0.169	195.1	0.3211	0.0000	OK
60 minute summer	50	33	124.725	0.105	30.2	0.2609	0.0000	OK
60 minute summer	51	33	124.195	0.124	53.5	0.2636	0.0000	OK
60 minute summer	52	33	123.598	0.133	78.7	0.3234	0.0000	OK
60 minute summer	33	33	125.662	0.137	30.9	0.3384	0.0000	OK
60 minute summer	34	33	125.467	0.142	57.7	0.3278	0.0000	OK
60 minute summer	35	33	124.276	0.131	89.4	0.3223	0.0000	OK
60 minute summer	36	33	122.492	0.182	201.4	0.4830	0.0000	OK
60 minute summer	53	33	121.760	0.085	20.8	0.1725	0.0000	OK
60 minute summer	37	33	120.793	0.183	235.2	0.3343	0.0000	OK
60 minute summer	38	33	119.673	0.138	235.0	0.1968	0.0000	OK
60 minute summer	39	33	112.330	0.205	262.0	0.5160	0.0000	OK
60 minute summer	40	33	110.595	0.250	468.9	0.5511	0.0000	OK
60 minute summer	41	33	109.259	0.204	499.2	0.5742	0.0000	OK
60 minute summer	64	33	112.649	0.049	12.6	0.0813	0.0000	OK
60 minute summer	65	33	111.370	0.100	56.1	0.2712	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)
60 minute summer	54	1.000	55	28.3	2.393	0.224	0.3217	
60 minute summer	55	1.001	56	32.7	2.725	0.240	0.1876	
60 minute summer	63	2.000	56	12.0	1.126	0.205	0.1481	
60 minute summer	56	1.002	57	60.4	2.709	0.223	0.7973	
60 minute summer	57	1.003	58	71.1	3.025	0.262	0.2707	
60 minute summer	58	1.004	59	76.5	2.721	0.155	0.2960	
60 minute summer	59	1.005	60	101.1	3.441	0.209	1.2987	
60 minute summer	60	1.006	61	147.3	3.354	0.187	1.9408	
60 minute summer	61	1.007	62	182.8	3.509	0.234	0.9855	
60 minute summer	62	1.008	40	194.9	3.877	0.248	0.9731	
60 minute summer	50	3.000	51	30.2	1.716	0.411	0.4210	
60 minute summer	51	3.001	52	53.5	2.021	0.326	0.6466	
60 minute summer	52	3.002	36	78.7	1.791	0.278	2.5501	
60 minute summer	33	4.000	34	30.9	1.197	0.625	0.5704	
60 minute summer	34	4.001	35	57.6	2.248	0.681	1.0775	
60 minute summer	35	4.002	36	89.4	3.122	0.367	1.0604	
60 minute summer	36	3.003	37	201.2	3.792	0.430	1.6651	
60 minute summer	53	5.000	37	20.8	1.532	0.296	0.6824	
60 minute summer	37	3.004	38	235.0	5.243	0.309	0.3372	
60 minute summer	38	3.005	39	234.9	4.803	0.295	2.3218	
60 minute summer	39	3.006	40	261.4	4.619	0.472	1.1585	
60 minute summer	40	1.009	41	468.7	4.810	0.280	2.1389	
60 minute summer	41	1.010	42	498.8	4.340	0.246	3.2765	
60 minute summer	64	6.000	65	12.6	1.998	0.101	0.1382	
60 minute summer	65	6.001	66	56.1	1.691	0.241	1.4052	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	66	33	109.622	0.187	79.7	0.3509	0.0000	OK
60 minute summer	67	33	109.262	0.147	112.1	0.3524	0.0000	OK
60 minute summer	68	33	107.387	0.372	150.4	1.0708	0.0000	OK
60 minute summer	69	33	107.206	0.336	166.8	0.6856	0.0000	OK
60 minute summer	42	33	106.924	0.324	690.4	0.7790	0.0000	OK
60 minute summer	43	33	104.573	0.228	723.6	0.6487	0.0000	OK
60 minute summer	70	33	105.363	0.138	42.8	0.4178	0.0000	OK
60 minute summer	71	33	104.337	0.117	82.9	0.3313	0.0000	OK
60 minute summer	72	34	100.892	0.412	120.2	1.2463	0.0000	OK
60 minute summer	73	33	100.882	0.612	130.9	1.2194	0.0000	OK
60 minute summer	12	33	100.876	0.666	134.1	1.1771	0.0000	OK
60 minute summer	44	33	100.870	0.775	878.3	2.2697	0.0000	SURCHARGED
60 minute winter	46	13	100.650	0.625	640.7	1.6773	0.0000	OK
60 minute summer	47	41	100.360	0.390	890.4	316.0045	0.0000	OK
60 minute summer	48	57	99.697	0.006	0.0	0.0164	0.0000	OK
60 minute summer	49	57	99.661	0.000	0.0	0.0000	0.0000	OK
60 minute summer	96	33	124.206	0.106	37.5	0.2798	0.0000	OK
60 minute summer	97	33	123.482	0.172	84.1	0.5319	0.0000	OK
60 minute summer	98	33	122.685	0.205	112.1	0.5258	0.0000	OK
60 minute summer	99	33	122.503	0.318	148.4	0.8929	0.0000	OK
60 minute summer	110	33	123.866	0.066	13.2	0.1125	0.0000	OK
60 minute summer	111	33	123.310	0.110	29.9	0.2028	0.0000	OK
60 minute summer	112	33	123.004	0.154	46.9	0.2754	0.0000	OK
60 minute summer	113	33	122.741	0.131	68.0	0.2634	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)
60 minute summer	66	6.002	67	79.7	1.973	0.626	0.9861	
60 minute summer	67	6.003	68	112.0	2.207	0.493	2.5570	
60 minute summer	68	6.004	69	149.2	1.457	1.139	1.6212	
60 minute summer	69	6.005	42	166.4	1.423	0.853	3.8172	
60 minute summer	42	1.011	43	689.0	5.456	0.464	6.1843	
60 minute summer	43	1.012	44	722.3	3.960	0.319	7.2447	
60 minute summer	70	7.000	71	42.6	1.700	0.671	1.5685	
60 minute summer	71	7.001	72	82.7	3.335	0.308	1.4713	
60 minute summer	72	7.002	73	120.1	0.883	0.270	7.5902	
60 minute summer	73	7.003	12	134.1	0.623	0.218	4.8332	
60 minute summer	12	7.004	44	138.5	0.522	0.258	4.3325	
60 minute summer	44	1.013	46	880.9	2.089	1.237	8.5987	
60 minute winter	46	1.014	47	649.9	3.372	0.907	3.6823	
60 minute summer	47	Orifice	48	0.0				
60 minute summer	47	Infiltration		345.5				
60 minute summer	48	1.016	49	0.0	0.057	0.000	0.0070	0.0
60 minute summer	96	8.000	97	37.5	1.182	0.272	1.6447	
60 minute summer	97	8.001	98	83.8	2.076	0.583	1.8285	
60 minute summer	98	8.002	99	111.9	1.730	0.432	0.9021	
60 minute summer	99	8.003	100	147.1	1.171	0.793	8.5142	
60 minute summer	110	9.000	111	13.2	0.919	0.188	0.4769	
60 minute summer	111	9.001	112	29.9	1.624	0.426	0.2798	
60 minute summer	112	9.002	113	46.9	1.425	0.481	1.0230	
60 minute summer	113	9.003	100	68.0	1.976	0.373	0.7401	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	100	33	122.309	0.349	240.5	0.7853	0.0000	OK
60 minute summer	101	34	122.103	0.228	278.4	0.6729	0.0000	OK
60 minute summer	114	33	121.426	0.126	70.2	0.5118	0.0000	OK
120 minute summer	102	92	119.907	0.612	267.2	352.1618	0.0000	SURCHARGED
60 minute summer	103	33	119.119	0.108	74.7	0.3163	0.0000	OK
60 minute summer	104	33	118.757	0.097	99.6	0.2532	0.0000	OK
60 minute summer	132	33	120.776	0.225	68.6	0.3377	0.0000	OK
60 minute summer	133	33	120.906	0.150	44.0	0.2419	0.0000	OK
60 minute summer	134	33	121.005	0.125	28.3	0.2911	0.0000	OK
60 minute summer	123	33	124.154	0.104	35.6	0.2477	0.0000	OK
60 minute summer	124	33	123.648	0.083	49.5	0.1410	0.0000	OK
60 minute summer	131	34	120.642	0.237	75.9	0.3015	0.0000	OK
60 minute summer	125	33	120.381	0.270	158.6	0.5991	0.0000	OK
60 minute summer	126	33	120.157	0.177	174.5	0.3532	0.0000	OK
