



Title: Drainage Strategy Technical Note
Date: 16th August 2024
Author: Rob Lowe
Reference: 24247-JUBB-XX-XX-RP-C-001
Revision: P1

1.0 Introduction

1.1.1 Jubb have prepared this Technical Note alongside the associated drawings to address the Drainage requirements for a planning application appeal in relation to the proposed development at Land to the West of Cobbett Way, Broak Oak. This technical note will address the amendments required to satisfy the conditions stated within the Eastleigh Borough Council decision notice.

1.1.2 The original application number was O/23/96432. The decision notice was issued 01/03/2024.

2.0 Surface Water Drainage

2.1 Eastleigh Borough Council Refusal Notice

2.1.1 The decision notice highlighted 5no reasons for refusal. Reason number 3 related to drainage and is shown below:

'3. Insufficient information has been provided to demonstrate that the sustainable drainage can provide three forms of natural filtration, and mitigate all pollution hazards, which is necessary to maintain the quality of runoff water entering the Solent and Southampton Water Special Protection Area and Ramsar Site and Solent Maritime Special Area of Conservation. The application is therefore contrary to the requirements of Policies S1, DM5, DM6, DM10 and DM11 of the Local Plan, the provisions of the National Planning Policy Framework (2023), and the Conservation of Habitats and Species Regulations (2017) (as amended).'

2.1.2 To satisfy the above requirements of three forms of natural filtration, the Flood Risk Assessment and Drainage Strategy (24247_FRA01) document has been updated to highlight the journey of the surface water from source to discharge location.

2.1.3 Section 6.1 of 24247_FRA01 details the surface water drainage strategy and the features of the network to convey the surface water safely from source to discharge location. Section 7 (Water Quality) of the above report details the three forms of filtration and shows the Simple Index Approach assessment (from SuDS Manual CIRIA C753) to show the measures taken are sufficient to provide a clean discharge.

2.1.4 To confirm the above, all surface water will pass through a combination of permeable paving, a conveyance swale and a pond for three forms of filtration.

2.2 Lead Local Flood Authority (Hampshire County Council) Response

2.2.1 Prior to the issuing of the refusal notice, HCC issued comments in their role as LLFA. An updated FRA & DS document was submitted to the planning authority, but the refusal notice was issued prior to HCC being consulted.

2.2.2 The HCC comments were:

1. Clarification is required over references to the basin and discharge locations in the text and plans of the Drainage Strategy. Basins should be positioned at the lower parts of the site. Watercourses should be clearly shown on the plan.
2. Greenfield runoff rates should be applied proportionately to the developed areas.

3. Revised calculations should also include up to date peak rainfall allowances and be representative of the proposed drainage layout.
 4. Flood exceedance flow routes should be shown on a plan.
 5. Water quality and maintenance information can be expanded through conditions.
- 2.2.3 For point 1, the drainage strategy drawing has been updated to highlight the existing watercourses the site will discharge to. A levels drawing has been added to show the basins are located in the lower parts of the site once the site has been developed.
- 2.2.4 For point 2, the greenfield runoff rate has been updated. The total site area is c2.8Ha in size. Due to the large areas of open space, a value of 1.65Ha has been used to better represent the developed areas. This has produced a new value of 10.9l/s which has been used in the latest calculations.
- 2.2.5 For point 3, calculations have been split into two catchments to serve each detention basin. FEH data has been used from 2013 which is the latest rainfall data available. This is representative of the drainage layout.
- 2.2.6 For point 4, Flood Exceedance Flow Routes have been added to the drainage strategy drawing.
- 2.2.7 For point 5, HCC have proposed to deal with this point via condition, so no response is necessary.

3.0 Conclusions

- 3.1.1 Based on the findings of this technical note, it is considered that there are no grounds from a drainage perspective which preclude positive determination of the planning application appeal. The application proposals accord with the relevant provisions of the Eastleigh Borough Council Local Plan Policies.



- O S
1. All surface water drains to be min. 100mmØ @ 1:100, unless stated otherwise.
 2. All private drains based on uPVC drains. All adoptable drainage to be to adoptable standards (Clayware).
 3. Levels TBC during further design stages.
 4. Where design connects to existing drains/ditches. Levels of existing to be confirmed onsite prior to new connections being made.
 5. All drain points to be set out in accordance with the architects drawings and layouts.
 6. Cover levels are approximate and to be adjusted onsite to suit Landscape Architect's proposed levels

CONNECTION INVERT LEVELS
TO BE CONFIRMED PRIOR
TO CONSTRUCTION

- Flow Arrow
- Swale
- Permeable paving
- 12.55 Proposed Level
- 12.55 Existing Level

Rev	Date	Description	By	Apvd
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PROJECT:
BROAD OAK, BOTLEY, SOUTHAMPTON

