

Downley Road, Havant

Flood Risk Assessment + Drainage Strategy



24-011-CAN Downley Road, Havant



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1. Introduction

I&L Consulting Limited (I&L) was commissioned by the Applicant, Canmoor Developments Limited, to undertake a Flood Risk Assessment (FRA) and drainage strategy for a proposed industrial development located off Downley Road in Havant. The site lies within the authority of Havant Borough Council (HBC).

The relevant national planning guidance is set out by the National Planning Policy Framework (NPPF, updated in 2023). A FRA is required because the proposed development is greater than 1 hectare and located in Flood Zone 1 (low risk). The FRA therefore must assess aspects of flood risk specifically with regards to surface water flooding at the site and ensure that any proposed development allows for this existing flood envelope on site.

1.1 Study Aims and Objectives

The overall objective of this study was to carry out a FRA that meets the requirements of the NPPF and HBC flood risk policies. These consider surface water runoff management and the specific needs of the Environment Agency (EA), HBC and Local Water Authority. The study is required to assess all aspects of flood risk to the proposed development, the potential impacts of the development on people and property elsewhere within the catchment and identify possible mitigation measures to ensure that the development is safe in the event of a flood. To achieve this aim, the following key actions were undertaken:

- Obtain flood data from the EA and HBC;
- Review topographical and flood risk data to identify the existing flood risk posed to the site from all sources;
- Assess the residual flood risk post-development;
- Consider the vulnerability of the users and the development, taking account of the vulnerability classification;
- Assess the safety of the route of access/egress from the site in a flood event;
- Identify suitable mitigation measures to protect the development site against flooding; and
- The production of a conceptual surface water drainage strategy for the proposed development.

1.2 Scope of Works

In order to meet the above objectives, the following scope of work and tasks were undertaken:

- **Task 1: Data Collection.** I&L Consulting collected relevant available information on the nature of the flooding at the site. The Applicant and their consultant team have provided information about the site and proposed development layout and design.
- **Task 2: Identification of Current and Post-Development Flood Risk.** The existing and post-development flood risk posed to the site was assessed from the data that was collected in Task 1. The assessment identifies the flood risk from all potential sources of flooding and includes consideration of the impact of climate change on flood risk.
- **Task 3: Assessment of Site Safety.** I&L Consulting considered whether flood resilience measures needed to be undertaken and the safety of the route of access/egress from the site.

1.3 Data Collected

Table 1 lists the data that has been collected as part of this assessment. Comments on the source and the nature of the data are also provided.

Table 1: Collected Data

Purpose	Data and Source	Comments
Identification of site location	Ordnance Survey Map	Identifies the position of the site and local hydrological features
Identification of flood risk	Environment Agency Flood Map	Risk of flood from tidal and fluvial sources
	Topographical Survey	Existing site levels and topography
	Development details (drawings for existing site and proposed development)	Information on the layout of the proposed development
	Strategic Flood Risk Assessment (SFRA)	Reports that identify existing flood risk information within the area and considerations for development.
	Havant Borough Council Local Development Framework	Relevant Planning Policies
Identification of the existing drainage network	Sitewide Drainage Plan	Asset plans and drainage drawings identify public and private sewers nearest to the site.
Identification of ground conditions	British Geological Society (BGS) borehole logs.	Identifies the type of aquifer, groundwater level, permeability and geotechnical information
	Site specific intrusive testing.	

2. Planning Policy and Evidence

2.1 National Planning Policy Framework

The NPPF sets out what needs to be taken into account by developers to assess whether a proposed development is likely to be at risk of flooding or has the potential to increase flood risk elsewhere. Within the recently published updated NPPF (2023), the principles relating to flood risk management remain mostly unchanged from the 2021 version.

The overall objective of the NPPF is to steer development towards areas of lowest flood risk. NPPF policy aims to ensure flood risks have been taken into account and appropriate measures put in place to ensure that:

- The development is safe;
- Where possible, the flood risk overall is reduced;
- Increased flood risk does not occur elsewhere; and
- Appropriate mitigation measures are employed to deal with these effects and risks.

Paragraph 173 and footnote 59 of the NPPF outlines that a site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding.

The EA Flood Map shows the site to be located within Flood Zone 1, **low risk from fluvial flooding and surface water flooding**.

The NPPF considers the vulnerability of different forms of development to flooding; and classifies the proposed development as 'Less Vulnerable'.

2.2 Local Policy

The Havant Borough Local Plan 2036 was subsequently withdrawn in 2021 due to concerns being raised by the Inspector. Given the age of the current Local Plan, extracts of all relevant drainage and flood risk management policies are included below given it shows the direction of travel for the new emerging Local Plan.

Policy CS15 Flood and Coastal Erosion Risk

Development in areas at risk of flooding now and in the future as identified on the latest Environment Agency flood risk maps and Strategic Flood Risk Assessment climate change maps will only be permitted where:

1. *It meets the sequential and exception test (where required) in relation to PPS25.*
2. *The site is located in a low hazard area as defined in the Strategic Flood Risk Assessment.*
3. *A site-specific flood risk assessment demonstrates that the development will be safe, including the access, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.*
4. *The scheme incorporates flood protection, flood resilience and resistance measures appropriate to the character and biodiversity of the area and the specific requirements of the site.*
5. *Appropriate flood warning and evacuation plans are in place.*
6. *New site drainage systems are designed taking account of events which exceed the normal design standard.*

All development will be required to ensure that there is no net increase in surface water run off. Priority should be given to incorporating Sustainable Drainage Systems (SuDS) to manage surface water drainage, unless it is proven that SuDS are not appropriate. Where SuDS are provided arrangements must be put in place for their whole life management and maintenance.

The council will work with partners to implement the Coastal Policy Zones in the North Solent Shoreline Management Plan to ensure that development avoids areas at risk from coastal erosion and coastal flooding and that areas required to offset coastal squeeze and prevent habitat fragmentation, to allow species to adapt to climate change, are identified and protected from development.

A pre- submission version of the Havant Borough Local Plan with changes was published in September

2020 and is expected to be submitted to the Secretary of State after consultation. Extracts of all relevant drainage and flood risk management policies are included below.

Policy E19 Managing flood risk in new development

Planning permission will only be granted where:

- a. The proposal meets the sequential and exception tests as set out in the NPPF and relevant local guidance;*
- b. The development will be safe over its lifetime without increasing flood risk elsewhere;*
- c. Any proposed flood protection, resilience and resistance measures address the specific requirements of the site, and are appropriate to the character and biodiversity of the area;*
- d. Opportunities have been explored to reduce flood risk;*
- e. Where necessary, appropriate flood warning and evacuation plans are in place; and*
- f. Where necessary, a contribution has been made towards any identified flood alleviation scheme(s).*

Policy E20 Drainage infrastructure in new development

Planning permission will only be granted where:

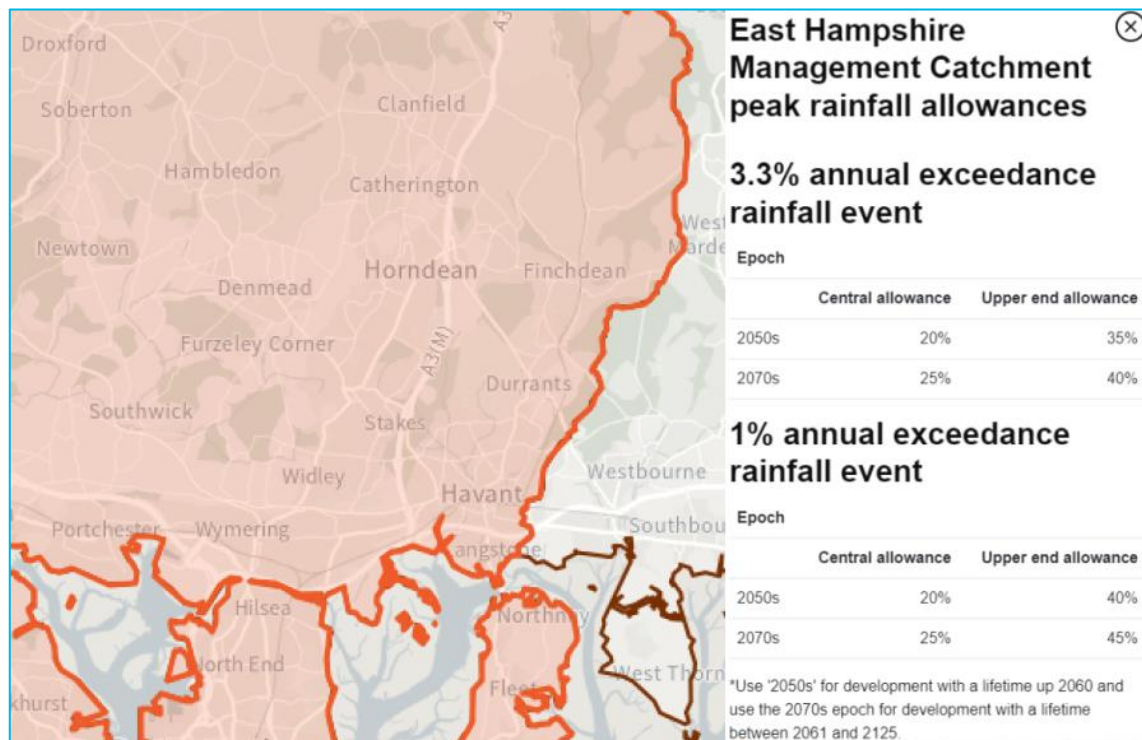
- a. Run-off rates have been reduced to below the pre-development rate, or, if this is not possible, there is no net increase in surface water run-off compared with the pre-development rate;*
- b. Drainage systems meet the drainage needs of the development in full over the lifetime of the*
- c. development and do not increase flood risk elsewhere;*
- d. The drainage strategy incorporates SuDS, unless there is clear evidence that this would be inappropriate;*
- e. Arrangements have been made between the applicant and the service provider for the timely delivery of sewerage network reinforcement; and*
- f. Any existing sewerage infrastructure is taken into account in site layout, to safeguard future access for maintenance and upsizing purposes.*

2.3 Climate Change

Predicted future change in peak river flows caused by climate change are provided by the EA within their online guidance¹. The UK has been split into a series of regionalised 'River Basin Districts'. These River Basin Districts are further split into Management Catchments, for which a range of climate change projections have been applied.

¹ Environment Agency, Flood risk assessments: climate change allowances: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-1>

The development falls within the East Hampshire Management Catchment. The extract below identifies the relevant peak rainfall allowances from this Management Catchment.



When determining the appropriate allowance for use in an FRA the anticipated lifespan of the development should be considered. This development is expected to have a design greater than 2060.

The EA guidance is to use the Upper End allowance for the 2070s epoch (2061 to 2125), which gives values of 40% for the 3.3% (30yr) and 45% for the 1% (100yr) rainfall events. The value of **45%** has been used in the surface water calculations appended to this report.

3. Site Description

The proposed development site which is the subject of this Flood Risk Assessment (FRA) is located off Downley Road, Havant. The site is located within a well-established industrial park. The existing site is currently extensively developed brownfield land with existing Industrial usage.

The proposal is to demolish the existing warehouse buildings and redevelopment to provide employment units for a flexible range of employment uses (Use Classes E(g)(iii), B2 and/or B8) erection of ancillary offices, together with the provision of yard areas, parking, landscaping and associated works. The total development has a slight fall from the northeast to the southwest.

The existing site is a Brownfield site with existing drainage serving the site. Southern Water utility map have been provided which shows both surface (375dia.) and foul (225dia.) water public sewers are located in Downley Road. The proposal would be to drain the redeveloped site at a restricted rate using a hydro brake flow control via the existing outfall pipes to the public sewers in Downley Road.

The site location plan is shown in Figure 1 below.



Figure 1: Site Location Plan

3.1 Topography and Hydrological Setting

There are no ordinary watercourses on or near the site. Therefore, ordinary watercourses are assessed to pose a low flood risk to the site.

The topographic survey (**Appendix B**) indicates that site levels across the site have fall from the northeast 19.25m AOD to southwest 18.05m AOD.

3.2 Geology and Hydrogeology

A phase 2 intrusive investigation has been completed by TRC at the site. Applicable sections from this report have been included below. This intrusive testing indicates ground conditions on site to comprise of Made Ground overlying the superficial geology, comprising River Terrace Deposits to at least 10m bgl. Bedrock geology was not encountered during the investigation.

Investigation Findings	
Ground Conditions	Made Ground was encountered between ground level and a maximum of 1.20m bgl.
	Superficial geology, comprising River Terrace Deposits, were encountered underlying Made Ground to at least 10m bgl, where the deepest borehole terminated. Bedrock geology was not encountered during the investigation.
Groundwater Conditions	During the ground investigation, groundwater was encountered within the deep borehole CP102 at 5.00m bgl and at 9.00m bgl rising to 7.50m bgl within the River Terrace Deposits. During subsequent monitoring, groundwater was encountered within CP102 at between 5.34m and 5.88m bgl within River Terrace Deposits. Dry conditions were encountered within the remaining shallower boreholes.
Soakaways	Soakaway testing did not form part of the scope of works, however given the predominantly granular nature of the superficial deposits, shallow soakaways may be viable for future developments. Suitability of ground conditions for shallow soakaways would be subject to confirmation of infiltration rates via in-situ testing in accordance with BRE 365.

Geology	Geological Description	Aquifer Status	Aquifer Description
Superficial Deposits: Head Deposits	Clay and Gravel	Secondary (Undifferentiated) Aquifer / Secondary (A) Aquifer	It is not possible to apply either an A or B definition because of the variable characteristics of the ground type.
Superficial Deposits: River Terrace Deposits	Sand and Gravel	Secondary (A) Aquifer	Permeable strata capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers, lakes or wetlands.
Bedrock: London Clay Formation	Clay and Silt	Unproductive Strata	Geological strata with low permeability that have negligible significance for water supply or river base flow. They consist of deposits that naturally offer protection to any aquifers that may be present beneath.

The Site lies within a groundwater Source Protection Zone (SPZ) 1c (Inner Protection Zone), which relates to the superficial deposits.

There are no active groundwater abstractions within 1km of the Site boundary.

The Landmark Envirocheck report indicates the potential for groundwater flooding of property situated below ground level and potential for groundwater flooding to occur at ground surface.

Historical BGS boreholes in the surrounding area indicate the presence of groundwater within the River Terrace Deposits between 1.40m and 6.00m bgl.

4. Existing Flood Risk

This section of the report identifies the existing risks from the different forms of flooding identified in NPPF.

4.1 Fluvial & Tidal Flooding

The EA has produced Flood Zone maps for much of England and Wales. The current displayed map is reproduced as Figure 2 below and shows the site to lie within Flood Zone 1 (low risk).

Figure 2 below has been extracted from the GOV.UK online map which shows the flood risk profile for the development site.