60 minute summer	127	33	119.376	0.131	180.6	0.2610	0.0000	OK
60 minute summer	128	33	117.995	0.270	237.2	0.8201	0.0000	OK
60 minute summer	139	33	121.931	0.061	19.2	0.1183	0.0000	OK
60 minute summer	140	33	120.357	0.097	76.5	0.3535	0.0000	OK
60 minute summer	141	33	118.464	0.154	100.7	0.3465	0.0000	OK
60 minute summer	142	33	117.594	0.314	362.0	0.8070	0.0000	OK
60 minute summer	28	33	117.301	0.231	383.1	0.5894	0.0000	OK
60 minute summer	129	34	116.519	0.519	498.6	1.1617	0.0000	OK
60 minute summer	130	34	116.374	0.444	498.8	0.7840	0.0000	OK
60 minute summer	117	33	122.024	0.104	27.4	0.2437	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)
60 minute summer	100	8.004	101	239.2	2.254	0.939	1.4502	
60 minute summer	101	8.005	102	278.8	3.542	0.487	7.2695	
60 minute summer	114	10.000	102	70.2	2.559	0.352	2.0367	
120 minute summer	102	Hydro-Brake®	103	42.0				
60 minute summer	103	8.007	104	74.7	2.184	0.047	0.4256	
60 minute summer	104	8.008	129	99.4	0.807	0.047	8.4451	
60 minute summer	132	11.002	131	68.3	1.176	0.794	1.4018	
60 minute summer	133	11.001	132	44.0	0.951	0.514	1.5787	
60 minute summer	134	11.000	133	28.3	0.898	0.328	0.6515	
60 minute summer	123	12.000	124	35.6	1.903	0.227	0.4608	
60 minute summer	124	12.001	125	49.5	3.169	0.162	0.6590	
60 minute summer	131	11.003	125	75.4	1.327	0.878	1.3703	
60 minute summer	125	11.004	126	158.4	2.017	0.630	1.6829	
60 minute summer	126	11.005	127	174.0	3.304	0.258	0.8023	
60 minute summer	127	11.006	128	180.5	3.216	0.137	1.1310	
60 minute summer	128	11.007	142	236.4	1.746	0.383	7.5405	
60 minute summer	139	13.000	140	19.2	2.275	0.151	0.2094	
60 minute summer	140	13.001	141	76.5	2.384	0.149	0.9650	
60 minute summer	141	13.002	142	100.7	2.473	0.321	1.3430	
60 minute summer	142	11.008	28	360.7	2.906	0.367	1.2904	
60 minute summer	28	11.009	129	382.4	2.346	0.299	4.6755	
60 minute summer	129	8.009	130	498.8	1.832	0.801	4.2959	
60 minute summer	130	8.010	108	500.1	2.936	0.779	6.8117	
60 minute summer	117	14.000	122	27.2	1.540	0.426	1.2027	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	122	33	120.976	0.156	54.9	0.3552	0.0000	OK
60 minute summer	118	33	120.825	0.120	85.1	0.2884	0.0000	OK
60 minute summer	119	33	117.102	0.347	130.7	0.9583	0.0000	OK
60 minute summer	120	33	116.975	0.325	141.3	0.5821	0.0000	OK
60 minute summer	105	33	116.866	0.296	140.8	0.4235	0.0000	OK
60 minute summer	45	33	118.181	0.061	23.9	0.1247	0.0000	OK
60 minute summer	106	33	116.790	0.245	219.5	0.6491	0.0000	OK
240 minute winter	107	240	116.312	0.382	57.3	0.5462	0.0000	OK
240 minute winter	108	240	116.312	0.532	217.0	725.4818	0.0000	OK
60 minute summer	109	1	115.505	0.000	0.0	0.0000	0.0000	OK
60 minute summer	74	33	125.719	0.119	27.1	0.2701	0.0000	OK
60 minute summer	75	33	125.442	0.142	41.0	0.2574	0.0000	OK
60 minute summer	76	33	125.363	0.237	166.4	1.2051	0.0000	OK
60 minute summer	83	33	124.726	0.126	34.3	0.3228	0.0000	OK
60 minute summer	77	33	124.353	0.228	242.8	0.5948	0.0000	OK
60 minute summer	84	33	124.651	0.106	25.8	0.2388	0.0000	OK
60 minute summer	85	33	124.289	0.144	58.9	0.3611	0.0000	OK
60 minute summer	86	33	123.428	0.163	116.7	0.6302	0.0000	OK
60 minute summer	78	33	122.780	0.250	418.1	0.9356	0.0000	OK
60 minute summer	79	34	121.908	0.558	452.3	1.6510	0.0000	OK
60 minute summer	80	34	121.660	0.480	450.6	0.8486	0.0000	OK
60 minute summer	87	33	126.608	0.108	45.0	0.3288	0.0000	OK
60 minute summer	88	33	125.011	0.186	90.1	0.5363	0.0000	OK
60 minute summer	89	33	124.796	0.186	114.9	0.4347	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)
60 minute summer	122	14.001	118	54.9	1.737	0.428	0.2741	
60 minute summer	118	14.002	119	85.0	1.960	0.341	3.6404	
60 minute summer	119	14.003	120	129.6	1.344	1.280	1.0990	
60 minute summer	120	14.004	105	140.8	1.215	0.773	2.9054	
60 minute summer	105	14.005	106	141.5	1.451	0.747	0.7167	
60 minute summer	45	15.000	106	23.9	2.845	0.147	0.1108	
60 minute summer	106	14.006	107	218.7	1.996	0.522	4.0127	
240 minute winter	107	14.007	108	57.4	1.352	0.248	4.4089	
240 minute winter	108	Orifice	109	0.0				0.3
240 minute winter	108	Infiltration		56.9				
60 minute summer	74	16.000	75	27.1	1.072	0.314	0.9407	
60 minute summer	75	16.001	76	40.8	0.731	0.314	2.2948	
60 minute summer	76	16.002	77	165.5	2.335	0.680	4.0793	
60 minute summer	83	17.000	77	34.3	1.253	0.350	1.1432	
60 minute summer	77	16.003	78	241.8	3.118	0.475	4.5512	
60 minute summer	84	18.000	85	25.8	1.462	0.412	0.3972	
60 minute summer	85	18.001	86	58.9	1.807	0.442	1.4871	
60 minute summer	86	18.002	78	116.8	1.969	0.201	2.7709	
60 minute summer	78	16.004	79	417.4	2.082	0.369	8.4001	
60 minute summer	79	16.005	80	450.6	1.799	1.113	6.7428	
60 minute summer	80	16.006	81	451.4	2.418	1.234	10.8979	
60 minute summer	87	19.000	88	45.1	1.940	0.277	1.7468	
60 minute summer	88	19.001	89	90.0	1.814	0.387	0.5165	
60 minute summer	89	19.002	90	114.7	1.928	0.331	2.4292	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	90	33	124.308	0.243	227.1	1.4348	0.0000	OK
60 minute summer	91	33	123.649	0.228	295.8	0.9591	0.0000	OK
60 minute summer	92	33	123.249	0.313	364.9	1.2137	0.0000	OK
60 minute summer	95	33	123.476	0.086	30.9	0.2134	0.0000	OK
60 minute summer	93	33	122.648	0.238	499.3	1.0949	0.0000	OK
60 minute winter	94	10	121.809	0.629	361.2	1.1107	0.0000	OK
120 minute winter	81	118	121.561	0.456	411.1	832.6993	0.0000	OK
60 minute summer	82	1	120.830	0.000	0.0	0.0000	0.0000	OK
60 minute summer	13	33	98.582	0.127	23.6	0.2768	0.0000	OK
60 minute summer	14	33	98.492	0.082	33.0	0.1185	0.0000	OK
60 minute summer	15	33	97.888	0.133	54.4	0.2523	0.0000	OK
60 minute summer	16	33	96.692	0.197	70.1	0.3351	0.0000	OK
60 minute summer	1	33	101.061	0.071	26.8	0.1614	0.0000	OK
60 minute summer	2	33	99.584	0.084	40.3	0.1386	0.0000	OK
60 minute summer	3	33	98.845	0.110	73.4	0.2793	0.0000	OK
60 minute summer	4	33	96.397	0.167	168.9	0.4026	0.0000	OK
60 minute summer	20	33	95.001	0.066	17.3	0.1233	0.0000	OK
60 minute summer	5	33	94.480	0.245	211.3	0.5342	0.0000	OK
60 minute summer	6	33	93.855	0.210	244.7	0.5555	0.0000	OK
60 minute summer	17	33	99.453	0.053	15.1	0.0953	0.0000	OK
