CAMPFIELD, SOUTHWATER

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

March 2025

Miller Homes Ltd

RESIDENTIAL SCHEME
CAMPFIELD
SOUTHWATER

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

CONTROLLED DOCUMENT

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1. EXECUTIVE SUMMARY

1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Paul Basham Associates on behalf of Miller Homes to support an outline planning application for an 82-unit residential site. The land is in Southwater, West Sussex. The nearest postcode is RH13 9FR.

1.2 The site is located entirely within Flood Zone 1.

1.3 Summary of residual flood risk

- Fluvial and tidal flooding is considered to be **very low**.
- Surface water flooding is considered to be **low**.
- Groundwater flooding is considered to be **very low**.
- Reservoir flooding is considered to be **very low.**
- Sewer flooding is considered to be **very low**.

1.4 There are isolated areas of surface water flood risk on the southern and eastern boundaries as well as at a low point in the centre of the site. The site layout has been designed to ensure that all dwellings are positioned outside any areas at risk of flooding.

1.5 As part of the pre-application process, it was agreed with the LPA through consultation that the sequential test would not be required subject to the dwellings being proposed outside any flood risk areas. See confirmation with LPA officer in **Appendix G** and further information in **Sections 5.6 to 5.9**.

1.6 BGS mapping, local borehole logs and the BGS infiltration SuDS Georeport indicate the site is underlain by Weald Clay formation, with minimal potential for infiltration. Additionally, no superficial deposits that may have infiltration potential were recorded on site. Therefore, drainage through infiltration is not considered a viable solution.

1.7 The surface water drainage proposal is to capture run-off at source, attenuate on-site within an attenuation basin and crates and discharge into the existing watercourse to the west of the site via a HydroBrake at the proposed impermeable area's greenfield Qbar rate (7.51 l/s). Please refer to Sections 3.13 and 3.14 for the greenfield runoff rates calculations.

1.8 All run-off (up to and including the 1-in-100-year rainfall event (+45% Climate Change)) shall be restricted to the proposed impermeable area's QBAR (7.51 l/s), per section 3.3.1 of The CIRIA SuDS manual. Discharging all run-off at QBAR is considered the more conservative approach when compared to the long-term storage approach (where discharge up to the up to the 1-100-year volume is discharged at the 1-in-100-year greenfield rate).

1.9 Water will be discharged from the HydroBrake to flow onto a swale with erosion control matting, which eventually drains into the water course.

1.10 Permeable paving shall be proposed for driveways and carparking to improve source control and improve water quality treatment.

1.11 Hydraulic calculations confirm that the network does not flood during the 100%AEP, 3.3%AEP (+40% climate change allowance) and 1%AEP storm events (+45% climate change allowance).

1.12 Foul water shall drain to a proposed pumping station, which will pump the effluent through a rising main towards the north, where it will connect into the nearest Southern Water manhole (Ref: 1205). The connection will be subject to a S106 agreement.

1.13 In response to a previous revision of this report, the LLFA questions the freeboard available in the basin, suggesting a minimum of 300mm freeboard should be provided between the peak water level for the 1:100-year event plus an allowance for climate change and the crest level of the basin. See item 4 on the WSCC LLFA response dated 07/03/2025. However, this is not in accordance with the CIRIA SuDS Manual, Water quantity paras 3.3.3 a and b, which states:

"*Properties should be fully protected against flooding from the site drainage system for the 1:100-year event…… The finished ground floor levels and the level of any opening into basement of the proposed buildings on site should be at least 300mm above the predicted flood level associated with the above scenario).*

Firstly, the proposed drainage is sized to ensure there is no flooding during the 1:100-year event plus an allowance for climate change, thus complying with the SuDS manual. Furthermore, the peak water level for the 1:100-year event plus an allowance for climate change is 37.645mAOD, 3.355m below the proposed road level of 41mAOD, which the proposed FFLs will sit above. Therefore, there is approximately 3.5m of freeboard between the peak water level and the proposed FFLs. Increasing the basin size to provide additional freeboard in the basin would be an unsustainable approach, needlessly increasing the earthworks required to deliver the basin.

2. INTRODUCTION

2.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Paul Basham Associates on behalf of Miller Homes to support an outline planning application for a residential site. The land is in Southwater, West Sussex. The nearest postcode is RH13 9FR.

2.2 The plot size is approximately 4.50ha and the land is currently open field. The site location is shown in **Figure 1** below.

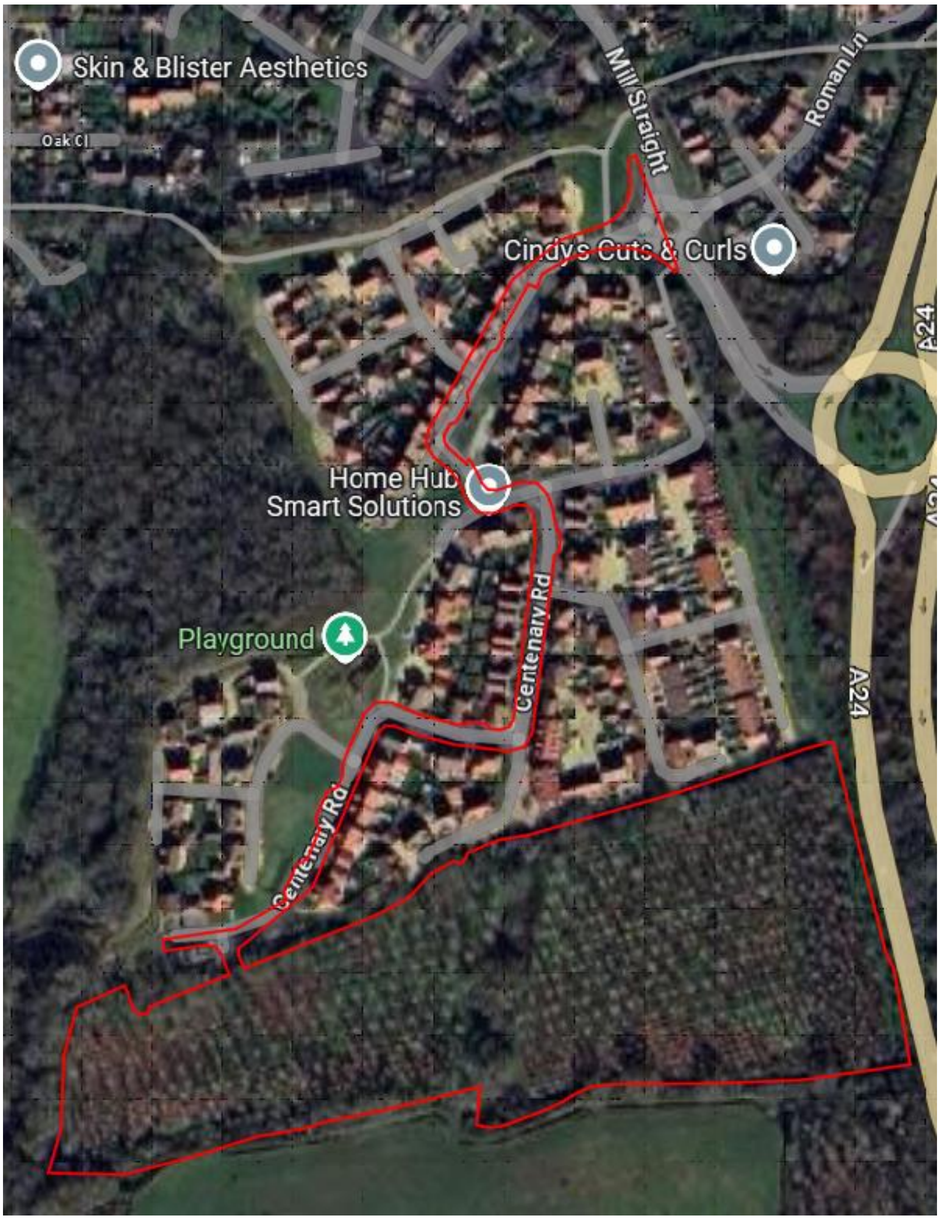


Figure 1: Site Location Plan (Source: Google Maps)

Development Proposals

2.3 The development proposals for the site are for a residential development comprising of 82 dwellings, parking spaces and public open space. The proposed scheme is being submitted as an outline planning application with all matters reserved except for access. The indicative site layout is included in **Appendix A**.

3. SITE DESCRIPTION

Topography

3.1 The site generally slopes from east to west, at an even gradient and gradually steepens towards the western boundary. The highest point is 50.723mAOD and is in the southeastern corner of the site and the lowest point is 35.717mAOD near the southwestern corner of the site. The topographical survey is included in **Appendix B.**

Geology

3.2 A review of the British Geological Survey (BGS) mapping indicates that the bedrock geology beneath the site is *''weald clay formation – mudstone. Sedimentary bedrock formed between 133.9 and 126.3 million years ago during Cretaceous period''.* No superficial deposits were recorded on site. See **Figure 2** for the BGS map extract.

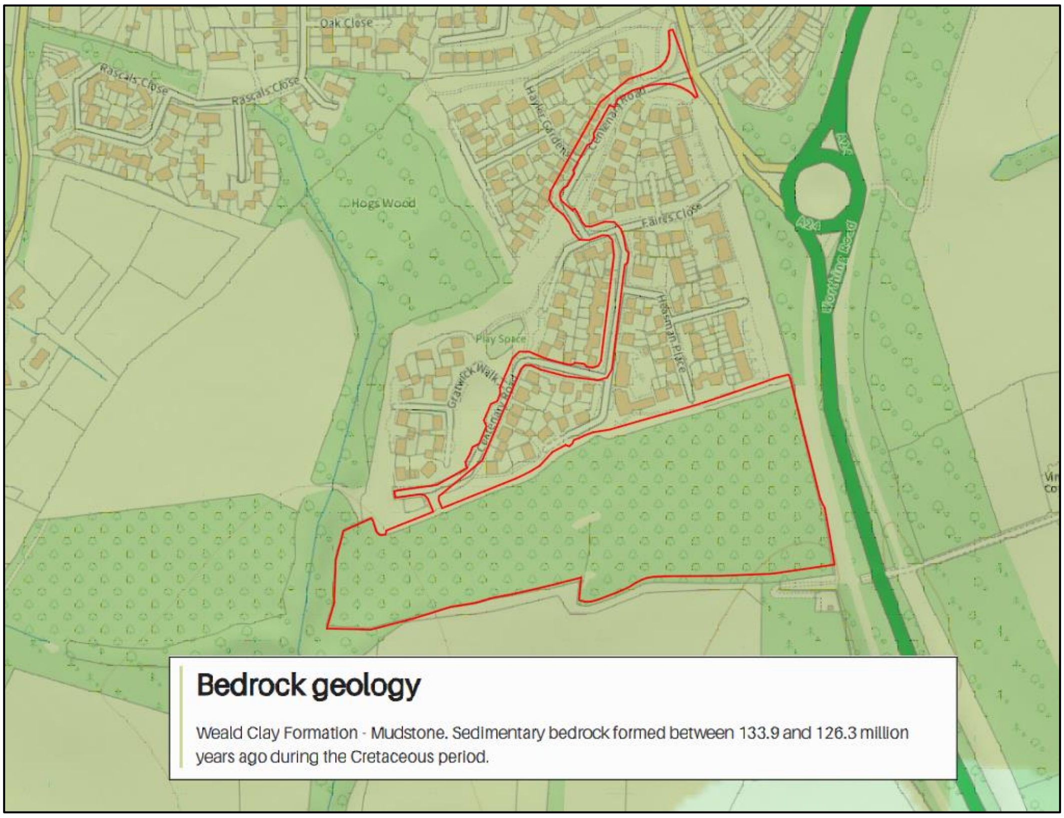


Figure 2: BGS bedrock mapping

3.3 **Figure 3**, obtained from the BGS website, shows the nearest boreholes: TQ12SE19, located northeast of the proposed development, and TQ12SE21, located south of the proposed development.

Figure 3: BGS borehole mapping

3.4 The BGS borehole log ref: TQ12SE19 indicates that the soil -consists of layers of friable and shaly clay (Weald Clay) down to 52m Below Ground Level (BGL), ground water depths were found at 4.90m BGL. Similarly, Borehole log ref: TQ12SE21 recorded Weald Clay strata down to 29.8m BGL; ground water struck at 9m BGL. Both borehole logs are included in **Appendix C**.

3.5 The BGS Infiltration SuDS Geo-report (**Appendix D**) was purchased to review the subsurface conditions for the proposed site. The report indicated that the bedrock permeability of the site was likely to be poorly draining (**Figure 4**). No superficial deposits were recorded on site (**Figure 5**).