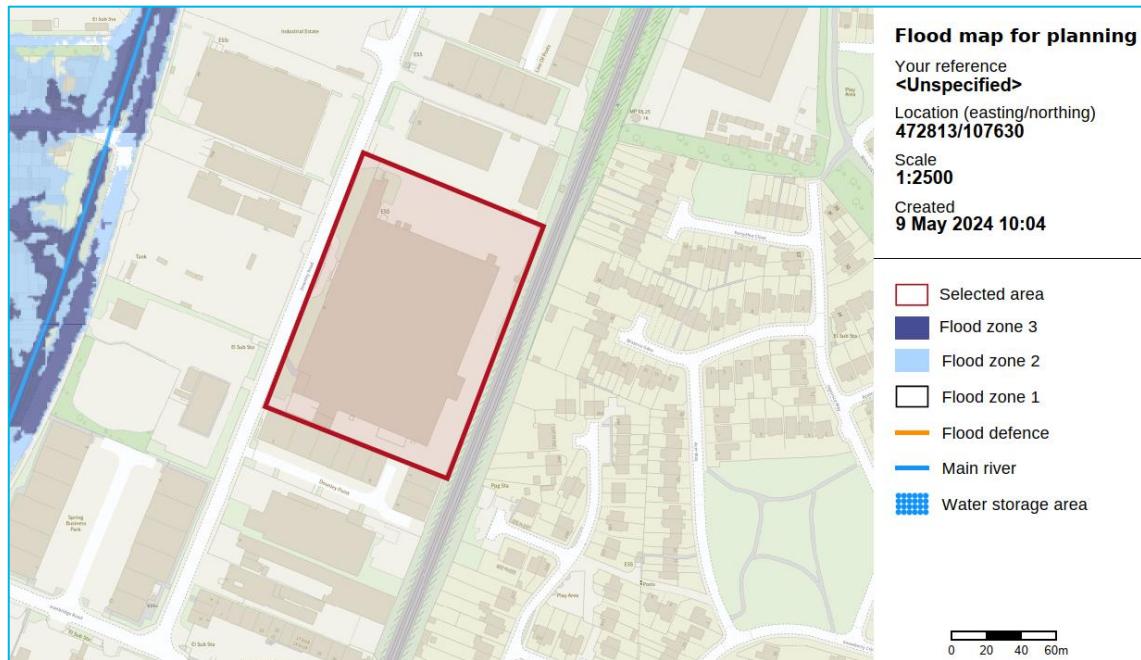


Figure 2: Fluvial Flood Risk Map (Source: <https://flood-warning-information.service.gov.uk>)

On the coast storm surges and high tides can threaten low lying coastal areas and can be sometimes large and rapid enough to overtop defence works, causing significantly more damage than river flooding. Tidal flooding is not considered a risk to the site due to the inland location of the development.

Therefore, flood risk from fluvial and tidal sources to the site is considered to be low.

4.2 Surface Water Flooding

Surface water flooding occurs when rainfall is unable to infiltrate into the ground and/or engineered drainage networks and accumulates on the surface.

The risk of flooding from surface water is presented in the GOV.UK online map at a strategic scale. It can be seen from the surface water flood map in Figure 3 that the site is at very low risk of surface water flooding. This represents a less than 0.1% annual probability of occurrence.

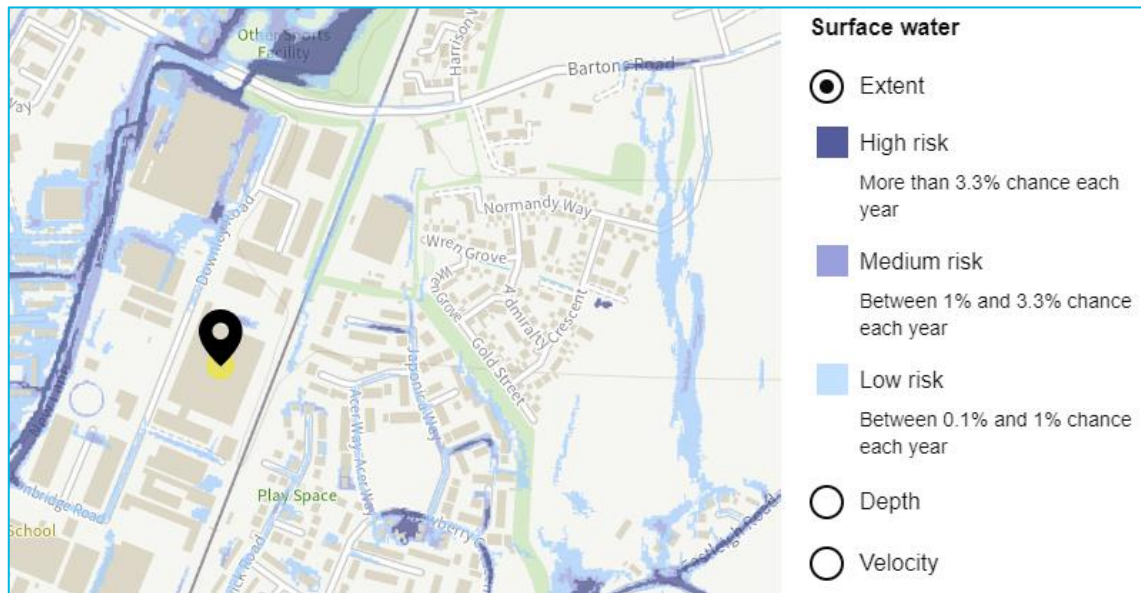


Figure 3: Surface Water Flood Risk Map (Source: <https://flood-warning-information.service.gov.uk>)

Given the topography, the proposed levels and the new drainage system with significant reduction to the runoff rate, the site will be at a low risk from surface water flooding.

4.3 Groundwater Flooding

Groundwater flooding typically occurs when water levels rise above surface elevations from underlying rocks or springs following prolonged rainfall. The two most common mechanisms of groundwater flooding are:

1. **Bedrock Flooding** – Occurs following extended periods of rainfall in areas underlain by a permeable bedrock outcrop. Typically, chalk aquifers pose the greater risk, where the large pore spaces in the rock allow the water table to rise rapidly. Settlements most at risk are those in low-lying areas and at the base of steep-sided valleys at the interface between permeable and impermeable strata (where the groundwater table is naturally closer to the ground surface).
2. **Superficial Deposit Flooding** – Occurs in permeable unconsolidated deposits (e.g., gravel) which lie on river floodplains following high in-bank river levels.

Due to a history of ground water flooding in Hampshire, Ground Water Management Plan (GWMP) was created in collaboration with other stakeholders in the county to identify areas at risk of ground water flooding and provide plans to mitigate the risks. The Areas Susceptible to Ground Water Flooding mapping provided in the Ground Water Management Plan GWMP (attached as Figure 4.4) indicates that there is a possibility of groundwater flooding within the vicinity of the proposed site.

A review of the results from intrusive testing on site by TRC, see point 3.2 above, have recorded groundwater within a range of 5.34m to 5.88m below the ground level at around 18.05 AOD; which is significantly lower than the proposed site's surface levels and therefore the risk of flooding on site due to ground water is considered low.

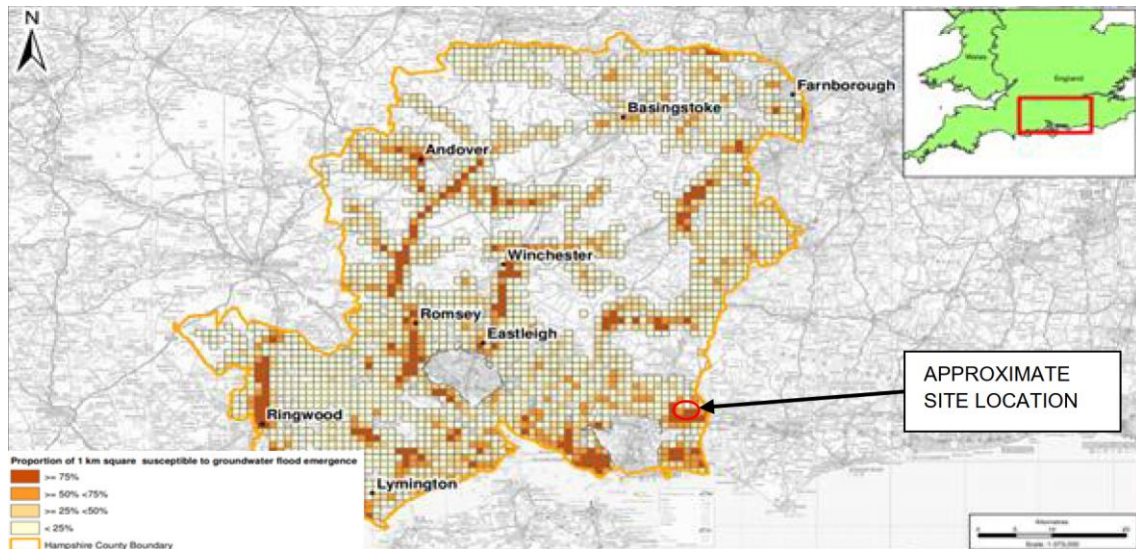


Figure 4: Areas Susceptible to Ground Water Flooding Mapping adapted from Hampshire Ground Water Management Plan. (Approximate Site shown in Red)

FFLs will be set 150mm above existing ground levels, we would expect the risk from groundwater flooding at this site to be low.

