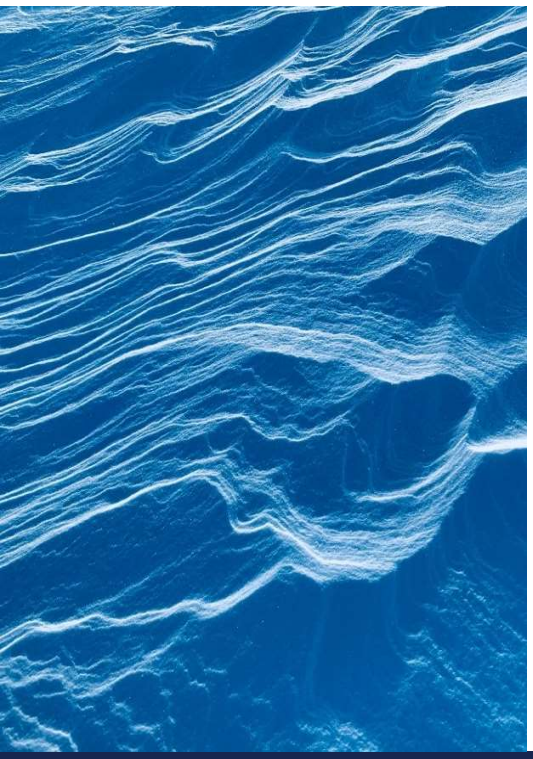

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Flood Risk Assessment & Surface Water Drainage Strategy
AEG3378_UB11_Uxbridge_07

Site Address: 3 The Square
Stockley Park
Uxbridge
London Borough of Hillingdon
UB11 1ET

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

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Document Issue Record

Project: Flood Risk Assessment

Prepared for: Iceni

Reference: AEG3378_UB11_Uxbridge_01

Site Location: 3 The Square, Stockley Park, Uxbridge, London Borough of Hillingdon, UB11 1ET

Issue	Date	Author	Check	Auth.	Comments
1	02/02/2024	Oliver Harvey	JA	NDD	First issue

Please Note:

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Table of Contents

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Summary

Development Description	Existing	Proposed
Development Type	Vacant commercial premises	A post-operative care facility
EA Vulnerability Classification	Less Vulnerable	More Vulnerable
External Levels	Between approximately 33.90m AOD and 34.50m AOD (based on topographic survey)	No change
Level of Sleeping Accommodation	No sleeping	Beds location on the first floor and above
Surface Water Drainage	N/A[1]	A surface water drainage strategy accompanies this FRA.
Site Size	Approximately 13,420m^2	No change
Risk to Development	**Summary**	**Comment**
EA Flood Zone	Flood Zone 1	There are no EA Main Rivers in the vicinity of the site.
Flood Source	N/A	Site considered to be at low risk from all sources
SFRA Available	West London Strategic Flood Risk Assessment (West London Boroughs, 2018)	
Management Measures	**Summary**	**Comment**
Ground floor level above extreme flood levels	Yes	Site considered to be at low risk from all sources
Safe Access/Egress Route	Yes	Site considered to be at low risk from all sources
Flood Resilient Design	N/A[1]	Site considered to be at low risk from all sources
Site Drainage Plan	Yes	Site considered to be at low risk from all sources

Flood Warning and Evacuation Plan	N/A	Recommended that occupier monitor Met Office Weather Warnings for extreme weather events.
Offsite Impacts	**Summary**	**Comment**
Displacement of floodwater	None	Site considered to be at low risk from all sources
Increase in surface run-off generation	None	A surface water drainage strategy accompanies this FRA.
Impact on hydraulic performance of channels	None	No nearby channels

[1] not required for this assessment

[2] data not available.

1. Introduction

1.1. Aegaea were commissioned by Iceni to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA 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 FRA is intended to support a full 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 3 The Square, Stockley Park, Uxbridge, London Borough of Hillingdon, UB11 1ET (Figure 1).

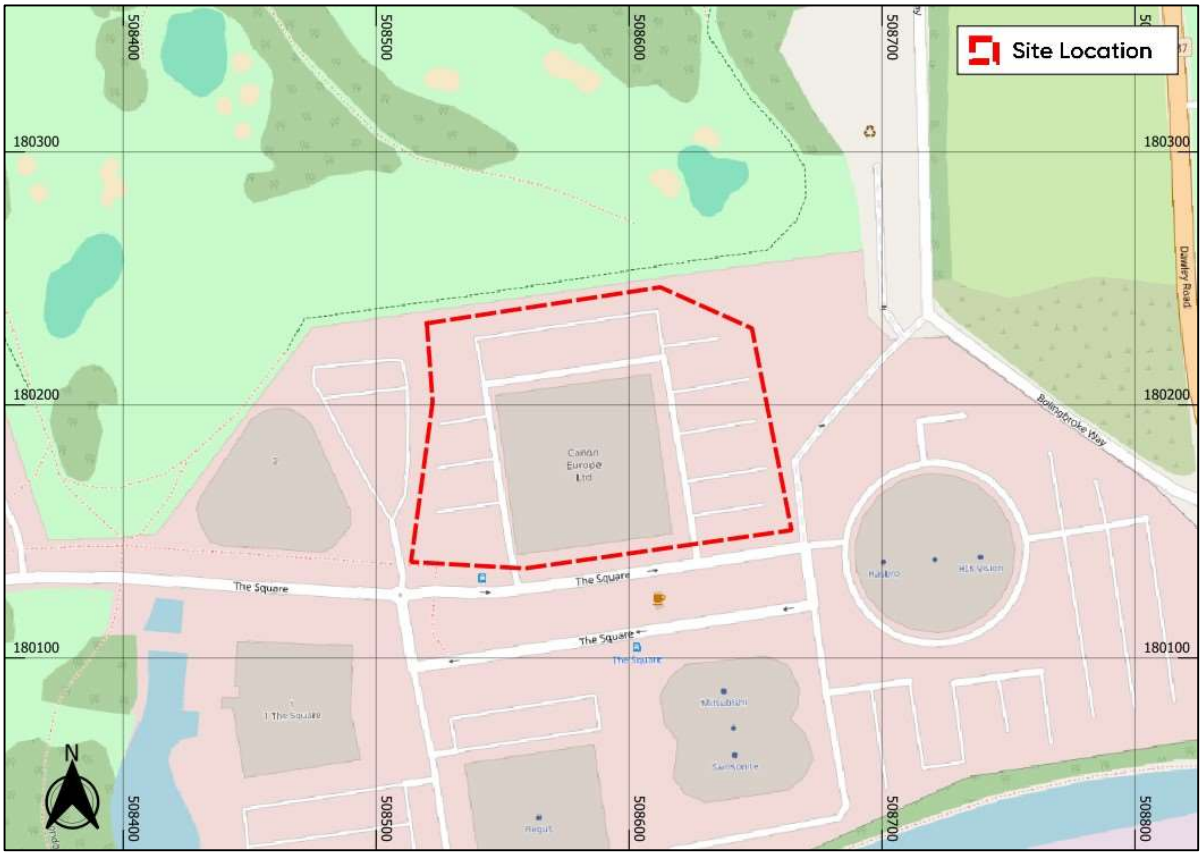


Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors)

1.4. The existing site is a vacant building (previously a commercial premises) on the Stockley Park business estate. The project will involve the renovation and repurposing of the existing building to accommodate various medical services, including primary care, specialty care, diagnostic services, laboratory services, imaging services, preventive care services, and rehabilitation services.

1.5. A topographic survey has been undertaken at the site by Greenhatch Group (drg no. 49582_T) on 18th December 2023. Analysis of the levels on site show that the external car parking areas are relatively flat, with levels varying between approximately 33.90m AOD and 34.50m AOD. Figure 2 provides a visual representation of the topographic levels on site using 1m Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model. It should be noted that the lower topographic levels shown at the location of the existing building are a result of the post-processing of the LiDAR data.

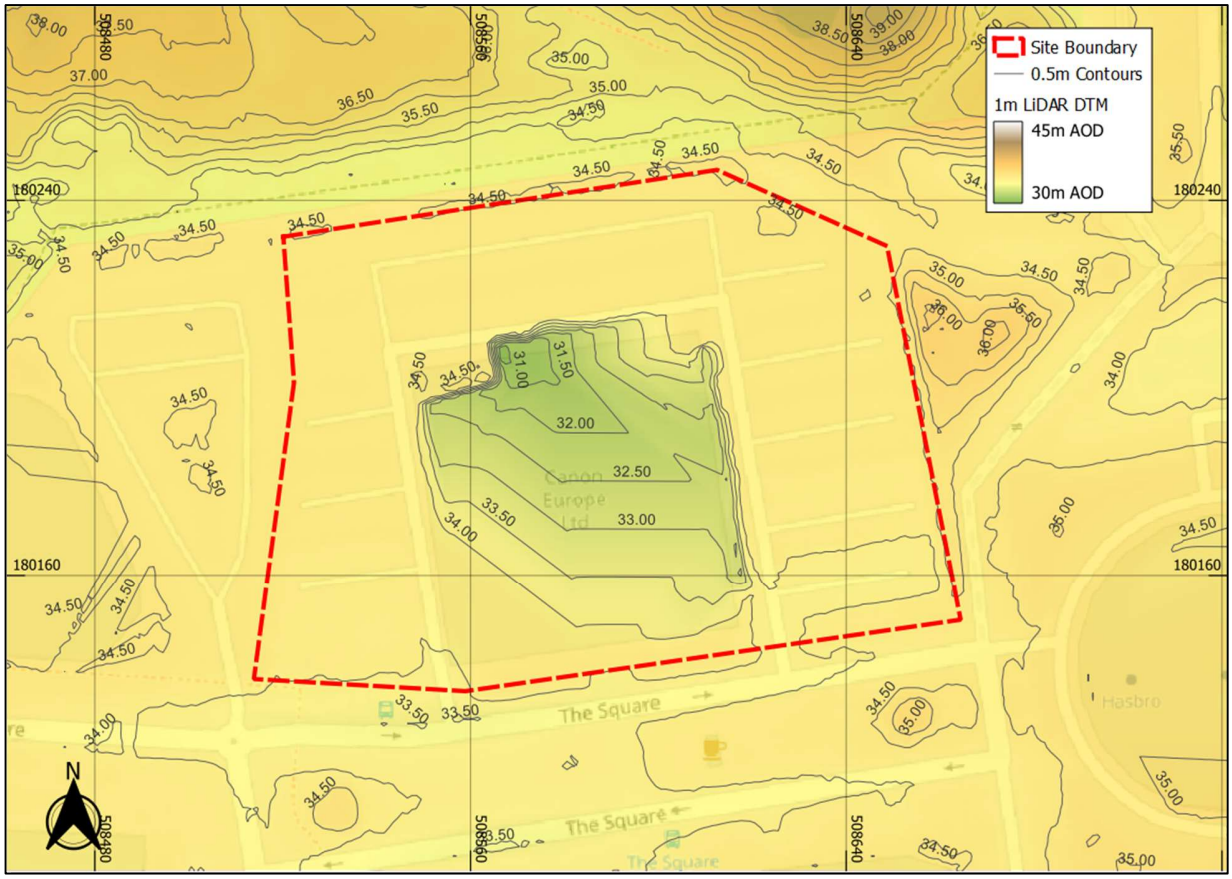


Figure 2: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.6. Hillingdon Council is the Local Planning Authority (LPA) for the site and also the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Hertfordshire and North London 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 site is located within Flood Zone 1. An FRA is required on sites of 1 hectare or more according to NPPF Footnote 59.

1.9. The objective of this FRA 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 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) (DLUHC, 2023) which includes UK Government policy on development and flood risk states:

> *165. 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.*
>
> *173. 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 2023**

> *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.*
>
> *174. Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 59.*

2.3. Footnote 59 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.

The London Plan

2.7. The London Plan prepared by the Greater London Authority in 2021 sets out the policies for development in the region.

2.8. Policy SI 12 Flood risk management outlines the requirements for new development within the region. It states:

> *Policy SI 12 Flood risk management*
>
> *A) Current and expected flood risk from all sources (as defined in paragraph 9.2.12) across London should be managed in a sustainable and cost-effective way in collaboration with the Environment Agency, the Lead Local Flood Authorities, developers and infrastructure providers.*
>
> *B) Development Plans should use the Mayor's Regional Flood Risk Appraisal and their Strategic Flood Risk Assessment as well as Local Flood Risk Management Strategies, where necessary, to identify areas where particular and cumulative flood risk issues exist and develop actions and policy approaches aimed at reducing these risks. Boroughs should cooperate and jointly address cross-boundary flood risk issues including with authorities outside London.*
>
> *C) Development proposals should ensure that flood risk is minimised and mitigated, and that residual risk is addressed. This should include, where possible, making space for water and aiming for development to be set back from the banks of watercourses.*
>
> *D) Developments Plans and development proposals should contribute to the delivery of the measures set out in Thames Estuary 2100 Plan. The Mayor will work with the Environment Agency and relevant local planning authorities, including authorities outside London, to safeguard an appropriate location for a new Thames Barrier.*
>
> *E) Development proposals for utility services should be designed to remain operational under flood conditions and buildings should be designed for quick recovery following a flood.*
>
> *F) Development proposals adjacent to flood defences will be required to protect the integrity of flood defences and allow access for future maintenance and upgrading. Unless exceptional circumstances are demonstrated for not doing so, development*

proposals should be set back from flood defences to allow for any foreseeable future maintenance and upgrades in a sustainable and cost-effective way.

Local Plan

2.9. The Local Plan prepared by the Local Planning Authority, Hillingdon Council, sets out the policies for development in the local area.

2.10. Policy EM6 Flood Risk Management outlines the requirements for new development within the area. It states:

The Council will require new development to be directed away from Flood Zones 2 and 3 in accordance with the principles of the National Planning Policy Framework (NPPF). The subsequent Hillingdon Local Plan: Part 2 -Site Specific Allocations LDD will be subjected to the Sequential Test in accordance with the NPPF. Sites will only be allocated within Flood Zones 2 or 3 where there are overriding issues that outweigh flood risk. In these instances, policy criteria will be set requiring future applicants of these sites to demonstrate that flood risk can be suitably mitigated. The Council will require all development across the borough to use sustainable urban drainage systems (SUDS) unless demonstrated that it is not viable. The Council will encourage SUDS to be linked to water efficiency methods. The Council may require developer contributions to guarantee the long term maintenance and performance of SUDS is to an appropriate standard.

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. The proposals are for a renovation and change of use of the existing building. In accordance with NPPF paragraph 174, some changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 59.

2.13. Therefore, given the proposals are for a change of use on an existing business estate, the Sequential Test is not considered applicable in this instance.

Exception Test

2.14. The Exception Test is applied to sites based on the Flood Zone and the nature of the development. As the proposed development consists of other it would be classed as 'More Vulnerable' (medical facilities) in line with government development use classes.

2.15. The Flood Risk Vulnerability Classification table[3] provided below in Table 2 shows which vulnerabilities are appropriate in each Flood Zone.