TITLE:
SURFACE WATER DRAINAGE STRATEGY

CLIENT:
THE MULBERRY INVESTMENTS

SCALE@A1:
1:500

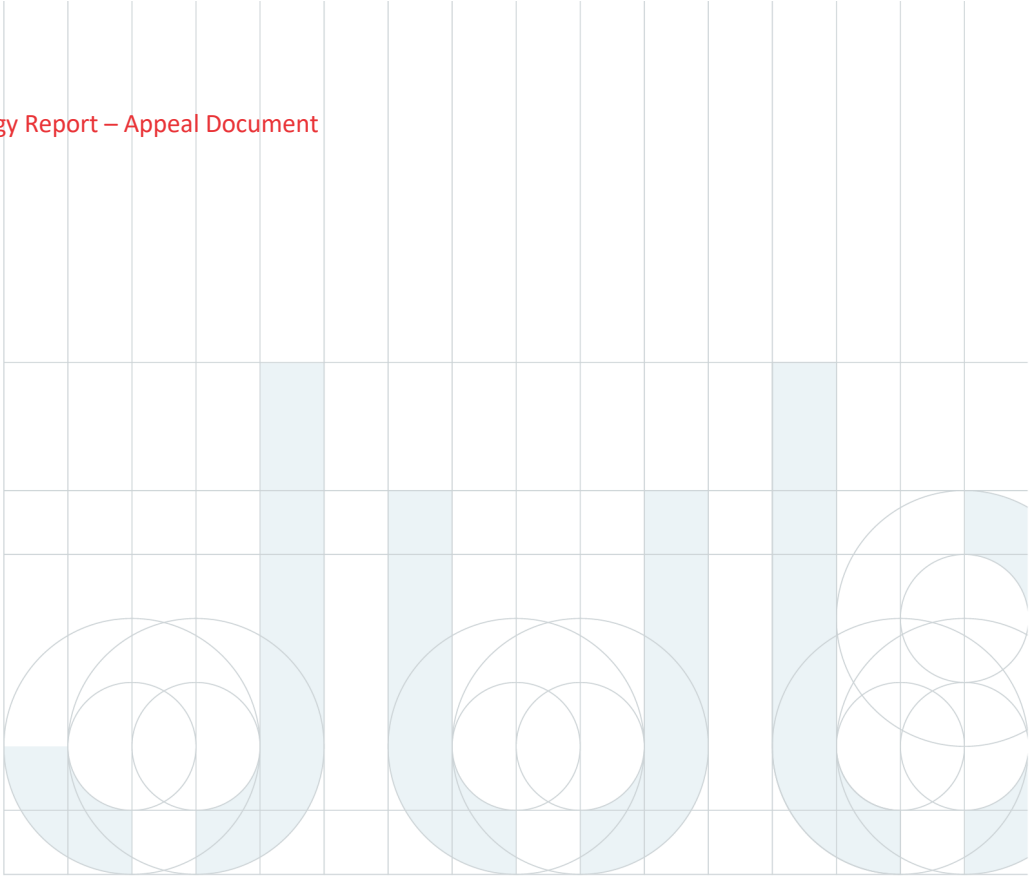
PROJECT REF:
24247

DRAWING No:
JUB_XX_XX_DR_C_500

REV:
P1

Revision Referencing
P = Preliminary A = Approval T = Tender C = Construction

Jubb



Land off Cobbett Way

Botley



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1 Project Information

1.1 Project Information

Client The Trustees of The Mulberry Investment Pension Scheme

1.2 Project Details

Project Name Land off Cobbett Way, Botley

Location Botley Parish

Jubb Project Number 24247

1.3 Report Details

Version 0.0

Status Draft

Date 18/07/24

1.4 Project Authorisation

ISSUE HISTORY:

Version	Date	Detail
0.0	18/07/24	First Issue

AUTHORISATION:

Prepared By	Approved By
AH	RL

2 Introduction

2.1 Instruction

- 2.1.1 Jubb has been commissioned on behalf of the trustees of The Mulberry Investment Pension Scheme to undertake a Flood Risk Assessment and Drainage Strategy report in support of a Planning Appeal following the rejection of Outline planning application (O/23/96432) for the Land off Cobbett Way located in Botley.

2.2 Brief

- 2.2.1 This Flood Risk Assessment is prepared in accordance with the requirements of the National Planning Policy Framework (NPPF) published by the Department of Communities and Local Government. The NPPF sets out the government's national policies to protect people and property from flooding in both existing and future situations as a result of development.
- 2.2.2 Section 14 of the NPPF and the associated Planning Practice Guidance for Flood Risk and Coastal Change sets out the framework for planning decisions made by the local, regional and national government and the Environment Agency (EA). In order for planning authorities to make informed decisions on the Development of sites in areas at risk of flooding, NPPF requires the developer to carry out an assessment of flood risk.
- 2.2.3 This report addresses the requirements given in Section 14 of the NPPF and other issues which are deemed relevant to flood risk. These requirements include the following:
- Assessment of the magnitude and severity of flood risk to the Site, including consideration of current and future impacts of climate change;
 - Assess suitability of Site and future development through the application of the Sequential Test and Exception Test (where required);
 - Assess the impacts of current and future development of the site on flood risk to adjacent developments;
 - Determine ability of existing and proposed drainage to accommodate development flows with respect to surface water runoff and flood risk;
 - Demonstrate that appropriate mitigation measures have been taken to prevent flooding;
 - Demonstrate that appropriate emergency situations have been considered e.g. overland flow path and evacuation routes.
- 2.2.4 This report also considers the disposal of wastewater generated by the proposed Development. Existing infrastructure will be reviewed to identify potential options for the disposal of foul and surface water runoff for future development.
- 2.2.5 Reason 3 for rejection of the planning application by Eastleigh Borough Council is as follows:

'Insufficient information has been provided to demonstrate that the sustainable drainage can provide three forms of natural filtration, and mitigate all pollution hazards, which is necessary to maintain the quality of runoff water entering the Solent and Southampton Water Special Protection Area and Ramsar Site and Solent Maritime Special Area of Conservation. The application is therefore contrary to the requirements of Policies S1, DM5, DM6, DM10 and DM11 of the Local Plan, the provisions of the National Planning Policy Framework (2023), and the Conservation of Habitats and Species Regulations (2017) (as amended).'

3 Site Location & Description

3.1 Background

- 3.1.1 The Site is 2.81ha in size and is located adjacent on the west edge of Botley, within the parish of Botley Parish Council.
- 3.1.2 The current proposals comprise the erection of 34 dwellings (including 35% affordable housing) together with associated access, parking, pedestrian and cycle routes, landscaping, green infrastructure and drainage.



Figure 1: Site Masterplan

3.2 Site location & land use

- 3.2.1 Land off Cobbett Way is located in Botley, adjacent to the A334, in Hampshire (coordinates: 450,439E, 113,103N), the nearest postcode is SO30 2EU.
- 3.2.2 The Site comprises agricultural land adjacent to the south of the A334. The Site is located to the east of Cobbett Way and directly north of The Bridleway.).