4.4 Sewer Flooding

A sewer flood is often caused by surface water drains discharging into the combined sewer systems; sewer capacity is exceeded in large rainfall events causing the backing up of floodwaters within properties or discharging through manholes. Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption. One of the design parameters is that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30-year rainfall event. By definition a 1 in 100-year event would exceed the capacity of the surrounding sewer network as well as any proposed drainage.

To ensure that sewer and surface water flooding is not exacerbated; surface water must be considered within the design of the site. This ensures that any additional surface water and overland flows are managed correctly, to minimise flood risk to the site and the surrounding area.

The discharge from the site will be restricted to Greenfield (urban) runoff rates therefore not increasing flows from the site.

Therefore, the risk of sewer flooding to the site is considered low.

4.5 Artificial Sources of Flooding

The EA Flood Risk from Reservoirs mapping indicates that the site is located outside of an area of potential risk from flooding. There has been no loss of life in the UK from reservoir flooding since 1925.

Therefore, the risk from this type of flooding can be considered low.

4.6 Summary of Existing Flood Risk

The flood risk from fluvial & tidal flooding, surface water flooding, sewer flooding and groundwater is assessed to be low.

The flood risk to the site is summarised in Table 3.

Table 3: Summary of flood risk to the Site

Type of Flooding	Source of Flooding	Existing Flood Risk
Fluvial and Tidal	No Watercourses in close proximity.	Low (Flood Zone 1)
Surface Water	Runoff from the site and surrounding land	Low
Sewers	Surrounding public foul drainage systems	Low
Ground Water	Underlying geology and groundwater levels	Medium
Artificial Sources	none	n/a

5. Flood Risk from the Proposed Development

A full planning application is being submitted for the redevelopment of the site to provide employment units for a flexible range of employment uses (Use Classes E(g)(iii), B2 and/or B8) erection of ancillary offices, together with the provision of yard areas, parking, landscaping and associated works. Total development area of 1.70 ha. The proposed Site plan drawing is included in **Appendix A**.

5.1 Design Philosophy

The site is located within the Source Protection Zone 1c (SPZ1c) for an essential Public Water Supply Source. The SPZ1c relates to subsurface activity only, where the Chalk aquifer is confined and may be impacted by deep drilling activities. Subterranean activities such as deep drainage solutions and/or piling may pose a risk to groundwater quality at the local public water supply source. The groundwater area is of high sensitivity and consequently all measures to prevent pollution during and post construction are required in order to safeguard the local public water supply.

In conjunction with Building Regulations H3, the primary approach to the drainage of surface water runoff must be subject to the results of an infiltration test (conducted in accordance with BRE365 guidance) commissioned on the development site, winter ground water level monitoring and the availability of good infiltration media at the proposed soakaway locations. A site-specific infiltration test (conducted in accordance with BRE365 guidance) will be commissioned on the development site to establish the suitability of the infiltration approach. However, the site is located within 'Zone 1- Subsurface Activity' Ground Water Source Protection Zone, which is designated as most at risk from contamination and development activities. Therefore, infiltration is not proposed as a suitable solution for this site.

The next method of discharge in conjunction to Building Regulation H3 would be to discharge into the nearest watercourse. No opportunity exists to discharge into watercourse as the nearest watercourse is located at approximately 60m away from the north west site boundary; beyond New Lane road and residential properties.

As noted under section 3 above, the existing site is connected directly to the public sewer network with no infiltration or formal surface water runoff reduction in place. The proposal therefore is to discharge the surface water runoff from the development into the existing public surface water network located under Downley Road at a reduced Greenfield (urban) rate.

The design approach ensures a sustainable, long-term solution for the Site, incorporating the following SuDS Mitigation measures:

- Permeable asphalt in carparks
- Underground restricted attenuation.

5.2 Fluvial and Tidal Flooding

The site is located within Flood Zone 1 (low risk) and therefore the proposed development would have no impact on the fluvial or tidal flooding. The risk from the proposed development would remain as low.

5.3 Surface Water Flooding and Proposed Drainage Strategy

Policy E20 notes that planning *Planning permission will only be granted where:*

- Run-off rates have been reduced to below the pre-development rate, or, if this is not possible, there is no net increase in surface water run-off compared with the pre-development rate;*
- Drainage systems meet the drainage needs of the development in full over the lifetime of the*
- development and do not increase flood risk elsewhere;*
- The drainage strategy incorporates SuDS, unless there is clear evidence that this would be inappropriate;*

Component Type	Description	Collection Mechanism	Design criteria					
			Water quantity			Water quality	Amenity	Biodiversity
			Peak runoff rate	Runoff volumes				
				Small events (interceptions)	Large events			
Rainwater harvesting	System that collects runoff from the roof of a building or other paved surface for use	P		•	•		•	
Green roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	◦	•		•	•	•
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	◦	•		•	•	•
Proprietary treatment systems	Subsurface structures designed to provide treatment of runoff	P				•		
Filter strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	L		•		•	◦	◦
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	•	◦		•	◦	◦
Swales	Vegetated channels (sometimes planted) used to convey and treat runoff	L	•	•	•	•	•	•
Bioretention systems	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	P	◦	•	◦	•	•	•
Trees	Trees within soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	•	•		•	•	•
Pervious pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	•	•	•	•	◦	◦
Attenuation storage tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration, controlled release or use	P	•					
Detention basins	Vegetated depressions that store and treat runoff	P	•	•	•	•	•	•
Ponds and wetlands	Permanent pools of water used to facilitate of runoff - runoff can also be stored in an attenuation zone above the pool	P	•			•	•	•
Key P-Point, L-Lateral, S-Surface, • Likely valuable contribution to delivery of design criterion, ◦ Some potential contribution to delivery of design criterion, if specifically included in the design								

Table 1: Table 7.1 SuDS component delivery of design criteria

5.3.1 Site Specific Strategy

The topographical survey and existing utility scan, see **Appendix B**, shows the site to be impermeable with existing drainage outfall points connecting to the public sewer. There is no record of there being any formal surface water restriction in place for the previous site.

As noted under point 5.1 above, the site is located within 'Zone 1- Subsurface Activity' Ground Water Source Protection Zone, which is designated as most at risk from contamination and development activities. Therefore, infiltration is not proposed as a suitable solution for this site.

The prevention of pollution during and post construction are required in order to safeguard the local public water supply given its location within the Source Protection Zone 1c (SPZ1c). Operation process will be required from the system: Sedimentation, Filtration, Chemical Separation and Oil Retention.

The surface water drainage network for the proposed development is in line with the principles of integrated Construction Industry Research and Information Association (CIRIA) Sustainable Drainage System SuDS and source control methods to convey surface water runoff flows from the site as well as national and local standard.