2.16. The proposed development sits wholly within Flood Zone 1 and the proposed development is 'More Vulnerable'. 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 and flood zone 'incompatibility'

	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	✓

3https://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) (Department for Levelling Up, Housing and Communities, 2023)
- Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
- Geoindex Onshore (British Geological Survey, 2023)
- The London Plan (Greater London Authority, 2021)[4]
- Local Plan: Part 1 - Strategic Policies (Hillingdon Council, 2012)[5]
- Preliminary Flood Risk Assessment (Hillingdon Council, 2011)[6]
- West London Strategic Flood Risk Assessment (Hillingdon Council, 2018)[7]

4 https://www.london.gov.uk/programmes-strategies/planning/london-plan/new-london-plan/london-plan-2021
5 https://www.hillingdon.gov.uk/media/3080/Local-Plan-Part-1---Strategic-Policies/pdf/Local_Plan_Part_1_Strategic_Policies_15_feb_2013_a_1_1.pdf?m=1598370401647
6 https://modgov.hillingdon.gov.uk/documents/s8734/Appendix%20-%20Flood%20Appraisal.pdf
7 https://westlondonsfra.london/

- Local Flood Risk Management Strategy 2015 (Hillingdon Council, 2016)[8]

Strategic Flood Risk Assessment (SFRA)

3.3. The SFRA, published in 2018, provides the evidence base for the Local Planning Authority Hillingdon 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.

3.4. The SFRA mapping provided by Hillingdon 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)

3.5. 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.

3.6. The Hillingdon Council LFRMS, published in 2015, is used within this report to identify any flood management infrastructure and historical incidences of flooding.

8https://www.hillingdon.gov.uk/media/4499/Local-Flooding-Risk-Management-Strategy/pdf/Appendix_A_-_Local_Flood_Risk_Management_Strategy_2016_1.pdf?m=1610451478887

4. Sources of Flood Risk

Fluvial

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. The site is shown to be located wholly within Flood Zone 1 on the EA Flood Map for Planning (Figure 3). Flood Zone 1 is defined as land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3).

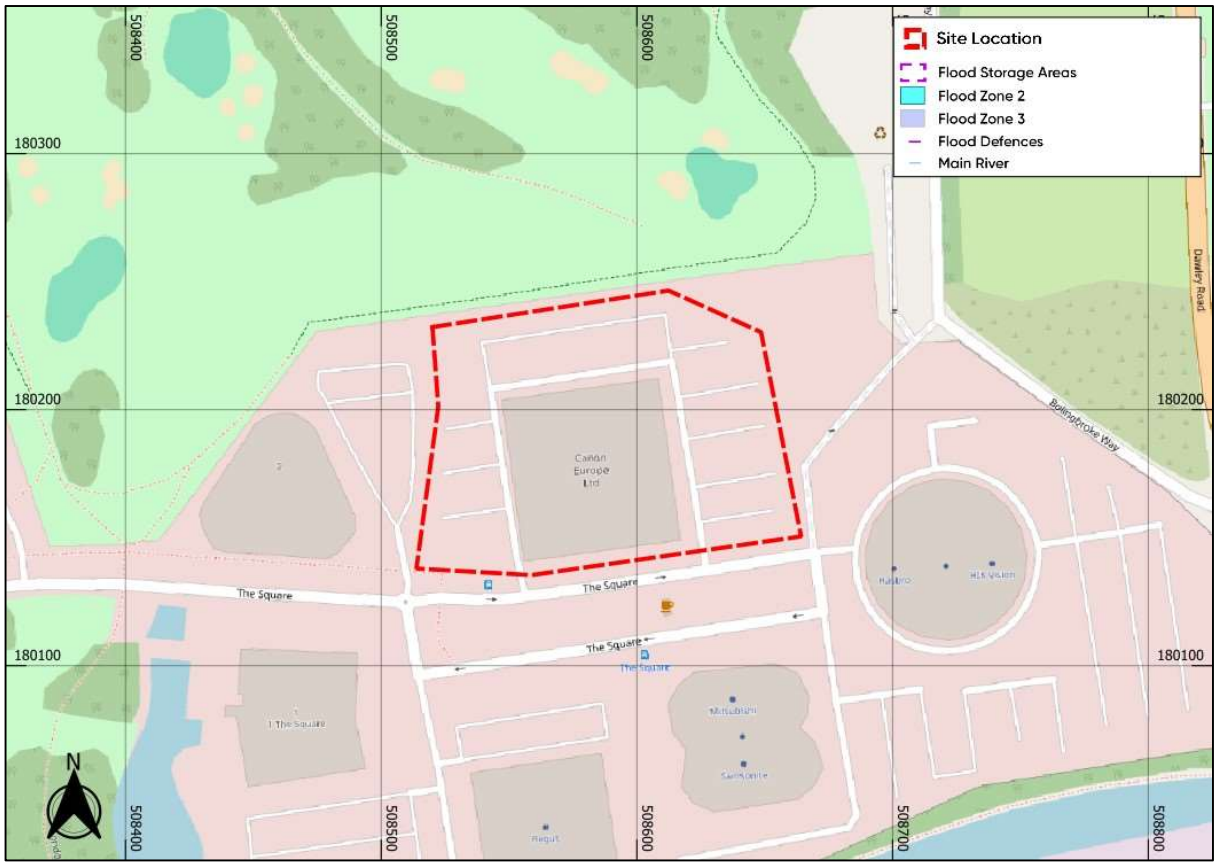


Figure 3: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.3. There are no main rivers in the vicinity of the site. The nearest EA main river is the River Crane, located approximately 2.2km to the east of the site.

4.4. Based on the EA Historic Flood Map (Figure 4), there is no record of historical fluvial flooding on or near the site.

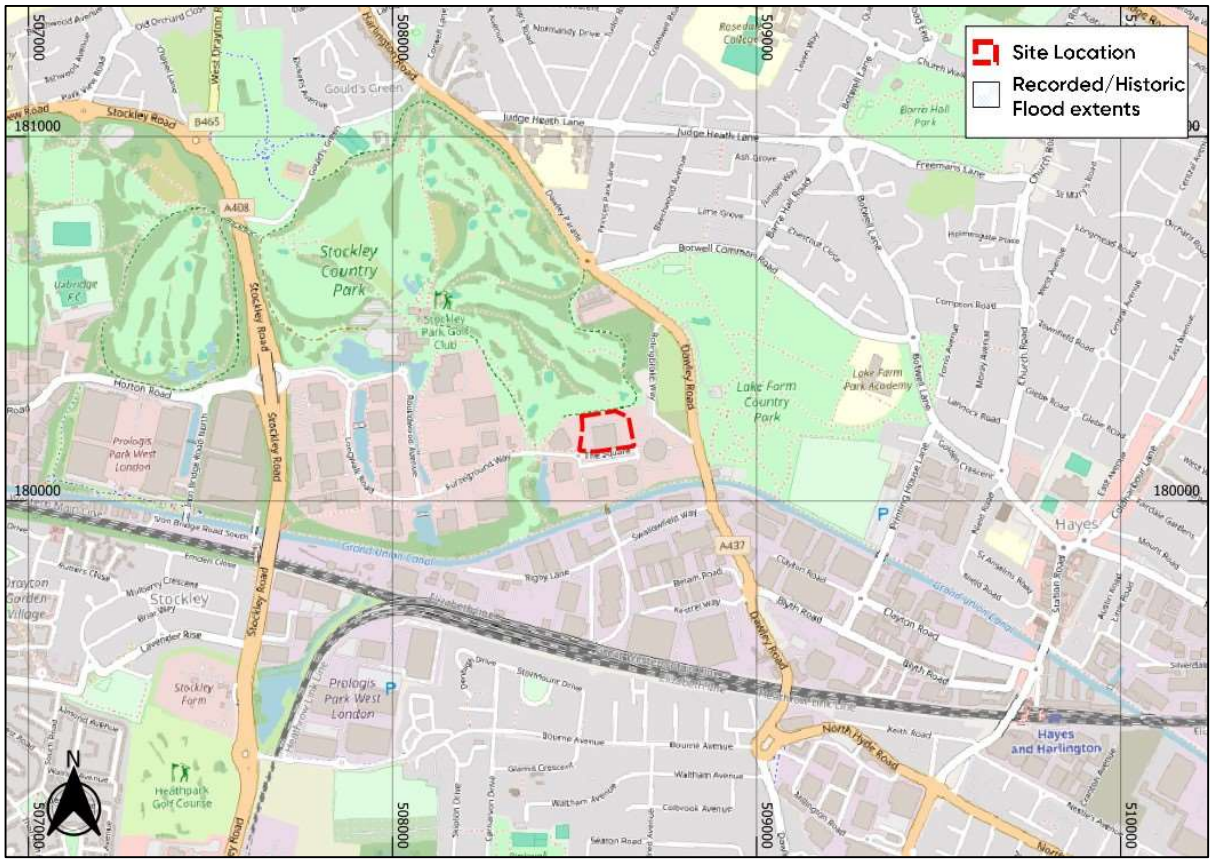


Figure 4: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.5. Given the site is located in Flood Zone 1, the risk of flooding from fluvial sources is considered to be relatively low.

Tidal

4.6. 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. The site is a significant distance from any tidal source and above the anticipated extreme tidal levels, even when considering the impacts of climate change.

4.7. There is no record of historical tidal or sea flooding. The risk of flooding from tidal sources is considered to be low.

Canals

4.8. 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.

4.9. The site is approximately 140m from the Grand Union Canal.

4.10. Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. Control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

4.11. Flooding can occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

4.12. The probability of a structural breach is low, and therefore the overall risk of considered to be low.

Pluvial

4.13. 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.

4.14. 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).

4.15. Examination of the EA's Flood Risk from Surface Water extent mapping (Figure 5) shows the site is located mostly in an area considered to be at 'very low' risk of flooding. There are some small,

isolated areas of 'low' risk located adjacent to the existing building. Areas of 'high' risk are shown to be located on the adjacent road, The Square.

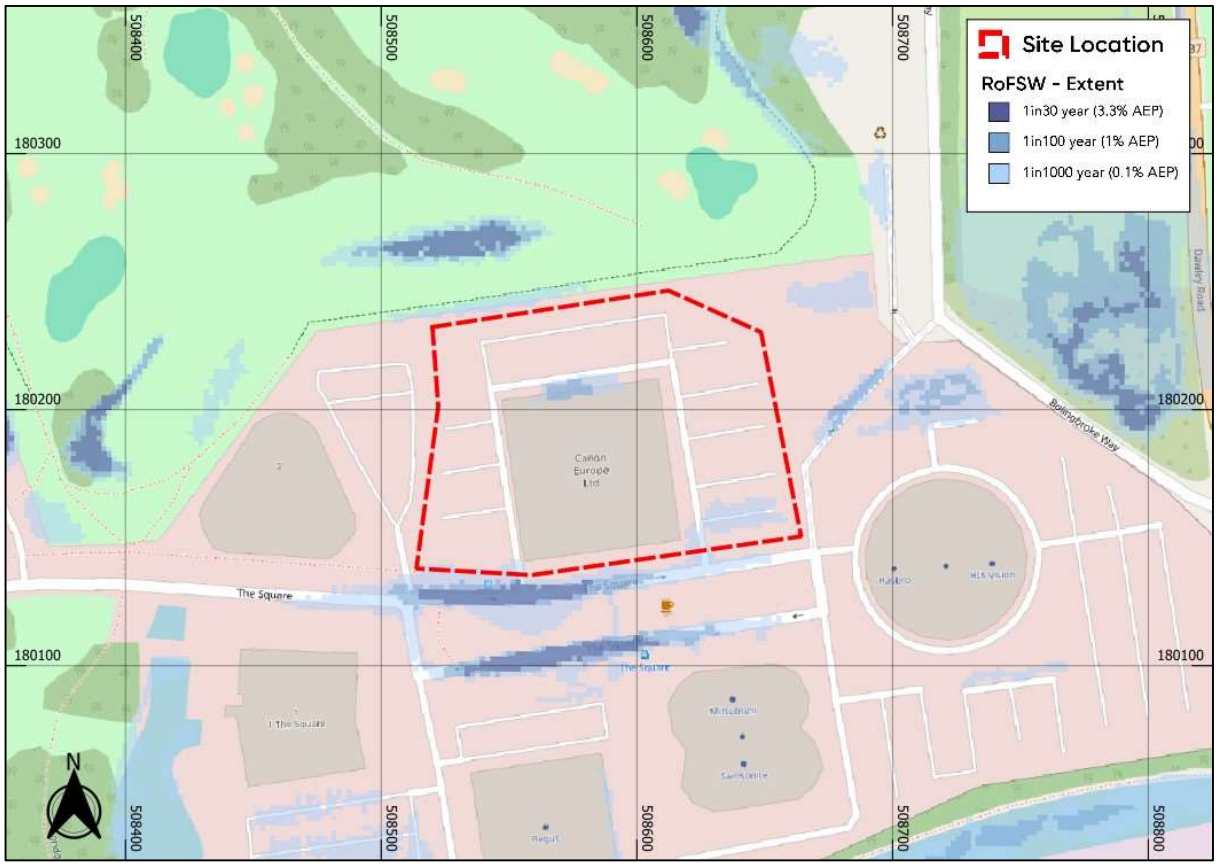


Figure 5: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.16. Given the site is not located within an area of 'high' or 'medium' surface water flood risk, no flood depths have been recorded on site, or on the surrounding roads, during the modelled 1 in 30 year (3.3% AEP) scenario or the 1 in 100 (1% AEP) scenario.

4.17. Analysis of the flood depths during the 'Low' risk event (equivalent to the 1 in 1000 year event) (Figure 6) shows the majority of the site would remain unaffected by flooding. The small area of risk located to the rear of the existing building may be affected by flood depths of over 1200mm. It should be noted that this area is a topographically lower area, as shown in the topographic survey and could be managed by an appropriate drainage strategy.

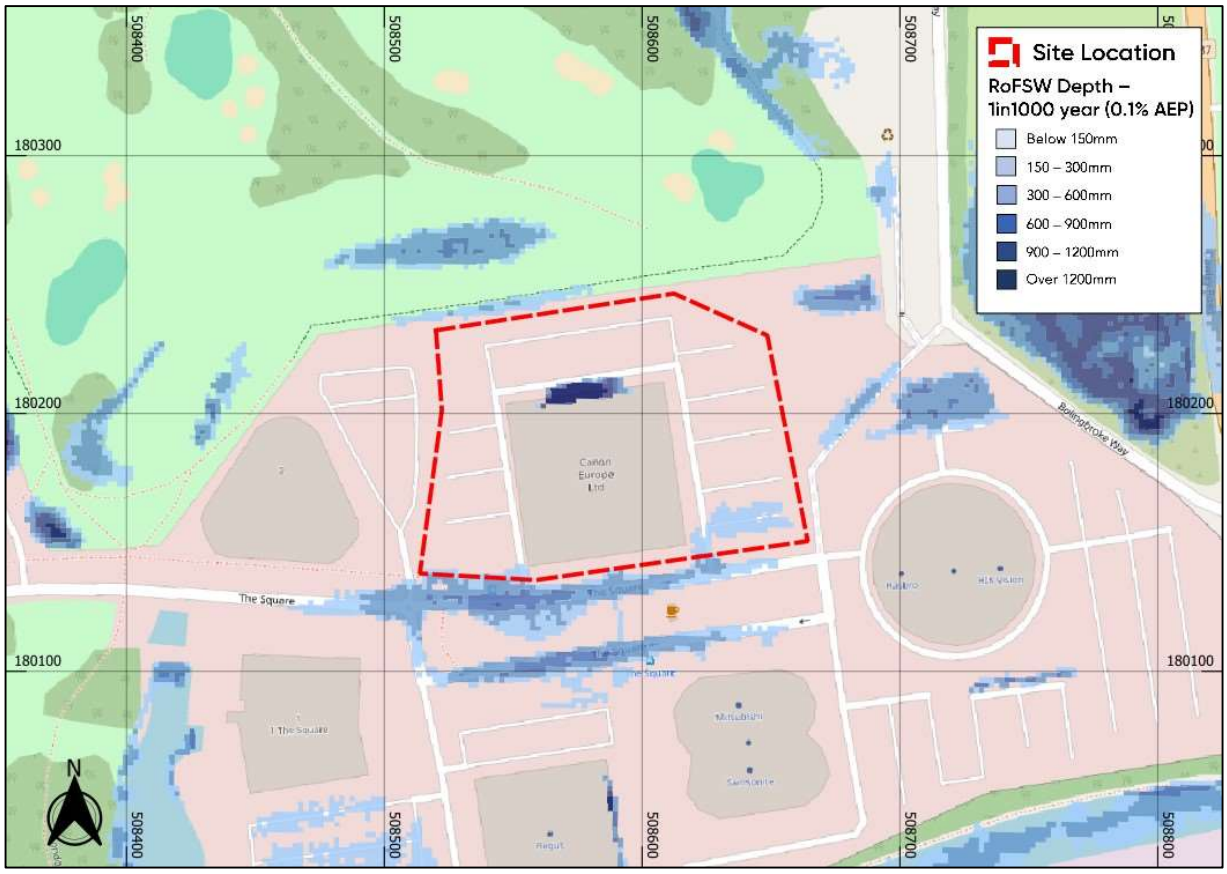


Figure 6: EA Surface Water Flood Depth Mapping for the 0.1%AEP Event (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.18. 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.

