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Flood Risk Assessment, Surface Water Drainage Strategy and Foul Water Drainage Strategy AEG5636_BN15_Lancing_07

Site Address: Queens Parade
North Road
Lancing
BN15 9RA

UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

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Document Issue Record

Project: Flood Risk Assessment, Surface Water Drainage Strategy and Foul Water Drainage Strategy

Prepared for: Farcastle Limited

Reference: AEG5636_BN15_Lancing_07

Site Location: Queens Parade, North Road, Lancing, BN15 9BA

Issue	Date	Author	Check	Auth.	Comments
1	10/12/2024	Oliver Harvey/ Jack Allen	CH	DC	First issue
2	17/01/2025	Oliver Harvey/ Jack Allen	CH	DC	Second Issue

Please Note:

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Summary

Development Description	Existing	Proposed
Development Type	Commercial use – parade of shops	A full planning application for the proposed upwards extension to provide up to 21no. additional flats (Class C3) plus aesthetic improvements to the existing parade of shops.
EA Vulnerability Classification	Less Vulnerable	Less and More Vulnerable
Ground Floor Level	The topographic levels along the northern site boundary are circa. 7.50m AOD and levels along the southern site boundary are circa. 6.50m AOD.	No change
Level of Sleeping Accommodation	N/A	First and second floors
Surface Water Drainage	N/A[1]	See Section 6.
Risk to Development	**Summary**	**Comment**
EA Flood Zone	Flood Zone 1	Based on the information the site is considered to be at a low risk from all analysed sources.
Flood Source	N/A	
SFRA Available	Adur and Worthing Level 1 and Level 2 Strategic Flood Risk Assessment (Adur District Council, 2020)	
Management Measures	**Summary**	**Comment**
Ground floor level above extreme flood levels	Yes	Based on the information the site is considered to be at a low risk from all analysed sources.
Safe Access/Egress Route	Yes	Based on the information the site is considered to be at a low risk from all analysed sources. Therefore, access/ egress will be available.

Flood Resilient Design	No	Based on the information the site is considered to be at a low risk from all analysed sources. Therefore, no mitigation measures have been recommended.
Site Drainage Plan	Yes	See Section 6
Flood Warning and Evacuation Plan	N/A	Recommended that occupiers monitor Met Office Weather Warnings for extreme weather events.
Offsite Impacts	**Summary**	**Comment**
Displacement of floodwater	No	Based on the information the site is considered to be at a low risk from all analysed sources.
Increase in surface run-off generation	No	See Section 6
Impact on hydraulic performance of channels	No	No watercourses in the immediate vicinity of the site.

[1] not required for this assessment

[2] data not available.

1. Introduction

1.1. Aegaea were commissioned by Farcastle Limited to undertake a Flood Risk Assessment (FRA) and Surface Water Drainage Strategy (SWDS) and Foul Water Drainage Strategy (FWDS) to facilitate a planning application for the proposed development. This FRA and SWDS has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

1.2. This report is intended to support a planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

1.3. The site of the proposed development is Queens Parade, North Road, Lancing, BN15 9BA (Figure 1).

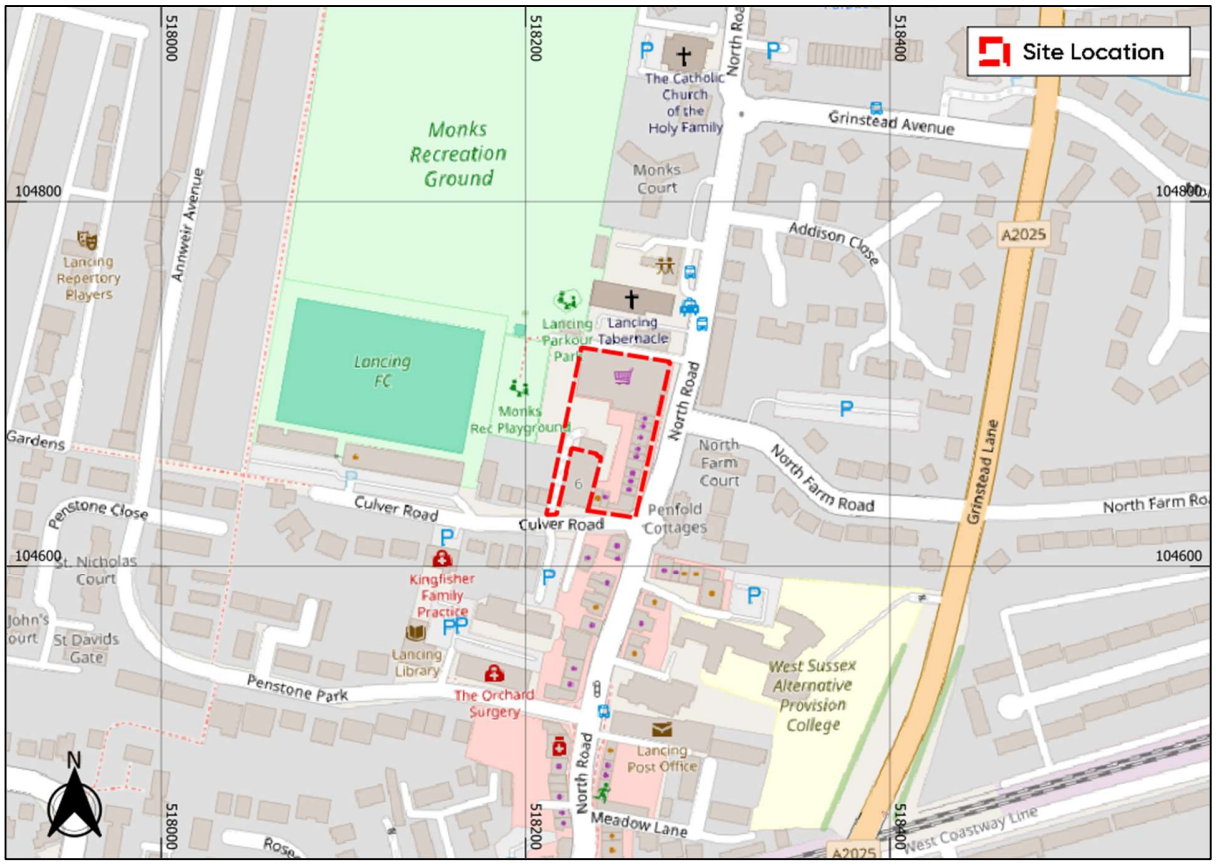

Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors)

1.4. The site is currently a parade of shops, the development is for the proposed upwards extension to provide up to 21no. additional flats (Class C3) plus aesthetic improvements to the existing parade of shops. The development proposals will be included in this report as Appendix A.

1.5. In the absence of a topographical survey, Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model has been used to review the topography of the site. Analysis of 1m LiDAR shows that the northern half of the site is generally higher than the southern parts of the site. The elevations along the northern site boundary are circa. 7.50m Above Ordnance Datum (AOD) and levels along the southern site boundary are circa. 6.50m AOD (Figure 2).

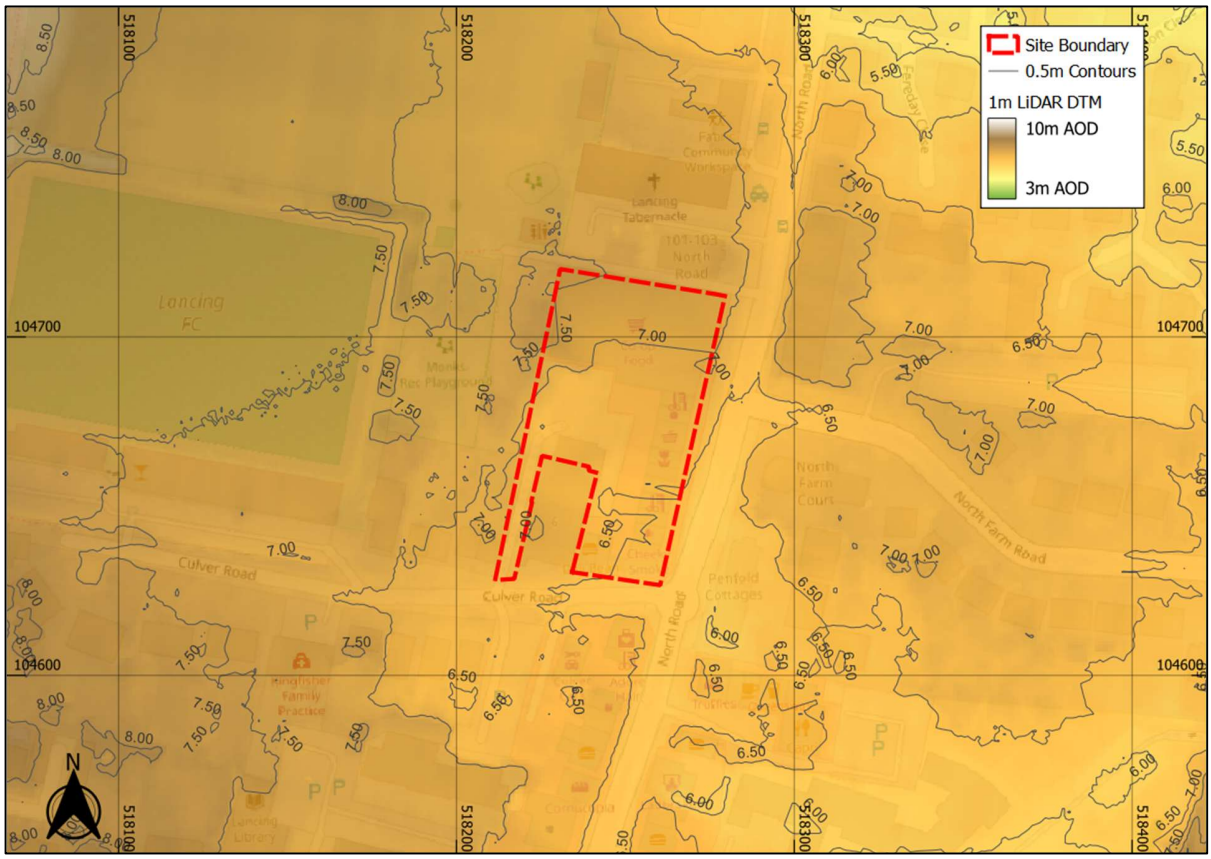

Figure 2: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.6. Adur District Council is the Local Planning Authority (LPA) for the site and West Sussex County Council is the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Solent and South Downs region.

Planning Policy and Guidance

1.7. UK government planning guidance states[1] that an FRA is required for developments which are:

- *in flood zone 2 or 3 including minor development and change of use*
- *more than 1 hectare (ha) in flood zone 1*
- *less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)*
- *in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency*

1.8. The objective of this FRA/SWDS is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Fluvial/tidal flood risk
- Surface water flood risk
- Risk of flooding from other sources

[1] **https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment**

2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework[2] (NPPF) (MHCLG, 2024) which includes UK Government policy on development and flood risk states:

> *170. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*
>
> *181. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*
>
> *a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
>
> *b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
>
> *c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

[2] https://www.gov.uk/guidance/national-planning-policy-framework, **last updated Dec 2024**

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

176. Applications for some minor development and changes of use should also not be subject to the sequential test, nor the exception test [set out below], but should still meet the requirements for site-specific flood risk assessments set out in footnote 63.

2.3. Footnote 63 of the NPPF states:

A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

2.4. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

Flood Zone	Definition
Zone 1 Low Probability	Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).
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 from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

	land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). 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. (Not separately distinguished from Zone 3a on the Flood Map)

2.5. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

2.6. An assessment of hydrological impacts should be undertaken, including to surface water runoff and impacts to drainage networks in order to demonstrate how flood risk to others will be managed following development and taking climate change into account.

2.7. The Planning Practice Guidance, which was substantially revised in March 2015 in relation to drainage, requires that sustainable drainage systems (SuDS) should be considered and included where practicable, in line with Defra Technical Standards[3].

Local Plan

2.8. The Local Plan prepared by the Local Planning Authority, Adur District Council, sets out the policies for development in the local area.

2.9. Policy 36.1 Flood Risk and Sustainable Drainage: Flood Risk outlines the requirements for new development within the area. It states:

3 Technical Standards Accessed Online
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf

The Council will work with relevant bodies to ensure that flood risk in Adur is reduced. A site specific flood risk assessment must be submitted with planning applications for:

- Proposals of 1 hectare or greater in Flood Zone 1

- All development or changes of use to a more vulnerable use in Flood Zones 2 and 3

- All development (excluding 'minor development' as defined in paragraph 046 of the National Planning Policy Framework Planning Practice Guidance) or changes of use to a more vulnerable use, regardless of flood zone or size, where flood risk from other sources (surface water, sewer, groundwater) is identified by the Strategic Flood Risk Assessment.

The flood risk assessment will need to demonstrate that development:

- is appropriately flood resilient and resistant, includes safe access and escape routes where required, and that any residual risk can be safely managed;

- will be safe for its lifetime taking account of the vulnerability of its users;

- will not increase flood risk (including sewer flooding, surface water and groundwater flood risk) elsewhere; - will, where possible, reduce flood risk overall; and

- will give priority to the use of sustainable drainage systems. The flood risk assessment will also need to demonstrate that, where possible, higher vulnerability uses have been located on parts of the site at the lowest probability of flooding.

2.10. Policy 36.2 Flood Risk and Sustainable Drainage: Sustainable Drainage outlines the requirements for new development within the area. It states:

New development within Adur must include some form of Sustainable Drainage System (SuDS) or other appropriate design measures in order to reduce the risks of surface water flooding and to mitigate the risk of pollution to groundwater sources. SuDS should be considered before other forms of disposal.

Substantial storage through SuDS will be required to achieve a reduction in runoff to levels below that experienced prior to development. On relevant sites, storage of runoff during the high part of the tidal cycle should be addressed. SuDS must be

designed sensitively and must seek to enhance landscapes, increase biodiversity gains, and provide quality spaces.

For all developments, applicants will be required to demonstrate that acceptable management arrangements are in place and funded to ensure the ongoing maintenance of SuDS into the future. Where it is not practical to provide SuDS on site, the development of strategic level SuDS may be considered appropriate. In these circumstances, contributions may be required through s106 undertakings/ CIL.

Sequential and Exception Tests

2.11. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.

Sequential Test

2.12. Paragraph 023 of the NPPG states that;

'The sequential approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Avoiding flood risk through the sequential test is the most effective way of addressing flood risk because it places the least reliance on measures like flood defences, flood warnings and property level resilience features. Application of the sequential approach in the plan-making and decision-making process will help to ensure that development is steered to the lowest risk areas, where it is compatible with sustainable development objectives to do so.'

2.13. The development is for the proposed upwards extension to provide up to 21no. additional flats (Class C3) plus aesthetic improvements to the existing parade of shops, wholly located within Flood Zone 1.

2.14. Therefore, the sequential approach has been adopted on site by locating the structure in a lowest risk area.

Exception Test

2.15. The Exception Test is applied to sites based on the Flood Zone and the nature of the development. As the proposed development consists of residential uses it would be classed as 'More Vulnerable' in line with government development use classes.

2.16. The Flood Risk Vulnerability Classification table[4] provided below in Table 2 shows which vulnerabilities are appropriate in each Flood Zone.

2.17. The proposed development sits within Flood Zone 1 and the proposals consist of 'More Vulnerable' uses. Table 2 shows Flood Zone 1 is an appropriate location for 'More Vulnerable' uses without the need for an Exception Test.

Table 2: Flood Risk Vulnerability Classification

	Flood Risk Vulnerability Classification				
Flood Zones	**Essential Infrastructure**	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**	**Water Compatible**
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	x	Exception Test required	✓	✓
Zone 3b	Exception Test required	x	x	x	✓

[4] **https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2**

3. Consultation and Review

Documents and Online Mapping

3.1. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.

3.2. The following sources of information have been reviewed for this assessment:

- Flood Map for Planning on the Environment Agency website *https://flood-map-for-planning.service.gov.uk/*
- Long Term Flood Risk Information on the Environment Agency website *https://www.gov.uk/check-long-term-flood-risk*
- National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2024)
- Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
- Geoindex Onshore (British Geological Survey, 2023)
- Adur Local Plan 2017 (Adur District Council, 2014)[5]
- West Sussex Preliminary Flood Risk Assessment (West Sussex County Council, 2011)[6]
- Adur and Worthing Level 1 (Adur District Council, 2024)[7] and Level 2 Strategic Flood Risk Assessment (Adur District Council, 2020)[8]

[5] https://www.adur-worthing.gov.uk/adur-local-plan/

[6] https://www.westsussex.gov.uk/media/1626/west_sussex_pfra.pdf

[7] https://www.adur-worthing.gov.uk/planning-policy/joint-aw/adur-and-worthing-background-studies-and-info/flood-risk/#sfra-2024

[8] https://www.adur-worthing.gov.uk/planning-policy/joint-aw/adur-and-worthing-background-studies-and-info/flood-risk/

- West Sussex Local Flood Risk Management Strategy (2013-2018) (West Sussex County Council, 2014)[9]

Preliminary Flood Risk Assessment (PFRA)

3.3. The PFRA, published in 2011 and 2017, is a high-level appraisal of flood risk across Lead Local Flood Authority West Sussex County Council. The flood risk from all sources, including fluvial, surface water, groundwater, and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.

3.4. The PFRA summarises historical flood incidents in West Sussex County Council. The site is not recorded as having been affected by any flood event.

Strategic Flood Risk Assessment (SFRA)

3.5. The SFRA, published in 2020, provides the evidence base for the Local Planning Authority Adur District Council Local Plan and guidance for consideration when determining planning applications. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.

3.6. The SFRA mapping provided by Adur District Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

Local Flood Risk Management Strategy (LFRMS)

3.7. The Local Flood Risk Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives, and actions of the Lead Local Flood Authority.

3.8. The West Sussex County Council LFRMS is used within this report to identify any flood management infrastructure and historical incidences of flooding.

[9] **https://www.westsussex.gov.uk/media/1595/local_flood_risk_management_strategy.pdf**

4. Sources of Flood Risk

Fluvial and Tidal

4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

4.2. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the river bank or river defences when tide levels are high.

4.3. The site is located wholly within Flood Zone 1 (Figure 3). Areas in Flood Zone 1 are defined as having less than 1in1000 (0.1%) risk of flooding from fluvial or tidal sources annually.