3.2.3 Refer to Appendix A for a Site Location Plan.

3.3 Site Topography

3.3.1 General site levels vary from 12.63mAOD at the north of the site to 13.57mAOD at the south. Then to the east of the site the levels vary from 13.50mAOD to 15.43mAOD to the west of the site. The overall site follows the natural topography with the higher levels being to the west of the site and low points being to the east of the site, with an approximate gradient of 1:67. The site also falls south to north direction, with an approximately fall of 1:177.

3.3.2 Refer to Appendix B for topographical survey.

3.4 Site Geology

3.4.1 Datasets have been obtained from the British Geological Survey (BGS) website to provide a high-level geology across the district. An extract of the BGS mapping is displayed in Figure 2 below. It indicates that the site is underlain by the Earnley Sand formation – Clay, Silt and Sand. Superficial deposits are not recorded across the site.

3.4.2 A review of the boreholes from the ground investigation that has been done on the Land off Cobbett Way site. They confirm presence of Dark grey very silty Clay (Earnley Sand Formation) within the area and indicate groundwater 2.6-5m below ground level.

3.4.3 EA maps (<https://magic.defra.gov.uk/>) were used to confirm that the site is not located within a Source Protection zone and is not within an Aquifer Designation (Bedrock & Superficial Drift).

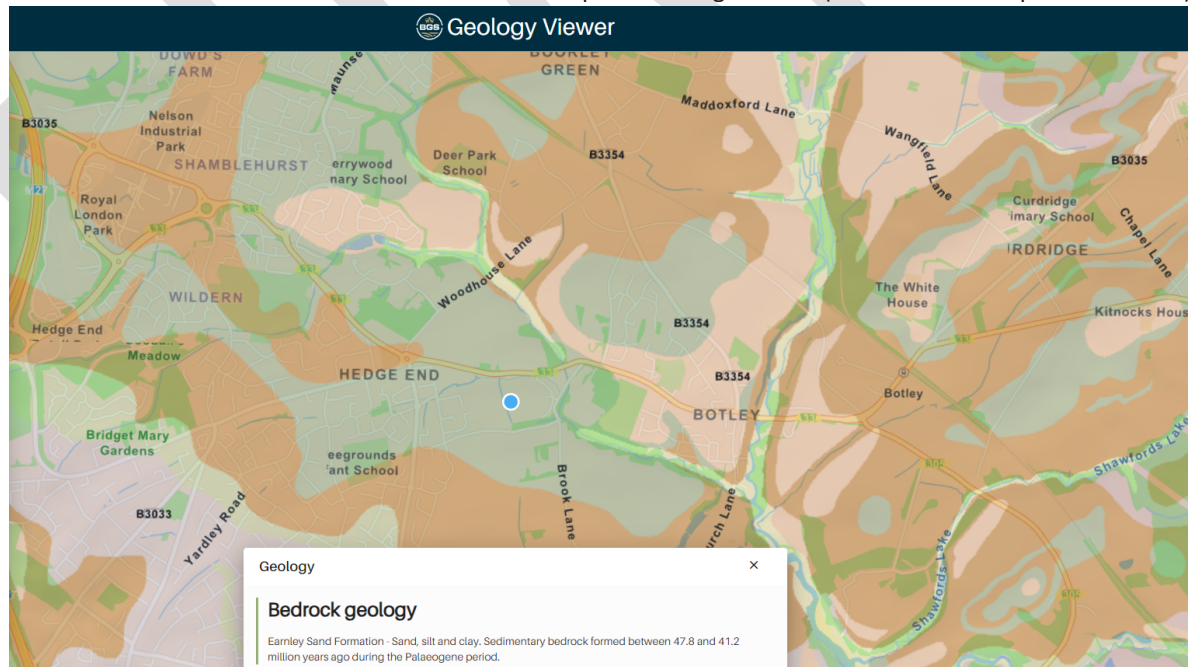


Figure 2: Extract of British Geological Survey mapping indicating Bedrock Geology

3.5 Local Watercourses

- 3.5.1 Hamble river, a designated main river and a tributary of the Hamble River is approximately 200m east of the Site. This watercourse flows 200m east before joining the Hamble River.
- 3.5.2 An unnamed ordinary watercourse located to the north, west and south of the site which drains towards the River Hamble (approximately 1.3km north of the site).

3.6 Existing Drainage

- 3.6.1 The application Site is classified as a greenfield site and currently drains via natural overland runoff towards the unnamed ordinary existing watercourses that surrounds the site. The topographical survey (Appendix B) indicates that there is a dry ditch running alongside the A33 to the west of the site.
- 3.6.2 Comprehensive below ground drainage records for the whole site are not available. The topographical survey of the site (Appendix B) undertaken by Encompass Surveys in April 2023 recorded all private drainage features including ditches, headwalls, pipe diameters.

4 Flood Risk to The Existing Site

4.1 Fluvial Flooding

- 4.1.1 The Environment Agency (EA) produces floodplain maps for the UK, which show the area at risk of fluvial and tidal flooding. The EA flood zone maps identify undefended floodplain, giving the horizontal extent of low (Zone 1), medium (Zone 2) and high-risk flood zones (Zones 3a and 3b) depending on the severity of the flood event.
- 4.1.2 The EA's Flood Map for Planning (Figure 3) indicates the site to be located within Flood Zone 1 (Low Probability) and therefore defined as having less than a 1 in 1,000 annual probability of river flooding.

