

Plot 400, Dunsbury Park, Portsmouth

PEREGA

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1. Introduction

- 1.1 This flood risk assessment (FRA) and Drainage Strategy Report has been prepared by Perega Ltd on behalf of their client, Portsmouth City Council for the development of Plot 400 at Dunsbury Park, Havant PO9 4EE, to support their full planning application for the proposed development site.
- 1.2 The application boundary covers an area of approximately 3.36 hectares (ha) and is a greenfield site.
- 1.3 This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Technical Guidance.
- 1.4 The key site details are presented in Table 1, below.

Table 1 - Site Summary

Site Name	Dunsbury Park, Portsmouth – Outline Plot 400
Location	Dunsbury Park, Havant PO9 4EE
Grid Reference	SU 70028 09317
Development Site Area	3.36 Hectares Approx.
Development Type	Commercial
Flood Zone	Flood Zone 1 (Low Probability Risk)
Surface Water Flood Risk	Medium Probability Risk
Local Water Authority	Southern Water
Local Planning Authority	Havant Borough Council
Lead Local Flood Authority	Hampshire County Council

- 1.5 The development area is located in Flood Zone 1 and has an area of over 1 hectare, therefore, in line with standing advice, an independent FRA is required under the guidance of the National Planning Policy Framework (NPPF).
- 1.6 This report has been prepared solely as a Flood Risk Assessment (FRA). It therefore only addresses any environmental issues to the extent they are impacted by flooding. The findings are based on information evaluated at the time of preparation.
- 1.7 The report is the property of Perega and is produced for the exclusive use of our client and is confidential to that client. The contents may not be made use of by any third party without the express written consent of Perega. Any liability to any third party is expressly excluded.
- 1.8 This report is made on behalf of Perega. By receiving this report and acting on it, the client, or any third party relying on it, accepts that no individual is personally liable in contract, tort, or breach of statutory duty (including negligence).

2. Methodology

- 2.1 This is a desk-based study that utilises existing, publicly held information in the form of mapping and previously undertaken work. Conclusions made about flooding have been made using our expert judgement and knowledge of similar events.
- 2.2 In preparing this report, information has been gathered and referenced from several sources. These are as follows:
 - i. The Environment Agency's Flood Map for Planning.
 - ii. The Long-Term Flood Risk Map for England.
 - iii. The National Planning Policy Framework , and.
 - iv. The Planning Practice Guidance.
 - v. As-Built topographical survey information for the property

3. Site Details

Site Setting

- 3.1 The proposed Plot 400 site is an irregular shape parcel of land in an existing 100-acre business park known as Dunsbury Park development.
- 3.2 Plot 400 is being developed as part of a multiple phased strategy, with construction progression in distinct parcels of land. At present, two of the parcels have already been fully built, with remaining areas planned in phases (Plot 100, Plot 400 and Plot 600). This is captured in the wider site planning application ref. APP/12/00338 with Peter Brett's proposed Outline Planning drainage strategy was approved. Plot 400 is proposed to fit into this overall drainage strategy by discharging both foul and surface sewers into the wider proposed foul run from the wider site and the existing surface sewer to the East of the site respectively.
- 3.3 The proposed site can be accessed via Fitzwygram Way at the junction adjacent to Plot 5.
- 3.4 A site location plan for Plot 400 is included in **Appendix A** of this report.

Surface Water Features

- 3.5 The Hermitage Stream runs approximately 315m south-west to the site, flowing in a south-eastern direction.
- 3.6 To the east of the site lies at approximately 310m the Park Lane Stream, which is culverted in its lower reaches before it joins the Hermitage Stream downstream of the Middle Park Way.

Geology

- 3.7 A ground investigation report has been undertaken by Hydrock Consultants Limited for the wider site. Another intrusive investigation covered the proposed Plot 400.
- 3.8 BGS Geology Viewer indicates that site is situated between two distinct geological formations: the London Clay Formation along its Portsmouth side and the Bognor Sand Member along its northern side. The London Clay Formation is noted to be mainly bioturbated or poorly laminates, blue-grey or grey-brown, slight calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. The Bognor Sand Member comprises to be glauconitic bioturbated or cross-bedded fine and medium-grained sands, partially cemented. The Superficial deposit is mostly identified as clay, silt, sand and gravel, which is referred to as Head Gravel.

3.9 Hydrock Consultants Limited ground investigation report confirms that the site is underlain by Bognor Sand Member (approximately 0.4 m and 5.1 m bgl), comprising silty fine sand and sandy clay/silt, overlaying a weathered zone of the London Clay Formation (to around 5.5 m bgl). Below this, the London Clay Formation extends to at least 30.45 m bgl, consisting of stiff to very stiff, low-permeability silty clay.

3.10 Hydrock Consultants Limited ground investigation report is included in **Appendix K** of this report.

Hydrogeology

3.11 Hydrock Consultants Limited reports that groundwater was encountered in the Bognor Sand Member and London Clay Formation between 1.3 -11.5m bgl, with monitored levels generally 1.6–4.2m bgl and slow seepage observed. An infiltration test in the London Clay (to 3.0 m bgl) showed no infiltration, indicating very low permeability.

3.12 Defra's Magic Maps indicates that the site is in an area of Medium Groundwater vulnerability.

Existing Drainage

3.13 The incumbent sewage undertaker is Southern Water.

3.14 CCTV Survey for the site was undertaken by Midland Survey LTD which can be seen in **Appendix J** of this report.

3.15 There is an existing 450mm diameter surface water sewer network running southbound to the East of Plot 400.

3.16 The CCTV survey indicates there is a private sewer network is approximately 140m south-east of Plot 400.

Source Protection Zones

3.17 Groundwater Source Protection Zones (SPZ's) are defined around groundwater abstraction sources such as wells, boreholes and springs that are used for public drinking water supply.

3.18 SPZ's show the risk of contamination to groundwater from any activities that might cause pollution in the area. The closer the activity to the source of abstraction, the greater the risk. The maps show three main zones; inner – Zone 1; outer – Zone 2 and total catchment – Zone 3.

3.19 Zone 1 is defined as the 50-day travel time from any point below the water table to the source of abstraction. This zone has a minimum radius of 50 metres.

3.20 Zone 2 is defined by a 400-day travel time from a point below the water table to the source of abstraction. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction.

3.21 Zone 3 is defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source of abstraction but is thought to be greater than 400 days travel time.

3.22 **Appendix I** shows Defra's Magic Map which identifies the site is located in zone 1 – subsurface activity in the Zone of Source Protection. This implies a high level of protection against pollution is required as part of the development. The proposed drainage design must ensure any polluted runoff is treated before getting discharged into the surface water drainage network.

Topography

- 3.23 Plot 400 is generally inclined with a considerable variation in levels between 41.00m AOD to the north and 30.29 AOD to the south. The lowest point is located at southeast corner of the site. Overall, the site has a fall of approximately 10.7m from north to south
- 3.24 The topography of the site can be seen in **Appendix E**.

Existing Discharge Rate

- 3.25 The existing site is greenfield.
- 3.26 The HR Wallingford tool has been used to calculate the following Greenfield discharge rate for the site which can be seen in **Appendix F**. This has been carried out for the site impermeable area of 2.96ha. This is summarised in Table 2.

Table 2 - Greenfield Runoff rate

Storm Event	Greenfield Rate (l/s for 2.96ha)
QBar	16.2
1-year	13.8
30-year	37.2
100-year	51.7

- 3.27 Calculated Greenfield runoff rates are in line with the Peter Brett discharge rate of 31.7 l/s.

4. The Proposed Development

- 4.1 The proposed development of Plot 400 comprises a commercial logistics development with ancillary office accommodation, external parking, access road and landscaping over the site area.
- 4.2 The proposed development can be seen in **Appendix B**.

5. Strategic Flood Risk Assessments, Surface Water Management Plans and Local Flood Risk Management Strategies

- 5.1 Strategic Flood Risk Assessments (SFRA's) and Surface Water Management Plans (SWMP's) provide a high-level overview of flood risk and are prepared by the Lead Local Flood Authorities (LLFA). In this context, the Hampshire County Council acts as the LLFA and is responsible for developing and implementing a Local Flood Risk Management Strategy (LFRMS), which outlines the policies and measure for managing local flood risks. There have been no sources that identify a SWMPs for Hampshire County Council: rather, the LFRMS serves as their primary strategy for managing these local flood risks.
- 5.2 The Level 1 SFRA for Hampshire County Council prepared by AECOM in February 2024 collates and analyses readily available flood risk information from all sources of flooding to provide an overview of flood risk issues across the study area. It considers flooding from tidal sources, rivers (fluvial), surface water runoff, groundwater, sewers and artificial sources. They also reference historical flooding and consider the potential for future flooding, including the impact of climate change. Additionally, the LFRMS provides the investigations and recording key local flood incidents, maintaining a flood risk asset register, establishing a sustainable drainage adoption body for SuDS, approving drainage arrangements for new developments and share flood risk information to establish a plan for managing it in surface water flood areas,

The Environment Agency Flood Map for Planning

- 5.3 The Environment Agency's Flood Map for Planning gives an indicative prediction of areas at risk of fluvial and tidal flooding. The mapping is an amalgamation of modelled flood levels and historical flood event outlines.
- 5.4 The Flood Map is split into 'Flood Zones', which demarcate the extent of flooding from rivers or the sea for different return periods. The Flood Map for Planning shows the extent of the natural floodplain if there were no defences or other man-made structures. They do not provide a definitive picture of where flooding would occur; rather, they provide an indicative prediction of areas at risk.
- 5.5 Table 3 lists the flood zone categories and explains the flood risk probabilities they represent.

Table 3 - Flood Zone Categories

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – 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. (Land shown in light blue on the Flood Map)
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. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their SFRAs areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

The National Planning Policy Framework

- 5.6 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The Technical Guidance to the NPPF provides further information on the policies set out in the NPPF. It encourages development to take place in areas of lower flood risk wherever possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.
- 5.7 Within each Flood Zone, a key factor in determining planning applications for development is the flood risk vulnerability of a development. Table 2 of the Technical Guidance to the NPPF categorises different development types according to their vulnerability to flooding. These categories are:
- Essential infrastructure.
 - Highly vulnerable development.
 - More vulnerable development.
 - Less vulnerable development, and.
 - Water-compatible development.

- 5.8 Within the different Flood Zones each of the above development categories are considered appropriate or not permissible. The PPG lists these as:

Flood Zone 1:

All the development categories listed above are appropriate.

Flood Zone 2:

Water-compatible, less vulnerable development, more vulnerable development and essential infrastructure is appropriate in this zone. An exception test is required for highly vulnerable infrastructure in this zone.

Flood Zone 3a:

Water-compatible and less vulnerable development is appropriate in this zone. Highly vulnerable development should not be permitted in this zone. An exception test is required for more vulnerable and essential infrastructure in this zone.

Flood Zone 3b:

Only water-compatible development and essential infrastructure that must be there should be permitted in this zone. An exception test is required for essential infrastructure.

- 5.9 The above information sets out the basis by which developments must be assessed in terms of flood risk. In Section 7 the vulnerability of the proposed development will be reviewed against the Flood Zone in which it is located. This will inform the suitability of the development as per the advice within the PPG.

6. Historical Flooding

- 6.1 There have been no recorded flood events from fluvial or tidal flooding within the site boundary shown on records consulted in accordance with Defra Data Services.

7. Current and Future Flood Risk

- 7.1 Flooding can arise from a variety or combination of sources. These may be natural or artificial and may be affected by climate change. These are discussed below detail and summarised in Table 10

Fluvial Flooding

- 7.2 **Appendix H** shows the Environment Agency's Flood Map for Planning at the site locations. The map shows that Plot 400 lies within Flood Zone 1. Therefore, the risk of flooding from rivers is considered to be **Very Low**.

- 7.3 According to The Level 1 SFRA for Hampshire County Council prepared by AECOM, the Hermitage stream is the main drainage feature in the Northern Havant. It flows south through Waterloo and Bedhampton before discharging into Langstone Harbour. The stream is approximately 7 km in length. While it retains a 'natural meandering form' through the urban areas, it has been straightened and contained within a concrete-lined channel, which may influence flow rates and local flood risk. The Hermitage Stream located approximately to the south of the site, flows southeast beneath the A3(M) through Leigh Park and Havant before discharging into Langstone Harbour.

- 7.4 The Park Lane Stream flows through a valley east of the site, which reaches a culvert before joining the Hermitage Stream downstream of Middle Park Way.

- 7.5 Both Hermitage Stream and Park Lane Streams (downstream of the Giant Steps) are designated as main rivers.

Flood Risk Vulnerability and Appropriateness of Development

- 7.6 Industrial, commercial and car parks are listed in Annex 3 of the NPPF as being 'less vulnerable' to flooding. A Table in the Flood risk and coastal change section of the PPG (replicated below in Table 4) states that 'less vulnerable' development is considered appropriate in Flood Zone 1 as the building footprint lies within the zone but it is still subjected to compliance with relevant flood risk management requirements.

Table 4: Replicated from the NPPF: Flood Risk Vulnerability and Flood Zone 'Compatibility'.

Flood Zones	Flood Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a [†]	Exception Test Required [†]	✗	Exception Test Required	✓	✓
Zone 3b [*]	Exception Test Required [*]	✗	✗	✗	✓

Key:

✓ - Development is appropriate

✗ - Development should not be permitted

Tidal Flood Risk

- 7.7 The Environment Agency's Flood Map for planning does not differentiate between fluvial and tidal flooding. However, the site is not located near to the sea therefore the site is not in an area at risk of tidal flooding.

Surface Water Flood Risk

- 7.8 Pluvial flooding results from rainfall-generated overland flow, where rainwater has not yet reached a watercourse or sewer and where the local drainage systems become overwhelmed. Pluvial flooding often occurs during short, very intense storms, but can also occur during longer periods of rainfall when the ground is already saturated, or where land has low permeability due to development. Although pluvial flood events are usually short-term, they can be devastating with fast flows and deep waters occurring quickly.
- 7.9 In these conditions surface water can build up where the topography allows it to converge or pond. Where it gathers it will travel down prevailing gradients. Pluvial flooding then occurs at locations where significant surface water flow paths converge, at localised low points and/or due to overland obstructions. In urban areas pluvial flooding often occurs where the built environment channels overland flow routes (down roads that are bounded by kerbs, for example) or where there are obstacles to the natural overland flow routes. Boundary walls and buildings are often the main causes and, hence, affect the likelihood of pluvial flooding to impact property and gardens.
- 7.10 Pluvial flooding is exacerbated in many cases by the mistreatment or failure of the below ground infrastructure (including partial or full blockages of gullies and/or within the combined sewers and the accumulation of fats, oils and greases within the sewer networks).

- 7.11 The Long-Term Flood Map for England (LTFMfE) attempts to model the areas where pluvial flooding is likely to occur. The LTFMfE is a national scale modelled output. It shows the flooding that could take place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which:
- is on the surface of the ground (whether it is moving), and
 - has not yet entered a watercourse, drainage system or public sewer.
- 7.12 The LTFMfE predominantly follows topographical flow paths of existing watercourses, or dry valleys with some isolated ponding located in low lying areas.
- 7.13 The LTFMfE shows that the development site is located in an area predominantly at **very low** risk of surface water flooding, implying the chance of surface water flooding at this site is less than 0.1% each year. However, a narrow strip along the centre of the site is identified as **high** risk area for surface water flood. This is likely due to natural low points within the existing site. This can be seen in Figure 1 and is included in **Appendix H**. The Surface Water Map shows that part of the site has a medium/high change of flooding from surface water. It is proposed that the drainage strategy will suitably mitigate the flood risk from surface water.