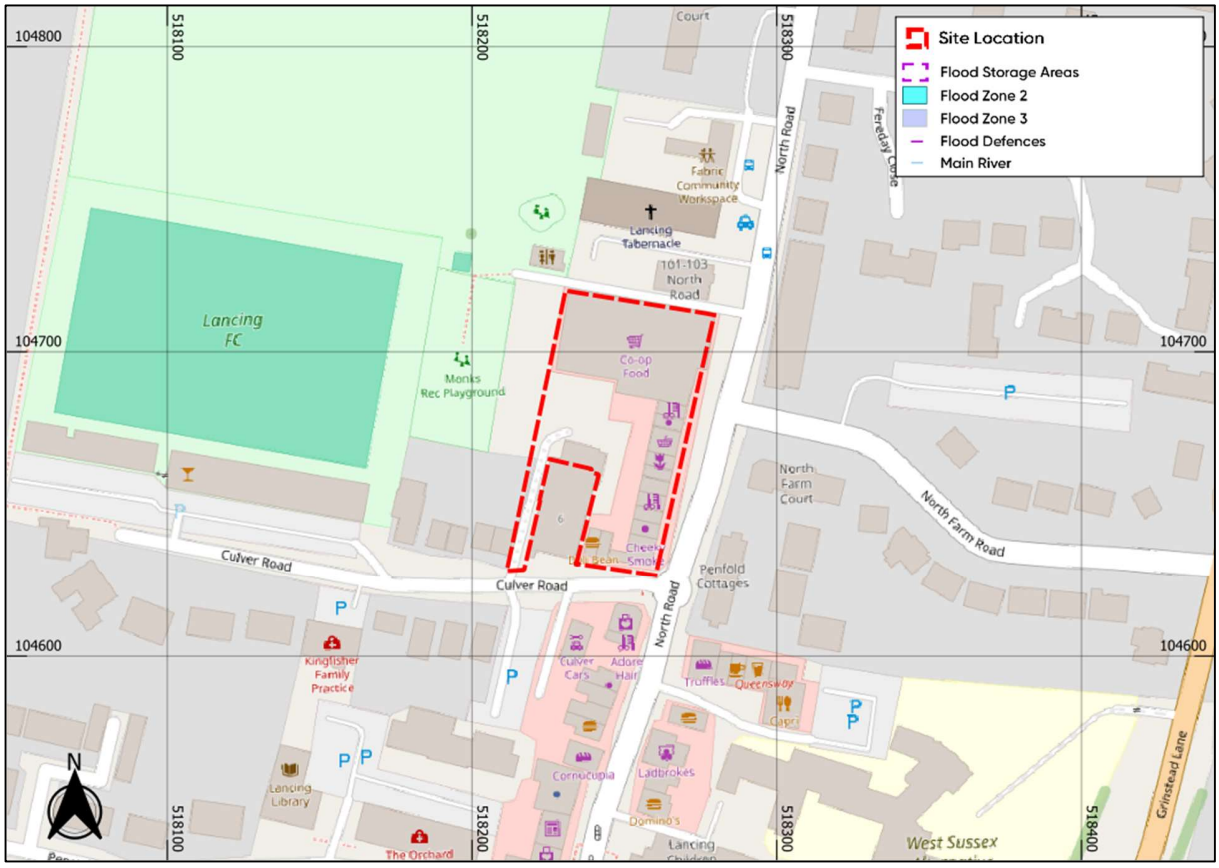

Figure 3: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.4. Neither the EA Historic Flood Map (Figure 4) nor the SFRA provided any records to indicate that the site has been previously flooded from fluvial sources.

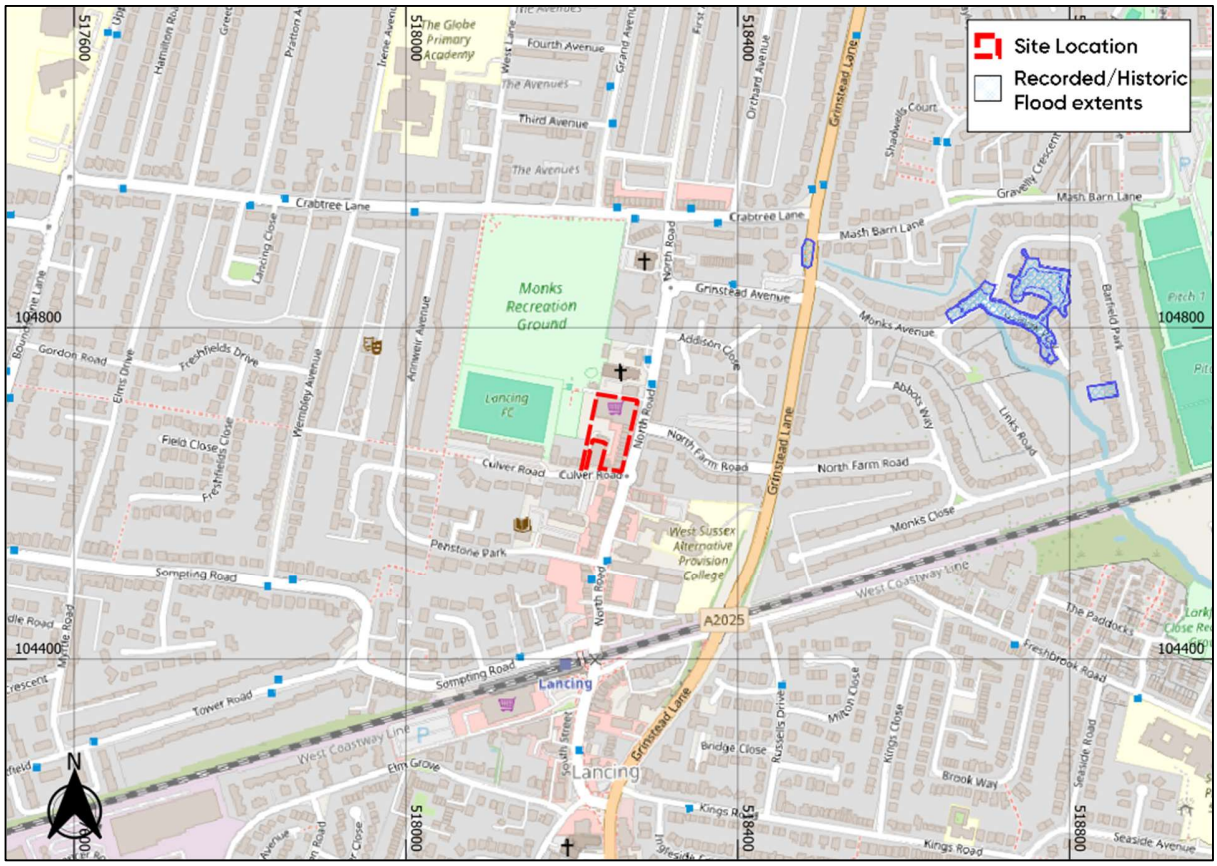

Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.5. Given the site is located within Flood Zone 1, the risk of fluvial/tidal flooding is considered to be low.

Canals

4.6. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.

4.7. There are no Canal and River Trust (CRT) canals within 1km of the site as per the CRT network map.

4.8. Therefore, the risk of flooding to this site from canals is considered to be low.

Pluvial

4.9. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

4.10. Annual surface water flood risk is labelled by the EA as:

- 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
- 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
- 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
- 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).

4.11. Examination of the EA's Flood Risk from Surface Water extent mapping shows the majority of the site is at 'very low' risk of flooding (Figure 5). There are small areas within the rear car parking area shown to be at 'low' and 'medium' risk of flooding and along North Road to the south east is at 'high' risk of flooding. Access into the residential units will be via the existing access along Culver Road, shown to be at 'low' risk of flooding.

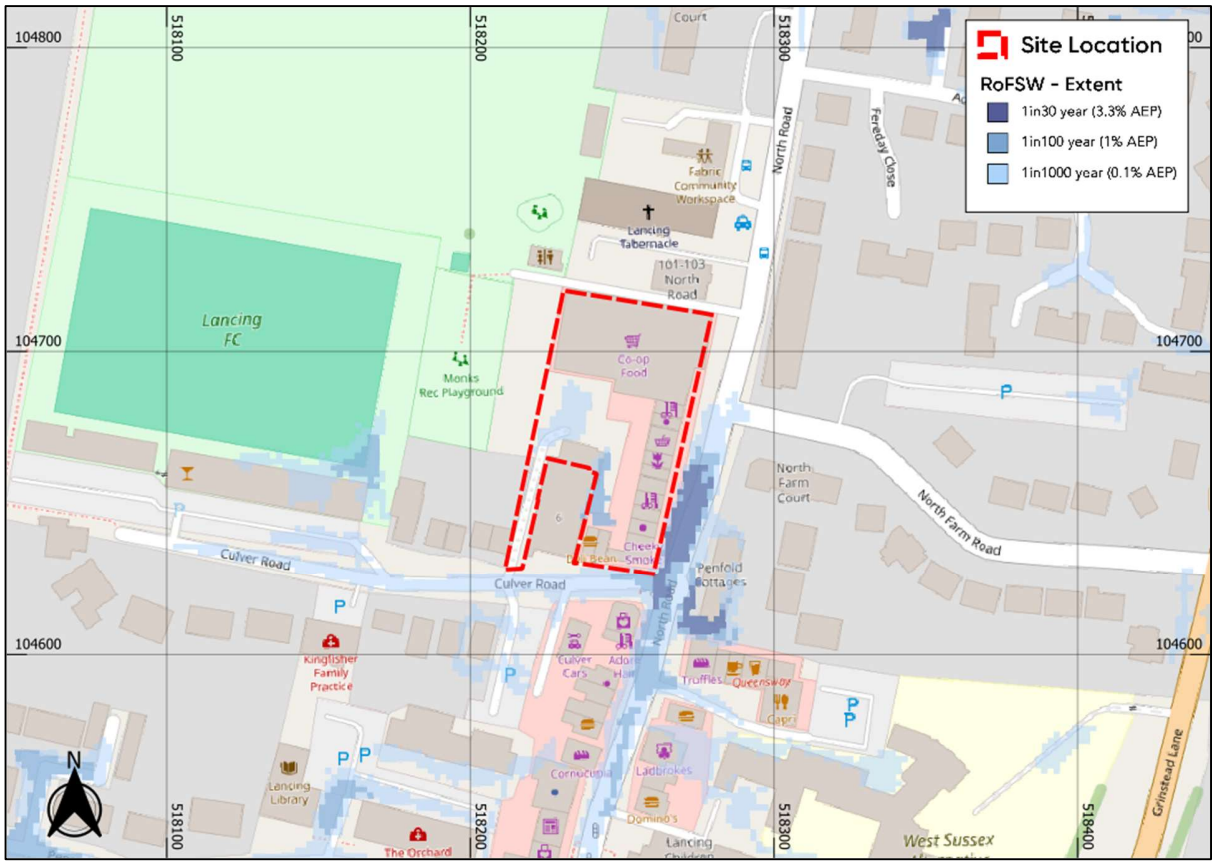

Figure 5: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.12. Given the site is not located within an area of 'high' surface water flood risk, no flood depths have been recorded on site, during the modelled 1 in 30 year (3.3% AEP) scenario. Analysis of the flood depths along North Road show that flood depths would not exceed 300mm during this event (Figure 6).

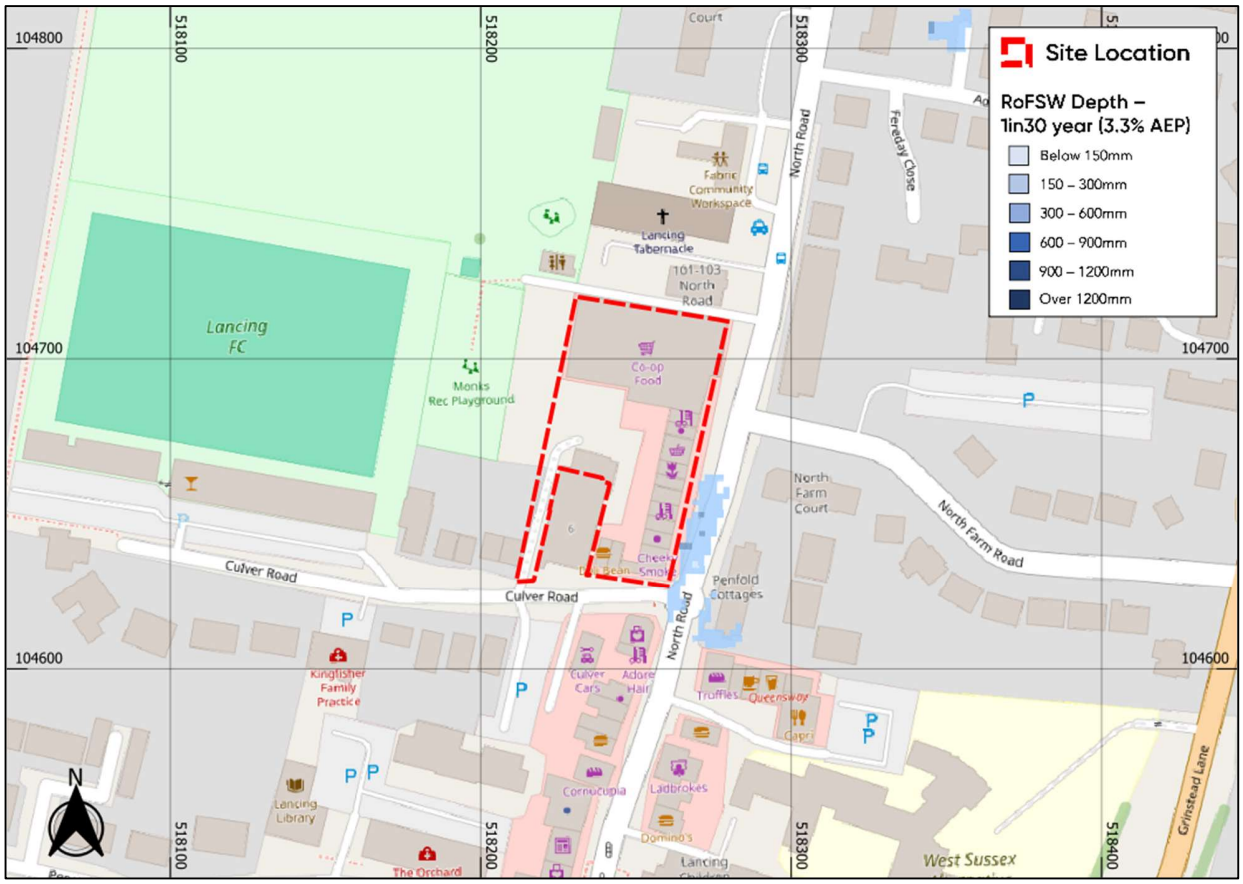

Figure 6: EA 'Flood Risk from Surface Water' mapping showing depth of flooding for a medium-risk scenario (1% AEP) (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.13. The EA Surface Water Depth map for the modelled 'medium' risk event (equivalent to the 1 in 100 year event) shows most of the site to remain unaffected by flooding (Figure 7). A small area towards the centre of the site is shown to experience flood depths of between 300mm and 600mm.

4.14. The access onto Culver Road does not experience any flooding during this event and the junction of Culver Road and North Road generally wouldn't experience any flood depths of greater than 300mm. Analysis of the RoFSW Hazard Mapping shows that hazard ratings along the pavement are below 0.75, which is considered 'safe hazard' (Figure 8).

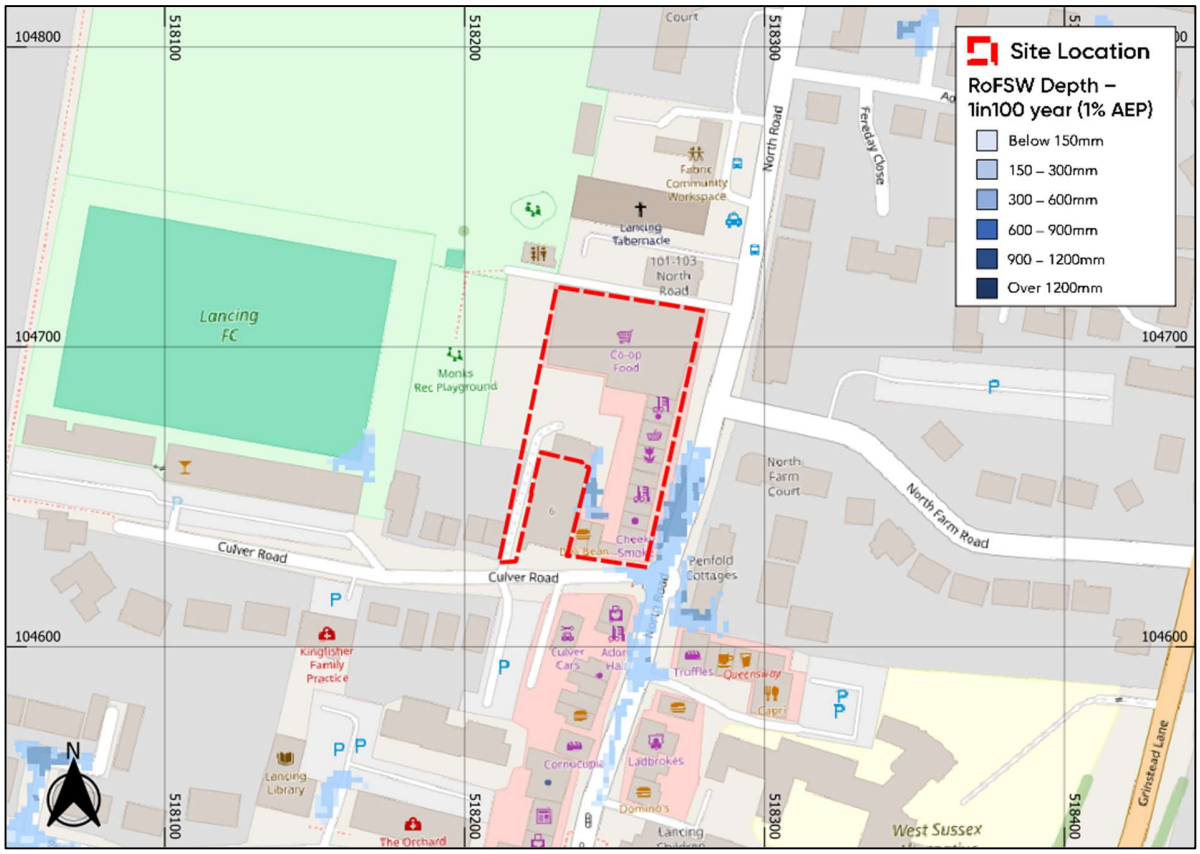

Figure 7: EA 'Flood Risk from Surface Water' mapping showing depth of flooding for a medium-risk scenario (1% AEP) (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