4.19. Overall, the risk of flooding from pluvial sources can be considered low.

Reservoirs

4.20. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain floodwater. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

4.21. According to the EA's Flood Risk from Reservoirs mapping the site is outside modelled flood extents in the event of reservoir flooding (Figure 7).

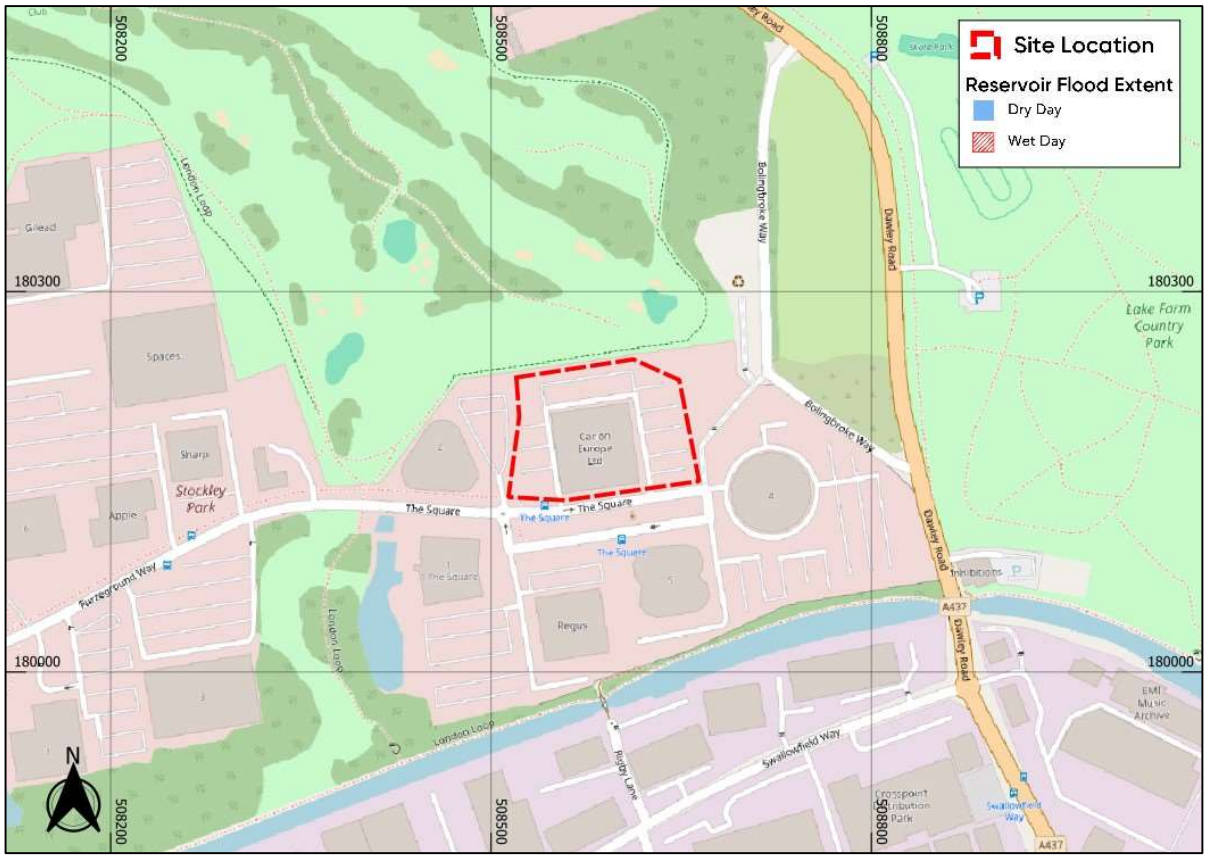


Figure 7: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

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

Groundwater

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

4.24. The British Geological Survey's (BGS) mapping shows superficial deposits of Lynch Hill Gravel Member consisting of sand and gravel underlying the site. The bedrock underlying the site is London Clay Formation consisting of clay, silt and sand.

4.25. The SFRA presents the EA's Areas Susceptible to Groundwater Flooding mapping (Figure 8). The site is within a 1km cell of which >= 50% <75% is considered susceptible to groundwater flooding.

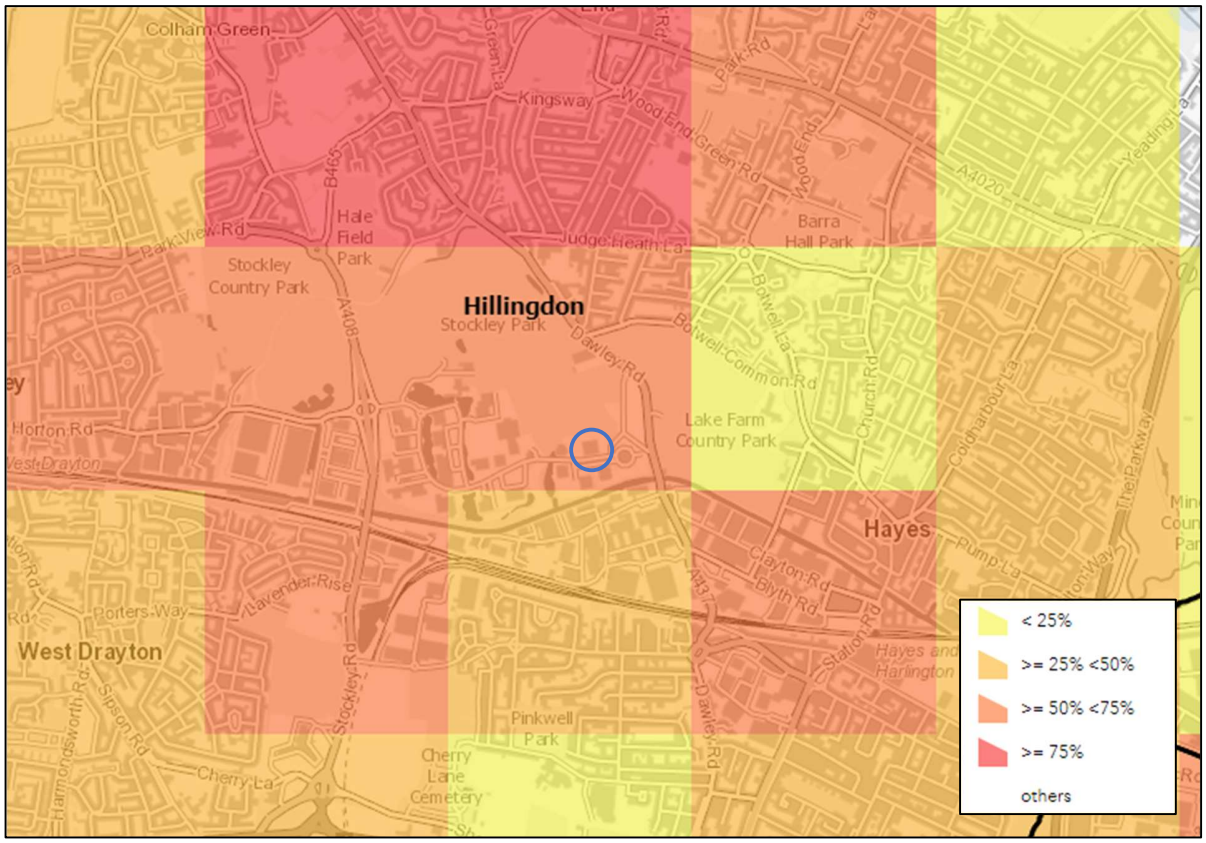


Figure 8: Areas Susceptible to Groundwater Flooding (West London SFRA, 2018) Site Located within Blue Circle

4.26. There is no known history of flooding from groundwater on site. Overall, the risk from groundwater to the development is considered to be low.

Sewers

4.27. 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.

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

4.29. Local policy documentation does not identify the site as being in a Critical Drainage Area.

4.30. The development is therefore considered to be at low risk of flooding from sewers.

5. Flood Risk Mitigation

All Sources of Flooding

5.1. The site is shown to be located wholly within Flood Zone 1 on the EA Flood Map for Planning. Flood Zone 1 is defined as land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3). According to national guidelines a medical facility (more vulnerable) is considered appropriate for location within Flood Zone 1.

5.2. Examination of the EA's Flood Risk from Surface Water extent mapping shows the site is located in an area considered to be at 'very low' risk of flooding. There are some small, isolated areas of 'low' risk located adjacent to the existing building. Areas of 'high' risk are shown to be located on the adjacent road, The Square.

5.3. Given that the site is considered to be at low risk from all sources of flooding, no specific mitigation measures are required to be implemented into the proposals.

Increase to Flood Risk Elsewhere

5.4. The existing site is a vacant building (previously a commercial premises) on the Stockley Park business estate. The project will involve the renovation and repurposing of the existing building to accommodate various medical services, including primary care, specialty care, diagnostic services, laboratory services, imaging services, preventive care services, and rehabilitation services.

5.5. The site is located in Flood Zone 1 and therefore no additional flood compensatory is required.

Met Office Weather Warnings

5.6. The analysis within the report has shown that some surrounding roads may be at risk from surface water flooding. Surface water flooding generally occurs during periods of high intensity rainfall or sustained long periods of wet weather.

5.7. Met Office is the national meteorological service for the UK; they issue weather warnings up to 5 days in advance, through the National Severe Weather Warning Service, when severe weather has the potential to bring impacts to the UK. It is also possible to stay up to date with weather warnings through the Met Office app (available on both android and apple), social media (twitter, Facebook) or email alerts.

5.8. During periods of bad weather, management staff should monitor local weather reports and sign up for the Met Office UK weather warnings. Procedures should be formalised (if not done so already) in the event of a severe weather warning or flooding.

6. Surface Water Drainage Strategy

Existing Drainage

6.1. The existing surface water drainage network has been surveyed (refer to Appendix B); it is understood that surface water run-off from roofs and hard paved areas currently discharge at an unrestricted rate to a public surface water sewer within Furzeground Way.

Ground Conditions

6.2. A review of publicly available information indicates that the site is situated in an area where soils are recorded as being "Freely draining slightly acid loamy soils". British Geological Survey's (BGS) mapping shows superficial deposits of Lynch Hill Gravel Member consisting of sand and gravel underlain by London Clay Formation bedrock, which indicates that infiltration techniques may be a viable solution for draining surface water flows.

6.3. The information regarding the ground conditions suggests that infiltration may be a viable option on site. However, infiltration testing has yet to be carried out on site, drainage methods including infiltration may be included on site if found to be a viable option.

Existing Greenfield Run-Off Rates

6.4. The existing greenfield run-off rate for the site has been calculated using the IH124 method and can be found in Appendix C.

6.5. The parameters used for estimating the greenfield runoff rates for the site are shown in Table 3.

Table 3: IH124 Input Parameters.

Parameter	Value
Area	0.985 Ha
SAAR	619.0
SPR	0.3
Region	Region 6

6.6. Table 4 displays the estimated greenfield runoff rates for the proposed impermeable area.

Table 4: Greenfield Runoff Rates

Return Period	Greenfield Runoff Rate
1 in 1 Year	1.32 l/s
Q_{BAR} (approx. 1 in 2.33 Year)	1.55 l/s
1 in 30 Year	3.58 l/s
1 in 100 Year	4.96 l/s

6.7. As the fully impermeable external areas of the development are to remain largely untouched except for the western car park which will be converted into permeable amenity space. It has been agreed with GLA that the site surface water run off can discharge at a rate of 3 x the site greenfield run off rate. Therefore, a peak discharge rate of 4.65 l/s has been agreed.

Proposed Strategy

6.8. The London Plan Policy 5:13 states that "*A Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy*". Refer to Table 5 below.

Table 5: Policy 5.13 SuDS Hierarchy

SUDS HIERARCHY In accordance with the London Plan, Policy 5.13 Sustainable drainage				
			Suitability	Comment
	1.	Store rainwater for later use	✓	There are plot scale opportunities for rainwater harvesting measures such as water butts and these should be implemented where practical.
	2.	Use infiltration techniques, such as porous surfaces in non-clay areas	x	The British Geological Survey's (BGS) mapping shows superficial deposits of Lynch Hill Gravel Member consisting of sand and gravel underlying the site. The bedrock underlying the site is London Clay Formation consisting of clay, silt and sand. Infiltration testing to BRE has yet to be undertaken, however, infiltration methods may be considered for use on site if testing found it to be a viable option.
	3.	Attenuate rainwater in ponds or open water features for gradual release	x	It is understood that there is not feasible enough space to provide larger open water features such as detention ponds. The area of car parking being taken up are to be used solely for amenity purposes for patients.
	4.	Attenuate rainwater by storing in tanks or sealed water features for gradual release	✓	Attenuation could be provided in the form of attenuation tanks prior to discharge, where infiltration methods are not found viable.
	5.	Discharge rainwater direct to a watercourse	x	There are no watercourses located within a close vicinity of the site. Therefore, it has been deemed unfeasible to drain into a watercourse.
	6.	Discharge rainwater to a surface water sewer/drain	✓	As infiltration test are yet to be undertaken on site surface water will be discharged at a controlled rate into a public surface water sewer.
	7.	Discharge rainwater to Combined Sewer	x	Connection to the combined sewer will only be considered when the above are proven unfeasible.

6.9. It is proposed that run-off from the remaining impermeable areas will be conveyed via a series of gullies pipes and attenuation tanks to the existing public surface water sewer located in Furzeground Way. A flow control chamber will limit the discharge rate to 4.65l/s prior to entering the existing 2 stage interceptor. However, should infiltration testing (to BRE 365) prove viable, the use of infiltration techniques to dispose of surface water flows from the site would be considered.

6.10. Cellular tanks will provide the attenuation required to accommodate flows in excess of the restricted discharge of 4.65 l/s (subject to Thames Water approval).

6.11. Cellular crates have been sized to accommodate a 1 in 100-year rainfall event with 40% climate change.

6.12. Drainage calculations can be found in Appendix D. The Proposed Drainage Layout can be found within Appendix C.

7. Future Maintenance Strategy

General Maintenance

7.1. It is proposed that the surface water network, including the and the flow control chamber, cellular attenuation tanks and existing 2 stage interceptor are to be accessible, with maintenance being undertaken throughout the lifetime of the development by the owner/maintenance company as employed by the owner.