60 minute summer	18	33	96.570	0.075	37.5	0.1549	0.0000	OK
60 minute summer	19	33	94.465	0.090	52.9	0.1585	0.0000	OK
60 minute summer	7	33	93.060	0.335	312.5	0.6249	0.0000	OK
60 minute summer	8	33	92.575	0.210	320.6	0.3708	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)
60 minute summer	90	19.003	91	226.5	2.444	0.392	3.7217	0.2
60 minute summer	91	19.004	92	295.6	2.393	0.236	1.8150	
60 minute summer	92	19.005	93	364.2	2.894	0.459	5.0065	
60 minute summer	95	20.000	93	30.9	2.327	0.272	0.1703	
60 minute summer	93	19.006	94	498.7	3.258	0.287	2.7798	
60 minute winter	94	19.007	81	360.6	2.449	0.821	7.6241	
120 minute winter	81	Orifice	82	0.0				
120 minute winter	81	Infiltration		56.9				
60 minute summer	13	21.000	14	23.6	1.311	0.593	0.1379	
60 minute summer	14	21.001	15	33.0	1.769	0.286	0.2513	
60 minute summer	15	21.002	16	54.4	2.285	0.620	0.9987	
60 minute summer	16	21.003	4	70.0	1.505	0.683	1.0378	
60 minute summer	1	22.000	2	26.8	2.558	0.203	0.2323	
60 minute summer	2	22.001	3	40.3	2.036	0.172	0.3455	
60 minute summer	3	22.002	4	73.4	3.200	0.274	0.9692	
60 minute summer	4	21.004	5	168.8	3.781	0.356	1.1574	
60 minute summer	20	23.000	5	17.3	1.849	0.170	0.1171	
60 minute summer	5	21.005	6	211.3	2.631	0.501	2.7905	
60 minute summer	6	21.006	7	244.5	2.436	0.423	2.8807	
60 minute summer	17	24.000	18	15.1	2.144	0.119	0.3385	
60 minute summer	18	24.001	19	37.5	2.393	0.138	0.5652	
60 minute summer	19	24.002	7	52.9	2.374	0.197	0.8248	
60 minute summer	7	21.007	8	311.8	3.113	0.721	2.0084	
60 minute summer	8	21.008	9	320.3	3.903	0.394	1.8990	



Results for 30 year Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	9	33	91.168	0.253	337.0	0.5190	0.0000	OK
60 minute winter	10	62	90.395	0.295	244.0	285.3230	0.0000	OK
60 minute summer	11	1	90.050	0.000	0.0	0.0000	0.0000	OK
60 minute summer	21	33	94.948	0.048	8.5	0.0723	0.0000	OK
60 minute summer	29	33	94.631	0.081	11.0	0.1287	0.0000	OK
60 minute summer	22	33	94.505	0.090	45.0	0.1832	0.0000	OK
60 minute summer	23	33	92.780	0.085	63.3	0.1485	0.0000	OK
60 minute summer	24	33	88.989	0.094	71.8	0.1359	0.0000	OK
240 minute winter	31	236	87.924	0.190	3.9	0.3422	0.0000	OK
240 minute winter	32	236	87.924	0.290	4.7	0.3573	0.0000	SURCHARGED
60 minute summer	30	33	89.055	0.055	21.7	0.1055	0.0000	OK
240 minute winter	25	236	87.924	0.405	29.2	21.6137	0.0000	SURCHARGED
240 minute winter	26	236	87.924	0.470	25.9	99.8172	0.0000	SURCHARGED
60 minute summer	27	1	87.420	0.000	0.0	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)
60 minute summer	9	21.009	10	336.2	4.131	0.446	1.2292	
60 minute winter	10	Orifice	11	0.0				0.1
60 minute winter	10	Infiltration		22.1				
60 minute summer	21	25.000	22	8.5	1.393	0.095	0.0853	
60 minute summer	29	26.000	22	11.0	0.905	0.241	0.0942	
60 minute summer	22	25.001	23	45.0	2.624	0.186	0.6292	
60 minute summer	23	25.002	24	63.3	3.588	0.176	0.6483	
60 minute summer	24	25.003	25	71.8	2.410	0.216	0.6898	
240 minute winter	31	27.000	32	3.9	0.606	0.081	0.4384	
240 minute winter	32	27.001	25	4.7	0.621	0.114	0.2531	
60 minute summer	30	28.000	25	21.7	1.637	0.134	0.3470	
240 minute winter	25	25.004	26	25.9	0.876	0.368	1.1292	
240 minute winter	26	Orifice	27	0.0				0.2
240 minute winter	26	Infiltration		3.3				



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	54	33	124.280	0.110	58.9	0.2636	0.0000	OK
60 minute summer	55	33	122.708	0.123	68.1	0.1635	0.0000	OK
60 minute summer	63	33	121.810	0.110	24.9	0.1782	0.0000	OK
60 minute summer	56	33	121.592	0.142	125.7	0.2468	0.0000	OK
60 minute summer	57	33	119.538	0.188	148.0	0.2906	0.0000	OK
60 minute summer	58	33	118.763	0.168	159.1	0.2742	0.0000	OK
60 minute summer	59	33	118.141	0.181	210.1	0.4320	0.0000	OK
60 minute summer	60	33	115.515	0.195	306.4	0.6262	0.0000	OK
60 minute summer	61	33	112.981	0.251	380.4	0.7041	0.0000	OK
60 minute summer	62	33	111.896	0.266	405.7	0.5070	0.0000	OK
60 minute summer	50	33	124.795	0.175	62.8	0.4331	0.0000	OK
60 minute summer	51	33	124.269	0.199	111.2	0.4208	0.0000	OK
60 minute summer	52	33	123.666	0.201	163.6	0.4881	0.0000	OK
60 minute summer	33	34	126.757	1.232	64.1	3.0458	0.0000	FLOOD RISK
60 minute summer	34	34	126.419	1.094	111.1	2.5282	0.0000	SURCHARGED
60 minute summer	35	34	124.336	0.191	170.4	0.4705	0.0000	OK
60 minute summer	36	33	122.608	0.298	402.8	0.7908	0.0000	OK
60 minute summer	53	33	121.802	0.127	43.2	0.2565	0.0000	OK
60 minute summer	37	33	120.930	0.320	471.9	0.5864	0.0000	OK
60 minute summer	38	33	119.739	0.204	471.2	0.2918	0.0000	OK
60 minute summer	39	34	112.934	0.809	527.2	2.0400	0.0000	SURCHARGED
60 minute summer	40	34	110.742	0.397	938.0	0.8767	0.0000	OK
60 minute summer	41	33	109.368	0.312	999.0	0.8808	0.0000	OK
60 minute summer	64	32	112.672	0.072	26.2	0.1181	0.0000	OK
60 minute summer	65	34	111.447	0.176	116.5	0.4811	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)
60 minute summer	54	1.000	55	58.9	2.833	0.467	0.5654	
60 minute summer	55	1.001	56	68.1	3.248	0.500	0.3278	
60 minute summer	63	2.000	56	24.9	1.353	0.426	0.2556	
60 minute summer	56	1.002	57	125.7	3.158	0.464	1.4191	
60 minute summer	57	1.003	58	148.0	3.534	0.545	0.4817	
60 minute summer	58	1.004	59	159.1	3.169	0.322	0.5283	
60 minute summer	59	1.005	60	210.2	4.146	0.434	2.2417	
60 minute summer	60	1.006	61	306.4	3.910	0.390	3.4575	
60 minute summer	61	1.007	62	380.3	4.031	0.486	1.7849	
60 minute summer	62	1.008	40	405.9	4.451	0.516	1.7997	
60 minute summer	50	3.000	51	62.8	1.992	0.855	0.7531	
60 minute summer	51	3.001	52	111.2	2.382	0.677	1.1393	
60 minute summer	52	3.002	36	163.6	2.113	0.578	4.4632	
60 minute summer	33	4.000	34	57.8	1.453	1.169	0.8789	
60 minute summer	34	4.001	35	107.8	2.710	1.274	1.6711	
60 minute summer	35	4.002	36	170.4	3.482	0.701	1.9131	
60 minute summer	36	3.003	37	401.2	4.144	0.858	3.0446	
60 minute summer	53	5.000	37	43.2	1.729	0.615	1.3912	
60 minute summer	37	3.004	38	471.2	5.736	0.619	0.6064	
60 minute summer	38	3.005	39	470.9	5.172	0.592	4.0624	
60 minute summer	39	3.006	40	517.7	5.051	0.934	2.0347	
60 minute summer	40	1.009	41	938.9	5.427	0.560	3.7848	