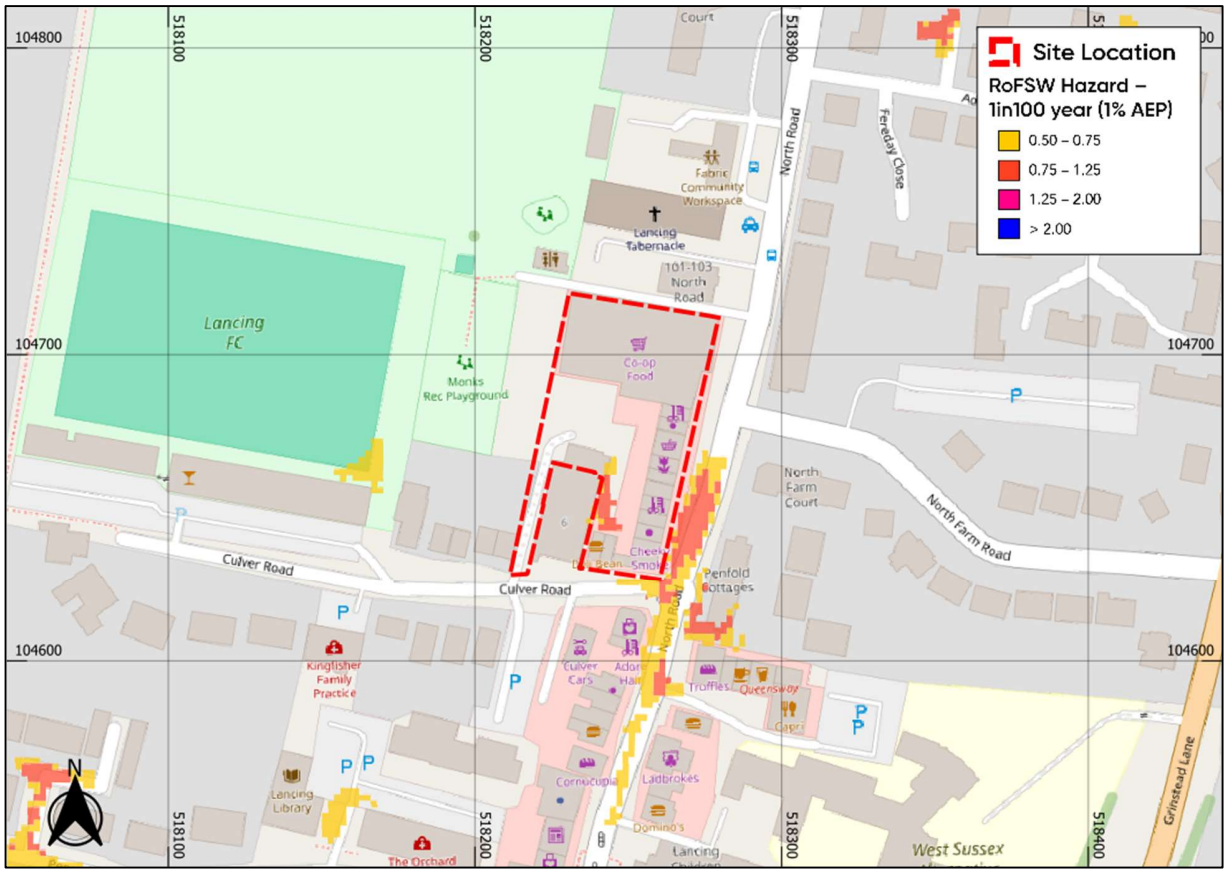

Figure 8: EA 'Flood Risk from Surface Water' mapping showing hazard ratings of flooding for a medium-risk scenario (1% AEP) (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.15. The EA Surface Water Depth map for the modelled 'low' risk event (equivalent to the 1 in 1000 year event) shows most of the site to remain unaffected by flooding (Figure 9). A small area towards the centre of the site is shown to experience flood depths of between 300mm and 600mm. However, it should be noted that all proposed residential use will be within the upper floors of the property, above modelled flood levels.

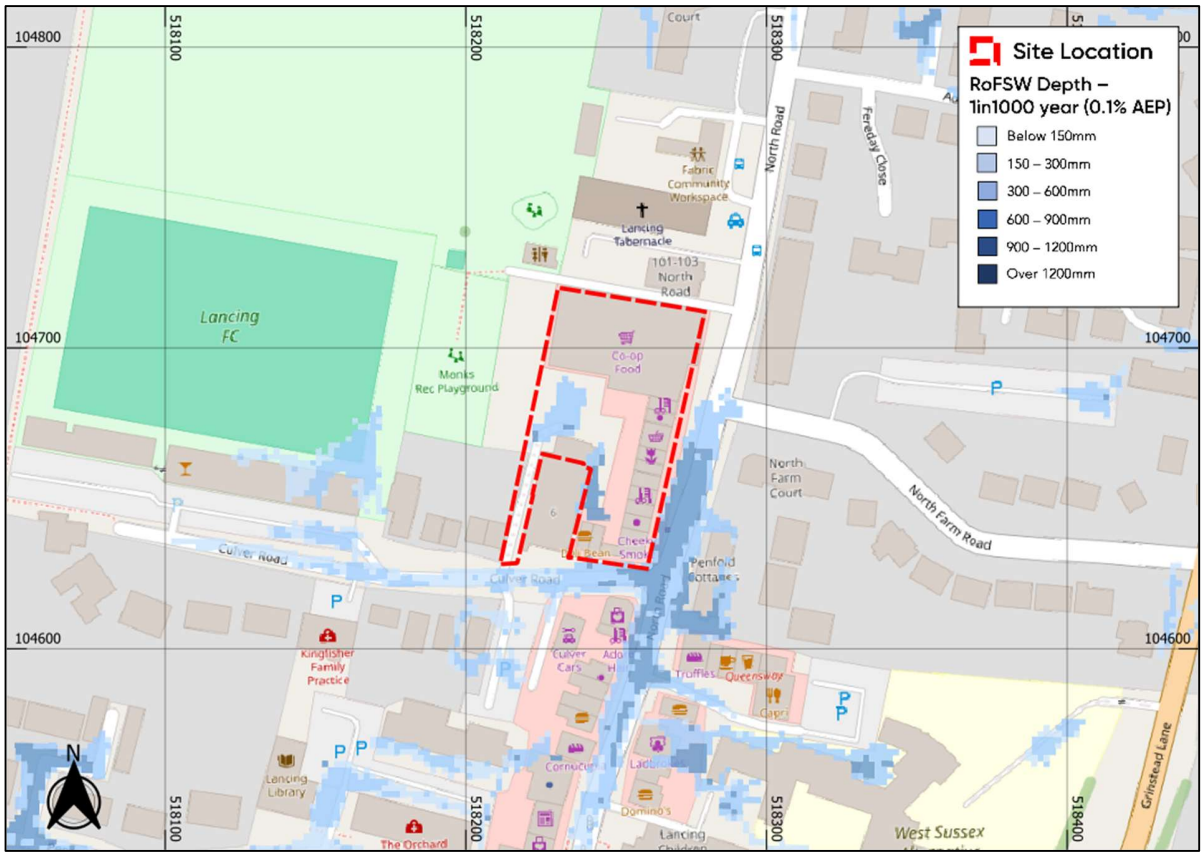

Figure 9: EA 'Flood Risk from Surface Water' mapping showing depth of flooding for a medium-risk scenario (1% AEP) (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.16. The SFRA provides mapping of historical surface water flood incident records kept by the local authority. No historical surface water incidents have been recorded in the vicinity of the site.

4.17. The access onto Culver Road does not experience any flooding during the 1in100 year event and the junction of Culver Road and North Road generally wouldn't experience any flood depths of greater than 300mm. Analysis of the RoFSW Hazard Mapping shows that hazard ratings along the pavement are below 0.75, which is considered 'safe hazard'. Therefore, access/egress is possible during the 1in100 year event.

4.18. Overall, the risk of flooding from pluvial sources is considered to be low.

Reservoirs

4.19. Large waterbodies or reservoirs that have walls built above the surrounding ground level pose a risk of flooding. Walls could fail due to old age, accident, or because excess flood water has

been added to the reservoir. Although a breach is unlikely the consequences would be significant, leading to rapid inundation of the downstream floodplain.

4.20. According to the EA's Flood Risk from Reservoirs mapping the site is outside flood extents in the event of reservoir flooding (Figure 10).

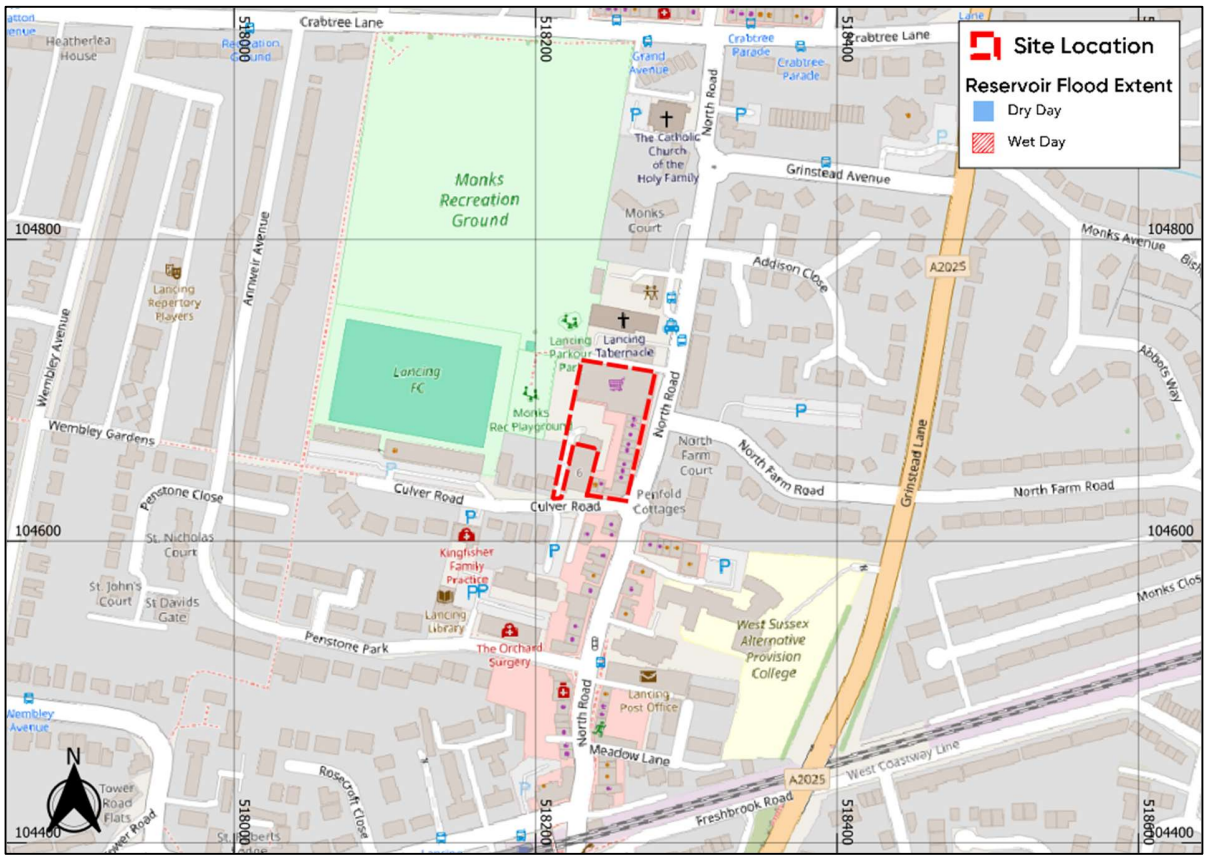

Figure 10: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.21. The site has not been flagged as being at risk of flooding following a reservoir failure. Therefore, the risk of flooding is considered to be low.

Groundwater

4.22. Groundwater flooding occurs in areas where underlying geology is permeable and water can rise within the strata sufficiently to breach the surface.

4.23. The British Geological Survey's (BGS) mapping shows raised beach superficial deposits of sand and gravel underlying the site. The bedrock underlying the site is Newhaven Chalk formation.

4.24. The SFRA presents the Groundwater Flooding mapping. The dataset also shows the risk of emergence of groundwater rather than the actual flood risk from groundwater flooding. Analysis of this mapping shows that the site may be located within an area where groundwater levels are between 0.025m and 0.5m below the ground surface (Figure 11).

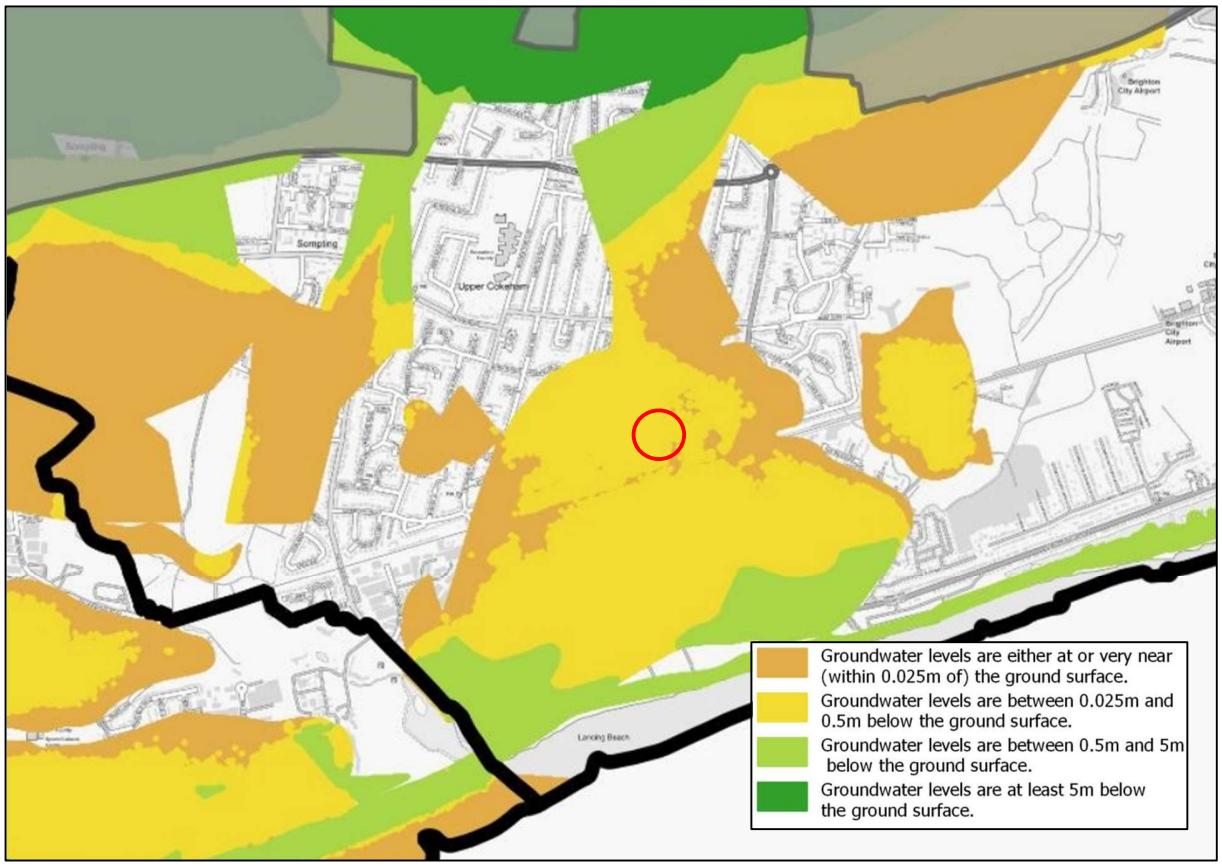

Figure 11: SFRA Groundwater Mapping (Source: Adur and Worthing SFRA, 2024). Site outlined by red circle

4.25. As all new residential units are proposed on upper floors, the risk from groundwater to the development is considered to be low.

Sewers

4.26. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.

4.27. The Southern Water Sewer Incident Report Form (SIRF) database indicates a total of 309 recorded flood events between 01/2013 and 05/2023 in the Local Plan areas. The most

frequently flooded postcode is BN13 2 in Worthing Borough (45 incidents) and BN42 4 in Adur District (45 incidents). The BN15 9 postcode area has 45 incidents recorded.

4.28. However, there is no record to indicate that the site has been previously affected by this source. Therefore, is considered to be at low risk of flooding from sewers.

5. Flood Risk Mitigation

All Sources

5.1. Flood risk from other sources is deemed to be low. Furthermore, all new residential uses will be on upper floors so specific mitigation measures are not required.

Increase to Flood Risk Elsewhere

5.2. The existing site is a full planning application for the proposed upwards extension to provide up to 21no. additional flats (Class C3) plus aesthetic improvements to the existing parade of shops. a planning application for the proposed upwards extension to provide up to 21no. additional flats (Class C3) plus aesthetic improvements to the existing parade of shops.

5.3. The site is located wholly within Flood Zone 1 and therefore no additional flood compensatory storage is required.

5.4. Furthermore, a SWDS has been provided in order to manage surface water runoff in accordance with local and national policies.

Flood Warnings

5.5. The site is not in an area where the EA provide specific flood alerts and warnings. The occupant of the dwelling should monitor Met Office Weather Warnings to be prepared for extreme weather events

5.6. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides site owners some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide site managers/residents with time to take necessary action, e.g. communication of the risk of flooding to occupants/employees etc, evacuation of occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site-specific flood defences.

6. Surface Water Drainage Strategy

Nearby Watercourses

6.1. There are no mapped nearby watercourses to the sites redline boundary.

Ground Conditions

6.2. The British Geological Survey's (BGS) mapping shows raised beach superficial deposits of sand and gravel underlying the site. The bedrock underlying the site is Newhaven Chalk formation.

6.3. At the time of writing no site-specific infiltration testing has been undertaken.

6.4. The compact layout of the site layout, infiltration has been discounted as a method of managing runoff as it would not be possible to locate a soakaway within the site at least 5m from any building.

6.5. Additionally, a Utilities Survey was conducted for the site (included as Appendix B) which shows utilities beneath the carpark area, further limiting space on site for a soakaway.

Existing Drainage Infrastructure

6.6. Southern Water asset plans are included in this report as Appendix C and reproduced below (Figure 12). The asset plans show that there is a foul sewer beneath North Road adjacent to the site.

6.7. However, the utilities survey confirms that the existing site has surface and foul water drains on site. The drains are assumed to drain to the foul sewer beneath North Road due to a lack of alternatives.

6.8. As such, the sewer beneath North Road is believed to be a combined sewer, rather than foul only. This is due to the utilities survey confirming the presence of surface and foul water drains on site. The drains have no alternative discharge location other than the sewer beneath North Road. As such, the sewer beneath North Road is assumed to be combined, taking surface and foul flows from the site.

6.9. For the purpose of this report the sewer beneath North Road will be referred to as combined, rather than foul for the reasons discussed above.