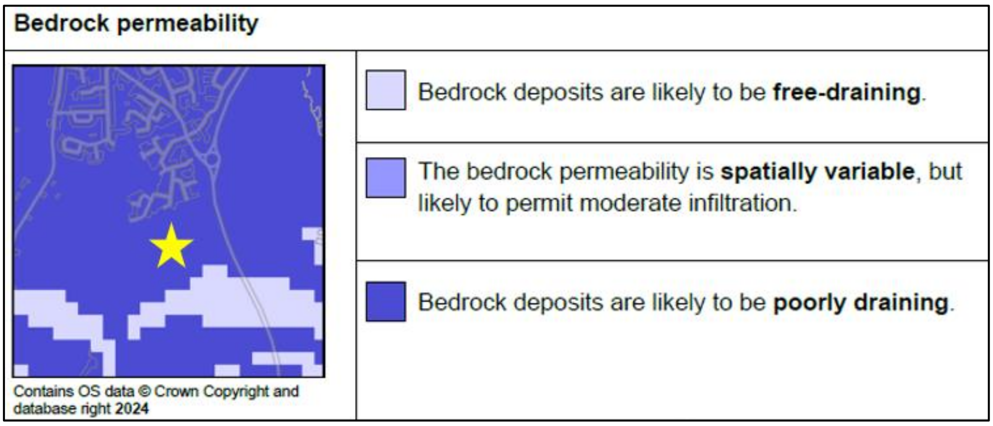


Figure 4: BGS SuDS Infiltration Geo-report - Bedrock Permeability Extract

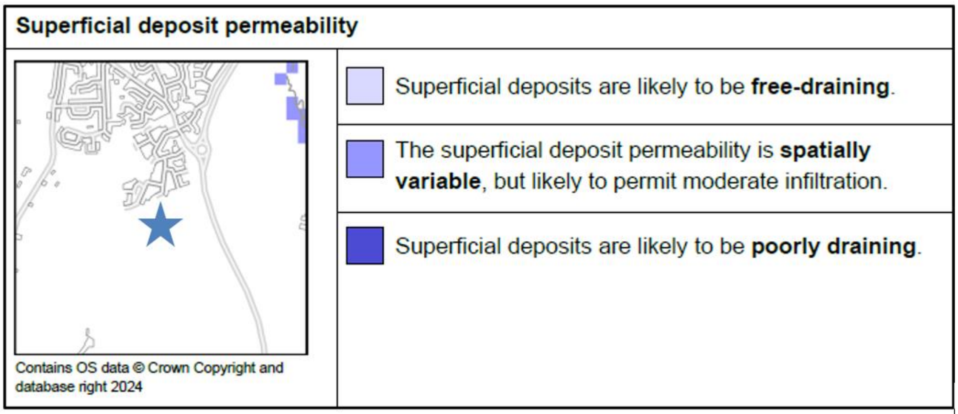


Figure 5: BGS SuDS Infiltration Geo-report – Superficial Deposit Permeability Extract

3.6 Given the ground conditions and considering that the site is entirely underlain by Weald Clay Formation, which is characterised by low permeability, infiltration is not considered a feasible drainage solution and the proposed strategy is to discharge to the adjacent watercourse.

Hydrogeology

3.7 DEFRA (Department for Environment, Food & Rural Affairs) Magic Map shows the location and classification of underlying aquifers. **Figure 6** below shows an extract from the online map and indicates that the site's nearest postcode (marked blue), does not lie within any source protection zones.

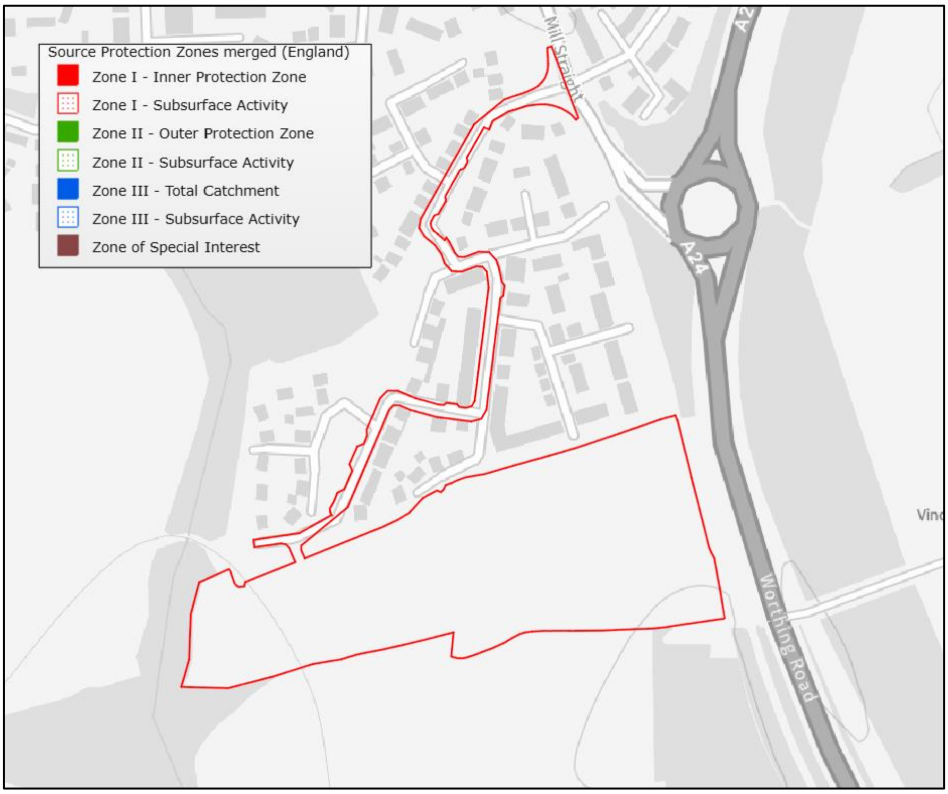


Figure 6: Magic Map – Source Protection Zones

3.8 The BGS Infiltration SuDS Geo-report (**Appendix D**) indicates that groundwater levels are expected to lie deeper than 5m BGL for the majority of the site, except for the western boundary of the site where the watercourse runs, which is associated with shallower groundwater levels between 3-5m BGL (**Figure 7**).

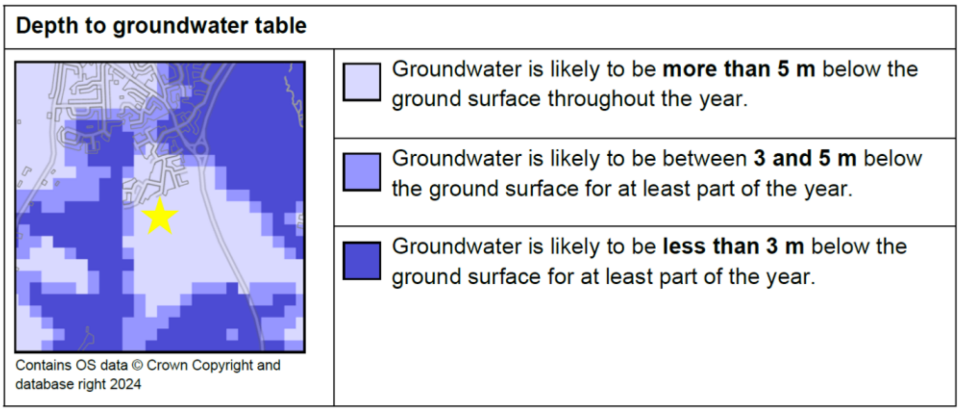


Figure 7: BGS SuDS Infiltration Geo-report – Depth to Groundwater Extract

Hydrology

3.10 **Figure 8** below shows there is an existing watercourse that runs along the western boundary of the site.

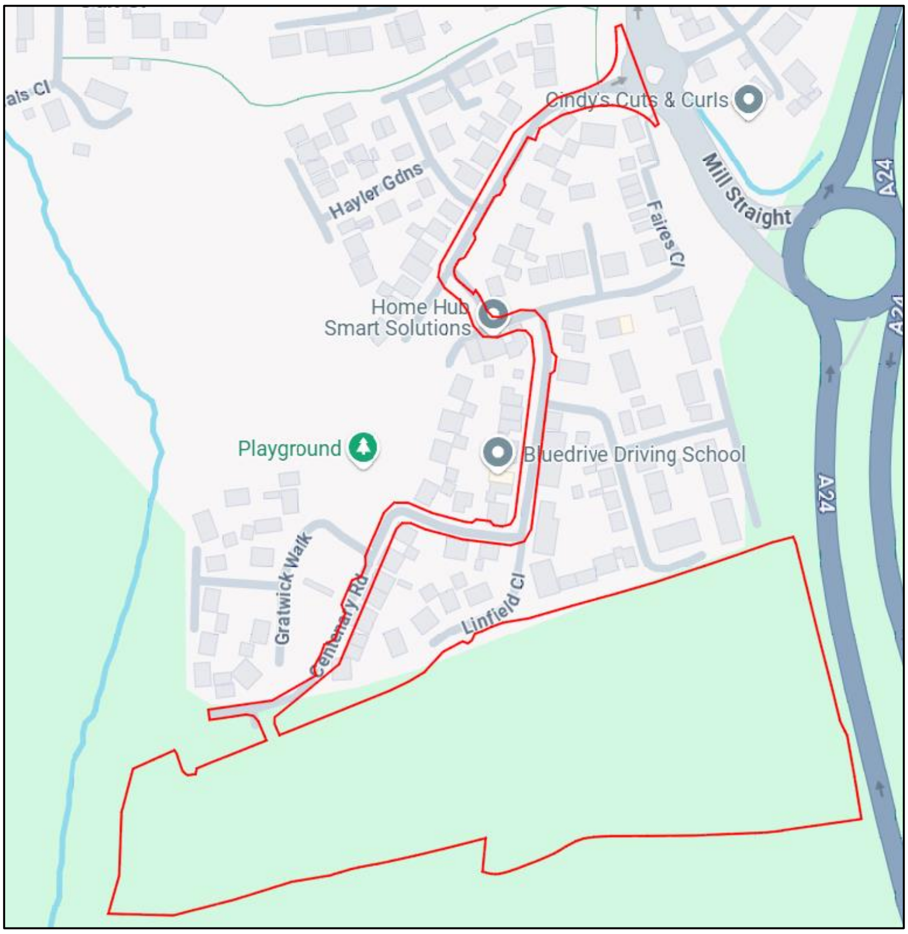


Figure 8: Nearby watercourses. (Source: Google Maps)

Public Sewer

3.11 Based on the sewer mapping provided by Southern Water (**Appendix E**), there are surface and foul sewers, which serve the neighbouring development to the north of the proposed site.

Pre-development greenfield rates

3.12 The site is currently a greenfield with no existing drainage. It appears that surface water runoff flows across the site, eventually discharging into the watercourse along the western boundary.

3.13 The greenfield run-off rates for the existing, undeveloped site have been calculated using the HR Wallingford online calculator. The Qbar for the greenfield 4.50ha site is calculated to be 24.58l/s. A summary of the greenfield run-off rates are shown in **Table 1** below. The full report can be found in **Appendix F**.

Q_{BAR} (l/s)	24.58
1 in 1 year (l/s)	20.90
1 in 30 years (l/s)	56.54
1 in 100 years (l/s)	78.42

Table 1: Pre-Development Greenfield runoff rates

3.14 The proposed impermeable area (including 10% urban creep) is 1.375ha. the greenfield runoff rates for this have also been calculated using the HR Wallingford calculator and have been summarised below. The full set of calculations are also included in **Appendix F**.

Q_{BAR} (l/s)	7.51
1 in 1 year (l/s)	6.38
1 in 30 years (l/s)	17.28
1 in 100 years (l/s)	23.96

Table 2: Proposed impermeable area greenfield runoff rates

4. PLANNING POLICY

4.1 The planning policies and guidance that are relevant to the proposed Development with regard to flood risk and surface water management are outlined below.

National Planning policy

4.2 2024 updated National Planning Policy Framework (NPPF) and the associated 2022 updated Planning Practice Guidance (PPG) by the Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government

- 2022 updated EA Standing Advice
- EA National Strategy for Flood and Coastal Erosion Risk Management 2020
- DEFRA Sustainable Drainage System: Non-Statutory Technical Standards 2015
- CIRIA C753 The Suds Manual 2015
- Flood and Water Management Act 2010
- Flood Risk Regulations 2009
- Flood risk assessments: climate change allowances 2016 (updated in 2022).