7.2. All drainage, whether piped or SuDS require regular maintenance. the tables below provide an overview of general maintenance tasks and frequency of which they need to be undertaken.

Surface Water Drainage Systems

General maintenance for Surface Water Drainage Systems

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in catchpits, gullies, attenuation devices and inside concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs.	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check attenuation devices	Annually

Cellular Attenuation Tank

General maintenance for a Cellular Attenuation Tank as per CIRIA C753.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct tank and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of tank)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check tank to ensure emptying is occurring	Annually

7.3. Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/debris removal for large systems. If maintenance is not undertaken for long periods, deposits can become hard packed and require considerable effort to remove.

Proprietary Treatment System

General maintenance for a for a Proprietary Treatment System (Manufacturer Guidance takes precedence)

Maintenance Schedule	Required Action	Typical frequency
Routine Maintenance	Remove Litter and debris and inspect for sediment, oil and grease accumulation	Six Monthly
	Change the filter media	As recommended by the manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial Actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies.	Monthly during first half year of operation, then every six months

Maintenance should be undertaken as often as required. Removal of oil, silt and other pollutants must be in accordance with the appropriate waste management legislation.

Maintenance responsibility for all systems should be placed with an appropriate organisation.

Maintenance is to be undertaken in accordance with the manufacturer's guidelines.

Hydro-Brake (Vortex Flow Control)

General maintenance for a for a Hydro-Brake (Manufacturer Guidance takes precedence)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes	Monthly (for the first 12 months, then 6 monthly).
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs.	As necessary.
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event.

ACO Channel/Yard Gullies/Highway Gullies

General maintenance for a for inlets (Manufacturer Guidance takes precedence)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Remove sediment and debris from gullies and channel drain	Quarterly

Flood Routes

General maintenance for Flood Route

Maintenance Schedule	Required Action	Typical frequency
Routine Maintenance	Make visual inspection. Check route is not blocked such as new fences/walls or soil or other rubbish.	Monthly
Remedial Actions	Remove as necessary	As required

Flood routes (exceedance routes) allow water volumes exceeding the capacity of the SUDS system to escape from the site without causing damage to property. This route must be clear of obstructions at all times.

Landscaping (Existing and Proposed)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Amenity grass – Mow all grass verges, paths and amenity grass at 35-50 mm with 75 mm max. All cuttings to remain in situ	16 Visits
	Rough grass – Mow at 75 mm – 100 mm but not to exceed 150 mm All cuttings to wildlife piles	4 – 8 visits
	Wildflower areas strimmed to 50 mm in Sept-Oct Or, Wildflower areas strimmed to 50 mm in July and Sept Or, Wildflower areas strimmed to 50mm on 2-year rotation, 30% each year. All cuttings to wildlife piles	1 visit 2 visits 1 visit
	Ornamental tree and shrub planting Weed all shrub beds as detailed spec. as necessary. Cut back planting from lights, paths and visibility sight lines in late autumn and as necessary. Cut hedges slightly tapered back from base with flat top at specified height. Do not mulch planting adjacent to permeable or porous surfaces. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting. Protect from strimmer damage and remove competitive growth until well established	4 visits
	Native trees and shrub planting Prune to shape in 1 year Protect trees from stimmer damage and remove competitive growth until well established. Remove stakes and ties from trees when no longer needed for support and within 3 years of planting.	1 visit
	Existing trees Check existing trees for safety	1 visit
Remedial	Replace trees and shrubs that fail in the first 5 years after planting. Carry out tree surgery as necessary	As required

8. Pollution Prevention & Water Quality Management

SuDS Mitigation Indices

8.1. Chapter 26 of the CIRIA C753 The SuDS Manual, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.

8.2. The proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk further.

8.3. Runoff from other roofs and non-residential car parking with infrequent change is generally viewed as low risk (as per Table 26.2 of C753), shown in table 8 below.

Table 8: Pollutant Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Non-residential car parking with infrequent change	Low	0.5	0.4	0.4

8.4. Due to the nature of this development, where carparking/impermeable areas are being removed to make space for amenity areas on site, the discharge rate is being reduced in line with the London Borough of Hillington's guidance, the existing 2 stage interceptor on site is proposed to remain and continue treating surface water flows. It is therefore considered that the existing onsite interceptor is acceptable in terms of water quality.

8.5. It is therefore considered that the existing pollution prevention features on site are appropriate and acceptable in terms of water quality.

9. Conclusions

9.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at 3 The Square, Stockley Park, Uxbridge, London Borough of Hillingdon, UB11 1ET. 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.

9.2. 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	The site is located within Flood Zone 1, however its proposed vulnerability according to government guidelines ("more Vulnerable"), is considered appropriate for the Flood Zone. The site is considered to be at low risk from fluvial flooding.
Pluvial	Examination of the EA's Flood Risk from Surface Water extent mapping shows the site is located in an area considered to be at 'very low' risk of flooding. There are some small, isolated areas of 'low' risk located adjacent to the existing building. Areas of 'high' risk are shown to be located on the adjacent road, The Square. 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. Overall, the risk of flooding from pluvial sources can be considered low.
Tidal Reservoirs Groundwater Sewers Canals	The site is considered to be at low risk from other sources.

9.3. The FRA supports the planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.

9.4. 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 considered to be at low risk from all other sources.

9.5. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

Appendix A - Development Proposals

The landscape design for the restorative gardens feature sweeping paths and organic loops, following the example set by the original park design. The original structure of the car park will be borrowed in order to create distinct spaces within the gardens. Informal seating areas will allow users to relax in a peaceful setting, surrounded by foliage-rich planting beds in varying shades of green.

Lawn areas feature throughout the gardens and will be seeded with a shade tolerant, flowering lawn seed mix. This mix can be managed to provide both an area of amenity space, for seating and relaxing, while other areas can be managed less intensively to allow for wildflowers to flourish.

Where possible, existing vegetation will be retained and enhanced with infill native planting to plug any gaps that may have appeared over the years. The hornbeam hedges that surround the site will be retained and underplanted with ivy and cotoneaster to add a sense of enclosure, while providing additional benefits to biodiversity around the site.

LEGEND

- Species-rich Flowering Lawn - Regularly mown to provide lawn area
- Species-rich Flowering Lawn - Mown less frequently to provide wildflower meadow
- Ornamental planting - planting mix to vary depending on location
- Rain garden planting mix
- Proposed trees/multi-stem Trees
- Existing yew hedge to be retained and enhanced
- Existing trees to be retained
- Existing vegetation to be retained
- Existing hornbeam hedgerow to be retained
- Existing block paving to be retained
- Permeable resin-bound surfacing - colour to match existing gravel pathways within wider park
- Curved seating
- Reflection pond
- Reused boulders found on site to provide informal play options for younger visitors
- Existing Building

With the majority of the trees on site being retained, the planting style will look to shade and semi-shade tolerant plants in order to bring interest and longevity to the gardens. Native plants like ferns and grasses will provide year round interest while offering a sustainable alternative to maintenance-heavy planting schemes. The existing structure will be retained with yew hedgerows providing the backdrop to the more ornamental planting beneath.

In the west, the existing car park structure will be reimagined, with a series of rooms being created, each with their own identity and style. A reflection pond featuring an array of aquatic plants will mark the centre of the gardens and the main entrance into the space, mimicking the larger ponds and lakes found outside of the site. A rain garden features in the south-eastern corner with informal natural play for younger visitors to enjoy.

On the eastern side of the building, the car park structure will be retained with the yew hedges being infilled where needed and underplanted with groundcover like ivy, providing valuable food and shelter for local wildlife during the winter months.

Proposed tree planting is limited due to the existing tree cover on site, where they have been proposed, they will be small to medium size trees and multi-stems that will work well beneath the canopies of the existing trees, while adding colour and texture at a lower height.

ICENI PROJECTS LIMITED
DA VINCI HOUSE
44 SAFFRON HILL
LONDON
EC1N 8FH

T 020 3640 8508
mail@iceniprojects.com

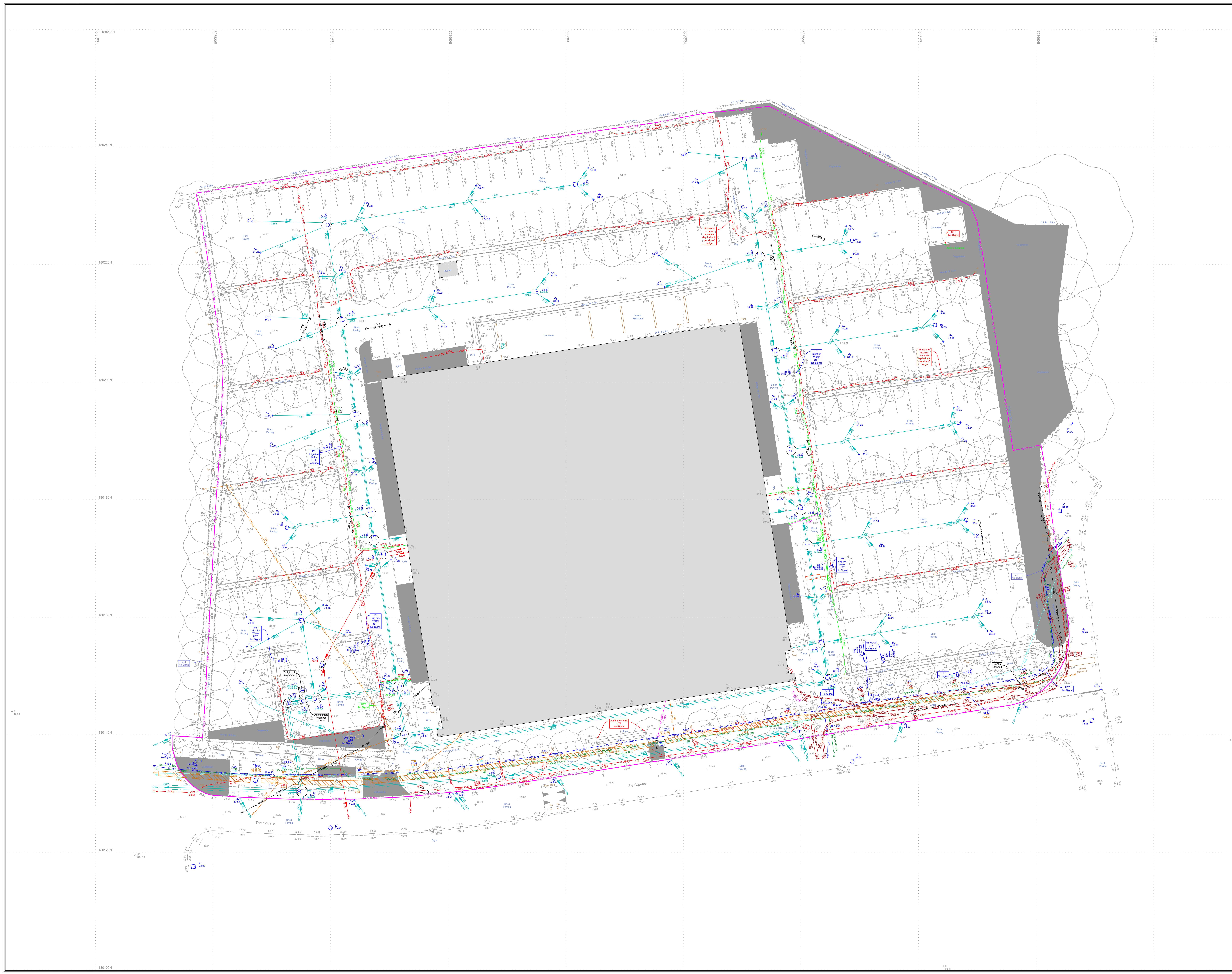
CLIENT: BMO Real Estate Partners

PROJECT: 3 The Square, Stockley Park

TITLE: Landscape Strategy Plan

DRAWN BY	CHECKED BY	
JG	SG	
SCALE @ A1	DATE	
1:250	23/01/2024	
PROJECT NO.	DRAWING NO.	REV.
21-531	LS1	-

Appendix B - Topographical Survey



N

NOTES;

In all cases please call the BT Dial before you dig service to mark their own plant before any site works commence 0800 917 3993

Always consult utility plans

1. Drainage Information provided has been determined without man entry into the chambers. Whilst every effort has been made to correctly identify the duty/pipes/chamber detail, it is recommended that this information should be checked in areas that are critical to the future proposal/development.
2. All sewer runs are presumed to be straight line connections between chambers unless proven otherwise by the use of a sonde or CCTV survey.
3. All desktop information should be treated as historical as the buried assets present might have changed since the drawing/record was last updated.
4. We have overlaid the statutory records onto the plan where services shown have not been located on site. These are shown in the B4 layer and annotated as 'TFR'.
5. All gas in area is plastic. Unable to trace.
6. Roadway adjacent to site not surveyed due to refusal by on-site security.

UTILITY LINETYPES

Air Line	AIR	Electric Low Voltage	LV
British Telecom	BT	Electric High Voltage	HV
British Telecom Overhead	O/H	Electric - Unknown Voltage	E
CCTV / Cable Television		Electric Overhead	O/H
Communication Cable	COM	Fibre Optic	FO
Drainage - Combined Water	Ø150	Fuel Line	FL
Drainage - Foul Water	Ø150	Gas Line	GAS
Drainage - Storm Water	Ø150	Gauge Line	GL
Drainage - Unknown Water	Ø150	GPR Line	GPR
Drainage - Trade Effluent Water	Ø150	Heating Pipes	HTG
Drainage - Combined Water - Assumed/TFR	Ø150	Offset Fills	OF
Drainage - Foul Water - Assumed/TFR	Ø150	Oil Pipe	OIL
Drainage - Storm Water - Assumed/TFR	Ø150	Rising Main	
Drainage - Unknown Water - Assumed/TFR	Ø150	Telecom	TEL
Drainage - Trade Effluent Water - Assumed/TFR	Ø150	Traffic Light Signals	TL
Drainage - Approximate Pipe Size/Extents		Trench Scar	
Earth Cable	ETH	Unknown	UKN
Empty Duct	ED	Vapour Recovery	VR
Electric & Comms	E&C	Vent Line	VP
		Water	WTR

UTILITY SURVEY INFORMATION

Contracted Survey Area	SVY AREA	Assumed Route	AR
Depth to Top of Service (m)	0.40d	Assumed Connection	ACP
End of Trace / Record	EOT	Sound Connection	S/C
Head of Run	HoR	Sonde Stopped	S/S
Weak Signal	WS	No Visible Access	NVA
Taken From Records	TFR	No Visible Exit	NVE
Off Survey Area	OSA	No Visible Pipes	NVP
Back Drop	BD	No Visible Services	NVS
Silt Level	SL	No Depth Indicated	NDI
Flow Level	FL	Base Level	BL
Above Ground	A/G	High Level	HL
Unable to Locate	UTL	Top of Pipe / Top of Valve	T.o.P / T.o.V
Unable to Survey	UTS	Landing Level	LL
Unable to Raise (cover)	UTR	Rubble Level	RL
Unable to Trace	UTT	No Signal	N/S
		Heavily Silted	H/S
		Approximate Location	
Unable to Survey		GPR Anomaly	
Chamber Extents		Multiple Services Route	

LEGEND

Buildings, Wall, Kerb line, Line marking, Drop kerb, Centre line, Top of bank, Overhead Cable, Concrete edge, Tarmac edge, Grass verge, Canopy/Overhang, Verge, Bottom of bank