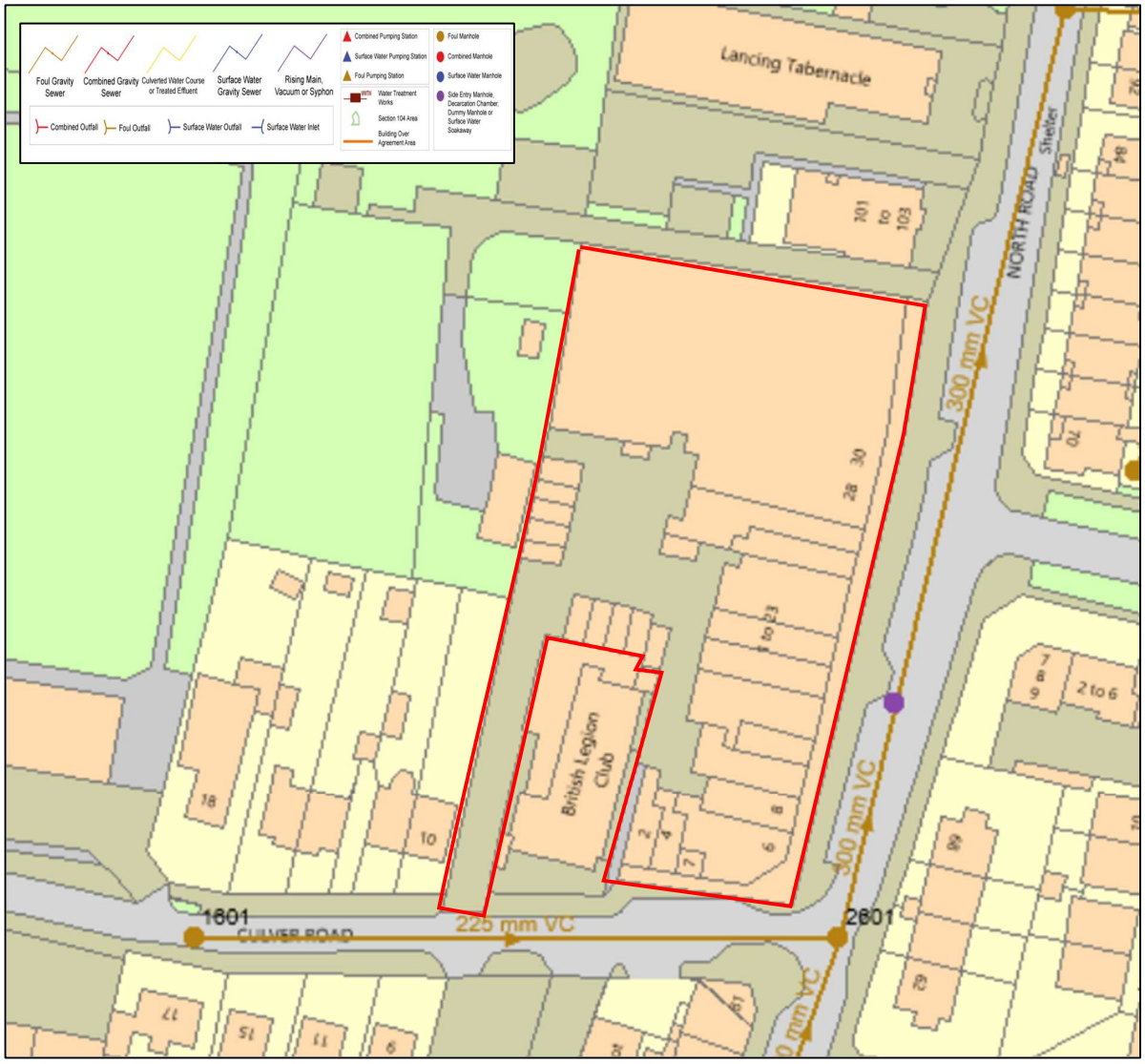

Figure 12: Southern Water asset plan

6.10. The utilities survey indicates no flow controls in the existing system as such it is understood that the surface water and foul from the site drain unrestricted via gravity into the 300mm combined sewer below North Road.

6.11. This drainage strategy proposes to reuse any existing drainage infrastructure on site using flow controls to achieve a betterment compared to the existing scenario.

Greenfield Runoff Rate

6.12. The total site area is approximately 0.37ha comprising the existing parade of shops and a carpark. The whole site is currently impermeable surfacing.

6.13. The greenfield runoff rate (QBAR rural) was calculated in InfoDrainage (v2025.2.3) using the ICP SuDS methodology. For sites smaller than 50 ha, the IH124 method is applied to a 50 ha site and the results multiplied by a scale factor equal to the site area (in hectares) divided by 50. QBAR was calculated using the following formula (equation yields m^3/s):

$$QBAR_{rural} = 0.00180 \times AREA^{0.89} \times SAAR^{1.17} \times SOIL^{2.17}$$

6.14. The greenfield runoff rate (Qbar) for the site area (0.37ha) was calculated to be 0.2 l/s.

6.15. Given the size of the development and the constraints with space on site there is limited scope for significant attenuation to restrict runoff to a greenfield rate of 0.7 l/s. To prevent the increased risk of blockage and sedimentation the proposed discharge rate into the combined sewer beneath North Road is 2.0l/s.

Brownfield Runoff Rate

6.16. Calculations have been carried out to estimate the existing unrestricted surface water flows only, from the site, into the combined sewer beneath North Road.

6.17. Given the size of the site, the resulting attenuation requirements and the compact layout it will not be feasible to include the whole site area in the calculations. Additionally, due to structural loading concerns a blue roof cannot be used for attenuation. As such, the proposed roof area of the extension (0.116ha) will be included in these calculations and the hardstanding carpark is to drain as per the existing scenario.

6.18. Adding to the point above regarding the compact site layout, if this strategy considers the whole site area (i.e. the whole 0.37ha of impermeable surfacing) the required attenuation for the 1 in 100 year (plus 45% climate change) event is between $313m^3$ and $400m^3$. This is based on a discharge rate of 2.0l/s, as discussed above. It is considered unfeasible to achieve this volume of attenuation on site, given the compact nature of the site as discussed above. As such, the impermeable area considered in this strategy is the proposed extension roof area only (0.116ha) discharging at a betterment to the existing scenario (discussed further below).

6.19. Based on the impermeable area of 0.116ha the flows in Table 3 have been calculated.

Table 3 Existing Brownfield (unrestricted) surface water flows

Critical Storm Return Period	Runoff Rate (l/s)
1 in 2 year	21.9
1 in 30 year	49.1
1 in 30 year +CC (35%)	68.7
1 in 100 year	61.9
1 in 100 year +CC (40%)	89.8

6.20. Calculations in Table 4 show the present-day maximum unrestricted outflow rates compared to the proposed 2.0l/s.

Table 4 Existing (unrestricted) and proposed runoff rates.

Catchment	Area	1 in 2 Year	1 in 30 Year	1 in 30 Year +CC	1 in 100 Year	1 in 100 Year + CC
Existing	0.116ha	21.9l/s	49.1l/s	68.7l/s	61.9l/s	89.8l/s
Proposed	0.116ha	2.0l/s	2.0l/s	2.0l/s	2.0l/s	2.0l/s
% Betterment	-	90.87%	95.93%	97.09%	96.77%	97.77%

6.21. Therefore, restricting rates to 2.0l/s to the combined sewer beneath North Road, would provide a significant betterment to the existing scenario in terms of surface water runoff. Reducing surface/ foul flows into the combined sewer provides a great benefit in comparison to the existing scenario.

6.22. Brownfield rates are included in this report as Appendix D.

Surface Water Drainage Strategy

6.23. In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development in Table 5 below.

6.24. The management of surface water has been considered in respect to the SuDS hierarchy below, as detailed in the CIRIA 753 "The SuDS Manual" (section 3.2.3).

Table 5: SuDS Drainage Hierarchy

SuDS Drainage Hierarchy				
			Suitability	**Comment**
	1.	**Infiltration**	**x**	The British Geological Survey's (BGS) mapping shows raised beach superficial deposits of sand and gravel underlying the site. The bedrock underlying the site is Newhaven Chalk formation. The compact layout of the approved site layout, infiltration has been discounted as a method of managing runoff as it would not be possible to locate a soakaway within the site at least 5m from any building. Additionally, a Utilities Survey was conducted for the site (included as Appendix B) which shows utilities beneath the carpark area, further limiting space on site for a soakaway.
	2.	**Discharge to surface waters**	**x**	No watercourses within feasible distance of site.
	3.	**Discharge to surface water sewer, highway drain or similar**	**x**	No surface water sewers in the vicinity of the site.
	4.	**Discharge to combined sewer**	✓	This drainage strategy proposes to reuse the existing connection to the sewer beneath North Road. The utilities survey confirmed the presence of surface and foul water drains on site. The drains have no alternative discharge location other than the sewer beneath North Road. As such, the sewer beneath North Road is assumed to be combined, taking surface and foul flows from the site.

6.25. On review of the SuDS drainage hierarchy, and with reference to both national and local policy, it is proposed that the surface water runoff from the proposed extension is attenuated in geocellular tank beneath the carpark area. The tank is to discharge into the existing drains on site in order to reuse the existing connection to the combined sewer beneath North Road.

6.26. The Surface Water Drainage Layout is included in this report as Appendix E.

6.27. A capacity check should be submitted to ensure Southern Water confirm they are in agreement with the proposed drainage strategy and betterment prior to commencement/ discharge of the condition.

InfoDrainage Modelling

6.28. InfoDrainage Software (v2025.2.3) was used to model the proposed drainage strategy incorporating a geocellular storage tank with a flow control.

6.29. The model comprises:

- 2 contributing catchment areas to represent the two roof areas of the proposed extension for a total of 0.116ha;
- 1 geocellular tank: plan area 58.5m^2, depth 1.5m, total volume 83.36m^3 at a 95% void ratio;
- Hydrobrake manhole between the geocellular tank and the existing drainage on site (ref: CHE-0055-2000-1950-2000);
- 1 manhole to represent the existing manhole chamber on site.

Climate Change

6.30. The Environment Agency Peak Rainfall Climate Change Allowance guidance was reviewed and subsequently the Defra Peak Rainfall Allowances Map was assessed to determine appropriate climate change allowances to inform the surface water drainage strategy. The upper end allowances for the Adur and Ouse Management Catchment have been used for both the 3.3% and 1% annual exceedance probability events for the 2070s epoch (40% and 45% respectively).

6.31. Table 6 summarises the simulation criteria for the InfoDrainage model.

Table 6: Simulation Criteria

Parameter	Value
Rainfall Data	FEH22
Total Area	Impermeable area - 0.116 ha (no urban creep applied as the sites 100% impermeable).
Return Periods	2, 30, 30+40%CC, 100, 100+45%CC. Summer and Winter
Storm Durations	FEH22 – 15, 30, 60, 120, 240, 360, 480, 960, 1440, minute
Volumetric Runoff Coefficient	0.9 (summer and winter storms)
Percentage Impervious	100%
Time of Concentration	5 minutes

InfoDrainage SuDS Modelling Results

6.32. The full calculation outputs for the proposed drainage strategy can be found in Appendix F of this report although the 1 in 100-year +45% climate change results have been summarised below:

- The surface water discharge rate from the site during the critical storm event 1 in 100-year plus 45% climate change (240 minutes winter), is 2.0 l/s. **This represents a 97.77% reduction in runoff rates from pre to post-development;**
- The maximum depth within the 1.5m deep geocellular tank for a 1 in 100-year plus 45% climate change critical storm (240 mins winter) is 1.413m;
- No flooding is observed in the critical storm event based on the InfoDrainage model.

6.33. **As such, it can be seen that runoff would continue to be discharged to the system on site and the proposed strategy would offer significant reduction in runoff rates (97.77% for the 1 in 100-year plus 45% climate change event) from the site into the combined sewer, thus providing a significant betterment over the existing situation.**

Surface Water Drainage Arrangement

6.34. The principles of the surface water drainage arrangements are outlined below. The surface water drainage arrangement is included as Appendix E.

- All surface water generated by the proposed development will be captured via rainwater downpipes.
- Surface water from the proposed rooftop extensions will be attenuated in a geocellular storage tank beneath the carpark. The tank is deep (1.5m) to allow to maximum attenuation, however, the system can discharge into the existing drainage system on site.
- A hydrobrake manhole is proposed to be located between the tank and the existing drainage network restricting surface water flow to 2.0l/s.
- It is proposed for the developer to consider systems made of recycled materials. This would reduce the embodied carbon of the proposed drainage system. The feasibility of such a system must be confirmed with a manufacturer whilst considering the relatively confined nature of the site.
- Maintenance of the proposed systems is provided in later sections of this report.

- The existing connection to the public combined water drainage infrastructure is proposed to be reused, to be confirmed with Southern Water.

Water Quality

6.35. According to the SuDS Manual Table 26.2[10], runoff from the roof of a residential dwelling is generally considered a very low contamination risk and does not usually warrant any significant treatment. Roof runoff will be drained silt traps prior to discharging into the geocellular storage tank as a precautionary measure.

Maintenance

6.36. Table 7 presents details regarding the maintenance requirements for the proposed blue roof included as part of the development, taken from the CIRIA C753 The SuDS manual. Each manufacturer will have bespoke requirements however the below should be used as a guide. All SuDS will be privately maintained.

Table 7: Specific SuDS Maintenance Requirements (Source: CIRIA SuDS Manual)

Maintenance Schedule	Required Action	Typical Frequency
Geocellular Storage		
Regular Maintenance	Inspect and identify any area that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	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

[10] **https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C753**

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

Designing for Exceedance

6.37. Exceedance events are those greater than the design rainfall event, i.e. greater than the 100-year rainfall event plus 45% increase for climate change.

6.38. Periods of exceedance occur when the rate of surface water runoff exceeds the drainage system capacity. Conveyance beneath ground cannot, generally, be economically or sustainably constructed to the scale required for the most extreme rainfall events. This may result, on occasion, in the surface water runoff exceeding the capacity of the drainage network, with excess water (exceedance flow) being conveyed above ground.

6.39. For situations where extreme rainfall intensity exceeds inlet capacities, or for extreme storm events exceeding the design flood event considered for drainage design, the proposed site levels in the carpark are recommended to be sloped away from existing buildings to direct surface water exceedance routes away from external thresholds.

7. Foul Water Drainage Strategy

Design Considerations

7.1. The foul water drainage layout is also included in the Surface and Foul Water Drainage Strategy in this report (Appendix E).

7.2. The foul water flow rate calculations for the residential development were calculated using 'The Code' (successor to Sewers for Adoption) methodology.

7.3. Table 8 below shows the final foul flow rate for a residential development of this size is 0.97l/s.

Table 8: Commercial Foul Flow Rate Calculations using 'The Code' (successor to Sewers for Adoption) Methodology.

Parameter	Value
Residential	
Number of Properties	21
Peak Flows from Each Property	4000 (litres/property/day)
Combined Foul Flows	
0.97 l/s	

7.4. The utilities survey included in this report as Appendix B shows that there is currently a foul water drain within the site draining into the combined sewer beneath North Road. This drain is proposed to be reused. The proposed foul water discharge rate is 0.97l/s based on the calculations above.

8. Conclusions

8.1. This report has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at Queens Parade, North Road, Lancing, BN15 9BA. It has been written to support a planning application and prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.

8.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

Source of Flooding	Flood Risk Summary
Fluvial/ Tidal	The site is located wholly within Flood Zone 1. Areas in Flood Zone 1 are defined as having less than 1in1000 (0.1%) risk of flooding from fluvial or tidal sources annually. Neither the EA Historic Flood Map nor the SFRA provided any records to indicate that the site has been previously flooded from fluvial sources. Given the site is located within Flood Zone 1, the risk of fluvial/tidal flooding is considered to be low.
Pluvial	Examination of the EA's Flood Risk from Surface Water extent mapping shows the majority of the site is at 'very low' risk of flooding. There are small areas within the rear car parking area shown to be at 'low' and 'medium' risk of flooding and along North Road to the south east is at 'high' risk of flooding. Access into the residential units will be via the existing access along Culver Road, shown to be at 'low' risk of flooding. The EA Surface Water Depth map for the modelled 'medium' risk event (equivalent to the 1 in 100 year event) shows most of the site to remain unaffected by flooding. A small area towards the centre of the site is shown to experience flood depths of between 300mm and 600mm. The access onto Culver Road does not experience any flooding during this event. Overall, the risk of flooding from pluvial sources is considered to be low
Reservoirs Groundwater Sewers	The site is considered to be at low risk from other sources.

Canals	

8.3. The report supports the planning application and demonstrates that there is an acceptable level of flood risk to the site. The development does not increase flood risk off site or to the wider area.

8.4. The following conclusions can be drawn from this FRA:

- This FRA has identified no prohibitive constraints in developing the proposed site for the proposed usage.
- The Site is in Flood Zone 1 and therefore at low risk of flooding from fluvial sources. The post-development use is to be "more vulnerable" which is deemed appropriate for location within this Flood Zone, according to national guidelines.
- The site is at low risk from all other sources.

8.5. The following conclusions can be drawn from this SWDS:

8.6. On review of the SuDS drainage hierarchy, and with reference to both national and local policy, it is proposed that the surface water runoff from the proposed extension is attenuated in geocellular tank beneath the carpark area. The tank is to discharge into the existing drains on site in order to reuse the existing connection to the combined sewer beneath North Road.

- The surface water discharge rate from the site during the critical storm event 1 in 100-year plus 45% climate change (240 minutes winter), is 2.0 l/s. **This represents a 97.77% reduction in runoff rates from pre to post-development;**
- The maximum depth within the 1.5m deep geocellular tank for a 1 in 100-year plus 45% climate change critical storm (240 mins winter) is 1.413m;
- No flooding is observed in the critical storm event based on the InfoDrainage model.

8.7. **As such, it can be seen that runoff would continue to be discharged to the system on site and the proposed strategy would offer significant reduction in runoff rates (97.77% for the 1 in 100-year plus 45% climate change event) from the site into the combined sewer, thus providing a significant betterment over the existing situation.**

8.8. The final foul flow rate for a residential development of this size is 0.97l/s. The proposed foul flows are to connect into the existing foul drains on site to discharge into the existing combined sewer beneath North Road.

8.9. This Flood Risk Assessment/Surface Water Drainage Strategy/ Foul Water Drainage Strategy should be submitted as part of the planning application to satisfy the requirements under NPPF.

Appendix A - Development Proposals

DRAFT ISSUE

(NOT FOR PLANNING SUBMISSION)

notes

Do not scale from drawing

To be read in conjunction with all relevant drawing and specifications

All measurements in millimetres unless otherwise stated

Dimensions are taken to either masonry or plasterboard, not plaster.