60 minute summer	41	1.010	42	1001.3	4.662	0.494	6.0858	
60 minute summer	64	6.000	65	26.2	2.385	0.210	0.3006	
60 minute summer	65	6.001	66	114.3	1.898	0.491	2.3920	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	66	35	110.717	1.282	163.4	2.3999	0.0000	SURCHARGED
60 minute summer	67	35	110.159	1.044	212.2	2.4968	0.0000	SURCHARGED
60 minute summer	68	35	108.195	1.180	284.1	3.3924	0.0000	SURCHARGED
60 minute summer	69	35	107.724	0.854	317.2	1.7440	0.0000	SURCHARGED
60 minute summer	42	35	107.324	0.724	1368.1	1.7396	0.0000	SURCHARGED
60 minute summer	43	34	104.767	0.421	1424.3	1.2016	0.0000	OK
60 minute summer	70	34	106.225	1.000	89.0	3.0257	0.0000	SURCHARGED
60 minute summer	71	34	104.399	0.179	165.2	0.5093	0.0000	OK
60 minute summer	72	34	102.215	1.735	241.9	5.2440	0.0000	FLOOD RISK
60 minute summer	73	34	102.159	1.889	255.2	3.7672	0.0000	SURCHARGED
60 minute summer	12	34	102.135	1.925	254.4	3.4020	0.0000	SURCHARGED
60 minute summer	44	34	102.112	2.017	1726.3	5.9065	0.0000	SURCHARGED
60 minute summer	46	35	101.358	1.333	1739.5	3.5773	0.0000	SURCHARGED
60 minute summer	47	44	100.911	0.941	1737.7	930.3031	0.0000	SURCHARGED
60 minute winter	48	63	99.700	0.009	0.0	0.0228	0.0000	OK
60 minute winter	49	63	99.661	0.000	0.0	0.0000	0.0000	OK
60 minute summer	96	35	124.881	0.781	77.9	2.0642	0.0000	SURCHARGED
60 minute summer	97	35	124.641	1.331	164.2	4.1234	0.0000	FLOOD RISK
60 minute summer	98	34	123.594	1.114	210.4	2.8638	0.0000	SURCHARGED
60 minute summer	99	34	123.355	1.170	280.7	3.2891	0.0000	SURCHARGED
60 minute summer	110	33	123.897	0.097	27.5	0.1662	0.0000	OK
60 minute summer	111	34	123.627	0.427	62.2	0.7853	0.0000	SURCHARGED
60 minute summer	112	34	123.378	0.528	91.0	0.9450	0.0000	SURCHARGED
60 minute summer	113	34	123.120	0.510	132.0	1.0283	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)
60 minute summer	66	6.002	67	148.3	2.107	1.165	1.7206	
60 minute summer	67	6.003	68	208.4	2.960	0.917	3.4378	
60 minute summer	68	6.004	69	282.4	2.561	2.156	1.7881	
60 minute summer	69	6.005	42	318.0	2.015	1.631	5.1832	
60 minute summer	42	1.011	43	1352.3	5.773	0.911	12.0409	
60 minute summer	43	1.012	44	1424.4	5.327	0.629	9.4129	
60 minute summer	70	7.000	71	83.6	2.102	1.317	2.4637	
60 minute summer	71	7.001	72	164.0	3.327	0.610	3.3897	
60 minute summer	72	7.002	73	232.9	0.937	0.523	9.0551	
60 minute summer	73	7.003	12	254.4	0.713	0.414	4.9577	
60 minute summer	12	7.004	44	254.1	0.712	0.474	4.3384	
60 minute summer	44	1.013	46	1726.5	3.923	2.424	9.2214	
60 minute summer	46	1.014	47	1737.7	4.068	2.426	7.1608	
60 minute summer	47	Orifice	48	0.0				
60 minute summer	47	Infiltration		455.6				
60 minute winter	48	1.016	49	0.0	0.073	0.000	0.0108	0.1
60 minute summer	96	8.000	97	72.3	1.291	0.525	3.6255	
60 minute summer	97	8.001	98	157.2	2.232	1.094	3.1918	
60 minute summer	98	8.002	99	210.6	1.910	0.814	1.4547	
60 minute summer	99	8.003	100	279.4	1.764	1.506	10.7257	
60 minute summer	110	9.000	111	27.5	1.042	0.391	0.9241	
60 minute summer	111	9.001	112	58.0	1.785	0.828	0.6046	
60 minute summer	112	9.002	113	90.4	1.494	0.927	2.1889	
60 minute summer	113	9.003	100	131.5	1.996	0.721	1.3175	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	100	34	122.758	0.798	461.2	1.7945	0.0000	SURCHARGED
60 minute summer	101	34	122.239	0.364	538.7	1.0766	0.0000	OK
60 minute summer	114	33	121.488	0.188	145.9	0.7657	0.0000	OK
120 minute winter	102	120	120.764	1.469	373.9	845.7741	0.0000	SURCHARGED
60 minute summer	103	32	119.145	0.135	112.5	0.3931	0.0000	OK
60 minute summer	104	33	118.784	0.124	163.9	0.3227	0.0000	OK
60 minute summer	132	34	121.640	1.090	134.0	1.6350	0.0000	SURCHARGED
60 minute summer	133	34	121.893	1.137	86.1	1.8288	0.0000	SURCHARGED
60 minute summer	134	34	121.962	1.082	58.9	2.5213	0.0000	SURCHARGED
60 minute summer	123	33	124.209	0.159	74.0	0.3804	0.0000	OK
60 minute summer	124	33	123.684	0.119	102.8	0.2014	0.0000	OK
60 minute summer	131	34	121.182	0.777	148.8	0.9888	0.0000	SURCHARGED
60 minute summer	125	33	120.617	0.506	317.8	1.1222	0.0000	SURCHARGED
60 minute summer	126	34	120.258	0.278	349.1	0.5562	0.0000	OK
60 minute summer	127	33	119.435	0.190	362.1	0.3791	0.0000	OK
60 minute summer	128	34	118.168	0.443	478.7	1.3458	0.0000	OK
60 minute summer	139	33	121.960	0.090	39.9	0.1761	0.0000	OK
60 minute summer	140	33	120.401	0.141	159.0	0.5166	0.0000	OK
60 minute summer	141	33	118.546	0.236	209.4	0.5331	0.0000	OK
60 minute summer	142	34	117.911	0.631	735.0	1.6213	0.0000	SURCHARGED
60 minute summer	28	34	117.641	0.571	768.9	1.4577	0.0000	OK
60 minute summer	129	34	117.156	1.156	960.6	2.5869	0.0000	SURCHARGED
720 minute winter	130	705	116.894	0.964	138.4	1.7029	0.0000	SURCHARGED
60 minute summer	117	33	122.086	0.166	56.9	0.3897	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)
60 minute summer	100	8.004	101	460.5	2.953	1.809	2.0219	
60 minute summer	101	8.005	102	535.8	3.670	0.936	11.5335	
60 minute summer	114	10.000	102	145.9	2.837	0.731	3.1172	
120 minute winter	102	Hydro-Brake®	103	42.0				
60 minute summer	103	8.007	104	112.2	2.358	0.071	0.5918	
60 minute summer	104	8.008	129	163.9	0.821	0.077	10.4173	
60 minute summer	132	11.002	131	133.9	1.901	1.557	1.6974	
60 minute summer	133	11.001	132	86.4	1.227	1.008	2.4152	
60 minute summer	134	11.000	133	55.1	0.942	0.639	1.4548	
60 minute summer	123	12.000	124	74.0	2.316	0.473	0.7858	
60 minute summer	124	12.001	125	102.8	3.758	0.336	1.6655	
60 minute summer	131	11.003	125	148.8	2.113	1.733	1.7013	
60 minute summer	125	11.004	126	316.6	2.292	1.259	2.7993	
60 minute summer	126	11.005	127	349.1	3.826	0.517	1.3878	
60 minute summer	127	11.006	128	362.5	3.276	0.275	2.2854	
60 minute summer	128	11.007	142	474.2	1.892	0.769	13.9807	
60 minute summer	139	13.000	140	39.9	2.764	0.315	0.3581	
60 minute summer	140	13.001	141	159.0	2.862	0.309	1.6518	
60 minute summer	141	13.002	142	209.5	2.723	0.668	2.9820	
60 minute summer	142	11.008	28	722.4	3.051	0.736	2.8916	
60 minute summer	28	11.009	129	762.0	2.725	0.595	8.0785	
60 minute summer	129	8.009	130	948.7	2.658	1.524	5.6460	
720 minute winter	130	8.010	108	137.0	1.716	0.214	11.3865	