1 / 100.000 — Station and Name / Station Level

Tree / Bush / Sapling

Area of Undergrowth

Woodland

R: Ridge Level

E: Eaves Level

F: Flat Roof Level

Gate

Fence types:

I\W	Interwoven
I\R	Iron Railings
W\M	Wire Mesh
P\R	Post & Rail
P\W	Post & Wire
C\L	Chain Link
W\P	Wooden Panels
C\B	Close Boarded
S\P	Steel Palisade

IC	Inspection chamber	Bo	Bollard
PInv	Pipe invert	IB	Illuminated bollard
Gy	Gully	Bin	Rubbish bin
Bg	Back gully	Vp	Vent pipe
Dp	Down pipe	Grl	Ground light
Pipe	Pipe above ground	Lbox	Letter box
MH	Manhole	Stmp	Tree Stump
WL	Water level	Sty	Stile
Fl	Flood light	IFL	Internal floor level
Lp	Lamp post	THL	Threshold level
Tp	Telegraph post	Sp	Sign post
Ep	Electricity post	TH	Trialhole
Tl	Traffic light	BH	Borehole
Bus	Bus stop	ELC	Electric
Sv	Stop valve	BT	British Telecom
St	Stop tap	C'box	Control box
Er	Earth rod	TT	Tactile
Wm	Water meter	BP	Brick paved
Gas	Gas valve	CPS	Concrete paving slabs
Av	Air valve	CVR	Cover
ICU	Unidentified inspection	R/wall	Retaining wall
Wo	Wash out	TWL	Top of Wall Level
Re	Rodding eye	TCL	Tree canopy level
BB	Belisha beacon	G:	Girth
CTV	Cable tv	MG	Multi girth
Mkr	Marker post	IC	Inspection chamber
Gmkr	Gas marker post	CL:	Cover level
So	Soffit	IL:	Invert level
Fh	Fire hydrant	UTL	Unable to locate

PAS 128 : 2022 LEVEL B SURVEY

QUALITY LEVEL	CRITERIA USED IN THE DETERMINATION OF QUALITY LEVEL	LOCATION ACCURACY
QL-B4	A UTILITY SEGMENT WHICH IS SUSPECTED TO EXIST (EITHER ON QL-D OR QL-C) BUT HAS NOT BEEN DETECTED AND THEREFORE SHOWN AS AN ASSUMED ROUTE. (NO DETECTION POSSIBLE)	UNDEFINED
QL-B3/B3P	HORIZONTAL LOCATION ONLY OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES USED. (EML OR GPR DETECTION WITH LIMITED CONFIDENCE IN DEPTH)	+/- 500mm HORIZONTAL LOCATE. UNDEFINED VERTICAL LOCATE
QL-B2/B2P	HORIZONTAL & VERTICAL LOCATION OF THE UTILITY DETECTED BY ONE OF THE GEOPHYSICAL TECHNIQUES. (EML OR GPR DETECTION WITH CONFIDENCE IN DEPTH)	+/- 250mm HORIZONTAL LOCATE +/- 40% VERTICAL LOCATE
QL-B1/B1P	POSITION AND DEPTH OF THE UTILITY DETECTED BY MULTIPLE GEOPHYSICAL TECHNIQUES. (EML + GPR DETECTION)	+/- 150mm HORIZONTAL LOCATE +/- 15% VERTICAL LOCATE

DISCLAIMER

Whilst every effort has been taken in the preparation of this drawing, the original land marks/apparatus configuration may have been altered since the survey/drawing was produced. The user shall make further enquiries and investigations to satisfy himself as to the accuracy of this drawing and position of the apparatus. The exact positions of the apparatus should be verified by the use of suitable detection devices and safe digging practices in accordance with HSG47, further advice on the location of apparatus should be recommended by the owner. No representation is made by Greenhatch Group, its agents or servants as to the accuracy, completeness, and sufficiency or otherwise of this drawing and the position of the apparatus.

All apparatus shall be treated as live unless proved otherwise by the owner. It is the users responsibility to ensure that the information on the location of apparatus is provided to all persons (either direct labour or contractors) working in proximity to the apparatus.

Rev	Date	Description	Drawn	Q. Ref.

greenhatch group

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

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

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

CLIENT

Hale Architecture: Design Management

PROJECT

3 The Square, Hayes, Uxbridge, UB11 1ET

TITLE

Utility Survey

SCALE	DATE
A0@ 1: 200	10/01/24
DRAWN	QUALITY REF
NS	GH19555

Level datum	See OS Note
Grid orientation	See OS Note
Job number	49582

Drawing No.	Rev.
49582_T_UG	0

Comments

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

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

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

Notes:

Appendix C - Surface Water Drainage Strategy

LEGEND

- PROPOSED SURFACE WATER SEWER
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED HYDROBRAKE MANHOLE
- PROPOSED CELLULAR ATTENUATION CRATES
- EXISTING SURFACE WATER SEWER
- EXISTING FOUL SEWER
- TREE ROOT PROTECTION ZONE

CELLULAR STORAGE 6
14m x 12m x 0.25m DEEP
BASE LEVEL = 33.000
VOLUME = 41m³

CELLULAR STORAGE 5
9m x 15m x 1m DEEP
BASE LEVEL = 32.600
VOLUME = 129m³

CELLULAR STORAGE 4
19m x 10m x 1m DEEP
BASE LEVEL = 32.500
VOLUME = 181m³

CELLULAR STORAGE 3
18m x 8m x 1.25m DEEP
BASE LEVEL = 32.400
VOLUME = 171.5m³

CELLULAR STORAGE 1
28m x 8m x 0.5m DEEP
BASE LEVEL = 32.900
VOLUME = 107m³

CELLULAR STORAGE (5)
28m x 7m x 0.5m DEEP
BASE LEVEL = 32.700
VOLUME = 94m³

PROPOSED CONNECTION TO EXISTING CHAMBER

PROPOSED CONNECTION TO EXISTING MANHOLE. INVERT TO INVERT CONNECTION

EXISTING PETROL INTERCEPTOR TO REMAIN

EXISTING MANHOLE TO BE REBUILT TO INCLUDE HYDROBRAKE WITH DISCHARGE RATE LIMITED TO 4.65 l/s (3x GREENFIELD RUN OFF RATE)

SWMH4
CL 34.110
IL 32.350

SWMH3
CL 33.950
IL 32.691

SWMH2
CL 33.970
IL 32.750

SWMH1
CL 34.320
IL 32.963

NEW CONNECTION TO EXISTING SURFACE WATER MANHOLE. INVERT TO INVERT CONNECTION

EXISTING CAR PARK DRAINAGE CONNECTIONS TO BE RE ROUTED TO CONNECT INTO SWMH1 OR NEAREST EXISTING STORM RUN

EXISTING CAR PARK DRAINAGE CONNECTIONS TO BE RE ROUTED TO CONNECT INTO SWMH2 OR SWMH3

NOTE: ALL EXISTING DRAINAGE WITHIN PROPOSED LANDSCAPED AREAS TO BE MADE REDUNDANT

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

GENERAL DRAINAGE NOTES

1. THE CONTRACTOR IS TO CHECK AND VERIFY ALL SITE DIMENSIONS AND LEVELS, INCLUDING EXISTING SEWER INVERT LEVELS AND UTILITIES, PRIOR TO START ON SITE.
2. POSITIONS OF EXISTING SERVICES/STATUTORY UNDERTAKERS APPARATUS ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
4. THIS DRAWING IS SCHEMATIC FOR CLARITY ONLY, POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO SITE CONDITIONS.
5. ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
6. THE CONTRACTOR IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
7. ALL PIPE SIZES, CHAMBER DEPTHS, SIZE & QUANTITY SUBJECT TO REVIEW AND DETAILED DESIGN. ALL ADOPTED PIPE WORK ROUTING AND ANY EASEMENTS SUBJECT TO FULL DESIGN REVIEW AND APPROVAL BY THE STATUTORY UNDERTAKER (AS PART OF THE SECTION 104 ADOPTION AGREEMENT).
8. ALL ATTENUATION SIZED BASED UPON CURRENT SITE LAYOUT AND IS SUBJECT TO CHANGE FOLLOWING RECEIPT OF REVISED ARCHITECTURAL SITE PLANS AND APPROVAL BY STATUTORY UNDERTAKER

CLIENT: ICENI PROJECTS

SITE: 3 THE SQUARE, STOCKLEY PARK

DRAWING: SURFACE WATER DRAINAGE STRATEGY

DRAWING NUMBER: AEG3378_DR01

DATE: JAN 2024 | **REV:** A

DRAWN BY: AR

DRAWING SCALE: 1:250 @ A1

PRELIMINARY DRAWING FOR PLANNING ONLY - NOT FOR CONSTRUCTION

aegaea
Flood risk, water and environment

Appendix D - Drainage Calculations

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Cellular Storage 3

Type : Cellular Storage

Dimensions

Exceedance Level (m)	34.200
Depth (m)	1.250
Base Level (m)	32.400
Number of Crates Long	8
Number of Crates Wide	18
Number of Crates High	5
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m^3)	171.550

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	3.001
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	3.002
Outlet Type	Free Discharge

Cellular Storage 4

Type : Cellular Storage

Dimensions

Exceedance Level (m)	34.200
Depth (m)	1.000
Base Level (m)	32.500
Number of Crates Long	10
Number of Crates Wide	19
Number of Crates High	4
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m^3)	181.200

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	3.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	3.001
Outlet Type	Free Discharge

Cellular Storage 5

Type : Cellular Storage

Dimensions

Exceedance Level (m)	34.200
Depth (m)	1.000
Base Level (m)	32.600
Number of Crates Long	9
Number of Crates Wide	15
Number of Crates High	4
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m^3)	128.850

Inlets

Outlets

Outlet

Outgoing Connection	3.000
Outlet Type	Free Discharge

Cellular Storage 6

Type : Cellular Storage

Dimensions

Exceedance Level (m)	34.300
Depth (m)	0.250
Base Level (m)	33.000
Number of Crates Long	12
Number of Crates Wide	14
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m³)	40.950

Inlets

Outlets

Outlet

Outgoing Connection	1.000
Outlet Type	Free Discharge

Cellular Storage 1

Type : Cellular Storage

Dimensions

Exceedance Level (m)	34.140
Depth (m)	0.500
Base Level (m)	32.900
Number of Crates Long	28
Number of Crates Wide	8
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m³)	107.140

Inlets

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Free Discharge

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Cellular Storage 2

Type : Cellular Storage

Dimensions

Exceedance Level (m)	33.900
Depth (m)	0.500
Base Level (m)	32.700
Number of Crates Long	28
Number of Crates Wide	7
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	1
Crate Height (m)	0.25
Total Volume (m^3)	93.800

Inlets

Outlets

Outlet

Outgoing Connection	Pipe (2)
Outlet Type	Free Discharge

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address:		

Flow Options

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

Pipe Options

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

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address:		

Manhole Options

Apply Offset	☐

Manhole Size Library

Default

Diameter / Width

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

Additional Sizing

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

Depth

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

Access

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

Benching Requirements

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

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	100
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.3
Ratio R	0.418
Summer	☑
Winter	☑

Return Period

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

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: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		

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	FSR: 100 years: +40 %: 15 mins: Winter	0.04	26.4	12.222
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Winter	0.10	62.2	28.779
Catchment Area (2)	FSR: 100 years: +40 %: 15 mins: Winter	0.05	35.4	16.389
Catchment Area (3)	FSR: 100 years: +40 %: 15 mins: Winter	0.09	59.4	27.501
Catchment Area (4)	FSR: 100 years: +40 %: 15 mins: Winter	0.05	30.4	14.058
Catchment Area (5)	FSR: 100 years: +40 %: 15 mins: Winter	0.07	43.3	20.055
Catchment Area (6)	FSR: 100 years: +40 %: 15 mins: Winter	0.07	44.9	20.772
Catchment Area (7)	FSR: 100 years: +40 %: 15 mins: Winter	0.07	43.4	20.091
Catchment Area (8)	FSR: 100 years: +40 %: 15 mins: Winter	0.06	38.0	17.559
Catchment Area (9)	FSR: 100 years: +40 %: 15 mins: Winter	0.02	14.8	6.837
Catchment Area (10)	FSR: 100 years: +40 %: 15 mins: Winter	0.02	12.4	5.742
Catchment Area (11)	FSR: 100 years: +40 %: 15 mins: Winter	0.01	3.2	1.503
Catchment Area (12)	FSR: 100 years: +40 %: 15 mins: Winter	0.01	8.5	3.924
Catchment Area (13)	FSR: 100 years: +40 %: 15 mins: Winter	0.00	2.2	1.041
Catchment Area (14)	FSR: 100 years: +40 %: 15 mins: Winter	0.02	12.7	5.895

Catchment Area (15)	FSR: 100 years: +40 %: 15 mins: Winter	0.01	4.7	2.181
Catchment Area (16)	FSR: 100 years: +40 %: 15 mins: Winter	0.09	60.6	28.041
Catchment Area (17)	FSR: 100 years: +40 %: 15 mins: Winter	0.09	57.5	26.604
Catchment Area (18)	FSR: 100 years: +40 %: 15 mins: Winter	0.10	65.4	30.276
Catchment Area (19)	FSR: 100 years: +40 %: 15 mins: Winter	0.10	62.5	28.905

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

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
7	FSR: 100 years: +40 %: 15 mins: Winter	34.200	32.660	33.582	0.922	337.2	1.043	0.000	122.6	176.966	Surcharged
8	FSR: 100 years: +40 %: 960 mins: Winter	33.910	32.430	33.540	1.110	12.4	1.255	0.000	12.3	404.424	Surcharged
6	FSR: 100 years: +40 %: 960 mins: Winter	34.100	32.410	33.540	1.130	24.5	1.278	0.000	24.3	741.784	Surcharged
9	FSR: 100 years: +40 %: 960 mins: Winter	34.080	32.330	33.540	1.210	24.3	1.368	0.000	4.5	896.930	Surcharged
10	FSR: 100 years: +40 %: 960 mins: Winter	34.150	32.020	32.062	0.042	4.5	0.047	0.000	4.5	439.796	OK
11	FSR: 100 years: +40 %: 960 mins: Winter	33.710	31.950	31.991	0.041	4.5	0.000	0.000	4.5	439.796	OK
1	FSR: 100 years: +40 %: 15 mins: Winter	34.400	32.980	33.985	1.005	62.7	1.136	0.000	15.6	40.314	Surcharged
2	FSR: 100 years: +40 %: 15 mins: Winter	34.330	32.810	33.994	1.184	59.4	1.339	0.000	55.7	45.025	Surcharged
3	FSR: 100 years: +40 %: 15 mins: Winter	34.360	32.770	33.943	1.173	59.0	1.327	0.000	55.5	42.593	Surcharged
4	FSR: 100 years: +40 %: 15 mins: Winter	34.370	32.610	33.893	1.283	64.0	1.451	0.000	60.2	45.325	Surcharged
5	FSR: 100 years: +40 %: 15 mins: Winter	34.350	32.610	33.863	1.253	140.7	1.417	0.000	136.8	81.189	Surcharged
Manhole	FSR: 100 years: +40 %: 15 mins: Winter	34.300	32.820	33.556	0.736	73.8	0.833	0.000	23.0	41.580	Surcharged