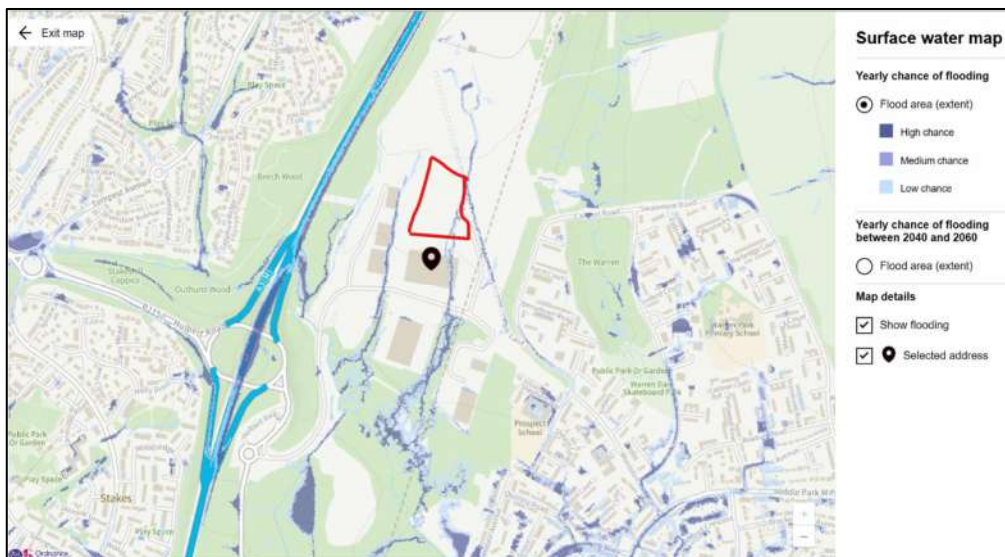


Figure 1 - Surface Water Flood Map

Groundwater Flood Risk

- 7.14 The risk of groundwater flooding is dependent on local geological and hydrogeological conditions at any given time. Groundwater levels rise during wet winter months and fall again in the summer when rainfall is low, and extractions are higher. In very wet winters, rising groundwater levels can reactivate flow in ephemeral streams that only flow for part of the year or even lead to the flooding of normally dry land.
- 7.15 Magic maps indicates that the site has a Medium groundwater vulnerability.

Flood Risk from Canals

- 7.16 There are no purpose-built canals or navigable waterways in the vicinity therefore, there is no risk from canals.

Flood Risk from Reservoirs and Large Water Bodies

- 7.17 Flooding can occur from reservoirs or large water bodies that are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies can overtop or breach their impounding structures leading to rapid inundation of the downstream floodplain.
- 7.18 The Environment Agency is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be regularly inspected and supervised by reservoir panel engineers. Local Authorities are responsible for coordinating Emergency Plans for reservoir flooding and ensuring communities are well prepared. Local Authorities should work with other members of the Local Resilience Forum (LRF) to develop these plans.
- 7.19 The Havant Thicket Reservoir, currently under construction, is designed as a winter storage reservoir operated by Southern Water. It is proposed for Staunton Country Park and located approximately to the east of the site.

Flood Risk from Sewers

- 7.20 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or because of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.
- 7.21 Typically, sewer systems are constructed to accommodate rainstorms with a 30-year return period or less, depending on their age. Consequently, rainstorm events greater than 1 in 30-years would be expected to result in surcharging of some parts of the sewer system. In fact, due to most gullies being poorly maintained and often partially blocked with silt, leaves and other debris, their capacity is often estimated to be closer to the 1 in 10-year storm.
- 7.22 English and Welsh water companies are required to maintain a register of flooding incidences due to hydraulic capacity problems on the sewage network. This database identifies properties where flooding has occurred on a frequency of 1 in 5 years and 1 in 10 years. The database is known as the DG5 and DG10 registers.
- 7.23 There is no record of flooding from sewers within the site boundary. However, the Level 1 Hampshire SFRA notes that the incidents may have been addressed through Southern Water's ongoing asset management programme.

Climate Change

- 7.24 The NPPF and the supporting Technical Guidance document sets out how flood risk should be considered over the lifetime of a development. This requires an increase in flood risk due to climate change to be considered. Both peak river flows and rainfall intensity should be assessed.

Peak River Flows

- 7.25 A range of climate change allowances have been provided by the NPPF for peak river flow increases - a 'central' allowance, a 'higher central' allowance, an 'upper end' allowance and a 'H++' allowance. The flood zone and risk vulnerability classification of the development decide which allowance to consider.
- 7.26 The NPPF groups England's individual river and rainfall catchments into wider catchment areas that are considered to have similar hydrogeological conditions, physical characteristics, rainfall inputs and responses to storm events.

- 7.27 The development is identified within the 'East Hampshire Management Catchment'.
- 7.28 The NPPF states that for 'less vulnerable' developments in Flood Zone 1 the central allowance should be used. Table 5 summarises the data attributed to the East Hampshire Management Catchment.

Table 5: Catchment Peak River Flow Allowances

Epoch	Central Allowance	Higher Allowance	Upper Allowance
2020s	19%	24%	37%
2050s	22%	30%	51%
2080s	37%	51%	88%

- 7.29 Without site-specific modelling, there can be no definitive conclusion regarding whether an increase in peak river flows of 37% will pose a risk to the development. It is unlikely that an increase in peak river flows will result in the new development being within a flood zone that would render the site inappropriate.

Peak Rainfall Intensity

- 7.30 With climate change it is becoming more common to see rainfall events of higher intensity. Increased rainfall intensity affects river levels and drainage systems, with the result being an increase in surface water flooding and sewerage surcharge.
- 7.31 The NPPF states that for flood risk assessments for developments with a lifetime beyond 2100, the upper end allowances for the 2070s should be used. Tables 6 and 7 summarise the data attributed to the East Hampshire Management Catchment.

Table 6: Catchment Peak Rainfall Flow Allowances - 3.3% annual exceedance rainfall event

Epoch	Central Allowance	Upper End Allowance
2050s	20%	35%
2070s	25%	40%

Table 7: Catchment Peak Rainfall Flow Allowances - 1% annual exceedance rainfall event

Epoch	Central Allowance	Upper End Allowance
2050s	20%	40%
2070s	25%	45%

- 7.32 The emerging surface water strategy for the proposed development should be designed to accommodate and discharge peak rainfall flows up to the 1 in 100-year even, including 45% increase in rainfall for climate change, as identified by the East Hampshire Catchment Peak Rainfall allowances for the 1% AEP. Similarly, the 3.3% AEP shall be designed using an increase rainfall uplift of 40%.

Residual Flood Risk

- 7.33 It is important to recognise that flood risk can never be fully mitigated and there will always be a residual risk of flooding. The residual risk is associated with several potential risk factors, including (but not limited to):

- A flood event that exceeds that for which the local flood defences or local drainage system has been designed to withstand.
- A residual danger posed to property and life because of flood defence failure through overtopping or structural collapse.
- General uncertainties inherent in the prediction of flooding.

7.34 Modelling of flood events is not an exact science. Therefore, there is an inherent uncertainty in the prediction of flood levels and extents used in the assessment of flood risk. The Environment Agency's Flood Map for Planning is largely based upon detailed modelling within the area. The LTFMfE and Ground Water Flooding mapping are based on broader-scale models that require numerous assumptions to be made.

7.35 Whilst they all provide a good depiction of flood risk for specific modelled conditions, all modelling requires the making of core assumptions and these might not occur in the open and dynamic environment of a flood event. Also, the Environment Agency's Flood Map for Planning and other flood modelling is updated regularly. Interested parties are recommended to keep abreast of this so that a significant change or increase in flood risk can be determined.

Summary of Flood Risk

Table 8: Summary of Flood Risk on Site

Flood Source	Risk Level				Comment
	High	Medium	Low	Very Low	
Fluvial				X	Fluvial Flood Zone 1. There are no rivers in the vicinity and further analysis of the Environment Agency's data confirms a low risk of fluvial flooding.
Tidal				X	Tidal Flood Zone 1.
Groundwater		X			Medium groundwater flood risk but no evidence of groundwater flooding and projected risk unreliable.
Surface Water		X			EA Maps shows small strips of Medium/High risk of surface water flooding.
Canals				X	There are no canals or navigable waterways in the vicinity
Reservoirs				X	No reservoirs in the vicinity. Only Streams near located along the site.
Sewers				X	There is no evidence to suggest that the site is at any risk of sewer flooding.
Increase due to Climate Change				X	Increased rainfall intensities are not expected to affect the flood risk on site.

8. Flood Avoidance, Resistance and Resilience

- 8.1 Flood risk can be mitigated through taking measures to avoid, resist and be resilient to flooding. Avoidance is carrying out development in line with the sequential test and relocating development to areas of lower flood risk. There is a range of construction methods that can be incorporated into the design of the property to reduce the risk of flooding at a site. These can either be categorised as resistance or resilience measures.
- 8.2 Resistance measures are those used to try to prevent floodwaters from reaching or entering a property. Resilience measures are those that acknowledge that flooding is likely to occur and try to minimise the damage caused by floodwaters entering the building. The Environment Agency recommends consideration is given to the incorporation of flood resistance and resilience into the design and construction of a development in areas that are at risk of flooding.

Avoidance

- 8.3 The best possible mitigation for properties at risk of flooding would be to relocate the building to an area of lower flood risk. This method is regarded as an avoidance measure. In the case of the new industrial and commercial building, this is not applicable because the development is a new site, with two phases already been completed. It is not possible to move the entire development to an area of lower flood risk.

Resistance

- 8.4 Resistance measures can help to prevent water from entering a property. This is particularly effective for low depth flooding. It is recommended to raise the threshold of a building to above the predicted flood levels, nominally 100 – 150mm. Raising thresholds and floor levels beyond the minimum required or would provide an additional level of protection and would have the additional benefit of lowering the residual risk of flooding.

Resilience

- 8.5 Resilience measures do not stop water from entering a property; they acknowledge that there will be floodwater ingress and aim to minimise the impact in terms of cost and disruption immediately after a flood event. They can be incorporated into the structure of the building or can be included in the finishes, services, and insulation on a building's internals.
- 8.6 Further site and ground investigations would be required to confirm that groundwater conditions. Additionally, flooding from sewer to be further investigated with Southern Water to determine if the development requires flood resilient construction methods in the proposed development.

9. Proposed Drainage Strategy

- 9.1 Based on the above flood risks and constraints, a proposed drainage strategy has been developed which can be seen in **Appendix C**.

Surface Water

- 9.2 As the development is to be constructed on a greenfield site near existing buildings, the preferred method of surface water discharge would be infiltration which is not possible. Also, there are no surface bodies close to the site to discharge the runoff into, so it is proposed to use the nearby surface water system offsite, which connects to the Southern Water surface water sewer near Fitzwygram Way southeast of the development site.

- 9.3 The outflow from the site is proposed to be discharged into the existing private network manhole east of the entrance. A hydrobrake is proposed to limit the discharge rate of 31.7 l/s as per the agreed works by Hydrock on their drawing 19453-HYD-00-ZZ-DR-C-7001. This is higher than the calculated greenfield runoff rate for the site as discussed earlier in the report. However, Plot 400 proposed discharge rate fits in the approved planning site wide drainage strategy produced by Peter Brett. This report can be seen in **Appendix G**
- 9.4 Surface water runoff from the car park and yard area will be collected via a network of proposed ACO channels and gullies. Roof runoff will be conveyed to the surface water system using a syphonic drainage arrangement.
- 9.5 Runoff from the northern half of the building roof will discharge directly into the first attenuation tank to the north of the building. Runoff from the yard will pass through full-retention separators before entering the same tank. The outflow will be controlled to 25.9 l/s, proportional to the contributing catchment area and the agreed total discharge rate of 31.7 l/s, via a hydrobrake. From there, discharge will proceed to the demarcation manhole and then into the existing private manhole east of the site entrance.
- 9.6 Runoff from the southern half of the building roof will discharge directly into the second attenuation tank located in the southeast car park area. Runoff from the car park itself will pass through a bypass separator before entering the same tank. The combined outflow from this attenuation tank will be restricted to 5.8 l/s, proportional to the contributing catchment area, before entering the downstream network.
- 9.7 The drainage network has been designed for a 1-in-100 year storm event plus 45% Climate Change Allowance
- 9.8 Different areas of hardstanding pose different risks of pollution.
- 9.9 Table 11 is replicated from CIRIA's C753: The SuDS Manual.

Table 11: Pollution hazard indices for different land use classifications - reproduced from Table 26.2 CIRIA C753: The SuDS Manual

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking	Medium	0.7	0.6	0.7

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹				
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009)

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Based on Table 11, the building roof is classified as having a low pollution hazard level, while the commercial yard and non-residential car parking areas are assessed as having a medium pollution hazard level.

Roof runoff is considered to pose a sufficiently low risk and therefore does not require treatment prior to discharge into the surface water sewer. In contrast, runoff from the commercial yard and car parking areas will require treatment. This treatment is proposed to be in the form of a petrol interceptors before discharged to the existing surface water sewer.

Foul Water

- 9.10 A foul sewer system is proposed to run along the northern elevation of the building, serving the office areas, before continuing down the eastern side of the building and out of the site south of the entrance.
- 9.11 The CCTV survey indicates that the private foul sewer network is located approximately 140 m south-east of Plot 400. A proposed foul sewer serving Plots 600 and 601 is proposed to run southwards, parallel to the existing surface water network, and connect to the nearest foul manhole further south of the proposed development. It is proposed that the foul drainage from Plot 400 will connect into this new system near the site entrance.

10. Conclusion

- 10.1 This flood risk assessment and drainage strategy has been prepared by Perega Ltd on behalf of the client Portsmouth City Council to support the detailed planning application for the development at Dunsbury Park, Havant, PO9 4EE comprising of the development of industrial and commercial building at Plot 400, with associated external parking and landscaping over the site area of approximately 3.36 ha.
- 10.2 There are no surface water features onsite, and the existing topography across the site has a 10.7m fall from north to south. Ground investigation report prepared by Hydrock Consultant Limited identified groundwater within the Bognor Sand Member and London Clay Formation, typically between 1.3 m and 11.5 m bgl, with observed levels generally ranging from 1.6 m to 4.2 m bgl. Groundwater conditions vary across the site, reflecting the underlying geology. The Environment Agency Flood Map classifies the site as having Medium Groundwater Vulnerability.
- 10.3 The site is located in Flood Zone 1. The risk of flooding from canals, reservoirs and sewers is considered negligible. There is a narrow strip along the centre of the site which is identified as high risk of surface water flood due to the Hermitage Stream and Park Lane Stream flowing across the site. However, overall the whole majority of the site is located in an area predominantly at very low risk of surface water flooding. The development is proposed to take into account to ensure flood risk from the surface water can be managed at this area. Defra's Magic Map which identifies the site is located in Source Protection Zone 1 – subsurface activity in the Zone of Source Protection.
- 10.4 The surface runoff from the car park and yard area is proposed to be collected via a series of gullies and linear drainage channels, treated by petrol (full retention and bypass) interceptors and stored in attenuation tanks. The first tank will have a 924m³ volume and will be located to the north of the building and the second tank will have a 187m³ volume, located south east of the building in the car park area. Syphonic drainage is proposed to collect the roof drainage. These runoffs are stored across two attenuation tanks and discharged at rates proportional to their respective catchment areas and the agreed discharge rate by Hydrock as part of their overall surface water drainage strategy for the site, via hydro brakes to limit the discharge rate. Discharge is proposed into the existing surface water sewer to the east of the site at a combined restricted rate of 31.7 l/s.
- 10.5 Private sewers are proposed to convey the foul water to connect into a private foul sewer from adjacent existing buildings that go southwards to discharge into public sewer. This is proposed to connect to the existing foul sewer onsite to the south.

Appendix A

Site Location Plan

General Notes

- This document is to be used for the stated purpose only and should not be used for any other.
- Dimensions are as at date of survey, unless stated otherwise.
- It is the responsibility of the client to ensure the document is the correct date & scale.
- All relevant drawings and specifications should be read in conjunction with the document.
- Scaling of the documents is not recommended.