60 minute summer	117	14.000	122	57.0	1.712	0.891	2.2782	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	122	33	121.084	0.264	114.6	0.6000	0.0000	OK
60 minute summer	118	34	120.906	0.201	177.1	0.4828	0.0000	OK
60 minute summer	119	35	118.492	1.737	270.0	4.7933	0.0000	SURCHARGED
60 minute summer	120	35	118.179	1.529	274.4	2.7396	0.0000	SURCHARGED
60 minute summer	105	35	117.925	1.355	272.2	1.9396	0.0000	SURCHARGED
60 minute summer	45	34	118.223	0.103	49.7	0.2094	0.0000	OK
60 minute summer	106	35	117.797	1.252	426.1	3.3173	0.0000	SURCHARGED
60 minute summer	107	35	117.005	1.075	421.9	1.5389	0.0000	SURCHARGED
360 minute winter	108	360	116.892	1.112	288.6	1678.6830	0.0000	SURCHARGED
60 minute summer	109	1	115.505	0.000	0.0	0.0000	0.0000	OK
60 minute summer	74	35	126.686	1.086	56.3	2.4745	0.0000	SURCHARGED
60 minute summer	75	35	126.589	1.289	76.6	2.3389	0.0000	SURCHARGED
60 minute summer	76	35	126.509	1.384	332.2	7.0250	0.0000	SURCHARGED
60 minute summer	83	35	125.091	0.491	71.3	1.2599	0.0000	SURCHARGED
60 minute summer	77	35	124.927	0.802	464.0	2.0884	0.0000	SURCHARGED
60 minute summer	84	33	124.720	0.175	53.7	0.3956	0.0000	OK
60 minute summer	85	33	124.387	0.242	122.4	0.6067	0.0000	OK
60 minute summer	86	35	123.655	0.390	242.5	1.5110	0.0000	OK
60 minute summer	78	35	123.569	1.039	801.5	3.8883	0.0000	SURCHARGED
60 minute summer	79	35	122.821	1.471	842.0	4.3562	0.0000	SURCHARGED
60 minute summer	80	36	122.212	1.032	840.5	1.8231	0.0000	SURCHARGED
60 minute summer	87	33	126.661	0.161	93.6	0.4902	0.0000	OK
60 minute summer	88	33	125.135	0.310	187.2	0.8911	0.0000	OK
60 minute summer	89	33	124.908	0.298	238.9	0.6940	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)
60 minute summer	122	14.001	118	114.4	2.012	0.892	0.4996	
60 minute summer	118	14.002	119	175.1	2.661	0.703	4.6932	
60 minute summer	119	14.003	120	251.4	2.280	2.483	1.2753	
60 minute summer	120	14.004	105	272.2	1.718	1.493	3.9505	
60 minute summer	105	14.005	106	273.5	1.726	1.443	1.1427	
60 minute summer	45	15.000	106	49.1	3.154	0.302	0.3784	
60 minute summer	106	14.006	107	421.9	2.663	1.008	5.8266	
60 minute summer	107	14.007	108	420.4	2.653	1.819	4.6294	
360 minute winter	108	Orifice	109	0.0				0.6
360 minute winter	108	Infiltration		56.9				
60 minute summer	74	16.000	75	53.0	1.202	0.615	2.6248	
60 minute summer	75	16.001	76	89.2	0.844	0.686	4.5313	
60 minute summer	76	16.002	77	308.5	2.798	1.267	6.3490	
60 minute summer	83	17.000	77	70.4	1.445	0.719	2.9453	
60 minute summer	77	16.003	78	450.2	3.395	0.885	9.2884	
60 minute summer	84	18.000	85	53.7	1.673	0.858	0.7290	
60 minute summer	85	18.001	86	122.1	2.090	0.917	2.6703	
60 minute summer	86	18.002	78	237.7	1.969	0.410	8.9746	
60 minute summer	78	16.004	79	777.8	2.762	0.687	12.3335	
60 minute summer	79	16.005	80	840.5	2.984	2.075	7.6760	
60 minute summer	80	16.006	81	839.4	2.447	2.295	17.3431	
60 minute summer	87	19.000	88	93.6	1.949	0.575	3.6591	
60 minute summer	88	19.001	89	187.2	2.123	0.806	0.9120	
60 minute summer	89	19.002	90	238.9	2.049	0.688	4.8044	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	90	33	124.469	0.404	472.5	2.3799	0.0000	OK
60 minute summer	91	33	123.838	0.418	616.6	1.7566	0.0000	OK
60 minute summer	92	33	123.517	0.582	759.3	2.2546	0.0000	OK
60 minute summer	95	32	123.526	0.136	64.1	0.3360	0.0000	OK
60 minute summer	93	33	122.926	0.516	1034.7	2.3785	0.0000	OK
60 minute winter	94	9	122.316	1.136	750.2	2.0075	0.0000	SURCHARGED
180 minute winter	81	180	122.125	1.020	599.5	2034.2180	0.0000	SURCHARGED
60 minute summer	82	1	120.830	0.000	0.0	0.0000	0.0000	OK
60 minute summer	13	35	99.141	0.686	49.1	1.4975	0.0000	SURCHARGED
60 minute summer	14	35	99.054	0.644	62.5	0.9314	0.0000	SURCHARGED
60 minute summer	15	35	98.795	1.040	102.7	1.9721	0.0000	SURCHARGED
60 minute summer	16	34	96.978	0.483	131.7	0.8216	0.0000	SURCHARGED
60 minute summer	1	33	101.098	0.108	55.6	0.2444	0.0000	OK
60 minute summer	2	33	99.629	0.129	83.7	0.2116	0.0000	OK
60 minute summer	3	32	98.901	0.166	152.3	0.4203	0.0000	OK
60 minute summer	4	34	96.506	0.276	336.0	0.6677	0.0000	OK
60 minute summer	20	34	95.577	0.642	36.0	1.1954	0.0000	SURCHARGED
60 minute summer	5	34	95.504	1.269	413.7	2.7706	0.0000	SURCHARGED
60 minute summer	6	34	94.760	1.115	477.1	2.9460	0.0000	SURCHARGED
60 minute summer	17	33	99.478	0.078	31.4	0.1396	0.0000	OK
60 minute summer	18	33	96.604	0.109	77.9	0.2259	0.0000	OK
60 minute summer	19	34	94.531	0.156	110.0	0.2749	0.0000	OK
60 minute summer	7	34	93.889	1.164	612.3	2.1723	0.0000	SURCHARGED
60 minute summer	8	34	92.752	0.387	629.4	0.6840	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)
60 minute summer	90	19.003	91	472.6	2.847	0.817	6.6528	0.3
60 minute summer	91	19.004	92	615.4	2.586	0.490	3.5894	
60 minute summer	92	19.005	93	754.0	3.006	0.951	10.6442	
60 minute summer	95	20.000	93	64.2	2.740	0.566	0.3243	
60 minute summer	93	19.006	94	1032.3	3.683	0.593	4.9134	
60 minute winter	94	19.007	81	747.5	2.579	1.702	12.0687	
180 minute winter	81	Orifice	82	0.0				
180 minute winter	81	Infiltration		56.9				
60 minute summer	13	21.000	14	43.9	1.487	1.105	0.3040	
60 minute summer	14	21.001	15	61.6	1.895	0.534	0.5333	
60 minute summer	15	21.002	16	101.2	2.545	1.154	1.6692	
60 minute summer	16	21.003	4	131.6	1.869	1.284	1.5345	
60 minute summer	1	22.000	2	55.6	3.081	0.421	0.4002	
60 minute summer	2	22.001	3	83.7	2.457	0.357	0.5981	
60 minute summer	3	22.002	4	153.3	3.682	0.573	1.8502	
60 minute summer	4	21.004	5	332.9	4.265	0.702	2.5569	
60 minute summer	20	23.000	5	37.5	1.959	0.369	0.4976	
60 minute summer	5	21.005	6	411.3	2.738	0.975	5.5065	
60 minute summer	6	21.006	7	476.5	3.008	0.824	4.5847	
60 minute summer	17	24.000	18	31.4	2.630	0.248	0.5743	
60 minute summer	18	24.001	19	77.9	2.855	0.288	1.0810	
60 minute summer	19	24.002	7	108.7	2.416	0.406	1.3994	
60 minute summer	7	21.007	8	612.0	3.882	1.416	3.0639	
60 minute summer	8	21.008	9	628.4	4.119	0.774	3.5106	



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	9	34	91.595	0.680	661.3	1.3946	0.0000	SURCHARGED
180 minute winter	10	180	91.078	0.978	216.1	710.1210	0.0000	SURCHARGED