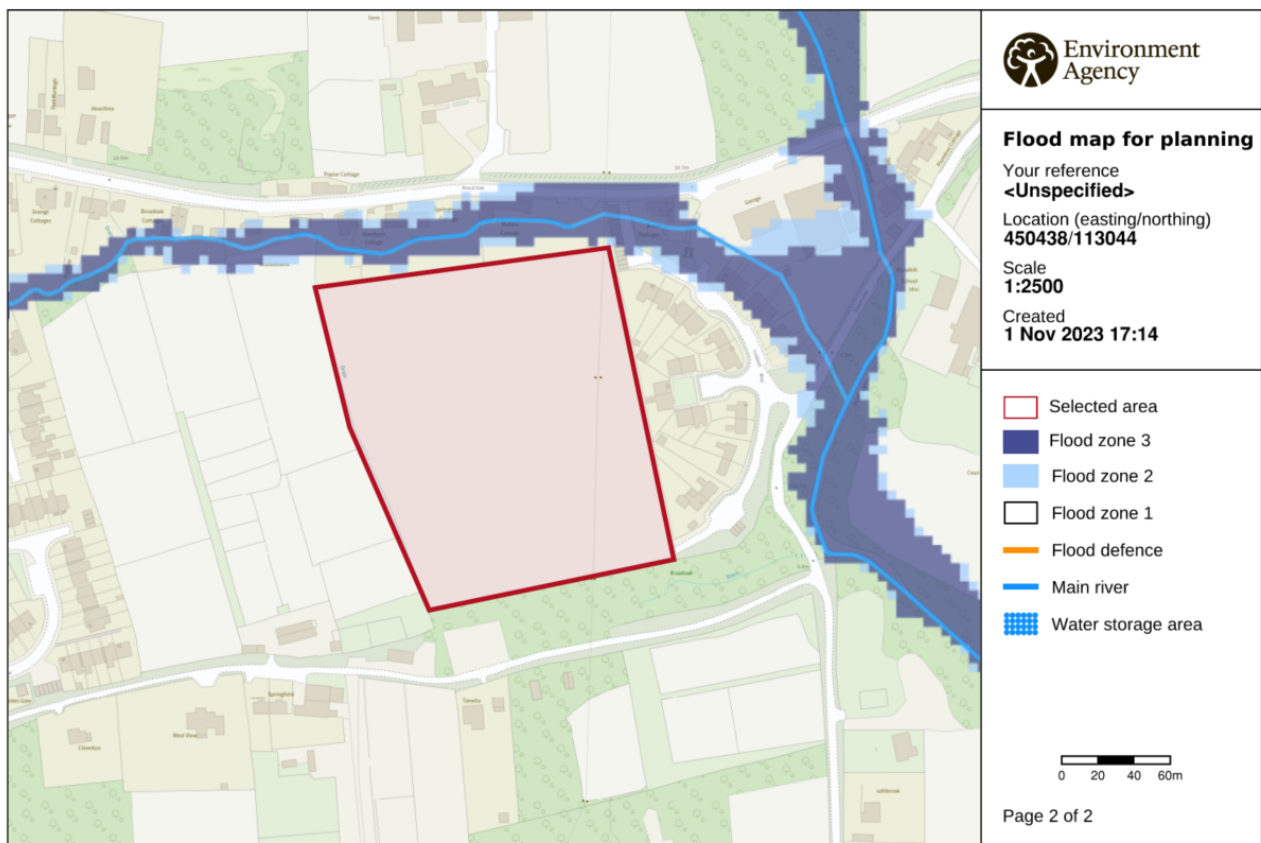


Figure 3: Extract from Environment Agency Tidal and Fluvial Flood Risk Map

- 4.1.3 Table 2 of the NPPF Planning Practice Guidance for Flood Risk and Coastal Change states in terms of flood risk vulnerability, that all types of development are suitable within this flood zone.

4.2 Overland (Surface Water) Flooding

- 4.2.1 The EA also produces maps which highlight the risk of flooding from surface water flows. The Long-Term Flood Risk Information maps can illustrate when the capacity of existing surface water drainage networks or channels are exceeded in extreme rainfall events. These maps are produced, as with fluvial modelling, based on generalised information, and need to be verified in terms of topographical ground levels and indicated flow routes.

4.2.2 Figure 4 indicates that the site will not be affected by surface water flooding, therefore it is in the low risk scenarios. This flood risk reflects the localised topography.

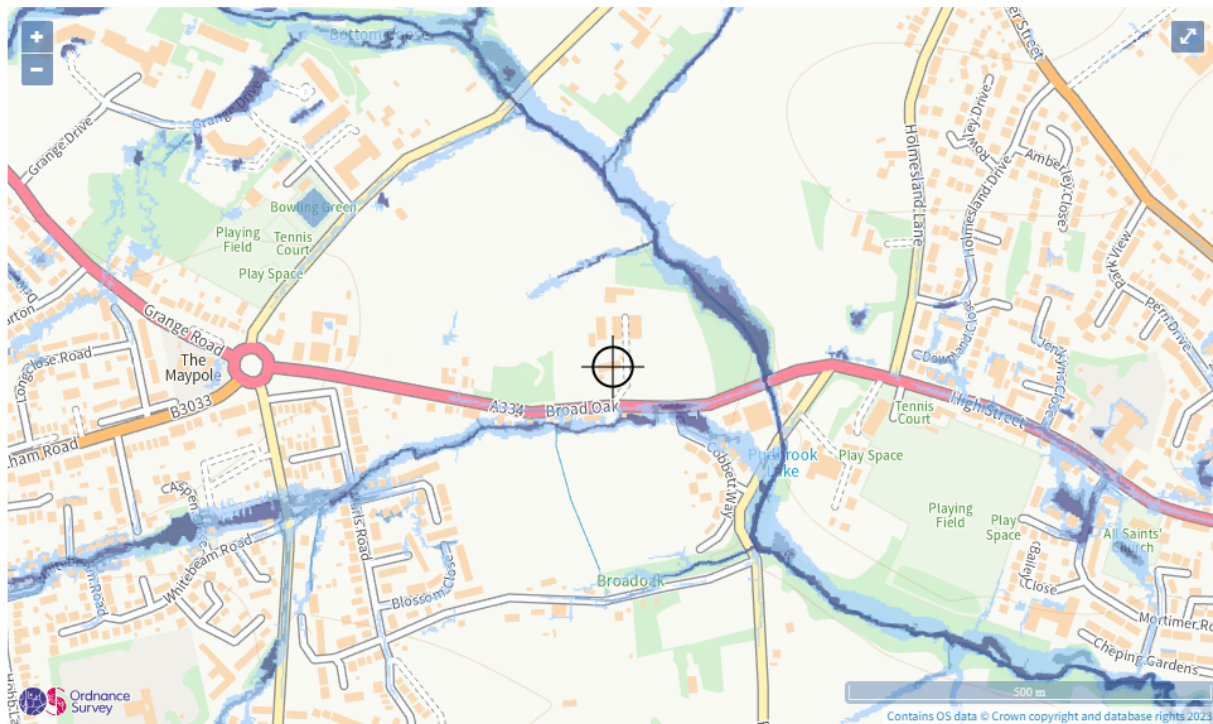
4.2.3 The development Site indicates to be at risk of surface water flooding, hence developing and changing the topography of this area will have a minimal impact on the surrounding overland flow routes.