All dimensions to be confirmed on-site. Any discrepancies to be notified to the designer for clarification

Second Floor Plan - Proposed 1:100@A0

Scale in Metres
0 1 2 3 4 5 10

REV C - Issued for comment 24/09/04
REV B - Pre App Changes 24/07/30
REV A - Client request changes 24/02/23

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e ewanstoddart@outlook.com w www.edwsarchitects.co.uk

JOB Queens Parade North Road Lancing	CHECKED -
	DRAWN ES
CLIENT Greatlen Estates	DATE 31.01.24
	SCALE 1:100 @ A0
DRAWING Proposed Second Floor Plan	REVISION C
	NUMBER 7281/SK/021

Site Plan

Scale in Metres

0 10 20 30 40 50 100

Block Plan

Scale in Metres

0 5 10 15 20 30 40 50

notes

Do not scale from drawing

To be read in conjunction with all relevant drawing and specifications

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N

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J O B Queens Parade North Road Lancing	CHECKED -
	DRAWN ES
CLIENT Greatlen Estates	DATE 31.01.24
	SCALE 1:500 @ A0
DRAWING Site / Block Plan	REVISION
	NUMBER 7281/SK/001

Appendix B - Utilities Survey

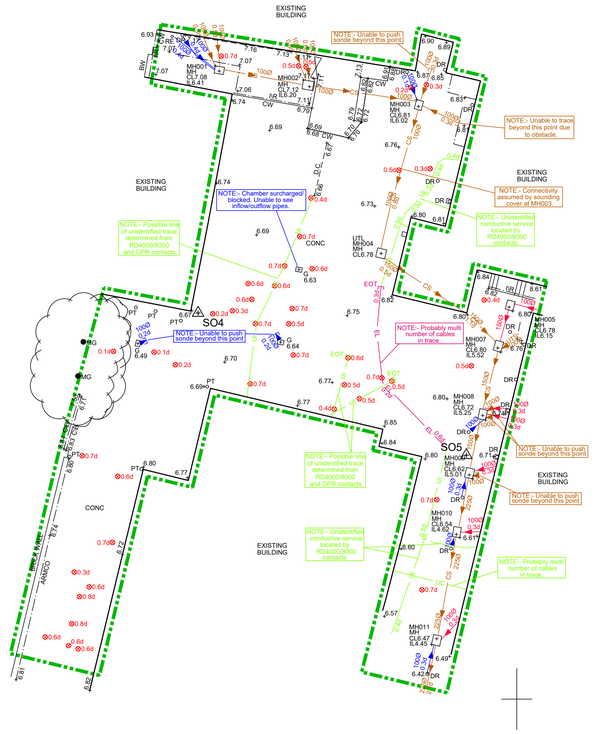
518150E

518200E

518250E

104700N

104650N



- SW — STORM WATER SEWERS
- FW — FOUL WATER SEWERS
- WM — WATER MAIN
- GM — GAS MAIN
- EL — ELECTRIC CABLES
- DUCT — CABLE DUCTING
- BT — BT (UNDERGROUND) CABLE TV
- CTV — CLOSED CIRCUIT TV
- UI — UNIDENTIFIED FEATURE
- UI — LINE OF POSSIBLE SUB-SURFACE FEATURE DETERMINED FROM GPR CONTACTS.
- UP — UNIDENTIFIED PIPE
- UC — UNIDENTIFIED CABLE
- UNPR — UNPROVEN FEATURE
- Cable Trace signal lost at this point
- Unable to Trace Sewer past this point due to Blockage / Obstacle / Pipe Material
- FW — LATERAL CONNECTIONS
- EXTENT OF SURVEY BY SURVEY OPERATIONS LTD.
- EXTENT OF SURVEY BY SURVEY OPERATIONS LTD.(JULY 2022)
- FW / SW — CONNECTIVITY BETWEEN CHAMBERS FROM CCTV REPORT
- COVER POSITION FROM CCTV REPORT - NOT SURVEYED ON TOPOGRAPHICAL SURVEY.
- 0.0d — BURIED FEATURE FOUND USING RADAR

UNIDENTIFIED - A buried feature or utility that has been located, but we are unable to state what it is.

UNPROVEN - The assumed location of a reported feature or utility, usually taken fron records, but not found during the utility trace (due to various conditions).

CAUTION - Electric pot ended cables, even when they are live, are unable to be detected or traced.

- EL — UNPROVEN: ELEC
- BT — UNPROVEN: BT
- GM — UNPROVEN: GAS
- WM — UNPROVEN: WATER
- SW — UNPROVEN: SURFACE
- FW — UNPROVEN: FOUL

All unproven lines without additional notes on drawing show the approximate location of a reported utility or feature as indicated on available stat records.

UNDERGROUND UTILITIES SERVICES DISCLAIMER

Where indicated, no allowance has been made for sub-surface entry into manholes, other chambers or confined spaces below ground level. Therefore any details relating to depths, sizes etc, are taken from the surface and as such will be approximate.

We have endeavoured to supply you with the most accurate data possible by using methods and equipment that are at the forefront of our industry. We have taken great care in the detection of pipework and buried features, but as with all methods of detecting underground or buried utilities the information provided is based on results obtained from electromagnetic techniques, and as such may be liable to distortion or errors beyond the reasonable control of the operator or his instruments.

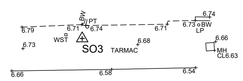
It is the responsibility of the user under Health & Safety (HSG47) Guidelines to satisfy himself of the suspected location of any services prior to excavation of the services shown.

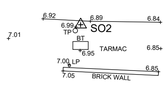
NOTE 1

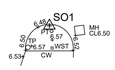
This utility survey has been undertaken using:
A: Radiodetection RD4000 + RD4000 TID
B: Mala Geoscience Ground Probing Radar

NOTE 2

Power carrying features shown on this drawing are shown as an individual service line. This does not necessarily represent the number of cables actually present and it is possible that there could be multi numbers of cables including HV, LV and communications transmission cables following the same trace line. These could be at different depths, the trace signal from the deeper cables being masked by signal emitted from the shallower services above. Cable runs could also be present running parallel to the single line shown.







N

Note:
The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Drainage information must be verified with local authority records before use

SURVEY STATIONS

Name	Easting	Northing	Height
SO1	518235.62	104618.30	6.55
SO2	518182.16	104619.67	6.99
SO3	518211.18	104627.13	6.73
SO4	518229.20	104675.21	6.67
SO5	518246.71	104665.92	6.68

SurveY OPERATIONS
Smith Street, Skelmersdale, Lancs. WN8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@survops.co.uk – www.survops.co.uk

Client: Aegaea

Drawing Title: Utility Survey of Land at:
Queens Parade
Lancing

Scale(s)	1:200	Surveyor	MWk
Date	Nov 24	Drawn	DS
Job Number	24J120	Checked	SO

Sheet Size & Drg Number & Revision: A1 24J120/001

Appendix C - Southern Water Asset Plan

(c) Crown copyright and database rights 2024 Ordnance Survey 100031673 | Date: 26/09/24 | Scale: 1:1250 | Map Centre: 518248,104677 | Data updated: 24/09/24 | Our Ref: 1579437 - 1 | Wastewater Plan A1 Powered by digdat

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2024 Ordnance Survey 100031673 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer | Combined Gravity Sewer | Culverted Water Course or Treated Effluent | Surface Water Gravity Sewer | Rising Main, Vacuum or Syphon

Combined Outfall | Foul Outfall | Surface Water Outfall | Surface Water Inlet

Combined Pumping Station | Surface Water Pumping Station | Foul Pumping Station | Water Treatment Works | Section 104 Area | Building Over Agreement Area

Foul Manhole | Combined Manhole | Surface Water Manhole | Side Entry Manhole, Decarcation Chamber, Dummy Manhole or Surface Water Soakaway

nick@aegaea.com

5636

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	F	5.98	3.91	
0302	F	6.39	4.05	
0501	F	7.80	5.09	
0701	F	8.45	6.81	
0704	F	8.77	0.00	
0801	F	9.18	6.30	
0802	F	0.00	0.00	
0804	F	0.00	0.00	
0805	F	0.00	0.00	
0901	F	8.98	5.63	
0902	F	9.38	5.77	
1301	F	5.81	3.78	
1411	F	0.00	0.00	
1412	F	0.00	0.00	
1501	F	7.50	4.41	
1601	F	6.97	4.04	
1901	F	7.64	0.00	
2312	F	5.59	3.59	
2313	F	5.57	5.57	
2402	F	5.60	3.49	
2404	F	5.63	3.38	
2414	F	0.00	0.00	
2415	F	0.00	0.00	
2416	F	0.00	0.00	
2502	F	6.45	3.25	
2507	F	6.22	0.00	
2508	F	6.12	3.37	
2509	F	0.00	0.00	
2510	F	0.00	0.00	
2511	F	0.00	0.00	
2512	F	0.00	0.00	
2513	F	0.00	0.00	
2601	F	6.28	3.21	
2606	F	0.00	0.00	
2701	F	6.56	0.00	
2901	F	6.21	4.24	
2902	F	6.17	4.14	
2903	F	6.21	4.47	
2904	F	0.00	0.00	
2905	F	0.00	0.00	
2906	F	0.00	0.00	
2907	F	0.00	0.00	
2908	F	0.00	0.00	
3401	F	5.46	3.67	
3402	F	5.44	3.49	
3403	F	5.05	3.34	
3404	F	0.00	0.00	
3405	F	0.00	0.00	
3505	F	0.00	0.00	
3601	F	6.87	0.00	
3606	F	0.00	0.00	
3607	F	0.00	0.00	
3701	F	5.97	0.00	
3704	F	5.20	3.61	
3705	F	5.50	3.44	
3706	F	6.10	0.00	
3707	F	5.35	3.24	
3708	F	5.80	4.30	
3709	F	0.00	0.00	
3710	F	0.00	0.00	
3711	F	0.00	0.00	
3712	F	0.00	0.00	
3713	F	0.00	0.00	
3801	F	4.90	3.43	
3804	F	5.10	3.72	
3901	F	5.30	3.65	
3907	F	3.55	1.92	
3908	F	3.79	2.52	
3909	F	3.73	2.91	
3910	F	3.85	3.16	
3911	F	3.95	3.35	
3912	F	4.07	3.68	
3913	F	0.00	0.00	
3914	F	0.00	0.00	
3917	F	0.00	0.00	
3918	F	0.00	0.00	
3919	F	0.00	0.00	
4401	F	5.21	3.66	
4402	F	4.72	3.17	
4403	F	4.74	3.07	
4405	F	4.76	3.16	
4406	F	0.00	0.00	
4407	F	0.00	0.00	
4409	F	0.00	0.00	
4501	F	4.47	0.00	
4502	F	0.00	0.00	
4504	F	0.00	0.00	
4505	F	0.00	0.00	
4601	F	6.19	4.21	
4605	F	0.00	0.00	
4606	F	0.00	0.00	
4607	F	0.00	0.00	
4608	F	0.00	0.00	
4609	F	0.00	0.00	
4704	F	5.41	0.00	
4705	F	4.89	0.00	
4706	F	4.81	0.00	
4707	F	4.29	3.23	
4708	F	0.00	0.00	
4709	F	5.70	0.00	
4710	F	5.90	3.51	
4712	F	0.00	0.00	
4713	F	0.00	0.00	
4801	F	2.91	1.22	
4804	F	4.95	3.59	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
4805	F	4.95	3.50	
4901	F	2.81	1.51	
4902	F	3.83	2.81	
4903	F	3.88	3.11	
4904	F	3.98	3.25	
4905	F	4.13	3.40	
4906	F	4.29	3.64	
4907	F	3.03	0.94	
4908	F	0.00	0.00	
5302	F	6.35	5.51	
5303	F	4.53	3.51	
5307	F	4.33	3.29	
5401	F	4.70	3.00	
5402	F	4.56	3.04	
5403	F	4.67	3.97	
5404	F	4.56	3.78	
5405	F	4.46	2.65	
5406	F	4.57	2.63	
5407	F	3.79	2.13	
5408	F	3.90	3.15	
5409	F	4.20	3.43	
5410	F	4.17	3.51	
5411	F	4.28	3.76	
5412	F	4.29	3.78	
5413	F	4.19	0.00	
5414	F	4.29	3.65	
5415	F	4.45	3.67	
5416	F	4.45	3.79	
5417	F	4.52	3.83	
5418	F	4.20	3.52	
5419	F	4.27	3.64	
5420	F	4.52	3.86	
5421	F	4.56	3.90	
5501	F	3.60	2.06	
5502	F	3.29	0.00	
5504	F	0.00	0.00	
5505	F	0.00	0.00	
5508	F	0.00	0.00	
5509	F	0.00	0.00	
5510	F	0.00	0.00	
5513	F	0.00	0.00	
5601	F	5.36	0.00	
5602	F	4.58	2.86	
5605	F	0.00	0.00	
5606	F	0.00	0.00	
5607	F	0.00	0.00	
560C	F	0.00	0.00	
5701	F	2.65	0.92	
5704	F	3.87	2.15	
5713	F	3.90	2.43	
5801	F	3.71	3.39	
5805	F	0.00	0.00	
5903	F	3.16	1.76	
6301	F	5.91	4.21	
6305	F	5.53	0.00	
6402	F	4.73	3.23	
6406	F	3.80	1.94	
6407	F	3.88	1.85	
6408	F	3.53	2.28	
6501	F	3.23	2.39	
6502	F	3.40	1.21	
6601	F	3.79	2.17	
6607	F	0.00	0.00	
6703	F	9.91	7.82	
6704	F	9.86	0.43	
6711	F	9.65	-2.00	
6712	F	10.11	9.54	
6713	F	10.17	9.20	
6714	F	9.96	0.00	
6715	F	9.86	0.00	
6716	F	10.05	9.25	
6717	F	10.08	9.07	
6718	F	10.01	8.81	
6719	F	9.88	9.06	
6720	F	10.01	8.89	
6721	F	10.11	8.29	
6722	F	9.92	9.00	
6723	F	9.95	9.20	
6724	F	9.90	9.30	
6725	F	9.85	9.20	
6726	F	9.79	8.40	
6727	F	9.79	8.95	
6728	F	9.76	9.00	
6729	F	9.76	9.00	
6730	F	0.00	0.00	
6731	F	0.00	0.00	
6901	F	3.60	2.63	
6909	F	3.62	1.96	
6910	F	3.22	2.07	
6912	F	3.18	2.29	
6913	F	3.11	2.25	
6914	F	3.02	2.21	
7301	F	4.62	3.27	
7405	F	4.15	4.15	
7407	F	0.00	0.00	
7408	F	0.00	0.00	
7409	F	0.00	0.00	
7601	F	2.67	0.90	
7603	F	2.26	0.35	
7706	F	0.00	0.00	
7707	F	0.00	0.00	
7714	F	9.65	7.95	
7715	F	9.69	7.98	
7716	F	9.84	8.55	
7717	F	9.65	8.80	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
7718	F	9.65	8.84	
7719	F	9.65	9.20	
7720	F	9.55	8.75	
7721	F	9.55	8.80	
7722	F	9.55	8.91	
7801	F	10.75	9.39	
7802	F	10.88	9.61	
7803	F	10.79	9.68	
7804	F	0.00	-0.84	
7805	F	10.68	10.00	
7806	F	10.68	10.05	
7807	F	0.00	-0.50	
7808	F	11.25	11.25	
7808	F	0.00	0.00	
7809	F	0.00	-1.25	
7810	F	11.03	10.51	
7811	F	11.06	10.21	
7812	F	11.03	10.59	
7813	F	11.10	11.10	
7814	F	11.08	9.82	
7815	F	11.06	9.74	
7816	F	10.90	9.51	
7901	F	3.50	2.60	
7902	F	3.53	2.64	
7903	F	11.46	9.31	
7905	F	11.02	9.85	
7906	F	0.00	-0.90	
7907	F	11.07	10.30	
7917	F	0.00	0.00	
7920	F	3.31	2.51	
7921	F	3.04	2.37	
8301	F	7.14	0.00	
8401	F	8.02	4.61	
8501	F	9.02	7.83	
8502	F	0.00	0.00	
8602	F	9.82	8.65	
8603	F	0.00	0.00	
8604	F	0.00	0.00	
8605	F	0.00	0.00	
8606	F	0.00	0.00	
8704	F	9.86	8.21	
8706	F	10.00	8.33	
8707	F	10.04	8.37	
8710	F	0.00	0.00	
8801	F	0.00	-0.44	
8802	F	10.56	8.76	
8803	F	10.50	8.85	
8804	F	0.00	-1.30	
8805	F	10.37	9.21	
8806	F	10.31	9.20	
8807	F	0.00	-1.01	
8808	F	10.35	9.38	
8809	F	0.00	-0.72	
8810	F	0.00	-0.59	
8811	F	10.16	-0.51	
8819	F	10.49	10.22	
8820	F	0.00	0.00	
8821	F	10.73	9.69	
8823	F	10.30	0.00	
8824	F	10.30	9.99	
8825	F	0.00	0.00	
8901	F	10.83	7.78	
8902	F	10.88	8.26	
8903	F	11.00	8.68	
8904	F	11.01	8.91	
8905	F	10.64	9.84	
8906	F	0.00	-0.61	
8907	F	0.00	-0.46	
8908	F	10.72	9.46	
8909	F	0.00	0.00	
8910	F	10.70	0.00	
9303	F	6.73	4.23	
9304	F	6.86	4.32	
9401	F	6.97	4.37	
9402	F	7.78	4.43	
9407	F	7.65	4.79	
9509	F	8.14	5.26	
9510	F	7.97	5.10	
9511	F	8.13	4.98	
9701	F	9.47	8.78	
9702	F	9.53	8.71	
9703	F	9.45	8.57	
9704	F	0.00	-0.94	
9705	F	0.00	-0.97	
9706	F	9.63	8.92	
9710	F	8.42	0.00	
9715	F	9.50	9.50	
9809	F	9.48	9.48	
9810	F	0.00	-0.91	
9811	F	10.02	7.65	
9814	F	9.48	8.19	
9815	F	9.49	8.37	
9818	F	0.00	0.00	
9901	F	10.27	0.00	
6753	S	9.83	8.80	
6754	S	9.98	9.24	
6755	S	9.79	8.88	
6756	S	9.74	8.96	
6757	S	9.96	8.88	
6758	S	10.10	8.91	
6759	S	10.17	9.42	
6760	S	9.88	9.25	
7754	S	9.71	8.49	
7755	S	9.74	8.59	
7756	S	9.81	8.59	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Appendix D - Brownfield Calculations

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		

Brownfield Area

Type : Catchment Area

Area (ha)	0.116

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

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

FEH

Type: FEH

Site Location	GB 518256 104661 TQ 18256 04661
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	0.000
100.0	0.000
30.0	40.000
100.0	45.000

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

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Title: UK and Ireland Rural Runoff Calculator	Company Address:		

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.116
SAAR (mm)	700.0
Soil	0.3
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	0.2	0.2	0.2	0.5	0.7

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Brownfield Area	FEH: 2 years: +0 %: 15 mins: Summer	0.12	21.9	9.861

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Brownfield Area	FEH: 30 years: +0 %: 15 mins: Summer	0.12	49.1	22.110

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Brownfield Area	FEH: 100 years: +0 %: 15 mins: Summer	0.12	61.9	27.897

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Brownfield Area	FEH: 30 years: +40 %: 15 mins: Summer	0.12	68.7	30.954

Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Brownfield Area	FEH: 100 years: +45 %: 15 mins: Summer	0.12	89.8	40.455

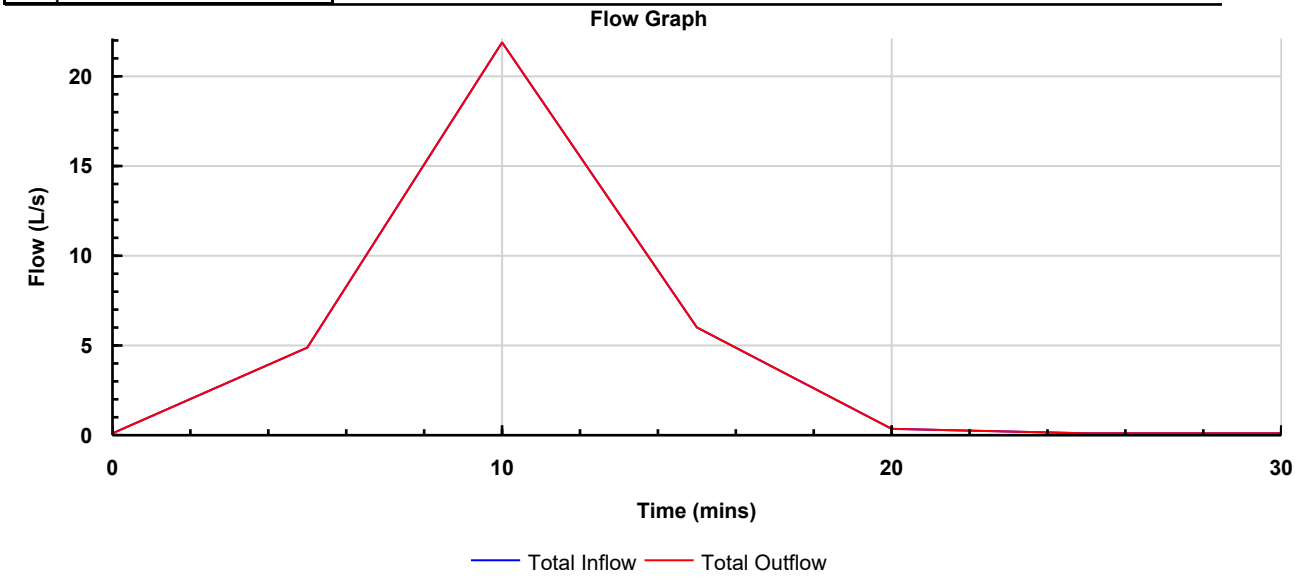
Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

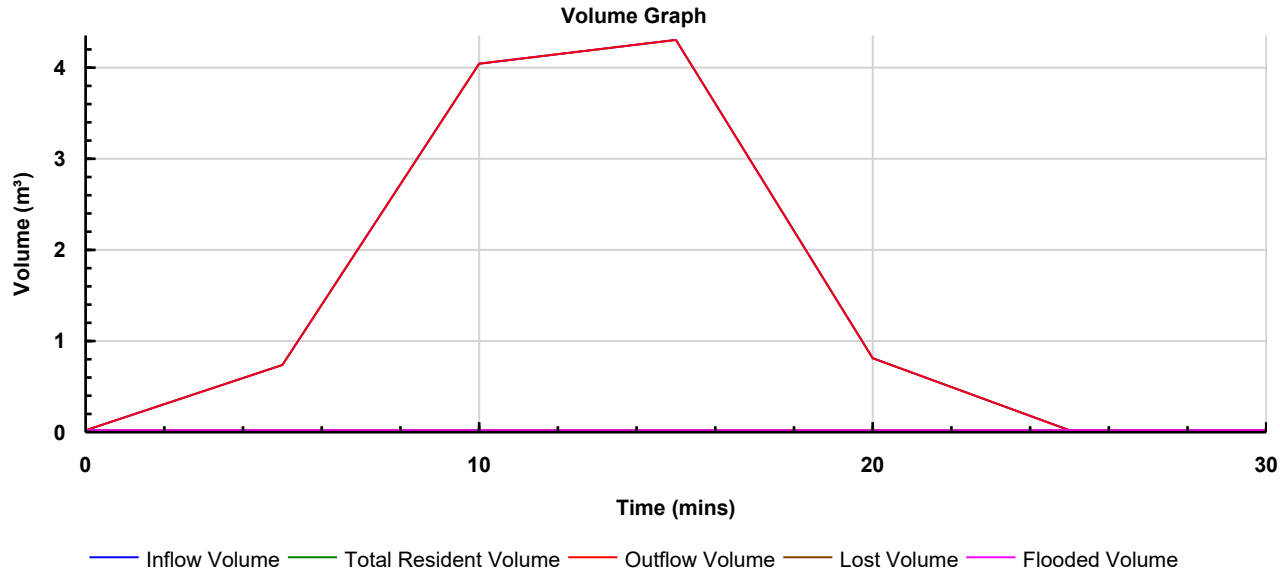
Phase
FEH: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	21.9	9.861	21.9	9.861

Graphs





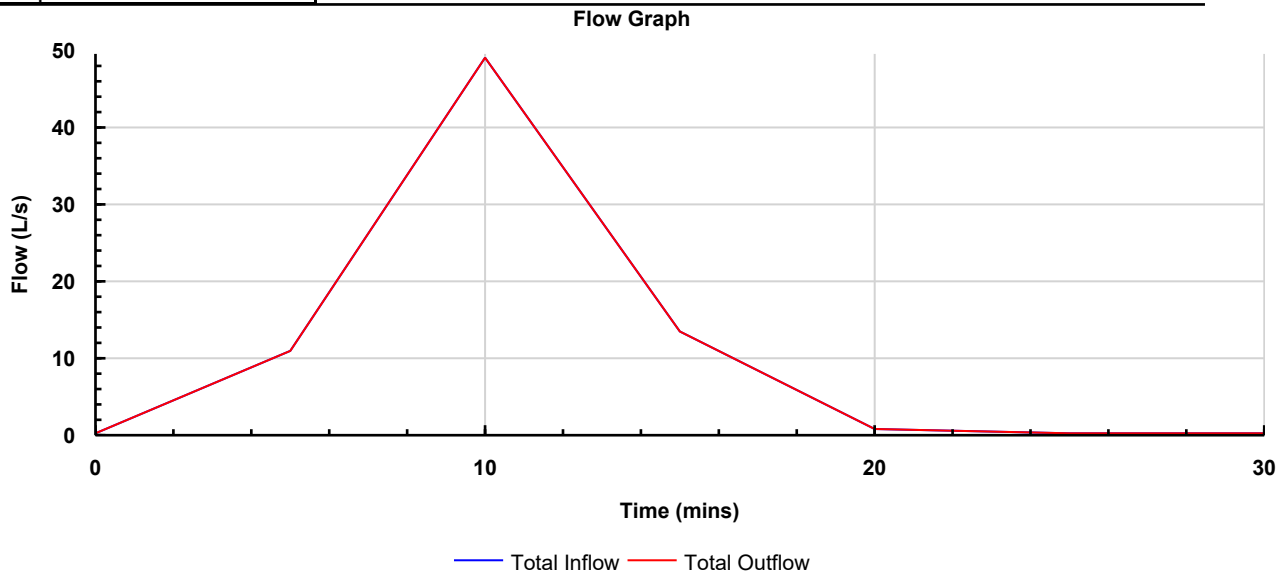
Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

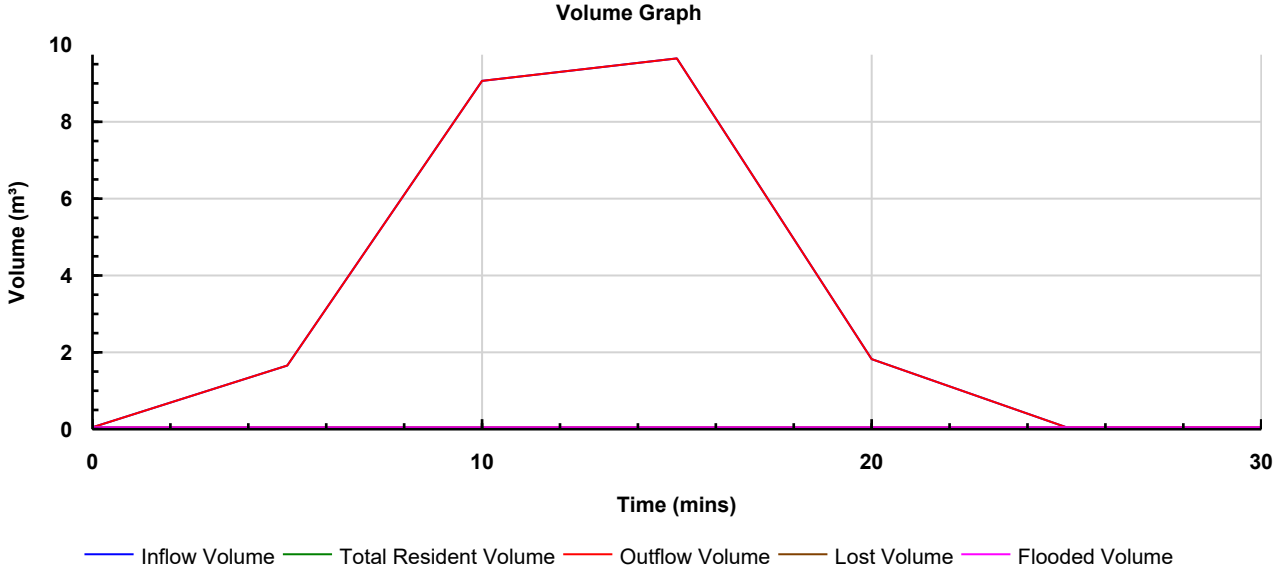
Phase
FEH: 30 years: Increase Rainfall (%): +0: 15 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	49.1	22.110	49.1	22.110

Graphs





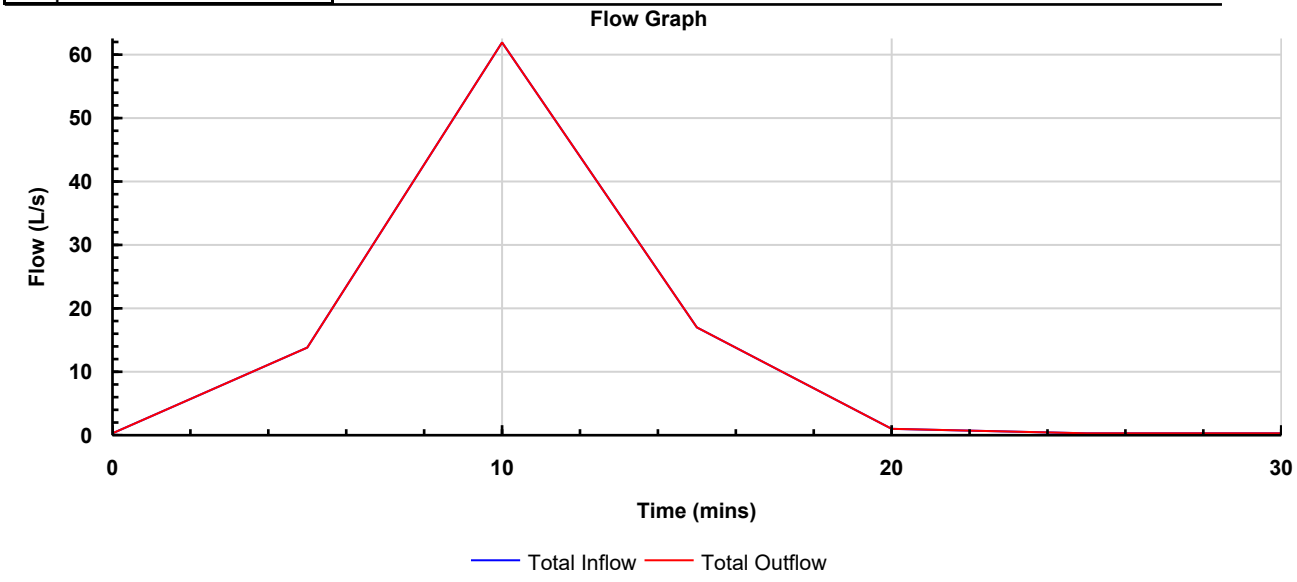
Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

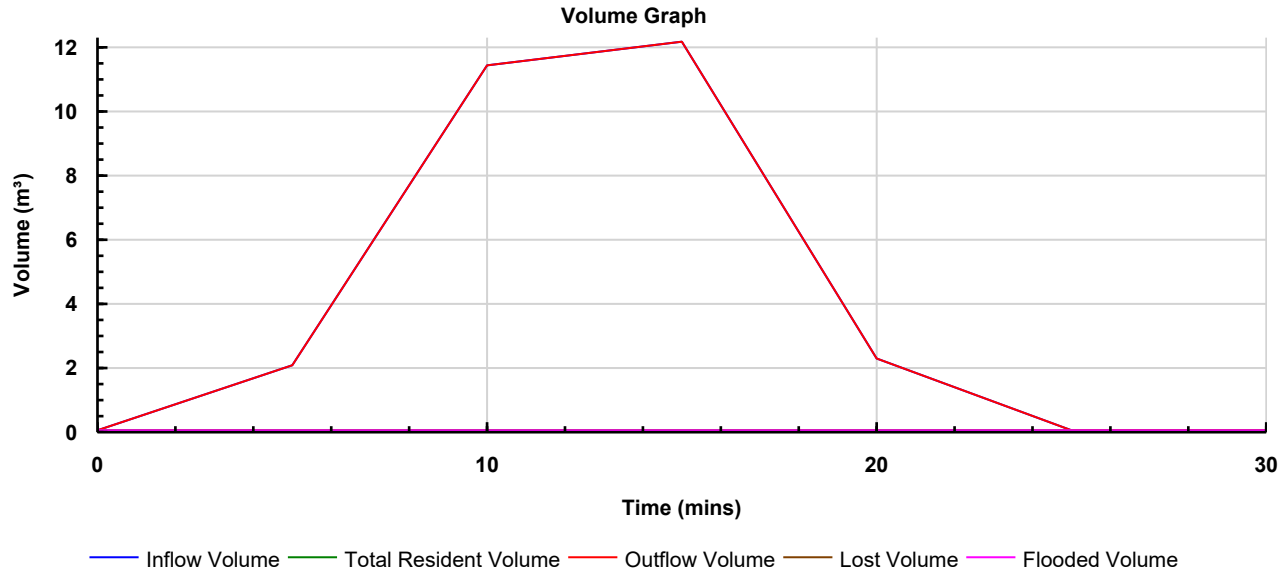
Phase
FEH: 100 years: Increase Rainfall (%): +0: 15 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	61.9	27.897	61.9	27.897

Graphs





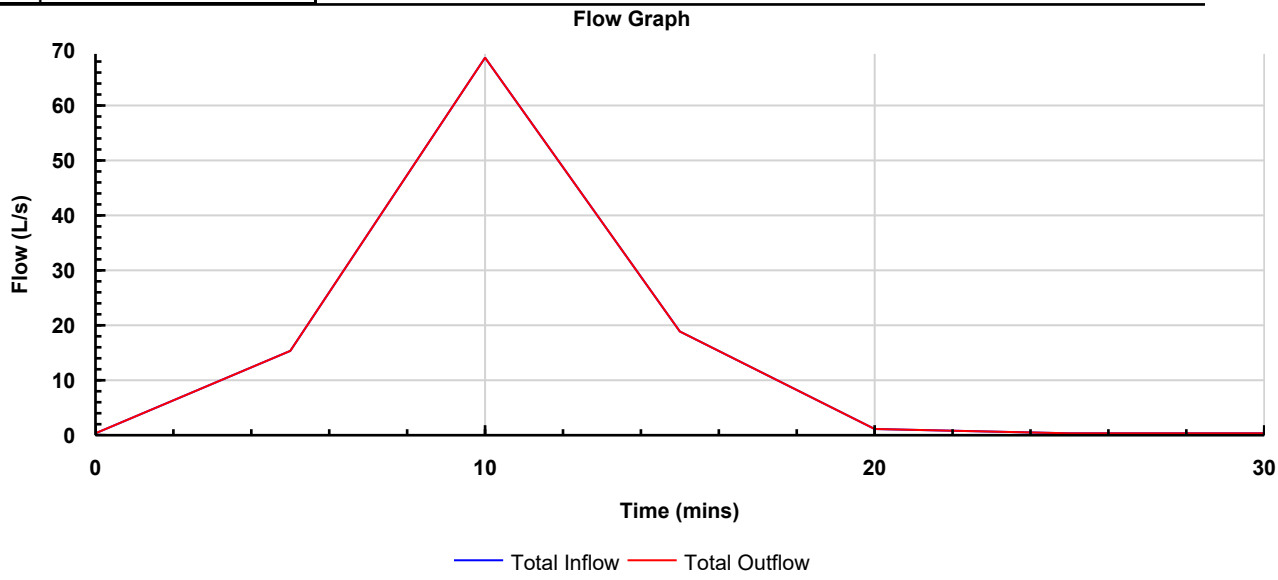
Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

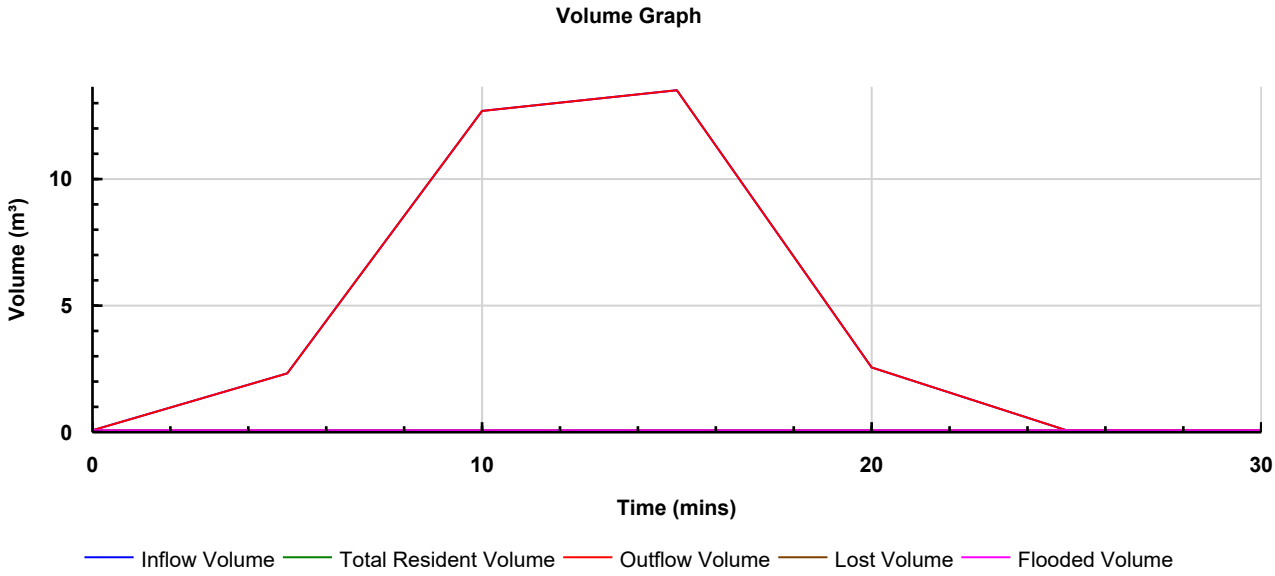
Phase
FEH: 30 years: Increase Rainfall (%): +40: 15 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	68.7	30.954	68.7	30.954

Graphs





Project:	Date: 26/09/2024		
	Designed by: Chris	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

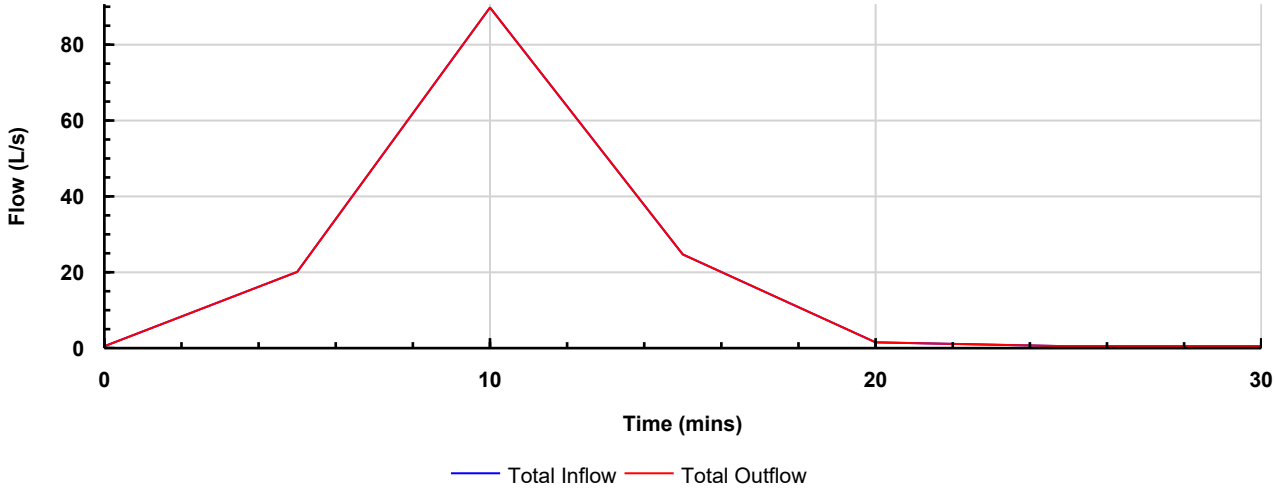
Phase
FEH: 100 years: Increase Rainfall (%): +45: 15 mins: Summer

Tables

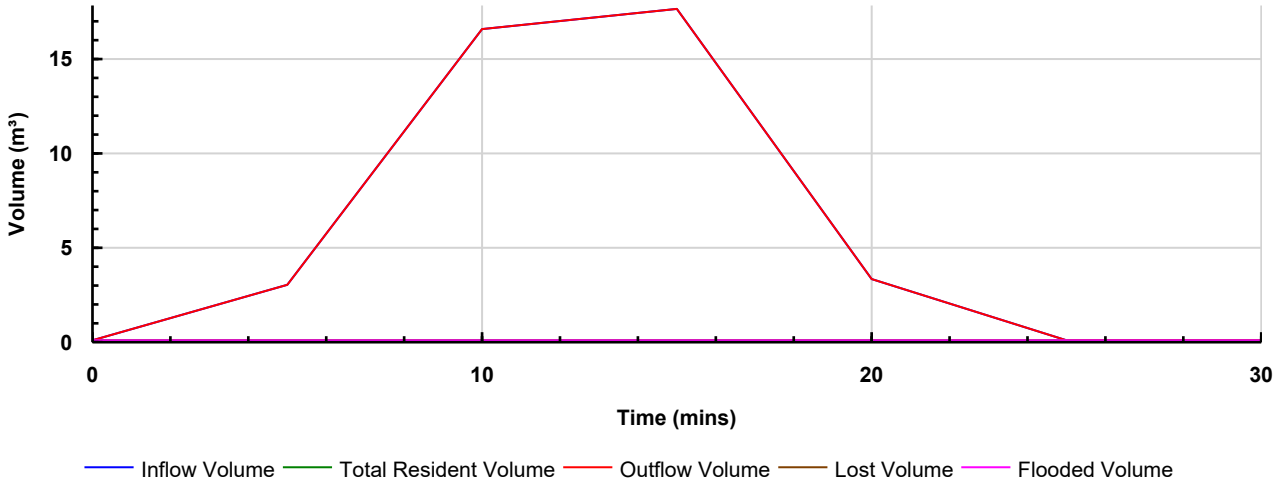
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
TOTAL	89.8	40.455	89.8	40.455

Graphs

Flow Graph



Volume Graph



Appendix E - Surface Water Drainage Strategy

NOTES

DUE TO THE COMPACT LAYOUT OF THE SITE INFILTRATION HAS BEEN DISCOUNTED AS A MEANS OF DISCHARGING SURFACE WATER AS IT WOULD NOT BE POSSIBLE TO LOCATE A SOAKAWAY WITHIN THE SITE AT LEAST 5m FROM ANY BUILDING.

ADDITIONALLY, IT WOULD NOT BE POSSIBLE TO PROVIDE ATTENUATION FOR THE WHOLE SITE AREA. AS SUCH, THE PROPOSED EXTENSION ROOF AREAS ARE TO BE ATTENUATED. THE PROPOSED DISCHARGE RATE IS 2l/s, REPRESENTING A 97.77% BETTERMENT DURING THE 1:100(+45%CC) EVENT.

FOUL WATER FROM THE PROPOSED DEVELOPMENT TO DISCHARGE INTO THE EXISTING FOUL DRAIN ON SITE.

BASED ON 'THE CODE' METHODOLOGY THE RESIDENTIAL FOUL FLOW RATE FROM THE DEVELOPMENT IS 0.97l/s.

SURFACE AND FOUL DISCHARGES ARE SUBJECT TO CAPACITY CHECKS/ APPROVAL FROM SOUTHERN WATER.

GEOCELLULAR STORAGE TANK (PERMAVOID HIGH STRENGTH UNIT)

PLAN AREA 58.5m^2
COVER LEVEL: 6.75m AOD
INVERT LEVEL: 4.95m AOD
COVER DEPTH: 0.3m
TANK DEPTH: 1.5m

ATTENUATION PROVIDED AT 95% VOID RATIO: 83.36m^3

ATTENUATION PROVIDED FOR THE PROPOSED EXTENSION ROOF AREAS ONLY.

RAINWATER DOWNPIPES SHOWN INDICATIVELY TO CONNECT INTO THE PROPOSED GEOCELLULAR STORAGE TANK.

THE CARPARK AREA IS TO DRAIN AS PER THE EXISTING SCENARIO INTO THE EXISTING DRAINAGE.

EXISTING COMBINED DRAIN TO BE REUSED SUBJECT TO PRIOR AGREEMENT WITH SOUTHERN WATER.

CCTV SURVEY ABBANDONED AT THIS POINT HOWEVER THE DRAIN ON SITE IS ASSUMED TO DISCHARGE TO THE SOUTHERN WATER SEWER BENEATH NORTH ROAD.

PROPOSED HYDROBRAKE MANHOLE
COVER LEVEL: 6.75m AOD
INVERT LEVEL: 4.80m AOD

HYDROBRAKE REFERENCE:
CHE-0058-2000-1500-2000

PROPOSED SURFACE WATER TO DISCHARGE TO EXISTING SURFACE WATER MANHOLE (MH010)
COVER LEVEL: 6.54m AOD
INVERT LEVEL: 4.62m AOD

PROPOSED FOUL WATER TO DISCHARGE TO EXISTING FOUL WATER MANHOLE (MH003)
COVER LEVEL: 6.81m AOD
INVERT LEVEL: 6.02m AOD

FOUL WATER FROM THE PROPOSED DEVELOPMENT TO CONNECT INTO THE EXISTING FOUL DRAIN ON SITE.

BASED ON 'THE CODE' METHODOLOGY THE RESIDENTIAL FOUL FLOW RATE FROM THE DEVELOPMENT IS 0.97l/s.

2.5m

2.5m

2.5m

RWP

Culver Road

North Road

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT REPORTS, PLANS AND ARCHITECTURAL DRAWINGS
2. THIS DRAWING SHOULD NOT BE SCALED. THERE SHOULD BE NO RELIANCE ON THIS DRAWING WITH REGARDS TO DIMENSIONS. ALL DIMENSIONS SHOULD BE CONFIRMED ON SITE.
3. ANY DISCREPANCY ON THIS DRAWING SHOULD BE REPORTED TO AEGAEA IMMEDIATELY FOR CLARIFICATION.
4. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORKS AND FOR THE STABILITY, INSTALLATION AND HEALTH AND SAFETY OF THE WORKS.
5. AEGAEA HAVE PRODUCED THIS DRAWING BASED ON THE DRAWINGS AND INFORMATION PROVIDED BY THE CLIENT AVAILABLE AT THE TIME OF PRODUCTION. WE CANNOT ACCEPT RESPONSIBILITY FOR DISCREPANCIES RESULTING FROM NEW PLANS/ INFORMATION BEING ISSUED POST-ISSUE OF THIS DRAWING. THE CONTRACTOR SHOULD REVIEW THIS DRAWING IN LIGHT OF WIDER SITE INFORMATION SUCH AS CONTAMINATION, UTILITIES SURVEYS AND SITE INVESTIGATIONS
6. IT IS THE RESPONSIBILITY OF THE PRINCIPLE CONTRACTOR TO MAKE THE DESIGNER AND CLIENT AWARE OF SITE-SPECIFIC RISKS AND HAZARDS THAT MAY AFFECT THE DRAWING AND SPECIFICATION

notes

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LEGEND

- PROPOSED SURFACE WATER DRAIN
- SOUTHERN WATER COMBINED SEWE
- EXISTING DRAIN ON SITE
- EXISTING MANHOLE ON SITE
- HYDROBRAKE MANHOLE
- PROPOSED GEOCELLULAR TANK
- RWP — INDICATIVE RAINWATER PIPE
- CATCHMENT AREAS

CLIENT: FARCASTLE LIMITED

SITE: QUEENS PARADE, NORTH ROAD, LANCING, BN15 9BA

DRAWING: SURFACE AND FOUL WATER DRAINAGE LAYOUT

DRAWING NUMBER: 5636_DR01

DATE: 17/01/2025

REV: SECOND ISSUE

DRAWN BY: JA

DRAWING SCALE: 1:250 @ A3

PRELIMINARY DRAWING FOR PLANNING ONLY - NOT FOR CONSTRUCTION

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Appendix F - Proposed Network Calculations

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Inflows Storm Phase: Phase	Company Address: Aegaea		

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Catchment Area

Type : Catchment Area

Area (ha)	0.03

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (1)

Type : Catchment Area

Area (ha)	0.086

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.900
Winter Volumetric Runoff	0.900
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: Aegaea		

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	6.750
Depth (m)	1.500
Base Level (m)	4.950
Number of Crates Long	26
Number of Crates Wide	25
Number of Crates High	5
Porosity (%)	95
Crate Length (m)	0.3
Crate Width (m)	0.3
Crate Height (m)	0.3
Total Volume (m³)	83.663

Inlets

Inlet

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

Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Free Discharge

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

FEH

Type: FEH

Site Location	GB 518256 104661 TQ 18256 04661
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
2.0	0.000
30.0	0.000
100.0	0.000
30.0	40.000
100.0	45.000

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

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.116
SAAR (mm)	700.0
Soil	0.3
Region	Region 7
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 7	0.2	0.2	0.2	0.5	0.7

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 2 years: +0 %: 15 mins: Summer	0.03	5.7	2.564
Catchment Area (1)	FEH: 2 years: +0 %: 15 mins: Summer	0.09	16.4	7.345

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 30 years: +0 %: 15 mins: Summer	0.03	12.8	5.729
Catchment Area (1)	FEH: 30 years: +0 %: 15 mins: Summer	0.09	36.7	16.422

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 100 years: +0 %: 15 mins: Summer	0.03	16.2	7.227
Catchment Area (1)	FEH: 100 years: +0 %: 15 mins: Summer	0.09	46.4	20.710

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 30 years: +40 %: 15 mins: Summer	0.03	17.9	8.010
Catchment Area (1)	FEH: 30 years: +40 %: 15 mins: Summer	0.09	51.5	22.968

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m^3)
Catchment Area	FEH: 100 years: +45 %: 15 mins: Summer	0.03	23.5	10.459
Catchment Area (1)	FEH: 100 years: +45 %: 15 mins: Summer	0.09	67.3	29.990

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Drainage	FEH: 2 years: +0 %: 960 mins: Winter	6.540	4.620	4.650	0.030	1.3	0.000	0.000	1.3	40.715	OK
Manhole	FEH: 2 years: +0 %: 240 mins: Winter	6.750	4.800	5.246	0.446	1.4	0.505	0.000	1.3	25.432	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Drainage	FEH: 30 years: +0 %: 240 mins: Winter	6.540	4.620	4.652	0.032	1.5	0.000	0.000	1.5	35.091	OK
Manhole	FEH: 30 years: +0 %: 240 mins: Winter	6.750	4.800	5.640	0.840	1.5	0.950	0.000	1.5	35.125	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Drainage	FEH: 100 years: +0 %: 240 mins: Winter	6.540	4.620	4.654	0.034	1.7	0.000	0.000	1.7	38.918	OK
Manhole	FEH: 100 years: +0 %: 240 mins: Winter	6.750	4.800	5.856	1.056	1.7	1.195	0.000	1.7	38.955	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Drainage	FEH: 30 years: +40 %: 240 mins: Winter	6.540	4.620	4.655	0.035	1.8	0.000	0.000	1.8	41.198	OK
Manhole	FEH: 30 years: +40 %: 240 mins: Winter	6.750	4.800	5.995	1.195	1.8	1.351	0.000	1.8	41.236	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
Existing Drainage	FEH: 100 years: +45 %: 240 mins: Winter	6.540	4.620	4.658	0.038	2.0	0.000	0.000	2.0	46.686	OK
Manhole	FEH: 100 years: +45 %: 240 mins: Winter	6.750	4.800	6.355	1.555	2.0	1.759	0.000	2.0	46.728	Surcharged

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

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. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Lost Volume (m³)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FEH: 2 years: +0 %: 240 mins: Winter	5.249	5.249	0.299	0.299	5.0	16.617	0.000	1.4	0.000	25.706	117	80.138

Status
OK

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Aegaea		

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FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

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. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Lost Volume (m³)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FEH: 30 years: +0 %: 240 mins: Winter	5.645	5.645	0.695	0.695	9.7	38.610	0.000	1.5	0.000	35.748	262	53.850

Status
OK

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

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. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Lost Volume (m³)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FEH: 100 years: +0 %: 240 mins: Winter	5.862	5.862	0.912	0.912	12.1	50.680	0.000	1.7	0.000	39.777	302	39.424

Status
OK

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

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. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Lost Volume (m³)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FEH: 30 years: +40 %: 240 mins: Winter	6.001	6.001	1.051	1.051	13.6	58.400	0.000	1.8	0.000	42.189	326	30.196

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address: Aegaea		

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Status
OK

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Resident Volume

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. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Lost Volume (m³)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Cellular Storage	FEH: 100 years: +45 %: 240 mins: Winter	6.363	6.363	1.413	1.413	17.5	78.504	0.000	2.0	0.000	48.027	381	6.166

Status
OK

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 2 years: +0 %: 60 mins: Winter	Pipe	Cellular Storage	Manhole	6.750	5.183	0.100	6.479	0.4	0.2	1.8	Surcharged
Pipe (1)	FEH: 2 years: +0 %: 960 mins: Winter	Pipe	Manhole	Existing Drainage	6.750	5.104	0.030	40.715	0.6	0.2	1.3	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	Cellular Storage	Manhole	6.750	5.321	0.100	2.226	0.6	0.21	1.9	Surcharged
Pipe (1)	FEH: 30 years: +0 %: 240 mins: Winter	Pipe	Manhole	Existing Drainage	6.750	5.640	0.032	35.091	0.7	0.22	1.5	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +0 %: 15 mins: Winter	Pipe	Cellular Storage	Manhole	6.750	5.421	0.100	2.500	0.5	0.32	2.8	Surcharged
Pipe (1)	FEH: 100 years: +0 %: 240 mins: Winter	Pipe	Manhole	Existing Drainage	6.750	5.856	0.034	38.918	0.7	0.25	1.7	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +40 %: 15 mins: Winter	Pipe	Cellular Storage	Manhole	6.750	5.474	0.100	2.638	0.5	0.38	3.4	Surcharged
Pipe (1)	FEH: 30 years: +40 %: 240 mins: Winter	Pipe	Manhole	Existing Drainage	6.750	5.995	0.036	41.198	0.7	0.27	1.8	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by: JA	Checked by: CH	Approved By: DC
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: Aegaea		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	Cellular Storage	Manhole	6.750	5.639	0.100	3.021	0.5	0.47	4.2	Surcharged
Pipe (1)	FEH: 100 years: +45 %: 240 mins: Winter	Pipe	Manhole	Existing Drainage	6.750	6.355	0.038	46.686	0.7	0.3	2.0	Surcharged

Project:	Date:		
Queens Parade, North Road (BN15 9BA) Surface Water Drainage Calculations	12/12/2024		
	Designed by:	Checked by:	Approved By:
	JA	CH	DC
Report Details: Type: Phase Management Storm Phase: Phase	Company Address: Aegaea		

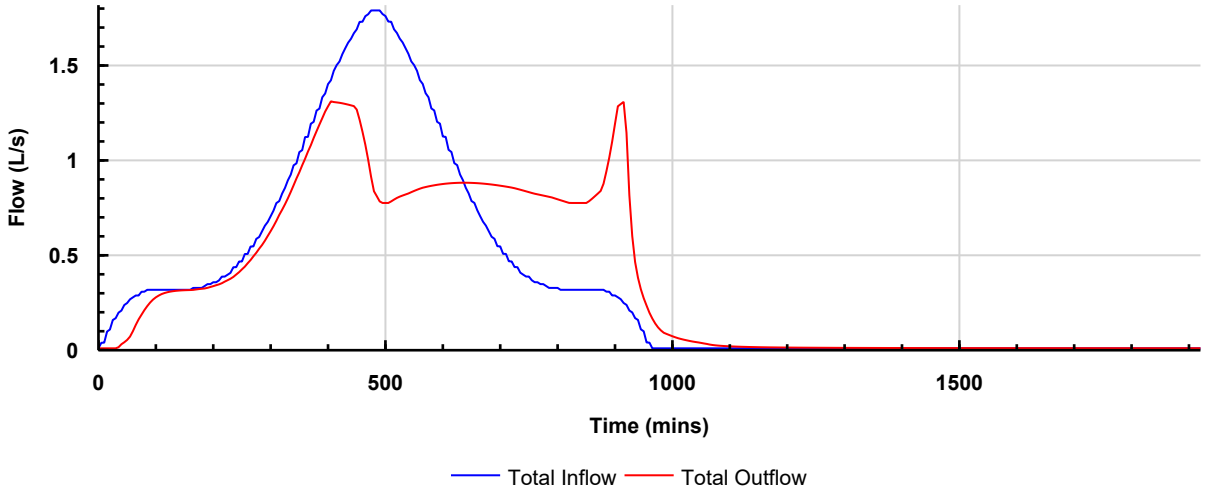
Phase
FEH: 2 years: Increase Rainfall (%): +0: 960 mins: Winter

Tables

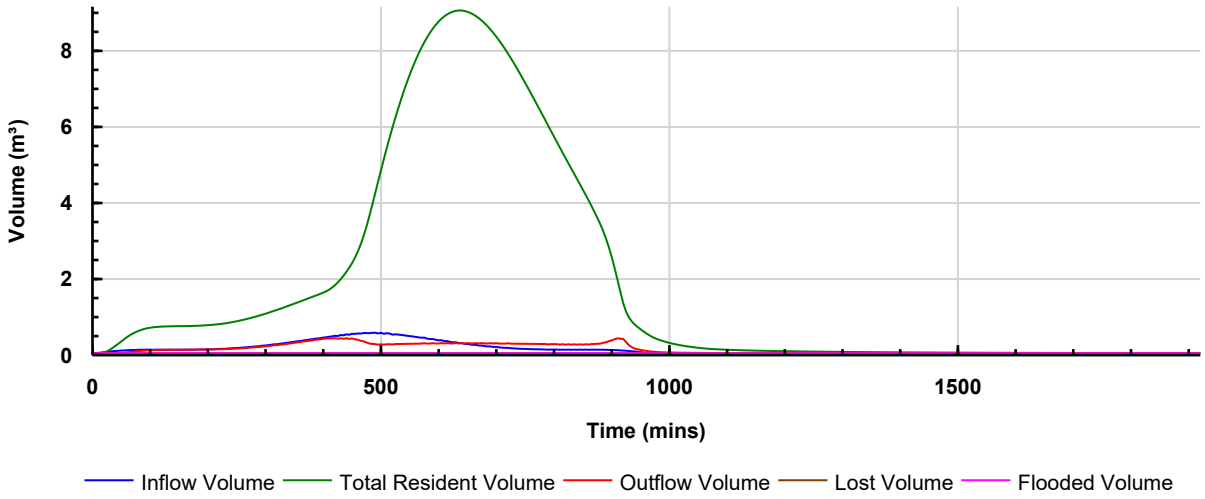
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Existing Drainage			1.3	40.715
TOTAL	1.8	40.761	1.3	40.715

Graphs

Flow Graph



Volume Graph

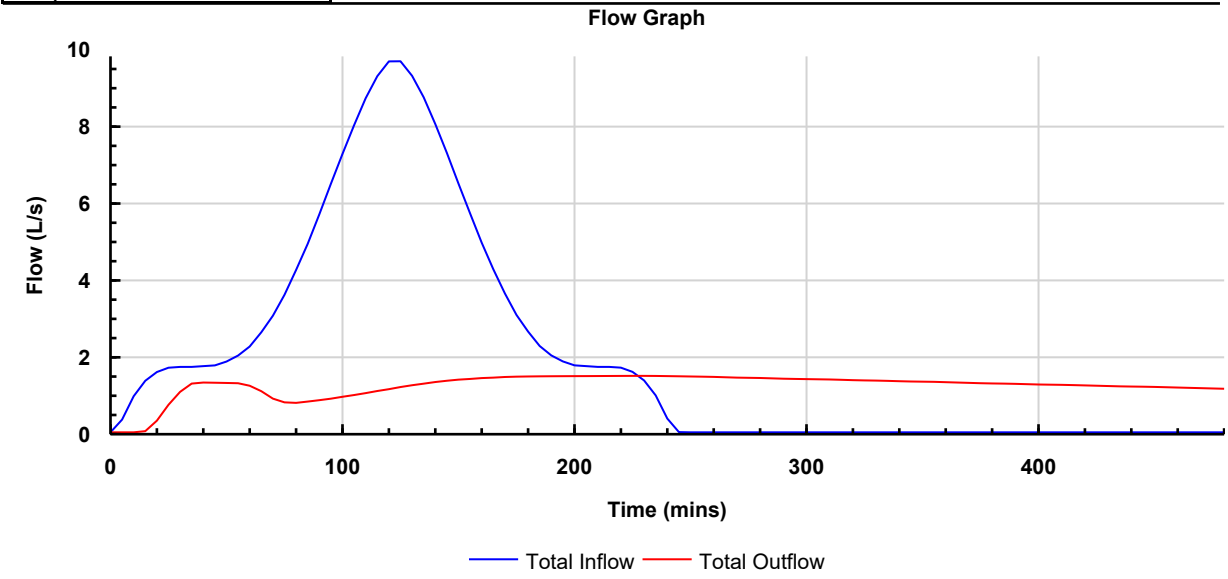


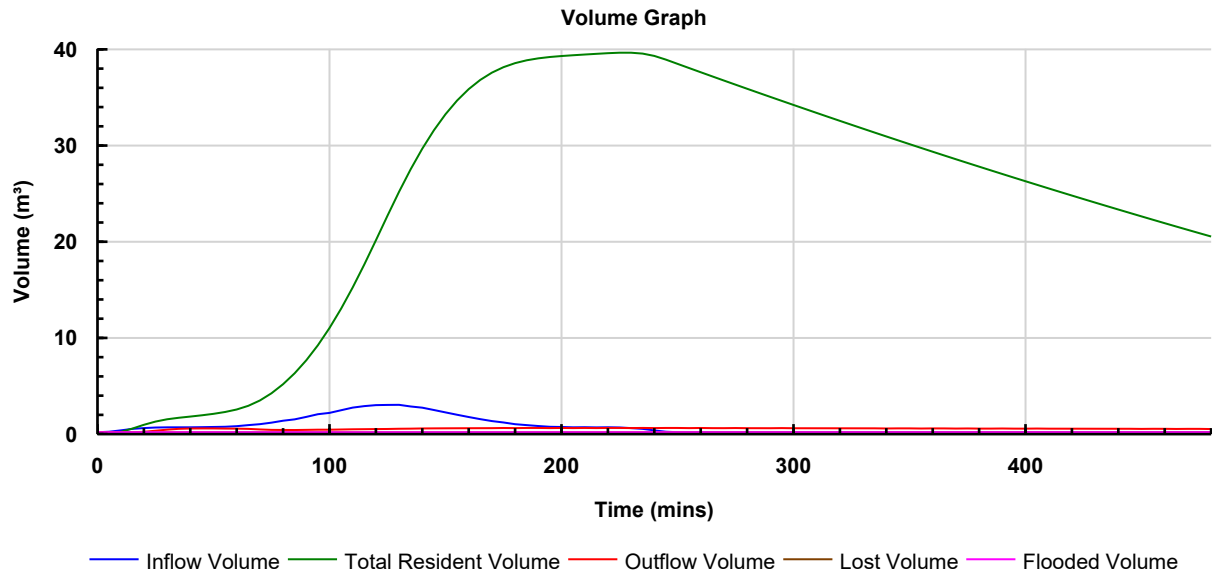
Phase
FEH: 30 years: Increase Rainfall (%): +0: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Existing Drainage			1.5	35.091
TOTAL	9.7	55.638	1.5	35.091

Graphs



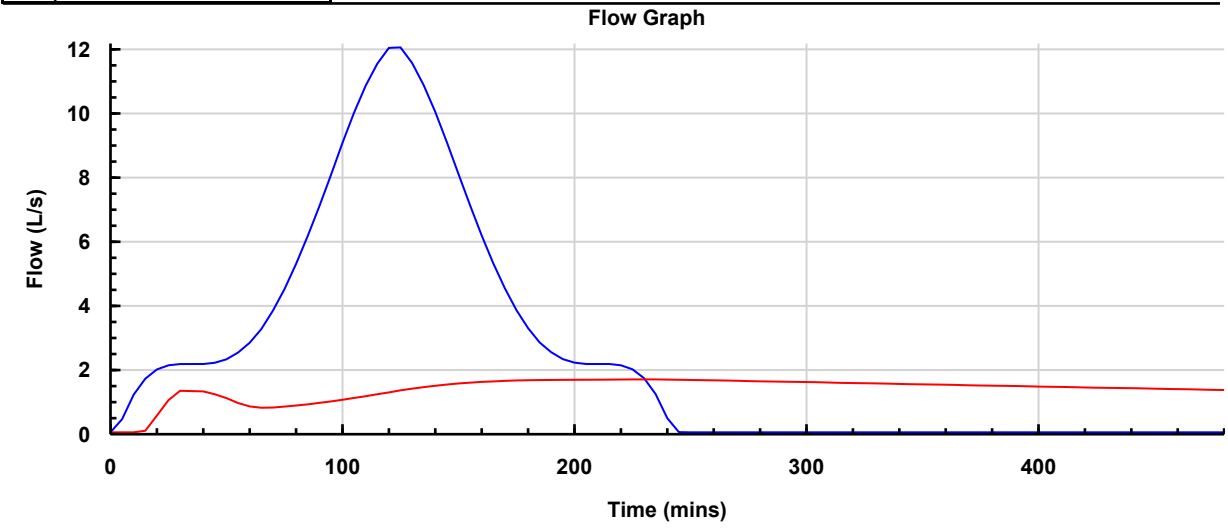


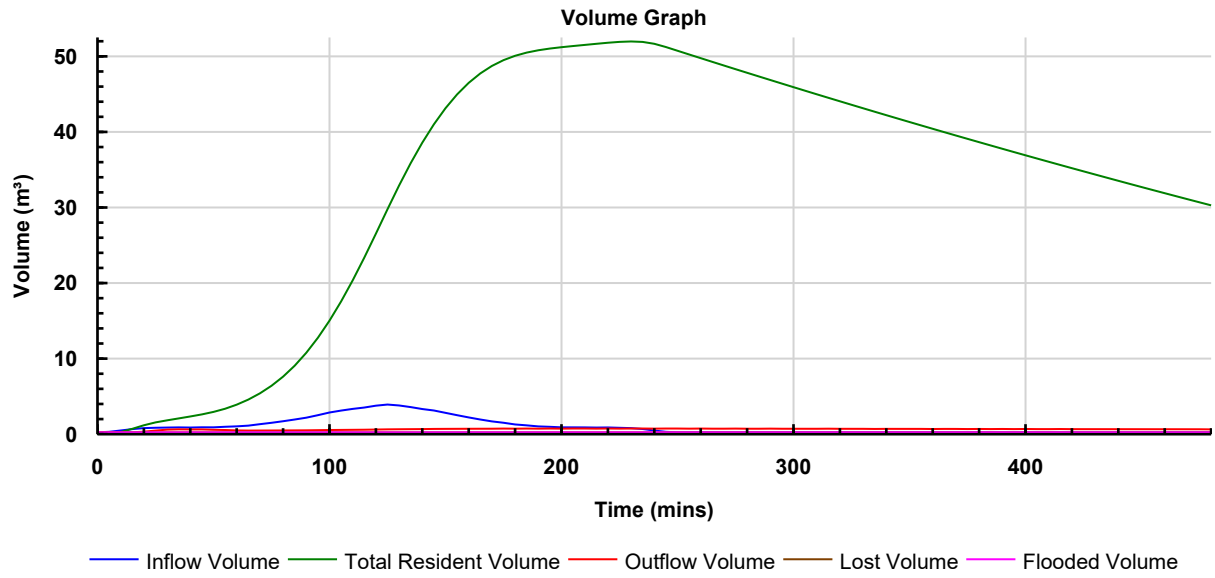
Phase
FEH: 100 years: Increase Rainfall (%): +0: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Existing Drainage			1.7	38.918
TOTAL	12.1	69.213	1.7	38.918

Graphs





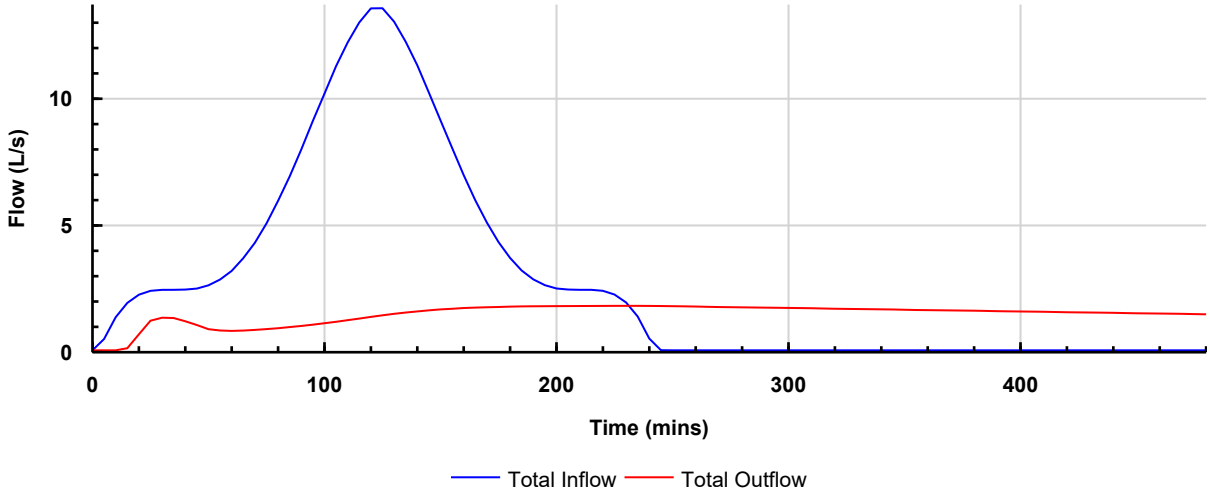
Phase
FEH: 30 years: Increase Rainfall (%): +40: 240 mins: Winter

Tables

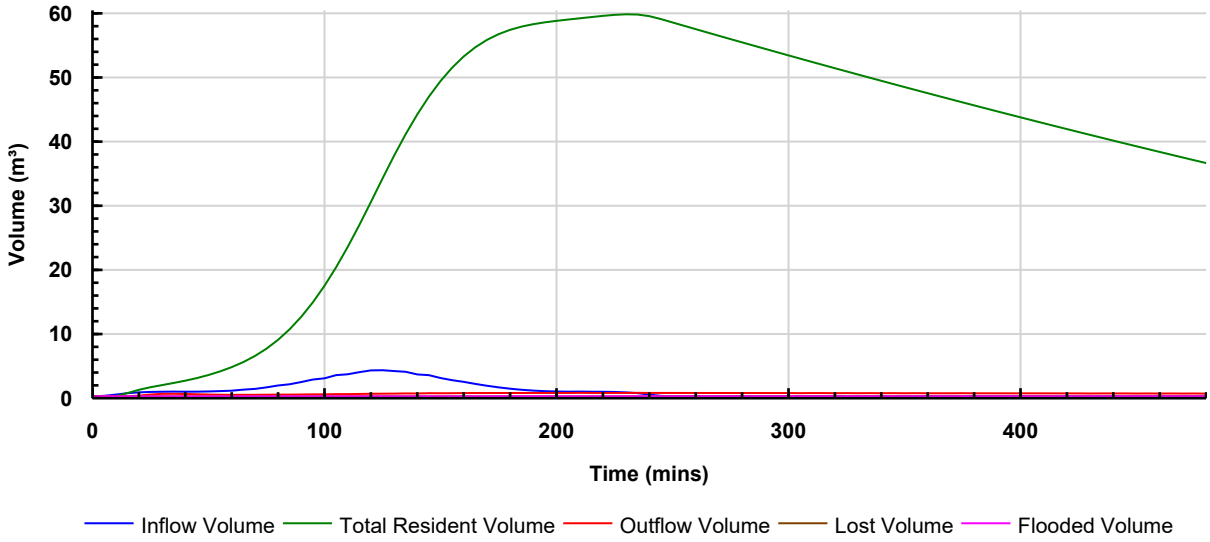
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Existing Drainage			1.8	41.198
TOTAL	13.6	77.870	1.8	41.198

Graphs

Flow Graph



Volume Graph



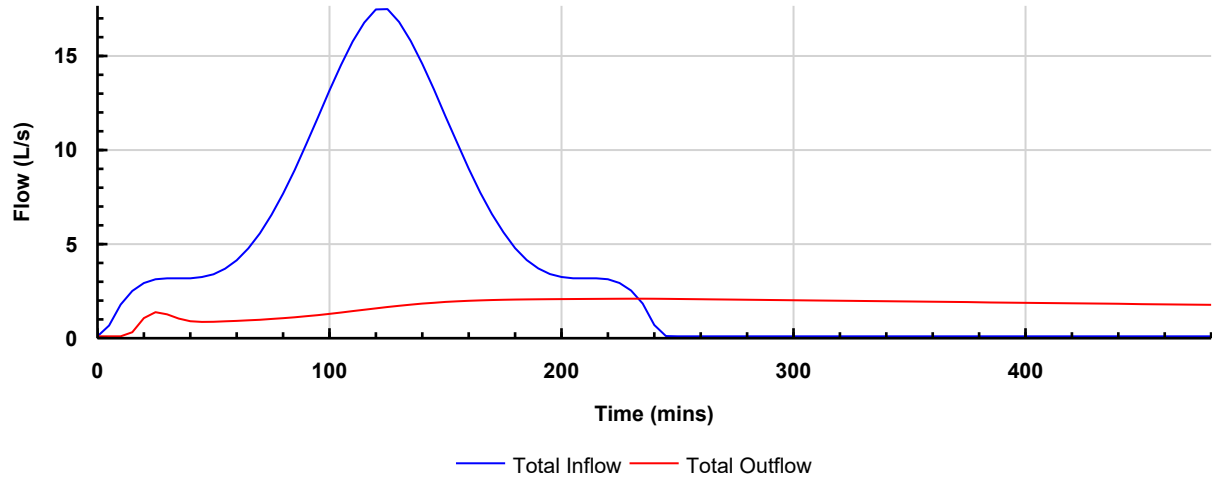
Phase
FEH: 100 years: Increase Rainfall (%): +45: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Existing Drainage			2.0	46.686
TOTAL	17.5	100.349	2.0	46.686

Graphs

Flow Graph



Volume Graph