60 minute summer	11	1	90.050	0.000	0.0	0.0000	0.0000	OK
60 minute summer	21	33	94.972	0.072	17.7	0.1067	0.0000	OK
60 minute summer	29	33	94.674	0.124	22.9	0.1979	0.0000	OK
60 minute summer	22	33	94.551	0.136	93.6	0.2762	0.0000	OK
60 minute summer	23	33	92.819	0.124	131.6	0.2166	0.0000	OK
60 minute summer	24	35	89.080	0.185	149.3	0.2681	0.0000	OK
60 minute summer	31	36	88.700	0.965	31.4	1.7417	0.0000	SURCHARGED
60 minute summer	32	36	88.662	1.027	35.2	1.2674	0.0000	SURCHARGED
60 minute summer	30	35	89.085	0.085	45.2	0.1623	0.0000	OK
60 minute summer	25	35	88.626	1.106	230.1	43.1240	0.0000	SURCHARGED
480 minute winter	26	472	88.491	1.036	27.4	245.6855	0.0000	SURCHARGED
60 minute summer	27	1	87.420	0.000	0.0	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)
60 minute summer	9	21.009	10	659.6	4.452	0.875	2.3912	0.3
180 minute winter	10	Orifice	11	0.0				
180 minute winter	10	Infiltration		22.1				
60 minute summer	21	25.000	22	17.7	1.699	0.198	0.1458	0.7
60 minute summer	29	26.000	22	22.9	1.086	0.501	0.1632	
60 minute summer	22	25.001	23	93.6	3.192	0.387	1.0760	
60 minute summer	23	25.002	24	131.6	4.154	0.366	1.2969	
60 minute summer	24	25.003	25	148.2	2.679	0.445	0.8972	
60 minute summer	31	27.000	32	28.7	0.722	0.596	0.4620	
60 minute summer	32	27.001	25	33.4	0.839	0.812	0.2531	
60 minute summer	30	28.000	25	45.2	1.824	0.279	0.3924	
60 minute summer	25	25.004	26	194.5	2.762	2.761	1.1292	
480 minute winter	26	Orifice	27	0.0				
480 minute winter	26	Infiltration		3.3				



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	54	33	124.284	0.114	61.8	0.2785	0.0000	OK
60 minute summer	55	33	122.712	0.127	71.4	0.1700	0.0000	OK
60 minute summer	63	33	121.814	0.114	26.1	0.1861	0.0000	OK
60 minute summer	56	33	121.597	0.147	131.9	0.2585	0.0000	OK
60 minute summer	57	33	119.545	0.195	155.3	0.3052	0.0000	OK
60 minute summer	58	33	118.768	0.173	167.0	0.2847	0.0000	OK
60 minute summer	59	33	118.147	0.187	220.6	0.4539	0.0000	OK
60 minute summer	60	33	115.520	0.200	321.7	0.6620	0.0000	OK
60 minute summer	61	33	112.990	0.260	399.3	0.7465	0.0000	OK
60 minute summer	62	33	111.905	0.275	426.0	0.5295	0.0000	OK
60 minute summer	50	33	124.803	0.183	66.0	0.4669	0.0000	OK
60 minute summer	51	33	124.276	0.206	116.8	0.4467	0.0000	OK
60 minute summer	52	33	123.672	0.207	171.8	0.5133	0.0000	OK
60 minute summer	33	35	126.949	1.424	67.3	3.6178	0.0000	FLOOD RISK
60 minute summer	34	35	126.580	1.255	115.9	2.9765	0.0000	FLOOD RISK
60 minute summer	35	34	124.341	0.196	177.7	0.4952	0.0000	OK
60 minute summer	36	33	122.623	0.313	421.5	0.8503	0.0000	OK
60 minute summer	53	33	121.806	0.131	45.4	0.2705	0.0000	OK
60 minute summer	37	33	120.949	0.339	493.9	0.6270	0.0000	OK
60 minute summer	38	33	119.745	0.209	492.3	0.2998	0.0000	OK
60 minute summer	39	34	113.115	0.990	550.9	2.5532	0.0000	SURCHARGED
60 minute summer	40	33	110.754	0.409	983.4	0.9125	0.0000	OK
60 minute summer	41	34	109.399	0.344	1047.8	0.9884	0.0000	OK
60 minute summer	64	31	112.672	0.072	27.5	0.1199	0.0000	OK
60 minute summer	65	35	111.499	0.229	122.4	0.6412	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)
60 minute summer	54	1.000	55	61.8	2.862	0.490	0.5873	
60 minute summer	55	1.001	56	71.4	3.280	0.524	0.3402	
60 minute summer	63	2.000	56	26.1	1.369	0.447	0.2649	
60 minute summer	56	1.002	57	131.9	3.184	0.487	1.4762	
60 minute summer	57	1.003	58	155.3	3.564	0.572	0.5010	
60 minute summer	58	1.004	59	167.0	3.197	0.338	0.5497	
60 minute summer	59	1.005	60	220.7	4.193	0.456	2.3271	
60 minute summer	60	1.006	61	321.7	3.943	0.409	3.5986	
60 minute summer	61	1.007	62	399.2	4.067	0.510	1.8568	
60 minute summer	62	1.008	40	426.0	4.416	0.542	1.8954	
60 minute summer	50	3.000	51	66.0	2.002	0.898	0.7871	
60 minute summer	51	3.001	52	116.8	2.403	0.712	1.1859	
60 minute summer	52	3.002	36	171.7	2.122	0.607	4.6576	
60 minute summer	33	4.000	34	60.2	1.514	1.218	0.8789	
60 minute summer	34	4.001	35	112.2	2.822	1.327	1.6718	
60 minute summer	35	4.002	36	177.7	3.510	0.730	2.0084	
60 minute summer	36	3.003	37	419.6	4.155	0.897	3.1852	
60 minute summer	53	5.000	37	45.4	1.748	0.646	1.4978	
60 minute summer	37	3.004	38	492.3	5.743	0.647	0.6312	
60 minute summer	38	3.005	39	491.8	5.149	0.618	4.1115	
60 minute summer	39	3.006	40	542.2	5.037	0.979	2.0741	
60 minute summer	40	1.009	41	984.7	5.397	0.588	4.0661	
60 minute summer	41	1.010	42	1046.8	4.718	0.517	6.3763	
60 minute summer	64	6.000	65	27.6	2.378	0.221	0.4222	
60 minute summer	65	6.001	66	117.3	1.902	0.504	2.6973	



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	66	35	111.128	1.693	168.8	3.2311	0.0000	SURCHARGED
60 minute summer	67	35	110.555	1.440	218.1	3.5327	0.0000	FLOOD RISK
60 minute summer	68	35	108.511	1.496	288.7	4.4075	0.0000	FLOOD RISK
60 minute summer	69	35	108.002	1.132	317.7	2.3484	0.0000	SURCHARGED
60 minute summer	42	34	107.591	0.991	1412.3	2.4126	0.0000	SURCHARGED
60 minute summer	43	35	104.798	0.453	1471.4	1.3149	0.0000	OK
60 minute summer	70	34	106.381	1.156	93.5	3.6088	0.0000	FLOOD RISK
60 minute summer	71	34	104.410	0.190	172.9	0.5551	0.0000	OK
60 minute summer	72	35	102.375	1.895	253.4	5.8480	0.0363	FLOOD
60 minute summer	73	35	102.320	2.050	284.7	4.1120	0.0000	SURCHARGED
60 minute summer	12	35	102.296	2.086	282.6	3.6858	0.0000	SURCHARGED
60 minute summer	44	35	102.273	2.178	1768.7	6.4184	0.0000	SURCHARGED
60 minute summer	46	35	101.444	1.419	1779.4	3.8159	0.0000	SURCHARGED
60 minute summer	47	44	100.964	0.994	1780.0	999.7236	0.0000	SURCHARGED
60 minute winter	48	63	99.700	0.009	0.0	0.0231	0.0000	OK
60 minute winter	49	63	99.661	0.000	0.0	0.0000	0.0000	OK
60 minute summer	96	34	125.103	1.003	81.8	2.7269	0.0000	SURCHARGED
60 minute summer	97	34	124.815	1.505	170.9	4.8100	0.7500	FLOOD
60 minute summer	98	34	123.727	1.247	217.1	3.2771	0.0000	SURCHARGED
60 minute summer	99	35	123.491	1.306	291.7	3.7633	0.0000	SURCHARGED
60 minute summer	110	33	123.900	0.100	28.9	0.1737	0.0000	OK
60 minute summer	111	34	123.764	0.564	65.3	1.0560	0.0000	SURCHARGED
60 minute summer	112	35	123.506	0.656	94.8	1.1945	0.0000	SURCHARGED