North

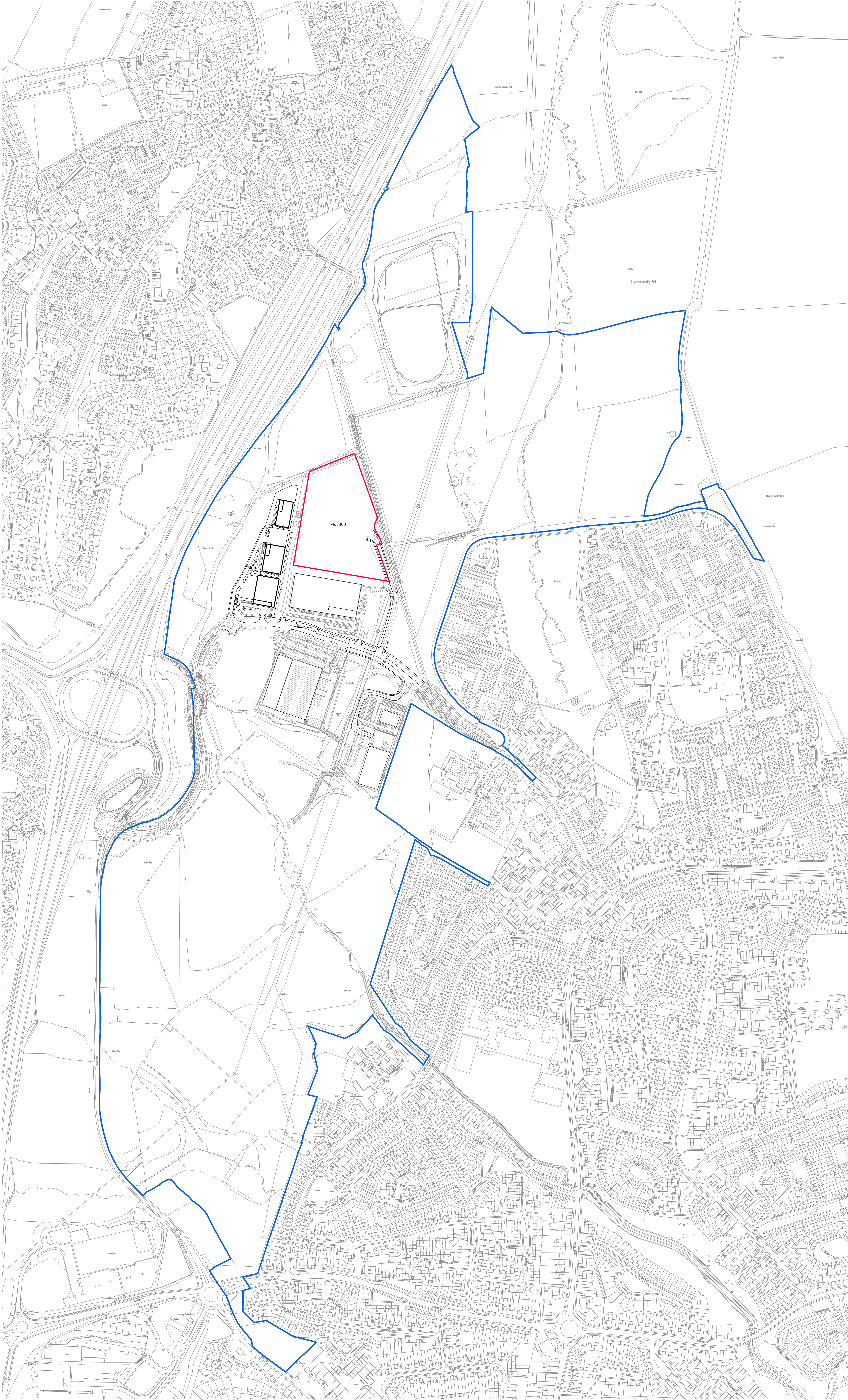
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Document Scale(s)

50m

SCALE 1:2500

Key			
<div></div>	Ownership Boundary	291.25 ac	117.86 ha
<div></div>	Plot 4 Area	8.30 ac	3.36 ha



Project Name		Plot 4, Dunsbury Park, Havant, Portsmouth	
Project Address		Dunsbury Park, Havant, Portsmouth	
Employer		Portsmouth City Council	
RIBA Workstage		Status	
2 - Concept Design		S3 - Review & Comment	
Drawn	Checked	Created	Size
KS	DS	10.10.2025	A0
UMC Project Reference		Scale	LOD
2501		1:2500	1
Document Title		Plot 4, Site Location Plan	
Document Reference		DP - UMC - 0400 - SI - DR - A - 0501	
Revision Note		Paper sheet size and scale amended at Planning Consultants request	

Issue Date	Package	Current Revision
13.10.2025	PLANNING	4.1

Appendix B

Proposed Site Layout



Key

Ownership Boundary	291.25	ac	117.86	ha
Plot 1 Area	2.37	ac	0.96	ha
Plot 4 Area	8.25	ac	3.34	ha
Plot 6 Area	8.13	ac	3.29	ha

Schedule of Accommodation Unit 100

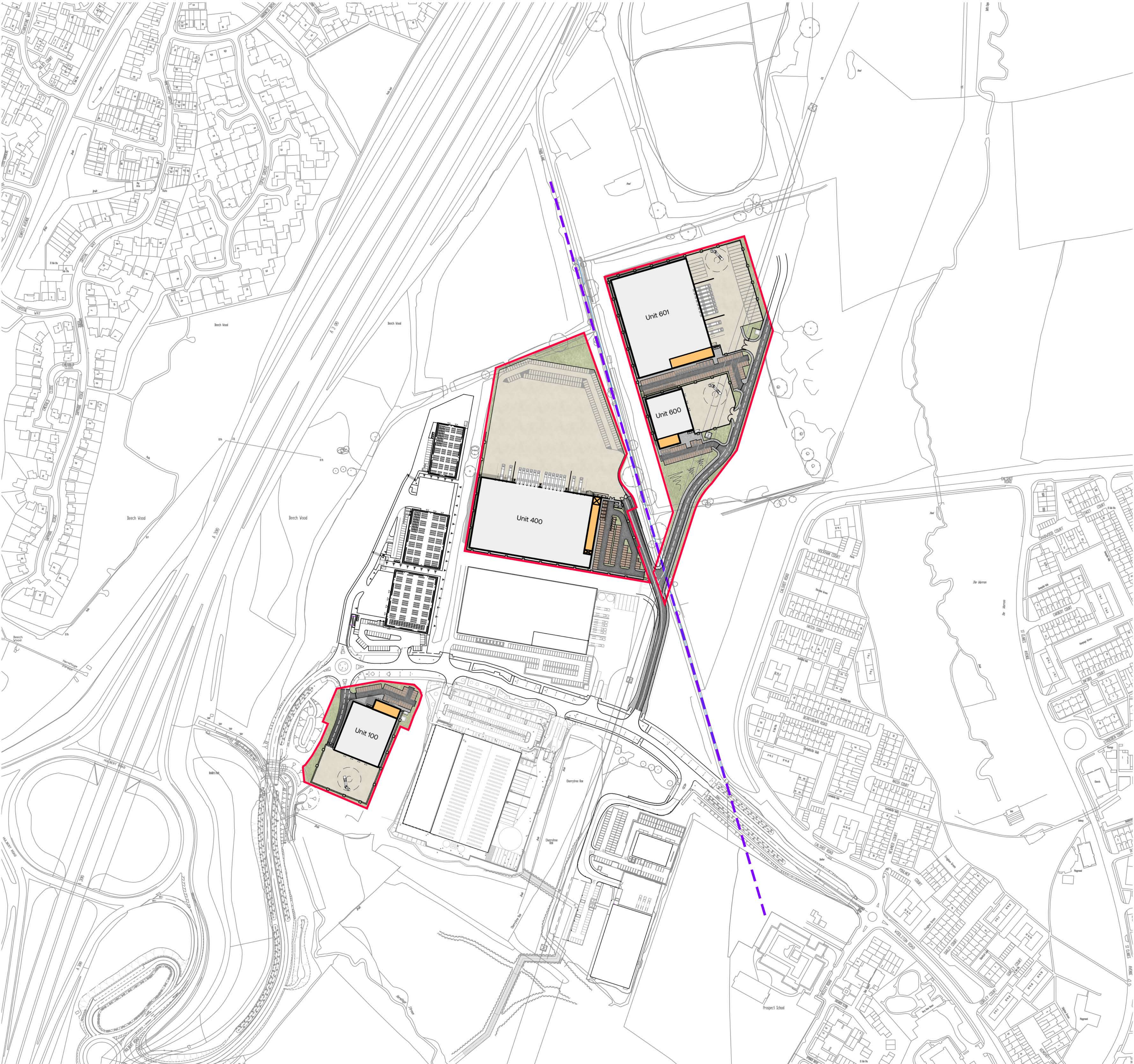
Warehouse	29,000	m ²	2,694	m ²
2-Storey Office	6,000	m ²	557	m ²
Total	35,000	m ²	3,251	m ²

Unit 400				
Warehouse	103,500	m ²	9,615	m ²
2-Storey Office	11,500	m ²	1068	m ²
Total	115,000	m ²	10,683	m ²

Unit 600				
Warehouse	21,750	m ²	2,021	m ²
Mezzanine Office [inc. GF Core]	2,415	m ²	224	m ²
Total	24,165	m ²	2,245	m ²

Unit 601				
Warehouse	95,000	m ²	8,826	m ²
Mezzanine Office [inc. GF Core]	5,000	m ²	465	m ²
Total	100,000	m ²	9,290	m ²

Public Right of Way: Bridleway



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North



Key Plan



Document Scale(s)

100m	SCALE 1:10000
10m	SCALE 1:2000

Document Notes

Project Name

Plot 400, Dunsbury Park

Employer	Project Address
Portsmouth City Council	Dunsbury Park, Havant, Portsmouth

RIBA Workstage		Status		
2 - Concept Design		S3 - Review & Comment		
Drawn	Checked	Created	Size	
KS	DS	15.10.2025	A1	
UMC Project Reference		Scale	LOD	LOI
25101		As Indicated	1	1

Document Title

Site Masterplan

Document Reference

DP - UMC - 0400 - SI - DR - A - 0605

Revision Note

Initial Issue

Issue Date	Package	Current Revision
15.10.2025	PLANNING	P1.0



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- Scaling according planning application

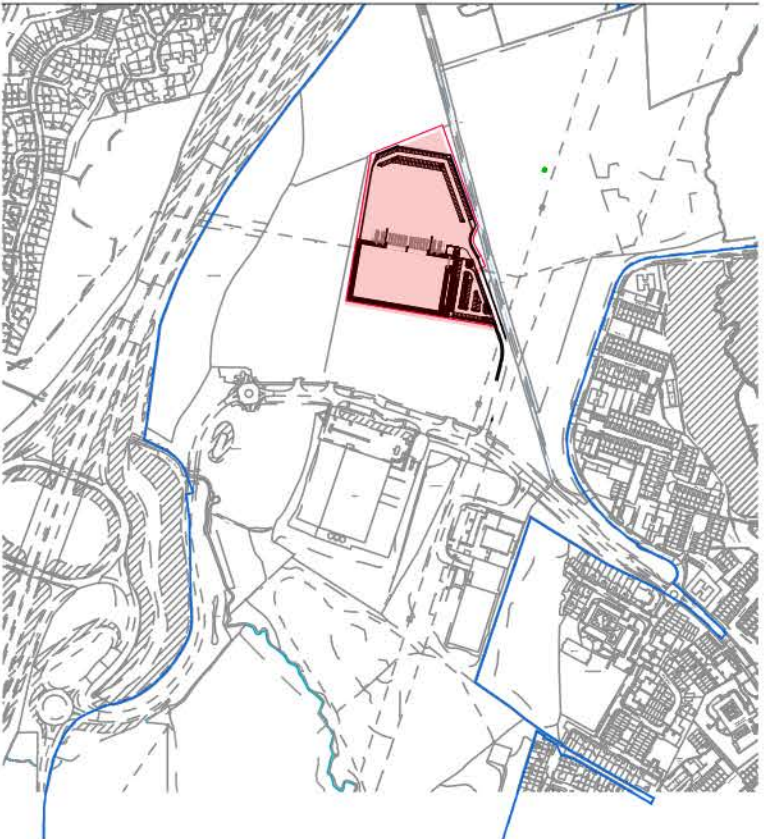
North



Document Scale(s)



Key Plan



Schedule of Accommodation Unit 400

Unit 400		
Warehouse	103,500 ft ²	9,615 m ²
2-Storey Office	11,500 ft ²	1068 m ²
Total	115,000 ft²	10,683 m²

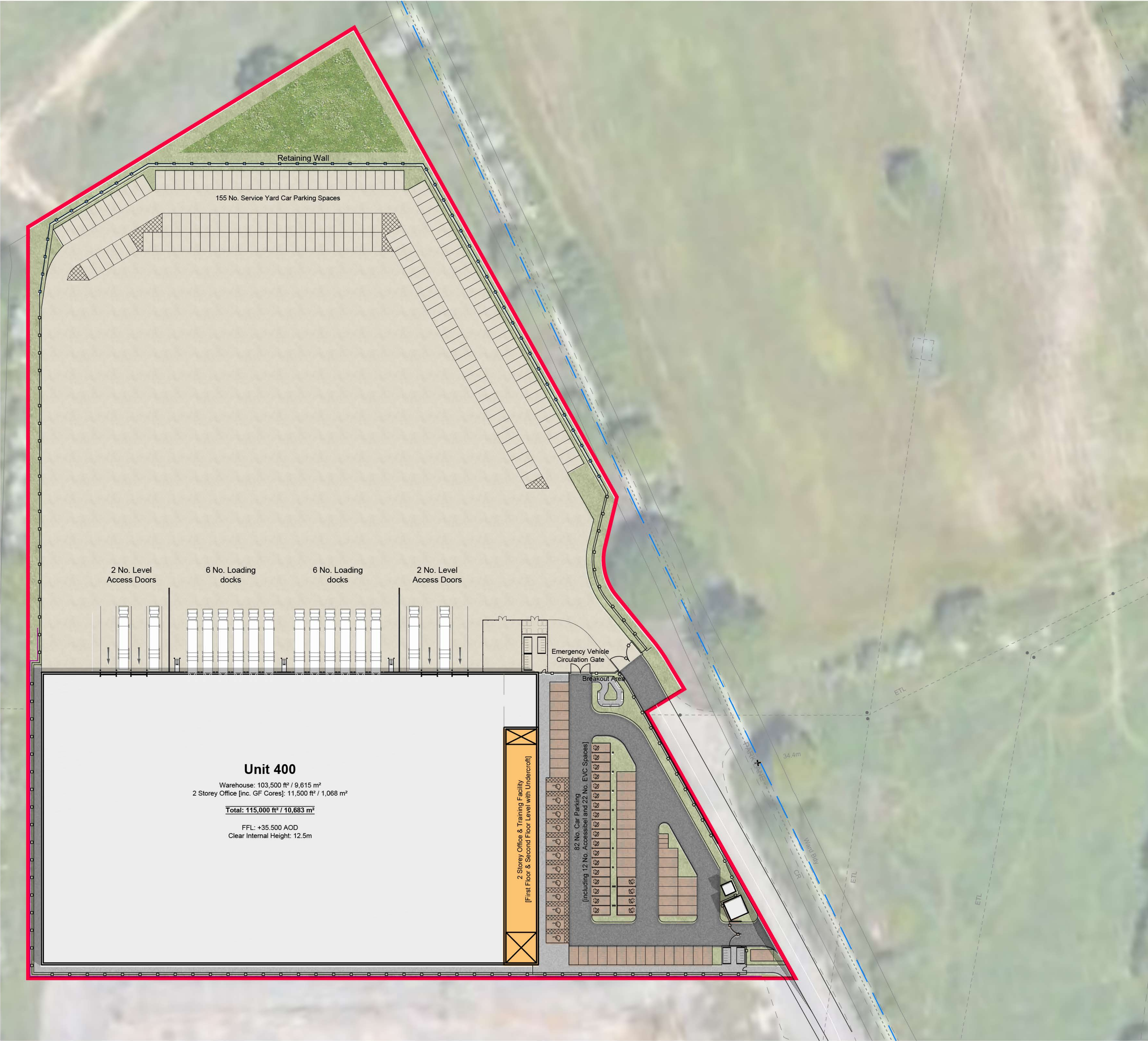
Level Access Doors	4
Dock Loading Doors	12

Parking	
Standard Car Parking Spaces	48
Accessible Spaces Included In Total	12
EVC Spaces Included In Total [10%]	22
Additional Service Yard Parking	155
Total Parking Provision	237

Cycle Spaces	30
--------------	----

Key

- Proposed Retaining Wall
- Public Right Of Way



Unit 400

Warehouse: 103,500 ft² / 9,615 m²
2 Storey Office [inc. GF Cores]: 11,500 ft² / 1,068 m²

Total: 115,000 ft² / 10,683 m²

FFL: +35.500 AOD
Clear Internal Height: 12.5m

2 Storey Office & Training Facility
[First Floor & Second Floor Level with Undercroft]

82 No. Car Parking
[including 12 No. Accessible and 22 No. EVC Spaces]

Project Name

Plot 400, Dunsbury Park

Employer	Project Address
Portsmouth City Council	Dunsbury Park Havant, Portsmouth

RIBA Workstage	Suitability
1 - Preparation and Brief	S3 - Review & Comment

Drawn	Checked	Created	Size
KS	DS	29.10.2025	A1
UMC Project Reference		Scale	LOD LOI
25101		As Indicated	1 1