Critical Storm Per Item: Rank By: Max. Flooded Volume

Stormwater Control	Storm Event	Max. Inflow (L/s)	Max. Resident Volume (m^3)	Max. Flooded Volume (m^3)	Total Lost Volume (m^3)	Max. Outflow (L/s)	Total Discharge Volume (m^3)	Percentage Available (%)	Status
Cellular Storage 3	FSR: 2 years: +0 %: 15 mins: Summer	152.3	51.565	0.000	0.000	0.0	31.572	69.941	OK
Cellular Storage 4	FSR: 2 years: +0 %: 15 mins: Summer	56.7	29.404	0.000	0.000	0.0	2.391	83.773	OK
Cellular Storage 5	FSR: 2 years: +0 %: 15 mins: Summer	4.9	1.443	0.000	0.000	0.0	0.000	98.880	OK
Cellular Storage 6	FSR: 2 years: +0 %: 15 mins: Summer	0.5	0.279	0.000	0.000	0.0	0.000	99.319	OK
Cellular Storage 1	FSR: 2 years: +0 %: 15 mins: Summer	2.3	0.083	0.000	0.000	0.0	0.000	99.922	OK
Cellular Storage 2	FSR: 2 years: +0 %: 15 mins: Summer	7.0	4.093	0.000	0.000	0.7	0.370	95.637	OK

Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		

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
2.001	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	7	8	34.200	33.545	0.450	81.744	0.8	0.73	132.5	Surcharged
2.002	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	8	6	33.910	33.422	0.450	105.019	1.3	1.24	199.8	Surcharged
1.006	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	6	9	34.100	33.354	0.600	199.502	1.4	0.76	393.8	Surcharged
1.007	FSR: 100 years: +40 %: 960 mins: Winter	Pipe	9	10	34.080	33.540	0.032	439.913	0.8	0	4.5	Surcharged
1.008	FSR: 100 years: +40 %: 960 mins: Winter	Pipe	10	11	34.150	32.062	0.042	439.796	0.5	0.01	4.5	OK
1.001	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	1	2	34.400	33.351	0.225	11.428	0.6	0.4	21.0	Surcharged
1.002	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	2	3	34.330	33.969	0.300	37.970	1.0	1.1	60.2	Surcharged
1.003	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	3	4	34.360	33.909	0.300	38.539	0.9	0.55	60.4	Surcharged
1.004	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	4	5	34.370	33.850	0.300	40.896	0.9	1.23	65.2	Surcharged
1.005	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	5	6	34.350	33.816	0.300	72.838	2.0	1.41	138.2	Surcharged
3.001	FSR: 30 years: +0 %: 30 mins: Winter	Pipe	Cellular Storage 4	Cellular Storage 3	34.200	32.868	0.426	0.000	0.0	0.03	7.0	OK
3.000	FSR: 2 years: +0 %: 30 mins: Winter	Pipe	Cellular Storage 5	Cellular Storage 4	34.200	32.711	0.161	0.000	0.1	0.02	5.0	OK
3.002	FSR: 30 years: +0 %: 30 mins: Winter	Pipe	Cellular Storage 3	9	34.200	32.939	0.450	0.000	0.1	0.04	9.1	Surcharged
1.000	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Cellular Storage 6	1	34.300	33.135	0.225	0.000	0.8	0.77	14.9	OK

Pipe	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Manhole	7	34.300	33.556	0.450	0.000	0.2	0.09	23.0	Surcharged
Pipe (1)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Cellular Storage 1	Manhole	34.140	33.024	0.300	0.000	0.7	0.19	22.2	OK
Pipe (2)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	Cellular Storage 2	7	33.900	32.982	0.300	0.000	0.4	0.41	27.6	OK

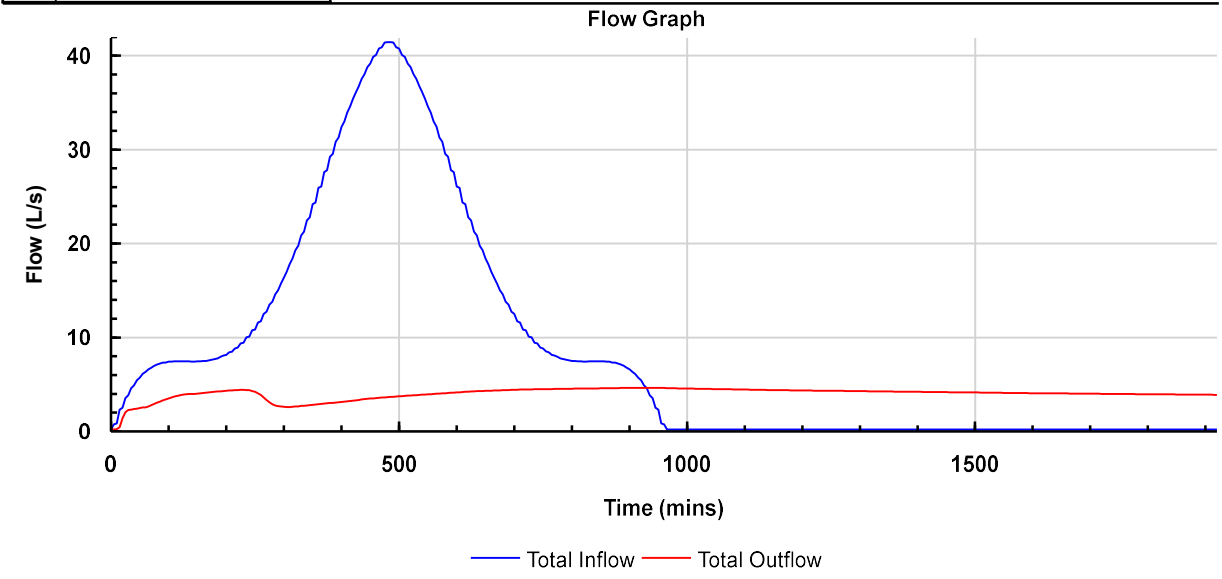
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		

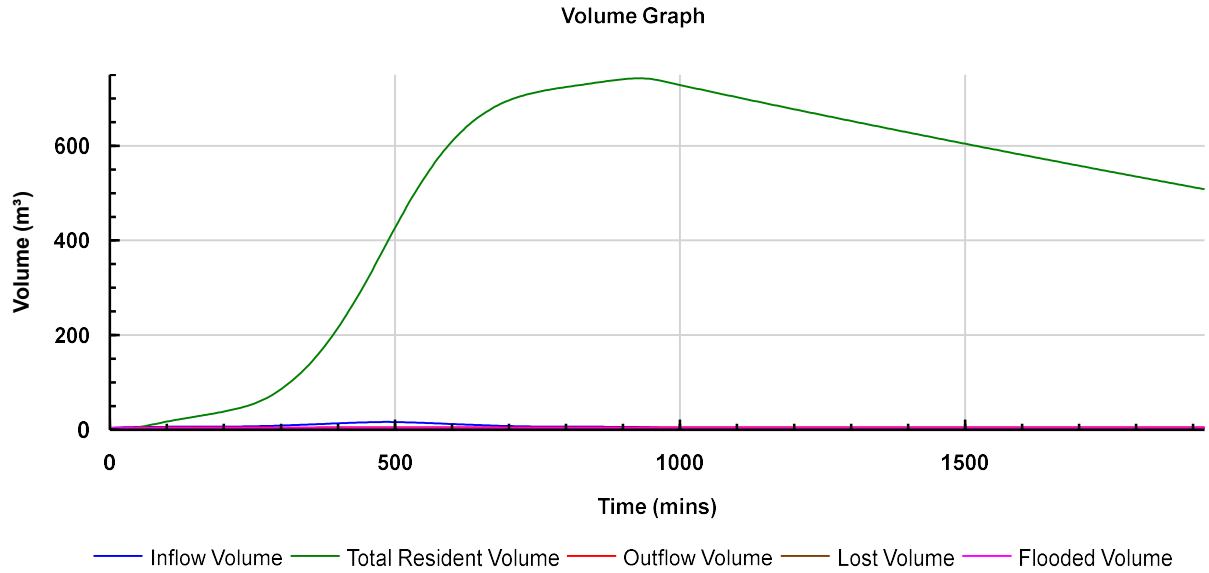
Phase
FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
11			4.5	439.796
TOTAL	41.5	943.881	4.5	439.796

Graphs



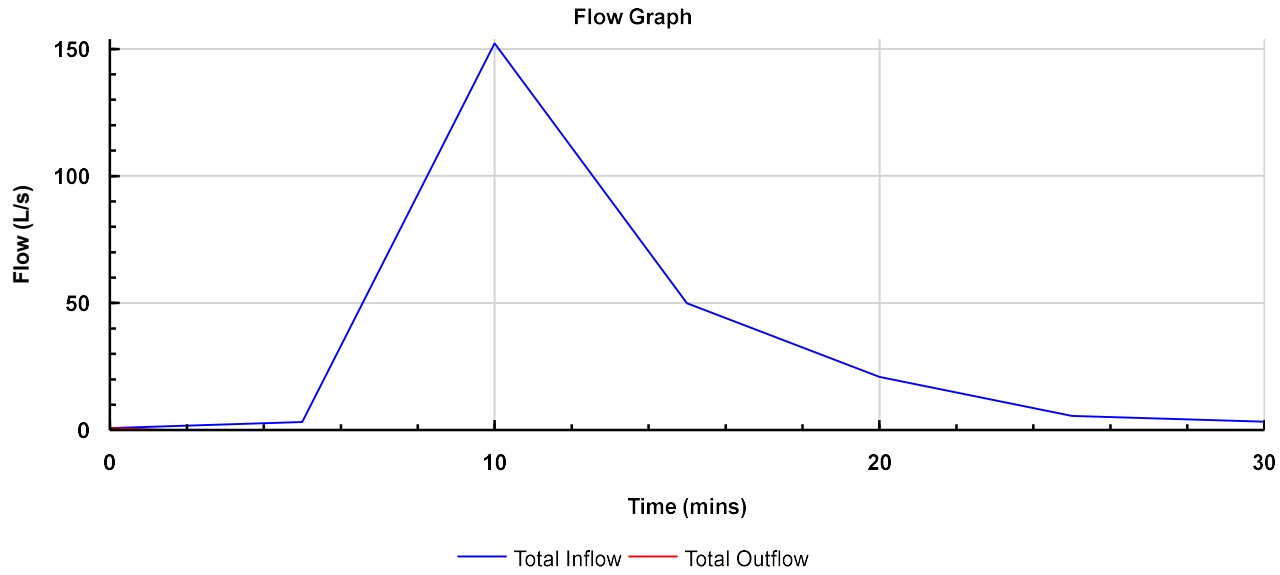


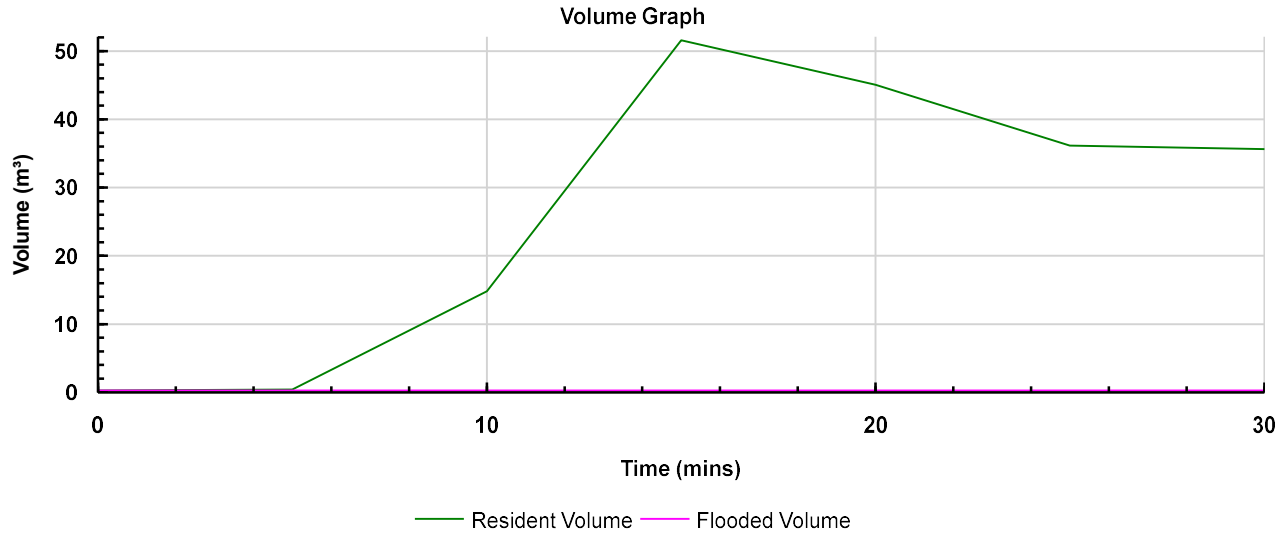
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Cellular Storage 3
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Cellular Storage