Regional Planning policy

- West Sussex County Council Local Flood Risk Management Strategy 2021-2023
- West Sussex Local Flood Risk Management Strategy (2013-2018)
- West Sussex's LLFA Policy for Management of Surface Water

Figure 9 below shows a summary of West Sussex's LLFA Suds Policies

Table 5.1: West Sussex LLFA SuDS Policies

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Manage Flood Risk Through Design
SuDS Policy 3	Mimic Natural Flows and Drainage Flow Paths
SuDS Policy 4	Seek to Reduce Existing Flood Risk
SuDS Policy 5	Maximise Resilience
SuDS Policy 6	Design to be Maintainable
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity
SuDS Policy 10	Link to Wider Landscape Objectives

Figure 9: Extract from WSCC SuDS Policies

Local Planning Policy

- Horsham District Council (HDC) Strategic Flood Risk Assessment 2010

4.3 The Horsham District Council local plan contains the following policies relating to flooding, drainage, and surface water:

- Local Plan, Policy 24 Environmental Protection
- Local Plan, Policy 35 Climate Change
- Local Plan, Policy 38 Flooding

4.4 Based on the above policies, the key requirements in relation to the surface water management and flood risk for the proposed Development are considered as to be follows:

- National Planning Policy Framework (2024): "A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use."

- Environment Agency Standing Advice: "The surface water management needs to meet requirements set out in either your local authority's Surface Water Management Plan (SWMP), Strategic Flood Risk Assessment (SFRA) and Building Regulations Part H. Emergency escape plans for any parts of a building that are below the estimated flood level are required"

- CIRIA C753 The SuDS manual 2015: "Control the quantity of runoff to support the management of flood risk and maintain and protect the natural water cycle. To ensure that the surface water runoff from a developed site does not have a detrimental impact on people, property, and the environment, it is important to control how fast runoff is discharged from the site (i.e., the peak runoff rate) and how much runoff is discharged from the site (i.e., the runoff volume). Suds that are designed to manage water quantity in this way reduce the likelihood of flooding caused by the development. They can help protect natural water cycles by promoting the recharge of soil moisture levels, by maintaining stream and river baseflows and by replenishing groundwater".

- SuDS Policy 2 of WSCC LLFA Policy for management of surface water states: "The drainage system must be designed to operate without any flooding occurring during any rainfall event up to (and including) the critical 1 in 30-year storm (3.33% AEP). The system must also be able to accommodate the rainfall generated by events of varying durations and intensities up to (and including) the critical, climate change adjusted 1 in 100-year storm (1% AEP) without any on-site property flooding and without exacerbating the off-site flood-risk. Sufficient steps are to be taken to ensure that any surface flows between the 1 in 30 and 1 in 100-year events are retained on site. Storage should be based upon analyses of a range of winter and summer storm profiles to determine a critical storm event."

- Horsham DC *Policy 24- Environmental Protection, Section 3* promotes ensuring developments "Maintain or improve the environmental quality of any watercourses, groundwater and drinking water supplies, and prevents contaminated run-off to surface water sewers".

- Horsham DC *Policy 35- Climate Change, Section 2* promotes developments being adaptive to climate change through the "Use of green infrastructure and dual use SuDS to help absorb heat, reduce surface water runoff, provide flood storage capacity and assist habitat migration"

- Horsham DC *Policy 38 – Flooding.* An extract of Policy 38 is shown in Figure 10 overleaf.

Policy 38

Strategic Policy: Flooding

1. **Development proposals will follow a sequential approach to flood risk management, giving priority to development sites with the lowest risk of flooding and making required development safe without increasing flood risk elsewhere. Development proposals will;**

   a. **take a sequential approach to ensure most vulnerable uses are placed in the lowest risk areas.**

   b. **avoid the functional floodplain (Flood zone 3b) except for water-compatible uses and essential infrastructure.**

   c. **only be acceptable in Flood Zone 2 and 3 following completion of a sequential test and exceptions test if necessary.**

   d. **require a site-specific Flood Risk Assessments for all developments over 1 hectare in Flood Zone 1 and all proposals in Flood Zone 2 and 3.**

2. **Comply with the tests and recommendations set out in the Horsham District Strategic Flood Risk Assessment (SFRA).**

3. **Where there is the potential to increase flood risk, proposals must incorporate the use of sustainable drainage systems (SuDS) where technically feasible, or incorporate water management measures which reduce the risk of flooding and ensure flood risk is not increased elsewhere.**

4. **Consider the vulnerability and importance of local ecological resources such as water quality and biodiversity when determining the suitability of SuDS. New development should undertake more detailed assessments to consider the most appropriate SuDS methods for each site. Consideration should also be given to amenity value and green infrastructure.**

5. **Utilise drainage techniques that mimic natural drainage patterns and manage surface water as close to its source as possible will be required where technically feasible.**

6. **Be in accordance with the objective of the Water Framework Directive, and accord with the findings of the Gatwick Sub Region Water Cycle Study in order to maintain water quality and water availability in rivers and wetlands and wastewater treatment requirements.**

Figure 10: Extract for HDC Planning Framework 2015 - Policy 38

5. CLIMATE CHANGE

Peak Rainfall Intensity Allowance

5.1 The "Flood Risk Assessments: Climate Change Allowances Guidance" 2016 (updated in 2022) published by the EA indicates that climate change is currently expected to result in increased peak rainfall and rising sea levels.

5.2 **Table 3** and **Table 4** shows anticipated changes in peak rainfall intensity in small and urban catchments within the Adur and Ouse Management Catchment.

5.3 The peak rainfall intensity allowance based on the Upper End allowance is 40% in the 3.3% AEP and 45% in the 1% AEP event.

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

Table 3: Peak Rainfall Intensity allowance in small and urban catchments. 3.3%AEP Events*

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

Table 4: Peak Rainfall Intensity allowance in small and urban catchments. 1%AEP Events*

**Source: https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall*

Peak River Flow Allowances

5.4 **Table 5** shows the anticipated changes in the peak river flow allowances in the Adur and Ouse Management Catchment.

Epoch	Central Allowance	Higher Allowance	Upper End Allowance
2050s	16%	23%	40%
2070s	18%	28%	57%
2080s	37%	55%	107%

Table 5: Peak River Flow Allowances

**Source: https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow*

5.5 The development is located within Flood Zone 1, is classed as more vulnerable, and the design life is approximately 100 years, based on GOV.UK Flood Risk and Coastal Change Guidance. The peak river flow allowance is therefore estimated to be 37% based on central allowance.

National Planning Policy Framework (NPPF)

5.6 This report has been prepared considering the National Planning Policy Framework (NPPF) Technical Guidance and the Environment Agency's (EA) flood risk standing advice.

5.7 Table 2 from the Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government Flood risk and coastal change guidance has been included as **Figure 11: Flood risk vulnerability and flood zone 'compatibility'** below. This provides the classes of development (based on flood risk vulnerability) that are permitted within each of the flood zones. The Flood Risk Vulnerability Classification for the site is 'More Vulnerable' as it is a housing development, which is defined in Annexxe 3 of the NPPF. The site lies entirely within Flood Zone 1, which does not trigger the need a sequential nor exception test.

5.8 There is, however, a localised area that is subject to a medium-low risk of long-term flooding from surface water within the northern portion of the site (See Section 6.7). Based on the NPPF guidance, the presence of medium flood risk could trigger the need for a sequential test.

5.9 As such, a consultation has been undertaken woth Horsham Dstrict Council (HDC) as part of the pre-application process. It was agreed with the Local Planning Authority (LPA) that all proposed dwellings lie outside of any surface water flood risk area (as outlided in Section 6.8), which would not trigger the sequential test. The correspondence and confirmation from the case officer is included in **Appendix G.**

Flood Zones	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: ✓ Exception test not required ✗ Development should not be permitted.

Notes to table 2:

- *This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;*
- *The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;*
- *Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.*

Figure 11: Flood risk vulnerability and flood zone 'compatibility'

6. FLOOD RISK

6.1 In line with the EA Standing Advice, the estimated flood level is considered to be the higher of:

- A river flood level with a 1 in 100 or greater annual probability plus an allowance for climate change; and
- A tidal flood level with a 1 in 200 or greater annual probability plus an allowance for climate change.

6.2 The following Flood Zone definitions ignoring flood defence, are set out in the Planning Practice Guidance:

- Zone 1 Low Probability - Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- Zone 2 Medium Probability - Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5%– 0.1%) in any year; and
- Zone 3 High Probability - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Fluvial / Tidal Flood Risk

6.3 Flood mapping obtained from the government's 'Department for Environment Food & Rural Affairs Data Services Platform' website has identified that the site falls entirely within Flood Zone 1. (**Figure 12**)

Figure 12: Flood Map for Rivers and Seas

6.4 The Government's long-term flood risk from rivers and seas mapping shows that the site is not considered to be at risk of flooding from rivers or seas. (**Figure 13**)

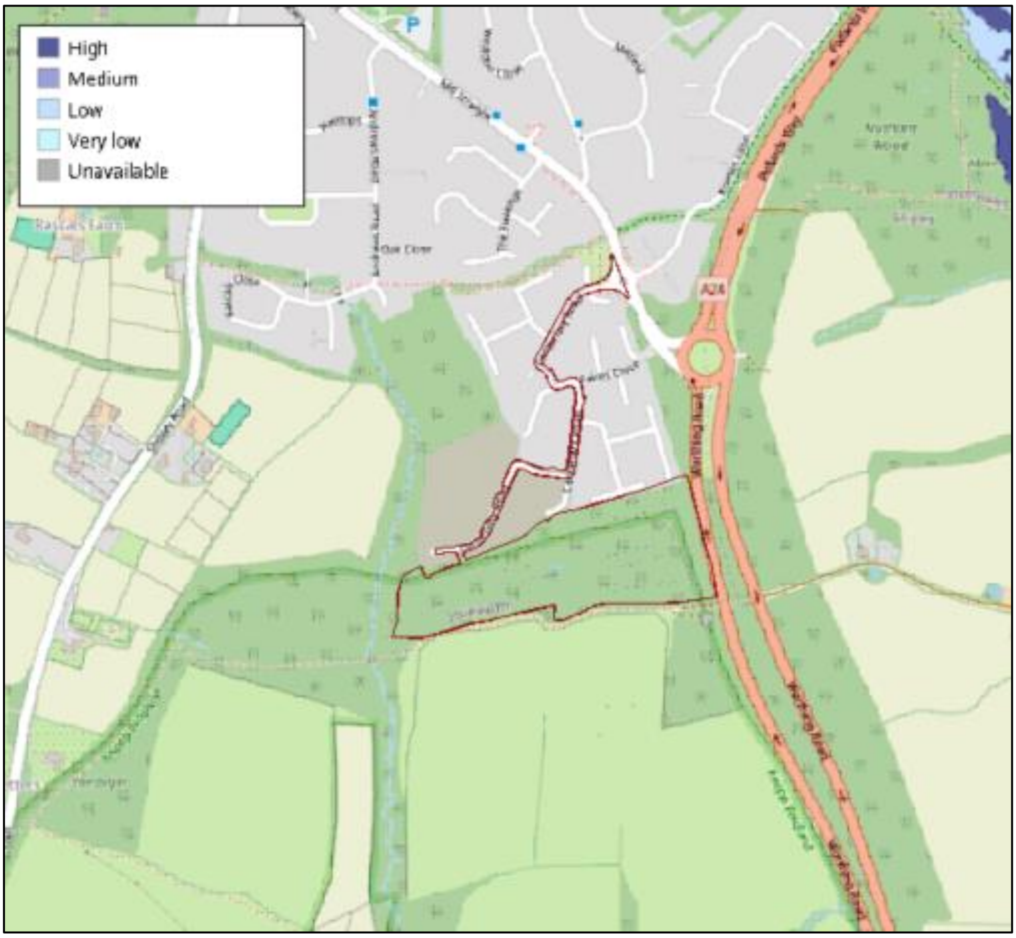


Figure 13: Long-term flood risk from rivers and seas map

Fluvial/tidal flooding – Residual Risk

6.5 In light of the above mapping, the site is considered to be at very low residual risk of flooding from rivers or seas.

Surface Water Flood Risk

6.6 Surface water or 'pluvial' flooding results from rainfall running over ground before eventually entering a watercourse or sewer. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is already saturated, frozen, developed (for example in an urban setting), or otherwise has low permeability.

6.7 The surface water flood risk map, shown in **Figure 14** , indicates that most of the site is not considered at risk of surface water flooding, except for a small area in the centre of the development and along the Eastern boundary where ponding occurs, these are both due to low spots in the existing ground. There is also an area along the Southern boundary that is low-high risk of surface water flooding.

Figure 14: Long term flood risk from surface water

Surface water flooding – Mitigation

6.8 The site layout has been developed to ensure that residential dwellings are located outside of any areas of flood risk.

6.9 The layout has been developed to ensure that the road is outside of medium-high risk areas, and only landscaped areas/ public open spaces are within the medium-high risk zones. T

6.10 The small band of flood risk on the northern boundary is a ditch which is currently draining the predevelopment site. The proposed access crosses this ditch; however, this would not pose any increase in flood risk as a box culvert with a cross section exceeding that of the existing ditch can be provided.