Document Title

Site Layout Plan

Document Reference

DP - UMC - 0400 - SI - DR - A - 0601

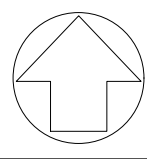
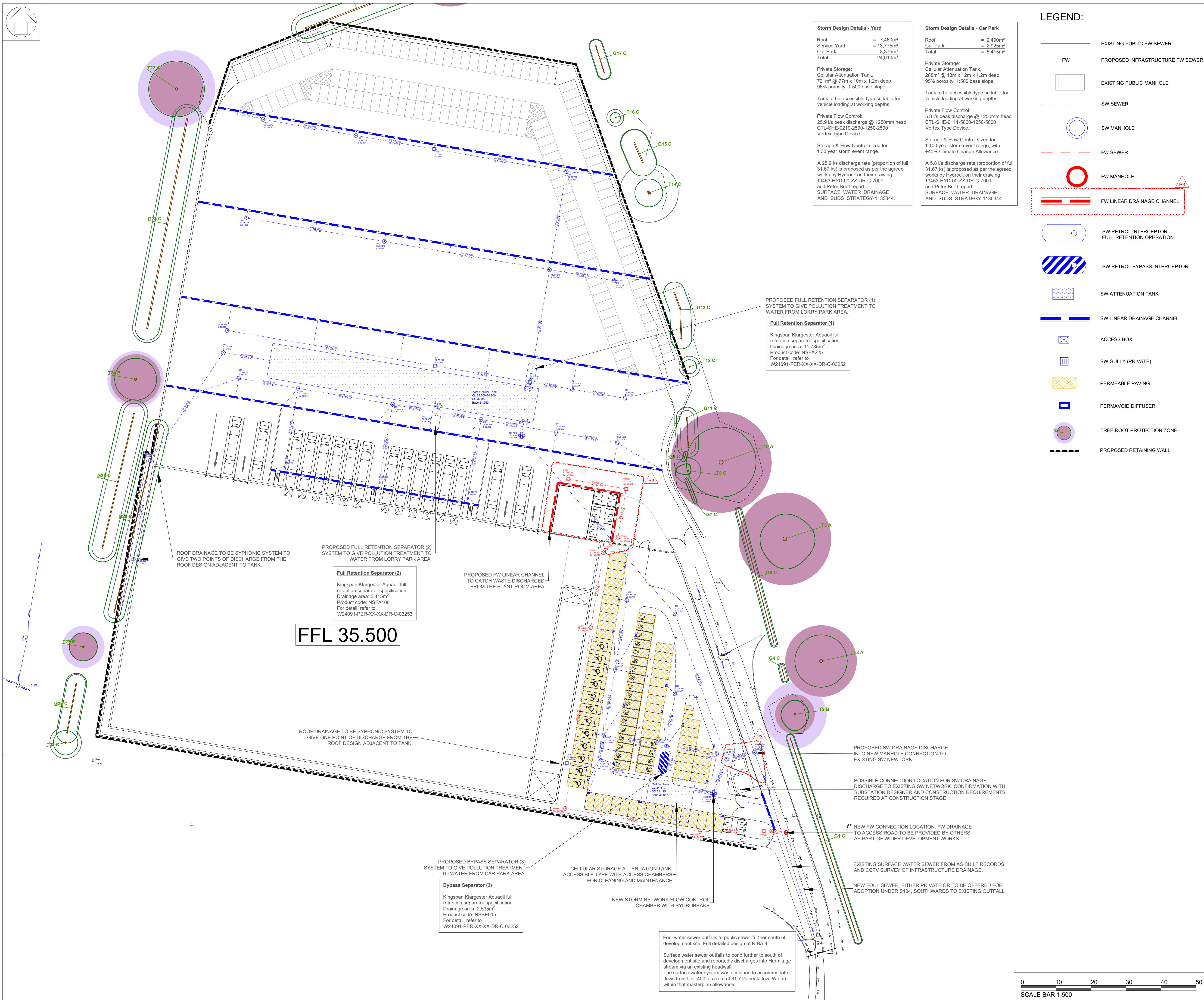
Revision Note

- Notes amended at Client's request.
- Break out space add.

Issue Date	Status	Current Revision
12.01.2026	Planning	

Appendix C

Drainage Strategy Layout, Flood Exceedance Route and Levels Strategy



Storm Design Details - Yard	
Roof	= 7,460m²
Service Yard	= 13,775m²
Car Park	= 3,375m²
Total	= 24,610m²

Private Storage:
Cellular Attenuation Tank,
721m³ @ 77m x 10m x 1.2m deep
95% porosity, 1:500 base slope.

Tank to be accessible type suitable for vehicle loading at working depths.

Private Flow Control:
25.9 l/s peak discharge @ 1250mm head
CTL-SHE-0219-2590-1250-2590
Vortex Type Device.

Storage & Flow Control sized for:
1:30 year storm event range.

A 25.9 l/s discharge rate (proportion of full 31.67 l/s) is proposed as per the agreed works by Hydrock on their drawing 19453-HYD-00-ZZ-DR-C-7001 and Peter Brett report SURFACE_WATER_DRAINAGE_AND_SUDS_STRATEGY-1135344.

Storm Design Details - Car Park	
Roof	= 2,490m²
Car Park	= 2,925m²
Total	= 5,415m²

Private Storage:
Cellular Attenuation Tank,
288m³ @ 13m x 12m x 1.2m deep
95% porosity, 1:500 base slope.

Tank to be accessible type suitable for vehicle loading at working depths.

Private Flow Control:
5.8 l/s peak discharge @ 1250mm head
CTL-SHE-0111-5800-1250-5800
Vortex Type Device.

Storage & Flow Control sized for:
1:100 year storm event range, with +40% Climate Change Allowance.

A 5.8 l/s discharge rate (proportion of full 31.67 l/s) is proposed as per the agreed works by Hydrock on their drawing 19453-HYD-00-ZZ-DR-C-7001 and Peter Brett report SURFACE_WATER_DRAINAGE_AND_SUDS_STRATEGY-1135344.

LEGEND:

- EXISTING PUBLIC SW SEWER
- PROPOSED INFRASTRUCTURE FW SEWER
- EXISTING PUBLIC MANHOLE
- SW SEWER
- SW MANHOLE
- FW SEWER
- FW MANHOLE
- FW LINEAR DRAINAGE CHANNEL
- SW PETROL INTERCEPTOR FULL RETENTION OPERATION
- SW PETROL BYPASS INTERCEPTOR
- SW ATTENUATION TANK
- SW LINEAR DRAINAGE CHANNEL
- ACCESS BOX
- SW GULLY (PRIVATE)
- PERMEABLE PAVING
- PERMAVOID DIFFUSER
- TREE ROOT PROTECTION ZONE
- PROPOSED RETAINING WALL

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- HIGH RETAINING WALLS AROUND SITE
- MAINTENANCE**
- EXISTING MASTERPLAN PONDS WILL REQUIRE MAINTENANCE AGREEMENTS OR ADOPTION TO SUPPORT DEVELOPMENT

DEMOLITION

-

ALL WORKS TO BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING (WHERE APPROPRIATE) TO AN APPROVED METHOD STATEMENT

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- PIPE BEDDING TO BE IN ACCORDANCE WITH THE MANUFACTURES RECOMMENDATIONS, TAKING ACCOUNT OF THE DEPTH AND LOADINGS IN RELATION TO THE PIPE STRENGTH AND MODIFIED IF NECESSARY. WHERE BELOW GROUND WATER LEVEL IS ABOVE THE PIPE THE MAIN CONTRACTOR IS TO ISSUE BEDDING PROPOSALS TO THE ENGINEER FOR CONSIDERATION.
- PIPES ENTERING AND EXITING MANHOLES ARE TO HAVE LEVEL SOFFITS U.N.O.
- DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUTFALLS IN RELATION TO EXISTING SEWERS PRIOR TO CONSTRUCTION OF ANY DRAINAGE TO ENSURE THE PROPOSED DESIGN MAY BE ACHIEVED. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- BEFORE EXCAVATION COMMENCES, THE CONTRACTOR SHALL ASCERTAIN THE DEPTHS, SIZES AND LOCATIONS OF ALL SERVICES TO BE CROSSED. ANY CONFLICT IN LEVELS BETWEEN NEW AND EXISTING SEWERS TO BE NOTIFIED TO THE ENGINEER.
- REFER TO ARCHITECTS DRAWINGS FOR POSITIONS OF SOIL VENT PIPES, STUB STACKS, RAINWATER PIPES AND INTERNAL GULLIES.
- ALL ROAD GULLY CONNECTIONS TO BE Ø150, LAID NO FLATTER THAN 1:80 U.N.O. ALL ROOF DRAINAGE CONNECTIONS TO BE Ø100, LAID NO FLATTER THAN 1:40 U.N.O.
- ADOPTABLE DRAINAGE:
 - NO WORKS ARE TO BE UNDERTAKEN TO THE PUBLIC SEWER UNTIL THE APPROPRIATE S106 CONNECTION APPLICATIONS HAVE BEEN MADE AND ISSUED BY THE STATUTORY AUTHORITY FOR THE WORKS.
 - ADOPTED DRAINAGE PIPEWORK TO BE HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 OR SIMILAR. ALL JOINTS TO BE FLEXIBLE, PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- PRIVATE DRAINAGE PIPEWORK TO BE EITHER HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 (OR SIMILAR) OR HEPWORTH UPVC DRAINAGE SYSTEM TO BS EN 1401 (OR SIMILAR). ALL JOINTS TO BE FLEXIBLE, PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. UPVC PIPES TO BE LAID IN SHORT LENGTH MAXIMUM 3.0 m DUE TO HEAVE POTENTIAL.
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- EXTERNAL CHANNEL DRAINS TO BE TRAPPED AND RODDABLE WITH LEAF/GRIT BASKET.

P3	Included CCTV information for existing SW drainage already installed on site. Updated Architect Layout. 704 DMC Manhole moved to avoid clash with proposed substation.	ET	10/12/2025	GS
P2	Updated SW Manholes 703 & 704 Numbering and Location	ET	21/10/2025	RGM
P1	Preliminary Issue	ET	17/10/2025	RGM
Rev	Description	By	Date	Chkd

Quarry Court, Lime Quarry Mews, Guildford, GU1 2RD

01483 565 886

Client

Portsmouth City Council

Project

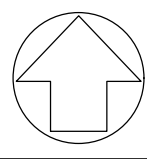
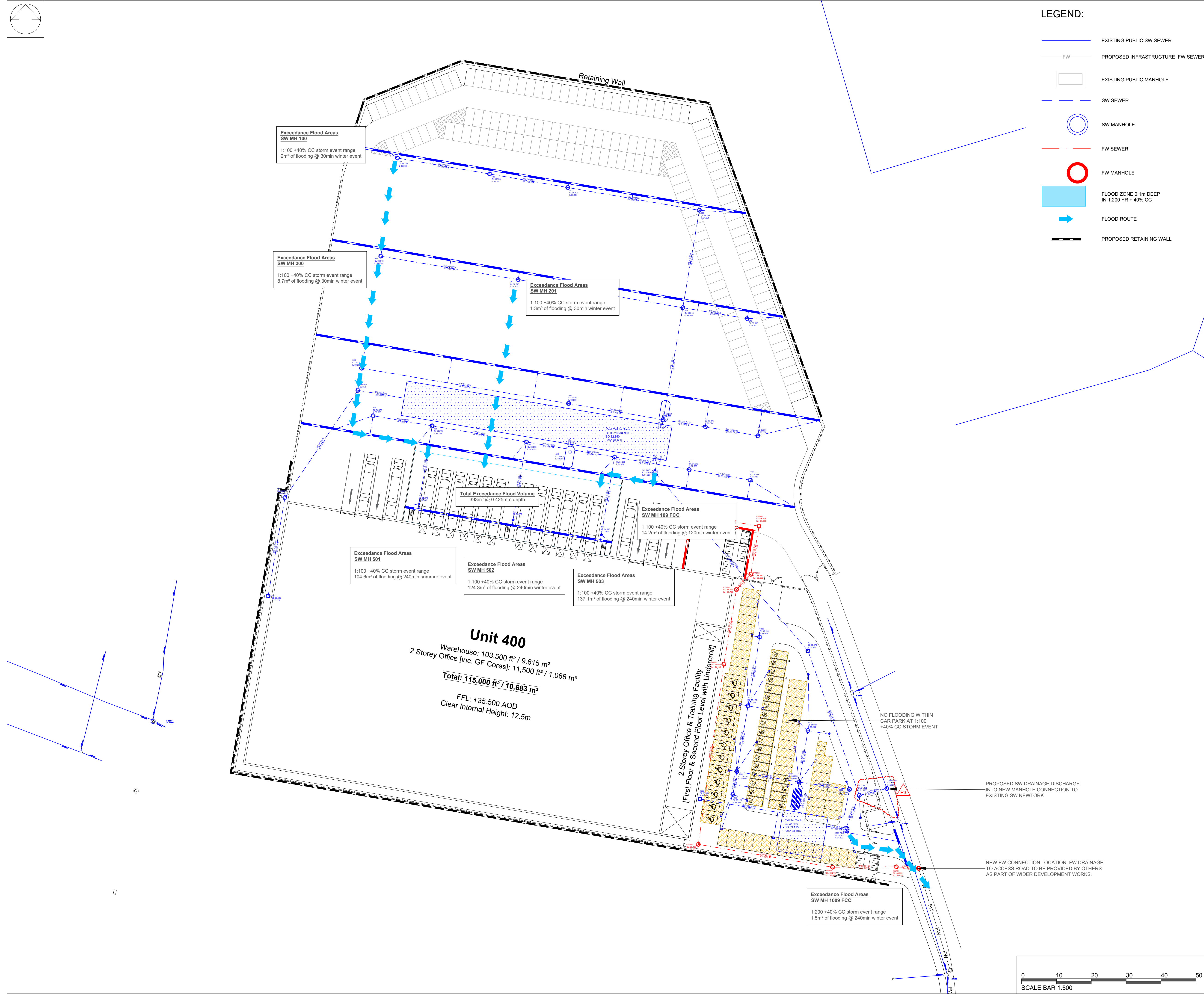
Plot 400

Dunsbury Park, Portsmouth

Title

Drainage Strategy

Perega Project No.	Checked	Passed	Size	Scale		
W24091	RGM		A1	1:500		
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24091	PER	XX	XX	DR	C	02001
Suitability Code	Status	Revision				
S2	PRELIMINARY	P3				



LEGEND:

- EXISTING PUBLIC SW SEWER
- FW
- EXISTING PUBLIC MANHOLE
- SW SEWER
- SW MANHOLE
- FW SEWER
- FW MANHOLE
- FLOOD ZONE 0.1m DEEP IN 1:200 YR + 40% CC
- FLOOD ROUTE
- PROPOSED RETAINING WALL

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- MAINTENANCE**
1. .
- DEMOLITION**
1. .
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P3	Included CCTV information for existing SW drainage already installed on site. Updated Architect Layout. 704 DMC Manhole moved to avoid clash with proposed substation.	ET	10/12/2025	GS
P2	Updated Drainage Layout. No change to Flood Exceedance.	ET	21/10/2025	RGM
P1	Preliminary Issue	ET	17/10/2025	RGM
Rev	Description	By	Date	Chkd