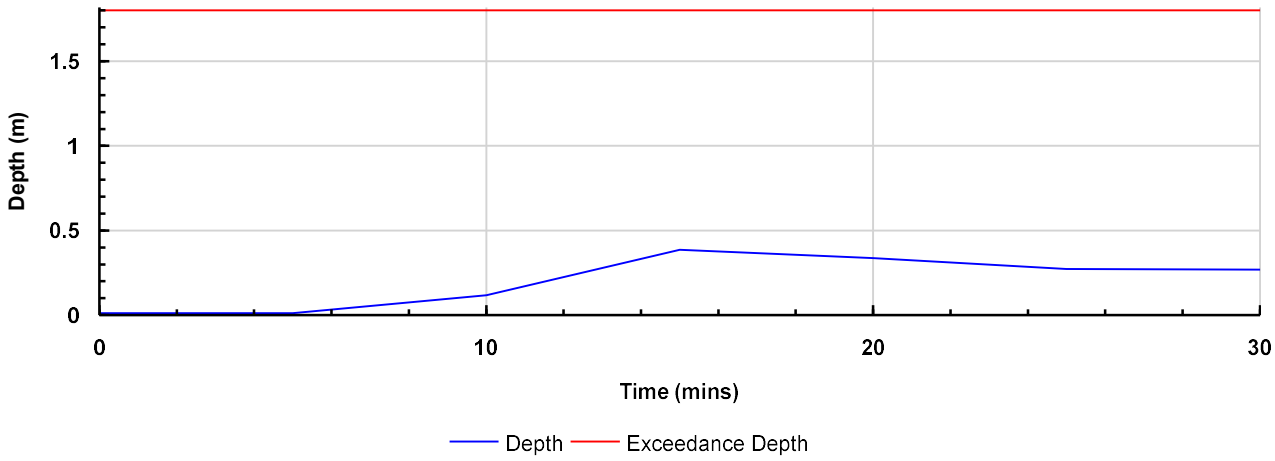
Graphs





Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

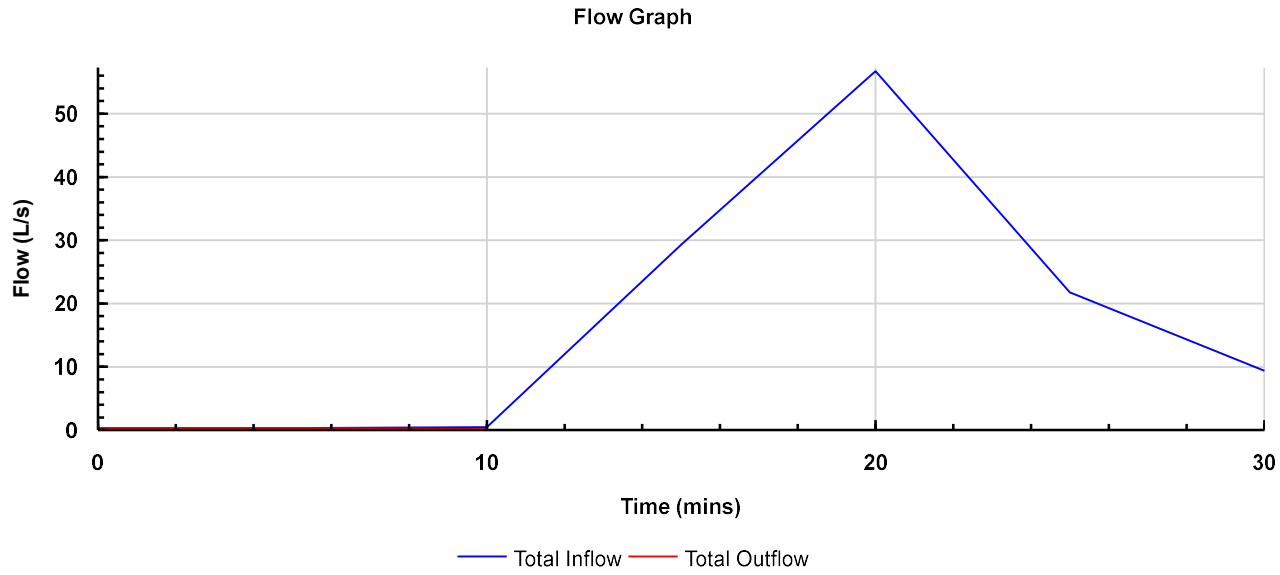
Depth Graph

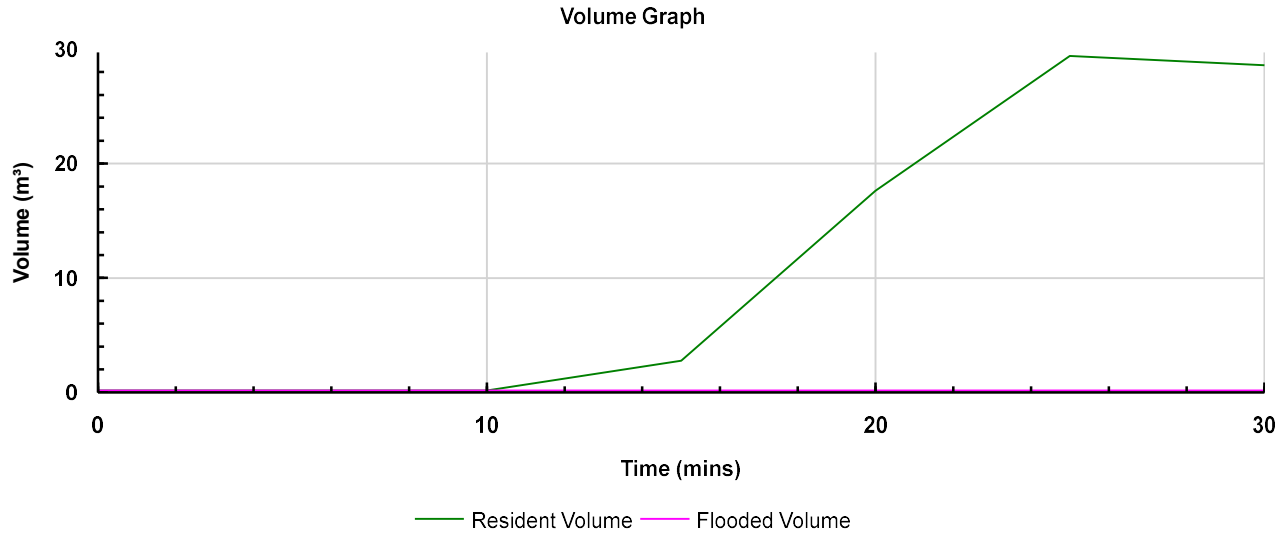


Cellular Storage 4
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

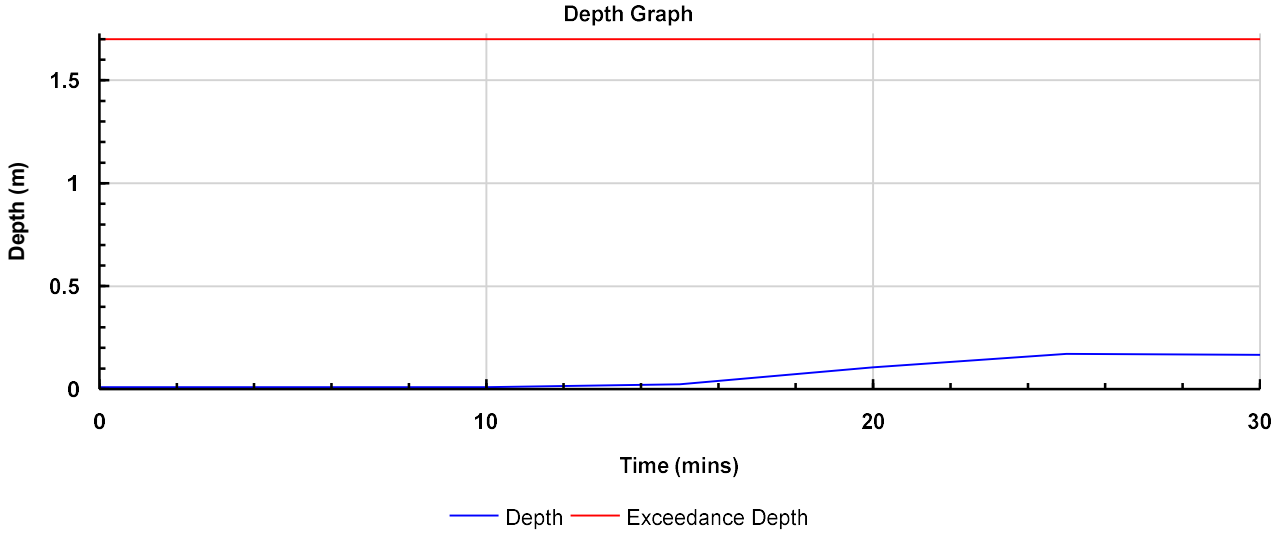
Type : Cellular Storage

Graphs





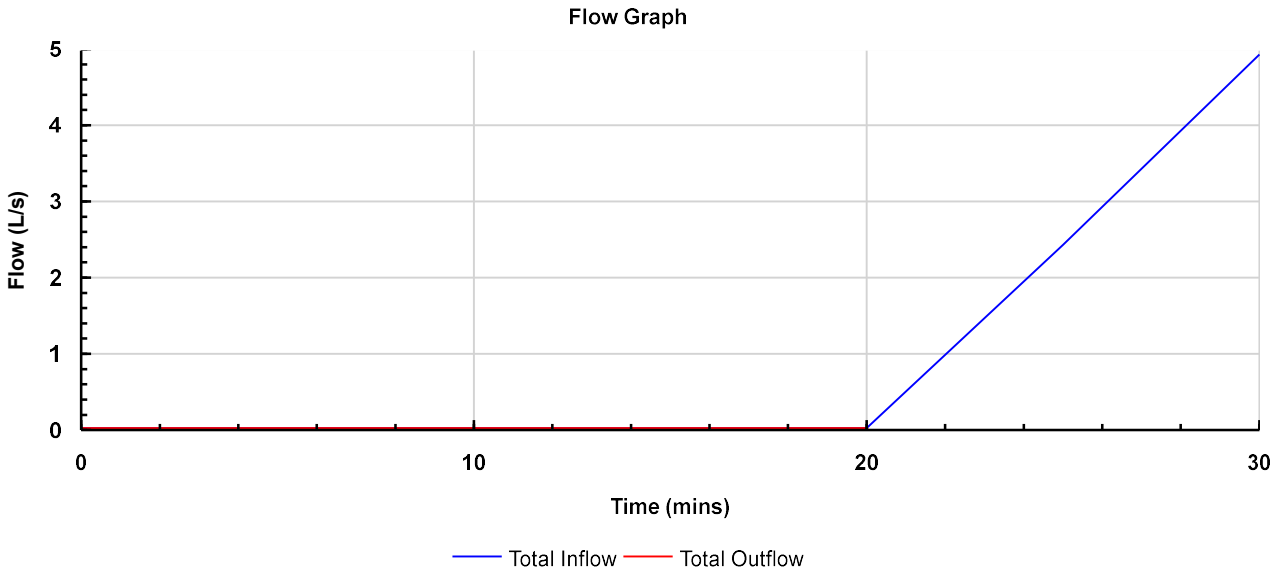
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

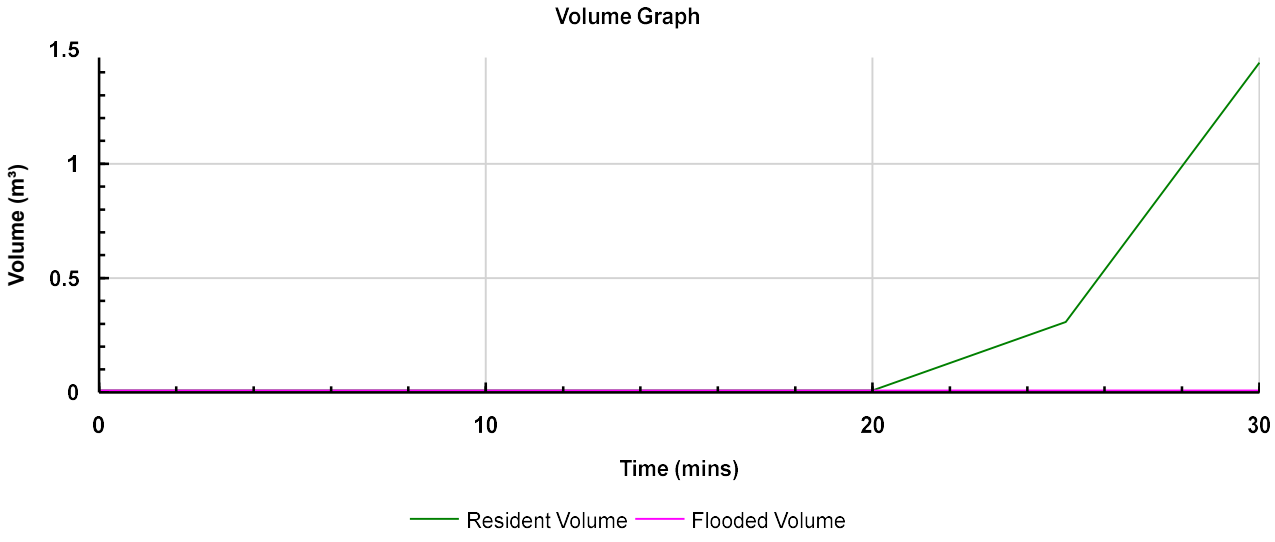


Cellular Storage 5
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

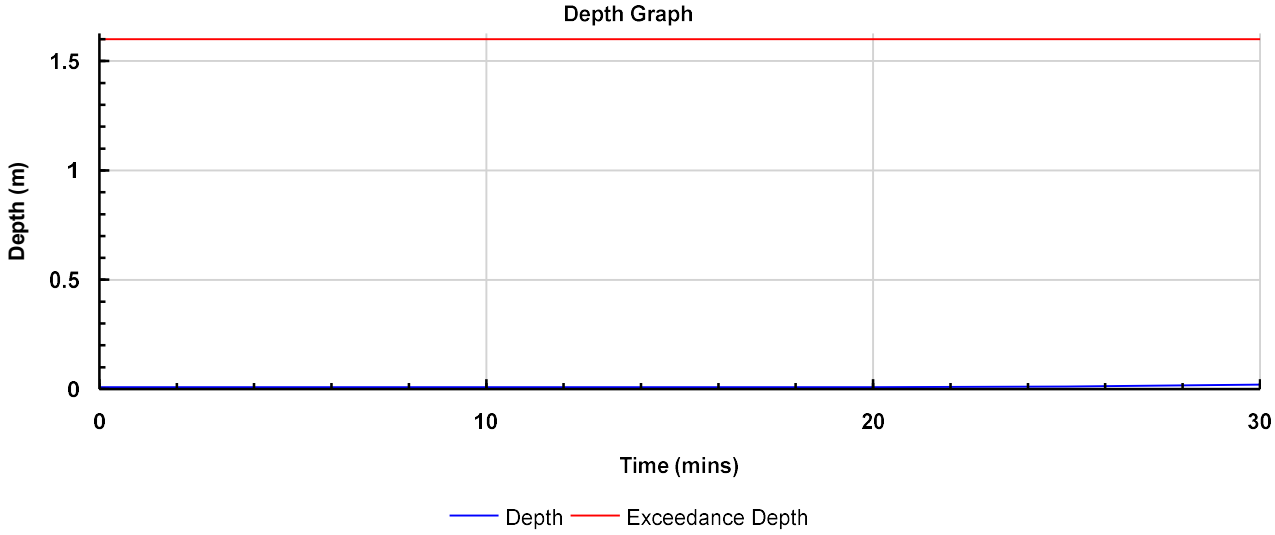
Type : Cellular Storage

Graphs





Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

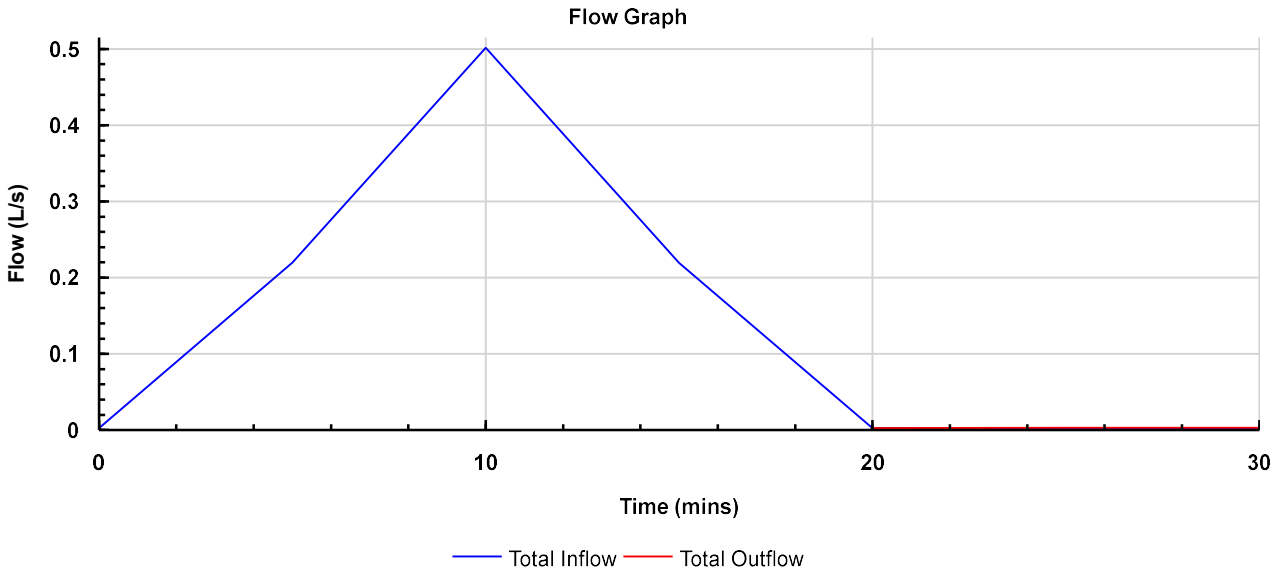


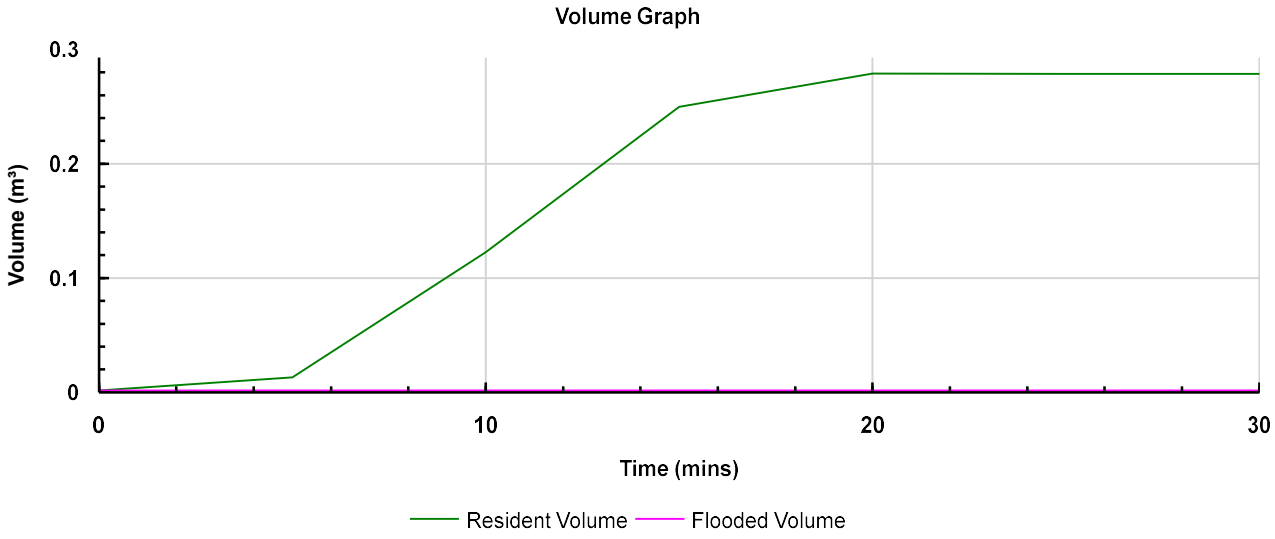
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Cellular Storage 6
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Cellular Storage