60 minute summer	113	35	123.268	0.658	137.5	1.3545	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)
60 minute summer	66	6.002	67	151.8	2.171	1.193	1.7206	
60 minute summer	67	6.003	68	213.2	3.027	0.938	3.4378	
60 minute summer	68	6.004	69	288.0	2.612	2.199	1.7881	
60 minute summer	69	6.005	42	325.9	2.057	1.671	5.1832	
60 minute summer	42	1.011	43	1400.3	5.765	0.944	12.4454	
60 minute summer	43	1.012	44	1468.4	5.396	0.648	9.7290	
60 minute summer	70	7.000	71	87.3	2.195	1.375	2.4637	
60 minute summer	71	7.001	72	171.6	3.370	0.638	3.4790	
60 minute summer	72	7.002	73	260.0	0.923	0.584	9.0551	
60 minute summer	73	7.003	12	282.6	0.792	0.460	4.9577	
60 minute summer	12	7.004	44	279.9	0.784	0.522	4.3384	
60 minute summer	44	1.013	46	1767.2	4.016	2.481	9.2214	
60 minute summer	46	1.014	47	1780.0	4.121	2.485	7.1608	
60 minute summer	47	Orifice	48	0.0				
60 minute summer	47	Infiltration		466.2				
60 minute winter	48	1.016	49	0.0	0.074	0.000	0.0110	0.1
60 minute summer	96	8.000	97	74.4	1.296	0.540	3.6255	
60 minute summer	97	8.001	98	158.6	2.253	1.104	3.1918	
60 minute summer	98	8.002	99	216.1	1.960	0.835	1.4547	
60 minute summer	99	8.003	100	290.6	1.835	1.567	10.7257	
60 minute summer	110	9.000	111	28.9	1.044	0.411	0.9341	
60 minute summer	111	9.001	112	59.6	1.774	0.851	0.6046	
60 minute summer	112	9.002	113	93.8	1.497	0.962	2.1889	
60 minute summer	113	9.003	100	136.6	1.988	0.749	1.3175	



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	100	35	122.935	0.975	480.0	2.2322	0.0000	SURCHARGED
60 minute summer	101	35	122.473	0.598	561.0	1.8110	0.0000	SURCHARGED
60 minute summer	114	33	121.495	0.195	153.2	0.8206	0.0000	OK
120 minute winter	102	120	120.849	1.553	392.5	894.5810	0.0000	SURCHARGED
60 minute summer	103	32	119.147	0.137	115.8	0.4074	0.0000	OK
60 minute summer	104	33	118.786	0.126	169.9	0.3336	0.0000	OK
60 minute summer	132	34	121.775	1.225	140.3	1.8589	0.0000	SURCHARGED
60 minute summer	133	34	122.050	1.295	90.2	2.1132	0.0000	SURCHARGED
60 minute summer	134	34	122.126	1.245	61.8	2.9778	0.0000	FLOOD RISK
60 minute summer	123	33	124.214	0.164	77.6	0.4022	0.0000	OK
60 minute summer	124	33	123.687	0.122	107.8	0.2101	0.0000	OK
60 minute summer	131	34	121.274	0.869	155.5	1.1122	0.0000	SURCHARGED
60 minute summer	125	33	120.656	0.546	332.8	1.2313	0.0000	SURCHARGED
60 minute summer	126	33	120.268	0.288	366.3	0.5842	0.0000	OK
60 minute summer	127	34	119.442	0.197	379.8	0.3950	0.0000	OK
60 minute summer	128	34	118.452	0.726	503.6	2.2521	0.0000	SURCHARGED
60 minute summer	139	33	121.963	0.093	41.9	0.1849	0.0000	OK
60 minute summer	140	33	120.405	0.145	167.0	0.5466	0.0000	OK
60 minute summer	141	34	118.570	0.260	219.9	0.5974	0.0000	OK
60 minute summer	142	34	118.091	0.811	749.9	2.1156	0.0000	SURCHARGED
60 minute summer	28	34	117.793	0.723	787.5	1.8740	0.0000	SURCHARGED
60 minute summer	129	35	117.237	1.237	981.1	2.7980	0.0000	SURCHARGED
360 minute winter	130	360	116.956	1.026	217.2	1.8136	0.0000	SURCHARGED
60 minute summer	117	33	122.093	0.173	59.8	0.4160	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)
60 minute summer	100	8.004	101	478.9	3.026	1.881	2.1648	
60 minute summer	101	8.005	102	555.4	3.630	0.970	12.3484	
60 minute summer	114	10.000	102	153.1	2.817	0.767	3.1666	
120 minute winter	102	Hydro-Brake®	103	42.0				
60 minute summer	103	8.007	104	115.6	2.371	0.073	0.6063	
60 minute summer	104	8.008	129	169.8	0.843	0.080	10.4466	
60 minute summer	132	11.002	131	139.9	1.987	1.627	1.6974	
60 minute summer	133	11.001	132	90.5	1.285	1.056	2.4152	
60 minute summer	134	11.000	133	57.9	0.945	0.671	1.4548	
60 minute summer	123	12.000	124	77.6	2.341	0.496	0.8149	
60 minute summer	124	12.001	125	107.8	3.684	0.353	1.8940	
60 minute summer	131	11.003	125	155.5	2.208	1.810	1.7013	
60 minute summer	125	11.004	126	332.2	2.269	1.321	2.8455	
60 minute summer	126	11.005	127	366.1	3.858	0.542	1.4423	
60 minute summer	127	11.006	128	379.9	3.279	0.288	2.8539	
60 minute summer	128	11.007	142	491.1	1.883	0.796	15.6018	
60 minute summer	139	13.000	140	41.9	2.799	0.330	0.3714	
60 minute summer	140	13.001	141	167.0	2.878	0.325	1.7781	
60 minute summer	141	13.002	142	216.8	2.707	0.692	3.1634	
60 minute summer	142	11.008	28	741.2	2.995	0.755	2.9168	
60 minute summer	28	11.009	129	782.9	2.780	0.612	8.1489	
60 minute summer	129	8.009	130	966.2	2.707	1.552	5.6460	
360 minute winter	130	8.010	108	214.7	1.755	0.335	11.3865	
60 minute summer	117	14.000	122	59.9	1.710	0.937	2.4100	



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status	
60 minute summer	122	33	121.101	0.281	120.4	0.6556	0.0000	OK	
60 minute summer	118	34	120.928	0.223	185.4	0.5521	0.0000	OK	
60 minute summer	119	35	118.733	1.978	282.1	5.5873	0.0000	FLOOD RISK	
60 minute summer	120	35	118.388	1.738	287.5	3.1460	0.0000	SURCHARGED	
60 minute summer	105	35	118.110	1.539	285.4	2.2030	0.0000	SURCHARGED	
60 minute summer	45	34	118.245	0.125	52.2	0.2599	0.0000	OK	
60 minute summer	106	35	117.969	1.424	445.9	3.8582	0.0000	SURCHARGED	
60 minute summer	107	35	117.097	1.167	441.1	1.6696	0.0000	FLOOD RISK	
360 minute winter	108	360	116.955	1.175	300.7	1791.9080	0.0000	SURCHARGED	
60 minute summer	109	1	115.505	0.000	0.0	0.0000	0.0000	OK	
60 minute summer	74	35	127.046	1.446	59.1	3.3773	0.0000	FLOOD RISK	
60 minute summer	75	35	126.947	1.647	79.8	3.0182	0.0000	SURCHARGED	
60 minute summer	76	35	126.864	1.739	342.7	9.1441	0.0000	SURCHARGED	
60 minute summer	83	35	125.364	0.764	74.9	2.0153	0.0000	SURCHARGED	
60 minute summer	77	35	125.186	1.061	478.7	2.8264	0.0000	SURCHARGED	
60 minute summer	84	33	124.728	0.183	56.3	0.4251	0.0000	OK	
60 minute summer	85	33	124.401	0.256	128.5	0.6575	0.0000	OK	
60 minute summer	86	35	123.867	0.602	254.4	2.3978	0.0000	SURCHARGED	
60 minute summer	78	35	123.736	1.206	813.8	4.6313	0.0000	SURCHARGED	
60 minute summer	79	35	122.930	1.580	873.0	4.7723	0.0000	FLOOD RISK	
60 minute summer	80	37	122.262	1.082	873.4	1.9113	0.0000	SURCHARGED	
60 minute summer	87	33	126.666	0.166	98.3	0.5210	0.0000	OK	
60 minute summer	88	33	125.148	0.323	196.6	0.9536	0.0000	OK	