PEREGA

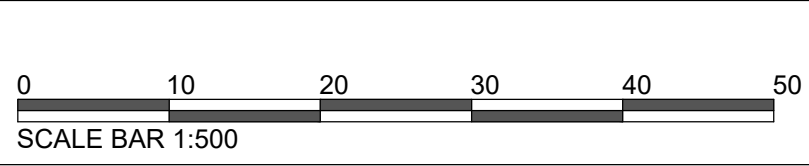
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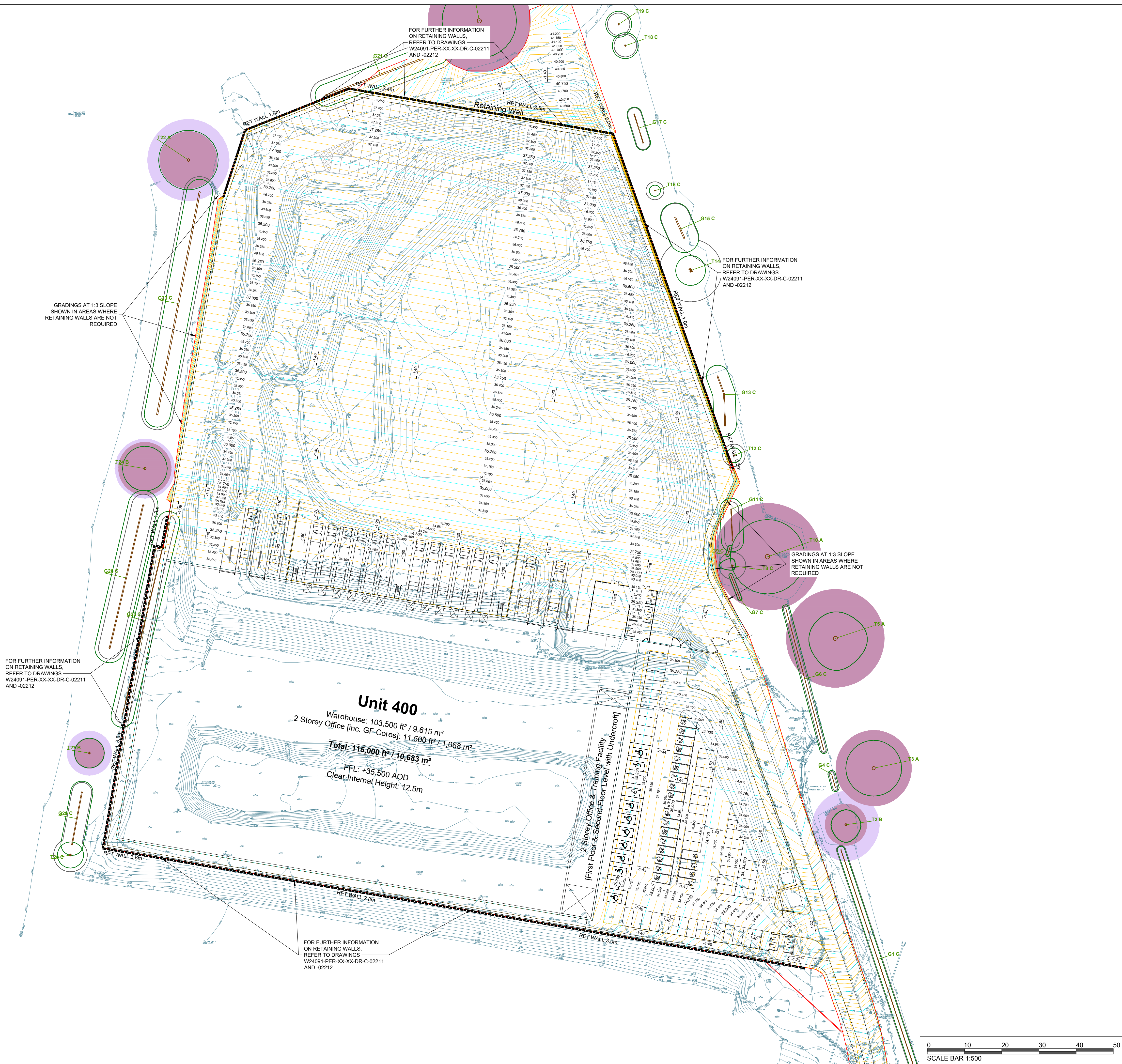
Client
Portsmouth City Council

Project
Plot 400
Dunsbury Park, Portsmouth

Title
Drainage Flood Exceedance Plan

Perega Project No.	Checked	Passed	Size	Scale		
W24091	RGM	-	A1	1:500		
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24091	PER	XX	XX	DR	C	02099
Suitability Code	Status	Revision				
S2	PRELIMINARY	P3				





<p align="center">SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION</p> <p align="center">IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING</p>
--

1. -

1. -

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2. ALL UNITS IN MILLIMETERS U.N.O. ON THE DRAWING.
3. DO NOT SCALE OFF THE DRAWING.

 PROPOSED MAJOR CONTOUR - 0.5m INTERVAL
 PROPOSED MINOR CONTOUR - 0.1m INTERVAL
 RETAINING WALL
 GRADINGS - CUT
 GRADINGS - FILL

P3	Updated Architect Layout	ET	10/12/2025	GS
P2	UPDATED CLIENT NAME. OMITTED STEP ACCESS TO NORTHERN LANDSCAPE AREA	ACN	13/11/2025	GS
P1	ISSUED FOR INFORMATION	ACN	17/10/2025	GS
Rev	Description	By	Date	Chkd

PEREGA

Client
Portsmouth City Council

Project	Plot 400 Dunsbury Park Dunsbury Park, Portsmouth
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Title	External Levels Strategy
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Peregrine Project No.			Checked	Passed	Size	Scale
W24091			GS	-	A1	1:500
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24091	PER	XX	XX	DR	C	02201
Suitability Code			Status			Revision
S3			INFORMATION			P3

Appendix D

Drainage Calculations

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1008	0.249	4.00	35.469	1500	470064.509	109263.758	1.424
1008 Tank			34.330		470103.569	109255.519	2.415
1009 FCC	0.039	4.00	34.256	2100	470106.429	109255.031	2.366
704 DMC			34.520	1200	470117.042	109266.519	3.432
705 Outfall			34.115	1200	470121.570	109257.470	3.074
1006	0.014	4.00	34.434	1500	470107.400	109266.527	1.307
1007	0.072	4.00	34.655	1500	470092.950	109268.603	1.755
1005	0.042	4.00	34.684	1500	470095.473	109283.405	1.400
1001	0.023	4.00	35.120	1500	470081.645	109310.231	1.860
1002	0.043	4.00	35.120	1500	470078.283	109290.515	1.993
1004	0.036	4.00	35.120	1500	470075.067	109271.663	2.120
1003	0.025	4.00	35.120	1200	470073.950	109265.113	1.820
703			34.413	1200	470110.210	109264.807	3.293

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1001	1001	1002	20.001	0.600	33.260	33.127	0.133	150.0	225	4.31	56.4
1002	1002	1004	19.124	0.600	33.127	33.000	0.127	150.0	225	4.61	56.4
1003	1003	1004	6.645	0.600	33.300	33.000	0.300	22.1	225	4.04	56.4
1004	1004	1007	18.143	0.600	33.000	32.900	0.100	181.4	225	4.92	56.4
1005	1005	1007	15.015	0.600	33.284	32.900	0.384	39.1	225	4.12	56.4
1006	1006	1007	14.598	0.600	33.127	32.900	0.227	64.3	225	4.15	56.4
1007	1007	1008 Tank	8.560	0.600	32.900	32.815	0.085	100.7	225	5.03	56.3
1008	1008	1008 Tank	25.100	0.600	34.045	32.815	1.230	20.4	300	4.12	56.4
1008 Tank	1008 Tank	1009 FCC	2.901	0.600	31.915	31.890	0.025	116.1	300	5.07	56.1
1009 FCC	1009 FCC	703	10.737	0.600	31.890	31.120	0.770	13.9	150	5.13	55.9
703	703	704 DMC	7.043	0.600	31.120	31.088	0.032	220.1	300	5.24	55.4
704 DMC	704 DMC	705 Outfall	10.177	0.600	31.088	31.041	0.047	216.5	300	5.40	54.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1001	1.065	42.3	4.6	1.635	1.768	0.023	0.0	50	0.700
1002	1.065	42.3	13.4	1.768	1.895	0.066	0.0	87	0.946
1003	2.792	111.0	5.1	1.595	1.895	0.025	0.0	33	1.442
1004	0.967	38.5	25.8	1.895	1.530	0.126	0.0	135	1.035
1005	2.098	83.4	8.5	1.175	1.530	0.042	0.0	48	1.354
1006	1.633	64.9	2.9	1.082	1.530	0.014	0.0	32	0.827
1007	1.303	51.8	51.7	1.530	1.290	0.254	0.0	185	1.478
1008	3.495	247.1	50.7	1.124	1.215	0.249	0.0	92	2.769
1008 Tank	1.458	103.1	102.0	2.115	2.066	0.503	0.0	245	1.653
1009 FCC	2.712	47.9	109.4	2.216	3.143	0.542	0.0	150	2.762
703	1.055	74.6	108.5	2.993	3.132	0.542	0.0	300	1.069
704 DMC	1.064	75.2	107.2	3.132	2.774	0.542	0.0	300	1.078

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x
Summer CV	0.750	Skip Steady State	x	Starting Level (m)			

Storm Durations

30	60	120	240	360	480	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0	100	40	0	0

Node 1009 FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	31.890	Product Number	CTL-SHE-0111-5800-1125-5800
Design Depth (m)	1.125	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.8	Min Node Diameter (mm)	1200

Node 1008 Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	31.915
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	260.0	0.0	0.400	260.0	0.0	0.800	260.0	0.0	1.200	260.0	0.0	1.201	0.0	0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1008	17	34.168	0.123	83.4	0.6454	0.0000	OK
240 minute winter	1008 Tank	228	32.514	0.599	33.7	147.9310	0.0000	SURCHARGED
240 minute winter	1009 FCC	228	32.514	0.624	9.3	2.3660	0.0000	SURCHARGED
30 minute summer	704 DMC	72	31.146	0.058	5.8	0.0661	0.0000	OK
30 minute summer	705 Outfall	73	31.097	0.056	5.8	0.0000	0.0000	OK
30 minute summer	1006	18	33.248	0.121	4.7	0.2398	0.0000	OK
30 minute summer	1007	18	33.245	0.345	75.0	0.8922	0.0000	SURCHARGED
30 minute summer	1005	17	33.346	0.062	14.0	0.1461	0.0000	OK
30 minute summer	1001	19	33.383	0.123	7.6	0.2473	0.0000	OK
30 minute summer	1002	19	33.374	0.247	21.9	0.5449	0.0000	SURCHARGED
30 minute summer	1004	19	33.349	0.349	37.8	0.7333	0.0000	SURCHARGED
30 minute summer	1003	19	33.346	0.046	8.4	0.0647	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1008	1008	1008 Tank	82.6	3.120	0.334	0.6644	
240 minute winter	1008 Tank	1008 Tank	1009 FCC	7.5	0.301	0.073	0.2043	
240 minute winter	1009 FCC	1009 FCC	703	5.8	1.205	0.121	0.0522	
30 minute summer	704 DMC	704 DMC	705 Outfall	5.8	0.621	0.077	0.0948	82.7
30 minute summer	1006	1006	1007	5.8	0.192	0.089	0.4489	
30 minute summer	1007	1007	1008 Tank	72.8	1.832	1.406	0.3358	
30 minute summer	1005	1005	1007	13.9	0.476	0.166	0.3649	
30 minute summer	1001	1001	1002	8.6	0.507	0.203	0.6198	
30 minute summer	1002	1002	1004	20.5	0.677	0.485	0.7606	
30 minute summer	1004	1004	1007	36.0	0.906	0.937	0.7216	
30 minute summer	1003	1003	1004	8.4	0.529	0.075	0.1515	

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	703	73	31.180	0.060	5.8	0.0679	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	703	703	704 DMC	5.8	0.590	0.078	0.0691	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1008	17	34.218	0.173	147.6	0.9115	0.0000	OK
360 minute winter	1008 Tank	344	33.085	1.170	42.7	289.0496	0.0000	SURCHARGED
360 minute winter	1009 FCC	344	33.085	1.195	10.0	4.5330	0.0000	SURCHARGED
360 minute winter	704 DMC	344	31.147	0.059	5.9	0.0667	0.0000	OK
360 minute winter	705 Outfall	352	31.097	0.056	5.9	0.0000	0.0000	OK
30 minute summer	1006	19	33.632	0.505	8.4	1.0019	0.0000	SURCHARGED
30 minute summer	1007	19	33.628	0.728	122.3	1.8828	0.0000	SURCHARGED
30 minute summer	1005	19	33.659	0.375	24.8	0.8864	0.0000	SURCHARGED
30 minute summer	1001	19	34.030	0.770	13.4	1.5466	0.0000	SURCHARGED
30 minute summer	1002	19	34.018	0.891	33.1	1.9615	0.0000	SURCHARGED
30 minute summer	1004	19	33.932	0.932	59.3	1.9604	0.0000	SURCHARGED
30 minute summer	1003	19	33.938	0.638	14.8	0.8972	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	1008	1008	1008 Tank	146.4	3.585	0.593	1.0253	
360 minute winter	1008 Tank	1008 Tank	1009 FCC	8.3	0.343	0.080	0.2043	
360 minute winter	1009 FCC	1009 FCC	703	5.9	1.211	0.123	0.0529	
360 minute winter	704 DMC	704 DMC	705 Outfall	5.9	0.624	0.078	0.0960	177.4
30 minute summer	1006	1006	1007	8.2	0.207	0.127	0.5806	
30 minute summer	1007	1007	1008 Tank	121.7	3.061	2.350	0.3370	
30 minute summer	1005	1005	1007	20.8	0.607	0.250	0.5972	
30 minute summer	1001	1001	1002	12.2	0.513	0.288	0.7955	
30 minute summer	1002	1002	1004	31.4	0.790	0.742	0.7606	
30 minute summer	1004	1004	1007	59.3	1.492	1.543	0.7216	
30 minute summer	1003	1003	1004	11.8	0.574	0.106	0.2643	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	703	344	31.181	0.061	5.9	0.0685	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	703	703	704 DMC	5.9	0.592	0.079	0.0700	

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	2	Maximum Rainfall (mm/hr)	75.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	0.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
100	0.093	4.00	36.730	1200	469977.740	109447.661	1.200
101	0.091	4.00	36.728	1200	470004.199	109443.081	1.467
103	0.125	4.00	36.724	1200	470064.333	109432.662	2.073
200	0.095	4.00	36.016	1500	469972.938	109419.508	1.046
201	0.107	4.00	36.016	1500	470012.368	109412.783	1.316
210	0.046	4.00	36.016	1500	470078.055	109401.581	1.416
300	0.178	4.00	35.201	1500	469967.455	109387.358	1.301
301	0.138	4.00	35.201	1500	470026.814	109377.234	1.701
310	0.079	4.00	35.201	1500	470081.102	109367.976	1.425
400	0.098	4.00	34.878	1500	469970.739	109373.717	1.553
412	0.192	4.00	34.878	1500	470040.019	109361.902	2.428
410	0.079	4.00	34.879	1500	470078.935	109355.255	2.129
704 DMC			34.413	1200	470117.042	109266.519	3.325
705 Outfall			34.115	1200	470121.570	109257.470	3.074
401	0.066	4.00	34.878	1500	469987.690	109370.826	2.128
402	0.081	4.00	34.878	1500	470014.703	109366.220	2.403
601	0.249	4.00	35.454	1350	469945.426	109350.205	2.154
501	0.045	4.00	34.270	1500	469983.880	109348.500	1.370
502	0.045	4.00	34.270	1500	470010.890	109343.840	1.570
503	0.047	4.00	34.270	1500	470036.200	109339.520	1.670
102	0.065	4.00	36.727	1200	470026.588	109439.205	1.693
701 FCC			34.815	2100	470051.576	109357.369	3.192
702			35.070	1500	470095.488	109306.264	3.750
703			34.402	1500	470110.210	109264.807	3.282

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
211	0.092	4.00	36.016	1500	470059.571	109404.733	1.648
312			35.201	1500	470053.943	109372.608	2.426
311	0.067	4.00	35.201	1500	470066.031	109370.546	1.527
411			34.878	1500	470061.423	109358.252	2.278
700 Tank			34.865	1350	470051.912	109359.340	3.215
602			35.040	1350	469966.375	109381.029	2.390
413			34.878	1500	470027.361	109364.061	2.593
600	0.497	4.00	35.425	1350	469940.619	109322.018	1.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
100	100	101	26.852	0.600	35.530	35.261	0.269	100.0	300	4.28	56.4
101	101	102	22.722	0.600	35.261	35.034	0.227	100.1	300	4.53	56.4
102	102	103	38.308	0.600	35.034	34.651	0.383	100.0	300	4.93	56.4
103	103	211	28.332	0.600	34.651	34.368	0.283	100.0	300	5.23	55.5
200	200	201	39.999	0.600	34.970	34.700	0.270	148.1	225	4.62	56.4
201	201	211	47.885	0.600	34.700	34.368	0.332	144.2	225	5.36	55.0
210	210	211	18.751	0.600	34.600	34.368	0.232	80.8	225	4.21	56.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
100	1.572	111.1	14.2	0.900	1.167	0.093	0.0	72	1.088
101	1.571	111.1	28.1	1.167	1.393	0.184	0.0	103	1.319
102	1.572	111.1	38.1	1.393	1.773	0.249	0.0	121	1.430
103	1.572	111.1	56.2	1.773	1.348	0.374	0.0	151	1.576
200	1.072	42.6	14.5	0.821	1.091	0.095	0.0	90	0.970
201	1.086	43.2	30.1	1.091	1.423	0.202	0.0	138	1.172
210	1.455	57.9	7.0	1.191	1.423	0.046	0.0	52	0.987