Flood risk

Extent of flooding

Location

Enter a place or postcode



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

Figure 4: Extract from Environment Agency's Long-Term Flood Risk mapping indicating Surface Water Flood Risk

4.3 Flooding from Groundwater

4.3.1 PUSH (Partnership for Urban South Hampshire) Strategic Flood Risk Assessment (SFRA) prepared by Wallingford HydroSolutions Limited and dated December 2016 states groundwater in Botley is typically caused by three main mechanisms:

- Rising water levels in superficial deposits;
- Groundwater flooding and fluvial flooding interactions; and
- Rising water levels in aquifers.

4.3.2 As previously detailed, there are no identified superficial deposits beneath the site. The bedrock strata is classified as a 'unproductive strata'. The Site area is not located within a groundwater Source Protection Zone.

4.3.3 A site-specific ground investigation has been undertaken which showed there to be no soakage.

4.3.4 In view of the above information, the Site is considered to be at low risk of flooding from groundwater.

4.4 Flooding from Sewers

- 4.4.1 There have been no recorded historic incidents of flooding resulting from sewers within the site boundary. Similarly, there are no recorded historic incidents of sewer flooding outside of the site boundary resulting in flooding of the Site. No other recorded information or anecdotal evidence regarding sewer flooding has been obtained.
- 4.4.2 The topography of the surrounding area and road network serves to naturally convey flood waters away from the Site. Therefore, the proposed site is considered to be at very low risk of flooding from sewers.

4.5 Flooding from Artificial Sources

- 4.5.1 The EA's Long-Term Flood Risk Information mapping also indicates the potential extent of flooding from reservoir breach/failure. The proposed site is not identified to be at risk of flooding from artificial sources.

5 Proposed Development

5.1 Development Description

5.1.1 As previously detailed, the current proposals comprise the erection of 34 dwellings (including 35% affordable housing) together with associated access, parking, pedestrian and cycle routes, landscaping, green infrastructure and drainage. The architect's masterplan is included in Appendix C.

5.2 Development Suitability

5.2.1 The NPPF aims to direct development to suitable areas with low probability of flooding. The table below illustrates the acceptable classifications of development within each flood zone.

Flood Risk Vulnerability Classification	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone 1 (<1 in 1000)	✓	✓	✓	✓	✓
Flood Zone 2 (up to 1 in 1000)	✓	✓	Exception Test	✓	✓
Flood Zone 3a (1 in 100 fluvial) (1 in 200 tidal)	Exception Test	✓	X	Exception Test	✓
Flood Zone 3b (functional floodplain)	Exception Test	✓	X	X	X

Table 1: Flood Risk Vulnerability Classification

5.2.2 Proposals within the Masterplan are classified as 'More Vulnerable' within Table 2 of the NPPF Planning Practice Guidance, and therefore is deemed acceptable for location within Flood Zone 1.

6 Proposed Drainage Strategy

6.1 Surface Water Drainage

- 6.1.1 New surface water drainage will be required to drain surface water runoff from any proposed buildings, carriageways, and associated car parking and pedestrian hard standing areas.
- 6.1.2 It is a requirement of the Eastleigh Borough Council SFRA that any development should not result in an increase in surface water runoff, and where possible, should demonstrate betterment in terms of rate and volumes of surface water runoff. Generally, the aim should be to discharge surface water run-off in accordance with the following hierarchy of surface water disposal options wherever reasonably practicable, (in order of preference):
- Into the ground (infiltration);
 - To a surface water body;
 - To a surface water sewer, highway drain, or another drainage system; or
 - To a combined sewer.
- 6.1.3 Furthermore, Sustainable Drainage Systems (SuDS) should be used to reduce and manage surface water run-off to and from proposed developments as near to source as possible. In line with the Eastleigh Borough Council Local Plan, SuDS must be implemented for all development sites unless it is demonstrated that SuDS are not suitable.
- 6.1.4 As detailed previously, infiltration measures in the form of traditional soakaways, cellular below ground tanks and infiltration basins will be ruled out due to poor ground conditions.
- 6.1.5 In consideration of the drainage hierarchy, discharge to a surface water body should be considered next, following ruling out infiltration. As detailed previously, there is a watercourse located along the western and southern boundaries. These will be reviewed for their suitability to accept the surface water discharge from the site.
- 6.1.6 The proposed development of the site in line with Masterplan will increase the impervious area within the overall development. Due to this increase in impermeable areas, the surface water runoff will need to be restricted to prevent an increase of surface water discharging off the site. Due to the greenfield nature of the site, the runoff rate will be restricted to Q_{bar} . The site layout currently included within the planning application is illustrative as per the outline nature of the overall submission. The current layout shows a developable area of 1.65ha, this figure will be used for calculating the greenfield runoff rate.
- 6.1.7 In order to enable discharge to the watercourse at a restricted discharge equivalent to the existing Greenfield runoff rate in line with Eastleigh Borough Council requirements, any increase in impervious area within the site boundary will need to be suitably attenuated prior to discharge. Attenuation will be designed and positioned in relation to the Phase of the development coming forward and will interact with existing drainage systems and SuDS as appropriate. Any proposed attenuation systems will be designed to accommodate a 1 in 100-year storm return period plus a 45% allowance for climate change.
- 6.1.8 The Q_{bar} rate for the developable site has been calculated as 10.9l/s. Calculations are included within Appendix D.
- 6.1.9 The surface water drainage strategy for the site is to attenuate within 2 detention basins, located in the western portion of the site and southwest of the area. The basins will provide min. 500m³ of storage, allowing for the