60 minute summer	89	33	124.920	0.310	250.6	0.7365	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)	
60 minute summer	122	14.001	118	119.4	2.021	0.932	0.5387	0.6	
60 minute summer	118	14.002	119	182.5	2.715	0.733	4.9355		
60 minute summer	119	14.003	120	263.4	2.388	2.601	1.2753		
60 minute summer	120	14.004	105	285.4	1.802	1.566	3.9505		
60 minute summer	105	14.005	106	286.6	1.809	1.512	1.1427		
60 minute summer	45	15.000	106	51.1	3.193	0.314	0.4109		
60 minute summer	106	14.006	107	441.1	2.784	1.053	5.8266		
60 minute summer	107	14.007	108	439.3	2.773	1.901	4.6294		
360 minute winter	108	Orifice	109	0.0					
360 minute winter	108	Infiltration		56.9					
60 minute summer	74	16.000	75	55.5	1.171	0.644	2.6248	0.6	
60 minute summer	75	16.001	76	91.4	0.919	0.702	4.5313		
60 minute summer	76	16.002	77	316.0	2.866	1.298	6.3490		
60 minute summer	83	17.000	77	74.4	1.450	0.760	2.9453		
60 minute summer	77	16.003	78	464.5	3.418	0.913	9.2884		
60 minute summer	84	18.000	85	56.3	1.678	0.900	0.7744		
60 minute summer	85	18.001	86	128.0	2.089	0.961	3.0047		
60 minute summer	86	18.002	78	234.4	1.974	0.404	9.9943		
60 minute summer	78	16.004	79	808.3	2.870	0.714	12.3335		
60 minute summer	79	16.005	80	873.4	3.101	2.156	7.6760		
60 minute summer	80	16.006	81	871.5	2.460	2.383	17.3431		
60 minute summer	87	19.000	88	98.3	1.948	0.604	3.8340		
60 minute summer	88	19.001	89	196.3	2.140	0.845	0.9474		
60 minute summer	89	19.002	90	250.5	2.055	0.722	5.0591		



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	90	33	124.488	0.423	495.7	2.5785	0.0000	OK
60 minute summer	91	34	123.974	0.554	645.8	2.3915	0.0000	OK
60 minute summer	92	34	123.755	0.820	779.7	3.2601	0.0000	SURCHARGED
60 minute summer	95	32	123.528	0.138	67.3	0.3501	0.0000	OK
60 minute summer	93	34	123.079	0.669	1058.5	3.1798	0.0000	SURCHARGED
60 minute winter	94	9	122.371	1.191	787.7	2.1045	0.0000	SURCHARGED
180 minute winter	81	180	122.181	1.076	629.8	2163.7740	0.0000	SURCHARGED
60 minute summer	82	1	120.830	0.000	0.0	0.0000	0.0000	OK
60 minute summer	13	35	99.347	0.892	51.5	1.9935	0.0000	SURCHARGED
60 minute summer	14	35	99.256	0.846	64.7	1.2377	0.0000	SURCHARGED
60 minute summer	15	35	98.989	1.234	106.5	2.3881	0.0000	SURCHARGED
60 minute summer	16	35	97.084	0.589	136.1	1.0185	0.0000	SURCHARGED
60 minute summer	1	33	101.101	0.111	58.4	0.2582	0.0000	OK
60 minute summer	2	33	99.633	0.133	87.9	0.2224	0.0000	OK
60 minute summer	3	32	98.907	0.172	160.1	0.4483	0.0000	OK
60 minute summer	4	35	96.648	0.418	350.0	1.0299	0.0000	SURCHARGED
60 minute summer	20	34	95.806	0.871	37.8	1.6536	0.0000	SURCHARGED
60 minute summer	5	34	95.721	1.486	428.9	3.3011	0.0000	SURCHARGED
60 minute summer	6	34	94.974	1.329	490.6	3.5921	0.0000	SURCHARGED
60 minute summer	17	33	99.480	0.080	33.0	0.1460	0.0000	OK
60 minute summer	18	33	96.607	0.112	81.8	0.2371	0.0000	OK
60 minute summer	19	34	94.559	0.184	115.5	0.3305	0.0000	OK
60 minute summer	7	34	94.096	1.371	629.8	2.5864	0.0000	SURCHARGED
60 minute summer	8	34	92.960	0.595	643.3	1.0628	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)
60 minute summer	90	19.003	91	494.6	2.842	0.855	7.8740	0.3
60 minute summer	91	19.004	92	628.5	2.570	0.501	4.0607	
60 minute summer	92	19.005	93	765.2	2.989	0.965	11.1612	
60 minute summer	95	20.000	93	67.2	2.730	0.593	0.4111	
60 minute summer	93	19.006	94	1049.9	3.728	0.604	5.1299	
60 minute winter	94	19.007	81	785.4	2.581	1.788	12.0687	
180 minute winter	81	Orifice	82	0.0				
180 minute winter	81	Infiltration		56.9				
60 minute summer	13	21.000	14	45.1	1.481	1.133	0.3040	
60 minute summer	14	21.001	15	63.8	1.903	0.553	0.5333	
60 minute summer	15	21.002	16	103.5	2.603	1.181	1.6692	
60 minute summer	16	21.003	4	134.5	1.911	1.313	1.5711	
60 minute summer	1	22.000	2	58.4	3.117	0.442	0.4155	
60 minute summer	2	22.001	3	87.9	2.508	0.376	0.6237	
60 minute summer	3	22.002	4	160.2	3.656	0.598	2.3024	
60 minute summer	4	21.004	5	343.4	4.299	0.724	2.8579	
60 minute summer	20	23.000	5	42.4	1.983	0.416	0.4976	
60 minute summer	5	21.005	6	417.8	2.733	0.990	5.5065	
60 minute summer	6	21.006	7	483.3	3.051	0.836	4.5847	
60 minute summer	17	24.000	18	33.0	2.666	0.260	0.5954	
60 minute summer	18	24.001	19	81.8	2.827	0.302	1.2333	
60 minute summer	19	24.002	7	113.5	2.384	0.424	1.5081	
60 minute summer	7	21.007	8	624.1	3.943	1.444	3.2004	
60 minute summer	8	21.008	9	637.8	4.131	0.785	3.6670	



Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.87%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	9	37	91.694	0.779	674.2	1.6226	0.0000	SURCHARGED
180 minute winter	10	180	91.143	1.043	226.7	755.7009	0.0000	SURCHARGED
60 minute summer	11	1	90.050	0.000	0.0	0.0000	0.0000	OK
60 minute summer	21	33	94.974	0.074	18.6	0.1110	0.0000	OK
60 minute summer	29	33	94.679	0.129	24.1	0.2073	0.0000	OK
60 minute summer	22	33	94.555	0.140	98.4	0.2909	0.0000	OK
60 minute summer	23	33	92.823	0.128	138.3	0.2264	0.0000	OK
60 minute summer	24	35	89.123	0.228	156.9	0.3344	0.0000	OK
60 minute summer	31	35	88.872	1.138	33.0	2.0908	0.0000	FLOOD RISK
60 minute summer	32	35	88.828	1.193	36.9	1.4780	0.0000	SURCHARGED
60 minute summer	30	35	89.099	0.099	47.4	0.1929	0.0000	OK
60 minute summer	25	35	88.785	1.265	241.1	43.3131	0.0000	SURCHARGED
480 minute winter	26	472	88.549	1.094	28.8	263.6466	0.0000	SURCHARGED
60 minute summer	27	1	87.420	0.000	0.0	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)
60 minute summer	9	21.009	10	669.8	4.437	0.888	2.3912	0.3
180 minute winter	10	Orifice	11	0.0				
180 minute winter	10	Infiltration		22.1				
60 minute summer	21	25.000	22	18.6	1.720	0.208	0.1513	0.7
60 minute summer	29	26.000	22	24.1	1.099	0.527	0.1697	
60 minute summer	22	25.001	23	98.4	3.232	0.407	1.1174	
60 minute summer	23	25.002	24	138.3	4.166	0.385	1.5321	
60 minute summer	24	25.003	25	155.6	2.712	0.467	0.9893	
60 minute summer	31	27.000	32	30.0	0.755	0.623	0.4620	
60 minute summer	32	27.001	25	34.9	0.879	0.850	0.2531	
60 minute summer	30	28.000	25	47.3	1.835	0.292	0.4151	
60 minute summer	25	25.004	26	211.8	3.009	3.008	1.1292	
480 minute winter	26	Orifice	27	0.0				
480 minute winter	26	Infiltration		3.3				