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
211	211	312	32.614	0.600	34.368	34.100	0.268	121.7	375	5.69	53.6
300	300	301	60.216	0.600	33.900	33.500	0.400	150.5	300	4.78	56.4
301	301	312	27.521	0.600	33.500	33.000	0.500	55.0	300	5.00	56.4
310	310	311	15.289	0.600	33.776	33.674	0.102	150.0	225	4.24	56.4
311	311	312	12.263	0.600	33.674	33.601	0.073	168.0	225	4.44	56.4
312	312	700 Tank	1.400	0.600	32.775	32.625	0.150	9.3	375	5.69	53.6
600	600	601	28.626	0.600	33.775	33.300	0.475	60.3	450	4.18	56.4
601	601	602	37.291	0.600	33.300	32.650	0.650	57.4	450	4.41	56.4
602	602	700 Tank	13.500	0.600	32.650	32.400	0.250	54.0	450	4.49	56.4
501	501	401	22.658	0.600	32.900	32.750	0.150	151.1	225	4.36	56.4
400	400	401	17.196	0.600	33.325	32.750	0.575	29.9	225	4.12	56.4
401	401	402	27.403	0.600	32.750	32.550	0.200	137.0	225	4.77	56.4
502	502	402	22.702	0.600	32.700	32.550	0.150	151.3	225	4.36	56.4
402	402	413	12.841	0.600	32.475	32.360	0.115	111.7	300	4.91	56.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
211	1.641	181.2	103.8	1.273	0.726	0.714	0.0	203	1.693
300	1.279	90.4	27.2	1.001	1.401	0.178	0.0	113	1.124
301	2.123	150.1	48.3	1.401	1.901	0.316	0.0	117	1.900
310	1.065	42.3	12.1	1.200	1.302	0.079	0.0	82	0.922
311	1.006	40.0	22.3	1.302	1.375	0.146	0.0	120	1.032
312	5.959	658.2	170.9	2.051	1.865	1.176	0.0	130	5.043
600	2.622	417.0	76.0	1.200	1.704	0.497	0.0	129	2.011
601	2.688	427.5	114.0	1.704	1.940	0.746	0.0	158	2.288
602	2.771	440.7	114.0	1.940	2.015	0.746	0.0	155	2.339
501	1.061	42.2	6.9	1.145	1.903	0.045	0.0	61	0.785
400	2.401	95.5	15.0	1.328	1.903	0.098	0.0	60	1.765
401	1.115	44.3	32.0	1.903	2.103	0.209	0.0	142	1.211
502	1.060	42.2	6.9	1.345	2.103	0.045	0.0	61	0.784
402	1.487	105.1	51.2	2.103	2.218	0.335	0.0	148	1.479

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
410	410	411	17.767	0.600	32.750	32.600	0.150	118.4	225	4.25	56.4
411	411	412	21.713	0.600	32.600	32.450	0.150	144.8	225	4.58	56.4
503	503	412	22.705	0.600	32.600	32.450	0.150	151.4	225	4.36	56.4
412	412	413	12.841	0.600	32.450	32.360	0.090	142.7	300	4.74	56.4
413	413	700 Tank	1.500	0.600	32.285	32.280	0.005	300.0	375	4.93	56.4
700 Tank	700 Tank	701 FCC	4.000	0.600	31.650	31.623	0.027	150.0	450	5.73	53.4
701 FCC	701 FCC	702	67.379	0.600	31.623	31.320	0.303	222.4	300	6.80	49.5
702	702	703	43.993	0.600	31.320	31.120	0.200	220.0	300	7.50	47.3
703	703	704 DMC	7.043	0.600	31.120	31.088	0.032	220.1	300	7.61	47.0
704 DMC	704 DMC	705 Outfall	10.119	0.600	31.088	31.041	0.047	215.3	300	7.77	46.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
410	1.200	47.7	12.1	1.904	2.053	0.079	0.0	77	1.004
411	1.084	43.1	12.1	2.053	2.203	0.079	0.0	81	0.933
503	1.060	42.2	7.2	1.445	2.203	0.047	0.0	63	0.796
412	1.314	92.9	48.6	2.128	2.218	0.318	0.0	154	1.329
413	1.041	114.9	99.8	2.218	2.210	0.653	0.0	271	1.166
700 Tank	1.657	263.6	373.0	2.765	2.742	2.575	0.0	450	1.678
701 FCC	1.050	74.2	345.6	2.892	3.450	2.575	0.0	300	1.064
702	1.056	74.6	330.2	3.450	2.982	2.575	0.0	300	1.069
703	1.055	74.6	327.8	2.982	3.025	2.575	0.0	300	1.069
704 DMC	1.067	75.4	324.5	3.025	2.774	2.575	0.0	300	1.081

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x
Summer CV	0.750	Skip Steady State	x	Starting Level (m)			

Storm Durations

30	60	120	240	360	480	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0	100	40	0	0

Node 701 FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	31.623	Product Number	CTL-SHE-0219-2590-1250-2590
Design Depth (m)	1.250	Min Outlet Diameter (m)	0.300
Design Flow (l/s)	25.9	Min Node Diameter (mm)	1800

Node 700 Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	31.650
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	770.0	0.0	0.400	770.0	0.0	0.800	770.0	0.0	1.200	770.0	0.0	1.201	0.0	0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	100	17	35.637	0.107	31.2	0.2867	0.0000	OK
30 minute summer	101	17	35.433	0.172	61.4	0.4080	0.0000	OK
30 minute summer	103	19	35.152	0.501	115.2	1.1700	0.0000	SURCHARGED
30 minute summer	200	19	35.465	0.495	31.9	1.7756	0.0000	SURCHARGED
30 minute summer	201	19	35.362	0.662	60.7	2.2468	0.0000	SURCHARGED
30 minute summer	210	18	34.828	0.228	15.4	0.5510	0.0000	SURCHARGED
30 minute summer	300	17	34.080	0.180	59.8	0.8121	0.0000	OK
30 minute summer	301	17	33.697	0.197	104.6	0.6671	0.0000	OK
30 minute summer	310	18	33.957	0.181	26.5	0.5205	0.0000	OK
30 minute summer	400	17	33.415	0.090	32.9	0.2734	0.0000	OK
30 minute summer	412	18	32.865	0.415	96.9	1.3891	0.0000	SURCHARGED
30 minute summer	410	18	32.958	0.208	26.5	0.5214	0.0000	OK
960 minute summer	704 DMC	885	31.219	0.131	25.9	0.1478	0.0000	OK
960 minute summer	705 Outfall	885	31.161	0.120	25.9	0.0000	0.0000	OK
30 minute summer	401	19	33.300	0.550	63.1	1.3124	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	100	100	101	30.9	0.967	0.278	0.8630	
30 minute summer	101	101	102	62.3	1.314	0.561	1.2205	
30 minute summer	103	103	211	109.1	1.550	0.982	1.9951	
30 minute summer	200	200	201	26.8	0.818	0.629	1.5908	
30 minute summer	201	201	211	52.0	1.309	1.205	1.9044	
30 minute summer	210	210	211	13.2	0.392	0.227	0.7457	
30 minute summer	300	300	301	58.3	1.262	0.645	2.8061	
30 minute summer	301	301	312	103.9	2.120	0.692	1.4858	
30 minute summer	310	310	311	25.1	0.723	0.593	0.5657	
30 minute summer	400	400	401	32.7	1.020	0.342	0.4698	
30 minute summer	412	412	413	96.3	1.367	1.036	0.9043	
30 minute summer	410	410	411	24.2	1.084	0.508	0.6940	
960 minute summer	704 DMC	704 DMC	705 Outfall	25.9	0.931	0.343	0.2816	1188.0
30 minute summer	401	401	402	60.1	1.511	1.356	1.0898	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	402	18	32.865	0.390	96.9	0.9514	0.0000	SURCHARGED
30 minute summer	601	17	33.563	0.263	248.5	0.9842	0.0000	OK
30 minute summer	501	19	33.322	0.422	15.1	1.0238	0.0000	SURCHARGED
30 minute summer	502	18	32.878	0.178	15.1	0.4175	0.0000	OK
30 minute summer	503	18	32.886	0.286	15.8	0.6656	0.0000	SURCHARGED
30 minute summer	102	19	35.353	0.319	82.9	0.6065	0.0000	SURCHARGED
240 minute winter	701 FCC	232	32.634	1.011	26.6	3.5024	0.0000	SURCHARGED
30 minute summer	702	19	31.443	0.123	25.9	0.2171	0.0000	OK
960 minute summer	703	885	31.259	0.139	25.9	0.2450	0.0000	OK
30 minute summer	211	19	34.813	0.445	200.2	1.2831	0.0000	SURCHARGED
30 minute summer	312	18	33.235	0.460	346.4	0.8136	0.0000	SURCHARGED
30 minute summer	311	18	33.922	0.248	46.3	0.6550	0.0000	SURCHARGED
30 minute summer	411	18	32.916	0.316	24.2	0.5590	0.0000	SURCHARGED
240 minute winter	700 Tank	232	32.635	0.985	173.2	721.8308	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	402	402	413	96.4	1.369	0.917	0.9043	
30 minute summer	601	601	602	245.9	2.424	0.575	3.7821	
30 minute summer	501	501	401	17.1	0.469	0.406	0.9011	
30 minute summer	502	502	402	14.0	0.655	0.333	0.8349	
30 minute summer	503	503	412	14.3	0.363	0.338	0.9030	
30 minute summer	102	102	103	73.6	1.286	0.663	2.6976	
240 minute winter	701 FCC	Hydro-Brake®	702	25.9				
30 minute summer	702	702	703	25.9	0.888	0.347	1.2964	
960 minute summer	703	703	704 DMC	25.9	0.845	0.347	0.2158	
30 minute summer	211	211	312	199.1	1.817	1.098	3.4487	
30 minute summer	312	312	700 Tank	345.2	3.636	0.524	0.1164	
30 minute summer	311	311	312	46.4	1.191	1.162	0.4526	
30 minute summer	411	411	412	25.5	0.642	0.592	0.8635	
240 minute winter	700 Tank	700 Tank	701 FCC	26.6	0.362	0.101	0.6338	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	602	17	32.937	0.287	245.9	0.4106	0.0000	OK
30 minute summer	413	18	32.717	0.432	191.5	0.7633	0.0000	SURCHARGED
30 minute summer	600	17	33.986	0.211	166.8	1.5705	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	602	602	700 Tank	245.4	2.575	0.557	1.2853	
30 minute summer	413	413	700 Tank	191.1	1.745	1.663	0.1576	
30 minute summer	600	600	601	164.9	1.952	0.396	2.4183	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	100	18	36.730	1.200	55.4	3.2172	1.9853	FLOOD
30 minute summer	101	18	36.728	1.467	84.7	3.4797	0.5113	FLOOD
30 minute summer	103	18	36.170	1.519	174.3	3.5497	0.0000	SURCHARGED
30 minute winter	200	17	36.016	1.046	49.0	3.7489	8.7100	FLOOD
30 minute summer	201	17	36.016	1.316	83.0	4.4652	1.3273	FLOOD
30 minute summer	210	18	35.399	0.799	27.4	1.9310	0.0000	SURCHARGED
60 minute winter	300	45	34.944	1.044	61.1	4.7020	0.0000	FLOOD RISK
60 minute winter	301	45	34.920	1.420	108.3	4.8154	0.0000	FLOOD RISK
60 minute winter	310	45	34.904	1.128	29.2	3.2439	0.0000	FLOOD RISK
60 minute winter	400	45	34.562	1.237	33.6	3.7468	0.0000	SURCHARGED
60 minute winter	412	45	34.772	2.322	122.0	7.7769	0.0000	FLOOD RISK
60 minute winter	410	44	34.798	2.048	36.7	5.1375	0.0000	FLOOD RISK
60 minute winter	704 DMC	46	31.260	0.172	40.6	0.1946	0.0000	OK
60 minute winter	705 Outfall	46	31.196	0.155	40.6	0.0000	0.0000	OK
60 minute winter	401	45	34.551	1.801	67.3	4.2982	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute summer	100	100	101	41.5	1.017	0.373	1.8909	
30 minute summer	101	101	102	81.5	1.291	0.734	1.6001	
30 minute summer	103	103	211	167.6	2.380	1.508	1.9951	
30 minute winter	200	200	201	29.9	0.792	0.701	1.5908	
30 minute summer	201	201	211	62.4	1.570	1.446	1.9044	
30 minute summer	210	210	211	24.6	0.619	0.426	0.7457	
60 minute winter	300	300	301	60.9	1.267	0.674	4.2404	
60 minute winter	301	301	312	108.6	2.128	0.724	1.9380	
60 minute winter	310	310	311	26.8	0.708	0.634	0.6081	
60 minute winter	400	400	401	31.5	0.967	0.330	0.6839	
60 minute winter	412	412	413	107.2	1.522	1.154	0.9043	
60 minute winter	410	410	411	26.5	1.039	0.556	0.7066	
60 minute winter	704 DMC	704 DMC	705 Outfall	40.6	1.037	0.538	0.3964	450.8
60 minute winter	401	401	402	67.3	1.692	1.518	1.0898	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	402	45	34.679	2.204	108.3	5.3812	0.0000	FLOOD RISK
60 minute winter	601	44	34.905	1.605	255.8	6.0091	0.0000	SURCHARGED
240 minute winter	501	140	34.270	1.370	47.2	3.3209	104.7666	FLOOD
240 minute winter	502	140	34.270	1.570	58.1	3.6738	124.4685	FLOOD
240 minute winter	503	140	34.270	1.670	64.4	3.8911	137.2940	FLOOD
30 minute summer	102	18	36.586	1.552	112.6	2.9473	0.0000	FLOOD RISK
120 minute winter	701 FCC	78	34.815	3.192	89.9	11.0571	14.5791	FLOOD
60 minute winter	702	44	31.481	0.161	40.6	0.2840	0.0000	OK
60 minute winter	703	46	31.305	0.185	40.6	0.3267	0.0000	OK
30 minute summer	211	18	35.350	0.982	299.6	2.8332	0.0000	SURCHARGED
60 minute winter	312	45	34.884	2.109	380.6	3.7261	0.0000	SURCHARGED
60 minute winter	311	45	34.902	1.228	49.6	3.2485	0.0000	FLOOD RISK
60 minute winter	411	44	34.788	2.188	36.8	3.8658	0.0000	FLOOD RISK
60 minute winter	700 Tank	45	34.833	3.183	848.5	882.7211	0.0000	FLOOD RISK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	402	402	413	108.4	1.540	1.032	0.9043	
60 minute winter	601	601	602	255.4	2.441	0.597	5.9085	
240 minute winter	501	501	401	-43.6	-1.096	-1.033	0.9011	
240 minute winter	502	502	402	-54.5	-1.370	-1.292	0.9029	
240 minute winter	503	503	412	-60.6	-1.524	-1.438	0.9030	
30 minute summer	102	102	103	110.7	1.573	0.997	2.6976	
120 minute winter	701 FCC	Hydro-Brake®	702	40.6				
60 minute winter	702	702	703	40.6	0.971	0.545	1.8451	
60 minute winter	703	703	704 DMC	40.6	0.930	0.544	0.3075	
30 minute summer	211	211	312	296.6	2.689	1.636	3.5608	
60 minute winter	312	312	700 Tank	380.9	3.941	0.579	0.1544	
60 minute winter	311	311	312	49.6	1.263	1.240	0.4877	
60 minute winter	411	411	412	-36.8	-0.926	-0.854	0.8635	
60 minute winter	700 Tank	700 Tank	701 FCC	119.4	0.754	0.453	0.6338	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	602	44	34.853	2.203	255.4	3.1527	0.0000	FLOOD RISK
60 minute winter	413	45	34.796	2.511	215.0	4.4364	0.0000	FLOOD RISK
60 minute winter	600	44	34.919	1.144	170.7	8.5292	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	602	602	700 Tank	255.3	2.591	0.579	2.1390	
60 minute winter	413	413	700 Tank	214.9	1.951	1.870	0.1654	
60 minute winter	600	600	601	170.4	1.966	0.408	4.5356	