- The site is a Brownfield site with existing drainage in place and no formal restrictions on discharge rates. The in-situ ground has potential to be appropriate for infiltration drainage. The proposal is to restrict the discharge from the redeveloped site to **the Greenfield (urban) rate** from the development for all return periods, including climate change allowances;
- Appropriate attenuation to be provided onsite;
- The onsite surface water drainage design will follow the principles listed in the Approved Document Part H of the Building Regulations and Sewers for Adoption 7th Edition. The Building Regulations established a hierarchy for surface water disposal which encourages a SuDS approach;
- No surcharge for the 1:1year rainfall event except for the outfall pipe which may surcharge due to restriction.
- Onsite surface water sewers shall be designed to a 1 in 30 year no flooding standard in accordance with BS EN 752: 2017. There will be no flooding of buildings or off-site areas during a 1 in 100-year return period storm event including climate change allowance.
- Greenfield runoff rate (GRR) calculated using the ICP SUDS method confirms Qbar (urban) rate for the site of 16.5 litres/second.
- Any onsite flooding in the 1:100+45% event, will be directed into a safe place or mitigation measures to be provided on site for any flooding over 5m³.
- The drainage system to provided pollution prevention proprietary systems.

The proposed drainage network and attenuation requirements are modelled using industry standard hydraulic modelling software and included in **Appendix D**. The controlled discharge will be made via the existing outfall points for the site.

The proposed drainage layout is included in **Appendix C**.

Therefore, based on designing to best practise and a betterment to the existing situation the risk of surface water flooding from the proposed development will remain low.

5.4 Water Quality

Table 26.2 of the CIRIA C753 SuDS Manual identifies that the pollution hazard level associated with the land uses within the Proposed Development as being 'Medium'. On a scale from 0 – 1, 'Commercial Yard & delivery areas' are deemed to have the following pollution hazard indices:

- Total suspended solids = 0.7
- Metals = 0.6
- Hydrocarbons = 0.7

The SuDS Manual confirms that in England and Wales, where the destination of runoff is to a watercourse then surface water indices should be used for the surface water discharge (Table 26.3 of The SuDS Manual).

The proposed surface water drainage strategy discharges to an existing sewer out falling into a watercourse. Therefore, the use of the surface water indices approach is deemed to be appropriate.

In terms of pollution control the site it is proposed that the commercial yard and delivery areas are to be protected by Class 1 bypass petrol interceptor. The pollution mitigation assessment is summarised in Tables 4 below. The pollution removal characteristics of the pollution control features are based on data in CIRIA C753 and data provided by the product manufacturers.

Table 4: Pollution Mitigation Assessment for the site

Type of SuDS component	Total suspended solids (TSS)	Metals	Hydrocarbons
Class 1 Bypass Petrol Interceptor (Kingspan or similar)	0.4*	0.6*	0.8*
Total	0.4	0.6	0.8

*subject to manufactures details

The results in Table 4 show that there is a minor residual impact associated with the Total Suspended Solids. However, whilst Pollution Mitigation Index data is not provided in CIRIA C753 for gullies/catch pit manholes, it is anticipated that sumps at the base of the gullies and catch pits will provide a positive improvement that would mitigate the residual impact for the Total Suspended Solids.

Proprietary treatment systems are manufactured products that remove specified pollutants from surface water runoff. They can often be complementary to landscaped features, reducing pollutant levels in the runoff and protecting the amenity and/or biodiversity functionality of downstream SuDS components.

They can provide a valuable function in removing pollutants from runoff and may therefore be considered as an integral part of the Management Train in some situations.

5.4.1 Maintenance of Proprietary Systems

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables. A log should be kept detailing the depth of oil found, any oil volume and silt removed, or cleaning carried out. Alarm probes should be removed and cleaned at each inspection.	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Table 5: Assessment of Suitability of SuDS at the site as the drainage hierarchy

SUDS Group	Technique	Image	Description	Advantages	Disadvantages	Suitable for Use at Site
Retention	Balancing Pond		Provides both storm water attenuation and treatment. Run-off from each rain event is detained and treated in the pool. The retention time promotes pollutant removal through sedimentation.	Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.	No reduction in run-off volume, land take may limit use in high density sites.	✗ Not suitable for the type of development
	Sub-surface Storage		Oversized pipes, tank systems and modular geocellular systems that can be used to create a below ground storage structure.	Modular and flexible, dual usage (infiltration/storage, high void ratios), can be installed beneath trafficked and soft landscaped areas.	No water quality treatment.	✓ Sub-surface storage is recommended.
Wetland	Shallow wetland		Wetlands provide storm water attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation. Wetlands detain flows for an extended period to allow sediments to settle and to remove contaminants. They can provide significant ecological benefits.	Good pollutant removal and if lined can be used where groundwater is vulnerable. Good community acceptability, ecological and amenity benefits.	Land take is high, requires base flow, little reduction in run-off volume, not suitable for steep sites.	✗ Wetlands are not possible due to the high land take required
	Extended detention wetland					
	Pond wetland					
	Pocket wetland					
	Submerged gravel wetland					
	Wetland channel					
Infiltration	Infiltration trench		Surface water run-off can be discharged directly to ground for infiltration by soakaways, basins, or trenches. A prerequisite is that both groundwater and ground conditions are appropriate to receive the quality and quantity of water generated.	Reduces the volume of run-off, effective at pollutant removal, contributes to groundwater recharge, simple and cost-effective, easy performance observation.	Requires appropriate pre-treatment, basins require a large flat area, offset from foundations.	✓ Site is located within 'Zone 1- Subsurface Activity' Ground Water Source Protection Zone. Therefore, infiltration is not proposed as a suitable solution for this site
	Infiltration basin					
	Soakaway					

SUDS Group	Technique	Image	Description	Advantages	Disadvantages	Suitable for Use at Site
	Porous paving		Block or porous paving allows run-off to infiltrate through to subbase layer. Water can then be infiltrated into ground or conveyed into storage or drainage systems.	Reduces the volume of run-off and if designed for infiltration contributes towards groundwater recharge. Easy to install and retrofit. Simple to manage. If lined can be used where groundwater is sensitive.	Not suitable for heavily trafficked areas or adoptable roads. Requires regular sweeping to prevent clogging with dirt.	✓ Porous asphalt to the car parking areas could be used but limited parking areas.
	Permeable paving					
Filtration	Surface sand filter		Structures designed to treat surface water run-off through filtration using a sand bed filter medium. The filters can be designed with or without infiltration. Temporary storage of run-off is achieved through ponding above the filter layer. They are used where particularly high pollutant removal is required.	Flexibility of design, efficient in removing pollutants, suitable for retrofits and in tightly constrained urban locations.	Not for high sediment content, detention times can support algae growth, minimum hydraulic head of 1.2m required, possible odour problems, high capital and maintenance cost.	✗ There is no requirement for high pollution reduction at this site
	Sub-surface sand filter					
	Perimeter sand filter					
	Bioretention/filter swale		Vegetated strips of land designed to accept run-off as overland sheet flow between a hard-surfaced area and a receiving system.	Landscaping features, effective in removing pollutants, flexible layout to fit into landscape, suited for highly impervious areas, good retrofit, capability, effective pre-treatment option.	Requires landscaping and management, large land required, not suitable for steep sites; no significant attenuation or reduction of flows.	✗ No requirement for high pollution reduction; large land areas not available.
	Filter trench/drain		Shallow excavations filled with rubble or stone that create temporary subsurface storage for filtration of storm water run-off. Receive lateral inflow from an adjacent impermeable surface.	Hydraulic benefits achieved with filter trenches, trenches can be incorporated into site landscaping and fit well	High clogging potential without effective pre-treatment, limited to small catchments, high cost of	✗ Not feasible for the proposed development