restriction of runoff to greenfield rates for all storms up to and including a 1 in 100-year storm plus 45% climate change allowance.

6.1.10 The site will continue to discharge towards the ditch / watercourse to the west and south of the site.

6.1.11 Proposed drainage design can be found in Appendix E, extract shown in



6.1.12 Figure 5 below. MicroDrainage network calculations for all storms of up to and including 1 in 100 + 45% CC can be found in Appendix D. FEH Storm data has been used for the modelling.



Figure 5, Proposed Drainage Strategy

6.1.13 To keep drainage shallow, roadside swales could be used to convey surface water flows to detention basins. This would allow levels on the site to remain similar to existing. Figure 6 below shows a cross section of a what the swales could look like. These swales would provide source control cleansing and also avoid the need for positive surface water drainage.

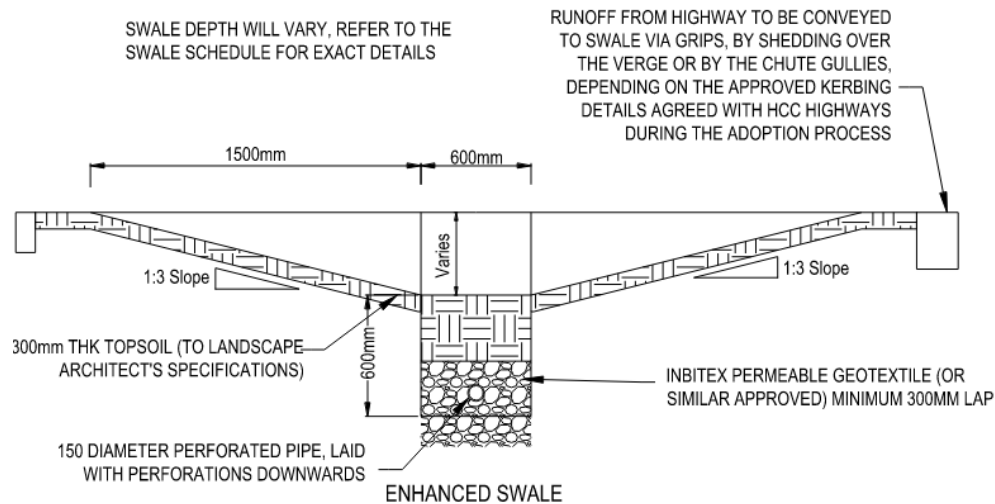


Figure 6, Roadside Swale

6.2 Proposed Site Levels

- 6.2.1 The existing levels of the site show a fall from west to east. On the proposed drainage layout, included in Appendix E, some indicative proposed levels have been included. These levels show, with some earth moving on site, the site levels can be adjusted to ensure sufficient falls are provided to drain to the designated attenuation basins. The maximum raise in levels is c1.3m to create a high point in the centre of the site. These level changes provide falls of c1:40 for the roads and keep the SuDS locations at their existing levels and do not compromise the IL of the proposed discharge points. The shown proposed levels also ensure the overland flows can access green areas and keep away from habitable areas.
- 6.2.2 There is an isolated area in the north east corner which shows a fall away from the rest of the site. This level fall is to ensure the overland flows continue to flow away from the habitable areas and match existing levels. The drainage in this area could be dealt with permeable paving with a sub base which falls in the opposite direction to the surface flows and would ensure IL stay shallow when going against the grain of the site levels.

7 Water Quality

7.1 Water Quality Principles

- 7.1.1 Surface water management should incorporate sustainable drainage techniques to restrict surface water discharge from the Site, in addition to improving water quality of runoff. Runoff from the proposed development may contain hydrocarbons, pollutants and nutrients which may be harmful if discharged directly to the ground. Whilst there is no UK wide legislation, the EBC local plan policy DM 6 requires three levels of filtration prior to discharge. This strategy complies with this requirement.
- 7.1.2 It is proposed to use attenuation in the form of detention basins and permeable paving discharging to the watercourse system off-site, as a means of surface water management in relation to delivery of the proposed Masterplan. Swales will be used to convey surface water into the detention basins in place of using a standard gully and pipe system. Sizing and positions of any proposed drainage will be confirmed through detailed design and intrusive site investigation for each phase of development.
- 7.1.3 All roof water downpipes will be sealed against pollutants entering the system from polluted surface runoff, effluent disposal or other forms of discharge, and will discharge to a catchpit manhole upstream of any proposed attenuation tanks to ensure all sediment and silts are removed upstream of discharging to the watercourse system.
- 7.1.4 To provide interception attenuation for RWPs, rainwater harvesting is proposed in the form of water butts. These will reduce the amount of surface water entering the drainage system.