Appendix E

Topographical Survey



LEGEND		
Topographic Linework Features		
Hand Rail	Hand Rail	Sky Light
Barrier	Hedge	Slope Bottom
Beam Line	Hoarding	Slope Top
Bench	Kerb Bottom	Slope Drain
Bin	Kerb Drop	Speed Bump
Bollard Illuminated	Kerb Top	Steel Cladding
Bollard	Lake	Steel Structure
Bridge	Land Drain	Step Line
Building Facade	Lift	Surface Change
Building	Opening - Slab	Tank
Bus Stop Shelter	Overhang	Telephone Box (TB)
Cable Trough	Overhead Cables	Ticket Machine(TVM)
Canopy	Parapet	Toilet
Ceiling Line	Partition	Top of Fence Line
Centre Line	Parking Meter (PM)	Top of Wall Line
Column	Pipe Line	Track
Column Bottom Line	Platform Train/Tram	Traffic Ctrl Box(TCB)
Column Top Line	Plinth	Tree Drip Line
Concrete Base/Slab	Roof	Tree Line
Contour Major	Post-box	Trials Pit
Contour Minor	Rail	Vegetation Line
Cycle Lane	Ramp	Vent
Ditch	Red Line Dashed	Verge Line
Door	Red Line Solid	Wall Line
Duct	Red Line Double	Window
Electric Box (EBOX)	River Edge	Window Glazing
Fence	Road Edge	White Line Dashed
Fixture	Road Scar Line	White Line Double
Flowerbed	Road Text	White Line Solid
Footpath	Roof	Yellow Line Dashed
Grating	Sanitary	Yellow Line Double
Grid Line	Service	Yellow Line Solid

Topographic Point Features		
AV Air Valve	IC Inspection Cover	RS Road Sign
APIEX Apex Building	IC - CATV	RE Rodding Eye
BL Bed Level	IC - Comms	SA Sector Antenna
BB Belisha Beacon	IC - Electric	SIGN Sign (General)
B Bollard	IC - Round	SOFF Soffit Level
BOLT Bolt	IC - Telecom	SP Spot Height
BH Borehole	IC - Traffic	SC Stop Cock
B Bush	Invert Level	ST Telegraph Pole
CCTV Camera Pole	Lamp Post	T12.24 Top of Tree Level
CE Ceiling Elevation	Manhole	T12.24 Top of Wall Level
CF Pipe	MH - Foul	TL Traffic Light
EP Electrical Pole	MH - Round	Tree (TXXX SX-XX)
FI Fire Hydrant	MH - Surface Water	T=Trunk Radius(m)
FL Floor Level	Marker Post	S=Spread Radius(m)
GM Gas Meter	Microwave Dish	Tree Deciduous
GW Gate	Pipe - Down	TJ Tree Trunk
G Gully	Pole	V Valve General
G Round	Post	WL Water Level
		WM Water Meter
		WV Water Valve

Special Features		
DATUM Datum Point	E=XXXXXXX	Survey Station
Photo Point	N=YYYYYYY	
Panoramic Photo Point	H=ZZZZZZZ	
	E=XXXXXXX	Scan Target
	N=YYYYYYY	
	H=ZZZZZZZ	

Fence Types		
B/W Barbed Wire	C/L Chain Link	O/S Open Boarded
C/B Close Boarded	H Heras	P/W Post and Wire
C/I Corrugated Iron	I/R Iron Railings	P/R Post and Rail

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Any concerns with the survey should be raised with Murphy Geospatial, who will endeavour to promptly provide a remedy. The Client shall not seek recourse through any third party until such time as Murphy Geospatial have had the opportunity to redress any concerns raised.

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Location Plan

Revisions

Rev	Description	Surveyed by	Drawn by	Checked by
A	First Issue	PK-09/06/25	IB-12/06/25	AO-12/06/25
A	Site additions	PK-11/07/25	DA-18/07/25	IB-23/07/25



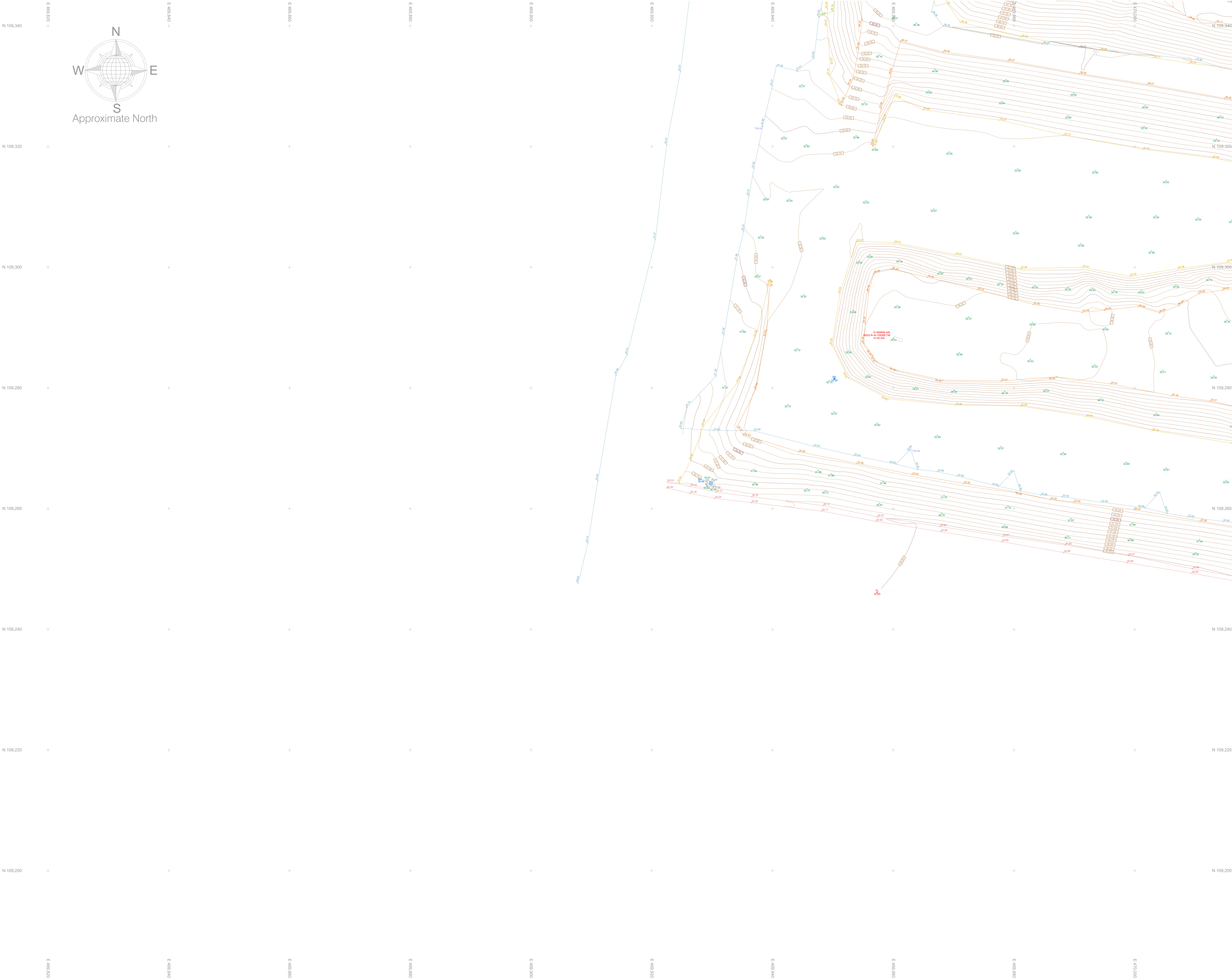
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Client	Avison Young
Project	Dunsbury Park
Site Address	Fitzwyram Way Havant PO9 4EE
Description	Topographical Survey
Survey Grid	Localised OSGB36(15) - Scale Factor 1.0
Survey Datum	Client Supplied Datum
RICS Band	Band F
Drawing Scale	1:200 @ A0
Drawing Number	MGS63669-T-Rev-01



LEGEND		
Topographic Linework Features		
Air-Con Unit (ACU)	Hand Rail	Sky Light
Barrier	Hedge	Slope Bottom
Beam Line	Hoarding	Slope Top
Bench	Kerb Bottom	Slope Drain
Bin	Kerb Drop	Speed Bump
Bollard Illuminated	Kerb Top	Steel Cladding
Bollard	Lake	Steel Structure
Bridge	Land Drain	Step Line
Building Facade	Lift	Surface Change
Building	Opening - Slab	Tank
Bus Stop Shelter	Overhang	Telephone Box (TB)
Cable Trough	Overhead Cables	Ticket Machine(TVM)
Canopy	Parapet	Toilet
Ceiling Line	Partition	Top of Fence Line
Centre Line	Parking Meter (PM)	Top of Wall Line
Column	Pipe Line	Track
Column Bottom Line	Platform Train/Tram	Traffic Ctrl Box(TCB)
Column Top Line	Plinth	Tree Drip Line
Concrete Base/Slab	Post-box	Tree Line
Contour Major	Rail	Tree Pit
Contour Minor	Ramp	Vegetation Line
Cycle Lane	Red Line Dashed	Verge Line
Ditch	Red Line Solid	Wall Line
Door	Red Line Double	Window
Duct	River Edge	Window Glazing
Electric Box (EBOX)	Road Edge	White Line Dashed
Fence	Road Scar Line	White Line Double
Fixture	Road Text	White Line Solid
Flowerbed	Road	Yellow Line Dashed
Footpath	Roof	Yellow Line Double
Grating	Sanitary	Yellow Line Solid
Grid Line	Service	

Topographic Point Features		
AV Air Valve	IC Inspection Cover	RS Road Sign
APIX Apex Building	IC - CATV	RE Rodding Eye
BL Bed Level	IC - Comms	SA Sector Antenna
BB Bellsha Beacon	IC - Electric	SIGN Sign (General)
B Bollard	IC - Round	SOFF Soffit Level
BOLT Bolt	IC - Telecom	SP Spot Height
BH Borehole	IC - Traffic	SC Stop Cock
B Bush		TE Telegraph Pole
CC CCTV Camera Pole		T12.24 Top of Fence Level
CE Ceiling Elevation		T12.24 Top of Tree Level
CP Pipe		T12.24 Top of Wall Level
DI Dipole		TL Traffic Light
EA Earth Rod		Tree (TXXX SX-XX)
EAVE Eave		T=Trunk Radius(m)
EM Manhole		S=Spread Radius(m)
EP Electrical Pole		Tree Coniferous
FI Fire Hydrant		Tree Deciduous
FL Floor Level		TI Tree Trunk
GA Gas Meter		V Valve General
GV Gas Valve		WL Water Level
G Gate		WM Water Meter
G Gully		WV Water Valve
GR Gully Round		

Special Features		
DATUM Datum Point	E=XXXXXXX	
Photo Point	N=YYYYYYY	Survey Station
Panoramic Photo Point	N=ZZZZZZZ	
	E=XXXXXXX	Scan Target
	N=ZZZZZZZ	

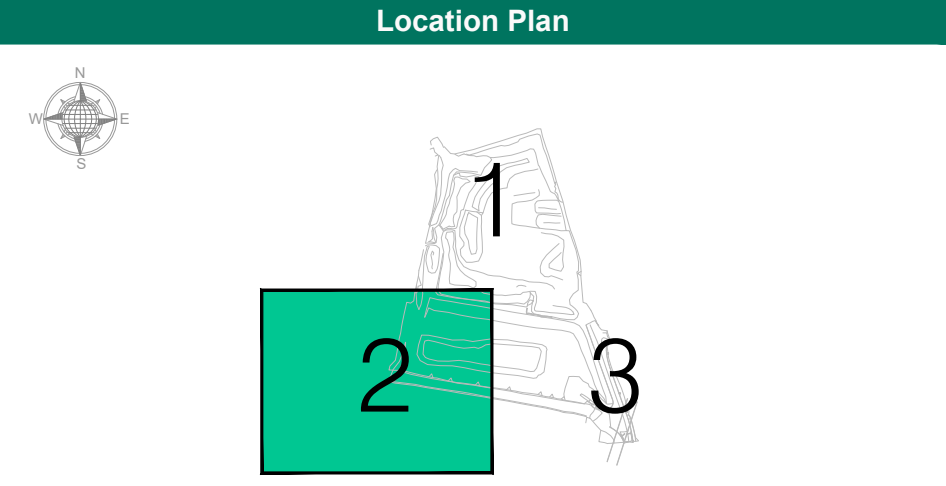
Fence Types		
B/W Barbed Wire	C/L Chain Link	O/B Open Boarded
C/B Close Boarded	H Heras	P/W Post and Wire
C/I Corrugated Iron	I/R Iron Railings	P/R Post and Rail

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Any concerns with the survey should be raised with Murphy Geospatial, who will endeavour to promptly provide a remedy. The Client shall not seek recourse through any third party until such time as Murphy Geospatial have had the opportunity to redress any concerns raised.

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Revisions				
Rev	Description	Surveyed by	Drawn by	Checked by
A	First Issue	PK-09/06/25	IB-12/06/25	AO-12/06/25
A	Site additions	PK-11/07/25	DA-18/07/25	IB-23/07/25

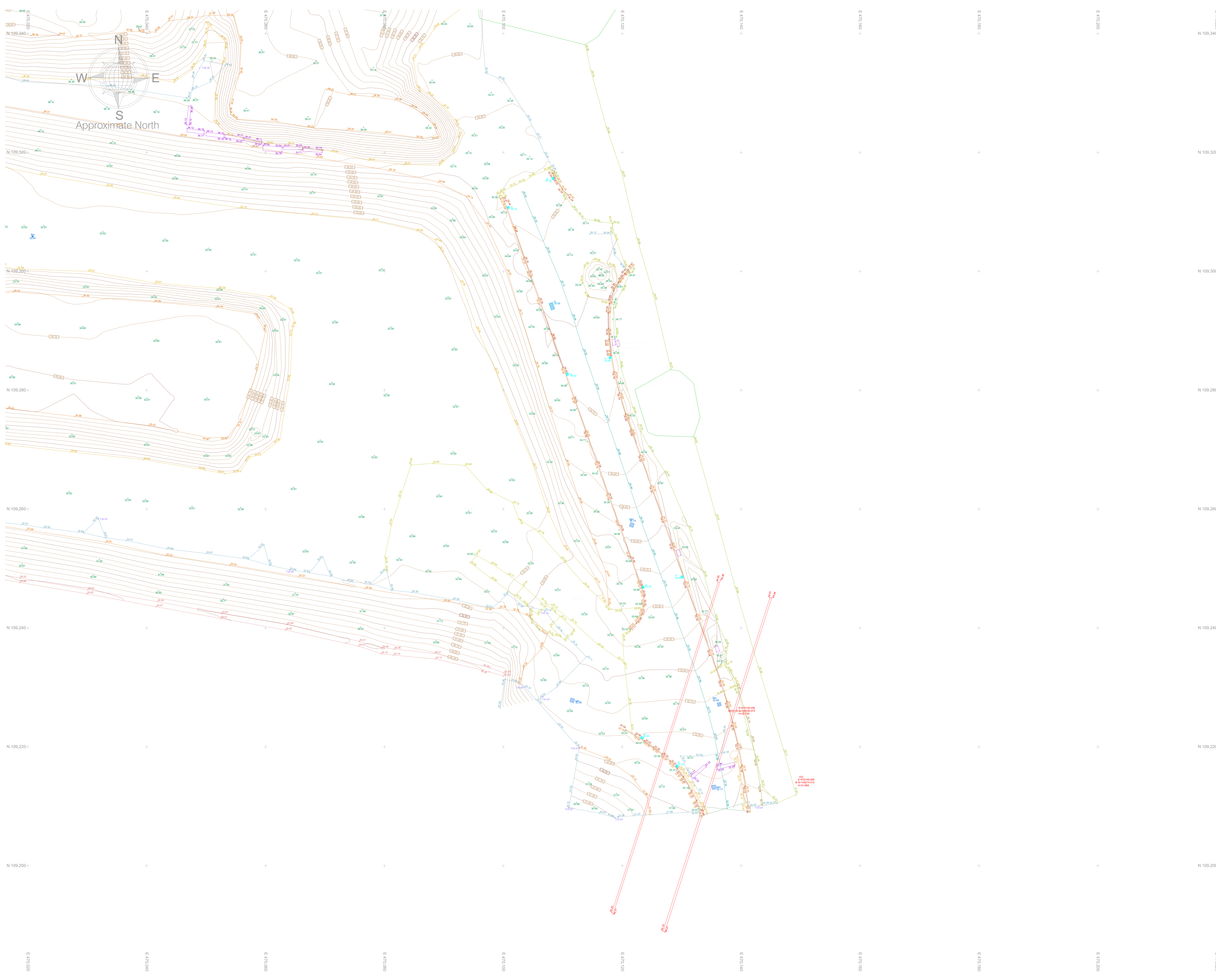


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Email: info@murphygs.com

London Manchester Birmingham Glasgow Belfast Cork Kildare

Client	Avison Young
Project	Dunsbury Park
Site Address	Fitzwyram Way Havant PO9 4EE
Description	Topographical Survey
Survey Grid	Localised OSGB36(15) - Scale Factor 1.0
Survey Datum	Client Supplied Datum
RICS Band	Band F
Drawing Scale	1:200 @ A0
Drawing Number	MGS63669-T-RevB-02