6.11 A portion of the proposed estate road lies within an area of low surface water flood risk of less than 0.2m depth. It is an area of isolated ponding that will not occur post development as rainfall landing on the site shall be captured in the proposed drainage system and attenuated in the SuDS basin prior to discharge at pre-development greenfield rates.

6.12 The existing site lacks drainage, and, as noted in the geology section, it is underlain by highly impermeable clay, resulting in a high rate of greenfield surface water run-off. The "unmanaged" surface water flooding currently occurs due to the site's topography and poor drainage characteristics in its undeveloped state.

6.13 The proposed development will address these issues by capturing and attenuating surface run-off within a sustainable drainage system before it contributes to surface water flooding. As a result, the development will lower the risk of surface water flooding both on-site and downstream

6.14 Please refer to **Section 8** for the proposed drainage strategy.

Surface water flooding – Residual Risk

6.15 As outlined in Section 5.9 above, this proposal has been discussed with HDC as part of the pre-application process and it has been agreed with the LPA that this approach is acceptable and would negate the need for a sequential test. Please see **Appendix G** for the confirmation from the planning officer at HDC and **Appendix H** for the drainage technical note prepared in support of the pre-application.

6.16 In light of the above, the site is considered to have low residual risk of surface water flooding.

Reservoirs Flood Risk

6.17 The EA's long-term flood risk from reservoirs shows that the site is considered to be at very low risk of flooding from reservoirs. (**Figure 15**)

Figure 15: Long term flood risk from reservoirs map

Reservoirs – Residual Risk

6.18 Flooding risk from reservoirs is extremely low as there are no reservoirs within the vicinity of the site. Accordingly, it can be concluded that the residual risk of flooding from reservoirs is considered to be very low.

Groundwater Flood Risk

6.19 Groundwater flooding occurs when groundwater levels increase sufficiently for the water table to intersect the ground surface. Groundwater flooding can occur in a variety of geological settings including valleys and in areas underlain by chalk, and in river valleys with thick deposits of alluvium and river gravels.

6.20 The EA's flood risk summary indicates that flooding from groundwater is unlikely for the site.

Other flood risks	
Groundwater	Flooding from groundwater is unlikely in this area.

Figure 16: Groundwater flood risk

6.21 HDC SFRA noted that there are no records of groundwater flooding within the northern study area of Horsham district council, where the site is located.

Groundwater- Residual risk

6.22 Based on the above, the proposed site is considered to be at very low residual risk of groundwater flooding.

Surface Water and Foul Water Sewers Flood Risk

6.23 According to the West Sussex SFRA, records did not show historical floods within the vicinity of the site. However, the SFRA notes that in 1981 a "*significant event occurred in Billingshurst after heavy rains that caused flooding in the High Street and Rosehill area due to inadequate highway drainage and blockages of surface water flow to sewers. The same event affected Southwater Street in Pulborough and Southwater*". The flooded area is further north of the site and is therefore not considered to be a flood risk.

Public Sewer- Residual risk

6.24 Based on the above, it can be summarised that the site is considered to be at very low risk of sewer flooding.

7. RESIDUAL FLOOD RISK

7.1 **Table 5** outlines the initial qualitative assessment of risk posed by the potential sources of flooding, the mechanisms for flooding and the likely consequences. It also includes a review of possible mitigation measures and the effect that the proposed mitigation measures are likely to have on the residual risk posed by the potential flood source.

Flood Risk	Flood Mechanism and Possible Consequences	Existing Assessment of Risk	Mitigation Measures	Residual Risk
Fluvial / Tidal	Flooding from River Adur	Very Low	NA	Very Low
Reservoirs	Flooding due to a reservoir failure	Very Low	NA	Very Low
Surface Water (Pluvial)	Flooding from surface water runoff caused by poor drainage and water logging, specifically in the northern portion of the site.	Medium-Low	The existing site lacks drainage, and, as noted in the geology section, it is underlain by highly impermeable clay, resulting in a high rate of greenfield surface water run-off. Surface water flooding currently occurs due to the site's topography and poor drainage characteristics in its undeveloped state. The proposed development will address these issues by capturing and attenuating surface run-off within a sustainable drainage system before it contributes to surface water flooding. As a result, the development will lower the risk of surface water flooding both on-site and downstream. Attenuation swales are proposed within low-medium pluvial flood risk areas to attenuate existing pluvial floods in the northern portion of the site. Additionally, the layout has been developed to ensure all dwellings lie outside of flood risk areas. This approach has been agreed with the LPA it was agreed that a sequential test would not be required using this approach.	Low
Groundwater	Flooding form high groundwater table	Very Low	EA mapping and HDC SFRA confirm no risk of groundwater flooding.	Very Low
Sewers	Flooding caused by overloaded sewers, mainly caused by surface water runoff.	Very Low	N/A	Very Low

Table 5: Summary of Existing and Residual Flood Risk

8. DRAINAGE STRATEGY

Potential Surface Water Drainage Strategy

8.1 In line with the Building Regulations Part H3, surface water shall discharge to one of the following, listed in order of priority:

- An adequate infiltration system: or, where not reasonably practicable,
- A watercourse; or, where not reasonably practicable,
- A sewer.

8.2 Given that the BGS SuDS Infiltration Geo-report indicated that the bedrock geology is Weald Clay Formation, which is expected to be "Poorly Draining" and no superficial deposits with infiltration potential were recorded on site, infiltration on-site is not considered to be feasible (See Section 3.5). Therefore, the proposals for the surface water drainage are to attenuate on-site and discharge into the nearest watercourse via. a HydroBrake at Qbar rate (7.51 l/s). Qbar has been calculated based on the proposed impermeable catchment area, please refer to Sections 3.13 and 3.14 for the greenfield runoff rates calculations.

8.3 The indicative drainage layout is included in **Appendix I.**

8.4 To mitigate the impact of surface water discharge from the proposed development, all run-off (up to and including the 1-in-100-year rainfall event (+45% Climate change) shall be restricted to the proposed impermeable area's QBAR (7.51 l/s), per section 3.3.1 of The CIRIA SuDS manual. Discharging all run-off at QBAR is considered the more conservative approach when compared to the long-term storage approach (where discharge up to the up to the 1-100-year volume is discharged at the 1-in-100-year greenfield rate).

8.5 Discharge from the basin into the watercourse shall be designed with consideration to the ancient woodland, which runs along the western boundary of the site. The proposal is to discharge surface water at restricted rates via. a HydroBrake manhole, towards a wide swale with erosion control matting, where water will flow towards the stream. This ensures that water flowing through the woodland mimics the existing flow.

8.6 Runoff from roads and roofs shall be collected and drained into the proposed piped network. Runoff will be attenuated on site within a basin located along the western boundary.

8.7 Permeable block paving shall be proposed for driveways and carpark areas to provide source control and manage water quantity. The permeable paving systems shall be constructed as Type-C systems, which will intercept and store runoff within the sub-base prior to discharging into the network.

8.8 The West Sussex Surface Water Drainage Pro-forma has been completed for the proposed site and is included in **Appendix J.**

Hydraulic Calculations

8.9 Hydraulic calculations have been undertaken using Site3D software and show that the drainage network does not flood during the 100% AEP, 3.3%AEP and 1% AEP storm events (Including climate change allowances). The full set of calculations is included in **Appendix K.**

8.10 The below table contains the parameters used in the supporting network modelling

Parameter	Input	Guidance/notes
Rainfall Data	FEH22	
Urban Creep	10%	Table 5.2 of West Sussex LLFA Policy for the Management of Surface Water
CV (Summer and Winter)	1.0	SFA 7
Climate Change 3.3% AEP 1% AEP	 40% 45%	EA Climate change allowances for peak rainfall in England https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall

Table 6: Hydraulic Modelling Parameters

Potential Foul Water Drainage Strategy

8.11 The proposals for the foul drainage are to a pumping station located in the western portion of the site. The proposed pumping station will pump the foul water through a rising main in a northerly direction into the nearest Southern Water foul manhole (Ref: 1205).

8.12 The proposed pumping station is located near the site's north-western access to facilitate maintenance access. The location also allows for a 15m odour offset from the wet well to the nearest habitable dwelling. The foul drainage proposals are included in **Appendix I**.

8.13 The peak design flow rates generated from the site, is calculated to be 4.1l/s. This is based on an estimated rate of 0.05 litres per second per dwelling, in accordance with the SSG- Appendix C.

8.14 The connection into Southern Water's network will be subject to a S106 agreement.

9. WATER QUALITY

9.1 **Figure 17** and **Figure 18** are extracted from the SuDS Manual and demonstrate the pollution risks associated with various discharge situations.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 17: Table 26.2 of the SuDS Manual

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Figure 18: Table 26.3 of the SuDS Manual

9.2 The UKSuDS Water Quality toolkits (based on the Simple Index Assessment method) has been used to assess water quality improvement for the site. **Table 7** below summarises the results of the toolkit, and a full copy of the toolkit can be found in **Appendix L**.

Land Use			**SuDS Component**			**Water Treatment**
Residential Roofing			Attenuation Basin			Sufficient
Pollution Indices			Mitigation Indices			
TSS	Metals	Hydrocarbons	TSS	Metals	Hydrocarbons	
0.5	0.4	0.4	0.5	0.5	0.6	
Residential Parking/ individual Driveways			Permeable Pavement			Sufficient
Pollution Indices			Mitigation Indices			
TSS	Metals	Hydrocarbons	TSS	Metals	Hydrocarbons	
0.5	0.4	0.4	0.7	0.6	0.7	
Low Traffic Roads			Attenuation Basin			Sufficient
Pollution Indices			Mitigation Indices			
TSS	Metals	Hydrocarbons	TSS	Metals	Hydrocarbons	
0.5	0.4	0.4	0.5	0.5	0.6	

Table 7: Water Quality Summary

10. SUMMARY AND CONCLUSION

10.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Paul Basham Associates on behalf of Miller Homes to support an outline planning application for an 82-unit residential site. The land is in Southwater, West Sussex. The nearest postcode is RH13 9FR.

10.2 The site is located entirely within Flood Zone 1.

10.3 Summary of residual flood risk

- Fluvial and tidal flooding is considered to be **very low**.
- Surface water flooding is considered to be **low**.
- Groundwater flooding is considered to be **very low**.
- Reservoir flooding is considered to be **very low.**
- Sewer flooding is considered to be **very low**.

10.4 There are isolated areas of surface water flood risk on the southern and eastern boundaries as well as at a low point in the centre of the site. The site layout has been designed to ensure that all dwellings are positioned outside any areas at risk of flooding.

10.5 As part of the pre-application process, it was agreed with the LPA through consultation that the sequential test would not be required subject to the dwellings being proposed outside any flood risk areas. See confirmation with LPA officer in **Appendix G** and further information in **Sections 5.6 to 5.9**.

10.6 BGS mapping, local borehole logs and the BGS infiltration SuDS Georeport indicate the site is underlain by Weald Clay formation, with minimal potential for infiltration. Additionally, no superficial deposits that may have infiltration potential were recorded on site. Therefore, drainage through infiltration is not considered a viable solution.

10.7 The surface water drainage proposal is to capture run-off at source, attenuate on-site within an attenuation basin and discharge into the existing watercourse to the west of the site via a HydroBrake at the proposed impermeable area's greenfield Qbar rate (7.51 l/s). Please refer to Sections 3.13 and 3.14 for the greenfield runoff rates calculations.

10.8 All run-off (up to and including the 1-in-100-year rainfall event (+45% Climate Change)) shall be restricted to the proposed impermeable area's QBAR (7.51 l/s), per section 3.3.1 of The CIRIA SuDS manual. Discharging all run-off at QBAR is considered the more conservative approach when compared to the long-term storage approach (where discharge up to the up to the 1-100-year volume is discharged at the 1-in-100-year greenfield rate).

10.9 Water will be discharged from the HydroBrake to flow onto a swale with erosion control matting, which eventually drains into the water course.

10.10 Permeable paving shall be proposed for driveways and carparking to improve source control and improve water quality treatment.

10.11 Hydraulic calculations confirm that the network does not flood during the 100%AEP, 3.3%AEP (+40% climate change allowance) and 1%AEP storm events (+45% climate change allowance).

