



Land South of West Hoathly Road
East Grinstead, West Sussex

Flood Risk Assessment and Drainage
Strategy

For

Devine Homes PLC

Document Control Sheet

Land South of West Hoathly Road

East Grinstead, West Sussex

Devine Homes PLC

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1.0 Introduction

- 1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been produced by Motion on behalf of their client, Devine Homes PLC. It supports the planning application for the erection of 44 new homes with access from West Hoathly Road, vehicle and cycle parking, landscaping, drainage, and associated infrastructure and highway works on the Land South of West Hoathly Road, East Grinstead, West Sussex (hereafter referred to as 'The Site'). The proposed development layout can be seen in [Appendix A](#).
- 1.2 According to the Environment Agency's (EA's) Flood Map for Planning, the site is within Flood Zone 1 so is not at risk of fluvial (or tidal) flooding. The updated (January 2025) EA Risk of Flooding from Surface Water (RoFSW) also shows that no part of the site is at risk of surface water flooding. However, because the site is over one hectare in area (it is approximately 2.14 ha) an FRA is required to be in accordance with the statutory requirements of the National Planning Policy Framework (NPPF).
- 1.3 As a major development, a drainage strategy is also required to demonstrate how the development will manage and discharge surface water generated in all rainfall events up to and including the 1 in 100-year + 45% storm, with inclusions for urban creep also considered.
- 1.4 Therefore, this FRA and Drainage Strategy has been produced to discuss the flood risks to the proposed development, from all sources. This FRA and Drainage Strategy will also define how the development will manage its surface water and foul sewage so that the development does not increase flood risk in the area or to neighbouring properties/land.
- 1.5 This FRA and drainage strategy follows the guidance set out in:
 - „ West Sussex LLFA Policy for the Management of Surface Water (November 2018)
 - „ National Planning Policy Framework (NPPF)
 - „ Planning Practice Guidance (PPG) to the National Planning Policy Framework
 - „ CIRIA SuDS Manual 2015 (C753)
 - „ Environment Agency Rainfall Runoff Management for Developments
 - „ The National Standards for SuDS (NSFS)
- 1.6 The proposed development falls within the administrative boundary of Mid-Sussex District Council (MSDC) and West Sussex County Council (WSCC).
- 1.7 This FRA and drainage strategy report pertains only to the drainage strategy for the development. It does not provide details of how the site will be drained during the construction phase. This report is also not a drainage verification report, which can only be produced post-construction.
- 1.8 Similarly, this report does not provide information on how the drainage infrastructure will be protected during the construction phase of the project. The provision of this information is the responsibility of the appointed contractor.

2.0 Site Description

Table 2.1 – Site Summary

Site Name	Land South of West Hoathly Road
Location	East Grinstead, West Sussex
Grid Reference	TQ392366 (6 figure, centre of site)
Site Area	1.97 ha
Development Type	A 44-unit residential development including access, parking, landscaping and greenspace, plus SuDS features
Flood Zone	1
Surface Water Flood Risk	Very Low
Local Water Authority	Southern Water
Local Planning Authority	Mid-Sussex District Council (MSDC)
Lead Local Flood Authority	West Sussex County Council (WSCC)

Site Location and Description

- 2.1 The development site comprises an approximately square-shaped greenfield parcel of land that is located to the south of West Hoathly Road, which is to the southwest of East Grinstead. A site location plan can be seen in [Appendix B](#) of this report.
- 2.2 The site is currently undeveloped with a ground cover of grassland. It is bounded to the northeast by the Sunnyside Recreation Ground, and southwest by open and undeveloped land. The southeastern boundary is characterised by ancient woodland and an ordinary watercourse and there are also mature trees on the northeastern and southwestern boundaries.
- 2.3 The site is accessed from West Hoathly Road.

Topography

- 2.4 A topographic survey of the site has been carried out that shows spot heights and contours, and the outputs of this survey can be seen in [Appendix C](#) of this report.
- 2.5 The topographic survey shows that the site has a consistent fall from the southwestern corner to the northeast and east of the site. The highest elevations on site, which are in the southwestern corner, are approximately 88.8 metres Above Ordnance Datum (mAOD). The lowest elevations are in the northeastern corner and fall to 78.2 mAOD.
- 2.6 The ground to the east of the site falls away steeply in the area of ancient woodland towards the ordinary watercourse, which is circa three metres lower than the adjacent areas of the site.

Geology

- 2.7 The British Geological Survey (BGS) online 1:50,000 Geoindex maps show that the site is in an area of Wadhurst Clay bedrock geology (Figure 2.1 on the next page). The superficial geology is listed as 'Head' (see Figure 2.2, next page), which can be present as either clay, silt or sands and gravels depending on the location.

Figure 2.1 – BGS 1:50,000 Scale Bedrock Geology

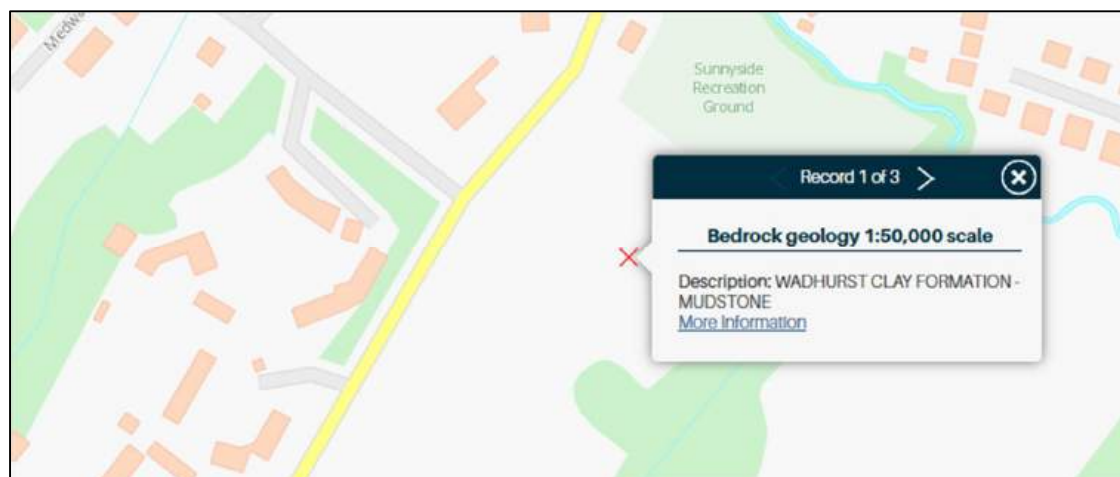
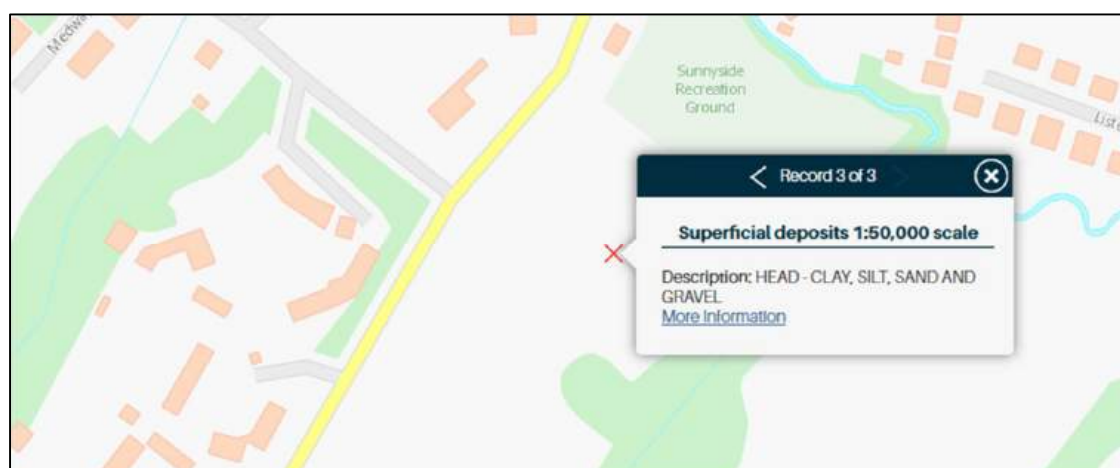


Figure 2.2 – BGS 1:50,000 Scale Superficial Geology



- 2.8 There are no BGS borehole records from within the site boundary. The nearest BGS borehole is TQ33NE31, which is approximately 200 metres to the northeast of the site in Forest View Road. While this is not a site-specific borehole record, it is valuable in terms of showing that characteristics of the local geology to 5.00 metres Below Ground Level (mBGL).
- 2.9 TQ33NE31 can be seen in [Appendix D](#). It shows the following geological strata and depths.

Table 2.2 – Geological Strata and Depths from TQ33NE31

Strata	Depth (mBGL)
Made Ground	0.0m - 0.3mBGL
Soft to firm grey mottled brown fissured silty CLAY	0.3 – 1.2mBGL
Firm grey mottled orange brown silty CLAY	1.2 – 2.0mBGL
Firm to stiff greyish brown silty CLAY with some fine gravel size mudstone lithorelicts	2.0 – 3.0mBGL
Greyish brown laminated highly weathered silty MUDSTONE	3.0 – 5.0mBGL

- 2.10 Table 2.2 suggests that both the superficial and bedrock geologies in this part of East Grinstead are defined by firm CLAY. This means that the geology is hydraulically unproductive and this impacts the local soils' capacity for infiltration (discussed below).

Hydrogeology and Groundwater

- 2.11 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.
- 2.12 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.
- 2.13 Defra's Magic Map was reviewed, and the site is not within in any SPZ's.
- 2.14 Defra's Magic Map does not classify the superficial or solid geology as a designated aquifer, which emphasises the hydraulically unproductive characteristics if the local soils.
- 2.15 The BGS Borehole Log of TW33NE31 in [Appendix D](#) recorded a groundwater strike at 4.85 mBGL, which rose to 4.65 mBGL after 20-minutes. Therefore, while groundwater is within five metres of ground level, it is not very mobile (otherwise there would be more groundwater rebound). This accords with what is known about the geology and its hydraulic productivity)

Infiltration Potential

- 2.16 Because the site is in area characterised by firm CLAY to depth, the local soils are not expected to have infiltration coefficients that are conducive to the discharge of surface water to ground. On this basis, infiltration has not been explored at this stage of the development and the drainage strategy.
- 2.17 Defra's Magic Map confirms that the site is in an area of hydraulically unproductive geology and that there is no groundwater vulnerability. The lack of groundwater rebound and mobility discussed in Paragraph 2.15, above, also confirms that infiltration is unlikely to viable.
- 2.18 It is noted that WSCC as the Lead Local Flood Authority (LLFA) would ordinarily require site specific BRE365 soakage testing results to support the decision not to use infiltration. Noting that soakage testing is very unlikely to offer a solution for the drainage strategy, our client would be willing to accept a condition on this matter, if necessary.

Existing Drainage Regime

Natural Drainage

- 2.19 As the site is greenfield, there is no existing formal surface water drainage system in place. The site will currently drain naturally, and the topography and local drainage features suggest that the site drains to the north and east and will do so as a single 'catchment'.
- 2.20 The ordinary watercourse that lies within the ancient woodland on the site's southeastern boundary has already been mentioned. Part of this ordinary watercourse lies within the red line boundary, and it flows southwest to northeast towards its confluence with the Sunnyside Stream, which is also classified as an ordinary watercourse. The Sunnyside Stream flows northwest to southeast on the southern side of East Grinstead.
- 2.21 Both the unnamed ordinary watercourse on the site's southeastern boundary and the Sunnyside Stream have year-round baseflow, ongoing connectivity (which is shown on all publicly available mapping), and are an important part of the local hydraulic regime. This means that it is important the site and the proposed development maintains an outfall to the ordinary watercourse to preserve its baseflow.

Public Sewerage

- 2.22 The nearest public sewerage is Southern Water's foul sewer that runs south to north in West Hoathly Road. This can be seen in the Asset Location Plan in [Appendix E](#). In the location adjacent to the site, it is a 150mm to 225mm diameter pipe and joins other foul sewers serving the southwest of East Grinstead by the junction of Dunnings Road and Stockwell Road.
- 2.23 An existing water distribution main, which is not shown on the Asset Location Plans, is known to cross the site from southeast to northwest. This water distribution main will be diverted as part of the development.

3.0 The Proposed Development

- 3.1 The proposed development is for 44no. residential dwellings and the proposed development layout can be seen in [Appendix A](#). The following housing mix is expected, as in Table 2.3.

Table 2.3: Proposed Housing Mix

Open Market	
Unit Type	No. of Units
2-Bed	9
3-Bed	19
4-Bed	3
Total:	31
Affordable	
Unit Type	No. of Units
1-bed	6
2-Bed	6
3-Bed	1
Total:	13
Grand Total:	44

- 3.2 The proposed development also includes access, parking and landscaping.

4.0 Flood Risk Legislative and Policy Framework

- 4.1 LLFA's including WSCC have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from local sources, such as surface water run-off, groundwater and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers'.
- 4.2 West Sussex often delegates their LLFA responsibilities to Local Planning Authorities. It is often the case that MSDC consult on local flood risk and drainage matters, and we expect that this will be the case for the current application.

The National Planning Policy Framework

- 4.3 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The Planning Practice Guidance (PPG) 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. This includes ensuring that flood risk is considered at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.
- 4.4 The process of directing development away from those areas where risks are highest is the Sequential Test. It covers all forms of flooding, and this is covered in Paragraphs 23 and 24 of the NPPF. Following the December 2024 update to the NPPF, Paragraph 175 was added that states that development can be appropriate on sites with flood risk *"in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would not be at risk of flooding from any source, now and in the future"*. This essentially means that if a sequential approach is applied within the site boundary, and areas of flood risk now and in the future are avoided, that flood risk should not prevent the development coming forward and that the Sequential Test is not required.

The Environment Agency Flood Map for Planning

- 4.5 The updated Environment Agency's Flood Map for Planning was released on 25th March 2025. This updated and new National Flood Risk Assessment (NaFRA) uses both existing detailed local information and improved national data, includes the potential impact of climate change on flood risk, based on UK Climate Projections (UKCP18) and shows potential flood depths. This allows the Flood Map for Planning to provide much higher resolution maps that make it easier to see where there is risk
- 4.6 The New NaFRA Flood Map for Planning remains split into 'Flood Zones', which demarcate the extent of flooding from rivers or the sea for different return periods.
- 4.7 Table 3.1, on the next page, lists the flood zone categories and explains the flood risk probabilities they represent.

Table 3.1 – 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 tidal 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 tidal flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water must flow or be stored in times of flood, which is typically the 1 in 30-year flood event or greater. 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, but may be distinguished in Product 4 information, for example)

- 4.8 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 that has critical drainage problems (as notified to the local planning authority by the EA). There are areas of surface water flood risk on the boundaries of the site and the site is over 1ha in area, thus flood risk from all sources will be reviewed for the completeness of the application.
- 4.9 An FRA should identify and assess the risks of all forms of flooding and demonstrate how these flood risks will be managed so that a development remains safe throughout its lifetime, taking climate change into account.
- 4.10 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 PPG 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.
- 4.11 Within the different Flood Zones each of the above development categories are considered appropriate or not permissible. The Technical Guidance to the NPPF 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.
- Flood Zone 3a:
- „ Water-compatible and less vulnerable development is appropriate in this zone. Highly vulnerable development should not be permitted in this zone.

Flood Zone 3b:

- „ Only water-compatible development and essential infrastructure that must be there should be permitted in this zone.

- 4.12 The above information sets out the basis by which developments must be assessed in terms of flood risk.
- 4.13 The development will be reviewed against the Flood Zone in which it is located and an assessment will be made of the appropriateness of the proposed development, as per the advice within the PPG to the NPPF, and taking account of the proposed site layout for the development shown in [Appendix A](#).

5.0 Current Flood Risk

- 5.1 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, in the following two sections and summarised in Table 6.1. The probability of any likely impacts is also assessed, where necessary.

Flooding from Rivers and the Sea

- 5.2 The Environment Agency's 2025 NaFRA2 Flood Map for Planning ([Appendix F](#)) shows that the site is within Flood Zone 1. Consequently, it can be summarised that the proposed development is at Very Low fluvial flood risk, now and in the future, and the residual flood risk to the site from river flooding is zero.

Fluvial Flood Risk and the Appropriateness of the Development in this Location

- 5.3 The proposed residential development is 'more vulnerable' according to the vulnerability classifications in the NPPF.
- 5.4 Table 3 of the PPG to the NPPF (see below) states that 'more vulnerable' development is appropriate in Flood Zone 1, thus the proposed development is appropriate in this location and with the current and future level of flood risk.

Table 3 of the NPPF - Flood Risk Vulnerability and Flood Zone Compatibility

Flood Zones	Flood Risk 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.

Surface Water Flooding

- 5.5 The EA's 2025 NaFRA2 Risk of Flooding from Surface Water (RoFSW) dataset for the site can be seen in the plans in [Appendix G](#). It shows that up to and including the 1 in 1,000-year flood event that no part of the interior or developable area is at risk of surface water flooding, which includes all locations where dwellings, accesses, parking and above-ground structures are proposed.
- 5.6 There is a line of surface water flood risk within the site boundary along the line of the watercourse on the site's eastern side (thus is probably a proxy for fluvial flooding in this case). It can be seen that this area of 'Very Low' risk surface water flooding is wholly within the steep-sided valley feature described earlier. Because this area of surface water flood risk does not coincide with the developable area, the proposed development accords with the requirements of Paragraph 175 of the NPPF, and the Sequential Test is not required, and surface water flood risk does not need to be considered further.

Groundwater Susceptibility

- 5.7 There are no flood risk maps for groundwater, as stated by the Environment Agency in their 2011 guidance note 'flooding from groundwater'. Mapping products currently available only show areas where the geological and hydrogeological conditions *may* combine to cause groundwater flooding, but they should not be considered as groundwater flood risk maps. They only show *susceptibility* to groundwater flooding.
- 5.8 There are several mapping products that depict areas that may be susceptible to groundwater flooding, but they are not comparable in detail to the risk maps developed for fluvial, tidal and surface water, such as those scrutinised above and used to support planning decisions. The mapping does not show the likelihood of groundwater flooding occurring and can only be considered as a hazard, but not a risk-based dataset.
- 5.9 As such, the mapping products can be viewed as indicative at best and should only be used as a prompt to review site-based information to determine whether groundwater is a risk factor that should be considered. Indeed, the Environment Agency state that:
- "The susceptibility data should not be used on its own to make planning decisions at any scale and, in particular, should not be used to inform planning decisions at the site scale. The susceptibility data cannot be used on its own to indicate risk of groundwater flooding."*
- 5.10 To investigate groundwater flooding susceptibility, this FRA will review groundwater flooding susceptibility mapping, which can be seen in [Appendix H](#). There are three different forms of groundwater susceptibility mapping, which are discussed in turn, below.

BGS Geological Indicators of Flooding

- 5.11 The BGS Geological Indicators of Flooding map shows that the site is not within an area where there are geological indicators of flooding.

BGS Groundwater Flooding Susceptibility

- 5.12 The BGS Groundwater Flooding Susceptibility map shows that the site is in not an area where there is potential for groundwater flooding to occur.

Geosmart Information Groundwater Flood Map

- 5.13 The Geosmart Information Groundwater Flood Map is considered to be the most reliable map in terms of susceptibility to groundwater flooding as it brings together multiple factors in its assessment of groundwater flood risk (rather than just geology, or hydraulic productivity).
- 5.14 The Geosmart Information Groundwater Flood Map places the site in an area of 'negligible' risk.

Groundwater Flooding Susceptibility Summary

- 5.15 In summary, mapping shows negligible to zero susceptibility to groundwater flooding. This is in line with the hydraulically unproductive characteristics of the local geology, which has been described above in Section 2.0 of this report.

Flooding from Infrastructure Failure

- 5.16 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, siltation, 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.
- 5.17 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.

- 5.18 The site is currently undeveloped, thus there is no existing risk of flooding due to the failure of infrastructure. With regards to the proposed development's drainage system and risk of failure, it will be designed to attenuate the 1 in 100-year + 45% rainfall event with an inclusion for urban creep and other uplifts. A drainage management and maintenance plan will also be provided, which will prescribe how the onsite drainage infrastructure should be looked after so that it works at optimum capacity. This will ensure that residual flood risks to the site from its internal drainage systems will be minimised.

Flooding from Artificial sources

- 5.19 The EA provides a map showing the maximum potential flood extent should all reservoirs with a capacity of greater than 25,000 cubic metres fail and release the water they hold.
- 5.20 The map shows that the East Street site would not experience flooding in this scenario and nor are there any no canals in the local area to create flood risk.

6.0 Future Flood Risk & Climate Change

- 6.1 The NPPF and the supporting Planning Practice 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 taken into account. Both peak river flows and rainfall intensity should be assessed.

Peak River Flows

- 6.2 The site is within Flood Zone 1. The NaFRA2 Flood Map for Planning has been reviewed in the 'design' (1 in 100-year) fluvial flood event with an addition for climate change (see Figure 6.1, below). This shows that the site remains within Flood Zone 1, even with an uplift due to climate change.

Figure 6.1 – Fluvial Flood Risk with Climate Change



Peak Rainfall Intensity and Climate Change

- 6.1 With climate change, peak rainfall intensities are expected to increase, which would result in increased surface water flows and, potentially, flooding.
- 6.2 The NaFRA2 RoFSW maps also provide outlines for future surface water flood risk up to the 2050's epoch. This is shown in Figure 2.2 on the next page.
- 6.3 This depiction of future surface water flood risk shows that it is no greater in extent, or in terms of its impact on the development, than in the present day. Surface water flood risk remains isolated within the watercourse corridor and does not affect any developed part of the site. This ensures that the development remains in accordance with Paragraph 175 of the NPPF for its lifetime.

Figure 2.2 – Future Surface Water Flood Risk (2050's epoch).



- 6.4 The drainage strategy for the development will also be designed to fully account for future peak rainfall intensities. A climate change increase will be applied to the hydraulic model for the 1 in 10-year, 1 in 30-year, and 1 in 100-year rainfall events for the drainage design, plus additional hydraulic inputs due to urban creep will be included, to ensure that all surface water loads, for the lifetime of the development, are full considered.
- 6.5 This approach ensures that the development will not be at risk of flooding from surface water now or in the future.

7.0 Summary of Flood Risk

7.1 Table 7.1, below, summarises the level of flood risk to the site.

Table 7.1: Summary of Flood Risk

Flood Source	Risk Level				Comment
	High	Medium	Low	Very Low	
Fluvial				X	Flood Zone 1 (present day and in the future)
Tidal				X	Not within a tidal flood risk area
Groundwater				X	Hydraulically unproductive geology.
Surface Water			X		Site is at very low risk of surface water flooding today and in the future. Where risk is higher, no development is proposed.
Canals				X	There are no canals in the vicinity
Reservoirs				X	The Reservoir Flood Risk Map places the site well outside a maximum extent of flooding
Infrastructure Failure				X	The site's infrastructure will be properly managed and maintained, as per the prescription in the drainage management and maintenance plan, which will minimise the risk of flooding due to infrastructure failure.
Increase due to Climate Change				X	Future fluvial flood risk has been discussed, and the drainage strategy will accommodate surface water generated in the 1 in 100 + 45% rainfall event.

8.0 Surface Water Drainage Strategy

Sustainable Drainage Overview

- 8.1 Current planning policy and Environment Agency guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that a development's surface water drainage closely reflects the natural hydrology of the pre-developed site.
- 8.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with current guidance and best practice.
- 8.3 Source control systems treat surface water close to the point of origin, in features such as soakaways, permeable paving and swales, to name a few.
- 8.4 The key benefits of SuDS are as follows:
- „ Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g., roads);
 - „ Improving amenity through the provision of open green space;
 - „ Improving biodiversity through increased areas for wildlife habitat; and
 - „ Enabling a natural drainage regime that recharges groundwater (where possible).

Site Areas

- 8.5 Of the 1.97 ha site, the current site layout proposes 0.703 ha of impermeable areas. This encompasses all the dwellings, garages, driveways, parking area, roads/accesses and footpaths – everything except greenspace. At this time, this figure does not include WSCC's requirements to consider an uplift of 10% to areas within private curtilages, thus is the pre-urban creep impermeable area figure. Urban creep will be discussed later in this section.
- 8.6 The developed and impermeable contributing areas of 0.703 ha will be used to calculate the QMED greenfield runoff rate so that an appropriate discharge rate for the site's single catchment can be set for hydraulic design.

QMED Greenfield Runoff Rate

- 8.7 The greenfield runoff rates have been calculated using the QMED value, which is the index flood in the Flood Estimation Handbook (FEH). QMED has been calculated for rural and urban values in MicroDrainage using the catchment descriptors methodology, which includes the following input variables:
- „ Site Location
 - „ SAAR – Standard Average Annual Rainfall 1961 – 1990 (mm)
 - „ SPR Host - Standard percentage runoff derived from HOST soils data
 - „ URBEXT - The extent of urban and suburban cover
 - „ BFIHOST - Baseflow index derived from Hydrology of Soil Types (HOST) soils data
 - „ FARL - Index of flood attenuation due to reservoirs and lakes
 - „ Catchment Area - Hectares

- 8.8 The QMED calculation sheet from MicroDrainage can be seen in [Appendix I](#), but the outputs for the 0.703 ha of impermeable contributing areas is summarised in Table 8.1, below.

Table 8.1 – QMED Rural/Urban Values

QMED Rural (l/s)	QMED Urban (l/s)
8.4	9.8

- 8.9 It is proposed to reduce off-site surface water discharge from the development to a maximum of the calculated QMED Rural value of 8.4 l/s. This will be for all storms, inclusive of climate change, which will maintain the local hydraulic regime and baseflow of the local watercourse, but will also reduce flood risk in the higher order rainfall events, which would usually overwhelm the channels of the watercourses.

Drainage Strategy Overview

- 8.10 The drainage strategy for the proposed development has been developed through the acknowledgement of the geo-environmental, topographical and infrastructure constraints that affect the site, as well as WSCC's SuDS guidance.
- 8.11 As discussed in Section 2 of this report, infiltration has been presumed as unviable in the due to the local geology, which is described through local boreholes and BGS 1:50,000 GeoIndex mapping as consisting of firm CLAY to depth. Other hydrogeological indicators have supported this, such as the 'hydraulic unproductivity' classification in Defra Magic Maps, and the lack of groundwater rebound in the BGS borehole, which demonstrates a lack of groundwater mobility. Therefore, infiltration has not formed part of the drainage strategy for the development.
- 8.12 There are no public surface water sewers within the site or within West Hoathly Road. This is shown on Southern Water's Asset Location Plans in [Appendix E](#).
- 8.13 An ordinary watercourse lies within the site boundary and on the eastern side of the development, which has proven ongoing connectivity to the wider hydraulic network. The watercourse is present at the topographically lowest point of the site's single catchment, so represents a sustainable outfall for the developments surface water because it can be sustainably reached by gravity. Additionally, the site has riparian access to it and, as discussed above, it is proposed to discharge surface water from the development at a maximum rate of 8.4 l/s for all storms, up to an including the 1 in 100-year + 45% rainfall event, which will maintain the existing hydraulic regime while simultaneously protecting the area from flooding in higher order rainfall events.
- 8.14 The drainage strategy for the development will use a combination of SuDS features, below-ground attenuation and traditional piped drainage. The following description of the proposed drainage strategy should be read in conjunction with the drainage strategy layout in [Appendix J](#) of this report.
- 8.15 Because the site falls from west to east, the development's attenuation features have preferentially been located on the eastern side of the development so that they have maximum effect. Most of the development's hardstanding and roof areas will be served by traditional piped drainage, which will follow the site's topography to the east. Surface water will be attenuated in a geocellular tank situated below an area of greenspace, as well as a large SuDS basin in the south-eastern corner of the site. These features are complimented by the use of permeable pavements in the parking courts on the eastern side of the site, which provide additional valuable attenuation and source control.
- 8.16 The total attenuation volume provided on site is as 747.201m³ (not including pipes and manholes) and is distributed among the storage features as follows:

„ Permeable Pavements (PP2): 23.692m³

- „ Permeable Pavements (PP3): 23.213m³
 - „ Geocellular Tank: 258.454m³
 - „ SuDS Basin: 441.842m³
- 8.17 Flow controls will be used pursuant to the permeable paved areas, the geocellular tank and, finally, following the SuDS basin. By providing three different types of attenuation across the site, from source control to mid-system and end of system storage, it makes the drainage system more resilient (because a single structure and 'end of system' attenuation feature is not being relied upon). This means that there is less residual risk of failure and flooding due to poor system performance
- 8.18 The final outfall from the SuDS basin will discharge directly to the ordinary watercourse on the site's eastern boundary and will do so at the QMED greenfield runoff rate of 8.4 l/s. The discharge to the watercourse can be achieved while avoiding tree Root Protection Areas within the ancient woodland. This is shown on the drainage strategy layout in [Appendix J](#), which includes the arboricultural survey outputs and tree RPA's.
- 8.19 Regarding ordinary watercourse consent for the discharge, WSCC's Application for Ordinary Watercourse Land Drainage Consent: Guidance Notes [1b] states that under the Land Drainage Act 1991, you only need consent if you want to construct a culvert or other structure that may affect the flow within any ordinary watercourse.
- 8.20 The typical structures that qualify under this statement are shown in [Appendix K](#).
- 8.21 As shown in [Appendix K](#), where pipes and headwalls are within the bank profile and do not protrude, they are unlikely to require consent because they do not affect flow within the watercourse.
- 8.22 It is proposed to build an informal headwall structure within the profile of the bank using concrete sandbags. This will be sensitive to the location (as opposed to a pre-cast concrete headwall structure) and will be simple to construct. It is proposed to build the headwall in accordance with WSCC's approved standard details for 'Headwall Detail for pipe sizes up to 600mm diam. (Concrete Bagwork)' which is in WSCC drawing S278/38/23 Rev A.
- 8.23 The drainage strategy as outlined above has been modelled in MicroDrainage's Network module and designed to attenuate the significant surface water inputs generated by the impermeable areas, climate change, urban creep, and the factors of safety applied by the LLFA. These are noted below.
- 8.24 The MicroDrainage Network hydraulic modelling has shown that the drainage strategy can accommodate all rainfall events up to and including the 1 in 100-year + 45% storm without flooding, while never discharging at greater than 8.4 l/s for all storms. The MicroDrainage Network hydraulic modelling outputs
- 8.25 The hydraulic modelling of the proposed drainage strategy is discussed later in this report.

Design Criteria

- 8.26 The drainage strategy has been designed in accordance with the design criteria outlined in West Sussex County Council's LLFA Policy for the Management of Surface Water¹.
- 8.27 This ensures that the current drainage strategy accords with local policy requirements (as well as those of the NPPF). In brief, this includes:
- „ Using FEH 2022 Annual Maximum Catchment data rather than FSR data. It should be noted that the dropdown menu in MicroDrainage's Network module only allows the choice of 1999 data and 2013 data but allows the upload of any data – including FEH 2022. Therefore, the user can use FEH 2022 data but is forced to do it under the label of 2013 data. As such, the MicroDrainage results included

¹ https://www.horsham.gov.uk/__data/assets/pdf_file/0019/65017/West-Sussex-Surface-Water-Management-Policy.pdf

with this report state that FEH 2013 data has been used, but we would like to assure that LLFA that FEH 2022 has been used. The LLFA are aware of this issue as it has been discussed with them on a number of other sites.

- ” Using a runoff coefficient (CV) value of 1.0 in all hydraulic modelling (for both summer and winter storms)
- ” Reducing the MADD Factor (which assumes 10m³ of pipe storage per hectare) to zero.
- ” Urban Creep at a rate of 10% has been considered and included in the parts of the site to which it applies (see below).
- ” The full suite of rainfall events has been used (up to the 5,760-minute storm, which is maximum allowable when using FEH data).
- ” The maximum rainfall intensity has been raised to 550mm/hr to ensure that the full hydrograph is included in the hydraulic calculations.]
- ” The maximum half-drain time is 256-minutes, much less than the 1,440-minute (24-hour) requirement for this metric.
- ” The geocellular attenuation tank will be preceded by silt traps and will use a distribution pipe (rather than direct entry) to stop silt entering the units. This will keep the maintenance requirement to a minimum

Urban Creep

- 8.28 An appropriate allowance should be made for urban creep throughout the lifetime of the development as per 'BS 8582:2013 Code of Practice for Surface Water Management for Developed Sites'.
- 8.29 WSCC have produced their own guidance on the percentage of urban creep that should be applied. They state that the consideration of urban creep should be assessed on a site-by-site basis but is limited to individual residential development only. The allowances set out in Table 5.2 of WSCC LLFA Policy for the Management of Surface Water must be applied to the impermeable area within the property curtilage according to the proposed development density. Table 5.2 of WSCC LLFA Policy is shown below.

Table 5.2 of WSCC LLFA Policy for the Management of Surface Water

Residential development density (Dwellings per hectare)	Change allowance (% of impermeable area)
≤25	10
30	8
35	6
45	4
≥50	2
Flats & Apartments	0

- 8.30 A full increase of 10% has been used as a precautionary approach. The 10% uplift has been applied to the proposed private impermeable areas (so excluding roads, pathways and blocks of apartments) and how they have been uplifted is detailed in Table 8.2, on the next page, and has been presented in terms of which pipes in the hydraulic model the uplift has been applied.

Table 8.2 – Urban Creep Increases Applied in Hydraulic Model

Pipe No.	Total Impermeable Area (ha)	Private Impermeable Areas (ha)	10 % of Private Impermeable Areas (ha)	Increased Impermeable Area Applied to Pipe (ha)
4.000	0.028	0.020	0.002	0.030
4.001	0.023	0.010	0.001	0.023
4.002	0.041	0.020	0.002	0.043
6.000	0.032	0.020	0.002	0.034
6.002	0.034	0.020	0.002	0.036
6.003	0.028	0.020	0.002	0.030
6.004	0.049	0.030	0.003	0.052
7.000	0.030	0.020	0.002	0.032
7.001	0.039	0.020	0.002	0.041
7.002	0.023	0.010	0.001	0.024
7.004	0.024	0.010	0.001	0.025
7.005	0.054	0.030	0.003	0.057
10.000	0.013	0.010	0.001	0.014
10.001	0.010	0.010	0.001	0.011
10.002	0.014	0.010	0.001	0.015
10.003	0.006	0.010	0.001	0.007
10.004	0.010	0.010	0.001	0.011
11.001	0.045	0.020	0.002	0.047
11.002	0.013	0.010	0.001	0.014
Total Pre-Urban Creep Private Impermeable Areas				0.310 ha
Total Urban Creep Increased Private Impermeable Areas				0.341 ha

- 8.31 With the addition of urban creep, the site's contributing impermeable areas, as taken into account in the MicroDrainage Network hydraulic model, is 0.736 ha, an uplift of 0.031 ha (310m²)².

Summary

- 8.32 The approach to the layout and design of the surface water drainage strategy for the development has been outlined and the drainage strategy layout has been presented in [Appendix J](#) of this report. With specific reference to the drainage hierarchy, the proposed drainage strategy is discussed, below.

The Drainage Hierarchy

- 8.33 The NPPF states that opportunities to reduce overall flood risk should be sought and achieved through sustainable development and careful drainage design. This can be achieved through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage

² It should be noted that the urban-creep-increased impermeable areas of 0.736 ha minus the increase of 0.031 ha does not equal the pre-urban creep figure of 0.703 ha listed in Paragraph 8.6. This is due to the way MicroDrainage rounds up and down the nearest 1,000th of a hectare (10m²).

systems (SuDS). SuDS are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible. They provide opportunities to:

- „ Reduce the causes and impacts of flooding;
- „ Remove pollutants from urban run-off at source;
- „ Combine water management with green space with benefits for amenity, recreation and biodiversity.

- 8.34 To deliver SuDS benefits and ensure that a development reduces overall flood risk, there is an established hierarchy of surface water drainage methods that should be considered. The most preferable and sustainable are at the top and the least preferable and least sustainable at the bottom.
- 8.35 The drainage hierarchy is a sequential check that intends to ensure that all practical and reasonable measures are taken to manage surface water as high up the hierarchy (with '1' being the highest) as possible, and that the amount of surface water managed at the bottom of the hierarchy is minimised. The Planning Practice Guidance to the National Planning Policy Framework (NPPF) states that *“Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable”*.
- 8.36 The drainage hierarchy presented in the NPPF presents only four tiers of drainage options. This has been expanded on and adopted by others and now can be viewed as the following:
1. Store rainwater for later use
 2. Use infiltration techniques, such as porous surfaces in non-clay areas
 3. Attenuate rainwater in ponds or open water features for gradual release
 4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
 5. Discharge rainwater direct to a watercourse
 6. Discharge rainwater to a surface water sewer/drain
 7. Discharge rainwater to the combined sewer
 8. Discharge rainwater to the foul sewer
- 8.37 Developers should not choose the method that is the most convenient or represents the lowest cost. LPA's, LLFA's and Water Authorities may enforce the surface water drainage hierarchy and demand that the highest practicable tier of the hierarchy is used.
- 8.38 The first two tiers of the drainage hierarchy ensure that surface water is retained within the site boundary and does not increase flood risk to others. This is always the most preferable method of surface water management.
- 8.39 The next six tiers of the hierarchy provide regional control, but with decreasing levels of pollution removal and reduced potential for amenity and habitat creation.
- 8.40 Within the lower six tiers of the drainage hierarchy, there must be some form of flow restriction, so that off-site surface water discharge is reduced, as much as is reasonably practicable. This requires on-site storage facilities, which may include ponds, swales, subsurface storage tanks and System C (non-infiltration) permeable pavements with flow control devices. Again, methods that provide the most potential for amenity and pollution removal should be favoured.
- 8.41 With regards to the proposed development, the tiers of the drainage hierarchy that have been achieved are outlined in Table 8.3 on the next page:

Table 8.3: Compliance with the Drainage Hierarchy

Tier	Discharge Method	Used?	Notes
1	Store rainwater for later use	ü	Water Butts are to be used in parts of the development.
2	Use infiltration techniques	û	The site is in an area of firm Wadhurst Clay, which is hydraulically unproductive and not conducive to infiltration.
3	Attenuate rainwater in ponds or open water features	ü	A SuDS basin has specified within the drainage strategy.
4	Attenuate rainwater by storing in tanks or sealed water features	ü	The drainage strategy will use 'System C' (tanked) composite permeable pavements and a geocellular tank.
5	Discharge rainwater direct to a watercourse	ü	The drainage strategy will discharge to an ordinary watercourse and will maintain the existing hydraulic regime.
6	Discharge rainwater to a surface water sewer/drain	û	This tier of the drainage hierarchy will not be required.
7	Discharge rainwater to the combined sewer	û	This tier of the drainage hierarchy will not be required.
8	Discharge rainwater to the foul sewer	û	This tier of the drainage hierarchy will not be required.

Summary

- 8.42 The drainage strategy uses the 1st, 3rd, 4th and 5th tiers of the drainage hierarchy, which are the highest available and site-suitable methods of surface water management and discharge.

MicroDrainage Hydraulic Modelling

- 8.43 The drainage strategy outlined above has been designed in MicroDrainage's Network hydraulic modelling module.
- 8.44 The results of the MicroDrainage hydraulic modelling for the proposed development can be seen in [Appendix L](#). All the pipe and manhole references match those on the drainage strategy plan in [Appendix J](#), for ease of reference.
- 8.45 The results of the hydraulic modelling show that the drainage strategy as outlined above can attenuate and discharge all surface water generated in the 1 in 100-year + 45% rainfall event, inclusive of urban creep, and without flooding.
- 8.46 The maximum half drain time of the system is 256 minutes, which is less than the 1,440-minute (24-hour) requirement for this metric.
- 8.47 The MicroDrainage hydraulic model has been built using the specific modelling requirements of WSCC as the LLFA and these have already been discussed in Paragraph 8.27 of this report.

9.0 Foul Water Drainage

- 9.1 Southern Water's Asset Location Plans in [Appendix E](#) show that there is that there is a public foul sewer network in West Hoathly Road adjacent to the site. This provides a suitable connection point for the development's foul waste.
- 9.2 The peak foul flow rate from the proposed development has been calculated based on Southern Water's foul sewerage modelling criteria. In summary, the calculation is based on the foul flow element, plus an allowance for misconnected surface water. While this is unlikely noting that the drainage strategy and design provides for separate and clearly defined surface water and foul drainage networks, it provides a precautionary approach.
- 9.3 Based on Southern Water's foul sewerage modelling criteria, the calculated design foul flow from the proposed development is 0.32 l/s.
- 9.4 It can be seen in the drainage strategy plan in [Appendix J](#) that the levels on the site will necessitate foul water to be pumped off site using a packaged pump station. Such a system will store foul waste within the wet well and the duty pump will lift waste when levels in the wet well reach critical levels. Therefore, while the inflow to the packaged pump station will be 0.32 l/s, it will lift waste intermittently at 2.5 l/s to 3.0 l/s. So, while the long-term average foul outflow will be 0.32 l/s, the pump will operate for short intermittent periods at a higher flow rate.
- 9.5 The ability to make a connection to the public foul sewer within the site, along with the capacity of the existing foul sewer, and any required network reinforcement, will be explored with Southern Water at the appropriate project juncture.
- 9.6 All Water and Sewerage Companies (WaSC's) have a legal obligation under Section 94 of the Water Industry Act 1991 (the Act) to provide developers with the right to connect to a public sewer regardless of capacity issues. This, in conjunction with Section 91(1) of the Act effectively means that Southern Water cannot object and the LPA cannot refuse to grant planning permission on the grounds of insufficient capacity or that no improvement works are planned for an area. The case precedent for this is a Supreme Court decision in Barratt Homes vs Welsh Water, in which the court held that the developer has an absolute right to connect to the existing sewer, whether or not it overloads the system. It ruled that the specific wording of the legislation allows for this right to be exercised, at no cost to the developer, apart from the normal connection charges.
- 9.7 Where local sewerage infrastructure constraints are identified, network reinforcements are delivered by the WaSC through New Infrastructure Charges on developers. For non-strategic sites, the WaSC company have a maximum of 24 months to deliver sewerage improvements from the date of 'a firm commitment to the development', which is the date of outline or full planning consent.

10.0 Surface Water Runoff Quality

- 10.1 The NPPF states that development should not have a detrimental impact on the environment, including the water environment. The technical guidance to the NPPF provides further advice on the benefits of ensuring runoff quality is to an appropriate standard.
- 10.2 The CIRIA SuDS Manual provides guidance on the treatment of surface water runoff. With regards to the proposed development, Table 4.3 of the CIRIA SuDS Manual rates the pollution hazard from roof water runoff as 'very low'. The only requirement for roof water runoff is the removal of gross solids and sediments, which would be achieved using catchpits and silt traps upstream of the permeable pavements and the geocellular tank.
- 10.3 With regards to the property driveways and the access roads, Table 4.3 of the CIRIA SuDS Manual rates the pollution hazard from residential car parking and low traffic roads as 'low'. To mitigate a 'low' pollution hazard, the CIRIA SuDS Manual recommends using a simple index approach in line with Section 26.7.1. This is discussed, below.
- 10.4 Table 26.2 of the CIRIA SuDS Manual provides pollution hazard indices for different land use classifications. The land use classification that requires consideration for low traffic roads and parking areas is in Table 10.1 below.

Table 10.1 - Excerpt from Table 26.2 of CIRIA SuDS Manual

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, homezones and general access roads) with less than 300 traffic movements per day.	Low	0.5	0.4	0.4

- 10.5 To deliver adequate pollution treatment and mitigation, the CIRIA SuDS Manual recommends using a SuDS component that has a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).
- 10.6 Table 26.3 of the CIRIA SuDS Manual provides indicative SuDS mitigation indices for each SuDS type when discharging to surface waters. Table 10.2, below, is an excerpt from Table 26.3 and this shows the mitigation indices for permeable pavements. Table 10.3 (next page) shows the mitigation indices for a SuDS basin.

Table 10.2 - Pollution Mitigation Indices for Permeable Pavements

Type of pollution removal component	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
Permeable Pavements	0.7	0.6	0.7

Table 10.3 - Pollution Mitigation Indices for a SuDS Basin

Type of pollution removal component	Total Suspended Solids (TSS)	Metals	Hydro-Carbons
SuDS Basin	0.5	0.5	0.6

- 10.7 Both the mitigation indices for permeable pavements and SuDS basins exceed those of the highest pollution hazard index figures from Table 10.1. This ensures all pollution hazards are completely mitigated, and no further treatment is needed.

11.0 Residual Risk

- 11.1 Whilst the drainage strategy for the development has been designed to attenuate surface water from the 1 in 100-year plus 45% rainfall event, plus an inclusion for urban creep, there could be a small residual risk of flooding due to blockage or failure or poor performance of on-site infrastructure. Therefore, appropriate and regular maintenance of the drainage infrastructure should be undertaken by the site management company or their agents.
- 11.2 To assist with this process, a Drainage Management and Maintenance Plan has been prepared, which sets out the principles for the long-term management and maintenance of the proposed surface water drainage system on the development. The Drainage Management and Maintenance Plan can be seen in [Appendix M](#).
- 11.3 The purpose of this document is to ensure that those responsible for site maintenance have a robust inspection and maintenance plan going forwards. This will help ensure the optimum operation of the surface water drainage system and that it will be regularly maintained for the lifetime of the development. This will contribute to reducing the risk of surface water flooding both on- and off-site.

12.0 Exceedance Events

- 12.1 Exceedance events are those greater than the design rainfall event (i.e., greater than the 1 in 100-year rainfall event plus 45% for climate change).
- 12.2 Any rainfall events greater than the design rainfall event may cause flooding due to them 'exceeding' the capacity of the drainage system. In this situation it is imperative to check whether flooding would occur and, if so, whether it needs to be contained on site. Exceedance flows should not ingress into any properties on site and should not cause nuisance to any neighbouring sites or buildings.
- 12.3 The drainage system as designed has a large attenuation capacity available and, because of the LLFA's design criteria, it assumes zero losses due to vegetation interception, evaporation and surface roughness, and cannot include for storage/conveyance within the pipes around/between the plots and the main drainage system. Therefore, the drainage system, as designed, represents an *extremely* conservative strategy that, in a real-world scenario, would not receive the surface water that has been catered for in the MicroDrainage hydraulic model. As such, the designed drainage system would, in operation, have capacity for events beyond that of the 1 in 100-year rainfall event plus 45% for climate change, i.e. 'exceedance events'.
- 12.4 Notwithstanding this, a high-level plan of exceedance flows has been produced to show the pathway that exceedance flows would take across the site. This can be seen in [Appendix M](#). Because of the topography of the site, exceedance flows would generally move north and eastwards and would fall to the watercourse on the eastern site boundary. Because of the depth of this channel relative to the site and the neighbouring plots of land (which are rural/undeveloped) exceedance flows would cause no inconvenience or damage on- or off-site.

13.0 Summary and Conclusion

- 13.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been produced by Motion on behalf of their client, Devine Homes PLC. It supports the planning application for the erection of 44 new homes with access from West Hoathly Road, vehicle and cycle parking, landscaping, drainage, and associated infrastructure and highway works on the Land South of West Hoathly Road, East Grinstead, West Sussex
- 13.2 The EA's Flood Map for Planning shows that the site is within Flood Zone 1 and is not at risk of fluvial (or tidal) flooding in the present day or in the future.
- 13.3 The updated RoFSW mapping for the site shows that the site is almost entirely at 'Very Low' risk of surface water flooding. In the southeastern corner of the site, there is an area of 'Low', 'Medium' and 'High' surface water flood risk that follows the channel and small valley feature associated with the ordinary watercourse.
- 13.4 Referring to Paragraph 175 of the NPPF, no built development is within any areas of risk. Therefore, the development has followed the sequential approach to the layout and allocation of development within the site and is in accordance with the NPPF and the minimal areas of surface flood risk within the red line boundary should not form an impediment to the progress of this development.
- 13.5 All other forms of 'local' flood risk are negligible to zero, and flood risk does not increase on site due to climate change.
- 13.6 The drainage strategy for the proposed development has been produced in line with the drainage hierarchy and WSCC's LLFA design criteria. It will use a traditional piped drainage, SuDS features and attenuation structures to provide surface water storage, source control and pollution mitigation. The site's surface water will discharge at the QMED Rural greenfield runoff rate of 8.4 l/s to the adjacent ordinary watercourse on the site's eastern boundary. This is the case for all rainfall events, so it preserves the baseflow and hydraulic regime of the local watercourses while simultaneously reducing flood risk during higher order rainfall events.
- 13.7 This drainage strategy has been hydraulically modelled in MicroDrainage's Network module and has shown that it can attenuate the 1 in 100-year + 45% rainfall event without flooding, with an inclusion for urban creep.
- 13.8 A drainage management and maintenance plan has been produced that shows how the proposed drainage system will be maintained in perpetuity.
- 13.9 Exceedance flows have been considered and an exceedance plan produced.
- 13.10 It is suggested that foul waste from the site will be lifted using a packaged pump station and will connect to the existing public foul sewer that is present in West Hoathly Road.
- 13.11 In conclusion, this drainage strategy has shown that the proposed development is at a very low residual risk of flooding, and this makes it appropriate in this location. Similarly, the drainage strategy has shown that the development can manage its foul and surface water sustainably. Therefore, flood risk and surface water management should not form an impediment to the progress of this application.

Appendix A

Proposed Development Layout



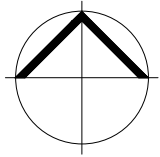
CDM 2015 Health & Safety Information

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

Accommodation Schedule

Affordable	Approx. Area	13 dwellings
1 no. 1B2P	50.1m ² (539ft ²)	1-Bedroom Flat
1 no. 1B2P	50.5m ² (544ft ²)	1-Bedroom Flat
1 no. 1B2P	50.6m ² (545ft ²)	1-Bedroom Flat
1 no. 1B2P	58.7m ² (632ft ²)	1-Bedroom Flat
2 no. 1B2P	59.1m ² (636ft ²)	1-Bedroom Flat
1 no. 2B4P	73.2m ² (788ft ²)	2-Bedroom Flat
1 no. 2B4P	80.0m ² (861ft ²)	2-Bedroom Flat
1 no. 2B4P	83.1m ² (894ft ²)	2-Bedroom FOG
3 no. 2B4P	79.9m ² (860ft ²)	2-Bedroom House
1 no. 3B5P	98.0m ² (1055ft ²)	3-Bedroom House
Open Market		
7 no. 2B4P	79.6m ² (857ft ²)	2-Bedroom House
2 no. 2B4P	80.2m ² (863ft ²)	2-Bedroom House
13 no. 3B5P	98.0m ² (1055ft ²)	3-Bedroom House
1 no. 3B5P	98.0m ² (1066ft ²)	3-Bedroom House
5 no. 3B5P	99.2m ² (1068ft ²)	3-Bedroom House
3 no. 4B6P	137.2m ² (1477ft ²)	4-Bedroom House
Total		44 dwellings

KEY	
	Site Boundary
	Ancient Woodland
	15m Buffer to Ancient Woodland
Cbf	1.8m Close board fence
Bw	1.8m Brick wall
PI	Post & rail fence
Car Parking;	1 space per apartment and FOG unit 2 spaces per 2-bedroom dwelling 2 spaces per 3-bedroom semi-detached dwelling 2 spaces with most 3-bedroom detached dwellings having an additional garage 11 visitor spaces
Cycle Parking;	2 spaces per dwelling within garages, or rear garden stores
Refuse Storage;	Within rear gardens to be brought to property fronts on collection days only, or to designated bin collection points



P06	11.12.25	Planning Submission	GP	PA
Rev	Date	Revision Details	Dr	Ch



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Client's Name
DEVINE HOMES

Job Title
**LAND AT WEST HOATHLY ROAD
EAST GRINSTEAD**

Drawing Title
SITE LAYOUT

Scale
1:500 @ A1 / 1:1000 @ A3

metres 10 20 30 40 50

Drawn	Checked	Date
GP	PA	05.09.25

Job No	Drawing No	Rev
7189	PL-01	P06

Status
APPROVAL

Appendix B

Site Location Plan



Key:

Site Boundary

Client's Name

DEVINE HOMES

Job Title

LAND AT WEST HOATHLY ROAD
EAST GRINSTEAD

Drawing Title

LOCATION PLAN

Scale

1:1250 @ A3

metres

10

20

30

40

50

Drawn	Checked	Date
GP	PA	31.10.25
Job No	Drawing No	Rev
7189	L-01	P2
Status		
INFORMATION		

P2	11.12.25	Revised Redline Boundary	GP	PA
P1	26.11.25	Revised Redline Boundary	GP	PA
Rev	Date	Revision Details	Dr	Ch

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www.ecearchitecture.com

CAD Plot date: 11/12/2025 - 11:28:58

7189 - site layout.dwg

Appendix C

Topographic Survey



Appendix D

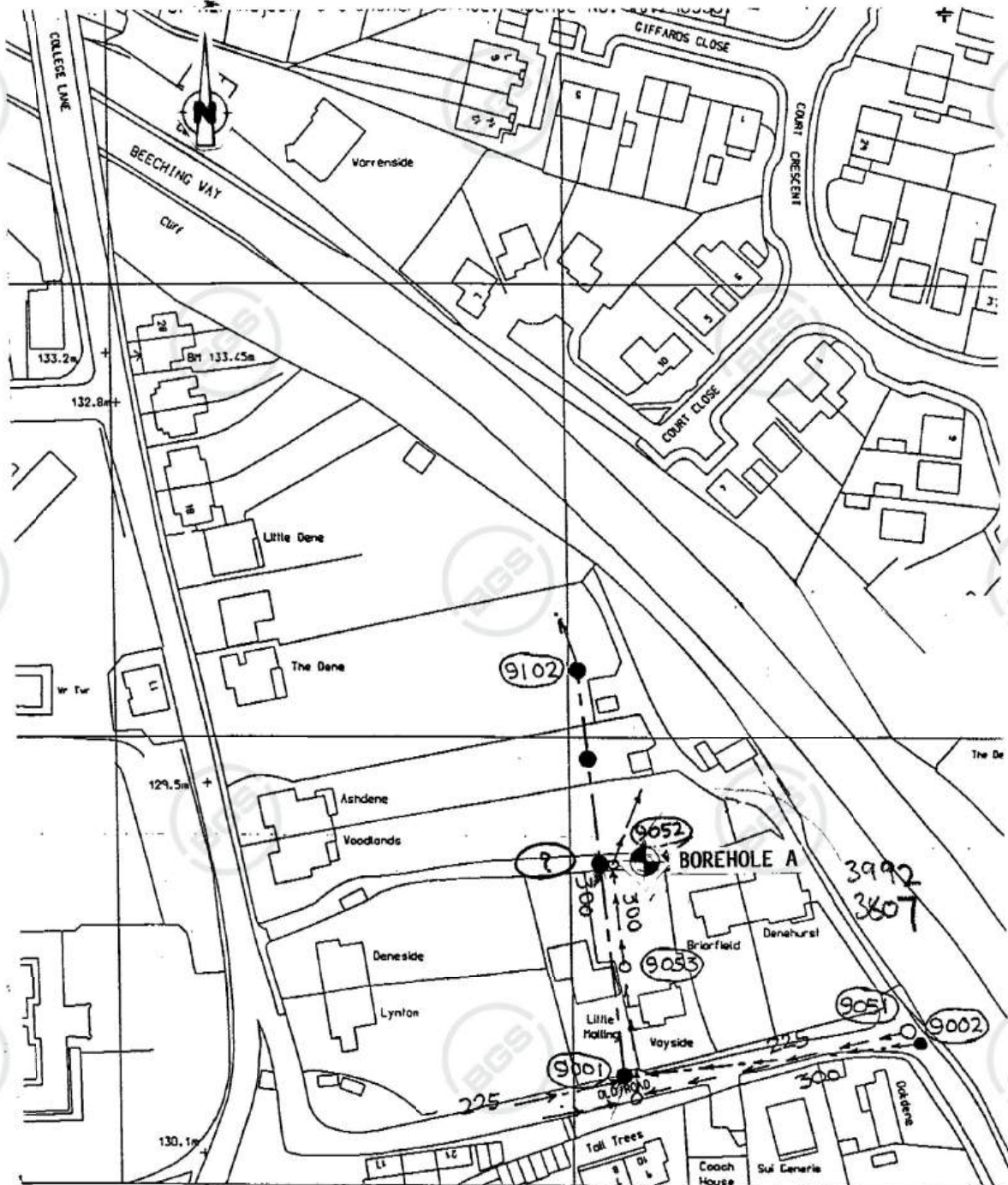
BGS Borehole Log TQ33NE31

Norwest Holst Soil Engineering Ltd

GROUND INVESTIGATION TQ33NE/28-31

Client: Southern Water Services Limited

Location: East Grinstead Re-Sewerage.



NB. Positions of Boreholes are only indicative unless dimensioned.

Contract No: F9690

Title:

Fig:

Scale: 1:1250

BOREHOLE LOCATION PLAN

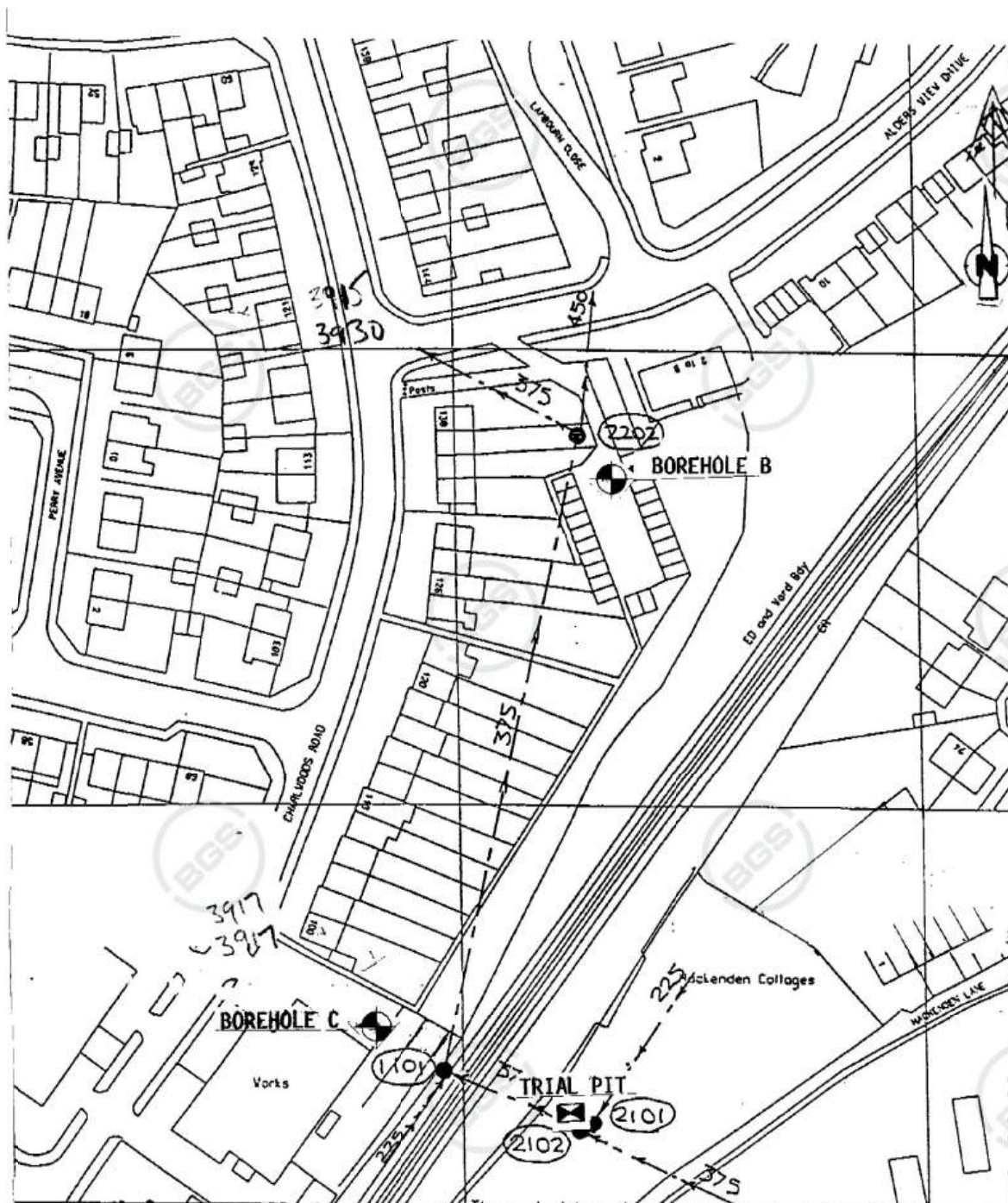
1

REF 1000/92

Norwest Holst Soil Engineering Ltd
GROUND INVESTIGATION TQ33NE/28-31

Client: Southern Water Services Limited.

Location: East Grinstead Re-Sewerage.



NB. Positions of Boreholes and Trial Pits are only indicative unless dimensioned

Contract No: F9690

Title:

Scale: 1:1250

BOREHOLE AND TRIAL PIT LOCATION PLAN

Fig:

2

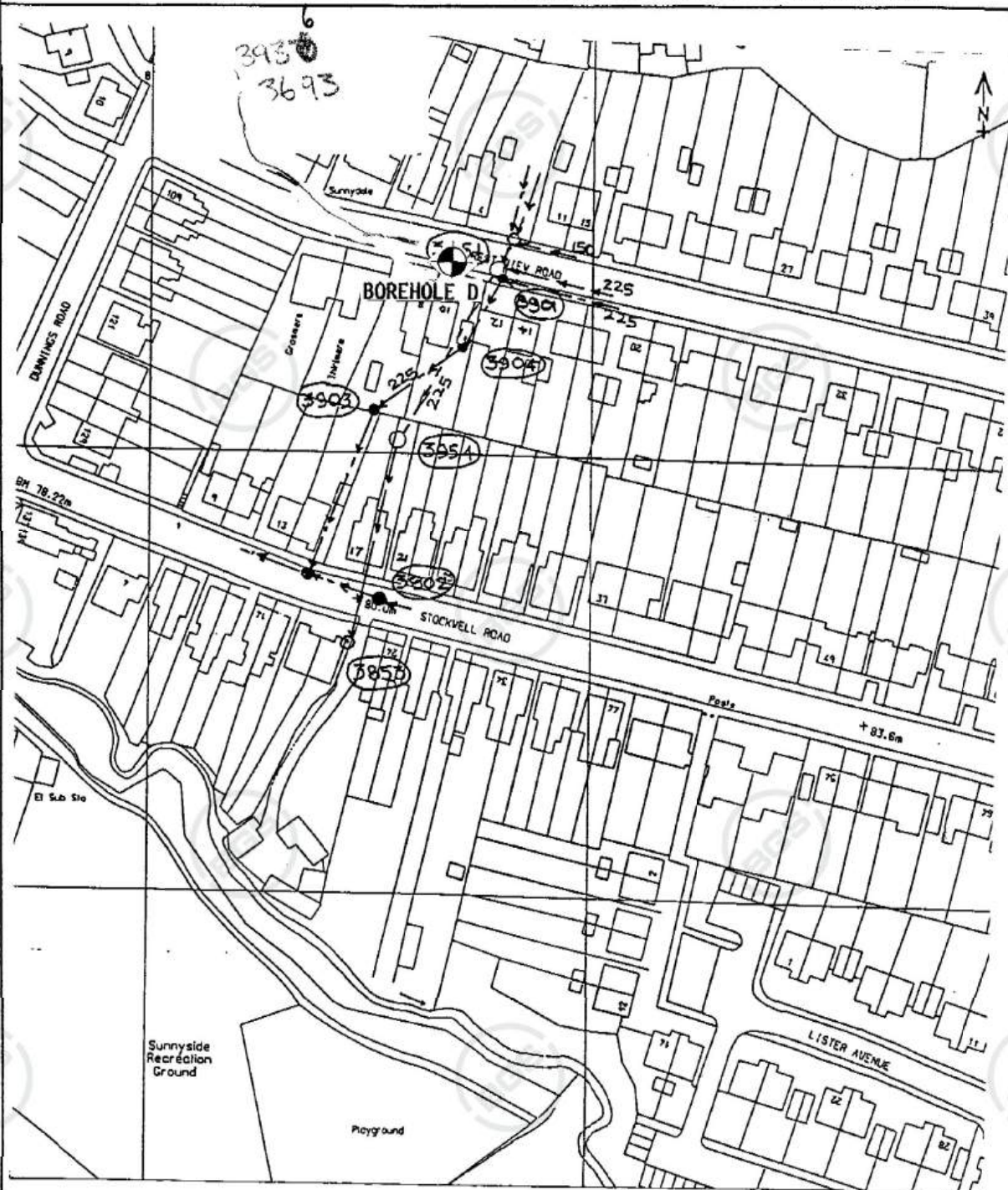
REF1003/92

Norwest Holst Soil Engineering Ltd

GROUND INVESTIGATION TQ33NE/28-31

Client: Southern Water Services Limited .

Location: East Grinstead Re-Sewerage.



NB. Positions of Boreholes are only indicative unless dimensioned.

Contract No: F9690

Title:

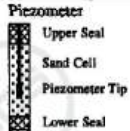
Fig:

Scale: 1:1250

BOREHOLE LOCATION PLAN

3

REF1000/92

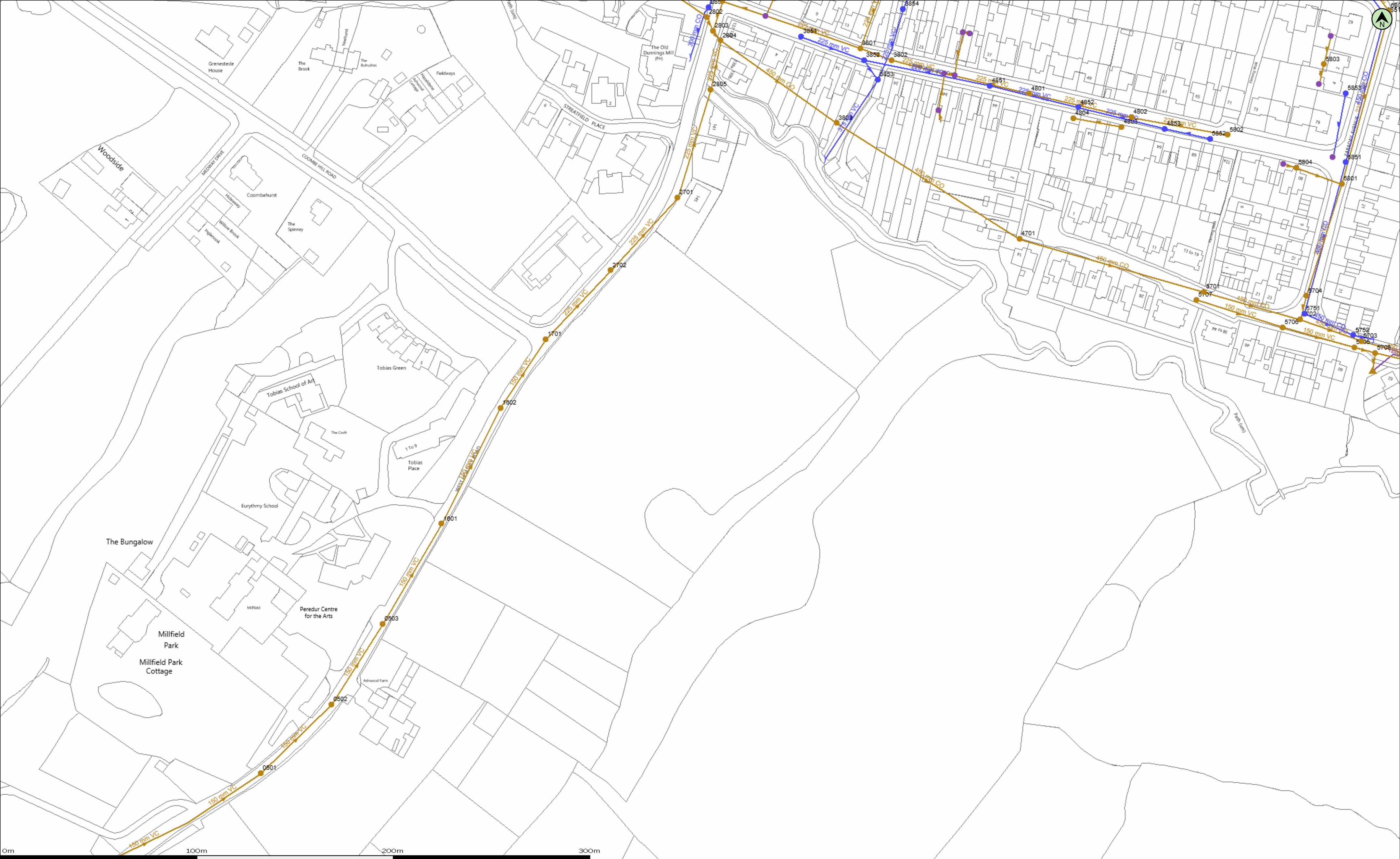
Status Final		 Norwest Holst Soil Engineering Ltd.				Borehole No. D									
Date 15/03/93		BOREHOLE LOG - CABLE PERCUSSION				Header Sheet									
Contract No. F9690 Project East Grinstead		Method Cable Percussion Drilling Rig Diameter 150		Coords. Ground Level Orientation Vertical Date Started 08/01/93 Date Completed											
Client Southern Water Services Ltd Consultant Sthn Projects Ltd		TP 33 NE/31													
PROGRESS							WATER STRIKES								
Date	Time	Hole Depth	Casing Depth	Casing Dia.	Water Depth	Remarks	Date	Time	Strike	Rise	After n Minutes	Flow	Sealed		
							08/01/93		4.80	4.65	20				
DRILLING DETAILS							SPT AND CPT DETAILS								
Chiselling		Water added		Remarks		Depth	Blows for 75mm Increments								
From	To	Hours	From										To		
NOTES															
All depths in metres; all diameters in millimetres.															
GROUNDWATER LEVELS ARE SUBJECT TO SEASONAL, TIDAL AND OTHER FLUCTUATIONS AND SHOULD NOT BE TAKEN AS CONSTANT.															
Driller				Logged by				Checked by							
KEY TO SYMBOLS AND ABBREVIATIONS															
D Small Disturbed Sample B Bulk Disturbed Sample LB Large Bulk Disturbed Sample U Undisturbed U100 Sample P Piston Sample TW Thin-wall Sample NR No Recovery				W Water Sample G Gas Sample () Blows to drive U100 V Insitu Vane Test PR Pressuremeter Test K Permeability Test				S Standard Penetration Test C Cone Penetration Test " " N for full 300mm penetration .. /175 For given penetration (mm) .. /25* Seating blows only NP No penetration				Piezometer  Upper Seal Sand Cell Piezometer Tip Lower Seal Grout		 Form G102 Version 1.04 Revised 24.09.99	



Status Final Date 15/03/93	Norwest Holst Soil Engineering Ltd. BOREHOLE LOG - CABLE PERCUSSION	Borehole No. D Sheet 1 of 1																																																																																																								
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Contract No. F9690</td> <td style="width: 33%;">Method Cable Percussion</td> <td style="width: 34%;">Coords.</td> </tr> <tr> <td>Project East Grinstead</td> <td>Drilling Rig</td> <td></td> </tr> <tr> <td></td> <td>Diameter 150</td> <td>Ground Level</td> </tr> <tr> <td>Client Southern Water Services Ltd</td> <td style="text-align: center; vertical-align: middle;"> TQ33NE/31 39363893 </td> <td>Orientation Vertical</td> </tr> <tr> <td>Consultant Sthn Projects Ltd</td> <td></td> <td>Date Started 08/01/93</td> </tr> <tr> <td></td> <td></td> <td>Date Completed</td> </tr> </table>			Contract No. F9690	Method Cable Percussion	Coords.	Project East Grinstead	Drilling Rig			Diameter 150	Ground Level	Client Southern Water Services Ltd	TQ33NE/31 39363893	Orientation Vertical	Consultant Sthn Projects Ltd		Date Started 08/01/93			Date Completed																																																																																						
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 45%;">Description of Strata</th> <th style="width: 5%;">Legend</th> <th style="width: 5%;">Depth below G.L.</th> <th style="width: 5%;">O.D. Level</th> <th style="width: 10%;">Sampling</th> <th style="width: 5%;">Casing Depth</th> <th style="width: 10%;">() & "N"</th> <th style="width: 10%;">Install-ation</th> </tr> </thead> <tbody> <tr> <td>MADE GROUND: Tarmac.</td> <td style="text-align: center;"></td> <td style="text-align: center;">0.30</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Soft to firm grey mottled orange brown fissured silty CLAY.</td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">D 0.50</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"></td> <td style="text-align: center;">1.20</td> <td></td> <td style="text-align: center;">D 1.00</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Firm grey mottled orange brown silty CLAY.</td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">DU 1.50 1.95</td> <td></td> <td style="text-align: center;">(30)</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"></td> <td style="text-align: center;">2.00</td> <td></td> <td style="text-align: center;">D 2.00</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Firm to stiff greyish brown silty CLAY with some fine gravel size mudstone lithorelicts.</td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">U 2.50 2.95</td> <td></td> <td style="text-align: center;">(80)</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"></td> <td style="text-align: center;">3.00</td> <td></td> <td style="text-align: center;">D 3.00</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Greyish brown laminated highly weathered silty MUDSTONE very weak.</td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">U 3.50 3.95</td> <td></td> <td style="text-align: center;">(100)</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">D 4.00</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"></td> <td></td> <td></td> <td style="text-align: center;">U 4.50 4.95</td> <td></td> <td style="text-align: center;">(85)</td> <td></td> </tr> <tr> <td>—5.00m becoming brown</td> <td style="text-align: center;"></td> <td style="text-align: center;">5.00</td> <td></td> <td style="text-align: center;">D 5.00</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Borehole complete at 5.00m</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>			Description of Strata	Legend	Depth below G.L.	O.D. Level	Sampling	Casing Depth	() & "N"	Install-ation	MADE GROUND: Tarmac.		0.30						Soft to firm grey mottled orange brown fissured silty CLAY.				D 0.50						1.20		D 1.00				Firm grey mottled orange brown silty CLAY.				DU 1.50 1.95		(30)				2.00		D 2.00				Firm to stiff greyish brown silty CLAY with some fine gravel size mudstone lithorelicts.				U 2.50 2.95		(80)				3.00		D 3.00				Greyish brown laminated highly weathered silty MUDSTONE very weak.				U 3.50 3.95		(100)						D 4.00								U 4.50 4.95		(85)		—5.00m becoming brown		5.00		D 5.00				Borehole complete at 5.00m							
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REMARKS - See Header Sheet for: Key to Symbols and abbreviations Drilling Details, Progress and Water Strikes General Notes						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"></td> </tr> <tr> <td>Form G112</td> </tr> <tr> <td>Version 1.04</td> </tr> <tr> <td>Revised 24.09.92</td> </tr> </table>			Form G112	Version 1.04	Revised 24.09.92																																																																																															
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Revised 24.09.92																																																																																																										

Appendix E

Southern Water Asset Location Plan



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 Date: 06/08/25 Scale: 1:1250 Map Centre: 539256,136678 Data updated: 23/07/25 Our Ref: 1844412 - 1 Wastewater Plan A2 Powered by digdat

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

pallen@motion.co.uk
1dheg2



Appendix F

Environment Agency Flood Map for Planning

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
539236/136677

Created
6 August 2025 09:52

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

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

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

Notes

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

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

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

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



Flood map for planning

Your reference

Unspecified

Location (easting/northing)

539236/136677

Scale

1:2,500

Created

6 Aug 2025 09:52

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



0 20 40 60m

Appendix G

Environment Agency Risk of Flooding from Surface Water (RoFSW) Map

Get a boundary report

 [Edit](#)

 [Delete](#)

Datasets

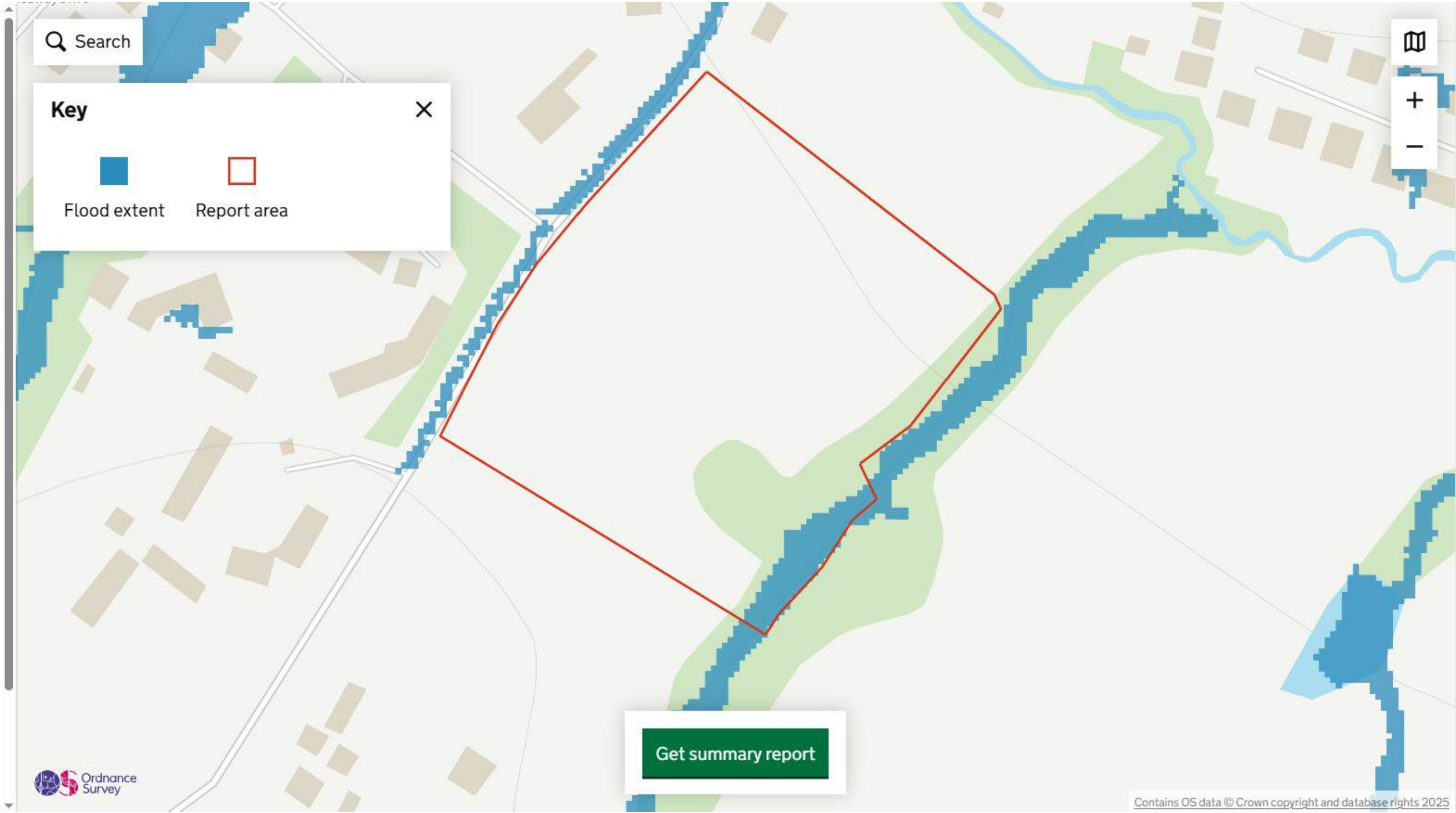
- ☐ Flood zones 2 and 3
- ☐ River and sea with defences
- ☐ River and sea without defences
- ☒ Surface water
- ☐ None

Annual likelihood of flooding

- ☐ 1 in 30
- ☐ 1 in 100
- ☒ 1 in 1000

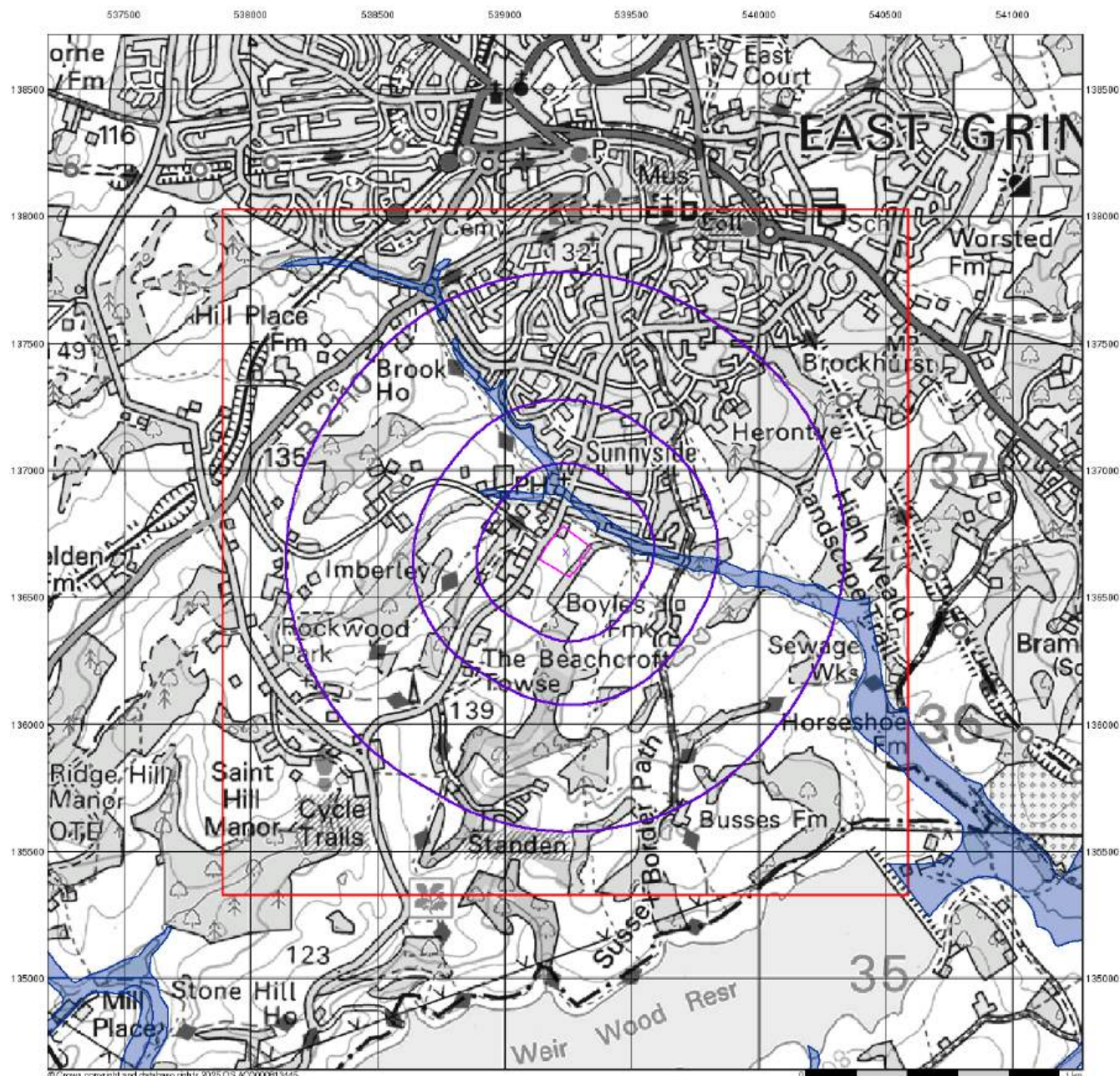
Map features

☐ Water storage



Appendix H

Groundwater Flood Susceptibility Mapping



© Crown copyright and database rights 2025 OS A20000813445

motion BGS Flood Data (1:50,000)

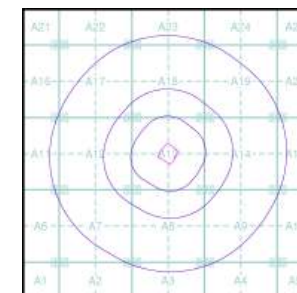
General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point
-  Slice
-  Map ID

BGS Geological Indicators of Flooding

-  Coastal
-  Inland
-  Bodies of Water

BGS Flood Data Map - Slice A



Order Details

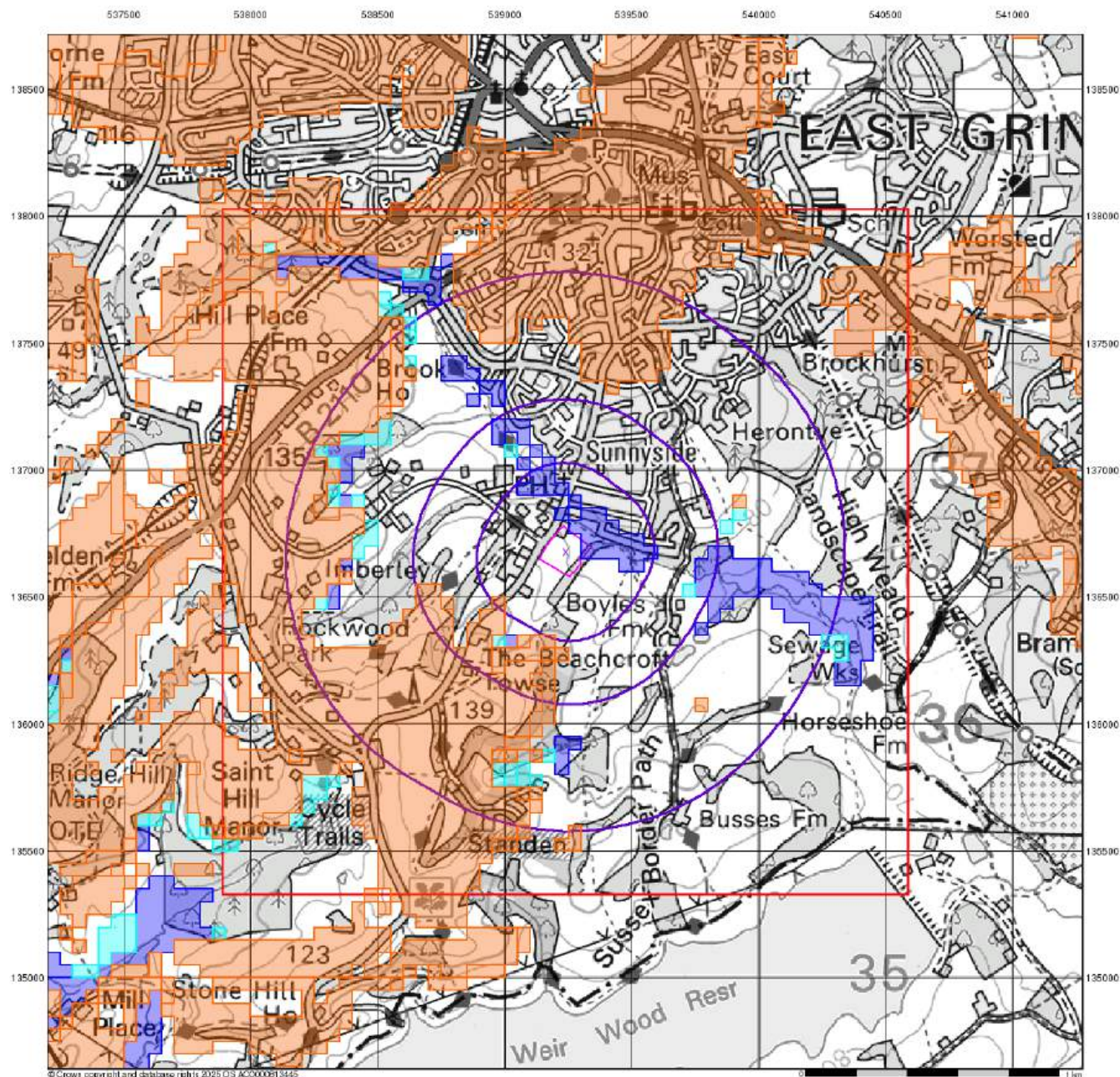
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 Customer Ref: 1dheg2/2504066
 National Grid Reference: 539240, 136680
 Slice: A
 Site Area (Ha): 2.17
 Search Buffer (m): 1000

Site Details

Coombe Cottage, Coombe Hill Road, EAST GRINSTEAD, RH19 4LY

Landmark
 INFORMATION GROUP

Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



© Crown copyright and database rights 2025 OS A20000081 0445

motion BGS Flood Data (1:50,000)

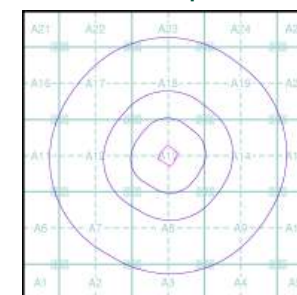
General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point
-  Slice
-  Map ID

BGS Groundwater Flooding Susceptibility

-  Potential for Groundwater Flooding to Occur at Surface
-  Potential for Groundwater Flooding of Property Situated Below Ground Level
-  Limited Potential for Groundwater Flooding to Occur

BGS Flood Data Map - Slice A



Order Details

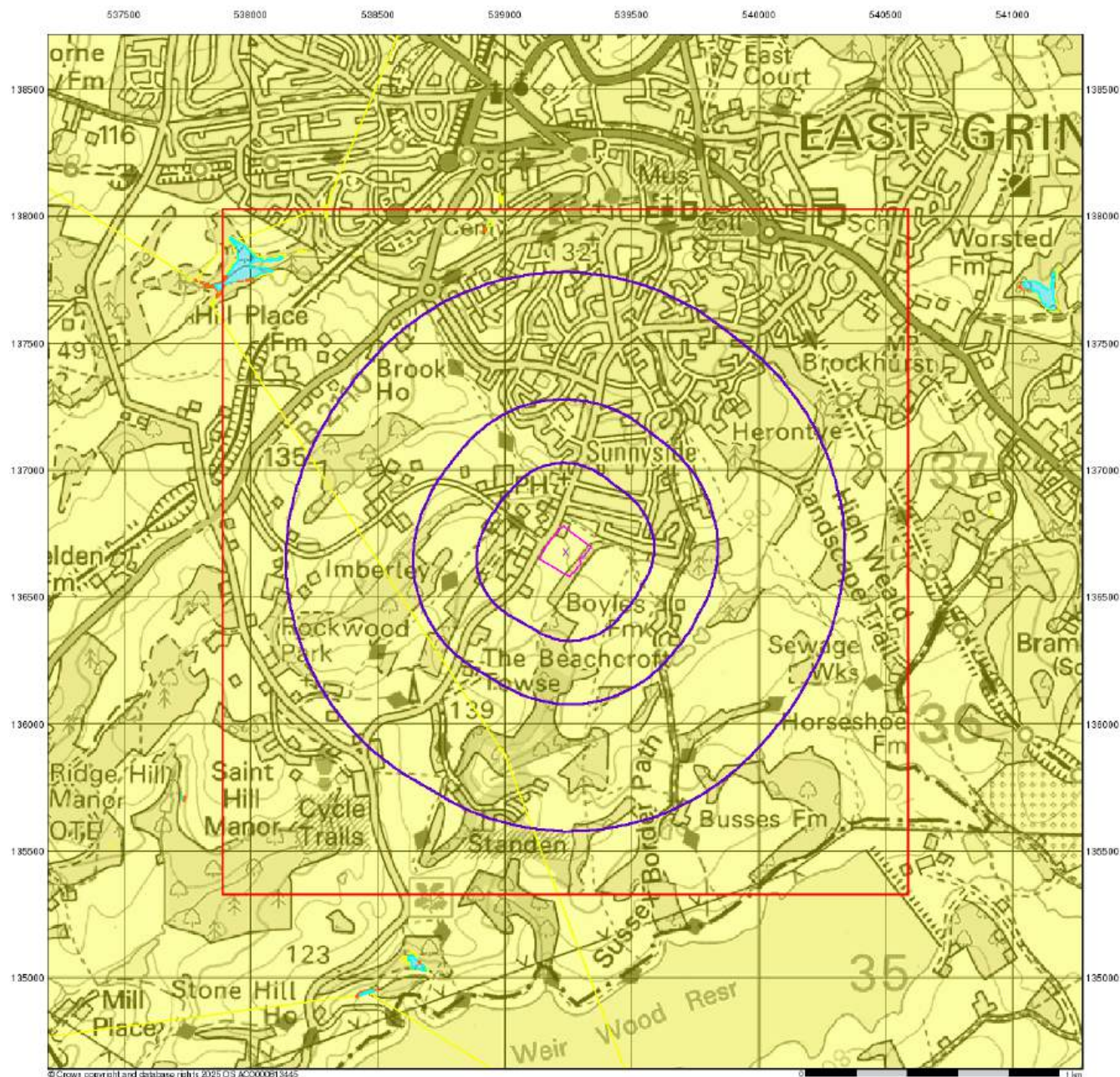
Order Number: 382833159_1_1
 Customer Ref: 1dheg2/2504066
 National Grid Reference: 539240, 136680
 Slice: A
 Site Area (Ha): 2.17
 Search Buffer (m): 1000

Site Details

Coombe Cottage, Coombe Hill Road, EAST GRINSTEAD, RH19 4LY

Landmark
 INFORMATION GROUP

Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



GeoSmart Information Groundwater Flood Map (1:50,000)

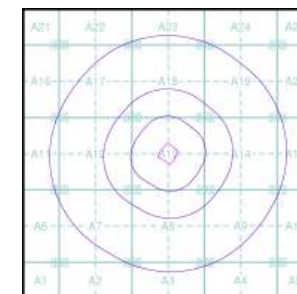
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice

GeoSmart Information Groundwater Flooding Risk

- High Risk
- Moderate Risk
- Low Risk
- Negligible Risk

GeoSmart Information Groundwater Flood Map - Slice A



Order Details

Order Number: 382833159 1 1
 Customer Ref: 1dheg2/2504066
 National Grid Reference: 539240, 136680
 Slice: A
 Site Area (Ha): 2.17
 Search Buffer (m): 1000

Site Details

Coombe Cottage, Coombe Hill Road, EAST GRINSTEAD, RH19 4LY



Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk

Appendix I

QMED Greenfield Runoff Calculation

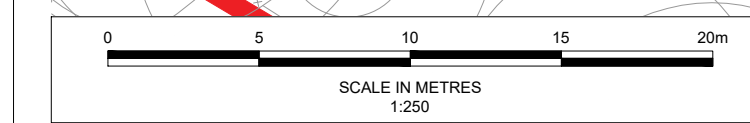
Motion		Page 1
84 North Street Guildford Surrey GU1 4AU		
Date 06/08/2025 14:12 File	Designed by commonuser Checked by	
Innovyze		Source Control 2020.1.3
FEH Mean Annual Flood Input QMED Method 2008 URBEXT (1990) 0.1345 Site Location GB 539400 136700 TQ 39400 36700 SPRHOST 45.310 Area (ha) 0.703 BFIHOST 0.362 SAAR (mm) 829 FARL 0.996 Results QMED Rural (l/s) 8.4 QMED Urban (l/s) 9.8		
©1982-2020 Innovyze		

Appendix J

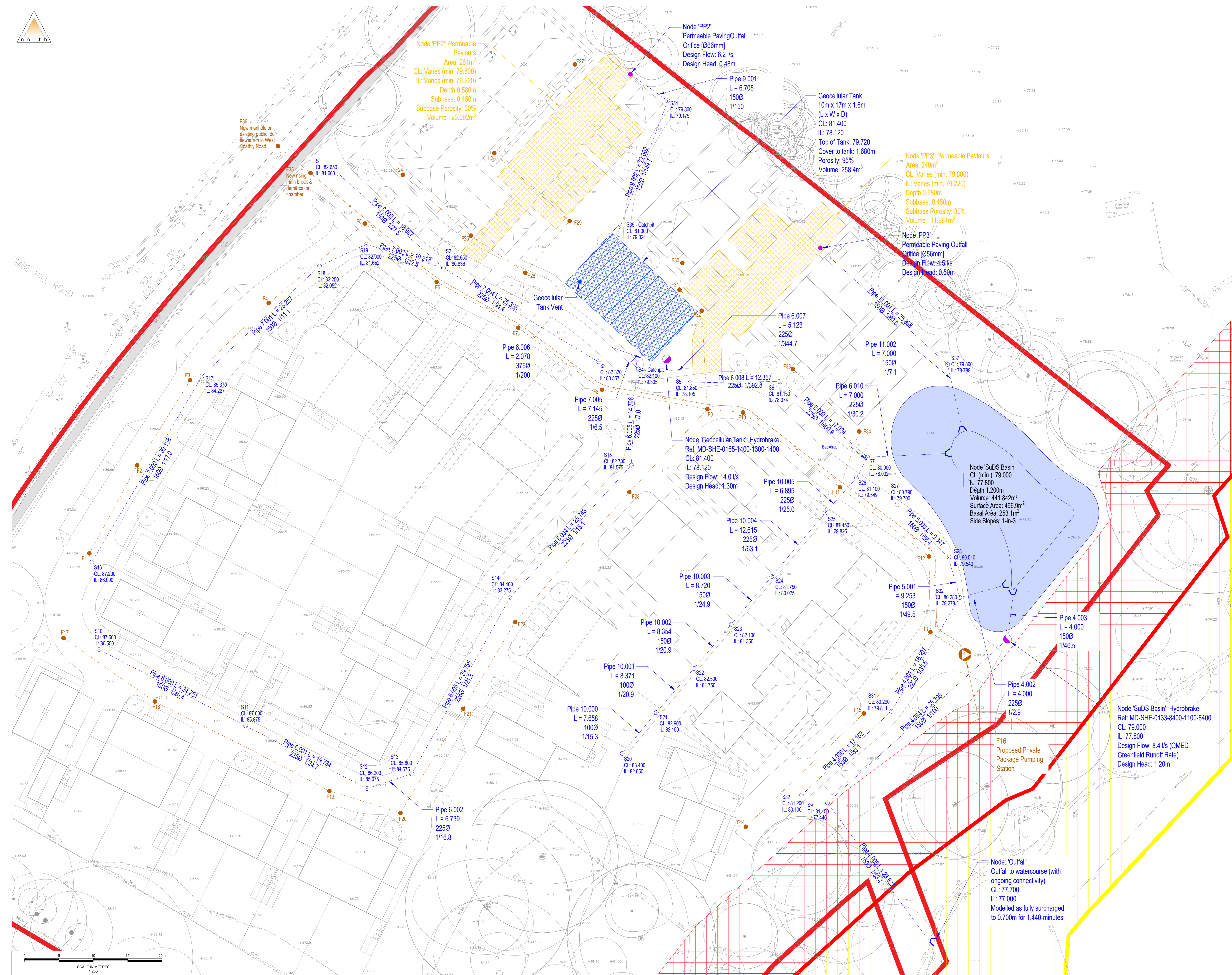
Drainage Strategy Plan



OMBE HILL ROAD
WEST HOATHLY ROAD



C:\Users\jhalley\Videos\SurfSite - Limg2_2504066\Drawings\2504066-0500-Drainage Strategy-P05.dwg



- Notes
1. This Drainage Strategy Plan is for planning purposes and does not constitute detailed designs and should not be used for construction purposes.
 2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
 3. This drawing has been based upon survey supplied information and Motion cannot guarantee the accuracy of the data provided.
 4. The drainage levels are based on existing levels, but also proposed levels where existing site features present unusual changes in gradient.
 5. Any discrepancies should be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
 6. This drawing should be read in conjunction with all other relevant engineering details, drawings and specification.
 7. 350mm minimum cover is to be provided for private pipes laid in soft/paved areas, with 900mm minimum cover to be provided for private pipes laid beneath roads / driveways unless not practicable. Where unachievable, shallow pipe drains may require protection using concrete surround or paving slabs bridging the trench, subject to the NHBC Inspector's requirements.
 8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.
 9. All foul sewage to have levels confirmed once detailed design commences and slab/FFL's are finalised.

- Legend
- Site Boundary
 - Permeable Paviments
 - Geocellular Attenuation Tank
 - Surface Water Gravity Pipe
 - Surface Water Manhole
 - Foul Gravity Pipe
 - Foul Water Manhole
 - Foul rising main
 - Existing foul public surface water sewer
 - Orifice Flow Control
 - Hydrobrake Flow Control
 - Proposed Headwall
 - Catchpit Manhole (1200mmØ)
 - Geocellular Tank Vent
 - Backdrop Manhole
 - 5m Ancient Woodland Buffer
 - Ancient Woodland

P05	Fifth Issue - Final Site Layout	PA	PA	PA	16/12/2025
P04	Fourth Issue	PA	PA	PA	24/11/2025
P03	Third Issue - Foul Sewerage Added	PA	PA	PA	20/11/2025
P02	Second Issue	PA	PA	PA	07/11/2025
P01	First Issue	PA	PA	PA	05/08/2025
Rev.	Description	Drm	Chk	App	Date

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION



Client:
Devine Homes

Project:
Land South of West Hoathly Road
East Grinstead, West Sussex
Title:
Drainage Strategy Plan

Scale: 1:250 (@ A1)
Drawing:
2504066-0500
Revision:
P05

Appendix K

WSCC Conditions Requiring Ordinary Watercourse Consent

Image	Description/Action
	Pipe culvert of part or whole section of watercourse, including modification of existing pipe culvert Consent required under Section 23 1(b & c)
	Oversized box culvert of part or whole section of watercourse, including modification of existing box culvert Consent required under Section 23 1(b & c)
	Addition or alteration of trash screens (grilles) Consent required under Section 23 1(b & c)
	Bank protection works, not resulting in loss of cross sectional area Unlikely to require consent*
	Pipe crossing in channel Consent required under Section 23 1(b & c)
	Pipe crossing above bank Unlikely to require consent*
	Pipe crossing below bed Unlikely to require consent*
	Protruding pipe outfall with or without headwall Consent required under Section 23 1(b & c)
	Outfall within bank profile with or without headwall Unlikely to require consent*
	Weir/Dam or impoundment that would obstruct natural flow Consent required under Section 23 1(a)
	Bridge where soffit level is below bank top level Consent required under Section 23 1(a) if it has the potential to affect flow
	Clear span bridge or abutments not within cross sectional area Unlikely to require consent*
	Bridge abutments or supports within cross sectional area Consent required under section 23 1(a)
	Clear span bridge Unlikely to require consent*.
	Bridge with support in channel. Consent required under section 23 1(a)

***May require consent if temporary works cause obstructions to flow.**

Note: "flow" should be determined as bank full flow conditions

Appendix L

MicroDrainage Network Hydraulic Model Outputs

Motion

84 North Street
Guildford
Surrey GU1 4AU

Date 06/08/2025 15:25
File 1dheg2-MD-NW-24.06.2025...

Innovyze

Page 1



Designed by commonuser
Checked by

Network 2020.1.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)

FEH Rainfall Version

Site Location GB 539400 136700 TQ 39400 36700

Data Type

Maximum Rainfall (mm/hr)

Maximum Time of Concentration (mins)

Foul Sewage (l/s/ha)

Volumetric Runoff Coeff.

PIMP (%)

Add Flow / Climate Change (%)

Minimum Backdrop Height (m)

Maximum Backdrop Height (m)

Min Design Depth for Optimisation (m)

Min Vel for Auto Design only (m/s)

Min Slope for Optimisation (1:X)

100

2013

Catchment

550

30

0.000

1.000

100

0

0.200

1.500

0.350

1.00

500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.350	4-8	0.314	8-12	0.032	12-16	0.032	16-20	0.009

Total Area Contributing (ha) = 0.736

Total Pipe Volume (m³) = 14.660

Network Design Table for Storm

- Indicates pipe length does not match coordinates
« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
S4.000	17.152	0.214	80.1	0.030	15.00	0.0	0.600	o	150	Pipe/Conduit		
S4.001	18.907	0.533	35.5	0.023	0.00	0.0	0.600	o	225	Pipe/Conduit		
S5.000	9.347	0.160	58.4	0.007	15.00	0.0	0.600	o	150	Pipe/Conduit		
S5.001	9.253	0.187	49.5	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit		

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.000	93.04	15.25	80.100	0.030	0.0	0.0	0.0	1.12	19.9	10.1
S4.001	92.61	15.40	79.811	0.053	0.0	0.0	0.0	2.20	87.6	17.7
S5.000	93.47	15.12	79.700	0.007	0.0	0.0	0.0	1.32	23.3	2.4
S5.001	93.13	15.23	79.540	0.012	0.0	0.0	0.0	1.43	25.3	3.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.002	4.000#	1.478	2.7	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.000	24.251	0.600	40.4	0.034	15.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	19.784	0.800	24.7	0.043	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.002	6.739	0.400	16.8	0.036	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.003	29.755	1.400	21.3	0.030	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.004	25.743	1.700	15.1	0.052	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.005	14.798	2.120	7.0	0.015	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.000	30.138	1.773	17.0	0.032	15.00	0.0	0.600	o	150	Pipe/Conduit	
S7.001	23.257	2.100	11.1	0.041	0.00	0.0	0.600	o	150	Pipe/Conduit	
S7.002	8.842	0.400	22.1	0.024	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.003	10.218	0.816	12.5	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.000	18.967	0.689	27.5	0.003	15.00	0.0	0.600	o	150	Pipe/Conduit	
S7.004	26.335	0.279	94.4	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
S7.005	7.085	1.102	6.4	0.057	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.006	2.078	0.010	200.0	0.008	0.00	0.0	0.600	o	375	Pipe/Conduit	
S9.000	0.984	0.012	80.0	0.000	15.00	0.0	0.600	o	100	Pipe/Conduit	
S9.001	6.705	0.045	150.0	0.063	0.00	0.0	0.600	o	150	Pipe/Conduit	
S9.002	22.602	0.151	149.7	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	
S9.003	3.000#	0.020	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S6.007	5.213	0.015	344.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.002	92.58	15.41	79.278	0.108	0.0	0.0	0.0	8.01	318.6	35.9
S6.000	93.04	15.25	86.550	0.034	0.0	0.0	0.0	1.59	28.1	11.4
S6.001	92.66	15.38	85.875	0.077	0.0	0.0	0.0	2.64	105.0	25.8
S6.002	92.56	15.41	85.075	0.113	0.0	0.0	0.0	3.20	127.4	37.8
S6.003	92.04	15.59	84.675	0.143	0.0	0.0	0.0	2.85	113.4	47.5
S6.004	91.66	15.72	83.275	0.195	0.0	0.0	0.0	3.38	134.4	64.5
S6.005	91.52	15.76	81.575	0.210	0.0	0.0	0.0	4.98	198.2	69.5
S7.000	93.20	15.20	86.000	0.032	0.0	0.0	0.0	2.46	43.4	10.8
S7.001	92.81	15.33	84.227	0.073	0.0	0.0	0.0	3.04	53.8	24.5
S7.002	92.65	15.38	82.052	0.097	0.0	0.0	0.0	2.80	111.1	32.5
S7.003	92.51	15.43	81.652	0.103	0.0	0.0	0.0	3.72	147.8	34.5
S8.000	93.32	15.16	81.600	0.003	0.0	0.0	0.0	1.93	34.0	1.0
S7.004	91.54	15.76	80.836	0.131	0.0	0.0	0.0	1.35	53.5	43.4
S7.005	91.47	15.78	80.557	0.188	0.0	0.0	0.0	5.19	206.5	62.2
S6.006	91.40	15.81	79.305	0.407	0.0	0.0	0.0	1.28	141.1	134.3
S9.000	93.78	15.02	79.232	0.000	0.0	0.0	0.0	0.86	6.8	0.0
S9.001	93.35	15.16	79.220	0.063	0.0	0.0	0.0	0.82	14.5«	21.1
S9.002	91.96	15.62	79.175	0.064	0.0	0.0	0.0	0.82	14.5«	21.3
S9.003	91.78	15.68	79.024	0.064	0.0	0.0	0.0	0.82	14.5«	21.3
S6.007	91.04	15.93	78.120	0.471	0.0	0.0	0.0	0.70	27.8«	154.9

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S6.008	12.357	0.031	392.8	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.009	17.034	0.042	400.9	0.003	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.000	7.658	0.500	15.3	0.014	15.00	0.0	0.600	o	100	Pipe/Conduit	
S10.001	8.371	0.400	20.9	0.011	0.00	0.0	0.600	o	100	Pipe/Conduit	
S10.002	8.354	0.400	20.9	0.015	0.00	0.0	0.600	o	150	Pipe/Conduit	
S10.003	8.720	0.350	24.9	0.007	0.00	0.0	0.600	o	150	Pipe/Conduit	
S10.004	12.615	0.200	63.1	0.011	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.005	6.895	0.276	25.0	0.012	0.00	0.0	0.600	o	225	Pipe/Conduit	
S10.006	3.421	0.068	50.0	0.018	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.010	7.000#	0.232	30.2	0.001	0.00	0.0	0.600	o	225	Pipe/Conduit	
S11.000	1.992	0.025	80.0	0.000	15.00	0.0	0.600	o	100	Pipe/Conduit	
S11.001	25.868	0.431	60.0	0.047	0.00	0.0	0.600	o	150	Pipe/Conduit	
S11.002	7.000#	0.989	7.1	0.014	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.003	30.985	0.310	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.004	29.887	0.490	61.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.008	90.14	16.25	78.105	0.474	0.0	0.0	0.0	0.65	26.0«	154.9
S6.009	88.93	16.68	78.074	0.477	0.0	0.0	0.0	0.65	25.7«	154.9
S10.000	93.63	15.06	82.650	0.014	0.0	0.0	0.0	1.98	15.6	4.7
S10.001	93.38	15.15	82.150	0.025	0.0	0.0	0.0	1.70	13.3	8.4
S10.002	93.18	15.21	81.750	0.040	0.0	0.0	0.0	2.21	39.1	13.5
S10.003	92.96	15.28	81.350	0.047	0.0	0.0	0.0	2.03	35.8	15.8
S10.004	92.57	15.41	80.025	0.058	0.0	0.0	0.0	1.65	65.6	19.4
S10.005	92.44	15.45	79.825	0.070	0.0	0.0	0.0	2.63	104.5	23.5
S10.006	92.35	15.48	79.549	0.089	0.0	0.0	0.0	1.85	73.7	29.7
S6.010	88.80	16.73	78.032	0.568	0.0	0.0	0.0	2.39	95.1«	182.0
S11.000	93.72	15.04	79.245	0.000	0.0	0.0	0.0	0.86	6.8	0.0
S11.001	92.69	15.37	79.220	0.047	0.0	0.0	0.0	1.30	23.0	15.7
S11.002	92.60	15.40	78.789	0.061	0.0	0.0	0.0	3.81	67.4	20.4
S4.003	87.44	17.25	77.800	0.736	0.0	0.0	0.0	1.00	17.8«	232.4
S4.004	86.45	17.63	77.490	0.736	0.0	0.0	0.0	1.29	22.8«	232.4

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
4.000	-	-	100	0.030	0.030	0.030
4.001	-	-	100	0.023	0.023	0.023
5.000	User	-	100	0.007	0.007	0.007
5.001	User	-	100	0.004	0.004	0.004
4.002	-	-	100	0.043	0.043	0.043
6.000	-	-	100	0.034	0.034	0.034
6.001	-	-	100	0.043	0.043	0.043
6.002	-	-	100	0.036	0.036	0.036
6.003	-	-	100	0.030	0.030	0.030
6.004	-	-	100	0.052	0.052	0.052
6.005	User	-	100	0.015	0.015	0.015
7.000	-	-	100	0.032	0.032	0.032
7.001	-	-	100	0.041	0.041	0.041
7.002	-	-	100	0.024	0.024	0.024
7.003	User	-	100	0.003	0.003	0.003
	User	-	100	0.003	0.003	0.006
8.000	User	-	100	0.003	0.003	0.003
7.004	-	-	100	0.025	0.025	0.025
7.005	-	-	100	0.057	0.057	0.057
6.006	User	-	100	0.008	0.008	0.008
9.000	-	-	100	0.000	0.000	0.000
9.001	User	-	100	0.026	0.026	0.026
	User	-	100	0.001	0.001	0.028
	User	-	100	0.031	0.031	0.058
	User	-	100	0.004	0.004	0.063
9.002	User	-	100	0.001	0.001	0.001
9.003	-	-	100	0.000	0.000	0.000
6.007	-	-	100	0.000	0.000	0.000
6.008	User	-	100	0.003	0.003	0.003
6.009	User	-	100	0.003	0.003	0.003
10.000	-	-	100	0.014	0.014	0.014
10.001	-	-	100	0.011	0.011	0.011
10.002	-	-	100	0.015	0.015	0.015
10.003	-	-	100	0.007	0.007	0.007
10.004	-	-	100	0.011	0.011	0.011
10.005	User	-	100	0.009	0.009	0.009
	User	-	100	0.004	0.004	0.012
10.006	User	-	100	0.015	0.015	0.015
	User	-	100	0.003	0.003	0.018
6.010	User	-	100	0.001	0.001	0.001
11.000	-	-	100	0.000	0.000	0.000
11.001	-	-	100	0.047	0.047	0.047
11.002	-	-	100	0.014	0.014	0.014
4.003	-	-	100	0.000	0.000	0.000
4.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.736	0.736	0.736

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S4.004	SOutfall	77.700	77.000	0.000	1500	0
Datum (m) 77.000 Offset (mins) 0						

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Surcharged Outfall Details for Storm													
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.700	63	0.700	125	0.700	187	0.700	249	0.700	311	0.700	373	0.700
2	0.700	64	0.700	126	0.700	188	0.700	250	0.700	312	0.700	374	0.700
3	0.700	65	0.700	127	0.700	189	0.700	251	0.700	313	0.700	375	0.700
4	0.700	66	0.700	128	0.700	190	0.700	252	0.700	314	0.700	376	0.700
5	0.700	67	0.700	129	0.700	191	0.700	253	0.700	315	0.700	377	0.700
6	0.700	68	0.700	130	0.700	192	0.700	254	0.700	316	0.700	378	0.700
7	0.700	69	0.700	131	0.700	193	0.700	255	0.700	317	0.700	379	0.700
8	0.700	70	0.700	132	0.700	194	0.700	256	0.700	318	0.700	380	0.700
9	0.700	71	0.700	133	0.700	195	0.700	257	0.700	319	0.700	381	0.700
10	0.700	72	0.700	134	0.700	196	0.700	258	0.700	320	0.700	382	0.700
11	0.700	73	0.700	135	0.700	197	0.700	259	0.700	321	0.700	383	0.700
12	0.700	74	0.700	136	0.700	198	0.700	260	0.700	322	0.700	384	0.700
13	0.700	75	0.700	137	0.700	199	0.700	261	0.700	323	0.700	385	0.700
14	0.700	76	0.700	138	0.700	200	0.700	262	0.700	324	0.700	386	0.700
15	0.700	77	0.700	139	0.700	201	0.700	263	0.700	325	0.700	387	0.700
16	0.700	78	0.700	140	0.700	202	0.700	264	0.700	326	0.700	388	0.700
17	0.700	79	0.700	141	0.700	203	0.700	265	0.700	327	0.700	389	0.700
18	0.700	80	0.700	142	0.700	204	0.700	266	0.700	328	0.700	390	0.700
19	0.700	81	0.700	143	0.700	205	0.700	267	0.700	329	0.700	391	0.700
20	0.700	82	0.700	144	0.700	206	0.700	268	0.700	330	0.700	392	0.700
21	0.700	83	0.700	145	0.700	207	0.700	269	0.700	331	0.700	393	0.700
22	0.700	84	0.700	146	0.700	208	0.700	270	0.700	332	0.700	394	0.700
23	0.700	85	0.700	147	0.700	209	0.700	271	0.700	333	0.700	395	0.700
24	0.700	86	0.700	148	0.700	210	0.700	272	0.700	334	0.700	396	0.700
25	0.700	87	0.700	149	0.700	211	0.700	273	0.700	335	0.700	397	0.700
26	0.700	88	0.700	150	0.700	212	0.700	274	0.700	336	0.700	398	0.700
27	0.700	89	0.700	151	0.700	213	0.700	275	0.700	337	0.700	399	0.700
28	0.700	90	0.700	152	0.700	214	0.700	276	0.700	338	0.700	400	0.700
29	0.700	91	0.700	153	0.700	215	0.700	277	0.700	339	0.700	401	0.700
30	0.700	92	0.700	154	0.700	216	0.700	278	0.700	340	0.700	402	0.700
31	0.700	93	0.700	155	0.700	217	0.700	279	0.700	341	0.700	403	0.700
32	0.700	94	0.700	156	0.700	218	0.700	280	0.700	342	0.700	404	0.700
33	0.700	95	0.700	157	0.700	219	0.700	281	0.700	343	0.700	405	0.700
34	0.700	96	0.700	158	0.700	220	0.700	282	0.700	344	0.700	406	0.700
35	0.700	97	0.700	159	0.700	221	0.700	283	0.700	345	0.700	407	0.700
36	0.700	98	0.700	160	0.700	222	0.700	284	0.700	346	0.700	408	0.700
37	0.700	99	0.700	161	0.700	223	0.700	285	0.700	347	0.700	409	0.700
38	0.700	100	0.700	162	0.700	224	0.700	286	0.700	348	0.700	410	0.700
39	0.700	101	0.700	163	0.700	225	0.700	287	0.700	349	0.700	411	0.700
40	0.700	102	0.700	164	0.700	226	0.700	288	0.700	350	0.700	412	0.700
41	0.700	103	0.700	165	0.700	227	0.700	289	0.700	351	0.700	413	0.700
42	0.700	104	0.700	166	0.700	228	0.700	290	0.700	352	0.700	414	0.700
43	0.700	105	0.700	167	0.700	229	0.700	291	0.700	353	0.700	415	0.700
44	0.700	106	0.700	168	0.700	230	0.700	292	0.700	354	0.700	416	0.700
45	0.700	107	0.700	169	0.700	231	0.700	293	0.700	355	0.700	417	0.700
46	0.700	108	0.700	170	0.700	232	0.700	294	0.700	356	0.700	418	0.700
47	0.700	109	0.700	171	0.700	233	0.700	295	0.700	357	0.700	419	0.700
48	0.700	110	0.700	172	0.700	234	0.700	296	0.700	358	0.700	420	0.700
49	0.700	111	0.700	173	0.700	235	0.700	297	0.700	359	0.700	421	0.700
50	0.700	112	0.700	174	0.700	236	0.700	298	0.700	360	0.700	422	0.700
51	0.700	113	0.700	175	0.700	237	0.700	299	0.700	361	0.700	423	0.700
52	0.700	114	0.700	176	0.700	238	0.700	300	0.700	362	0.700	424	0.700
53	0.700	115	0.700	177	0.700	239	0.700	301	0.700	363	0.700	425	0.700
54	0.700	116	0.700	178	0.700	240	0.700	302	0.700	364	0.700	426	0.700
55	0.700	117	0.700	179	0.700	241	0.700	303	0.700	365	0.700	427	0.700
56	0.700	118	0.700	180	0.700	242	0.700	304	0.700	366	0.700	428	0.700
57	0.700	119	0.700	181	0.700	243	0.700	305	0.700	367	0.700	429	0.700
58	0.700	120	0.700	182	0.700	244	0.700	306	0.700	368	0.700	430	0.700
59	0.700	121	0.700	183	0.700	245	0.700	307	0.700	369	0.700	431	0.700
60	0.700	122	0.700	184	0.700	246	0.700	308	0.700	370	0.700	432	0.700
61	0.700	123	0.700	185	0.700	247	0.700	309	0.700	371	0.700	433	0.700
62	0.700	124	0.700	186	0.700	248	0.700	310	0.700	372	0.700	434	0.700
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84 North Street Guildford Surrey GU1 4AU													
Date 06/08/2025 15:25						Designed by commonuser							
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Innovyze												Network 2020.1.3	
Surcharged Outfall Details for Storm													
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
497	0.700	559	0.700	621	0.700	683	0.700	745	0.700	807	0.700	869	0.700
498	0.700	560	0.700	622	0.700	684	0.700	746	0.700	808	0.700	870	0.700
499	0.700	561	0.700	623	0.700	685	0.700	747	0.700	809	0.700	871	0.700
500	0.700	562	0.700	624	0.700	686	0.700	748	0.700	810	0.700	872	0.700
501	0.700	563	0.700	625	0.700	687	0.700	749	0.700	811	0.700	873	0.700
502	0.700	564	0.700	626	0.700	688	0.700	750	0.700	812	0.700	874	0.700
503	0.700	565	0.700	627	0.700	689	0.700	751	0.700	813	0.700	875	0.700
504	0.700	566	0.700	628	0.700	690	0.700	752	0.700	814	0.700	876	0.700
505	0.700	567	0.700	629	0.700	691	0.700	753	0.700	815	0.700	877	0.700
506	0.700	568	0.700	630	0.700	692	0.700	754	0.700	816	0.700	878	0.700
507	0.700	569	0.700	631	0.700	693	0.700	755	0.700	817	0.700	879	0.700
508	0.700	570	0.700	632	0.700	694	0.700	756	0.700	818	0.700	880	0.700
509	0.700	571	0.700	633	0.700	695	0.700	757	0.700	819	0.700	881	0.700
510	0.700	572	0.700	634	0.700	696	0.700	758	0.700	820	0.700	882	0.700
511	0.700	573	0.700	635	0.700	697	0.700	759	0.700	821	0.700	883	0.700
512	0.700	574	0.700	636	0.700	698	0.700	760	0.700	822	0.700	884	0.700
513	0.700	575	0.700	637	0.700	699	0.700	761	0.700	823	0.700	885	0.700
514	0.700	576	0.700	638	0.700	700	0.700	762	0.700	824	0.700	886	0.700
515	0.700	577	0.700	639	0.700	701	0.700	763	0.700	825	0.700	887	0.700
516	0.700	578	0.700	640	0.700	702	0.700	764	0.700	826	0.700	888	0.700
517	0.700	579	0.700	641	0.700	703	0.700	765	0.700	827	0.700	889	0.700
518	0.700	580	0.700	642	0.700	704	0.700	766	0.700	828	0.700	890	0.700
519	0.700	581	0.700	643	0.700	705	0.700	767	0.700	829	0.700	891	0.700
520	0.700	582	0.700	644	0.700	706	0.700	768	0.700	830	0.700	892	0.700
521	0.700	583	0.700	645	0.700	707	0.700	769	0.700	831	0.700	893	0.700
522	0.700	584	0.700	646	0.700	708	0.700	770	0.700	832	0.700	894	0.700
523	0.700	585	0.700	647	0.700	709	0.700	771	0.700	833	0.700	895	0.700
524	0.700	586	0.700	648	0.700	710	0.700	772	0.700	834	0.700	896	0.700
525	0.700	587	0.700	649	0.700	711	0.700	773	0.700	835	0.700	897	0.700
526	0.700	588	0.700	650	0.700	712	0.700	774	0.700	836	0.700	898	0.700
527	0.700	589	0.700	651	0.700	713	0.700	775	0.700	837	0.700	899	0.700
528	0.700	590	0.700	652	0.700	714	0.700	776	0.700	838	0.700	900	0.700
529	0.700	591	0.700	653	0.700	715	0.700	777	0.700	839	0.700	901	0.700
530	0.700	592	0.700	654	0.700	716	0.700	778	0.700	840	0.700	902	0.700
531	0.700	593	0.700	655	0.700	717	0.700	779	0.700	841	0.700	903	0.700
532	0.700	594	0.700	656	0.700	718	0.700	780	0.700	842	0.700	904	0.700
533	0.700	595	0.700	657	0.700	719	0.700	781	0.700	843	0.700	905	0.700
534	0.700	596	0.700	658	0.700	720	0.700	782	0.700	844	0.700	906	0.700
535	0.700	597	0.700	659	0.700	721	0.700	783	0.700	845	0.700	907	0.700
536	0.700	598	0.700	660	0.700	722	0.700	784	0.700	846	0.700	908	0.700
537	0.700	599	0.700	661	0.700	723	0.700	785	0.700	847	0.700	909	0.700
538	0.700	600	0.700	662	0.700	724	0.700	786	0.700	848	0.700	910	0.700
539	0.700	601	0.700	663	0.700	725	0.700	787	0.700	849	0.700	911	0.700
540	0.700	602	0.700	664	0.700	726	0.700	788	0.700	850	0.700	912	0.700
541	0.700	603	0.700	665	0.700	727	0.700	789	0.700	851	0.700	913	0.700
542	0.700	604	0.700	666	0.700	728	0.700	790	0.700	852	0.700	914	0.700
543	0.700	605	0.700	667	0.700	729	0.700	791	0.700	853	0.700	915	0.700
544	0.700	606	0.700	668	0.700	730	0.700	792	0.700	854	0.700	916	0.700
545	0.700	607	0.700	669	0.700	731	0.700	793	0.700	855	0.700	917	0.700
546	0.700	608	0.700	670	0.700	732	0.700	794	0.700	856	0.700	918	0.700
547	0.700	609	0.700	671	0.700	733	0.700	795	0.700	857	0.700	919	0.700
548	0.700	610	0.700	672	0.700	734	0.700	796	0.700	858	0.700	920	0.700
549	0.700	611	0.700	673	0.700	735	0.700	797	0.700	859	0.700	921	0.700
550	0.700	612	0.700	674	0.700	736	0.700	798	0.700	860	0.700	922	0.700
551	0.700	613	0.700	675	0.700	737	0.700	799	0.700	861	0.700	923	0.700
552	0.700	614	0.700	676	0.700	738	0.700	800	0.700	862	0.700	924	0.700
553	0.700	615	0.700	677	0.700	739	0.700	801	0.700	863	0.700	925	0.700
554	0.700	616	0.700	678	0.700	740	0.700	802	0.700	864	0.700	926	0.700
555	0.700	617	0.700	679	0.700	741	0.700	803	0.700	865	0.700	927	0.700
556	0.700	618	0.700	680	0.700	742	0.700	804	0.700	866	0.700	928	0.700
557	0.700	619	0.700	681	0.700	743	0.700	805	0.700	867	0.700	929	0.700
558	0.700	620	0.700	682	0.700	744	0.700	806	0.700	868	0.700	930	0.700
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Surcharged Outfall Details for Storm													
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
993	0.700	1049	0.700	1105	0.700	1161	0.700	1217	0.700	1273	0.700	1329	0.700
994	0.700	1050	0.700	1106	0.700	1162	0.700	1218	0.700	1274	0.700	1330	0.700
995	0.700	1051	0.700	1107	0.700	1163	0.700	1219	0.700	1275	0.700	1331	0.700
996	0.700	1052	0.700	1108	0.700	1164	0.700	1220	0.700	1276	0.700	1332	0.700
997	0.700	1053	0.700	1109	0.700	1165	0.700	1221	0.700	1277	0.700	1333	0.700
998	0.700	1054	0.700	1110	0.700	1166	0.700	1222	0.700	1278	0.700	1334	0.700
999	0.700	1055	0.700	1111	0.700	1167	0.700	1223	0.700	1279	0.700	1335	0.700
1000	0.700	1056	0.700	1112	0.700	1168	0.700	1224	0.700	1280	0.700	1336	0.700
1001	0.700	1057	0.700	1113	0.700	1169	0.700	1225	0.700	1281	0.700	1337	0.700
1002	0.700	1058	0.700	1114	0.700	1170	0.700	1226	0.700	1282	0.700	1338	0.700
1003	0.700	1059	0.700	1115	0.700	1171	0.700	1227	0.700	1283	0.700	1339	0.700
1004	0.700	1060	0.700	1116	0.700	1172	0.700	1228	0.700	1284	0.700	1340	0.700
1005	0.700	1061	0.700	1117	0.700	1173	0.700	1229	0.700	1285	0.700	1341	0.700
1006	0.700	1062	0.700	1118	0.700	1174	0.700	1230	0.700	1286	0.700	1342	0.700
1007	0.700	1063	0.700	1119	0.700	1175	0.700	1231	0.700	1287	0.700	1343	0.700
1008	0.700	1064	0.700	1120	0.700	1176	0.700	1232	0.700	1288	0.700	1344	0.700
1009	0.700	1065	0.700	1121	0.700	1177	0.700	1233	0.700	1289	0.700	1345	0.700
1010	0.700	1066	0.700	1122	0.700	1178	0.700	1234	0.700	1290	0.700	1346	0.700
1011	0.700	1067	0.700	1123	0.700	1179	0.700	1235	0.700	1291	0.700	1347	0.700
1012	0.700	1068	0.700	1124	0.700	1180	0.700	1236	0.700	1292	0.700	1348	0.700
1013	0.700	1069	0.700	1125	0.700	1181	0.700	1237	0.700	1293	0.700	1349	0.700
1014	0.700	1070	0.700	1126	0.700	1182	0.700	1238	0.700	1294	0.700	1350	0.700
1015	0.700	1071	0.700	1127	0.700	1183	0.700	1239	0.700	1295	0.700	1351	0.700
1016	0.700	1072	0.700	1128	0.700	1184	0.700	1240	0.700	1296	0.700	1352	0.700
1017	0.700	1073	0.700	1129	0.700	1185	0.700	1241	0.700	1297	0.700	1353	0.700
1018	0.700	1074	0.700	1130	0.700	1186	0.700	1242	0.700	1298	0.700	1354	0.700
1019	0.700	1075	0.700	1131	0.700	1187	0.700	1243	0.700	1299	0.700	1355	0.700
1020	0.700	1076	0.700	1132	0.700	1188	0.700	1244	0.700	1300	0.700	1356	0.700
1021	0.700	1077	0.700	1133	0.700	1189	0.700	1245	0.700	1301	0.700	1357	0.700
1022	0.700	1078	0.700	1134	0.700	1190	0.700	1246	0.700	1302	0.700	1358	0.700
1023	0.700	1079	0.700	1135	0.700	1191	0.700	1247	0.700	1303	0.700	1359	0.700
1024	0.700	1080	0.700	1136	0.700	1192	0.700	1248	0.700	1304	0.700	1360	0.700
1025	0.700	1081	0.700	1137	0.700	1193	0.700	1249	0.700	1305	0.700	1361	0.700
1026	0.700	1082	0.700	1138	0.700	1194	0.700	1250	0.700	1306	0.700	1362	0.700
1027	0.700	1083	0.700	1139	0.700	1195	0.700	1251	0.700	1307	0.700	1363	0.700
1028	0.700	1084	0.700	1140	0.700	1196	0.700	1252	0.700	1308	0.700	1364	0.700
1029	0.700	1085	0.700	1141	0.700	1197	0.700	1253	0.700	1309	0.700	1365	0.700
1030	0.700	1086	0.700	1142	0.700	1198	0.700	1254	0.700	1310	0.700	1366	0.700
1031	0.700	1087	0.700	1143	0.700	1199	0.700	1255	0.700	1311	0.700	1367	0.700
1032	0.700	1088	0.700	1144	0.700	1200	0.700	1256	0.700	1312	0.700	1368	0.700
1033	0.700	1089	0.700	1145	0.700	1201	0.700	1257	0.700	1313	0.700	1369	0.700
1034	0.700	1090	0.700	1146	0.700	1202	0.700	1258	0.700	1314	0.700	1370	0.700
1035	0.700	1091	0.700	1147	0.700	1203	0.700	1259	0.700	1315	0.700	1371	0.700
1036	0.700	1092	0.700	1148	0.700	1204	0.700	1260	0.700	1316	0.700	1372	0.700
1037	0.700	1093	0.700	1149	0.700	1205	0.700	1261	0.700	1317	0.700	1373	0.700
1038	0.700	1094	0.700	1150	0.700	1206	0.700	1262	0.700	1318	0.700	1374	0.700
1039	0.700	1095	0.700	1151	0.700	1207	0.700	1263	0.700	1319	0.700	1375	0.700
1040	0.700	1096	0.700	1152	0.700	1208	0.700	1264	0.700	1320	0.700	1376	0.700
1041	0.700	1097	0.700	1153	0.700	1209	0.700	1265	0.700	1321	0.700	1377	0.700
1042	0.700	1098	0.700	1154	0.700	1210	0.700	1266	0.700	1322	0.700	1378	0.700
1043	0.700	1099	0.700	1155	0.700	1211	0.700	1267	0.700	1323	0.700	1379	0.700
1044	0.700	1100	0.700	1156	0.700	1212	0.700	1268	0.700	1324	0.700	1380	0.700
1045	0.700	1101	0.700	1157	0.700	1213	0.700	1269	0.700	1325	0.700	1381	0.700
1046	0.700	1102	0.700	1158	0.700	1214	0.700	1270	0.700	1326	0.700	1382	0.700
1047	0.700	1103	0.700	1159	0.700	1215	0.700	1271	0.700	1327	0.700	1383	0.700
1048	0.700	1104	0.700	1160	0.700	1216	0.700	1272	0.700	1328	0.700	1384	0.700
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<u>Simulation Criteria for Storm</u> <table> <tr> <td>Volumetric Runoff Coeff</td> <td>1.000</td> <td>Additional Flow - % of Total Flow</td> <td>0.000</td> </tr> <tr> <td>Areal Reduction Factor</td> <td>1.000</td> <td>MADD Factor * 10m³/ha Storage</td> <td>0.000</td> </tr> <tr> <td>Hot Start (mins)</td> <td>0</td> <td>Inlet Coeffiecient</td> <td>0.800</td> </tr> <tr> <td>Hot Start Level (mm)</td> <td>0</td> <td>Flow per Person per Day (l/per/day)</td> <td>0.000</td> </tr> <tr> <td>Manhole Headloss Coeff (Global)</td> <td>0.500</td> <td>Run Time (mins)</td> <td>60</td> </tr> <tr> <td>Foul Sewage per hectare (l/s)</td> <td>0.000</td> <td>Output Interval (mins)</td> <td>1</td> </tr> </table> Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FEH</td> <td>Summer Storms</td> <td>No</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>FEH Rainfall Version</td> <td>2013</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Site Location</td> <td>GB 539400 136700 TQ 39400 36700</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>Data Type</td> <td>Catchment</td> <td>Storm Duration (mins)</td> <td>30</td> </tr> </table>			Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000	Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000	Hot Start (mins)	0	Inlet Coeffiecient	0.800	Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000	Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60	Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1	Rainfall Model	FEH	Summer Storms	No	Return Period (years)	100	Winter Storms	Yes	FEH Rainfall Version	2013	Cv (Summer)	1.000	Site Location	GB 539400 136700 TQ 39400 36700	Cv (Winter)	1.000	Data Type	Catchment	Storm Duration (mins)	30
Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000																																											
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000																																											
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Innovyze Network 2020.1.3		

Online Controls for Storm

Orifice Manhole: SPP2, DS/PN: S9.001, Volume (m³): 0.7

Diameter (m) 0.066 Discharge Coefficient 0.600 Invert Level (m) 79.220

Hydro-Brake® Optimum Manhole: SGeocellular Tank, DS/PN: S6.007, Volume (m³): 4.8

Unit Reference	MD-SHE-0165-1400-1300-1400
Design Head (m)	1.300
Design Flow (l/s)	14.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	165
Invert Level (m)	78.120
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.300	14.0	Kick-Flo®	0.850	11.5
Flush-Flo™	0.387	14.0	Mean Flow over Head Range	-	12.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.9	0.800	12.2	2.000	17.2	4.000	23.9	7.000	31.3
0.200	13.0	1.000	12.4	2.200	18.0	4.500	25.3	7.500	32.4
0.300	13.8	1.200	13.5	2.400	18.7	5.000	26.6	8.000	33.4
0.400	14.0	1.400	14.5	2.600	19.5	5.500	27.9	8.500	34.4
0.500	13.8	1.600	15.4	3.000	20.8	6.000	29.1	9.000	35.3
0.600	13.6	1.800	16.3	3.500	22.4	6.500	30.2	9.500	36.3

Orifice Manhole: SPP3, DS/PN: S11.001, Volume (m³): 0.7

Diameter (m) 0.056 Discharge Coefficient 0.600 Invert Level (m) 79.220

Hydro-Brake® Optimum Manhole: SSuDS Basin, DS/PN: S4.003, Volume (m³): 1.8

Unit Reference	MD-SHE-0132-8400-1200-8400
Design Head (m)	1.200
Design Flow (l/s)	8.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	132
Invert Level (m)	77.800
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	8.4	Kick-Flo®	0.768	6.8
Flush-Flo™	0.357	8.4	Mean Flow over Head Range	-	7.3

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File 1dheg2-MD-NW-24.06.2025...	Checked by								
Innovyze	Network 2020.1.3								
<u>Hydro-Brake® Optimum Manhole: SSuDS Basin, DS/PN: S4.003, Volume (m³): 1.8</u>									
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated									
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	0.800	6.9	2.000	10.7	4.000	14.8	7.000	19.4
0.200	7.9	1.000	7.7	2.200	11.2	4.500	15.7	7.500	20.1
0.300	8.3	1.200	8.4	2.400	11.6	5.000	16.5	8.000	20.7
0.400	8.4	1.400	9.0	2.600	12.1	5.500	17.3	8.500	21.3
0.500	8.2	1.600	9.6	3.000	12.9	6.000	18.0	9.000	21.9
0.600	8.0	1.800	10.2	3.500	13.9	6.500	18.7	9.500	22.5

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Innovyze Network 2020.1.3		

Storage Structures for Storm

Porous Car Park Manhole: SPP2, DS/PN: S9.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	26.0
Max Percolation (l/s)	72.2	Slope (1:X)	50.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	79.220	Cap Volume Depth (m)	0.450

Cellular Storage Manhole: SGeocellular Tank, DS/PN: S6.007

Invert Level (m)	78.120	Safety Factor	1.5
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

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	170.0	170.0	1.600	170.0	256.4	1.601	0.0	256.4

Porous Car Park Manhole: SPP3, DS/PN: S11.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	24.0
Max Percolation (l/s)	66.7	Slope (1:X)	50.0
Safety Factor	1.5	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	79.220	Cap Volume Depth (m)	0.450

Tank or Pond Manhole: SSuDS Basin, DS/PN: S4.003

Invert Level (m)	77.800
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Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	253.1	1.200	496.9

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Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S4.000	S30	1.244	0.303	0.000	1.547
S4.001	S31	0.542	0.752	0.000	1.294
S5.000	S27	1.233	0.165	0.000	1.398
S5.001	S28	1.097	0.164	0.000	1.261
S4.002	S32	1.133	0.159	0.000	1.292
S6.000	S10	1.188	0.429	0.000	1.616
S6.001	S11	1.272	0.787	0.000	2.059
S6.002	S12	1.272	0.268	0.000	1.540
S6.003	S13	1.272	1.183	0.000	2.455
S6.004	S14	1.272	1.024	0.000	2.296
S6.005	S15	1.272	0.588	0.000	1.861
S7.000	S16	1.357	0.533	0.000	1.890
S7.001	S17	1.293	0.411	0.000	1.704
S7.002	S18	1.355	0.352	0.000	1.706
S7.003	S19	1.411	0.406	0.000	1.818
S8.000	S1	1.188	0.335	0.000	1.523
S7.004	S2	2.052	1.047	0.000	3.099
S7.005	S3	1.994	0.282	0.000	2.276
S6.006	S4 - Catchpit	4.001	0.229	0.000	4.230
S9.000	S33	0.665	0.008	0.000	0.673
S9.001	SPP2	0.656	0.118	23.692	24.467
S9.002	S34	0.707	0.399	0.000	1.106
S9.003	S35 - Catchpit	2.574	0.053	0.000	2.627
S6.007	SGeoCellular Tank	4.695	0.207	258.454	263.356
S6.008	S5	4.235	0.491	0.000	4.727
S6.009	S6	3.479	0.677	0.000	4.156
S10.000	S20	0.848	0.060	0.000	0.908
S10.001	S21	0.848	0.066	0.000	0.914
S10.002	S22	0.848	0.148	0.000	0.996
S10.003	S23	0.848	0.154	0.000	1.002
S10.004	S24	1.951	0.502	0.000	2.453
S10.005	S25	1.838	0.274	0.000	2.112
S10.006	S26	1.754	0.136	0.000	1.890
S6.010	S7	3.244	0.278	0.000	3.522
S11.000	S36	0.650	0.016	0.000	0.666
S11.001	SPP3	0.656	0.457	23.213	24.326
S11.002	S37	1.143	0.124	0.000	1.267
S4.003	SSuDS Basin	1.357	0.548	441.842	443.747
S4.004	S9	3.857	0.528	0.000	4.385
Total		64.302	14.660	747.201	826.163

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm																																																																																																																																																																																																																																																																																																																																																																
Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0 Synthetic Rainfall Details Rainfall Model FEH Data Type Catchment FEH Rainfall Version 2013 Cv (Summer) 1.000 Site Location GB 539400 136700 TQ 39400 36700 Cv (Winter) 1.000 Margin for Flood Risk Warning (mm) 300.0 DVD Status ON Analysis Timestep Fine Inertia Status ON DTS Status OFF Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 2, 10, 30, 100 Climate Change (%) 0, 40, 40, 45																																																																																																																																																																																																																																																																																																																																																																
<table><tr><th>PN</th><th>US/MH Name</th><th>Storm</th><th>Return Period</th><th>Climate Change</th><th>First (X) Surge</th><th>First (Y) Flood</th><th>First (Z) Overflow</th><th>Overflow Act.</th><th>Water Level (m)</th></tr><tr><td>S4.000</td><td></td><td>S30 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>80.140</td></tr><tr><td>S4.001</td><td></td><td>S31 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>79.853</td></tr><tr><td>S5.000</td><td></td><td>S27 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>79.718</td></tr><tr><td>S5.001</td><td></td><td>S28 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>79.563</td></tr><tr><td>S4.002</td><td></td><td>S32 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>79.321</td></tr><tr><td>S6.000</td><td></td><td>S10 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>86.585</td></tr><tr><td>S6.001</td><td></td><td>S11 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>85.923</td></tr><tr><td>S6.002</td><td></td><td>S12 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>85.137</td></tr><tr><td>S6.003</td><td></td><td>S13 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>84.741</td></tr><tr><td>S6.004</td><td></td><td>S14 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>83.348</td></tr><tr><td>S6.005</td><td></td><td>S15 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>81.638</td></tr><tr><td>S7.000</td><td></td><td>S16 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>86.027</td></tr><tr><td>S7.001</td><td></td><td>S17 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>84.270</td></tr><tr><td>S7.002</td><td></td><td>S18 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>82.109</td></tr><tr><td>S7.003</td><td></td><td>S19 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>81.702</td></tr><tr><td>S8.000</td><td></td><td>S1 30 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>81.607</td></tr><tr><td>S7.004</td><td></td><td>S2 15 Summer</td><td>2</td><td>+0%</td><td>10/15 Summer</td><td></td><td></td><td></td><td>80.930</td></tr><tr><td>S7.005</td><td></td><td>S3 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>80.622</td></tr><tr><td>S6.006</td><td>S4 - Catchpit</td><td>S15 15 Summer</td><td>2</td><td>+0%</td><td>10/15 Summer</td><td></td><td></td><td></td><td>79.532</td></tr><tr><td>S9.000</td><td></td><td>S33 120 Summer</td><td>2</td><td>+0%</td><td>2/15 Summer</td><td></td><td></td><td></td><td>79.423</td></tr><tr><td>S9.001</td><td></td><td>SPP2 120 Summer</td><td>2</td><td>+0%</td><td>2/15 Summer</td><td></td><td></td><td></td><td>79.423</td></tr><tr><td>S9.002</td><td></td><td>S34 120 Summer</td><td>2</td><td>+0%</td><td>30/240 Summer</td><td></td><td></td><td></td><td>79.223</td></tr><tr><td>S9.003</td><td>S35 - Catchpit</td><td>S120 120 Summer</td><td>2</td><td>+0%</td><td>30/120 Summer</td><td></td><td></td><td></td><td>79.079</td></tr><tr><td>S6.007</td><td>SGeocellular Tank</td><td>S240 240 Summer</td><td>2</td><td>+0%</td><td>2/30 Summer</td><td></td><td></td><td></td><td>78.469</td></tr><tr><td>S6.008</td><td></td><td>S5 240 Summer</td><td>2</td><td>+0%</td><td>10/120 Summer</td><td></td><td></td><td></td><td>78.242</td></tr><tr><td>S6.009</td><td></td><td>S6 240 Summer</td><td>2</td><td>+0%</td><td>10/120 Summer</td><td></td><td></td><td></td><td>78.201</td></tr><tr><td>S10.000</td><td></td><td>S20 30 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>82.671</td></tr><tr><td>S10.001</td><td></td><td>S21 30 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>82.183</td></tr><tr><td>S10.002</td><td></td><td>S22 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>81.789</td></tr><tr><td>S10.003</td><td></td><td>S23 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>81.396</td></tr><tr><td>S10.004</td><td></td><td>S24 15 Summer</td><td>2</td><td>+0%</td><td></td><td></td><td></td><td></td><td>80.081</td></tr><tr><td>S10.005</td><td></td><td>S25 15 Summer</td><td>2</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>79.880</td></tr><tr><td>S10.006</td><td></td><td>S26 15 Summer</td><td>2</td><td>+0%</td><td>10/15 Summer</td><td></td><td></td><td></td><td>79.641</td></tr><tr><td>S6.010</td><td></td><td>S7 480 Summer</td><td>2</td><td>+0%</td><td>10/120 Summer</td><td></td><td></td><td></td><td>78.153</td></tr></table>			PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	S4.000		S30 30 Summer	2	+0%					80.140	S4.001		S31 30 Summer	2	+0%					79.853	S5.000		S27 30 Summer	2	+0%					79.718	S5.001		S28 30 Summer	2	+0%					79.563	S4.002		S32 15 Summer	2	+0%					79.321	S6.000		S10 30 Summer	2	+0%					86.585	S6.001		S11 30 Summer	2	+0%					85.923	S6.002		S12 15 Summer	2	+0%	100/15 Summer				85.137	S6.003		S13 15 Summer	2	+0%	100/15 Summer				84.741	S6.004		S14 15 Summer	2	+0%	100/15 Summer				83.348	S6.005		S15 15 Summer	2	+0%					81.638	S7.000		S16 30 Summer	2	+0%					86.027	S7.001		S17 30 Summer	2	+0%					84.270	S7.002		S18 15 Summer	2	+0%					82.109	S7.003		S19 15 Summer	2	+0%	100/15 Summer				81.702	S8.000		S1 30 Summer	2	+0%	100/15 Summer				81.607	S7.004		S2 15 Summer	2	+0%	10/15 Summer				80.930	S7.005		S3 15 Summer	2	+0%	100/15 Summer				80.622	S6.006	S4 - Catchpit	S15 15 Summer	2	+0%	10/15 Summer				79.532	S9.000		S33 120 Summer	2	+0%	2/15 Summer				79.423	S9.001		SPP2 120 Summer	2	+0%	2/15 Summer				79.423	S9.002		S34 120 Summer	2	+0%	30/240 Summer				79.223	S9.003	S35 - Catchpit	S120 120 Summer	2	+0%	30/120 Summer				79.079	S6.007	SGeocellular Tank	S240 240 Summer	2	+0%	2/30 Summer				78.469	S6.008		S5 240 Summer	2	+0%	10/120 Summer				78.242	S6.009		S6 240 Summer	2	+0%	10/120 Summer				78.201	S10.000		S20 30 Summer	2	+0%					82.671	S10.001		S21 30 Summer	2	+0%	100/15 Summer				82.183	S10.002		S22 15 Summer	2	+0%					81.789	S10.003		S23 15 Summer	2	+0%					81.396	S10.004		S24 15 Summer	2	+0%					80.081	S10.005		S25 15 Summer	2	+0%	100/15 Summer				79.880	S10.006		S26 15 Summer	2	+0%	10/15 Summer				79.641	S6.010		S7 480 Summer	2	+0%	10/120 Summer				78.153
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)																																																																																																																																																																																																																																																																																																																																																							
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S4.001		S31 30 Summer	2	+0%					79.853																																																																																																																																																																																																																																																																																																																																																							
S5.000		S27 30 Summer	2	+0%					79.718																																																																																																																																																																																																																																																																																																																																																							
S5.001		S28 30 Summer	2	+0%					79.563																																																																																																																																																																																																																																																																																																																																																							
S4.002		S32 15 Summer	2	+0%					79.321																																																																																																																																																																																																																																																																																																																																																							
S6.000		S10 30 Summer	2	+0%					86.585																																																																																																																																																																																																																																																																																																																																																							
S6.001		S11 30 Summer	2	+0%					85.923																																																																																																																																																																																																																																																																																																																																																							
S6.002		S12 15 Summer	2	+0%	100/15 Summer				85.137																																																																																																																																																																																																																																																																																																																																																							
S6.003		S13 15 Summer	2	+0%	100/15 Summer				84.741																																																																																																																																																																																																																																																																																																																																																							
S6.004		S14 15 Summer	2	+0%	100/15 Summer				83.348																																																																																																																																																																																																																																																																																																																																																							
S6.005		S15 15 Summer	2	+0%					81.638																																																																																																																																																																																																																																																																																																																																																							
S7.000		S16 30 Summer	2	+0%					86.027																																																																																																																																																																																																																																																																																																																																																							
S7.001		S17 30 Summer	2	+0%					84.270																																																																																																																																																																																																																																																																																																																																																							
S7.002		S18 15 Summer	2	+0%					82.109																																																																																																																																																																																																																																																																																																																																																							
S7.003		S19 15 Summer	2	+0%	100/15 Summer				81.702																																																																																																																																																																																																																																																																																																																																																							
S8.000		S1 30 Summer	2	+0%	100/15 Summer				81.607																																																																																																																																																																																																																																																																																																																																																							
S7.004		S2 15 Summer	2	+0%	10/15 Summer				80.930																																																																																																																																																																																																																																																																																																																																																							
S7.005		S3 15 Summer	2	+0%	100/15 Summer				80.622																																																																																																																																																																																																																																																																																																																																																							
S6.006	S4 - Catchpit	S15 15 Summer	2	+0%	10/15 Summer				79.532																																																																																																																																																																																																																																																																																																																																																							
S9.000		S33 120 Summer	2	+0%	2/15 Summer				79.423																																																																																																																																																																																																																																																																																																																																																							
S9.001		SPP2 120 Summer	2	+0%	2/15 Summer				79.423																																																																																																																																																																																																																																																																																																																																																							
S9.002		S34 120 Summer	2	+0%	30/240 Summer				79.223																																																																																																																																																																																																																																																																																																																																																							
S9.003	S35 - Catchpit	S120 120 Summer	2	+0%	30/120 Summer				79.079																																																																																																																																																																																																																																																																																																																																																							
S6.007	SGeocellular Tank	S240 240 Summer	2	+0%	2/30 Summer				78.469																																																																																																																																																																																																																																																																																																																																																							
S6.008		S5 240 Summer	2	+0%	10/120 Summer				78.242																																																																																																																																																																																																																																																																																																																																																							
S6.009		S6 240 Summer	2	+0%	10/120 Summer				78.201																																																																																																																																																																																																																																																																																																																																																							
S10.000		S20 30 Summer	2	+0%					82.671																																																																																																																																																																																																																																																																																																																																																							
S10.001		S21 30 Summer	2	+0%	100/15 Summer				82.183																																																																																																																																																																																																																																																																																																																																																							
S10.002		S22 15 Summer	2	+0%					81.789																																																																																																																																																																																																																																																																																																																																																							
S10.003		S23 15 Summer	2	+0%					81.396																																																																																																																																																																																																																																																																																																																																																							
S10.004		S24 15 Summer	2	+0%					80.081																																																																																																																																																																																																																																																																																																																																																							
S10.005		S25 15 Summer	2	+0%	100/15 Summer				79.880																																																																																																																																																																																																																																																																																																																																																							
S10.006		S26 15 Summer	2	+0%	10/15 Summer				79.641																																																																																																																																																																																																																																																																																																																																																							
S6.010		S7 480 Summer	2	+0%	10/120 Summer				78.153																																																																																																																																																																																																																																																																																																																																																							
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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000	S30	-0.110	0.000	0.16			2.9	OK	
S4.001	S31	-0.183	0.000	0.08			6.1	OK	
S5.000	S27	-0.132	0.000	0.03			0.7	OK	
S5.001	S28	-0.127	0.000	0.06			1.3	OK	
S4.002	S32	-0.182	0.000	0.08			13.8	OK	
S6.000	S10	-0.115	0.000	0.12			3.3	OK	
S6.001	S11	-0.177	0.000	0.10			9.5	OK	
S6.002	S12	-0.163	0.000	0.17			15.0	OK	
S6.003	S13	-0.159	0.000	0.19			19.6	OK	
S6.004	S14	-0.152	0.000	0.22			27.7	OK	
S6.005	S15	-0.162	0.000	0.17			30.1	OK	
S7.000	S16	-0.123	0.000	0.08			3.1	OK	
S7.001	S17	-0.107	0.000	0.18			9.0	OK	
S7.002	S18	-0.168	0.000	0.14			12.6	OK	
S7.003	S19	-0.175	0.000	0.11			13.6	OK	
S8.000	S1	-0.143	0.000	0.01			0.3	OK	
S7.004	S2	-0.131	0.000	0.36			17.8	OK	
S7.005	S3	-0.160	0.000	0.18			26.5	OK	
S6.006	S4 - Catchpit	-0.148	0.000	0.67			58.2	OK	
S9.000	S33	0.091	0.000	0.03			0.1	SURCHARGED	
S9.001	SPP2	0.053	0.000	0.25		28	3.0	SURCHARGED	
S9.002	S34	-0.102	0.000	0.22			3.1	OK	
S9.003	S35 - Catchpit	-0.095	0.000	0.29			3.1	OK	
S6.007	S Geocellular Tank	0.124	0.000	0.56		100	13.2	SURCHARGED	
S6.008	S5	-0.088	0.000	0.68			13.3	OK	
S6.009	S6	-0.098	0.000	0.61			13.4	OK	
S10.000	S20	-0.079	0.000	0.10			1.4	OK	
S10.001	S21	-0.067	0.000	0.24			2.9	OK	
S10.002	S22	-0.111	0.000	0.15			5.1	OK	
S10.003	S23	-0.104	0.000	0.20			6.2	OK	
S10.004	S24	-0.169	0.000	0.14			7.9	OK	
S10.005	S25	-0.170	0.000	0.13			9.9	OK	
S10.006	S26	-0.133	0.000	0.35			12.8	OK	
S6.010	S7	-0.104	0.000	0.23			15.4	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S11.000	S36	120 Summer	2	+0%	2/15 Summer				79.389
S11.001	SPP3	120 Summer	2	+0%	2/30 Summer				79.389
S11.002	S37	30 Summer	2	+0%	100/480 Winter				78.815
S4.003	SSuDS Basin	480 Summer	2	+0%	2/60 Summer				78.146
S4.004	S9	480 Summer	2	+0%	2/15 Summer				77.770

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S11.000	S36	0.044	0.000	0.02			0.1	SURCHARGED	
S11.001	SPP3	0.019	0.000	0.11		24	2.4	SURCHARGED	
S11.002	S37	-0.124	0.000	0.07			4.0	OK	
S4.003	SSuDS Basin	0.196	0.000	0.49			8.3	SURCHARGED	
S4.004	S9	0.130	0.000	0.38			8.3	SURCHARGED	

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10 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000
Hot Start (mins) 0
Hot Start Level (mm) 0
Manhole Headloss Coeff (Global) 0.500
Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000
MADD Factor * 10m³/ha Storage 0.000
Inlet Coefficient 0.800
Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0
Number of Offline Controls 0
Number of Online Controls 4
Number of Storage Structures 4

Number of Time/Area Diagrams 0
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH
FEH Rainfall Version 2013
Site Location GB 539400 136700 TQ 39400 36700

Data Type Catchment
Cv (Summer) 1.000
Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep
DTS Status OFF

DVD Status ON
Fine Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 2, 10, 30, 100
Climate Change (%) 0, 40, 40, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.000		S30 30 Summer	10	+40%					80.164
S4.001		S31 15 Summer	10	+40%					79.882
S5.000		S27 30 Summer	10	+40%					79.729
S5.001		S28 15 Summer	10	+40%					79.580
S4.002		S32 15 Summer	10	+40%					79.354
S6.000		S10 30 Summer	10	+40%					86.606
S6.001		S11 15 Summer	10	+40%					85.958
S6.002		S12 15 Summer	10	+40%	100/15 Summer				85.190
S6.003		S13 15 Summer	10	+40%	100/15 Summer				84.798
S6.004		S14 15 Summer	10	+40%	100/15 Summer				83.415
S6.005		S15 15 Summer	10	+40%					81.694
S7.000		S16 30 Summer	10	+40%					86.043
S7.001		S17 15 Summer	10	+40%					84.304
S7.002		S18 15 Summer	10	+40%					82.156
S7.003		S19 15 Summer	10	+40%	100/15 Summer				81.742
S8.000		S1 30 Summer	10	+40%	100/15 Summer				81.615
S7.004		S2 15 Summer	10	+40%	10/15 Summer				81.111
S7.005		S3 15 Summer	10	+40%	100/15 Summer				80.678
S6.006	S4 - Catchpit	S15 Summer	10	+40%	10/15 Summer				79.867
S9.000		S33 60 Summer	10	+40%	2/15 Summer				79.597
S9.001		SPP2 60 Summer	10	+40%	2/15 Summer				79.597
S9.002		S34 60 Summer	10	+40%	30/240 Summer				79.238
S9.003	S35 - Catchpit	S60 Summer	10	+40%	30/120 Summer				79.096
S6.007	SGeocellular Tank	S240 Summer	10	+40%	2/30 Summer				78.993
S6.008		S5 360 Winter	10	+40%	10/120 Summer				78.568
S6.009		S6 480 Winter	10	+40%	10/120 Summer				78.558
S10.000		S20 30 Summer	10	+40%					82.683
S10.001		S21 15 Summer	10	+40%	100/15 Summer				82.210
S10.002		S22 15 Summer	10	+40%					81.822
S10.003		S23 15 Summer	10	+40%					81.435
S10.004		S24 15 Summer	10	+40%					80.129
S10.005		S25 15 Summer	10	+40%	100/15 Summer				79.926
S10.006		S26 15 Summer	10	+40%	10/15 Summer				79.778
S6.010		S7 480 Winter	10	+40%	10/120 Summer				78.548

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10 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S4.000		S30	-0.086	0.000	0.39		7.2	OK	
S4.001		S31	-0.154	0.000	0.21		16.9	OK	
S5.000		S27	-0.121	0.000	0.08		1.7	OK	
S5.001		S28	-0.110	0.000	0.16		3.5	OK	
S4.002		S32	-0.149	0.000	0.25		42.0	OK	
S6.000		S10	-0.094	0.000	0.30		8.1	OK	
S6.001		S11	-0.142	0.000	0.29		27.8	OK	
S6.002		S12	-0.110	0.000	0.52		46.0	OK	
S6.003		S13	-0.102	0.000	0.58		61.1	OK	
S6.004		S14	-0.085	0.000	0.70		87.3	OK	
S6.005		S15	-0.106	0.000	0.54		94.7	OK	
S7.000		S16	-0.107	0.000	0.18		7.6	OK	
S7.001		S17	-0.073	0.000	0.52		26.5	OK	
S7.002		S18	-0.121	0.000	0.43		38.5	OK	
S7.003		S19	-0.135	0.000	0.34		41.6	OK	
S8.000		S1	-0.135	0.000	0.02		0.7	OK	
S7.004		S2	0.050	0.000	1.08		53.3	SURCHARGED	
S7.005		S3	-0.104	0.000	0.54		80.0	OK	
S6.006	S4 - Catchpit		0.187	0.000	2.04		177.1	SURCHARGED	
S9.000		S33	0.265	0.000	0.04		0.2	FLOOD RISK	
S9.001		SPP2	0.227	0.000	0.39	36	4.8	FLOOD RISK	
S9.002		S34	-0.087	0.000	0.36		5.0	OK	
S9.003	S35 - Catchpit		-0.078	0.000	0.47		5.0	OK	
S6.007	SGeocellular Tank		0.648	0.000	0.59	168	14.0	SURCHARGED	
S6.008		S5	0.238	0.000	0.72		14.1	SURCHARGED	
S6.009		S6	0.259	0.000	0.64		14.1	SURCHARGED	
S10.000		S20	-0.067	0.000	0.23		3.3	OK	
S10.001		S21	-0.040	0.000	0.66		8.0	OK	
S10.002		S22	-0.078	0.000	0.46		15.6	OK	
S10.003		S23	-0.065	0.000	0.61		19.1	OK	
S10.004		S24	-0.121	0.000	0.44		24.6	OK	
S10.005		S25	-0.124	0.000	0.41		30.7	OK	
S10.006		S26	0.004	0.000	1.05		38.8	SURCHARGED	
S6.010		S7	0.291	0.000	0.28		19.0	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000									
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 0.000									
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800									
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000									
Foul Sewage per hectare (l/s) 0.000									
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0									
Number of Online Controls 4 Number of Storage Structures 4 Number of Real Time Controls 0									
Synthetic Rainfall Details									
Rainfall Model FEH Data Type Catchment									
FEH Rainfall Version 2013 Cv (Summer) 1.000									
Site Location GB 539400 136700 TQ 39400 36700 Cv (Winter) 1.000									
Margin for Flood Risk Warning (mm) 300.0 DVD Status ON									
Analysis Timestep Fine Inertia Status ON									
DTS Status OFF									
Profile(s) Summer and Winter									
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440									
Return Period(s) (years) 2, 10, 30, 100									
Climate Change (%) 0, 40, 40, 45									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S4.000		S30 30 Summer	30	+40%					80.176
S4.001		S31 15 Summer	30	+40%					79.893
S5.000		S27 30 Summer	30	+40%					79.733
S5.001		S28 15 Summer	30	+40%					79.586
S4.002		S32 15 Summer	30	+40%					79.366
S6.000		S10 30 Summer	30	+40%					86.616
S6.001		S11 15 Summer	30	+40%					85.972
S6.002		S12 15 Summer	30	+40%	100/15 Summer				85.212
S6.003		S13 15 Summer	30	+40%	100/15 Summer				84.824
S6.004		S14 15 Summer	30	+40%	100/15 Summer				83.446
S6.005		S15 15 Summer	30	+40%					81.717
S7.000		S16 30 Summer	30	+40%					86.050
S7.001		S17 15 Summer	30	+40%					84.319
S7.002		S18 15 Summer	30	+40%					82.175
S7.003		S19 15 Summer	30	+40%	100/15 Summer				81.758
S8.000		S1 30 Summer	30	+40%	100/15 Summer				81.617
S7.004		S2 15 Summer	30	+40%	10/15 Summer				81.356
S7.005		S3 15 Summer	30	+40%	100/15 Summer				80.701
S6.006	S4 - Catchpit	15 Summer	30	+40%	10/15 Summer				80.026
S9.000		S33 60 Summer	30	+40%	2/15 Summer				79.676
S9.001		SPP2 60 Summer	30	+40%	2/15 Summer				79.676
S9.002		S34 240 Summer	30	+40%	30/240 Summer				79.340
S9.003	S35 - Catchpit	240 Summer	30	+40%	30/120 Summer				79.320
S6.007	SGeocellular Tank	240 Summer	30	+40%	2/30 Summer				79.316
S6.008		S5 480 Winter	30	+40%	10/120 Summer				78.763
S6.009		S6 480 Winter	30	+40%	10/120 Summer				78.751
S10.000		S20 30 Summer	30	+40%					82.688
S10.001		S21 15 Summer	30	+40%	100/15 Summer				82.223
S10.002		S22 15 Summer	30	+40%					81.835
S10.003		S23 15 Summer	30	+40%					81.453
S10.004		S24 15 Summer	30	+40%					80.148
S10.005		S25 15 Summer	30	+40%	100/15 Summer				79.945
S10.006		S26 15 Summer	30	+40%	10/15 Summer				79.839
S6.010		S7 480 Winter	30	+40%	10/120 Summer				78.737
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Appendix M

Drainage Management and Maintenance Plan



Land South of West Hoathly Road
East Grinstead, West Sussex

Drainage Management and Maintenance
Plan

For

Devine Homes PLC

Document Control Sheet

Land South of West Hoathly Road

East Grinstead, West Sussex

Devine Homes PLC

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
7 th August 2025	Final A	Phil Allen MCIWEM C.WEM	Neil Jaques



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4.0 General Maintenance Principles 4

5.0 Inspection and Maintenance Frequency of Components..... 6

1.0 Introduction

- 1.1 This document has been produced by Motion on behalf of their client, Devine Homes PLC. It sets out the principles for the long-term management and maintenance of the proposed surface water drainage system on the proposed development on the Land South of West Hoathly Road, East Grinstead, West Sussex.
- 1.2 The purpose of this document is to ensure that the site management company or their agents have a robust inspection and maintenance plan going forwards. This ensures the optimum operation of the surface water drainage system and that it will be continually maintained for the lifetime of the development. This will contribute to reducing the risk of surface water flooding both on- and off-site.
- 1.3 All those responsible for maintenance should follow relevant health and safety legislation for all activities listed within this report (including lone working, if relevant). Method statements and risk assessments should always be undertaken and made available, if requested.
- 1.4 This document describes the typical management and maintenance tasks that are known at the design stage (maintenance frequencies and typical tasks, for example). These have been drawn from industry guidance such as CIRIA C753 - The SuDS Manual – and manufacturer's own guidance.
- 1.5 Maintenance is considered as a construction activity under the CDM Regulations 2015. Under the CDM Regulations, it is a requirement that a competent person be appointed to carry out a required role. CDM defines a competent person as an individual with sufficient knowledge of the specific tasks to be undertaken, as well as sufficient experience and ability to carry out their duties in relation to the task in a way that secures health and safety on site.
- 1.6 In recognition of the requirements of the CDM Regulations 2015, this surface water management and maintenance plan expects that the maintenance work will be carried out by a competent person who must have prior knowledge of the drainage components and SuDS systems on site.
- 1.7 There are limitations on what this document can prescribe at this time. At this stage this document cannot name the specific individuals who will carry out the maintenance and what equipment is to be used. Related to this, this document is unable to provide method statements for exactly how maintenance practices will be carried out. These can only be determined at the time of the maintenance being carried out by the exact maintenance need and the antecedent site conditions. Therefore, this is to be the responsibility of the site management company and/or the individuals carrying out the work. We urge those who are carrying out the maintenance to record this information and make it available to the Local Planning Authority (LPA), if required to do so. This drainage management and maintenance plan needs to be a living document that is owned and maintained by the adopting site management company.

2.0 Maintenance Categories

2.1 There are three categories of maintenance activities referred to in this report. These are:

Regular maintenance (including inspections and monitoring)

- „ Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including inspections, vegetation management, and litter, silt and debris removal.

Occasional maintenance

- „ Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

Remedial maintenance

- „ Remedial maintenance comprises of intermittent tasks that may be required to rectify faults associated with the system. The likelihood of faults can be minimised by correct installation, regular inspection and timely maintenance. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events and, as such, timings are difficult to predict.
- „ This document should be read in conjunction with the design drawings of the drainage system, so that the location and type of each feature can be recognised and understood.

3.0 The Drainage System Components

Surface water

- 3.1 The proposed surface water drainage system is made up of a number of components. These include:
- ” Water Butts
 - ” Pipes
 - ” Manholes
 - ” Catchpit manholes/silt traps
 - ” Permeable pavements
 - ” A geocellular attenuation tank
 - ” A SuDS basin
 - ” Orifice and Hydrobrake flow controls
- 3.2 All components should be constructed and installed in accordance with the manufacturer's instructions and to the levels/arrangement as defined on the designer's drawings. Not doing so will invalidate any warranty provided by the manufacturer.
- 3.3 All maintenance and cleaning must be carried out in accordance with manufacturer's recommendations and by competent and suitably qualified staff, as defined in the CDM regulations 2015.

4.0 General Maintenance Principles

- 4.1 All surface water drainage systems, whether piped gravity systems, Sustainable Drainage Systems (SuDS), or flow control devices and pumps, require regular maintenance to keep them working at optimum efficiency and capacity. The maintenance of the surface water drainage system on the Land South of West Hoathly Road, East Grinstead should be carried out alongside other regular maintenance tasks on site.
- 4.2 Timely and adequate maintenance will increase the lifespan of all the drainage components. Inadequate maintenance will do the reverse. Therefore, the projected lifespan and anticipated replacement date of each drainage component cannot be forecast at the time of this document being produced.
- 4.3 The site management company and/or their agents are responsible for the maintenance of the surface water drainage system.
- 4.4 Construction activities can create and discharge significant quantities of sediment that will quickly clog the surface water drainage system. Therefore, construction-stage sediment removal is required immediately post-construction. This may require several cleans of the system during the first year after installation. The construction site manager should assess this and carry out cleaning as necessary.
- 4.5 Catchpit manholes/silt traps will be specified upstream of the discharge to the permeable paving and the geocellular tank. They will remove gross solids and most silts. It is important that any debris build-up in the catchpit manholes/silt traps is removed at regular intervals. This will reduce the risk of the permeable paving becoming silted up. It will maintain its design capacity and function.
- 4.6 Cleaning should also take place after large storms when there have been increased surface water flows and visible entrainment and deposition of debris.
- 4.7 An increased frequency of inspection and maintenance should be programmed into the autumn and winter months in acknowledgement that:
 - „ Leaf fall from deciduous trees in autumn will result in an increased amount of leaf litter and an elevated blockage risk of drainage infrastructure.
 - „ Increased rainfall during winter months will result in greater quantities of water moving through the drainage system and a greater input of silt and other debris.
- 4.8 Table 4.1, on the next page, gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken. Section 5 – Inspection and Maintenance Frequency of Components – will assign typical maintenance frequencies and tasks to the specific components within the surface water drainage system on the development on the Land South of West Hoathly Road.

Table 4.1 - Typical maintenance tasks and frequencies

Activity	Indicative Frequency	Typical Tasks
Routine/regular maintenance	Monthly to annually	" Litter picking " Silt removal " Inspection of all inlets, outlets and control structures " Weed removal and invasive plant control
Occasional maintenance	Annually up to 25 years	" Silt control around components " Vegetation management around components " Sweeping of pavement areas to remove surface silt " Silt removal from catchpits, cellular storage structures
Remedial maintenance	As required	" Inlet/outlet repairs " Erosion repairs " Reinstatement of edgings " Reinstatement following pollution " Removal of silt build-up and leaf litter after storms " Repair of vandalism " Replacement of any blocked filter membranes/materials

5.0 Inspection and Maintenance Frequency of Components

- 5.1 Table 5.1 below lists each of the components used within the site's surface water drainage system. It suggests an indicative maintenance frequency for each component and ascribes typical maintenance tasks to them.
- 5.2 This list is not exhaustive, nor is it prescriptive. As mentioned in Section 3, additional, unscheduled maintenance may be required following adverse weather conditions or after autumn leaf falls. Additional maintenance tasks may be required to adequately clean and maintain individual components.
- 5.3 The list of components should be cross-referenced with the designer's drawings so that the location of each component can be identified.
- 5.4 It is the responsibility of the site management company and/or their agents to ensure that all necessary maintenance activities are carried out in a timely manner and that the design performance of each drainage component is preserved.
- 5.5 If there is any uncertainty regarding the correct and safe methods of cleaning, or what equipment should be used, the manufacturer should be consulted.

Table 5.1 - Maintenance Frequency and Task for Drainage Components

Activity	Indicative Frequency	Anticipated Tasks
Water Butts	Annually in Autumn to Winter	- Remove falling leaves and seeds from guttering or those that have found their way into the water butt. - Water may stagnate slightly. If so, use a water butt cleaning disc into the tank. - In autumn and winter, drain water off every 10 days (or less) to make sure that water butts don't overflow and that water is kept moving. This will stop larvae and flies from using the water butt. - Use safe products such as vinegar to clean the outside of the tank and the inside of the lid and be careful not to contaminate water with chemicals. - At least once a year, completely empty the water butt and scrub it out with warm soapy water and then rinse thoroughly. This is best done at a time when the water butt is already nearly empty (end of summer) or when it can readily refill (winter).
Pipes	As required	- Identify any pipes that may not be operating properly and employ a competent, qualified contractor to inspect using CCTV. - If the pipe is blocked with silt or debris, the pipe should be jetted clean from an upstream access point. All silt and debris should be captured and removed at a downstream access point. - Inspect once clean. - If any other defects are encountered (cracks, displaced joints, root ingress), appropriate

		solutions should be discussed with a competent and qualified contractor. These services are usually provided by the same companies that offer CCTV surveys and pipe jetting services.
Manholes	Annually	Inspect/identify any damage or areas that are not operating correctly Remove silt, litter, leaves and other detritus. Inspect once clean.
Catchpit Manholes/Silt Traps	Twice a year, before and after autumn/winter	Inspect/identify any damage or areas that are not operating correctly Remove silt, litter, leaves and other detritus. Inspect once clean.
Permeable paving	Once a year after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.	Agitate surface by means of mechanical sweeping or vacuuming to ensure no vegetation or moss is allowed to establish and grow in the joints. Mechanical sweeping of pavements and refilling of joints with the correct aggregate need only be carried out at intervals of 5 years or so Remove weeds from the surface through the application of glyphosate-based weed killers Stabilise and mow contributing and adjacent areas. Inspect once clean. See Table 20.15 of CIRIA C753 for more information. Permeable paving has a nominal 25-year lifespan, if correctly and regularly maintained. When subjected to low level oil drips permeable pavements can continue to biodegrade hydrocarbons indefinitely. Major oil spills have the potential to contaminate the surface and the underlying crushed stone. In the event of a major oil spill, the area of block pavements and crushed stone that is affected should be removed, cleaned and reinstalled.
Geocellular Attenuation Tanks	Annually	Contact manufacturer for instruction on approved and safe inspection and maintenance practices. Inspect/identify any areas that are not operating correctly. Remove debris from catchment surface. Remove sediment from pre-treatment structures. Check for silt build-up and flush and remove as required (in accordance with manufacturer's instructions). Inspect once clean. See Table 21.3 of CIRIA C753 for more information.

		Most geocellular units have a 60-year creep limited life expectancy, so they should be planned for replacement by 2075 (approx.).
Orifice Plates	Every 3 – 6 months.	Orifice plates have no moving parts to fail and quality units are made of stainless steel to resist scour, degradation and chemical attack. The orifice plates in this scheme are to be downstream of the permeable pavements, so all contributing flows should be heavily filtered and free of any debris. Debris and silt should be removed if present. Check wear on orifice to ensure no enlargement is taking place. Any visible fixing bolts should be checked. If there is a suspected blockage, the housing chamber can be inspected internally, the blockage cleared and the orifice returned to its working position.
SuDS Basins	Monthly in Summer, as required in Winter	Responsibility should be with landscape contractors. Maintenance tasks are not that different from standard public open space. Adequate access needs to be provided to the area. Regular mowing should take place across maintenance access routes, amenity areas, across embankments and the main storage area. Remaining areas can remain as 'meadow'. Mowed grass lengths of 75 – 100mm are appropriate. Grass clippings should be disposed of off-site. Any dead growth should be cleared before the start of the growing season. Any permanently wet areas with emergent aquatic vegetation should be managed as ponds or wetlands. Remove any sediment build-up as required. Check any inlets and outlets for blockages and clear as required. Check any flow control devices, if present.
Hydrobrake chamber	Every three months for the first year, then annually thereafter	Contact manufacturer for instruction on approved and safe inspection and maintenance practices. Inspect Hydrobrake and check functionality. Remove any detritus as required. Inspect once clean.

5.6 Upon completion of maintenance activities, a record should be kept of the work carried out. This should be retained, and an annual maintenance report should be compiled, which should include the following:

- Observations resulting from inspections
- Maintenance and operation activities undertaken during the year

17 Recommendations for inspections and maintenance programmes for the following year

- 5.7 On the last page of this document is a table with suggested information should be recorded and included with the maintenance plan. As mentioned in the introduction to this document, this should be a living document and regularly updated, as required.

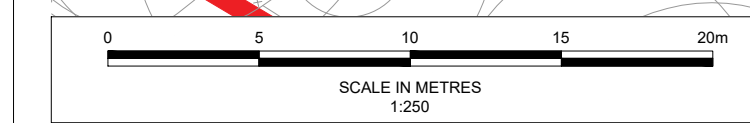
Date	Component requiring maintenance	Issues prompting maintenance	Scheduled maintenance (Y/N)	Maintenance carried out	Additional works required (Y/N). If yes, please detail	Next scheduled date of inspection and maintenance

Appendix N

Exceedance Plan

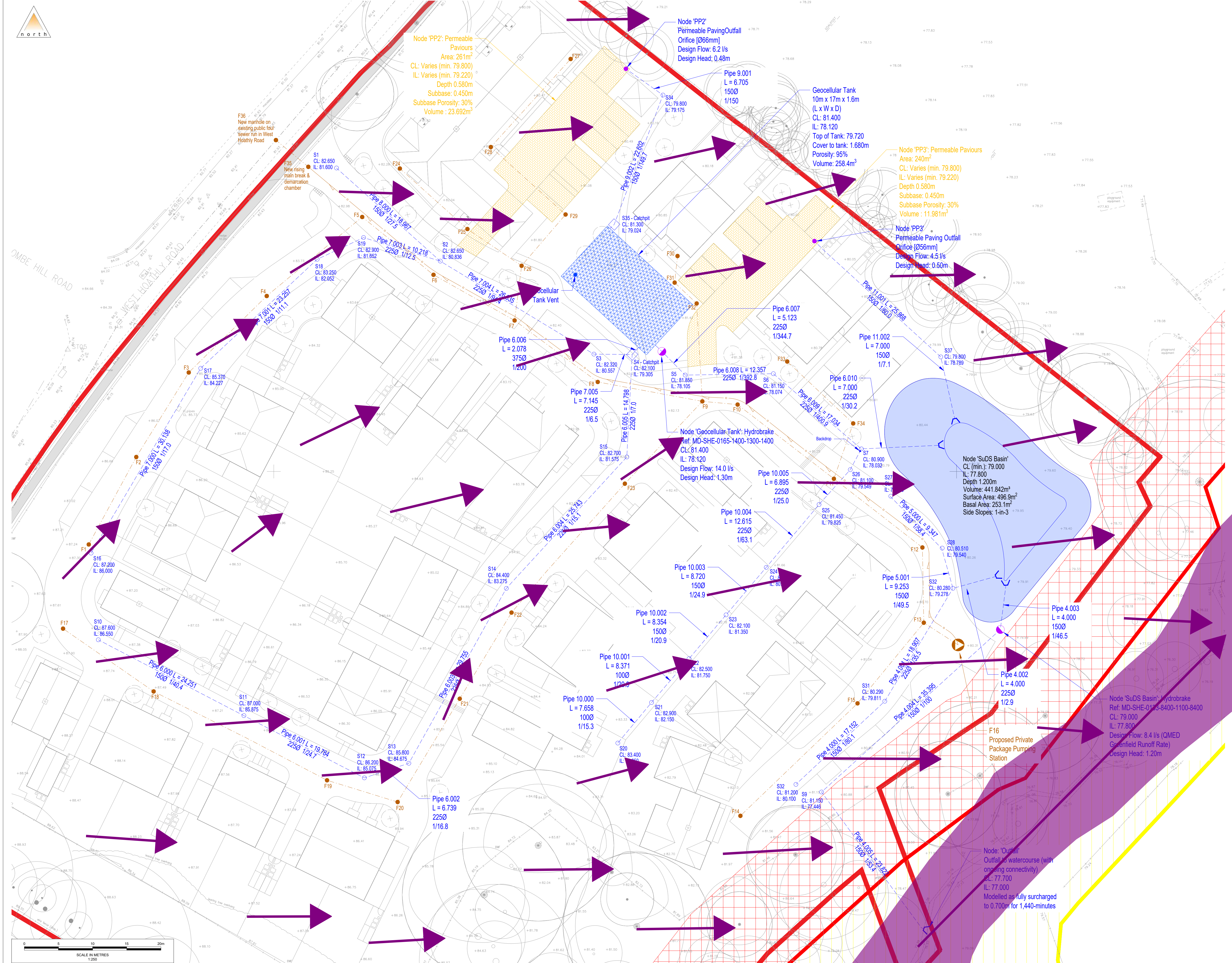


OMBE HILL ROAD
WEST HOATHLY ROAD



C:\Users\jphillips\Documents\Drawings\2504066-0500-Drainage Strategy-P05.dwg

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- Notes
1. This Drainage Strategy Plan is for planning purposes and does not constitute detailed designs and should not be used for construction purposes.
 2. All levels and dimensions are to be checked on site before any work commences. All dimensions are in metres unless stated otherwise.
 3. This drawing has been based upon survey supplied information and Motion cannot guarantee the accuracy of the data provided.
 4. The drainage levels are based on existing levels, but also proposed levels where existing site features present unusual changes in gradient.
 5. Any discrepancies should be reported to the engineer immediately, so that clarification can be sought prior to the commencement of works.
 6. This drawing should be read in conjunction with all other relevant engineering details, drawings and specification.
 7. 350mm minimum cover is to be provided for private pipes laid in soft/paved areas, with 900mm minimum cover to be provided for private pipes laid beneath roads / driveways unless not practicable. Where unachievable, shallow pipe drains may require protection using concrete surround or paving slabs bridging the trench, subject to the NHBC Inspector's requirements.
 8. Manholes situated within areas accessible to motor vehicles are to be fitted with suitable strength covers and frames.
 9. All foul sewage to have levels confirmed once detailed design commences and slab/FFL's are finalised.

- Legend
- Site Boundary
 - Permeable Pavements
 - Geocellular Attenuation Tank
 - Surface Water Gravity Pipe
 - Surface Water Manhole
 - Foul Gravity Pipe
 - Foul Water Manhole
 - Foul rising main
 - Existing foul public surface water sewer
 - Orifice Flow Control
 - Hydrobrake Flow Control
 - Proposed Headwall
 - Catchpit Manhole (1200mmØ)
 - Geocellular Tank Vent
 - Backdrop Manhole
 - 5m Ancient Woodland Buffer
 - Ancient Woodland

P05	Fifth Issue - Final Site Layout	PA	PA	PA	16/12/2025
P04	Fourth Issue	PA	PA	PA	24/11/2025
P03	Third Issue - Foul Sewerage Added	PA	PA	PA	20/11/2025
P02	Second Issue	PA	PA	PA	07/11/2025
P01	First Issue	PA	PA	PA	05/08/2025
Rev.	Description	Drm	Chk	App	Date

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

motion

Guildford - Reading - London
www.motion.co.uk

Client:
Devine Homes

Project:
Land South of West Hoathly Road
East Grinstead, West Sussex

Title:
Drainage Strategy Plan

Scale: 1:250 (@ A1)

Drawing:
2504066-0500

Revision:
P05