LEGEND		
Topographic Linework Features		
Air-Con Unit (ACU)	Hand Rail	Sky Light
Barrier	Hedge	Slope Bottom
Beam Line	Hoarding	Slope Top
Bench	Kerb Bottom	Slab Drain
Bin	Kerb Drop	Speed Bump
Bollard Illuminated	Kerb Top	Steel Cladding
Bollard	Lake	Steel Structure
Bridge	Land Drain	Step Line
Building Facade	Lift	Surface Change
Building	Opening - Slab	Tank
Bus Stop Shelter	Overhang	Telephone Box (TB)
Cable Trough	Overhead Cables	Ticket Machine(TVM)
Canopy	Parapet	Toilet
Ceiling Line	Partition	Top of Fence Line
Centre Line	Parking Meter (PM)	Top of Wall Line
Column	Pipe Line	Track
Column Bottom Line	Platform Train/Tram	Traffic Ctrl Box(TCB)
Column Top Line	Plinth	Tree Drip Line
Concrete Base/Slab	Red Line Solid	Tree Line
Contour Major	Red Line Double	Triax Pit
Contour Minor	Ramp	Vegetation Line
Cycle Lane	Red Line Dashed	Verge Line
Ditch	Road Line Solid	Wall Line
Door	Road Line Double	Window
Duct	River Edge	Window Glazing
Electric Box (EBOX)	Roof	White Line Dashed
Fence	Road Scar Line	White Line Double
Fixture	Road Text	White Line Solid
Flowerbed	Roof	Yellow Line Dashed
Footpath	Sanitary	Yellow Line Double
Grating	Service	Yellow Line Solid
Grid Line		

Topographic Point Features		
AV Air Valve	IC Inspection Cover	RS Road Sign
APLX Apex Building	IC - CATV	RE Rodding Eye
BL Bed Level	IC - Comms	SA Sector Antenna
BB Belisha Beacon	IC - Electric	SIGN Sign (General)
B Bollard	IC - Round	SOFF Soffit Level
BOLT Bolt	IC - Telecom	SC Spot Height
BH Borehole	IC - Traffic	ST Stop Cock
B Bush	Invert Level	TE Telegraph Pole
CCV CCTV Camera Pole	Lamp Post	T12.24 Top of Fence Level
CE Ceiling Elevation	Manhole	T12.24 Top of Tree Level
CP Pipe	MH - Foul	T12.24 Top of Wall Level
CR Ripple	MH - Round	TL Traffic Light
EAR Earth Rod	MH - Surface Water	Tree (TX.XX SX.XX)
EAVE Eave	Marker Post	T=Trunk Radius(m)
EM Manhole	MW Microwave Dish	S=Spread Radius(m)
EP Electrical Pole	Pipe - Down	Tree Coniferous
FI Fire Hydrant	POLE pole	Tree Deciduous
FL Floor Level	POST Post	Tree Trunk
12.24 Gas Meter		Valve General
GV Gas Valve		Valve Water
Gate		Water Level
G Gully		Water Meter
G Gully Round		Water Valve

Special Features		
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Photo Point	N=YYYY.YYY	Scan Target
Panoramic Photo Point	H=ZZZ.ZZZ	

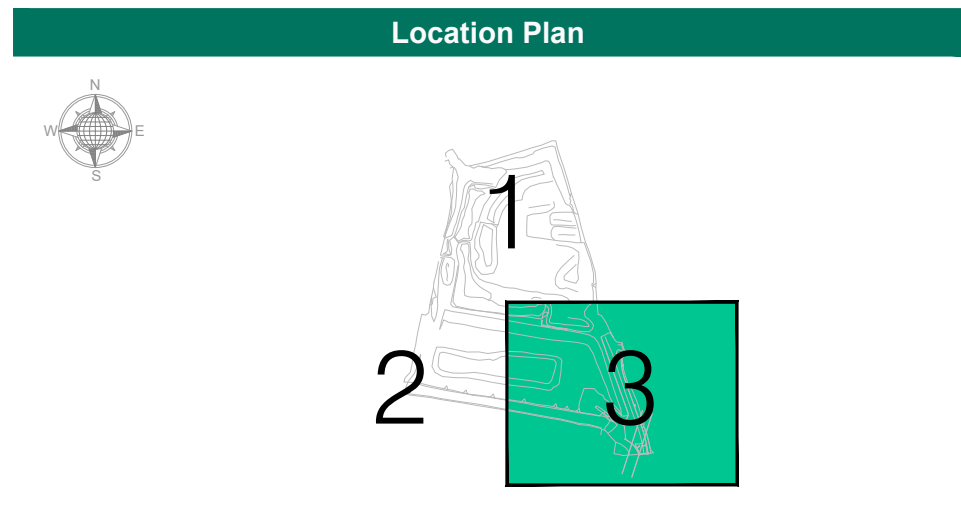
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London Manchester Birmingham Glasgow Belfast Cork Kildare

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Project	Dunsbury Park
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Survey Datum	Client Supplied Datum
RICS Band	Band F
Drawing Scale	1:200 @ A0
Drawing Number	MGS63669-T-RevB-03

Appendix F

HR Wallingford

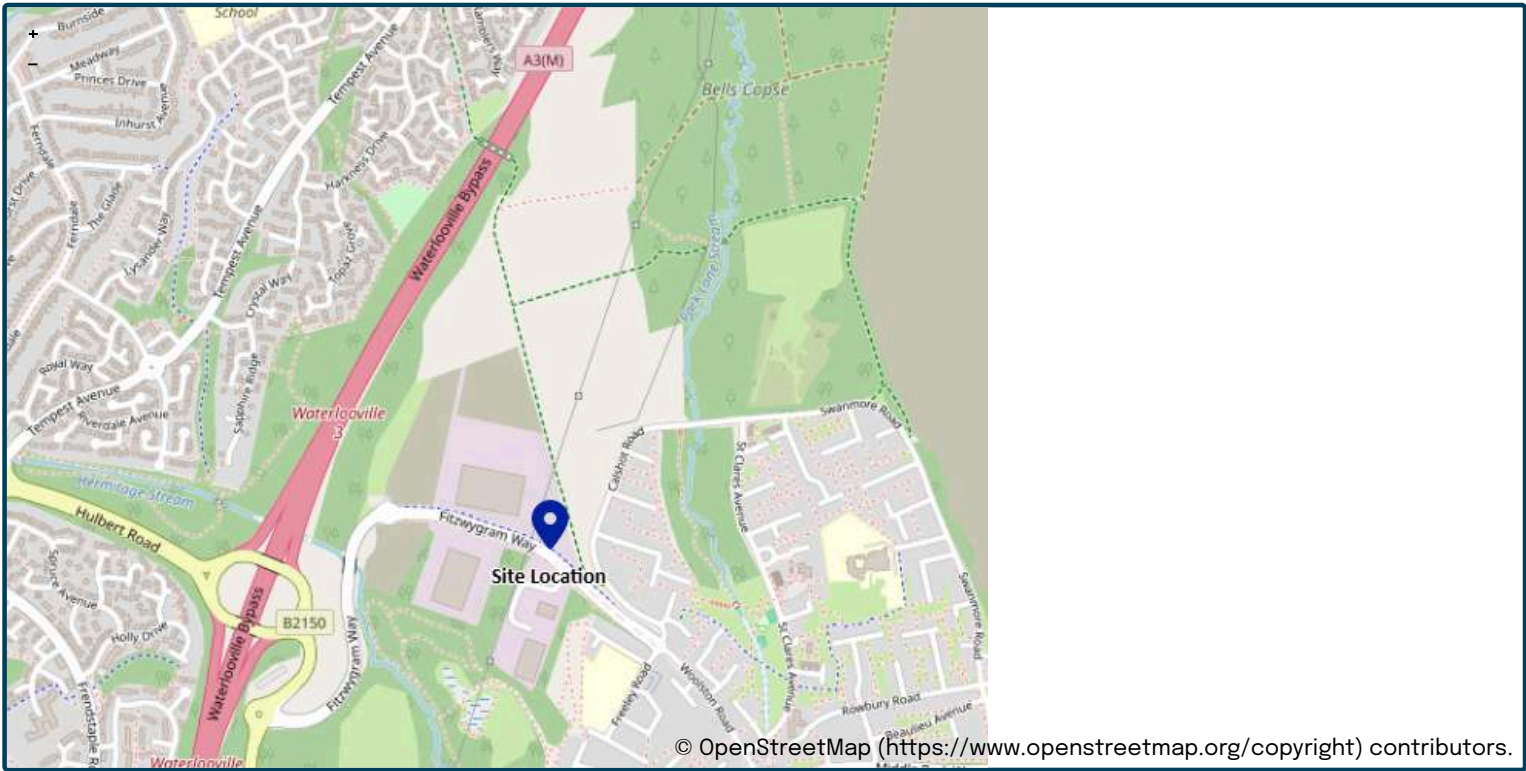
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	<input type="text" value="05/11/2025"/>
Calculated by	<input type="text" value="ET"/>
Reference	<input type="text" value="W24084"/>
Model version	<input type="text" value="2.2.2"/>

Location

Site name	<input type="text" value="Dunsbury Park Plot 400"/>
Site location	<input type="text" value="Dunsbury Park, Havant PO9 4EE"/>



Site easting (British National Grid)	<input type="text" value="470135"/>
Site northing (British National Grid)	<input type="text" value="109033"/>

Site details

Total site area (ha)	<input type="text" value="2.96"/>	ha
----------------------	-----------------------------------	----

Greenfield runoff

Method

Method	IH124	
IH124		
	<u>My value</u>	<u>Map value</u>
SAAR (mm)	<div><div>779</div><div>mm</div></div>	<div><div></div><div>779</div></div>
How should SPR be derived?	WRAP soil type	
WRAP soil type	<div><div>4</div></div>	<div><div></div><div>4</div></div>
SPR	<div><div>0.47</div><div></div></div>	
QBar (IH124) (l/s)	<div><div>16.2</div><div>l/s</div></div>	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	<div><div>7</div></div>	<div><div></div><div>7</div></div>
1 year growth factor	<div><div>0.85</div><div></div></div>	
2 year growth factor	<div><div>0.88</div><div></div></div>	
10 year growth factor	<div><div>1.62</div><div></div></div>	
30 year growth factor	<div><div>2.3</div><div></div></div>	
100 year growth factor	<div><div>3.19</div><div></div></div>	
200 year growth factor	<div><div>3.74</div><div></div></div>	

Results

Method	IH124	
Flow rate 1 year (l/s)	<div><div>13.8</div><div>l/s</div></div>	
Flow rate 2 year (l/s)	<div><div>14.3</div><div>l/s</div></div>	
Flow rate 10 years (l/s)	<div><div>26.2</div><div>l/s</div></div>	
Flow rate 30 years (l/s)	<div><div>37.2</div><div>l/s</div></div>	
Flow rate 100 years (l/s)	<div><div>51.7</div><div>l/s</div></div>	
Flow rate 200 years (l/s)	<div><div>60.6</div><div>l/s</div></div>	

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Appendix G

Peter Brett Wider Site Drainage and Hydrock Strategy
Available on request if required

Appendix H

Flood Risk Maps

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	470025/109356	5 November 2025 16:11

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Unspecified

Location (easting/northing)

470025/109356

Scale

1:2,500

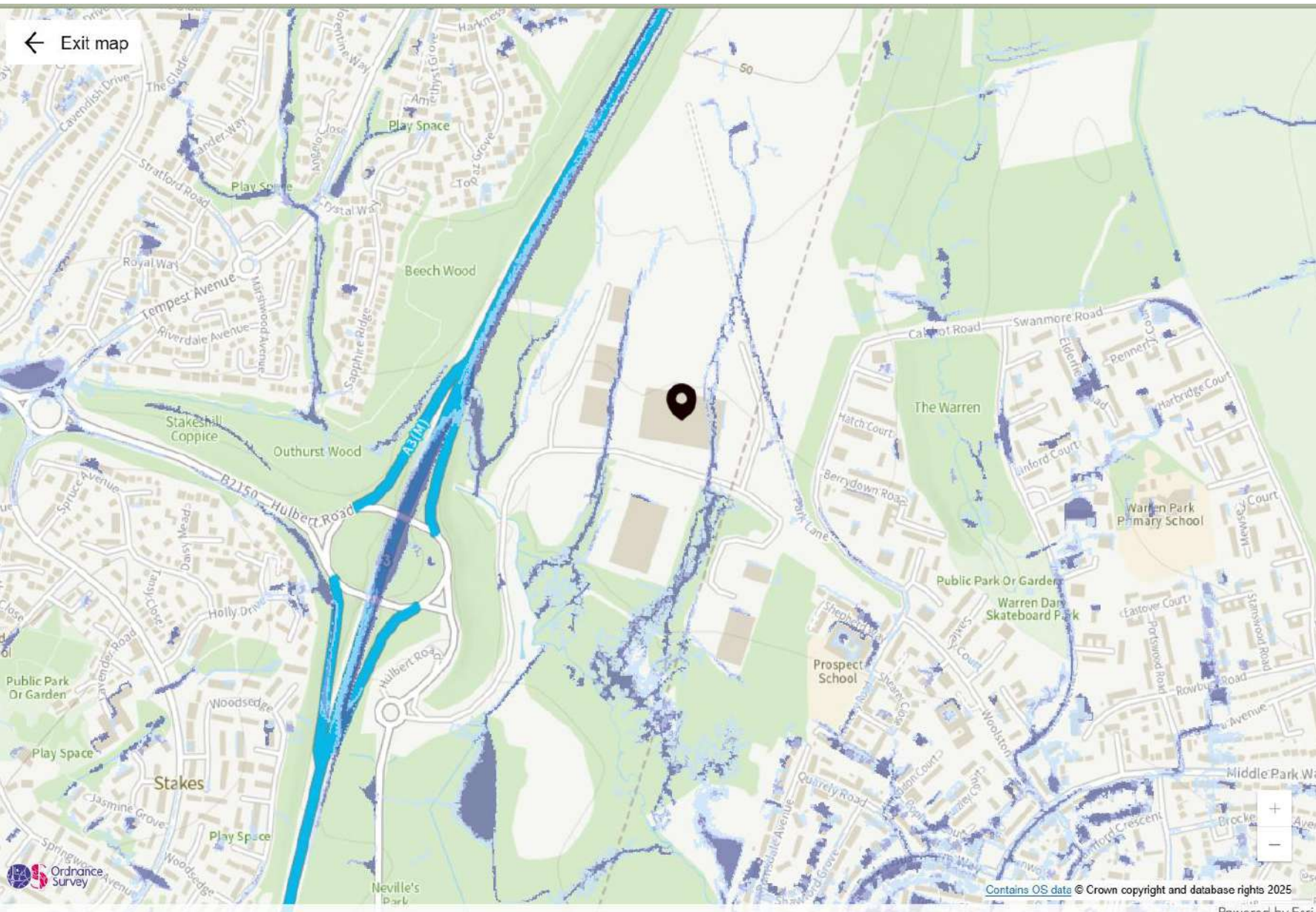
Created

5 Nov 2025 16:11

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



0 20 40 60m



Surface water map

Yearly chance of flooding

☒ Flood area (extent)

High chance

Medium chance

Low chance

Yearly chance of flooding between 2040 and 2060

☐ Flood area (extent)

Map details

☒ Show flooding

☒ Selected address

Contains OS data © Crown copyright and database rights 2025

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Appendix I

Magic Map

Legend

Only layers selected and visible at this map scale will be shown

Magic

Landscape

Geology and Soils

Groundwater Vulnerability Map (England)

- Local Information
- Soluble Rock Risk
- High
- Medium - High
- Medium
- Medium - Low
- Low
- Unproductive



Legend



Only layers selected and visible at this map scale will be shown

Magic

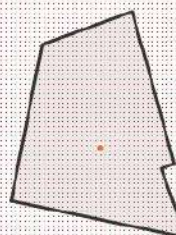
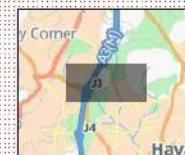
Designations

Land-Based Designations

Non-statutory

Source Protection Zones merged (England)

- Zone I - Inner Protection Zone
- Zone I - Subsurface Activity
- Zone II - Outer Protection Zone
- Zone II - Subsurface Activity
- Zone III - Total Catchment
- Zone III - Subsurface Activity
- Zone of Special Interest



Appendix J
CCTV Survey Plan
Available on request if required

Appendix K
Ground Investigation Report
Available on request if required

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