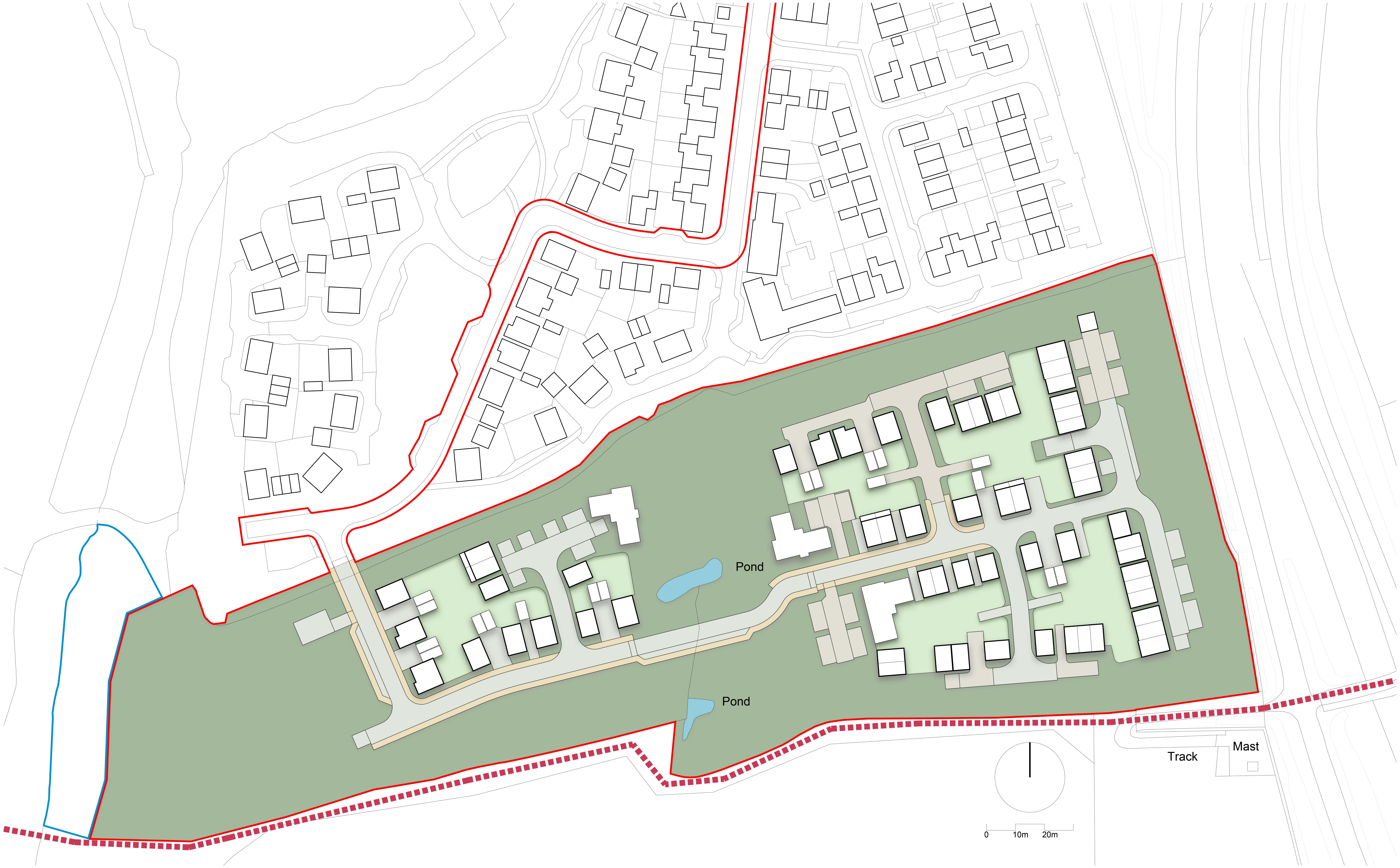
10.12 Foul water shall drain to a proposed pumping station, which will pump the effluent through a rising main towards the north, where it will connect into the nearest Southern Water manhole (Ref: 1205). The connection will be subject to a S106 agreement.

10.13 In response to a previous revision of this report, the LLFA questions the freeboard available in the basin, suggesting a minimum of 300mm freeboard should be provided between the peak water level for the 1:100-year event plus an allowance for climate change and the crest level of the basin. See item 4 on the WSCC LLFA response dated 07/03/2025. However, this is not in accordance with the CIRIA SuDS Manual, Water quantity paras 3.3.3 a and b, which states:

"*Properties should be fully protected against flooding from the site drainage system for the 1:100-year event…… The finished ground floor levels and the level of any opening into basement of the proposed buildings on site should be at least 300mm above the predicted flood level associated with the above scenario).*

10.14 Firstly, the proposed drainage is sized to ensure there is no flooding during the 1:100-year event plus an allowance for climate change, thus complying with the SuDS manual. Furthermore, the peak water level for the 1:100-year event plus an allowance for climate change is 37.645mAOD, 3.355m below the proposed road level of 41mAOD, which the proposed FFLs will sit above. Therefore, there is approximately 3.5m of freeboard between the peak water level and the proposed FFLs. Increasing the basin size to provide additional freeboard in the basin would be an unsustainable approach, needlessly increasing the earthworks required to deliver the basin

Appendix A



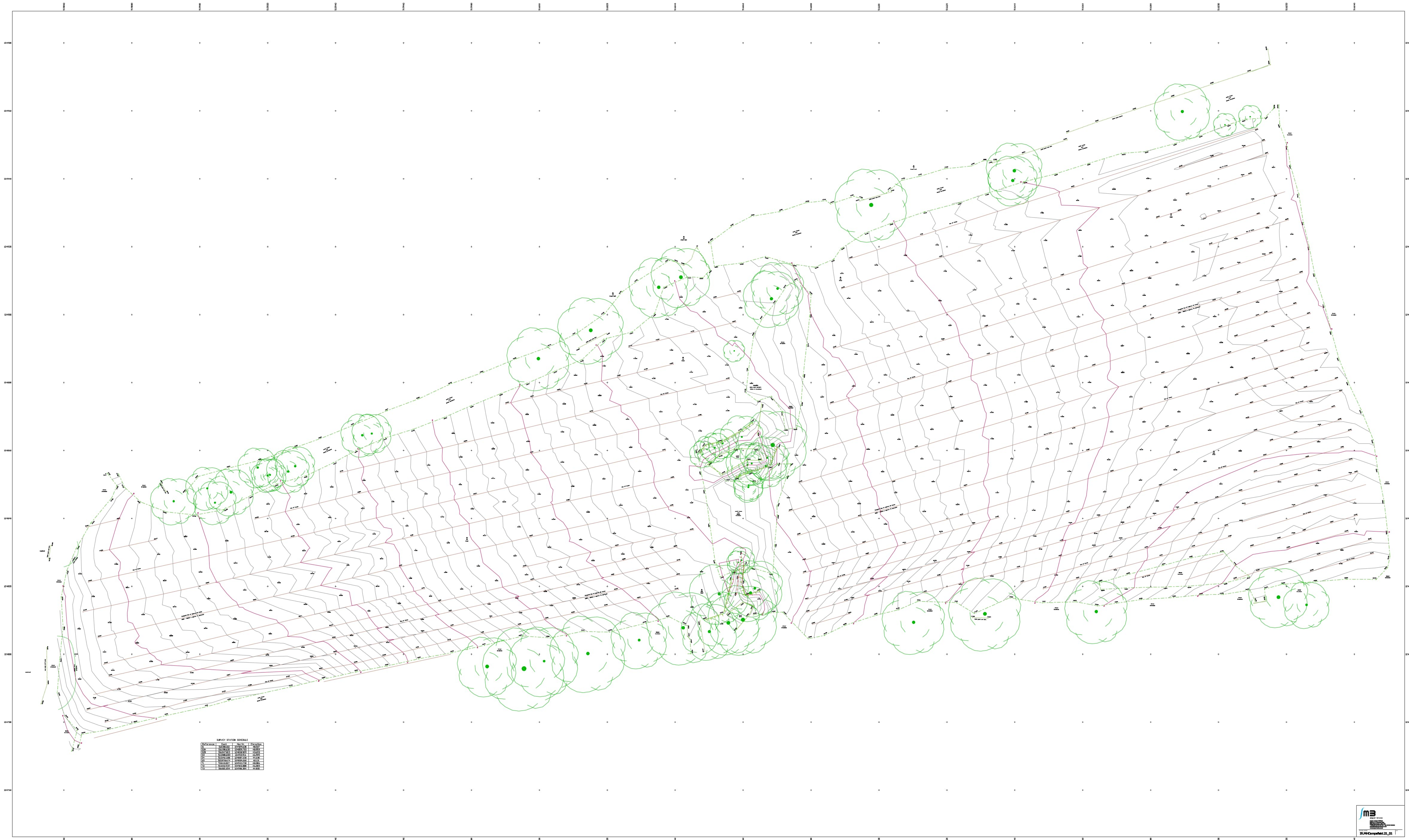
DRAFT

CLIENT:	MILLER HOMES
PROJECT TITLE:	CAMPSFIELD, SOUTHWATER
PROJECT NO:	02.40
DRAWING TITLE:	ILLUSTRATIVE MASTERPLAN
DRAWING NO:	02.40(01)20
SCALE:	1:500 @ A0

THE CORE design & consultancy www.thecoredesign.co.uk

miller homes

Appendix B



Notes

1. The survey was carried out using Leica Viva GS12 and TS15 survey instruments.
2. North relates to OS Grid North.
3. All co-ordinates relate to OS GB36 Datum at Stn 1. The rest of the site is orientated to OS Grid North but has been surveyed on a flat grid with no scale factor. All heights relate to OSGB 36 datum and have been computed using the OSTN(15) Geoid model.

LEGEND

- Survey Station
- IC - Inspection Cover
- CA - Cable TV Cover
- FH - Fire Hydrant
- SV - Stop Valve
- GV - Gas Valve
- PB - Post Box
- TCB - Call box
- TC - TCSU Cover
- PT - Parking Ticket Machine
- ER - Earthing Rod
- TB - Traffic Bollard
- Litter Bin
- Gully
- MH - Manhole Triangular
- MHC - Manhole Circular
- PB - Post Box
- Gate Post
- Telephone Pole
- Electricity Pole
- Road Sign
- Traffic Light
- Bollard
- Flag Pole
- Lamp Post
- Camera
- Gate
- Tree (Coniferous - girth and spread to scale)
- Tree (Deciduous - girth and spread to scale)
- Tree (Dead/diseased - girth and spread to scale)
- Spot Level
- Top of Wall Height
- Apex Height
- Eave Height

- Kerb
- Drop Kerb
- Road Edge
- Track Edge
- Line of Trees
- Road Centre Line
- Double Yellow Lines

- Wall
- Fence
- Edge of Hedge
- Vegetation Edge
- Metal Railings

- Building
- Apex Line
- Eave Line
- Parking Bay

- Overhead Power Cable
- Open Channel
- Top of Bank
- Bottom of Bank
- Major Contour Interval - 1.0m
- Minor Contour Interval - 0.2m

rev.	amendment	checked	date

mayer brown

Mayer Brown Limited
Suite 4.3, 4 Carrwood Park
Selby Road, Leeds, LS15 4LG
Telephone 01133 854 697 Fax 01133 854 698
leedsoffice@mayerbrown.co.uk
www.mayerbrown.co.uk

client
Miller Homes Ltd.

project
Campsfield, Southwater, West Sussex.

scale	drawn by	checked by
1:500@A0	GC	SO

date	cad file
24th March 2023	MH.Campsfield.21

title
Detailed Topographical Survey

drawing number
IR.MHCampsfield.21_01

rev.

paulbasham associates

Appendix C

GROUND EXPLORATIONS Ltd.
68/76 Alpha Street, Slough, Bucks., SL1 1QX

Contract	Southwater Bypass TQ12SE/19	Borehole No	61
Location	A24 north of Vincents Cottages	Started	28.3.73.
Report No	5949/BW 1628, 2494	Completed	29.3.73.
		Diameter	150 mm
		Ground Level	O.D. 46·98 m

Description	Legend	Thickness m	Depth m	Level m	Sample Type	Sample No	Depth m	C/O (N)	Mv/Cv (G/Sa/Si)	Water
[illegible]		0·2	0·2	46·8	D	5131	0·2			
Mottled brown and blue-green clay with pieces of stone, porcelain, etc		1·2	1·4	45·6	D U	5132 5133	0·5 1·1			
Mottled brown & light grey clay with rootlets & woody plant stems		0·7	2·1	44·9	D	5200	1·7			
Brown friable clay		0·9	3·0	44·0	D U	5134 5135	2·3 2·6			WE Nil/1·5/28.3. WS Nil/1·5/29.3.
Brown and grey shaly clay		1·0	4·0	43·0	D	5136	3·4			
Green-brown and blue mottled friable clay		0·9	4·9	42·1	U D U	5137 5138 5139	4·1 4·7 4·7			SK 5·0/29.3.
Grey and brown clay-shale		0·3	5·2	41·8	D W	5140 5141	5·2 4·9			WE/4·9/1·5/29.3.