7.2 Simple Index Method

- 7.2.1 The SuDS Manual (CIRIA C753) recommends that the Simple Index Approach is used to ensure that there is adequate treatment proposed. This approach assigns pollution hazard indices to land types (see Table 2), and SuDS mitigation indices to different SuDS components (see Table 3).
- 7.2.2 As infiltration has been found to not be feasible, only SuDS mitigation indices for discharging to surface water are considered.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Property Driveways & Low Traffic Roads	Low	0.5	0.4	0.4

Table 2: Pollution Hazard Indices for applicable land use classifications (from Table 26.2 CIRIA SuDS Manual 2015, C753)

- 7.2.3 Indicative SuDS mitigation indices for discharges to surface water sewers are indicated in Table 6 below for the types of SuDS proposed within the development.

Type of SuDS Component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5

Table 3: Indicative SuDS Mitigation Indices for discharges to Surface Water (from Table 26.3 CIRIA SuDS Manual 2015, C753)

7.2.4 To ensure adequate treatment, the SuDS components used should, for each contaminant type, ensure:

Total SuDS Mitigation Index $\geq$ Pollution Hazard Index

7.2.5 It is anticipated that the SuDS incorporated within the proposed drainage strategy will deliver a treatment train approach, with runoff being intercepted and conveyed through the SuDS features. Any mitigation provided by secondary and tertiary measures will have their values halved inline with CIRIA requirements. Table 4 below shows the final values being applied.

Type of SuDS Component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Swale	0.25	0.3	0.3
Pond	0.35	0.35	0.25
Total	1.3	1.25	1.25

Table 4: Final SuDS Mitigation Indices for discharges to surface water (from Table 26.3 CIRIA SuDS Manual 2015, C753)

7.2.6 Based on the values indicated in Tables 2, 3 & 4 above, the SuDS Mitigation Index is greater than the Pollution Hazard Index, and therefore it is anticipated that the proposed strategy will provide sufficient mitigation against the pollution hazards expected on-site.

7.2.7 The figure below details the SuDS treatment train that will provide the three levels of filtration.

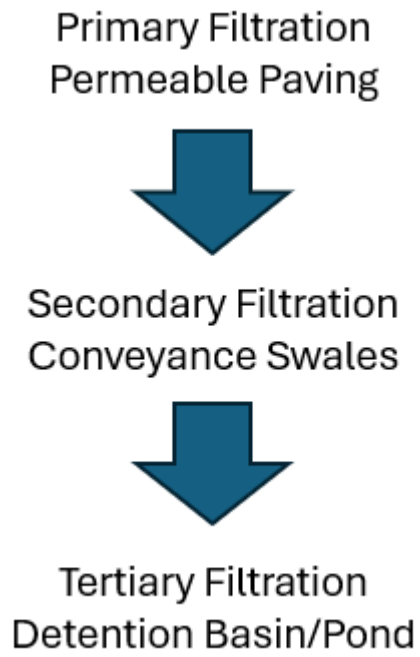


Figure 7, Filtration Tree

7.2.8 The above measures will ensure the site complies with EBC Local Plan policies DM6, DM8, and DM10.

8 SuDS Management & Maintenance

- 8.1.1 All main drainage runs within the proposed development will be offered up for adoption to Southern Water and have been designed in line with the relevant adoptable standards.
- 8.1.2 All SuDS and private drainage within the proposed development site will be privately owned and is not proposed to be adopted by the local water authority Southern Water, in accordance with their policies. These systems will be managed and maintained privately by the landowner, either through an internal maintenance team or an external site management company.
- 8.1.3 As the Masterplan is developed and individual phases progressed, management and maintenance practices for any proposed SuDS/drainage infrastructure will be determined, and continually reviewed and updated with a final confirmed plan to be detailed at the completion of the construction.
- 8.1.4 SuDS features will be managed in accordance with the guidelines outlined within The SuDS Manual (CIRIA C753, Chapter 32). Given the nature of the development and the status of the planning process, final details of the SuDS system and exact maintenance requirements are yet to be fully determined.

9 Management of Residual Risk

- 9.1.1 The Site is not considered to be at risk of fluvial flooding in the future, however the development of the different phases within the Masterplan and the delivery of Masterplan overall, should be designed to further mitigate the potential surface water flood risk posed to and from the site as rainfall intensities increase.

9.2 Flood Resistance

- 9.2.1 It has been identified there are no areas on the Site at risk from surface water flooding.
- 9.2.2 The proposed drainage and levels strategy for the site ensures that during all phases, surface water within the Site boundary will be captured and any low points drained. The proposed attenuation measures incorporated to manage surface water flows are appropriately sized with an allowance for future flows and climate change.
- 9.2.3 Finished external levels will direct surface water away from any proposed or existing buildings to lower risk areas of the Site such as car park and open space.
- 9.2.4 The risk of surface water flooding will be mitigated as highlighted above, therefore surface water flooding is considered low risk.

9.3 Flood Resilience

- 9.3.1 In addition to flood resistance measures, any ground floor, or below ground structures should be designed to be resilient against flooding. Potential measures could include:
- Building facades to be constructed with water resilience materials;
 - Construction materials to be waterproof and washable wherever possible;
 - Below ground infrastructure to be waterproofed in accordance with Building Regulations guidelines.
- 9.3.2 Potential pollutants (plan fuels, oils, petrols etc.) should also be stored securely and bunded where required.

9.4 Access and Egress

- 9.4.1 Safe access and egress are required to enable the evacuation of people from the development and to provide the emergency services with access to the development during times of flood.
- 9.4.2 The site access is contained within an area with a very low flood risk. This will provide a safe and dry access and egress in times of emergency.