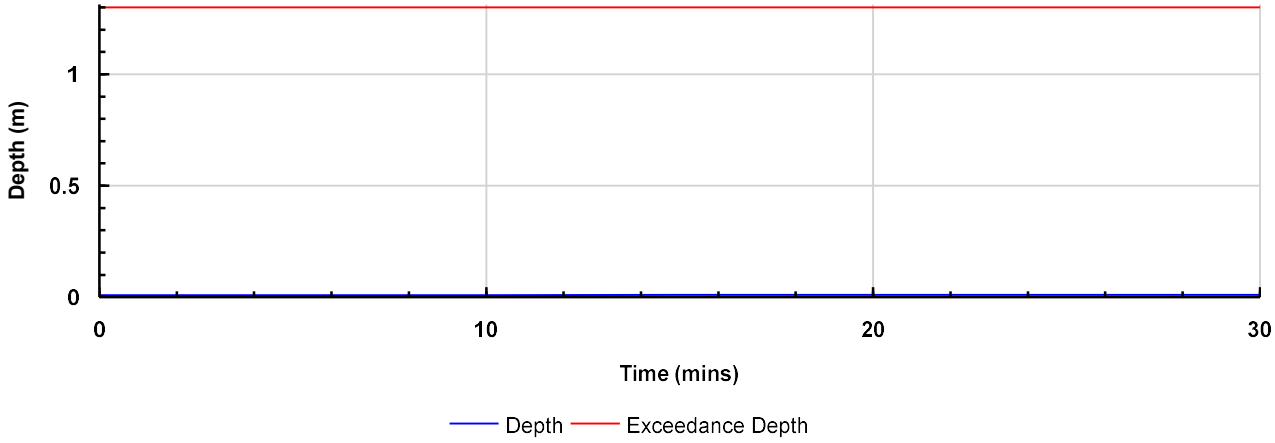
Graphs





Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Depth Graph

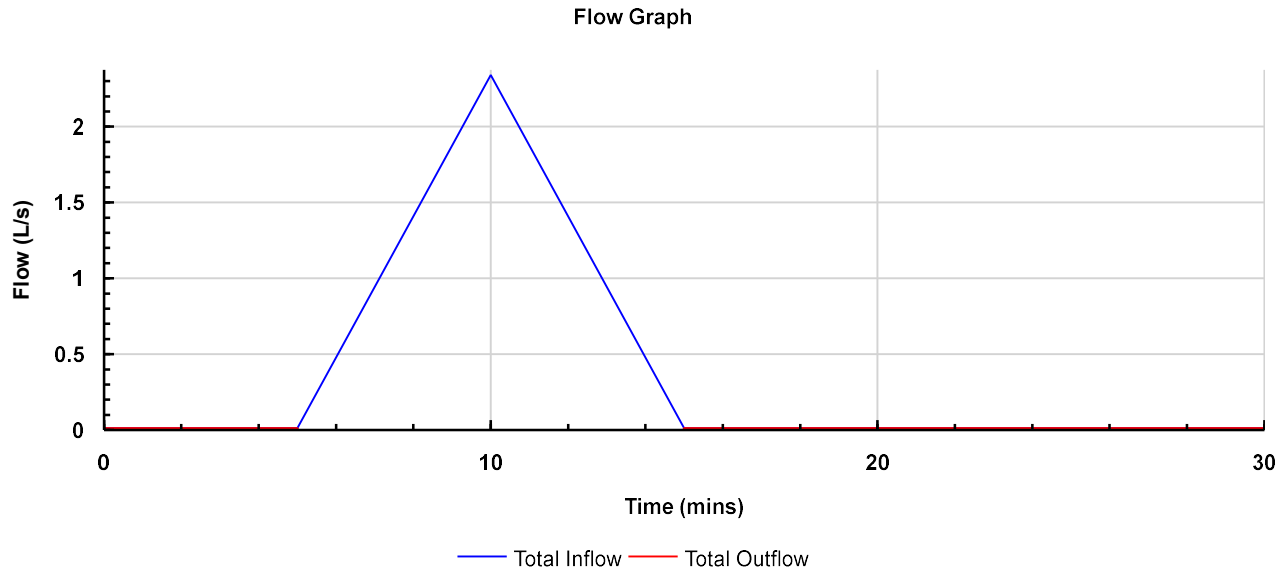


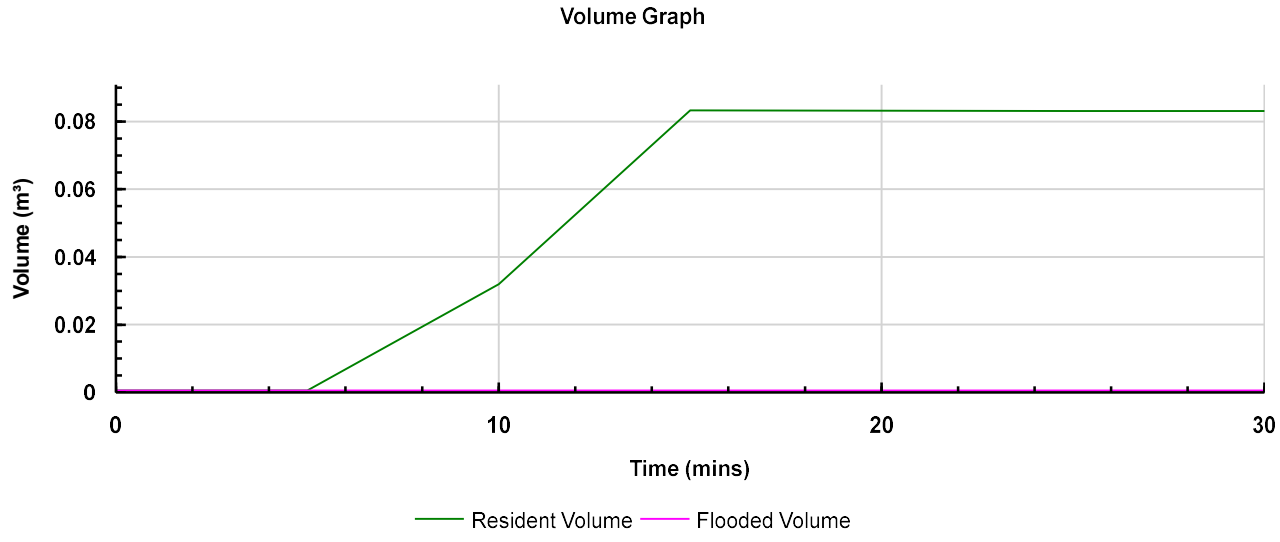
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Cellular Storage 1
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Cellular Storage

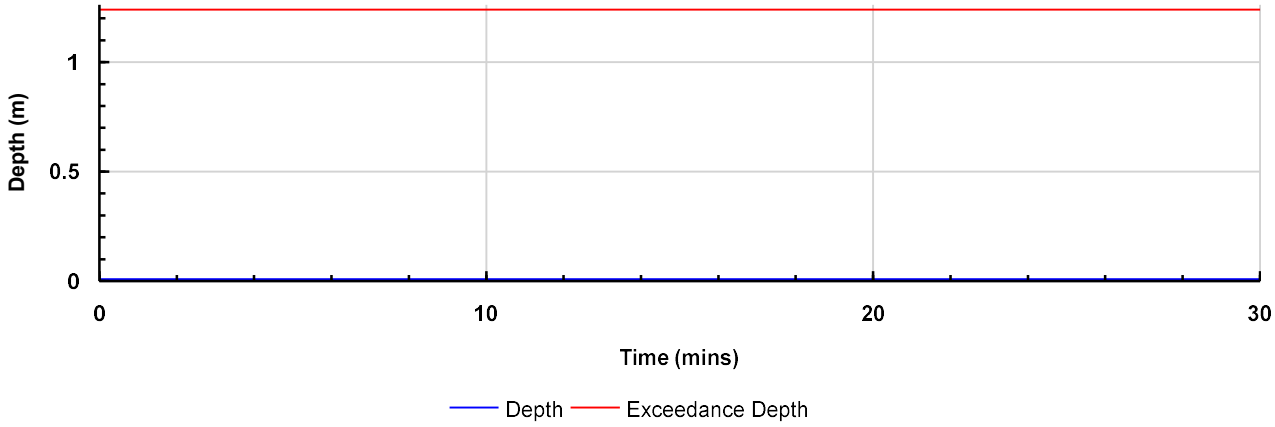
Graphs





Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Depth Graph

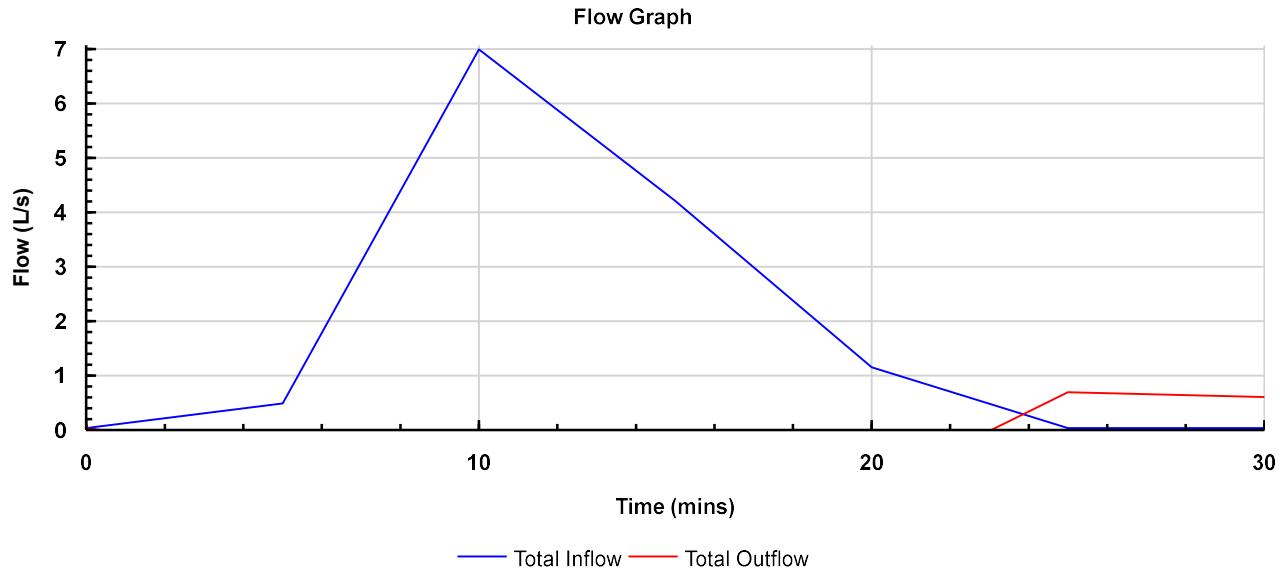


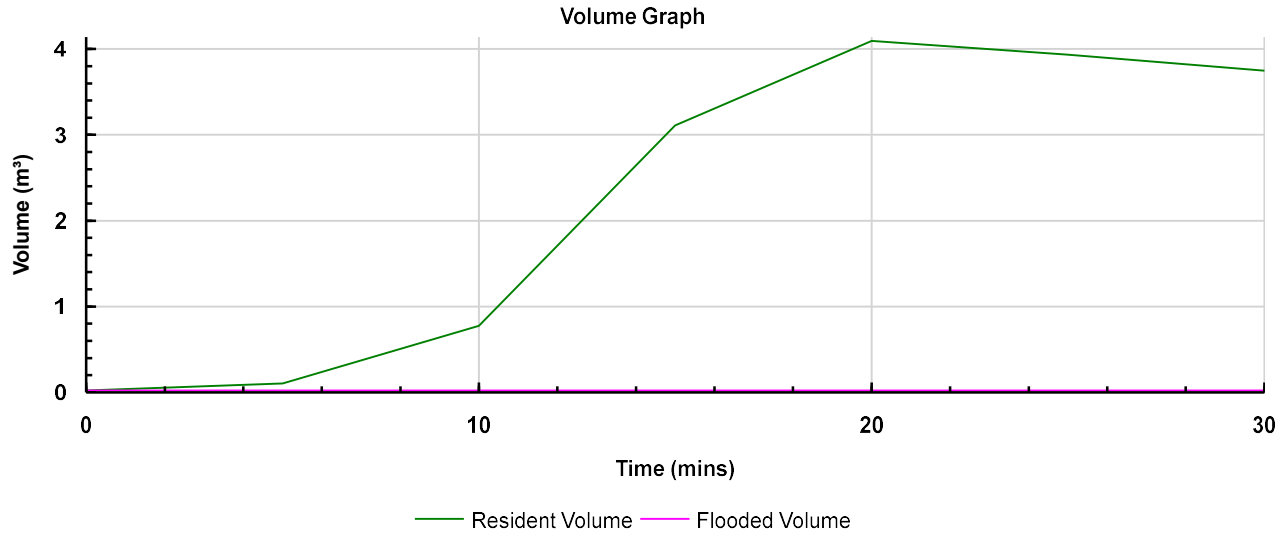
Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address:		

Cellular Storage 2
Critical Storm: FSR: 2 years: Increase Rainfall (%): +0: 15 mins: Summer

Type : Cellular Storage

Graphs





Project:	Date: 22/01/2024		
	Designed by: alixr	Checked by:	Approved By:
Report Details: Type: Stormwater Control Results Storm Phase: Phase	Company Address: