

Dunsbury Park, Portsmouth – Outline Plot 600 & 601

PEREGA

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1. Introduction

- 1.1 This flood risk assessment (FRA) report has been prepared by Perega Ltd on behalf of their client, Portsmouth City Council for the development of Plot 600 at Dunsbury Park, Havant PO9 4EE.
- 1.2 The development Plot 600 & 601 is part of the wider development site, with construction progressing in distinct parcels. This FRA primarily relates to the development of Plot 600 & 601 only.
- 1.3 The application boundary covers an area of approximately 3.29 hectares (ha) and is a greenfield site.
- 1.4 This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) 2025 and the associated Technical Guidance.
- 1.5 The key site details are presented in Table 1, below.

Table 1 - Site Summary

Site Name	Plot 600 & 601 Dunsbury Park, Portsmouth
Location	Dunsbury Park, Havant PO9 4EE
Grid Reference	SU 70175 09486
Development Site Area	3.29 Hectares Approx.
Development Type	Warehouse and Office
Flood Zone	Flood Zone 1 (Low Probability Risk)
Surface Water Flood Risk	Very Low Probability Risk
Local Water Authority	Southern Water
Local Planning Authority	Havant Borough Council
Lead Local Flood Authority	Hampshire County Council

- 1.6 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).
- 1.7 This report has been prepared solely as 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.
- 1.8 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.
- 1.9 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 site is an irregular shape parcel of land in an existing 100-acre business park known as Dunsbury Park development. The plot is currently consists of an uneven open ground, predominantly covered with scrub vegetations.
- 3.2 Plot 600 & 601 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 & 601). This is captured in the wider site planning application ref. APP/12/00338 with Peter Brett Associates' approved Outline Planning Drainage Strategy. Subsequently, Hydrock Consultants Limited prepared an Outline Drainage Strategy (Drawing no 19453-HYD-00-ZZ-DR-C-7000 & 7001) for the wider development site, building upon Peter Brett Associate's original Drainage Strategy.
- 3.3 The proposed site can be accessed via Fitzwygram Way at the junction adjacent to the existing building 'Biopure Technology' and Plot 400.
- 3.4 A site location plan for Plot 600 & 601 is included in **Appendix A** of this report.

Surface Water Features

- 3.5 The Hermitage Stream runs approximately 600m south-west to the site, flowing in a south-eastern direction.
- 3.6 To the east of the site lies at approximately 210m 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 development site and the report includes the ground investigation for Plot 600 & 601.
- 3.8 BGS Geology Viewer indicated that the site is situated in Bognor Sand Member which forms a part of the London Clay Formations.

BGS Geology Viewer indicates that site is situated between two distinct geological formations: the London Clay Formation along its southern 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 0.3 m and 4.0 m bgl), comprising silty fine sand and sandy clay/silt, overlaying a weathered zone of the London Clay Formation (to around 0.6m bgl and up to 4.0m bgl, with an average thickness of 1.85m) across the entire Plot 600 & 601. Below this, the London Clay Formation extends to at least 20.45 m bgl across the entire Plot 600 & 601, 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 at Plot 600 & 601 groundwater was encountered within the Head Deposits at 2.70m bgl (between 1.87m bgl – 2.74m bgl within the Bognor Sand Formation), and within the London Clay Formations between 0.98m bgl to 5.0m bgl. An infiltration test in the London Clay (to 3.0 m bgl) showed no infiltration, indicating very low permeability. It is noted that soakaway infiltration test was subsequently abandoned due to the negligible infiltration observed.

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 No public foul and surface water records are available at the time of writing this report.

3.15 A CCTV Survey was undertaken by Miland Survey LTD for the wider development site, which included the private drainages within the site (Plot 600 & 601). The CCTV survey identifies no private foul and surface water present within the site. However, a 600mm diameter surface water network was identified running adjacent to the access road serving Plot 600 & 601. This existing sewer continues downstream to the south of the site and is assumed to ultimately discharge into an existing attenuation pond located further downstream.

3.16 The CCTV survey can be seen in **Appendix J** of this report.

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 600 & 601 is generally inclined with a considerable variation in levels between 43.79m AOD to the north and 32.69 AOD to the south. The lowest point is located at southwest corner of the site, along the access road serving Plot 600 & 601. Overall, the site has a fall of approximately 11.10m 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 2.62ha. This is summarised in Table 2.

Table 2 - Greenfield Runoff rate

Storm Event	Greenfield Rate (l/s for 2.62ha)
QBar	14.3
1-year	12.2
30-year	33.0
100-year	45.7

4. The Proposed Development

- 4.1 The proposed illustrative layout of Plot 600 & 601 comprises two warehouse buildings with an associated office area, a substation, car parking with associated private access roads, and a service yard.
- 4.2 Illustrative details of 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 is considering 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 the 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 600 & 601 lies within Flood Zone 1. Therefore, the risk of flooding from rivers are **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 Waterlooville 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 **low to medium** 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 low/medium change of flooding from surface water. It is proposed that the drainage strategy will suitably mitigate the flood risk from surface water.

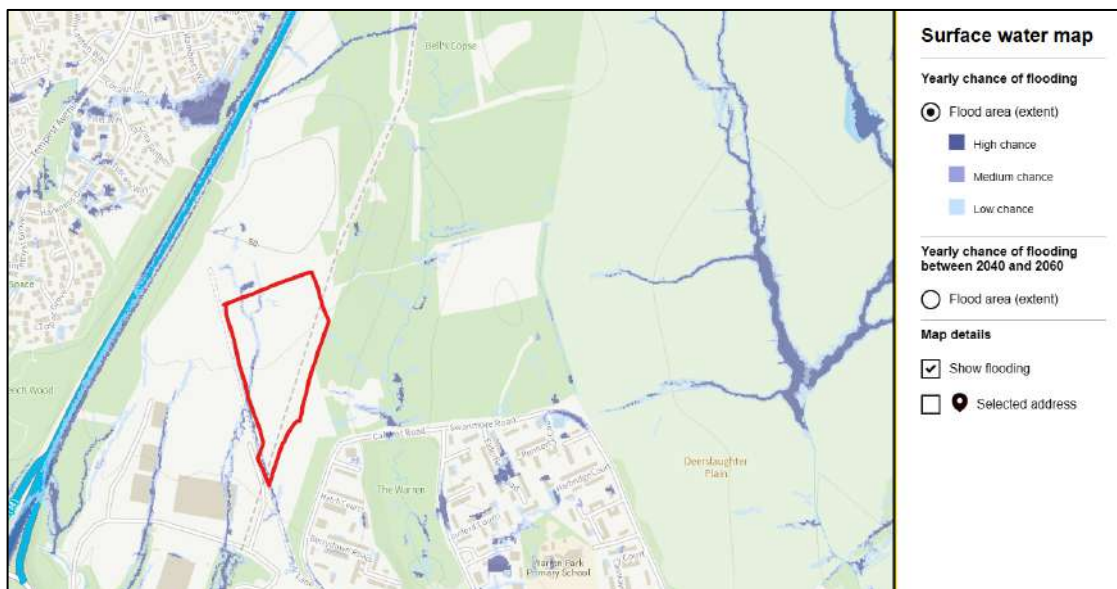


Figure 1 - Surface Water Flood Map

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 19% - 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.

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. Table 6 and

- 7.31 Table 7 summarises the data attributed 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 within 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**. The associated drainage calculation can be seen in **Appendix D** of this report.

Surface Water

- 9.2 The Hierarchy for the discharge of surface water looks at the most sustainable ways to discharge surface water from most preferred to least preferred options.
- 9.3 The most preferred option is to discharge to ground, then discharge to surface water body, then discharge to surface water sewer, then discharge to combined sewer.

- 9.4 The proposed development is a greenfield, where infiltrations to ground would typically present the most suitable discharge option. However, the ground investigation undertaken by Hydrock indicated low infiltration rates based on the onsite testing. As such, soakaways or infiltration systems are considered as unsuitable for this site. However, the recorded infiltration rates could potentially assist with attenuation as part of the SuDs for the site.
- 9.5 There are surface bodies in close proximity to the Unit 600 & 601 that could provide suitable outfall for surface water discharge.
- 9.6 Following from the drainage hierarchy, the preferred method of surface water discharges is via a new attenuation pond which will predominately serve for Plot 600 & 601. The connection from Plot 600 & 601 into the pond will be either via an underground sewer pipe or via above-ground swale, which is subject to the exact position of the pond. The surface water from the site would be discharged from the attenuation pond at a controlled rate of approximately 17.5 l/s via a Hydrobrake chamber.
- 9.7 This discharge rate has been derived from the approved drainage strategy prepared by Peter Brett Associates and Hydrock for the wider development site. The Plot 600 & 601 drainage strategy therefore is, according with the principles and design principles set out within the wider development site strategy, ensuring that consistency in runoff management across the masterplan.
- 9.8 The discharge rate concluded by Peter Brett Associates and Hydrock for the wider development site is included in **Appendix G** of this report.
- 9.9 The surface water runoff from Unit 601 roof is proposed to be collected through siphonic drainage systems, which would discharge into the site network. The surface water runoff from Unit 600 roof is proposed to discharge into the site network, via gravity. Surface water runoff from the car parks, private access roads and the service yards is proposed to be collected via a series of gullies and linear channels, as appropriate. Surface water runoff from the car parks serving for Unit 600 & 601 runoff is proposed to pass through individual petrol interceptor prior to entering the attenuation pond to remove any potential contaminants. The main road of the site is divided into two drainage catchments. The top section of the road will discharged to an adjacent above-ground swale, out-falling into the attenuation pond, while the bottom section will drain to a separate swale, discharging to the existing surface water sewer located at the southwestern boundary of the site.
- 9.10 An attenuation pond of an outline volume of 1750m³ is proposed just outside of southeastern boundary of the site. This pond would occupy an estimated land area of 1725m², with a base area of approximately 750m². Surface water collected within the attenuated pond will be discharging into the Park Lane stream, located to the east of the site. The exact position of the pond is to be subject to agreement, taken into account the high-pressure gas-main exclusion zone, availability of topographical data and maintenance requirements. The pond is currently proposed with a side-slope of 1:4, consistent with the existing ground condition and slope. However, the pond may needed to be construct deeper and narrower, which could require additional protection measures. These are to be confirmed during the detailed design stage.
- 9.11 There is a concern that the location of the proposed attenuation pond may be precluded due to the proximity to the existing as pipeline and associated eaement. An alternative to the proposed attenuation pond is to include a fully below ground attenuation solution, has been developed. This proposal comprises a series of geocellular attenuation tanks distributed throughout the plot 600, 601 and the access road. The proposed tanked solution provides an estimated total attenuation storage volume of approximately 2,400m³ across a combined footprint area of circa 2,105m², with the attenuation tanks proposed at an approximate depth of 1.2m below ground level and with 95% voids ratio. The tanked arrangement would remove the requirement for the attenuation pond and associated land take outside of the development boundary.

- 9.12 The proposed tanked solution offers several potential benefits over the attenuation pond option, including avoiding constraints associated with the high-pressure gas main exclusion zone, reducing long-term maintenance requirements associated with open water features, and maximising the developable area of the site. In addition, the below-ground attenuation system could provide greater flexibility during the detailed design stage, allowing storage volumes to be distributed across the site and coordinated with other infrastructure and landscaping requirements. The suitability, location and construction requirements of the proposed attenuation tanks would be subject to further detailed design, ground investigation, utility coordination and structural design considerations associated with the proposed tank depth. Please refer to Appendix C of this report for drawing “W24084-PER-60-XX-DR-C-02003” for the alternative drainage layout plan.
- 9.13 The drainage network for all options has been designed for a 1-in-100-year storm event plus 45% Climate Change Allowance.
- 9.14 The surface drainage strategy is subject to confirmation of any public sewer on site, as well as pre-planning application with Southern Water.
- 9.15 The proposed route from the Hydrobrake to the outfall at Park Land stream is to be confirmed and subjected to Portsmouth County Council land ownership, existing utility conflicts and ecology. Further surveys are required to accurately determine sewer alignment and connection point downstream.
- 9.16 Different areas of hardstanding pose different risks of pollution. 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 with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly	High	0.8 ²	0.8 ²	0.9 ²

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				
--	--	--	--	--

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.

- 9.17 Based on Table 11, the building roof is classified as having a low pollution hazard level, while the commercial yard, access road, and non-residential car parking areas are assessed as having a high pollution hazard level due to the presence of the service yard where heavy goods vehicles will operate.
- 9.18 Roof runoff is considered to pose a sufficiently low risk and therefore does not require treatment prior to discharge into the surface water sewer. All surface water from the car park, access road and service yard would pass through a petrol interceptor before discharging into the attenuated pond as part of the treatment process. The petrol interceptor will remove any pollutants or hydrocarbons from the runoff, reducing the risks of contamination to both the attenuated pond and the existing Park Lane Stream, into which the pond ultimately outfalls.

Foul Water

- 9.19 There are no existing foul water sewer running within the site however, the CCTV survey indicates a private foul sewer network located approximately south-west of Plot 600 & 601.
- 9.20 A foul water sewer is proposed along the southeastern section of the main road of the site, serving the office areas. This sewer will connect to the nearest proposed foul water sewer serving Plot 400, located to the south of Plots 600 & 601 site. This connection to the Plot 400 foul sewer is subject to the detailed design. It is assumed that SVPs are located within the office areas, however if SVPs are to be located within the warehouse areas, additional foul water sewer is to be proposed on site.
- 9.21 The foul water drainage strategy will be developed subject to confirmation of any public foul sewer on site, as well as pre-planning applications with Southern Water.

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 planning application for the development of Plot 600 & 601 at Dunsbury Park, Havant, PO9 4EE. The site comprises of the development of two warehouse buildings with associated office areas, a substation, carparking with associated private access road and service yards.
- 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 Plot 600 & 601 groundwater was encountered within the Head Deposits at 2.70m bgl (between 1.87m bgl – 2.74m bgl within the Bognor Sand Formation), and within the London Clay Formations between 0.98m bgl to 5.0m bgl. An infiltration test in the London Clay (to 3.0 m bgl) showed no infiltration, indicating very low permeability. It is noted that soakaway infiltration test was subsequently abandoned due to the negligible infiltration observed. As such, use of soakaway or infiltration systems is

considered as unsuitable for this site. 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 further way 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 water runoff from the site will be discharged to an attenuation pond located southeastern boundary from the site, either via an underground sewer pipe or via above-ground swale. Flow will be controlled to approximately 17.5 l/s using a Hydrobrake.
- 10.5 The roof runoff will be collected either via siphonic drainage system or via gravity, while runoff from the car park, private roads and service yard will be captured by gullies and linear channels and treated through petrol interceptor before discharging into the pond. Surface water runoff from the main road of the site is divided into two drainage catchments. The top section of the will discharged to an adjacent above-ground swale, out-falling into the attenuation pond, while the bottom section will drain to a separate swale, discharging to the existing surface water sewer located at the southwestern boundary of the site.
- 10.6 Private sewers are proposed to convey the foul water from the site, along the southeastern section of the main road and connect into the nearest proposed foul water sewer serving Plot 400, located to the south of Plots 600 & 601 site.
- 10.7 The foul and surface water drainage strategy is subject to the confirmations of any public sewers on site, as well as pre-planning applications with Southern Water.

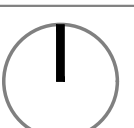
Appendix A

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 indicated, unless stated otherwise.
- It is the responsibility of the user to ensure the document is the correct size & scale.
- All relevant drawings and specifications should be read in conjunction with this document.
- Scaling of this document is not recommended.

North

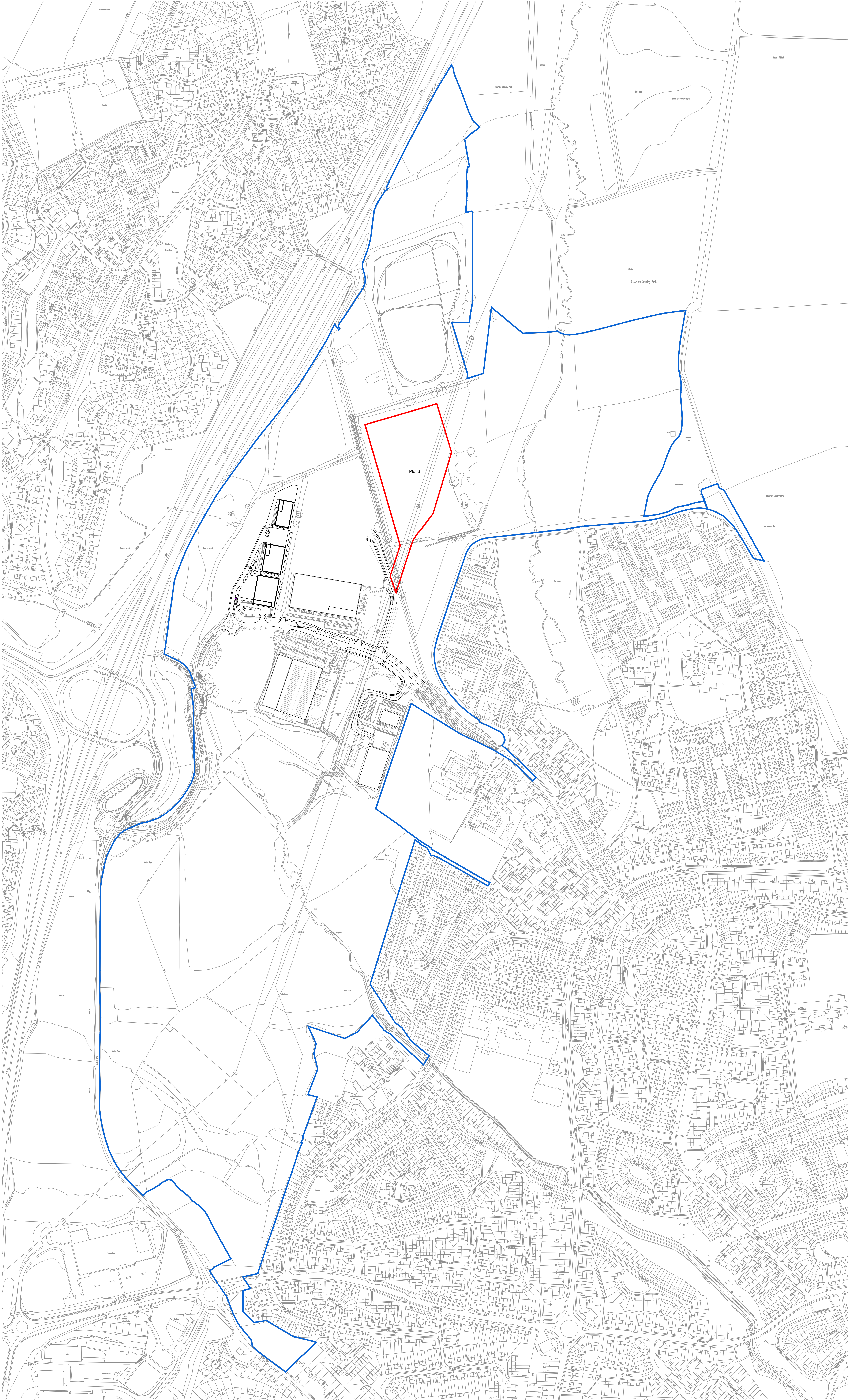


Document Scale(s)



Key

— Ownership Boundary	291.25 ac	117.86 ha
— Plot 6 Area	8.13 ac	3.29 ha



Project Name

Plot 6, Dunsbury Park, Havant, Portsmouth

Portsmouth City Council

Project Address

Civic Offices,
Guildhall Square,
Portsmouth,
PO1 2AL

RIBA Workstage

2 - Concept Design

Status

S3 - Review & Comment

Drawn Checked Created Size

KS DS 10.10.2025 A0

UMC Project Reference

25102

Scale LOD LOI

1:2500 1 1

Document Title

Plot 6, Site Location Plan

Document Reference

DP - UMC - 0600 - SI - DR - A - 0501

Revision Note

Initial Issue

Issue Date Package Current Revision

13.10.2025 PLANNING

Appendix B

Illustrative Site Layout



Key

Ownership Boundary	291.25 ac	117.86 ha
Plot 6 Area	8.13 ac	3.29 ha

Schedule of Accommodation Plot 6

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

Level Access Doors	3
--------------------	---

Parking		
Standard Car Parking Spaces	30	
Accessible Spaces Included In Total	2	
EVC Spaces Included In Total	4	
Total Parking Provision	36	

Cycle Spaces	10
--------------	----

Clear Internal Height	12.5 m
-----------------------	--------

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

Level Access Doors	2
--------------------	---

Dock Loading Doors	8
--------------------	---

HGV Parking	25
-------------	----

Parking		
Standard Car Parking Spaces	85	
Accessible Spaces Included In Total	5	
EVC Spaces Included In Total	10	
Total Parking Provision	100	

Cycle Spaces	10
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Clear Internal Height	12.5 m
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General Notes

- This document is to be used for the stated purpose only and should not be used for any other.
- Dimensions are all in millimetres, unless stated otherwise.
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- All relevant drawings and specifications should be read in conjunction with this document.
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North



Document Scale(s)



Key Plan



Project Name

Plot 6, Dunsbury Park, Portsmouth

Employer	Project Address
Portsmouth City Council	Dunsbury Park Havant, Portsmouth

RIBA Workstage

S3 - Review & Comment

Drawn	Checked	Created	Size
KS	DS	26.09.2025	A1
UMC Project Reference		Scale	LOD LOI
25102		As Indicated	1 1

Document Title

Plot 6, Site Plan

Document Reference

DP - UMC - 0600 - SI - DR - A - 0601

Revision Note

Clear internal height amended at Clients request

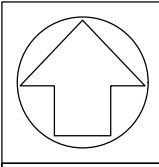
Issue Date Package Current Revision

10.12.2025 PLANNING

P2.1

Appendix C

Drainage Strategy Layout



VIEWPORT A

ROOF TO THE UNIT 601 TO DRAIN INTO THE SOUTHERN ELEVATION BY SIPHONIC DRAINAGE AT ALL GUTTER LOCATIONS.

SW SEWER PROPOSED TO RUN ALONG THE FOOTPATH TO ACCOMMODATE THE SIPHONIC DRAINAGE FOR THE ROOF AND IS SUBJECT TO THE DETAILED DESIGN.

THE SERVICE YARD PROPOSED TO BE DRAINED INTO SW NETWORK VIA GULLIES AND ACO CHANNELS.

PLOT 601

SVP CONNECTION ARE ASSUMED TO BE LOCATED WITHIN THE OFFICE AREA ONLY AND IS TO BE DISCHARGED INTO THE PROPOSED FOUL SEWER ALONG THE PRIVATE ROAD, VIA INSPECTION CHAMBERS ALONG THE FOOTWAY. THIS IS SUBJECT TO DETAILED DESIGN.

THE CAR PARK PROPOSED TO BE DRAINED INTO THE SW NETWORK VIA GULLIES AND ACO CHANNELS.

FLAT ROOF TO UNIT 600 TO DISCHARGE SURFACE WATER RUNOFF BY GRAVITY INTO PROPOSED SW SEWER, AS SHOWN ALONG THE BUILDING.

SVP CONNECTION ARE ASSUMED TO BE LOCATED WITHIN THE OFFICE AREA ONLY AND IS TO BE DISCHARGED INTO THE PROPOSED FOUL SEWER ALONG THE PRIVATE ROAD, VIA INSPECTION CHAMBERS ALONG THE FOOTWAY. THIS IS SUBJECT TO DETAILED DESIGN.

THE CAR PARK PROPOSED TO BE DRAINED INTO THE SW NETWORK VIA GULLIES AND ACO CHANNELS.

BOTTOM SECTION OF THE MAIN ROAD IS PROPOSED TO BE DRAINED INTO EITHER THE ABOVE-GROUND SWALE OR VIA UNDERGROUND SW SEWER, WHICH ULTIMATELY OUTFALLS INTO TO THE EXISTING SW SEWER. THIS IS SUBJECT TO DETAILED DESIGN.

CUTLINE A-A

EXISTING OVERHEAD CABLES TERMINATES APPROXIMATELY AT THIS POINT AND CONTINUES BELOW GROUND. FURTHER GPR SURVEY REQUIRED TO CONFIRM THE DEPTH AND EXACT LOCATION OF THE BELOW GROUND CABLES TO VERIFY THE FEASIBILITY OF THE PROPOSED DRAINAGE ALIGNMENT.

TOP SECTION OF THE MAIN ROAD IS PROPOSED TO BE DRAINED INTO THE ATTENUATION POND, EITHER VIA THE ABOVE-GROUND SWALE OR VIA UNDERGROUND SW SEWER. IF SW IS TO BE DISCHARGE INTO POND VIA UNDERGROUND SEWER, ADDITIONAL SW SEWER IS TO BE PROPOSED FROM UNIT 601 SERVICE YARD, CONVEYING SW FLOWS ALONG THE ACCESS ROAD TO THE PROPOSED MAIN ROAD SW SEWER. THIS IS SUBJECT TO DETAILED DESIGN.

THE SERVICE YARD PROPOSED TO BE DRAINED INTO SW NETWORK VIA GULLIES AND ACO CHANNELS.

A SWALE PROPOSED ALONGSIDE THE ROAD TO COLLECT AND CONVEY SURFACE WATER RUNOFF ABOVE-GROUND FROM THE MAIN ROAD TO THE POND. THE DESIGN OF THE SWALE TO BE CARRIED OUT AT DETAILED DESIGN.

PETROL INTERCEPTOR TO TREAT SURFACE WATER RUNOFF FROM VEHICULAR AREA, WHICH INCLUDES CAR PARK AND THE SERVICE YARD FOR BOTH UNITS.

THE SURFACE WATER RUNOFF FROM UNIT 600 & 601 TO DISCHARGE INTO THE ATTENUATION POND EITHER VIA AN UNDERGROUND SEWER PIPE OR VIA THE ABOVE-GROUND SWALE.

A NEW ATTENUATION POND WITH VOLUME OF 1750m³ PROPOSED TO SERVE FOR BOTH UNIT 600 & 601. THE DESIGN OF THE POND IS SHOWN INDICATIVELY AND THE DESIGN TO BE CARRIED OUT AT DETAILED DESIGN.

THE ROUTE FROM THE FLOW CONTROL CHAMBER TO THE OUTFALL AT PARK LAND STREAM IS TO BE CONFIRMED. THE ROUTE IS SUBJECT TO THE PORTSMOUTH COUNTY COUNCIL LAND OWNERSHIP, EXISTING UTILITY CONFLICTS AND ECOLOGY.

THE SURFACE WATER FROM THE SITE PROPOSED TO ULTIMATELY DISCHARGE INTO THE PARK LANE STREAM VIA NEW HEADWALL AT CONTROLLED DISCHARGE RATE OF 17 l/s. THIS IS TO BE AGREED WITH LLFA AND SUBJECT TO DETAILED DESIGN.

PROPOSED FLOW CONTROL CHAMBER. PROPOSED HYDROBRAKE DISCHARGE RATE OF 17.5 l/s

SVP CONNECTION ARE ASSUMED TO BE LOCATED WITHIN THE OFFICE AREA ONLY AND IS TO BE DISCHARGED INTO THE PROPOSED FOUL SEWER ALONG THE PRIVATE ROAD, VIA INSPECTION CHAMBERS ALONG THE FOOTWAY. THIS IS SUBJECT TO DETAILED DESIGN.

THE CAR PARK PROPOSED TO BE DRAINED INTO THE SW NETWORK VIA GULLIES AND ACO CHANNELS.

BOTTOM SECTION OF THE MAIN ROAD IS PROPOSED TO BE DRAINED INTO EITHER THE ABOVE-GROUND SWALE OR VIA UNDERGROUND SW SEWER, WHICH ULTIMATELY OUTFALLS INTO TO THE EXISTING SW SEWER. THIS IS SUBJECT TO DETAILED DESIGN.

EXISTING OVERHEAD CABLES ALONG THE ACCESS AREA. HIGH-PRESSURE GAS MAIN RUNNING PARALLEL BELOW GROUND WITHIN THE VICINITY. FURTHER GPR SURVEY REQUIRED TO CONFIRM THE DEPTH AND LOCATION OF THE GAS MAIN. CONFIRMATION OF THE FOUL SEWER RUN TO BE CARRIED OUT AT DETAILED DESIGN.

THE FW SEWER FROM THE PROPOSED SITE TO CONNECT INTO THE FW MANHOLE FROM PLOT 400, LEADING FURTHER SOUTH. CONNECTION INTO THE FW MANHOLE IS SUBJECT TO THE CONFIRMATION OF THE PLOT 400 FWMH IL.

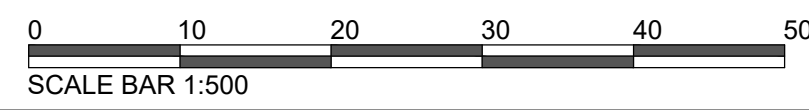
THE SWALE PROPOSED ALONGSIDE THE MAIN ROAD TO COLLECT AND CONVEY SURFACE WATER RUNOFF ABOVE-GROUND FROM THE ROAD AND DISCHARGE INTO THE EXISTING SW SEWER. THE DESIGN OF THE SWALE TO BE CARRIED OUT AT DETAILED DESIGN.

EXISTING OVERHEAD CABLES TERMINATES APPROXIMATELY AT THIS POINT AND CONTINUES BELOW GROUND. FURTHER GPR SURVEY REQUIRED TO CONFIRM THE DEPTH AND EXACT LOCATION OF THE BELOW GROUND CABLES TO VERIFY THE FEASIBILITY OF THE PROPOSED DRAINAGE ALIGNMENT.

CUTLINE A-A

CUTLINE A-A

VIEWPORT B



OUR DRAINAGE CALCULATIONS ARE DETERMINED IN FLOW FORMAT.

THE PROPOSAL OF THE DRAINAGE NETWORK IS SUBJECT TO VERIFICATION THROUGH FURTHER SITE SURVEYS TO DETERMINE THE EXACT LOCATION AND DEPTH OF THE EXISTING UNDERGROUND SERVICES, ESPECIALLY THE GAS MAIN. THE SURVEY IS REQUIRED TO CONFIRM THE PROPOSAL OF THE DRAINAGE NETWORK.

THIS STRATEGY USES DRAWING: 'DP-UMC-0600-SI-DR-A-0601 - PLOT 6, SITE PLAN' FROM UMC ARCHITECTS. THIS MASTERPLAN WAS PROVIDED FOR THE OUTLINE STRATEGY.

Storm Design Details	
ROOF AREA	= 11259m ²
PRIVATE PARKING	= 8763m ²
SERVICE AREA	= 4710m ²
HIGHWAY AREA	= 1482m ²
TOTAL	= 26214m ²

THE STORM CALCULATION ABOVE ARE IMPERMEABLE AREAS FOR THE DESIGN OF THE POND STORAGE.

POND STORAGE:
OUTLINE POND VOLUME : 1,750m³
POND BASE: 750m³
TOTAL LAND INTAKE: 1,725m³
SIDE-SLOPE OF THE POND: 1:4
NOTE THAT THE SIDE-SLOPE OF THE POND CURRENTLY BASED ON THE EXISTING SLOPE ON SITE, ACHIEVING A FLAT BASE FOR THE POND MAY PRESENT CHALLENGES. ADDITIONAL PROTECTIVE MEASURES MAY NEED TO BE CONSIDERED, AS THE POND MAY NEED TO BE DESIGNED DEEPER AND NARROWER. THE DESIGN OF THE POND TO BE CARRIED OUT AT DETAILED DESIGN.

STORAGE & FLOW CONTROL SIZED FOR: 1:100 YEAR STORM EVENT RANGE, WITH +45% CLIMATE CHANGE ALLOWANCE.

A 17.5l/s OF DISCHARGE RATE BASED ON 'DRAINAGE STRATEGY' DRAWING: (19433-HYD-00-22-DR-C-7000 & 7001) PREPARED BY HYDROCK. THIS DISCHARGE ARE SUBJECT TO DETAILED DESIGN FOLLOWING FROM PRE-APPLICATION.

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

- CONSTRUCTION
1. POSSIBILITIES THAT THERE ARE UNKNOWN SERVICES ALONG THE SEWER CONNECTION WITHIN THE SITE.
 2. UNKNOWN SERVICES UNDERGROUND TO BE CONFIRMED.
 3. SERVICES OVERHEAD TO BE CONSIDERED ON SITE.

- MAINTENANCE
1. EXISTING AND PROPOSED PONDS WILL REQUIRE MAINTENANCE AGREEMENTS OR ADOPTION TO SUPPORT THE DEVELOPMENT.

- DEMOLITION
1. POSSIBILITIES THAT THERE ARE UNKNOWN SERVICES ALONG THE SEWER CONNECTION WITHIN THE SITE.
 2. UNKNOWN SERVICES UNDERGROUND TO BE CONFIRMED.
 3. SERVICES OVERHEAD TO BE CONSIDERED ON SITE.

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

GENERAL NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.
2. ALL UNITS IN MILLIMETERS U.N.O. ON THE DRAWING.
3. DO NOT SCALE OFF THE DRAWING.
4. THE WORKS DESCRIBED AND SPECIFIED ON THIS DRAWING AND ASSOCIATED DRGS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ALL CURRENT HEALTH AND SAFETY LEGISLATION AND THE PROJECT HEALTH & SAFETY PLAN, PREPARED BY THE PLANNING SUPERVISOR FOR THE PROJECT.
5. WHERE NOTES AND INFORMATION ON THIS DRG DIFFER FROM THE SPECIFICATION, CLARIFICATION SHOULD BE SOUGHT FROM THE ENGINEER.
6. THIS DRAWING IS SOLELY FOR OUTLINE DRAINAGE STRATEGY PURPOSES ONLY. NO CONSTRUCTION WORKS ARE TO BE CARRIED OUT BASED ON THIS DRAWING.

LEGEND:

- PLOT BOUNDARY
- EXISTING PUBLIC SW SEWER
- EXISTING PUBLIC FW SEWER
- EXISTING PUBLIC MANHOLE
- SW SEWER
- FLOW CONTROL CHAMBER
- FW SEWER
- FW MANHOLE
- PLOT 400 FW SEWER (PROPOSED)
- FW SEWER AS PART OF WIDER SCHEME (PROPOSED AS PART OF PLOT 400)
- PETROL INTERCEPTOR
- PROPOSED RETAINING WALL
- GRADING - CUT
- GRADING - FILL

P3	Site Boundary added	ET	07/01/2026	GS
P2	Updated to new Architect Layout	ET	22/12/2025	RGM
P1	Preliminary Issue	AS	18/11/2025	RGM
Rev	Description	By	Date	Chkd

PEREGA

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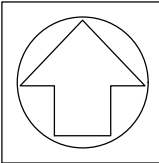
Client

PORTSMOUTH CITY COUNCIL

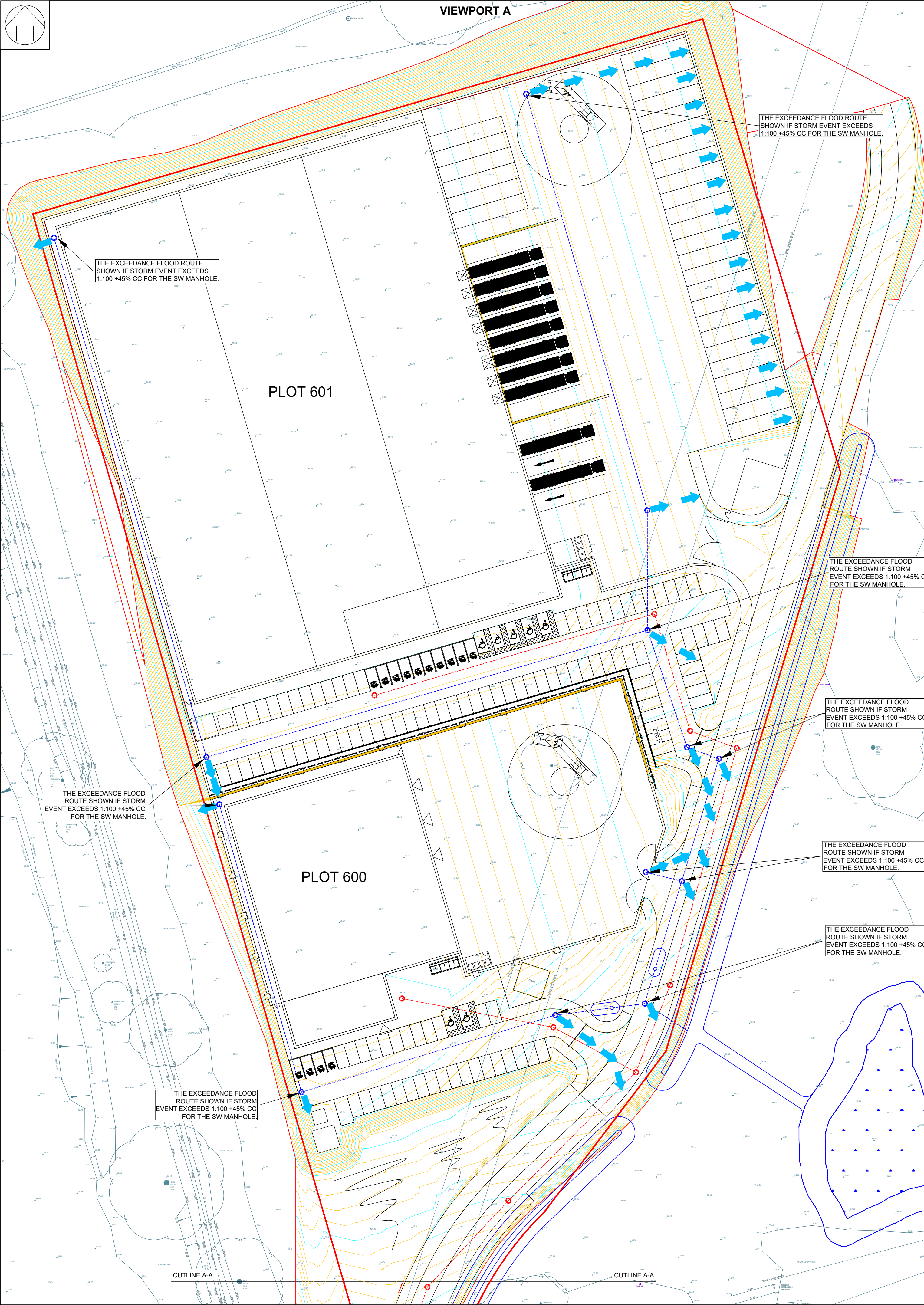
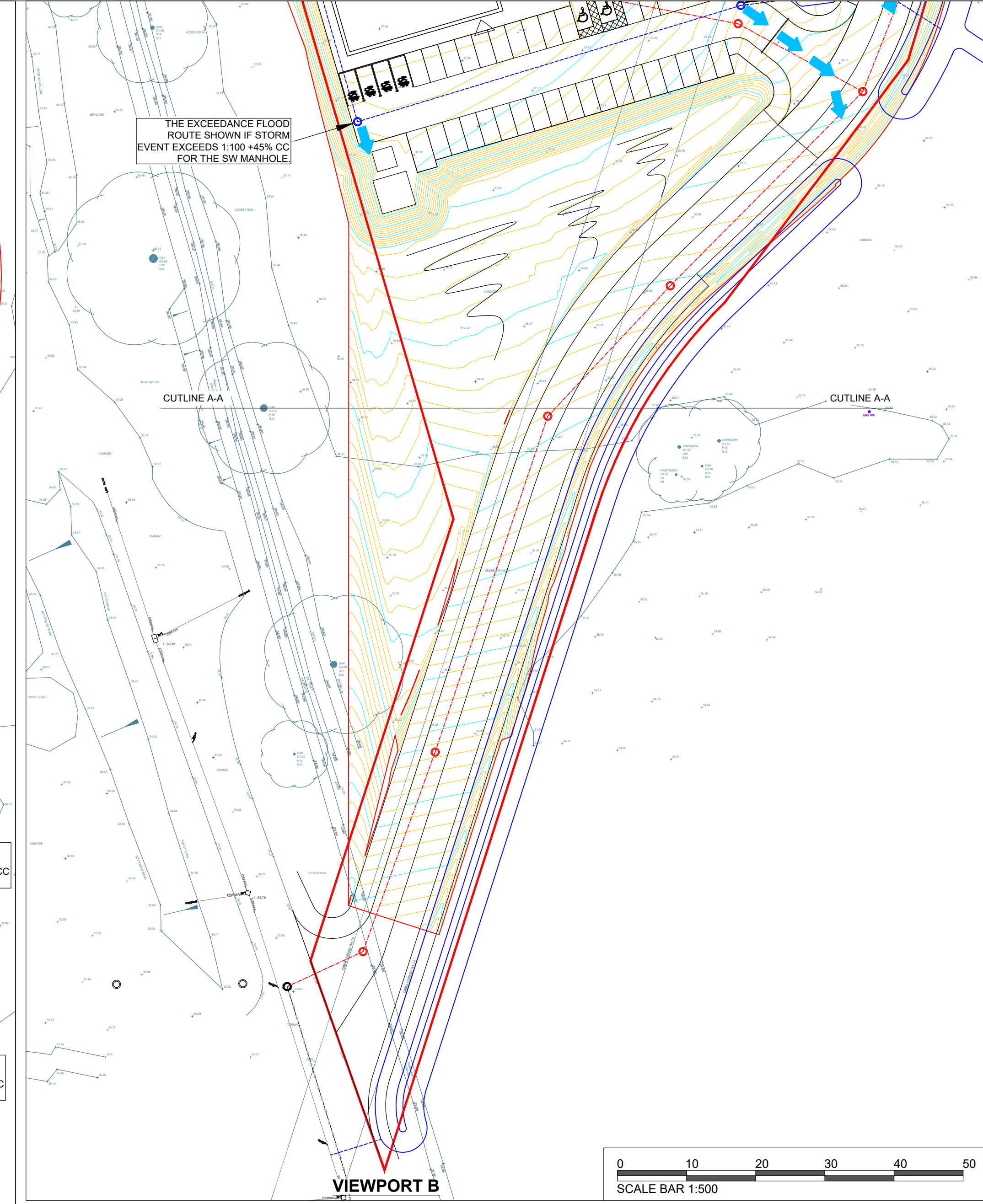
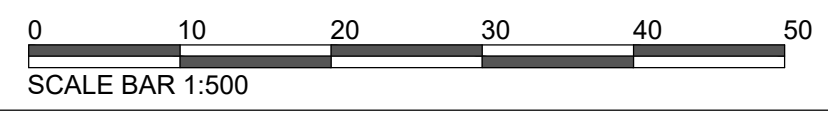
Project
DUNSURY PARK, PORTSMOUTH HAVANT, PORTSMOUTH

Title
**PLOT 600 & 601
OUTLINE DRAINAGE STRATEGY**

Perega Project No.			Checked	Passed	Size	Scale
W24084			RGM		A1	1:500
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24084	PER	60	XX	DR	C	02001
Suitability Code			Status		Revision	
S2			INFORMATION			P3



VIEWPORT A



THIS STRATEGY USES DRAWING:
'DP-UMC-0600-SI-DR-A-0601 - PLOT 6, SITE PLAN'
FROM UMC ARCHITECTS. THIS MASTERPLAN
WAS PROVIDED FOR THE OUTLINE STRATEGY.

THE EXCEEDANCE FLOOD ROUTE SHOWN IF
STORM EVENT EXCEEDS 1:100 +45%CC FOR
ALL SW MANHOLES

THE ROUTE FROM THE FLOW CONTROL CHAMBER
TO THE OUTFALL AT PARK LAND STREAM IS TO BE
CONFIRMED. THE ROUTE IS SUBJECT TO THE
PORTSMOUTH COUNTY COUNCIL LAND OWNERSHIP,
EXISTING UTILITY CONFLICTS AND ECOLOGY.

THE SURFACE WATER FROM THE SITE PROPOSED
TO ULTIMATELY DISCHARGE INTO THE PARK LANE
STREAM VIA NEW HEADWALL AT CONTROLLED
DISCHARGE RATE OF 17 l/s. THIS IS TO BE AGREED
WITH LLFA AND SUBJECT TO DETAILED DESIGN

THE EXCEEDANCE FLOOD ROUTE SHOWN IF STORM EVENT EXCEEDS 1:100 +45% CC FOR THE SW MANHOLE. THIS IS BASED ON THE EXISTING LEVELS ON SITE.



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- ### SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
- IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING
- #### CONSTRUCTION
- POSSIBILITIES THAT THERE ARE UNKNOWN SERVICES ALONG THE SEWER CONNECTION WITHIN THE SITE.
 - UNKNOWN SERVICES UNDERGROUND TO BE CONFIRMED.
 - SERVICES OVERHEAD TO BE CONSIDERED ON SITE.
- #### MAINTENANCE
- EXISTING AND PROPOSED PONDS WILL REQUIRE MAINTENANCE AGREEMENTS OR ADOPTION TO SUPPORT THE DEVELOPMENT.
- #### DEMOLITION
- POSSIBILITIES THAT THERE ARE UNKNOWN SERVICES ALONG THE SEWER CONNECTION WITHIN THE SITE.
 - UNKNOWN SERVICES UNDERGROUND TO BE CONFIRMED.
 - SERVICES OVERHEAD TO BE CONSIDERED ON SITE.
- ALL WORKS TO BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING (WHERE APPROPRIATE) TO AN APPROVED METHOD STATEMENT

- ### GENERAL NOTES:
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.
 - ALL UNITS IN MILLIMETERS U.N.O. ON THE DRAWING.
 - DO NOT SCALE OFF THE DRAWING.
 - THE WORKS DESCRIBED AND SPECIFIED ON THIS DRAWING AND ASSOCIATED DRGS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ALL CURRENT HEALTH AND SAFETY LEGISLATION AND THE PROJECT HEALTH & SAFETY PLAN, PREPARED BY THE PLANNING SUPERVISOR FOR THE PROJECT.
 - WHERE NOTES AND INFORMATION ON THIS DRG DIFFER FROM THE SPECIFICATION, CLARIFICATION SHOULD BE SOUGHT FROM THE ENGINEER. THIS DRAWING IS SOLELY FOR OUTLINE DRAINAGE STRATEGY PURPOSES ONLY. NO CONSTRUCTION WORKS ARE TO BE CARRIED OUT BASED ON THIS DRAWING.

- ### LEGEND:
- PLOT BOUNDARY
 - EXISTING PUBLIC SW SEWER
 - EXISTING PUBLIC FW SEWER
 - EXISTING PUBLIC MANHOLE
 - SW SEWER
 - FLOW CONTROL
 - FW SEWER
 - PLOT 400 FW SEWER (PROPOSED)
 - FW MANHOLE
 - PLOT 400 FW MANHOLE (PROPOSED)
 - PETROL INTERCEPTOR
 - FLOOD ROUTE
 - PROPOSED MAJOR CONTOUR - 0.5m INTERVAL
 - PROPOSED MINOR CONTOUR - 0.1m INTERVAL
 - PROPOSED RETAINING WALL

P2	Updated to new Architect Layout	ET	22/12/2025	RGM
P1	Preliminary Issue	AS	18/11/2025	RGM
Rev	Description	By	Date	Chkd

PEREGA

Quarry Court, Lime Quarry Mews, Guildford, GU1 2RD 01483 565 886

Client

PORTSMOUTH CITY COUNCIL

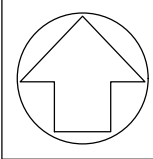
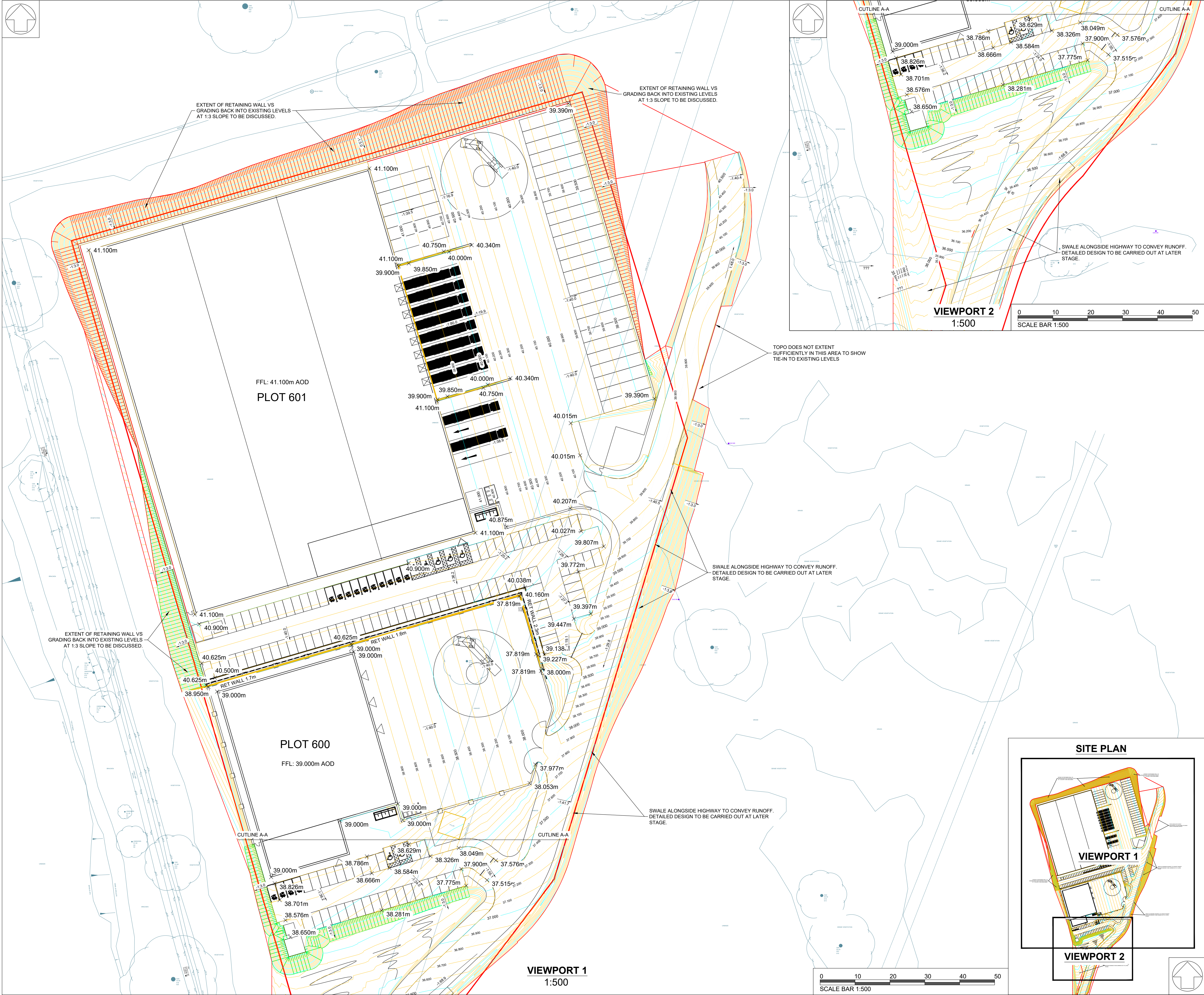
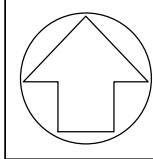
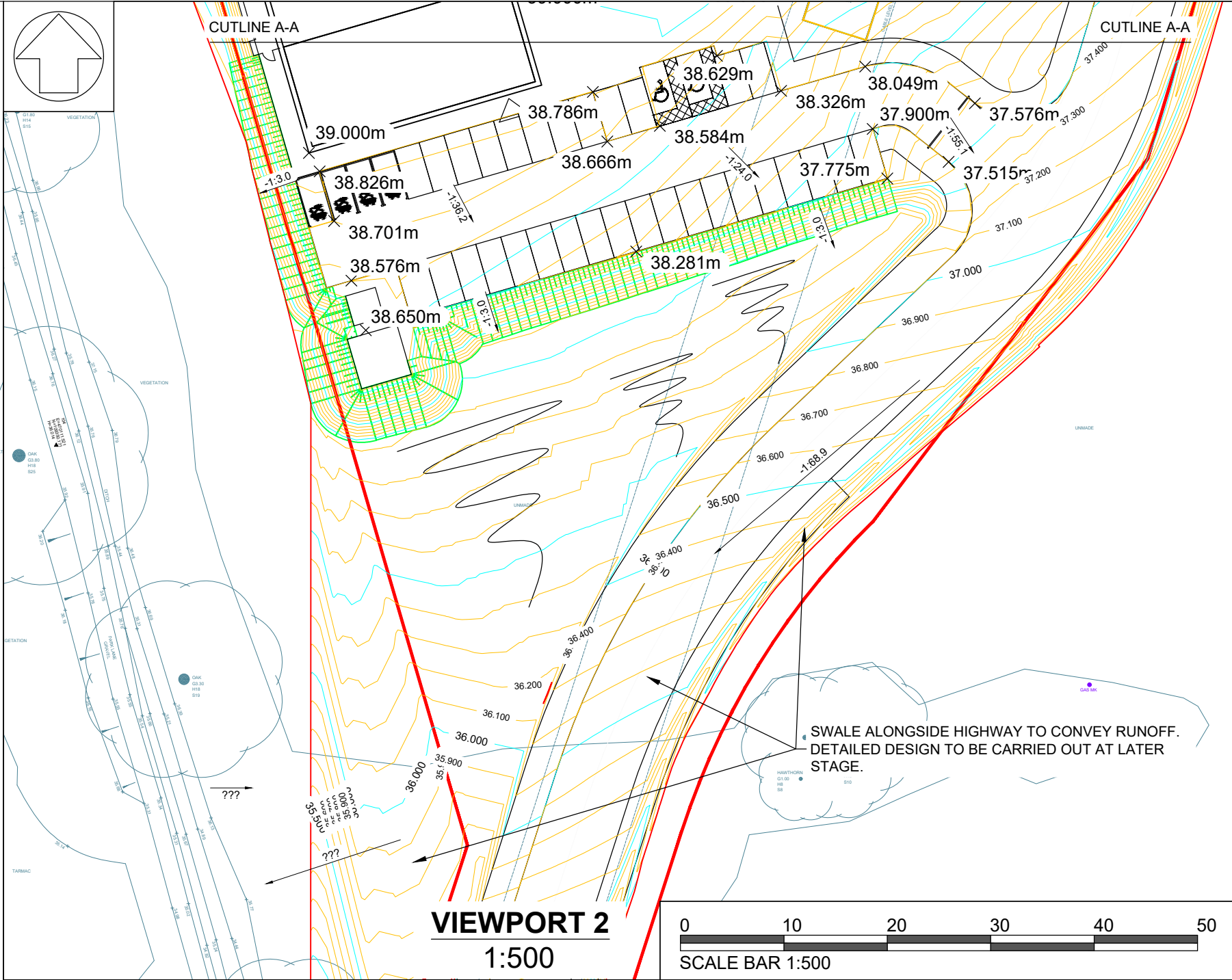
Project

DUNSBUY PARK, PORTSMOUTH HAVANT, PORTSMOUTH

Title

PLOT 600 & 601
FLOOD EXCEEDANCE PLAN

Perega Project No.			Checked	Passed	Size	Scale
W24084			RGM		A1	1:500
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24084	PER	60	XX	DR	C	02002
Suitability Code		Status				Revision
S2		INFORMATION				P2



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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

- CONSTRUCTION**
- NOT REVIEWED AT THIS STAGE
- MAINTENANCE**
- NOT REVIEWED AT THIS STAGE
- DEMOLITION**
- NOT REVIEWED AT THIS STAGE

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

- GENERAL NOTES:**
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.
 - ALL UNITS IN MILLIMETERS U.N.O. ON THE DRAWING.
 - DO NOT SCALE OFF THE DRAWING.
 - THE WORKS DESCRIBED AND SPECIFIED ON THIS DRAWING AND ASSOCIATED DRGS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ALL CURRENT HEALTH AND SAFETY LEGISLATION AND THE PROJECT HEALTH & SAFETY PLAN, PREPARED BY THE PLANNING SUPERVISOR FOR THE PROJECT.
 - WHERE NOTES AND INFORMATION ON THIS DRG DIFFER FROM THE SPECIFICATION, CLARIFICATION SHOULD BE SOUGHT FROM THE ENGINEER.

- LEGEND**
- PLOT BOUNDARY
 - PROPOSED MAJOR CONTOUR - 0.5m INTERVAL
 - PROPOSED MINOR CONTOUR - 0.1m INTERVAL
 - RETAINING WALL
 - GRADINGS - CUT
 - GRADINGS - FILL
 - GRADIENT
 - SPOT LEVEL

P4	SITE BOUNDARY ADDED	ET	07/01/2026	GS
P3	UPDATED TO NEW ARCHITECT LAYOUT	ET	22/12/2025	RGM
P2	SITE LAYOUT UPDATED, PLOT LABELED AND TITLE CHANGED	AS	18/11/2025	GS
P1	ISSUED FOR INFORMATION	ACN	20/10/2025	GS
Rev	Description	By	Date	Chkd

PEREGA
Quarry Court, Lime Quarry Mews, Guildford, GU1 2RD 01483 565 886
Client

PORTSMOUTH CITY COUNCIL

Project
**DUNSBUY PARK
HAVANT, PORTSMOUTH**

Title
**PLOT 600 & 601
PROPOSED LEVELS**

Peregra Project No.			Checked	Passed	Size	Scale
W24084			GS	-	A1	1:500
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
W24084	PER	60	XX	DR	C	02401
Suitability Code			Status			Revision
S2			INFORMATION			P4

Appendix D

Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
00	0.874	5.00	37.300	1500	470193.280	109386.899	1.750
4 Pond		5.00	33.500		470287.760	109347.650	2.000
5 FCC			33.600	2100	470292.220	109345.830	2.150
6 Brake			31.900	1200	470295.970	109335.880	0.650
20	0.874	5.00	37.100	1500	470205.870	109392.420	1.875
10	0.874	5.00	37.650	1350	470213.980	109416.420	1.750
21			35.750		470247.480	109365.999	4.217

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)
2.000	00	20	13.747	0.600	35.550	35.375	0.175	78.6	450	5.10	50.0
3.000	4 Pond	5 FCC	5.000	0.600	31.500	31.450	0.050	100.0	300	5.05	50.0
3.001	5 FCC	6 Brake	10.000	0.600	31.450	31.250	0.200	50.0	300	5.13	50.0
1.001	20	21	49.290	0.600	35.225	33.100	2.125	23.2	600	5.31	50.0
1.000	10	20	25.333	0.600	35.900	35.375	0.525	48.3	450	5.14	50.0

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)
2.000	2.295	365.0	157.9	1.300	1.275	0.874	0.0	207	2.217
3.000	1.572	111.1	0.0	1.700	1.850	0.000	0.0	0	0.000
3.001	2.228	157.5	0.0	1.850	0.350	0.000	0.0	0	0.000
1.001	5.070	1433.4	473.8	1.275	2.050	2.622	0.0	236	4.572
1.000	2.932	466.3	157.9	1.300	1.275	0.874	0.0	180	2.658

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	13.747	78.6	450	Circular	37.300	35.550	1.300	37.100	35.375	1.275
3.000	5.000	100.0	300	Circular	33.500	31.500	1.700	33.600	31.450	1.850
3.001	10.000	50.0	300	Circular	33.600	31.450	1.850	31.900	31.250	0.350

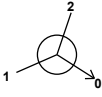
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	00	1500	Manhole	Adoptable	20	1500	Manhole	Adoptable
3.000	4 Pond		Junction		5 FCC	2100	Manhole	Adoptable
3.001	5 FCC	2100	Manhole	Adoptable	6 Brake	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	49.290	23.2	600	Circular	37.100	35.225	1.275	35.750	33.100	2.050
1.000	25.333	48.3	450	Circular	37.650	35.900	1.300	37.100	35.375	1.275

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	20	1500	Manhole	Adoptable	21		Junction	
1.000	10	1350	Manhole	Adoptable	20	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
00	470193.280	109386.899	37.300	1.750	1500				
						0	2.000	35.550	450
4 Pond	470287.760	109347.650	33.500	2.000					
						0	3.000	31.500	300
5 FCC	470292.220	109345.830	33.600	2.150	2100		1	3.000	31.450
						0	3.001	31.450	300
6 Brake	470295.970	109335.880	31.900	0.650	1200		1	3.001	31.250
20	470205.870	109392.420	37.100	1.875	1500		1	2.000	35.375
							2	1.000	35.375
							0	1.001	35.225
									600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
10	470213.980	109416.420	37.650	1.750	1350				
							0	1.000	35.900
21	470247.480	109365.999	35.750	4.217					
							1	1.001	33.100

Simulation Settings

Rainfall Methodology	FSR	Summer CV	1.000	Starting Level (m)	
Rainfall Events	Singular	Analysis Speed	Detailed	Check Discharge Rate(s)	x
FSR Region	England and Wales	Skip Steady State	✓	Check Discharge Volume	x
M5-60 (mm)	17.000	Drain Down Time (mins)	2880		
Ratio-R	0.300	Additional Storage (m ³ /ha)	0.0		

Storm Durations

60 | 120 | 240 | 360 | 480 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node 5 FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	31.450	Product Number	CTL-SHE-0174-1750-1885-1750
Design Depth (m)	1.885	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	17.5	Min Node Diameter (mm)	1800



Node 4 Pond Pond Storage Structure

Invert Level (m)	31.500	Analyse flow through structure	✓	Main Channel Slope (1:X)	150.0
Time to half empty (mins)	1140	Main Channel Length (m)	5.000	Main Channel n	0.025

Inlets
21

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	750.0	0.250	850.2	0.500	956.7	0.750	1069.5	1.000	1188.6	1.250	1313.9	1.500	1445.6	1.750	1583.5	2.000	1727.7

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	00	32	36.194	0.644	408.4	1.1385	0.0000	SURCHARGED
960 minute summer	4 Pond	915	33.337	1.837	107.0	2111.6160	0.0000	FLOOD RISK
960 minute summer	5 FCC	915	33.335	1.885	37.8	6.5284	0.0000	FLOOD RISK
60 minute summer	6 Brake	1	31.250	0.000	17.5	0.0000	0.0000	OK
60 minute summer	20	33	35.675	0.450	1225.2	0.7954	0.0000	OK
60 minute summer	10	33	36.291	0.391	408.4	0.5594	0.0000	OK
960 minute summer	21	915	33.337	1.804	198.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	00	2.000	20	408.4	2.578	1.119	2.1478	
960 minute summer	4 Pond	3.000	5 FCC	37.8	0.699	0.341	0.3521	
960 minute summer	5 FCC	Hydro-Brake®	6 Brake	17.5				3006.0
60 minute summer	20	1.001	21	1225.1	5.646	0.855	10.6886	
60 minute summer	10	1.000	20	408.4	3.050	0.876	3.3703	
960 minute summer	21	Pond	4 Pond	107.0	0.006	0.000		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
00	0.619	5.00	37.400	1500	470193.280	109386.899	2.200	35.200
10	1.834	5.00	38.800	1500	470213.980	109416.420	2.200	36.600
4 Pond		5.00	33.500		470287.760	109347.650	2.000	31.500
5 FCC			33.600	2100	470292.220	109345.830	2.150	31.450
6 Brake			31.900	1200	470295.970	109335.880	0.650	31.250
20	0.258	5.00	37.000	1500	470205.870	109392.420	2.275	34.725
21			35.750		470247.480	109365.999	4.217	31.533

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.000	13.747	78.6	450	Circular	37.400	35.200	1.750	37.000	35.025	1.525
3.000	5.000	100.0	300	Circular	33.500	31.500	1.700	33.600	31.450	1.850
3.001	10.000	50.0	300	Circular	33.600	31.450	1.850	31.900	31.250	0.350
1.001	49.290	30.3	600	Circular	37.000	34.725	1.675	35.750	33.100	2.050
1.000	25.333	14.7	450	Circular	38.800	36.600	1.750	37.000	34.875	1.675

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	00	1500	Manhole	Adoptable	20	1500	Manhole	Adoptable
3.000	4 Pond		Junction		5 FCC	2100	Manhole	Adoptable
3.001	5 FCC	2100	Manhole	Adoptable	6 Brake	1200	Manhole	Adoptable
1.001	20	1500	Manhole	Adoptable	21		Junction	
1.000	10	1500	Manhole	Adoptable	20	1500	Manhole	Adoptable

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Rainfall Events	Singular	Skip Steady State	✓	Starting Level (m)			
Summer CV	1.000	Drain Down Time (mins)	2880	Check Discharge Rate(s)	x		

Storm Durations

60 | 120 | 240 | 360 | 480 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node 5 FCC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	31.450	Product Number	CTL-SHE-0174-1750-1885-1750
Design Depth (m)	1.885	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	17.5	Min Node Diameter (mm)	1800

Node 00 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	35.200	Product Number	CTL-SHE-0092-4000-1200-4000
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	4.0	Min Node Diameter (mm)	1200

Node 10 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	36.600	Product Number	CTL-SHE-0154-1180-1200-1180
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	11.8	Min Node Diameter (mm)	1500

Node 4 Pond Storage Structure

Invert Level (m)	31.500	Analyse flow through structure	✓	Main Channel Slope (1:X)	150.0
Time to half empty (mins)	0	Main Channel Length (m)	5.000	Main Channel n	0.025

Inlets

21

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	750.0	0.250	850.2	0.500	956.7	0.750	1069.5	1.000	1188.6	1.250	1313.9	1.500	1445.6	1.750	1583.5	2.000	1727.7

Node 00 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	35.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1170

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	480.0	480.0	1.200	480.0	573.2	1.201	0.0	573.2

Node 10 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	36.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	1215

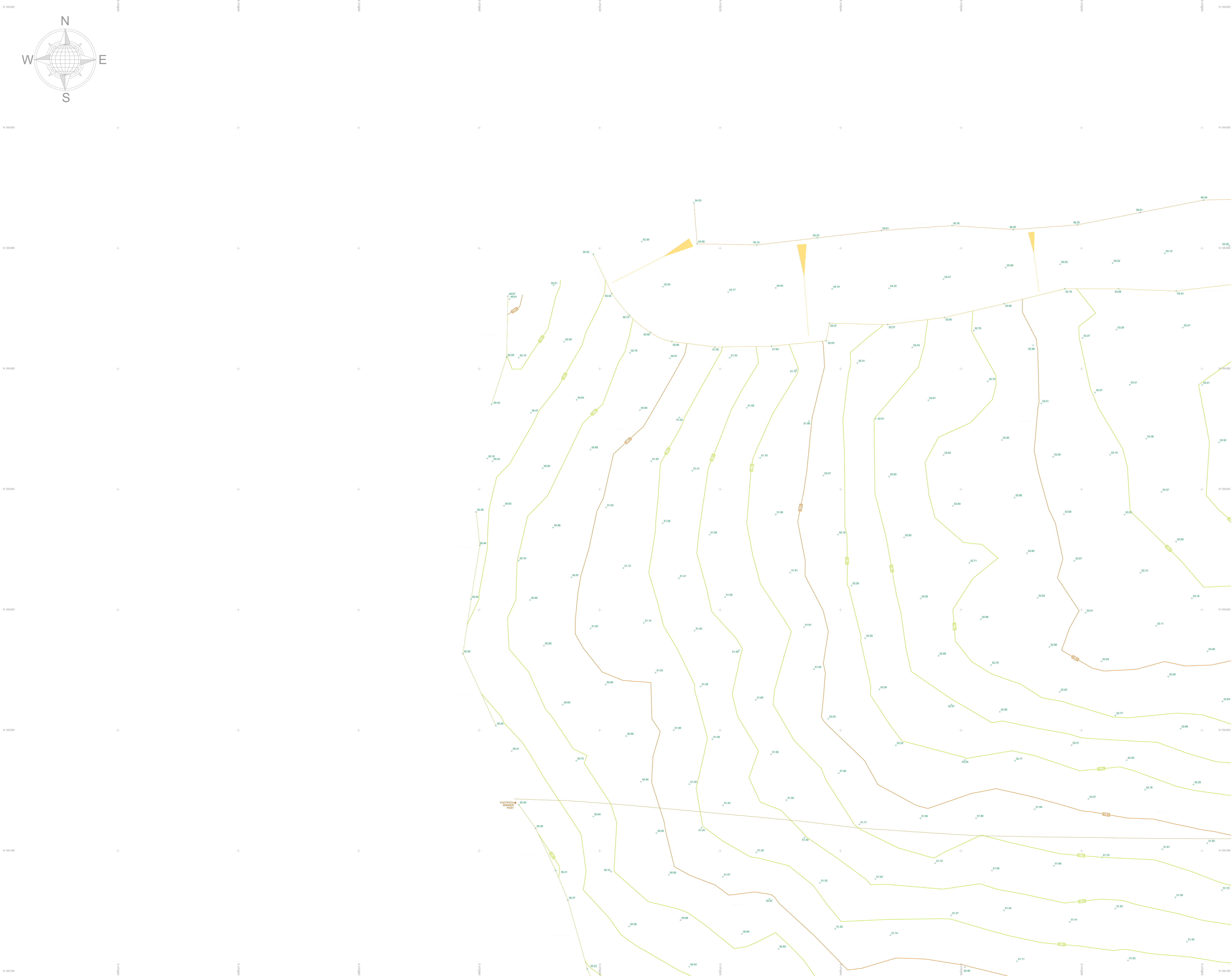
Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1400.0	1400.0	1.200	1400.0	1559.2	1.201	0.0	1559.2

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	00	945	36.339	1.139	45.9	521.3557	0.0000	SURCHARGED
960 minute summer	10	945	37.774	1.174	136.1	1564.0880	0.0000	SURCHARGED
1440 minute summer	4 Pond	1110	31.831	0.331	27.0	256.0006	0.0000	SURCHARGED
1440 minute summer	5 FCC	1110	31.829	0.379	38.0	1.3128	0.0000	SURCHARGED
60 minute summer	6 Brake	1	31.250	0.000	16.3	0.0000	0.0000	OK
60 minute summer	20	33	34.873	0.148	165.4	0.2610	0.0000	OK
1440 minute summer	21	1110	31.831	0.298	29.1	0.0000	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	00	2.000	20	4.0	0.760	0.011	0.0724	
960 minute summer	10	1.000	20	11.8	1.909	0.014	0.1564	
1440 minute summer	4 Pond	3.000	5 FCC	38.0	0.745	0.342	0.3521	
1440 minute summer	5 FCC	Hydro-Brake®	6 Brake	17.1				3243.4
60 minute summer	20	1.001	21	165.4	3.126	0.132	2.6082	
1440 minute summer	21	Pond	4 Pond	27.0	0.002	0.000		

Appendix E

Topographical Survey



LEGEND		
Topographic Linework Features		
Air-Con Unit (ACU)	Hand Rail	Sky Light
Barrier	Hedge	Slope Bottom
Beam Line	Hoarding	Slope Top
Bench	Kerb Bottom	Slat 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	Parking Meter (PM)	Top of Fence Line
Centre Line	Pipe Line	Top of Wall Line
Column	Platform Train/Tram	Track
Column Bottom Line	Plinth	Traffic Ctrl Box(TCB)
Column Top Line	Pond	Tree Drip Line
Concrete Base/Slab	Post-box	Tree Line
Contour Major	Rail	Trial 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	Sanitary	Yellow Line Dashed
Footpath	Service	Yellow Line Double
Grating		Yellow Line Solid
Grid Line		

Topographic Point Features		
APV Air Valve	IC Inspection Cover	RS Road Sign
APVX Apex Building	IC - CATV	RE Rodding Eye
BL Bed Level	IC - Comms	SA Sector Antenna
BS Belisha Beacon	IC - Electric	SIGN Sign (General)
Bolt	IC - Round	SOF Soffit Level
Bolt	IC - Telecom	SP Spot Height
Borehole	IC - Traffic	SC Stop Cock
Bush	Invert Level	ST Telegraph Pole
CCTV Camera Pole	Lamp Post	T12.24 Top of Fence Level
Ceiling Elevation	Manhole	T12.24 Top of Tree Level
CF	MH - Foul	T12.24 Top of Wall Level
CF	MH - Round	TL Traffic Light
CF	MH - Surface Water	Tree (TX,XX SX,XX)
CF	Marker Post	Tree (Trunk Radius(m))
CF	Microwave Dish	S=Spread Radius(m)
CF	Pipe - Down	Tree Coniferous
CF	Pole	Tree Deciduous
CF	Post	Tree Trunk
CF		Valve General
CF		Valve Water Level
CF		Water Meter
CF		Water Valve

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

Murphy Geospatial Disclaimer

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Location Plan		

Revisions				
Rev	Description	Surveyed by	Drawn by	Checked by
A	First issue	CC - 28/06/21	CS - 06/12/21	AO - 06/12/21

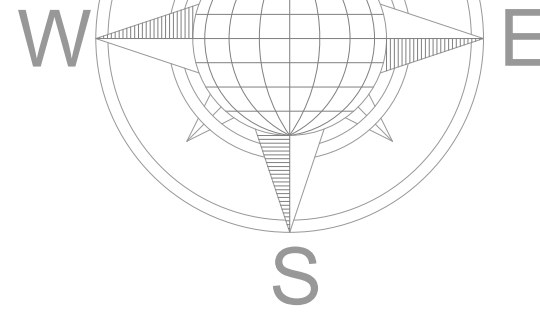


Geospatial certainty you can trust [murphygcs.com](https://www.murphygcs.com)

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London Manchester Glasgow Belfast Cork Kildare

Client	Portsmouth City Council
Project	Dunsbury Park
Site Address	Fitzwygram Way Havant PO9 4EE
Description	Topographical Survey
Survey Grid	Localised OSGB36(15) - Scale Factor 1.0
Survey Datum	GNSS - Ordnance Datum Newlyn (ODN)
RICS Band	Band F
Drawing Scale	1:200 @ A0
Drawing Number	MGS44680-T-01

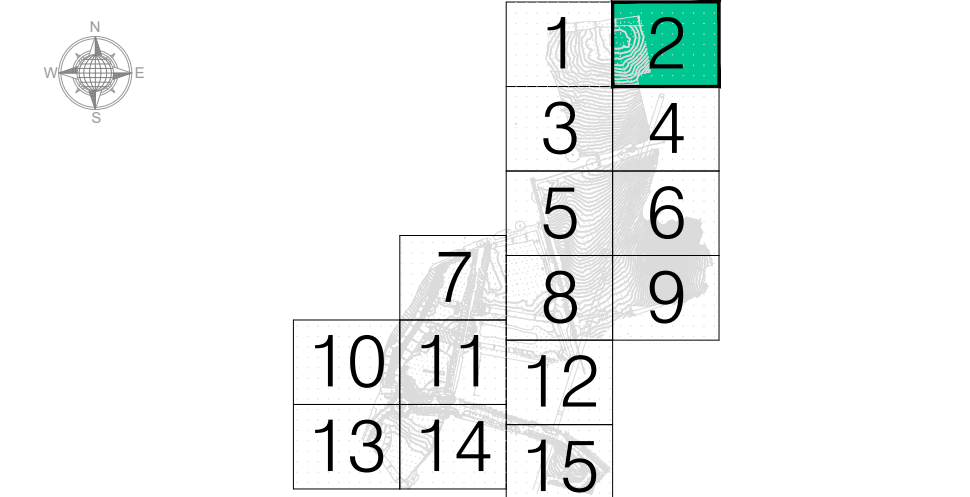


LEGEND					
Topographic Linework Features					
Air-Con Unit (ACU)	Hand Rail	Sky Light			
Barrier	Hedge	Slope Bottom			
Beam Line	Hoarding	Slope Top			
Bench	Kerb Bottom	SloT Drain			
Bin	Kerb Ditch	Speed Bump			
Bollard Illuminated	Kerf Top	Steel Cladding			
Bollard	Lake	Steel Structure			
Bridge	Land Drain	Surface			
Building Facade	Level	Surface Change			
Building	Opening - Slab	Tank			
Bus Stop Shelter	Overhead	Telephone Box (TB)			
Cable Trough	Overhead Cables	Track Machine(TVM)			
Canopy	Parking	Traffic Cone			
Ceiling Line	Partition	Top of Fence Line			
Centre Line	Parking Meter (PM)	Top of Wall Line			
Circle	Platform	Trail			
Common Bottom Line	Platform Train/Tram	Traffic Chit Circle(TCB)			
Cookout Top Line	Plinth	Tree Lign Tree			
Concrete Base/Slab	Rail	Vent			
Contour Major	Post-box	Trial Pit			
Contour Minor	Post	Vegetation Line			
Cycle Lane	Ramp	Wall			
Ditch	Red Line Dashed	Warp Line			
Drain	Red Line Solid	Window			
Dredge	Red Line Double	Window Glazing			
Electric Box (EBOX)	Road Test	White Line Dashed			
Fence	Road Edge	White Line Double			
Fixture	Road Scar Line	White Line Solid			
Flowerbed	Roof	Yellow Line Dashed			
Footpath	Road Side	Yellow Line Double			
Gating	Sanitary	Yellow Line Solid			
Grid Line	Service	Yellow Line Solid			
Topographic Point Features					
AV	IC	RS	RD	RD	RD
APX	IC	IS	RD	RD	RD
APX Building	ICTV	IC	RD	RD	RD
BL	IC	IC	RD	RD	RD
Bed Level	IC	IC	RD	RD	RD
Bellisha Beacon	IC	IC	RD	RD	RD
Belt	IC	IC	RD	RD	RD
Bolt	IC	IC	RD	RD	RD
Bottle	IC	IC	RD	RD	RD
Booth	IC	IC	RD	RD	RD
Borehole	IC	IC	RD	RD	RD
Bush	IC	IC	RD	RD	RD
CCTV Camera Pole	IC	IC	RD	RD	RD
Celestial Elevation	IC	IC	RD	RD	RD
DP	IC	IC	RD	RD	RD
Dipole	IC	IC	RD	RD	RD
Earth	IC	IC	RD	RD	RD
EAVE	IC	IC	RD	RD	RD
EP	IC	IC	RD	RD	RD
Fire Hydrant	IC	IC	RD	RD	RD
Floor Level	IC	IC	RD	RD	RD
Gas Meter	IC	IC	RD	RD	RD
Gully	IC	IC	RD	RD	RD
Gully	IC	IC	RD	RD	RD
Gully	IC	IC	RD	RD	RD
Special Features					
DATUM	Date Point	ID	XXXXXXXXXX	Survey Station	
PHOTO	Photo Point	ID	XXXXXXXXXX	Scan Target	
PANORAMIC PHOTO	Panoramic Photo Point	ID	XXXXXXXXXX	Scan Target	
Feature Types					
BWW	Barbed Wire	CL	Chain Link	OBS	Open Boarded
CIB	Cable Boarded	H	Heras	PW	Post and Wire
CI	Corrugated Iron	I/R	Iron Railings	PIR	Post and Rail

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Revisions				
Rev	Description	Surveyed by	Drawn by	Checked by
A	First Issue	CC - 29/05/21	CS - 06/12/21	AO - 06/12/21



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London	Manchester	Glasgow	Belfast	Cork	Kildare

Client	Portsmouth City Council
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Drawing Number	MG544680-T-02

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