10 Conclusions and Recommendations

10.1.1 It is considered that this assessment represents a comprehensive and robust analysis of the flood impact of the current Masterplan proposals on the Site itself and on adjacent properties. In addition, this report demonstrates that the proposed Masterplan can be delivered sustainably in terms of flood risk, which can be summarised as follows:

Subject	Conclusion
TIDAL & FLUVIAL FLOOD RISK	Flood Zone 1 - Low Risk
FLOOD RISK FROM OTHER SOURCES	Low Risk from all other sources,
DEVELOPMENT SUITABILITY	Development suitable in line with table 2 of the NPPF.
EXISTING DRAINAGE	There are existing FW and SW sewers near the site. Existing site drains overland towards an unnamed ordinary watercourse to the north of the site.
PROPOSED DRAINAGE	Foul water will flow towards the existing Southern Water network. Surface water will continue to discharge towards the ordinary watercourses to the west and south.
SURFACE WATER MANAGEMENT	Runoff rates will be limited to greenfield rates for all storms up to and including 1 in 100 + 45% Climate Change. Attenuation will be provided via detention basins to the west of the site. Inline with the CIRIA guidance, the detention basins will provide suitable levels of treatment but additional will be provided to meet the Eastleigh Borough Council Local Plan requirements.
FOUL WATER DISPOSAL	It is proposed to discharge the foul water from the site to the existing adopted foul water network. It is proposed to discharge this via gravity.

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Jubb :		



Catchment Area

Type : Catchment Area

Area (ha)	0.38
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Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.40
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Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Jubb :		



Pond

Type : Pond

Dimensions

Exceedence Level (m)	0.000
Depth (m)	2.000
Base Level (m)	-2.000
Freeboard (mm)	150
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.634
Total Volume (m³)	226.125

Depth (m)	Area (m²)	Volume (m³)
0.000	100.00	0.000
2.000	150.00	248.316

Inlets

Inlet

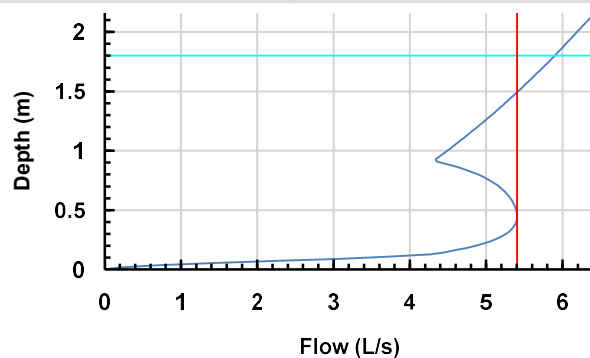
Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	-2.000
Design Depth (m)	1.800
Design Flow (L/s)	5.9
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☒

Unit Reference SHE-0102-5900-1800-5900



Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Jubb:		



Advanced

Perimeter	Circular
Length (m)	84.634
Friction Scheme	Manning's n
n	0.03



Pond (1)

Type : Pond

Dimensions

Exceedence Level (m)	0.000
Depth (m)	2.000
Base Level (m)	-2.000
Freeboard (mm)	150
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.776
Total Volume (m³)	339.187

Depth (m)	Area (m²)	Volume (m³)
0.000	150.00	0.000
2.000	225.00	372.474

Inlets

Inlet

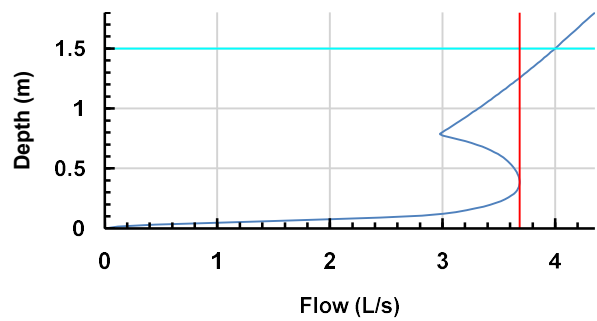
Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Broad Oak, Botley, Southampton:	Date: 19/08/2024			
	Designed by: AH	Checked by: KG	Approved By:	
Report Details:	Jubb:			
Type: Stormwater Controls Storm Phase: Phase				

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	-2.000
Design Depth (m)	1.500
Design Flow (L/s)	4.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☒
Unit Reference	SHE-0087-4000-1500-4000



Advanced

Perimeter	Circular
Length (m)	91.134
Friction Scheme	Manning's n
n	0.03

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase	Jubb :		



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Pond (1)		Time of Concentration	0.38	100	0	100	0.38
Catchment Area (1)	Pond		Time of Concentration	0.40	100	0	100	0.40
TOTAL		0.0		0.78				0.78

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Jubb:		



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	500.00
Max. Slope (1:x)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
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Diameter (mm)	Min. Slope (1:x)	Max. Slope (1:x)
100	0.00	0.00
150	0.00	0.00

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Jubb :		



Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☒

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Broad Oak, Botley, Southampton:	Date: 19/08/2024			
	Designed by: AH	Checked by: KG	Approved By:	
Report Details: Type: Outfall Details Storm Phase: Phase	Jubb :			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Pond	Free Discharge		
Pond (1)	Free Discharge		

Broad Oak, Botley, Southampton:	Date: 19/08/2024			
	Designed by: AH	Checked by: KG	Approved By:	
Report Title: Rainfall Analysis Criteria	Jubb :			

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

Rainfall

FSR	Type: FSR
-----	-----------

Region	England and Wales
M5-60 (mm)	19.5
Ratio R	0.350
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Jubb :		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow (m³)
Catchment Area	FSR: 100 years: +45 %: 15 mins: Winter	0.38	228.5	105.245
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Winter	0.40	240.5	110.779

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Jubb :		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 100 years: +45 %: 240 mins: Winter	-0.211	-0.211	1.789	1.789	49.6	217.294	0.000	0.000	5.9	145.281	4	OK
Pond (1)	FSR: 100 years: +45 %: 360 mins: Winter	-0.660	-0.660	1.340	1.340	34.8	232.742	0.000	0.000	3.8	141.950	31	OK

Broad Oak, Botley, Southampton:	Date: 19/08/2024		
	Designed by: AH	Checked by: KG	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Jubb:		





Phase

FSR: 100 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Pond			5.9	145.281
Pond (1)			3.8	94.772
TOTAL	96.7	554.460	9.6	240.054

Graphs