SUDS Group	Technique	Image	Description	Advantages	Disadvantages	Suitable for Use at Site
				beside roads and car parks.	replacing filter material.	
Detention	Detention basin		Surface storage basins that provide flow control through attenuation. Normally dry and in certain situations the land may also function as a recreational facility	Cater for a wide range of rainfall events, can be used where groundwater is vulnerable, potential for dual land use, easy to maintain.	Land take, little reduction in run-off volume, detention depths constrained by levels.	✗ Not suitable and not required for this site
	Enhanced dry swale		Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate.	Incorporate into landscaping, good removal of pollutants, reduces run-off rates and volumes, low cost.	Not suitable for steep areas, significant land take, not suitable in areas with roadside parking.	✗ Not suitable and not required for this site
	Enhanced wet swale					
Conveyance	Conveyance swales		Formal linear drainage features in which surface water can be stored or conveyed. They can be incorporated with water features such as ponds or waterfalls where appropriate.	Negate the need for underground pipework. Can provide some attenuation. Possible reduction in run-off volume via plant uptake and infiltration.	Potential trip/wheel hazard, disable access issues.	✗ Not suitable and not required for this site
	Rills					
Source control	Green/brown roof		Multi-layered system that covers the roof of a building with vegetation cover/landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows.	Mimics greenfield state of building footprint for high density developments, good removal of pollutants, ecological benefits, insulates buildings, sound absorption.	Additional weight, not appropriate for steep roofs, maintenance of roof vegetation.	✗ Not suitable for long span portal framed buildings which is what will be proposed at this site.

5.4.2 Maintenance of SuDS

The on-site drainage will be managed by the site management company who will be responsible to maintain any on-site services including drainage.

Table 6: Management and Maintenance Strategy

Drainage Feature	Regular Maintenance	Occasional/Remedial Maintenance	Monitoring
Drainage channels/Gullies	- Inspections will include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent surfacing. - Check for accumulation of debris and silt and cleaned as necessary - Gratings, frames and all associated locking parts to be checked for damage. - Exposed concrete and adjacent surfacing to be checked for cracking and general damage. - Check condition of inlet and outlet pipes, flow controls, baffles and isolation structures	- Channel/Slot cleaning will be by flushing with water or high-pressure jetting (no boiling water or cleaning agent will be used). All silt buckets and sumps will be cleaned out replaced back into the units ensuring they are correctly fitted. - All channel surfaces and joints will be checked and repaired as necessary. - Repair/rehabilitation of inlets, outlet, as required.	Inspect every 4 months or after large storm.
Manholes/Inspection Chambers	- Check for accumulation of debris and silt and clean as necessary. - Covers and frames to be checked for damage. - Exposed concrete and adjacent surfacing to be checked for cracking and general damage. - Check condition of inlet and outlet pipes, flap valves, baffles etc.	- Clean as necessary. - All manhole and inspection chamber covers and frames to be replaced as necessary. - Repair exposed concrete and surfacing as necessary - Repair/rehabilitation of inlets, outlet, overflows and vents, as required.	Inspect every 6 months or after large storm.
Attenuation Tank	- Check for accumulation of debris and silt and clean as necessary. - Check condition of inlet and outlet pipes and ventilation structures	- Clean as necessary. - Repair/rehabilitation of inlets and outlet, as required.	Inspect every 6 months or after large storm.

5.5 Sewer Flooding

The site will reuse the existing outfall points. The peak discharge rate from the industrial development will be minimal and have limited impact on wider infrastructure.

Therefore, the risk of sewer flooding to the site post development work would remain unchanged as low risk.

5.6 Groundwater Flooding

The proposed development is unlikely to impact the groundwater.

Therefore, the risk from groundwater flooding will remain as low.

5.7 Artificial Sources of Flooding

The proposed development work will not have an impact on artificial sources of flood risk.

5.8 Summary of Flood Risk from the Proposed Development

The flood risk to and from the proposed development has been assessed to remain low from all sources.

The flood risk to the development is summarised in Table 8.

Table 8: Summary of flood risk to the development

Type of Flooding	Source of Flooding	Flood Risk	Proposed Mitigation
Fluvial and Tidal	No Watercourses in close proximity.	Low	Site is located in Flood Zone 1 (low risk).
Surface Water	Runoff from the site and surrounding land	Low risk	Discharge from the redeveloped site at a restricted Greenfield runoff rate and onsite infiltration attenuation.
Sewers	Surrounding public foul drainage systems	Low	Discharge into the existing drainage network
Ground Water	Underlying geology and groundwater levels	Low	Intrusive investigations identified depth of groundwater. Development levels raised.
Artificial Sources	none	Not applicable	

6. Conclusion

The existing flood risk to the development area from all sources has been assessed from a review of all available data. Future climate change has also been considered. Using the proposed development plan, the extent of the flood risk has been determined for the site as well as the effect that the development might have on flood risk elsewhere.

The assessment can be summarised as follows:

- The site is located in Flood Zone 1.
- The site is at low risk of flooding from all sources.
- The proposed development is classified as 'Less Vulnerable' and suitable for this location.
- The proposed development work would not increase the risk of flooding from any sources;
- A drainage strategy is proposed in consideration with the local and national standard and would not increase the flood risk.
- The site is located within 'Zone 1- Subsurface Activity' Ground Water Source Protection Zone, which is designated as most at risk from contamination and development activities. Therefore, infiltration is not proposed as a suitable solution for this site
- The site is a Brownfield site with existing drainage in place and no formal restrictions on discharge rates. The existing site is 100% impermeable. The proposal is to limit the discharge from the redeveloped site for from 1 in 1 year to 1 in 100-year return periods, including climate change allowance (45%) to the Qbar (urban) rate for the site of 16.5 L/seconds.
- The new drainage system will incorporate proprietary systems to removing pollutants from runoff from the site.
- The site lies in an area of potential groundwater vulnerability which has been considered in the drainage strategy proposed
- In conclusion, the proposed development work will not increase the risk of flooding to the site or surrounding areas in accordance with the provisions of relevant national and local planning policies.

Appendix A Proposed Site Plan



Disclaimer:
Subject to survey.

Notes:

KEY

- Ownership Boundary
- Site Boundary
(16,970m² / 4.19acres / 1.70ha)

GENERAL KEY

- New Entrance
- 1 Cycle Stands
- 2 Car Share Spaces
- 3 EV Charging Bays
- R Refuse
- D Disabled Parking Bays
- SS Sub-Station
- Existing Steel Palisade Fence
- Proposed Steel Palisade Fence

AREA SCHEDULE (GIA)

UNIT 1 (GIA)	27,395ft²
Warehouse (incl. office Undercroft)	23,725ft ²
Office (FF)	3,670ft ²
Car Parking	40
(Including 2 accessible bays)	
EV charging spaces	8
Car Share	2
Cycle parking spaces	20
Motor bike spaces	2
UNIT 2 (GIA)	35,535ft²
Warehouse (incl. office Undercroft)	32,540ft ²
Office (FF)	2,995ft ²
Car Parking	45
(Including 2 accessible bays)	
EV charging spaces	10
Car Share	2
Cycle parking spaces	20
UNIT 3 (GIA)	38,500ft²
Warehouse (incl. office Undercroft)	33,400ft ²
Office (FF)	5,100ft ²
Car Parking	51
(Including 2 accessible bays)	
EV charging spaces	10
Car Share	3
Cycle parking spaces	20
Motor bike spaces	3
TOTAL (GIA)	101,430ft²
Total Parking	136

J	Landscaping updated	04.0724	HT	HA
I	Car Sharing	26.06.24	HT	HA
H	EV Charging bays and Area check	20.06.24	HT	HA
G	Additional cycle and motor bike spaces	17.05.24	AH	HA
F	Unit Plan Updated	01.05.24	HT	HA
E	Changes to Yard Layout	25.01.24	AH	HA
D	Changes to Sheet Layout	25.01.24	AH	HA
C	Hedge Width Increased to 1.5m	24.01.24	AH	HA
B	Additional landscaping and trees added to the Downley Road frontage, car parking spaces increased and ancillary offices completely encompassed into the units	23.01.24	AH	HA
A	Updated Site Plan	13.11.23	TM	HA
-	First Issue	10.11.23	TM	HA

Rev: Notes: Date: Dwn: Iss:

Suitability Code:

PLANNING

Client:

CANMOOR

hale
ARCHITECTURE
22c Leathermarket Street, London, SE1 3HP

Project:
Dunham Bush Site, Downley Road Havant

Drawing Title:
Proposed Site Plan

Project No: 23076	Scale @ A1 / A3 1:500 / 1:1000	Revision: J
Drawing No: PL004		

Appendix B Topographical Survey + Southern Water Utility Map



OS Note:

This survey has been orientated to the Ordnance Survey (O.S.) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) and the O.S. Active Network (OS Net).

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied.
Please refer to Survey Station Table to enable establishment of the on-site grid and datum.

Some services may have been omitted due to parked vehicles.

Legend:

	Buildings	CVR	Cover (generic)	DDMM	Drainage duct
	Overhead Cables	IC	Inspection chamber	DR	Drainage duct
	Concrete pipe	PIR	Pipe	DR	Drainage duct
	Kiosk line	GY	Gully	BR	Rubbish bin
	Lane marking	BG	Backgully	VO	Vent pipe
	Signage	DR	Drain pipe	VO	Vent pipe
	Tree	DR	Drain	VO	Vent pipe
	Grass verge	DR	Drain	VO	Vent pipe
	Bottom of Bush	MH	Manhole	DR	Drain
	Station and Name	WL	Water level	DR	Drain
	Station Level	FL	Flow light	DR	Drain
	Tree / Bush / Slipping	LP	Lamp post	DR	Drain
	Area of Underground	EP	Electricity spot	DR	Drain
	Woodland	BS	Bus stop	DR	Drain
	Ridge Level	VS	Voltage	DR	Drain
	E Level	SL	Slip tap	DR	Drain
	First Floor Level	WM	Water meter	DR	Drain
	Fence type	GS	Gas valve	CPS	Covered paving slab
	Interconnect	AV	Air valve	CVR	Cover
	Rain Rating	IR	Inspection inspection	DR	Drain
	Wind Mesh	WO	Wind out	TCL	Top of Wall Level
	Post & Rail	RE	Railing	TCL	Top canopy level
	Post & Wire	BS	Basketball	GO	Gully
	Chain Link	MV	Market post	GO	Gully
	Wooden Panels	GR	Gas marker post	CL	Cover level
	Grass Boarded	GR	Grass	CL	Cover level
	Steel Plate/Pipe	FR	Fire protection	LTR	Lights to street

Rev	Date	Description	Drawn	Q. F.
-----	------	-------------	-------	-------



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

Rowan House

Rowan House
Duffield Road

Little Eaton

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CLIENT

**Canmoor Projects
Limited**

PROJECT

Dunham Bush
Downley Road, Havant
PO9 2JD

TITLE

Topographical Survey

SCALE
A2@ 1: 50

DRAWN
SA

Level datum
Grid orientation

Job number

Drawing No. 487

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

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

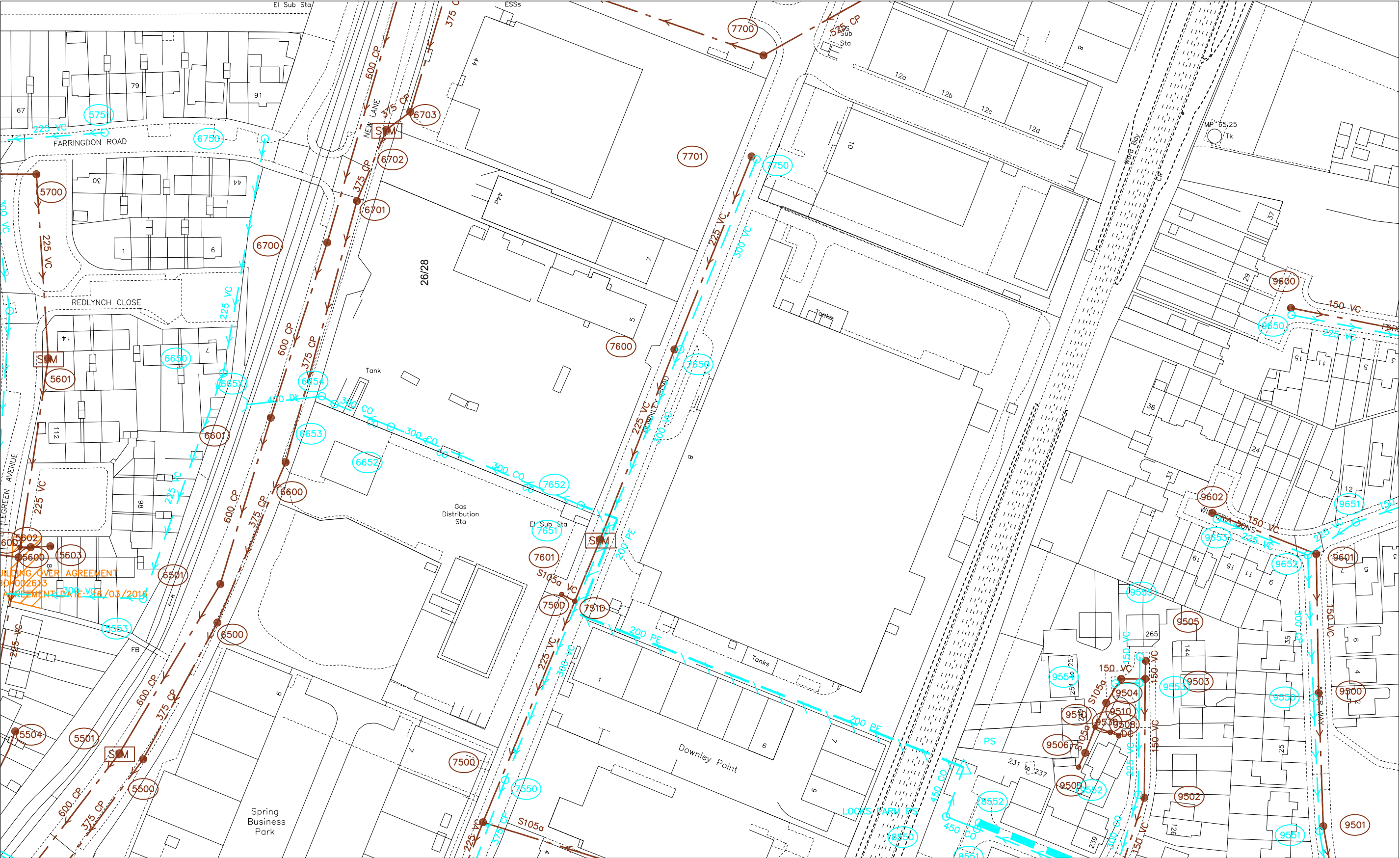
Notes:

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	472781.964	107723.005	18.157
GH2	472765.011	107659.079	18.186
GH3	472734.924	107581.117	18.037
GH4	472830.841	107546.299	18.395
GH5	472857.679	107606.300	19.316
GH6	472877.678	107662.073	19.234
GH7	472824.167	107708.043	19.089

SEWER RECORDS PAGE 1 OF 2

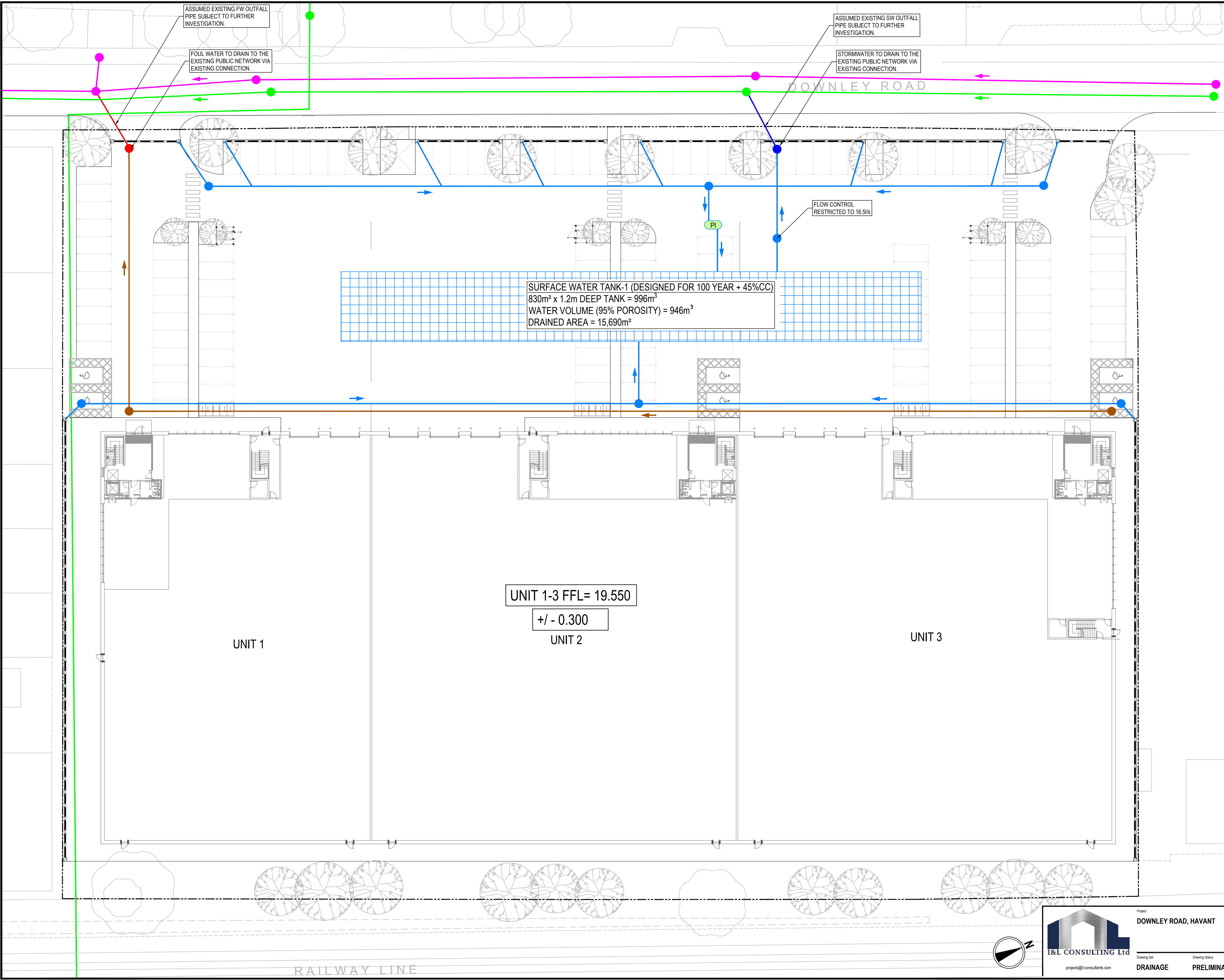
107788



107500

472537	O.S. REF. SU7207NE	Drawn by: kumarshar	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.			473008
	Title: 8 Downley Road	Scale: 1:1250				
		Date: 31/10/2023				

Appendix C Proposed Drainage Strategy Layout



STRATEGY

- 1. THIS DRAWING SHOULD ONLY USED TO SUPPORT A PLANNING APPLICATION AND MAY FORM PART OF A FLOOD RISK ASSESSMENT. IT FORMS AN INTENDED STRATEGY THAT WILL BE DEVELOPED IN MORE DETAIL.
- 2. DO NOT USE THIS DRAWING FOR DETAILED COST ESTIMATES OR TENDER PURPOSES.
- PRE-DEVELOPMENT:
 - 3. THE EXISTING SITE IS PRE-DEVELOPED AND DISCHARGES INTO A PUBLIC SEWER. DISCHARGE POINT IS UNKNOWN AT THIS STAGE.
- PROPOSAL:
 - 4. THE NEW DEVELOPMENT SHALL BE RESTRICTED TO 16.5/s. THIS IS BASED ON A URBAN RATE CALCULATED USING ICP SUDS.
 - 5. TOTAL ATTENUATION FOR 100Yr+45% CLIMATE CHANGE STORM EVENT STORED BELOW GROUND = 946m³.
- HYDRAULIC DESIGN:
 - 6. THE SURFACE WATER NETWORK, FLOW CONTROL AND ATTENUATION HAS BEEN DESIGNED USING MICRODRAINAGE SOFTWARE WITH FSR RAINFALL DATA.
- FINAL DRAINAGE CONNECTIONS:
 - 7. DISCHARGE POINTS SHOWN MAY NEED TO BE FURTHER INVESTIGATED IN TERMS OF LOCATING AND INVERT LEVELS.
 - 8. APPROVAL SHALL BE OBTAINED FOR INTENDED DISCHARGE INTO THE PUBLIC SEWER
- MAINTENANCE:
 - 9. THE NETWORK AND ALL ANCILLARY COMPONENTS SHALL RECEIVE REGULAR MAINTENANCE AS OUTLINED IN SEPARATE SCHEDULE.

AREAS:

SITE AREA	1.70 ha
EXISTING IMPERMEABLE AREA	1.55 ha
PROPOSED IMPERMEABLE AREA	1.57 ha

LEGEND

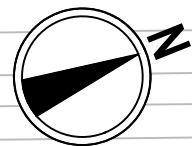
- SITE BOUNDARY (1.70ha)
- EXISTING FW PUBLIC SEWER
- EXISTING PRIVATE FW
- EXISTING SW PUBLIC SEWER
- EXISTING PRIVATE SW
- NEW STORM WATER RUN
- NEW FOUL WATER RUN
- PI PETROL INTERCEPTOR
SERVICE YARD AND OTHER VEHICULAR
ACCESSED AREAS TO PASS THROUGH
PETROL INTERCEPTOR BEFORE
DRAINING TO TANK.

UNIT 1-3 FFL= 19.550
+/- 0.300
UNIT 2

UNIT 1

UNIT 3

P1	03.10.24	PRELIMINARY ISSUE	SH	IL
Rev.	Date	Description	Technician	Reviewer
Drawing				
Project				
DOWNLEY ROAD, HAVANT				
DRAINAGE PLANNING STRATEGY				
Drawing Set				
DRAINAGE				
Drawing Status				
PRELIMINARY				
Scale				
1:250 @ A1				
1:500 @ A3				
Project Number				
24-011-I&L				
Drawing Number				
D00				
Revision				
P1				



Appendix D Hydraulic Calculation

ICP SUDS Mean Annual Flood

Input

Return Period (years)2SAAR (mm)707Urban0.750
Area (ha)1.697Soil0.400Region NumberRegion7

Results1/s

QBAR Rural5.8
QBAR Urban16.5

Q2 years16.7

Q1 year14.0
Q30 years28.6
Q100 years33.3



Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Tank 1	1.568	5.00	19.110	10.714	80.769	2.110

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	10080
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Tank 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	17.000	Product Number	CTL-SHE-0180-1650-1200-1650
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	16.5	Min Node Diameter (mm)	1500

Node Tank 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	17.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	512

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	830.0	0.0	1.200	830.0	0.0	1.201	0.0	0.0



Results for 100 year +45% CC 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
360 minute winter	Tank 1	352	18.179	1.179	139.6	929.2908	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
360 minute winter	Tank 1	Hydro-Brake®	16.5	1192.5