10

15

20

TQ12/17 17½
TQ12 SE 21

RECORD of WELL or BORING

Survey No. 302
1" N.S.
1" O.S.

at (house or farm) field Pollards Hill Farm
Town, Village, &c. Southwater County Sussex (W) Six-inch map 24NE
Exact site (unless a tracing from a map is supplied, give distance and direction from parish church, cross-roads, or other object shown on maps). In field west side of main road Worthing to Horsham (see copy) (Sketch) Popular Edition of one-inch map. Sheet / Square

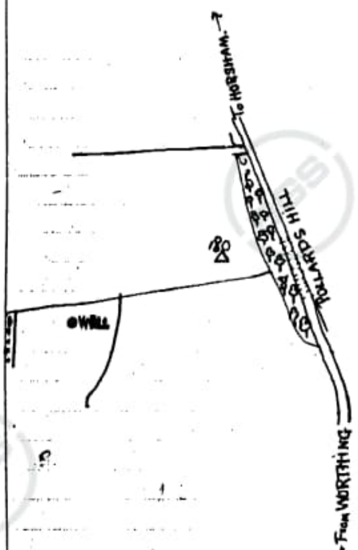
Surface level of ground 175 ft. above Ordnance Datum. Well or Bore commenced at ..... ft. below surface level of ground.
Sunk 68 ft., diameter ..... ft. Bored 98 ft.; diameter of boring: at top 4½ in., at bottom 4½ in.
Details of lining tubes (internal diameters preferred) 4½ in. i/d tubes 66' to 86½'

NGR 1612 2465

Water struck at depths of (feet) 30 to 35', small spring 92'
Rest-level of water below top of well or bore 46 ft. Pumping level ..... ft. Time of recovery ..... hours.
Suction at ..... ft. depth. Yield: (i) on test ..... galls. per ....., (ii) normal ..... galls. per .....
Quality (attach copy of analysis if available)
Made by Duke & Ockenden, Ltd, for Mr. Knepp Castle Estate Date of boring Jan, 1934
Information from do. Ferry Wharf, Littlehampton

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA. (and any additional remarks)	THICKNESS. Feet.	THICKNESS. Inches.	DEPTH. Feet.	DEPTH. Inches.
Weald Clay	Clay	86	6	86	6
	Rock	5	6	92	.
	Clay	6	.	98	.

SB.



Owner Sir Merrick Burrell
In use.
Sited on Sussex 24 NE/E
No further information available
S.McC.H. 2-6-47.

Geological Survey and Museum, South Kensington, London, S.W.7.

For Survey use only.

Date received.	G.S.M.	M. of H. notified.	Site marked on 1" map.
1934	6378.		

(11069B) Wt 10256/0175 2,500 9/32 H, J, R & L, Ld Gp 616

1

TQ 12/17

302/55 Knepp Castle Estate, Pollard's Hill Farm, Shipley. (Disused)

Surface +170. Shaft 68; rest bore. Lining tubes: 20½ × 4½ in from 66 down. Water struck at +140 to +135 and at +78. R.W.L. +124. *Dando, Jan. 1934.*
R.W.L. +138½. Windpump. *Nov. 1957.*

WC 98 98

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS	DEPTH
WEALD CLAY	CLAY	86' 6	86' 6
	ROCK	5' 6	92'
	CLAY	6'	98'
SB.			

TQ 1612 2465 TQ 12/17

RECORD of WELL or BORING

Survey No. 302
1" N.S.
1" O.S.

at (house or farm) field Pollards Hill Farm
Town, Village, &c. ~~Southwater~~ Shipley, County Sussex (West) Six-inch map 24 NE/w
Exact site (unless a tracing from a map is supplied, give distance and direction from parish church, cross-roads, or other object shown on maps). In field west side of main road Worthing to Horsham (see copy of sketch below) Popular Edition of -inch map. Sheet Square

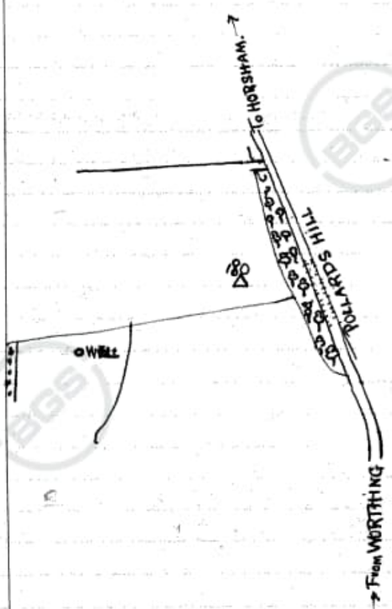
Surface level of ground 170 ft. above Ordnance Datum. Well or Bore commenced at ... ft. below surface level of ground.
Sunk 68 ft., diameter ... ft. Bored 98 ft.; diameter of boring: at top 4½ in., at bottom 4½ in.
Details of lining tubes (internal diameters preferred) 4½ in. i/d tubes 66' to 86½'.

55

Water struck at depths of (feet) 30 to 35', small spring 92'.
Rest-level of water below top of well or bore 46 ft. Pumping level ... ft. Time of recovery ... hours.
Suction at ... ft. depth. Yield: (i) on test ... galls. per ..., (ii) normal ... galls. per ...
Quality (attach copy of analysis if available)
Made by Duke & Ockenden, Ltd, for Mr. Knepp Castle Estate Date of boring Jan, 1934
Information from do' Ferry Wharf, Littlehampton

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA. (and any additional remarks)	THICKNESS. Feet.	THICKNESS. Inches.	DEPTH. Feet.	DEPTH. Inches.
Weald Clay	Clay	86	6	86	6
	Rock	5	6	92	.
	Clay	6	.	98	.

SB.



Owner Sir Merrick Burrell
In use.
Sited on Sussex 24 NE/W
No further information available
S. McC. H. 2-6-47.

Visited and site corrected. Windpump still in position.
Disused. RWL. 38'7" b. wooden well top, which is c 7' above ground.
On mains. Owner Mr Walter Burrell.
OD. 170. 19.11.57. RM.

Sir Walter Burrell
Knepp Castle, Shipley.

DATA Bank

Geological Survey and Museum,
South Kensington,
London, S.W.7.

For Survey use only.

Date received.	G.S.M.	M. of H. notified.	Site marked on 1" map.
1934	6378.		

(11969B) Wt 10256/0175 2,500 9/32 H, J, R & L, Ld Gp 616

paulbasham associates

Appendix D

GeoReports

British Geological Survey

Oliver Terry
Paul Basham Associates
Burseldene
Windmill Lane
Bursledon
Southampton
SO31 8BG

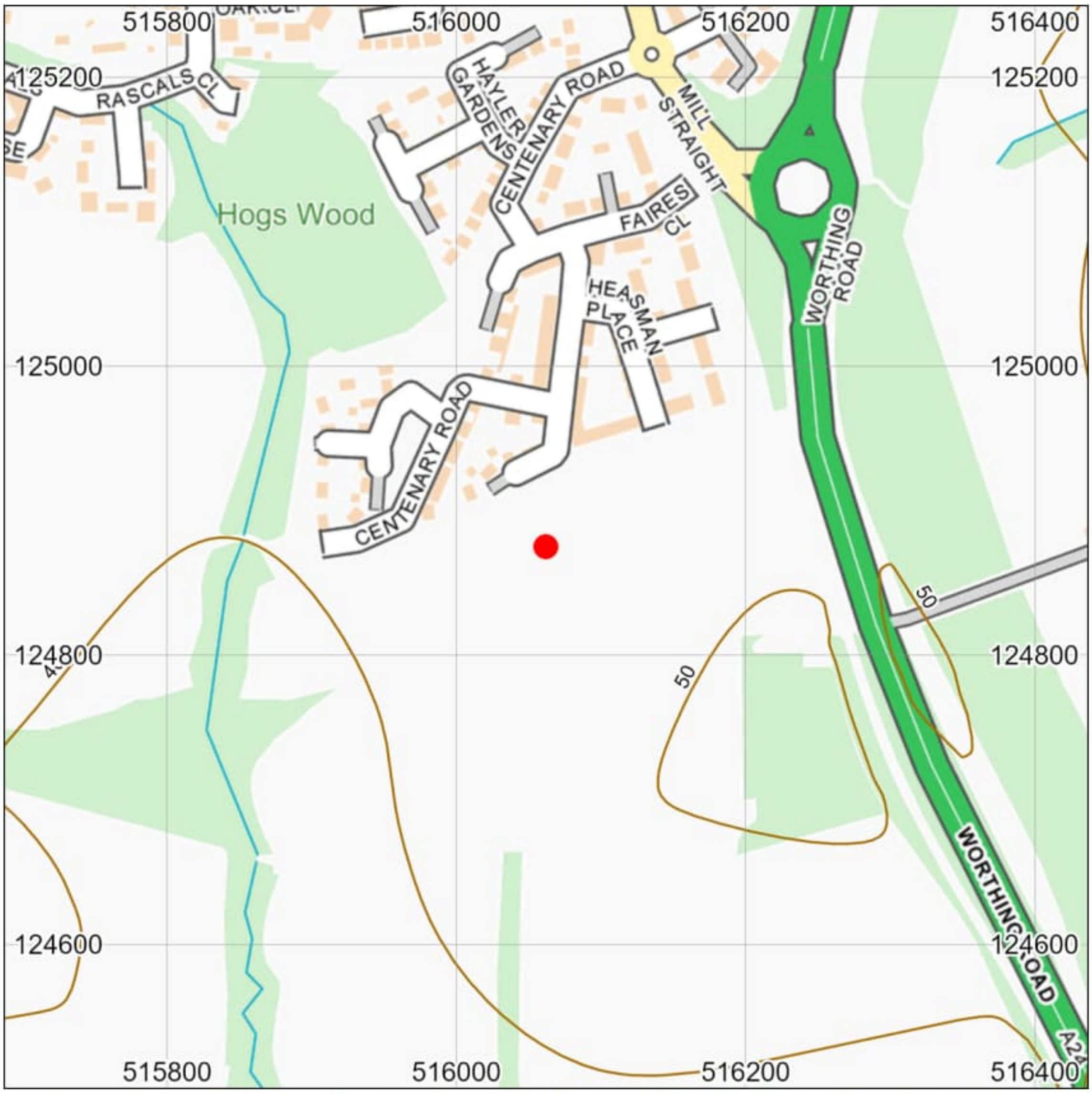
Infiltration SuDS GeoReport:

This report provides information on the suitability of the subsurface for the installation of infiltration sustainable drainage systems (SuDS). It provides information on the properties of the subsurface with respect to significant constraints, drainage, ground stability and groundwater quality protection.

Report Id: *BGS_338484/54345*

Client reference:

Search location



Contains OS data © Crown Copyright and database right 2024. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m)

Search location indicated in red

Point centred at: 516062,124875

Assessment for an infiltration sustainable drainage system

Introduction

Sustainable drainage systems (SuDS) are drainage solutions that manage the volume and quality of surface water close to where it falls as rain. They aim to reduce flow rates to rivers, increase local water storage capacity and reduce the transport of pollutants to the water environment. There are four main types of SuDS, which are often designed to be used in sequence. They comprise:

- **source control:** systems that control the rate of runoff
- **pre-treatment:** systems that remove sediments and pollutants
- **retention:** systems that delay the discharge of water by providing surface storage
- **infiltration:** systems that mimic natural recharge to the ground.

This report focuses on infiltration SuDS. It provides subsurface information on the properties of the ground with respect to drainage, ground stability and groundwater quality protection. It is intended principally for those involved in the preliminary assessment of the suitability of the ground for infiltration SuDS, and those involved in assessing proposals from others for sustainable drainage, but it may also be useful to help house-holders judge whether or not further professional advice should be sought. If in doubt, users should consult a suitably-qualified professional about the results in this report before making any decisions based upon it.

This GeoReport is structured in two parts:

- **Part 1. Summary data**.

  Comprises three maps that summarise the data contained within Part 2.

- **Part 2. Detailed data**.

  Comprises a further 24 maps in four thematic sections:

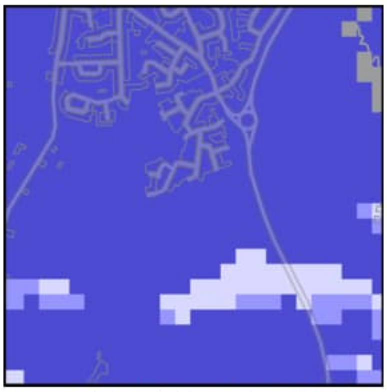
  - **Very significant constraints.** Maps highlight areas where infiltration may result in adverse impacts due to factors including: ground instability (soluble rocks, non-coal shallow mining and landslide hazards); persistent shallow groundwater, or the presence of made ground, which may represent a ground stability or contamination hazard.
  - **Drainage potential**. Maps indicate the drainage potential of the ground, by considering subsurface permeability, depth to groundwater and the presence of floodplain deposits.
  - **Ground stability**. Maps indicate the presence of hazards that have the potential to cause ground instability resulting in damage to some buildings and structures, if water is infiltrated to the ground.
  - **Groundwater protection**. Maps provide key indicators to help determine whether the groundwater may be susceptible to deterioration in quality as a result of infiltration.

This report considers the suitability of the subsurface for the installation of infiltration SuDS, such as soakaways, infiltration basins or permeable pavements. It provides subsurface data to indicate whether, and which type of infiltration system may be appropriate. It does not state that infiltration SuDS are, or are not, appropriate as this is highly dependent on the design of the individual system. This report therefore describes the subsurface conditions at the site, allowing the reader to determine the suitability of the site for infiltration SuDS.

The map and text data in this report is similar to that provided in the '*Infiltration SuDS Map: Detailed'* national map product. For further information about the data, consult the '*User Guide for the Infiltration SuDS Map: Detailed*', available from http://nora.nerc.ac.uk/16618/.

PART 1: SUMMARY DATA

This section provides a summary of the data.

In terms of the drainage potential, is the ground suitable for infiltration SuDS?	
	Highly compatible for infiltration SuDS. The subsurface is likely to be suitable for free-draining infiltration SuDS.
	Probably compatible for infiltration SuDS. The subsurface is probably suitable although the design may be influenced by the ground conditions.
	Opportunities for bespoke infiltration SuDS. The subsurface is potentially suitable although the design will be influenced by the ground conditions.
Contains OS data © Crown Copyright and database right 2024	Very significant constraints are indicated. There is a very significant potential for one or more hazards associated with infiltration.

Is ground instability likely to be a problem?	
	Increased infiltration is very unlikely to result in ground instability.
	Ground instability problems may be present or anticipated, but increased infiltration is unlikely to result in ground instability.
	Ground instability problems are probably present. Increased infiltration may result in ground instability.
Contains OS data © Crown Copyright and database right **2024**	There is a very significant potential for one or more geohazards associated with infiltration.

Is the groundwater susceptible to deterioration in quality?	
	The groundwater is not expected to be especially vulnerable to contamination.
	The groundwater may be vulnerable to contamination.
	The groundwater is likely to be vulnerable to contaminants.
Contains OS data © Crown Copyright and database right 2024	Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

PART 2: DETAILED DATA

This section provides further information about the properties of the ground and will help assess the suitability of the ground for infiltration SuDS.

Section 1. Very significant constraints

Where maps are overlain by grey polygons, geological or hydrogeological hazards may exist that could be made worse by infiltration. The following hazards are considered:

- soluble rocks
- landslides
- shallow mining (not including coal)
- shallow groundwater
- made ground

For more information read 'Explanation of terms' at the end of this report.

Soluble rock hazard	
 Contains OS data © Crown Copyright and database right 2024	Very significant soluble rock hazard. Soluble rocks are present with a very significant possibility of localised subsidence that could be initiated or made worse by infiltration. The site investigation should consider whether the potential for or the consequences of subsidence as a result of infiltration are significant.
	Very significant soluble rock hazards are not present; however this hazard may still need to be considered. See Part 3.
Landslide hazard	
 Contains OS data © Crown Copyright and database right 2024	Very significant landslide hazard. Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail. The site investigation should consider whether the potential for or the consequences of landslide as a result of infiltration are significant.
	Very significant landslide hazards are not present; however this hazard may still need to be considered. See Part 3.

Shallow mining hazard (not including coal)

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- [■] Very significant mining hazard.

  Shallow mining is likely to be present with a very significant possibility of localised subsidence that could be initiated or made worse by increased infiltration. Also, infiltration may increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of subsidence and/or remobilisation of pollutants as a result of infiltration are significant.

- [ ] Very significant mining hazards are not present; however this hazard may still need to be considered. See Part 3.

Persistent shallow groundwater

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- [■] Very high likelihood of persistent or seasonally shallow groundwater.

  Persistent or seasonally shallow groundwater is likely to be present. Infiltration may increase the likelihood of soakaway inundation, or groundwater emergence at the surface. The site investigation should consider whether the potential for or the consequences of groundwater level rise as a result of infiltration are significant.

- [ ] See Part 2 for the likely depth to water table.

Made ground

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- [■] Made ground present.

  Made ground is present at the surface. Infiltration may affect ground stability or increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of ground instability and/or pollutant leaching as a result of infiltration are significant.

- [ ] None recorded

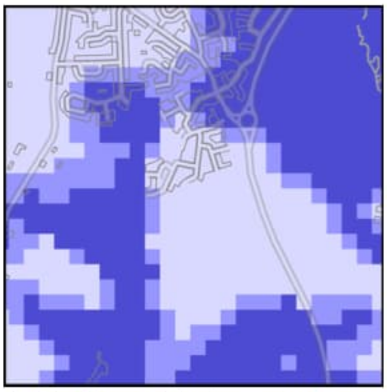
Section 2. Drainage potential

The following pages contain maps that will help you assess the drainage potential of the ground by considering the:

- depth to water table
- permeability of the superficial deposits
- thickness of the superficial deposits
- permeability of the bedrock
- presence of floodplains

Superficial deposits are not present everywhere and therefore some areas of the *superficial deposit permeability* map may not be coloured. Where this is the case, the *bedrock permeability* map shows the likely permeability of the ground. Superficial deposits in some places are very thin and hence in these places you may wish to consider both the permeability of the superficial deposits and the permeability of the bedrock. The *superficial thickness* map will tell you whether the superficial deposits are thin (< 3 m thick) or thick (>3 m). Where they are over 3 m thick, the permeability of the bedrock may not be relevant.

For more information read 'Explanation of terms' at the end of this report.

Depth to groundwater table	
 Contains OS data © Crown Copyright and database right 2024	Groundwater is likely to be **more than 5 m** below the ground surface throughout the year.
	Groundwater is likely to be between **3 and 5 m** below the ground surface for at least part of the year.
	Groundwater is likely to be **less than 3 m** below the ground surface for at least part of the year.

Superficial deposit permeability

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Superficial deposits are likely to be **free-draining**.

The superficial deposit permeability is **spatially variable**, but likely to permit moderate infiltration.

Superficial deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

- Very Low
- Low
- Moderate
- High
- Very High

Minimum

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Maximum

Contains OS data © Crown Copyright and database right 2024

Superficial deposit thickness

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The thickness of superficial deposits is **< 3 m** and hence the permeability of the ground may be dependent on both the superficial deposits (where present) and underlying bedrock (see below).

The thickness of superficial deposits is **> 3 m** and hence the permeability of the superficial deposits is likely to determine the permeability of the ground.

Bedrock permeability

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Bedrock deposits are likely to be **free-draining**.

The bedrock permeability is **spatially variable**, but likely to permit moderate infiltration.

Bedrock deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

Key

- Very Low
- Low
- Moderate
- High
- Very High

Minimum

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Maximum

Contains OS data © Crown Copyright and database right 2024

Geological indicators of flooding

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Superficial floodplain deposits or low-lying coastal areas have been identified. Groundwater levels may rise in response to high river or tide levels, potentially causing inundation of subsurface infiltration SuDS.

Section 3. Ground stability

The following pages contain maps that will help you assess whether infiltration may impact the stability of the ground. They consider hazards associated with:

- soluble rocks
- landslides
- shallow mining
- running sands
- swelling clays
- compressible ground, and
- collapsible ground

In the following maps, geohazards that are identified in green are unlikely to prevent infiltration SuDS from being installed, but they should be considered during design. For more information read 'Explanation of terms' at the end of this report.

Soluble rocks

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	Increased infiltration is unlikely to result in subsidence.
	Increased infiltration is unlikely to cause localised subsidence, but potential impacts should be considered.
	Increased infiltration may result in localised subsidence. The potential for or the consequences of subsidence associated with soluble rocks should be considered.
	Very significant possibility of localised subsidence that could be initiated or made worse by infiltration.

Landslides

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- Increased infiltration is unlikely to lead to slope instability.
- Slope instability problems may be present or anticipated, but increased infiltration is unlikely to cause instability
- Slope instability problems are probably present or have occurred in the past, and increased infiltration may result in slope instability.
- Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail.

Shallow mining

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- Increased infiltration is unlikely to lead to subsidence.
- Shallow mining is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Shallow mining could be present with a significant possibility that localised subsidence could be initiated or made worse by increased infiltration.
- Shallow mining is likely to be present, with a very significant possibility that localised subsidence may be initiated or made worse by increased infiltration.

Running sand

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- Increased infiltration is unlikely to cause ground collapse associated with running sands.
- Running sand is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Significant possibility for running sand problems. Increased infiltration may result in a geohazard.

Swelling clays

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- Increased infiltration is unlikely to cause shrink-swell ground movement.
- Ground is susceptible to shrink-swell ground movement. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Ground is susceptible to shrink-swell ground movement. Increased infiltration may result in a geohazard.

Compressible ground

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- Increased infiltration is unlikely to lead to ground compression.
- Compressibility and uneven settlement hazards are probably present. Increased infiltration may result in a geohazard.

Collapsible ground

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- Increased infiltration is unlikely to result in subsidence.
- Deposits with potential to collapse when loaded and saturated are possibly present in places. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Deposits with potential to collapse when loaded and saturated are probably present in places. Increased infiltration may result in a geohazard.

Section 4. Groundwater quality protection

The following pages contain maps showing some of the information required to ensure the protection of groundwater quality. Data presented includes:

- groundwater source protection zones (Environment Agency data)
- predominant flow mechanism
- made ground

For more information read 'Explanation of terms' at the end of this report.

Groundwater source protection zones

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Derived in part from Source Protection Zone data provided under licence from the Environment Agency © Environment Agency 2024.

Key
Groundwater is not within a source protection zone.
Source protection zone IV
Source protection zone III
Source protection zone II
Source protection zone I

Predominant flow mechanism

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Key
Water is likely to percolate through the unsaturated zone to the groundwater through either the pore space in granular media or through porespace and fractures; these processes have some potential for contaminant removal and breakdown.
Water is likely to percolate through the unsaturated zone to the groundwater through fractures, a process which has little potential for contaminant removal and breakdown.

Made ground

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Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

Section 5. Geological Maps

The following maps show the artificial, superficial and bedrock geology within the area of interest.

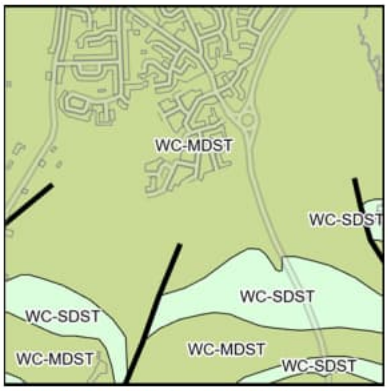
Artificial deposits

Contains OS data © Crown Copyright and database right 2024

Superficial deposits

Contains OS data © Crown Copyright and database right 2024

Bedrock



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Fault

Coal, ironstone or mineral vein

Note: Faults and Coals, ironstone & mineral veins are shown for illustration and to aid interpretation of the map. Not all such features are shown and their absence on the map face does not necessarily mean that none are present

Key to Artificial deposits:
No deposits recorded by BGS in the search area

Key to Superficial deposits:

Map colour	Computer Code	Rock name	Rock type
	ALV-XCZSV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL

Key to Bedrock geology:

Map colour	Computer Code	Rock name	Rock type
	WC-SDST	WEALD CLAY FORMATION	SANDSTONE
	WC-MDST	WEALD CLAY FORMATION	MUDSTONE

Limitations of this report:

- This report is concerned with the potential for infiltration-to-the-ground to be used as a SuDS technique at the site described. It only considers the subsurface beneath the search area and does NOT consider potential surface or subsurface impacts outside of that area.
- This report is NOT an alternative for an on-site investigation or soakaway test, which might reach a different conclusion.
- This report must NOT be used to justify disposal of foul waste or grey water.
- This report is based on and limited to an interpretation of the records held by the British Geological Survey (BGS) at the time the search is performed. The datasets used (with the exception of that showing depth to water table) are based on 1:50 000 digital geological maps and not site-specific data.
- Other more specific and detailed ground instability information for the site may be held by BGS, and an assessment of this could result in a modified assessment.
- To interpret the maps correctly, the report must be viewed and printed in colour.
- The search does NOT consider the suitability of sites with regard to:
    - previous land use,
    - potential for, or presence of contaminated land
    - presence of perched water tables
    - shallow mining hazards relating to coal mining. Searches of coal mining should be carried out via The Coal Authority Mine Reports Service: www.coalminingreports.co.uk.
    - made ground, where not recorded
    - proximity to landfill sites (searches for landfill sites or contaminated land should be carried out through consultation with local authorities/Environment Agency)
    - zones around private water supply boreholes that are susceptible to groundwater contamination.
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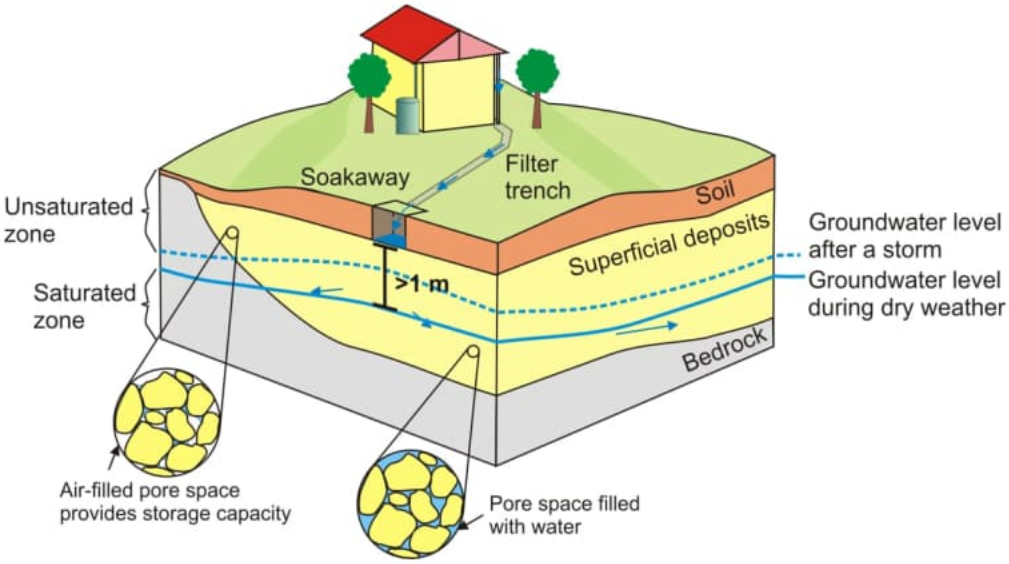
Explanation of terms

Depth to groundwater

In the shallow subsurface, the ground is commonly unsaturated with respect to water. Air fills the spaces within the soil and the underlying superficial deposits and bedrock. At some depth below the ground surface, there is a level below which these spaces are full of water. This level is known as the groundwater level, and the water below it is termed the groundwater. When water is infiltrated, the groundwater level may rise temporarily. To ensure that there is space in the unsaturated zone to accommodate this, there should be a minimum thickness of 1 m between the base of the infiltration system and the water table. An estimate of the *depth to groundwater* is therefore useful in determining whether the ground is suitable for infiltration.



Groundwater flooding

Groundwater flooding occurs when a rise in groundwater level results in very shallow groundwater or the emergence of groundwater at the surface. If infiltration systems are installed in areas that are susceptible to groundwater flooding, it is possible that the system could become inundated. The susceptibility map seeks to identify areas where the geological conditions and water tables indicate that groundwater level rise could occur under certain circumstances. A high susceptibility to groundwater flooding classification does not mean that groundwater flooding has ever occurred in the past, or will do so in the future as the susceptibility maps do not contain information on how often flooding may occur. The susceptibility maps are designed for planning; identifying areas where groundwater flooding might be an issue that needs to be taken into account.

Geological indicators of flooding
In floodplain deposits, groundwater level can be influenced by the water level in the adjacent river. Groundwater level may increase during periods of fluvial flood and therefore this should be taken into account when designing infiltration systems on such deposits. The *geological indicators of flooding* dataset shows where there is geological evidence (floodplain deposits) that flooding has occurred in the past.

For further information on flood-risk, the likely frequency of its recurrence in relation to any proposed development of the site, and the status of any flood prevention measures in place, you are advised to contact the local office of the Environment Agency (England and Wales) at www.environment-agency.gov.uk/ or the Scottish Environment Protection Agency (Scotland) at www.sepa.org.uk.

Artificial ground
Artificial ground comprises deposits and excavations that have been created or modified by human activity. It includes ground that is worked (quarries and road cuttings), infilled (back-filled quarries), landscaped (surface re-shaping), disturbed (near surface mineral workings) or classified as made ground (embankments and spoil heaps). The composition and properties of artificial ground are often unknown. In particular, the permeability and chemical composition of the artificial ground should be determined to ensure that the ground will drain and that any contaminants present will not be remobilised.

Superficial permeability
Superficial deposits are those geological deposits that were formed during the most recent period of geological time (as old as 2.6 million years before present). They generally comprise relatively thin deposits of gravel, sand, silt and clay and are present beneath the pedological soil in patches or larger spreads over much of Britain. The ease with which water can percolate through these deposits is controlled by their permeability and varies widely depending on their composition. Those deposits comprising clays and silts are less permeable and thus infiltration is likely to be slow, such that water may pool on the surface. In comparison, deposits comprising sands and gravels are more permeable allowing water to percolate freely.

Bedrock permeability
Bedrock forms the main mass of rock forming the Earth. It is present everywhere, commonly beneath superficial deposits. Where the superficial deposits are thin or absent, the ease with which water will percolate into the ground depends on the permeability of the bedrock.

Natural ground instability

Natural ground instability refers to the propensity for upward, lateral or downward movement of the ground that can be caused by a number of natural geological hazards (e.g. ground dissolution/compressible ground). Some movements associated with particular hazards may be gradual and of millimetre or centimetre scale, whilst others may be sudden and of metre or tens of metres scale. Significant natural ground instability has the potential to cause damage to buildings and structures, especially when the drainage characteristics of a site are altered. It should be noted, however, that many buildings, particularly more modern ones, are built to such a standard that they can remain unaffected in areas of significant ground movement.

Shrink-swell

A shrinking and swelling clay changes volume significantly according to how much water it contains. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Contributory circumstances could include drought, leaking service pipes, tree roots drying-out the ground or changes to local drainage patterns, such as the creation of soakaways. Shrinkage may remove support from the foundations of buildings and structures, whereas clay expansion may lead to uplift (heave) or lateral stress on part or all of a structure; any such movements may cause cracking and distortion.

Landslides (slope stability)

A landslide is a relatively rapid outward and downward movement of a mass of ground on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. The stability of a slope can be reduced by removing ground at the base of the slope, by placing material on the slope, especially at the top, or by increasing the water content of the materials forming the slope. Increase in subsurface water content beneath a soakaway could increase susceptibility to landslide hazards. The assessment of landslide hazard refers to the stability of the present land surface. It does not encompass a consideration of the stability of excavations.

Soluble rocks (dissolution)

Some rocks are soluble in water and can be progressively removed by the flow of water through the ground. This process tends to create cavities, potentially leading to the collapse of overlying materials and possibly subsidence at the surface. The release of water into the subsurface from infiltration systems may increase the dissolution of rock or destabilise material above or within a cavity. Dissolution cavities may create a pathway for rapid transport of contaminated water to an aquifer or water course.

Compressible ground
Many ground materials contain water-filled pores (the spaces between solid particles). Ground is compressible if a building (or other load) can cause the water in the pore space to be squeezed out, causing the ground to decrease in thickness. If ground is extremely compressible the building may sink. If the ground is not uniformly compressible, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The compressibility of the ground may alter as a result of changes in subsurface water content caused by the release of water from soakaways.

Collapsible deposits
Collapsible ground comprises certain fine-grained materials with large pore spaces (the spaces between solid particles). It can collapse when it becomes saturated by water and/or a building (or other structure) places too great a load on it. If the material below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The subsurface underlying a soakaway will experience an increase in water content that may affect the stability of the ground. This hazard is most likely to be encountered only in parts of southern England.

Running sand
Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation, borehole or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains and they are carried along by the flow. This can lead to subsidence of the surrounding ground. Running sand is potentially hazardous during the drainage system installation. During installation, excavation of the ground may create a space into which sand can flow, potentially causing subsidence of surrounding ground.

Shallow mining hazards (non coal)
Current or past underground mining for coal or for other commodities can give rise to cavities at shallow or intermediate depths, which may cause fracturing, general settlement, or the formation of crown-holes in the ground above. Spoil from mineral workings may also present a pollution hazard. The release of water into the subsurface from soakaways may destabilise material above or within a cavity. Cavities arising as a consequence of mining may also create a pathway for rapid transport of contaminated water to an aquifer or watercourse. The mining hazards map is derived from the geological map and considers the potential for subsidence associated with mining on the basis of geology type. Therefore if mining is known to occur within a certain rock, the map will highlight the potential for a hazard within the area covered by that geology.

For more information regarding underground and opencast **coal mining**, the location of mine entries (shafts and adits) and matters relating to subsidence or other ground movement induced by **coal mining** please contact the Coal Authority, Mining Reports, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG; telephone 0845 762 6848 or at www.coal.gov.uk**.** For more information regarding other types of mining (i.e. non-coal), please contact the British Geological Survey.

Groundwater source protection zones

In England and Wales, the Environment Agency has defined areas around wells, boreholes and springs that are used for the abstraction of public drinking water as source protection zones. In conjunction with Groundwater Protection Policy the zones are used to restrict activities that may impact groundwater quality, thereby preventing pollution of underlying aquifers, such that drinking water quality is upheld. The Environment Agency can provide advice on the location and implications of source protection zones in your area (www.environment-agency.gov.uk/)

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- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
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- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
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- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Report issued by
BGS Enquiry Service

paulbasham associates

Appendix E

Date: 29/05/24

Scale: 1:1250

Map Centre: 515972,124916

Data updated: 23/05/24

Our Ref: 1480725 - 1

Wastewater Plan A0

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 2024 Ordnance Survey 100031673 .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.

Foul Gravity Sewer | Combined Gravity Sewer | Culverted Water Course or Treated Effluent | Surface Water Gravity Sewer | Rising Main, Vacuum or Syphon

Combined Outfall | Foul Outfall | Surface Water Outfall | Surface Water Inlet

Combined Pumping Station | Surface Water Pumping Station | Foul Pumping Station | Water Treatment Works | Section 104 Area | Building Over Agreement Area

Foul Manhole | Combined Manhole | Surface Water Manhole | Side Entry Manhole, Decarbonation Chamber, Dummy Manhole or Surface Water Soakaway

s.ho@paulbashamassociates.com

Campfield Southwater

WATER for LIFE from Southern Water.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0001	F	46.55	42.20	
0002	F	46.95	42.36	
0003	F	47.01	42.52	
0004	F	47.17	42.70	
0005	F	47.77	42.79	
0006	F	47.35	42.91	
0007	F	46.30	43.00	
0008	F	49.05	46.53	
0009	F	48.55	47.22	
0010	F	48.36	46.15	
0101	F	47.18	43.07	
0102	F	46.99	43.30	
0103	F	46.50	43.42	
0104	F	46.71	43.54	
0201	F	47.83	46.20	
0301	F	49.80	47.73	
0303	F	50.99	0.00	
0304	F	49.61	47.98	
0305	F	0.00	0.00	
0306	F	0.00	0.00	
0307	F	0.00	0.00	
0308	F	0.00	0.00	
0801	F	44.09	42.68	
0901	F	46.51	42.07	
0902	F	47.34	45.85	
0903	F	48.17	46.06	
0904	F	48.84	43.23	
0905	F	46.71	44.81	
0906	F	46.80	44.76	
0907	F	45.97	44.61	
0908	F	45.50	44.08	
0909	F	44.45	42.80	
1001	F	48.76	46.65	
1002	F	49.59	47.51	
1003	F	49.65	46.92	
1004	F	49.83	47.00	
1005	F	49.83	47.09	
1101	F	48.96	47.30	
1201	F	50.89	49.45	
1202	F	48.82	46.40	
1203	F	49.72	49.72	
1204	F	49.03	0.00	
1205	F	0.00	0.00	
1901	F	49.54	48.04	
1902	F	48.35	46.95	
2201	F	48.67	46.19	
2202	F	48.57	46.02	
2203	F	48.58	45.87	
2301	F	48.27	45.67	
2302	F	47.22	45.48	
2303	F	46.89	45.34	
2304	F	45.95	44.20	
2305	F	44.43	42.91	
2407	F	43.64	42.19	
5201	F	52.14	0.00	
6201	F	50.21	49.22	
6202	F	48.09	47.44	
6203	F	0.00	0.00	
6301	F	53.12	51.61	
6302	F	52.10	50.35	
6303	F	0.00	0.00	
6304	F	50.94	50.19	
6305	F	0.00	0.00	
6306	F	0.00	0.00	
7100	F	46.50	44.56	
7101	F	45.72	43.81	
7102	F	44.26	41.52	
7103	F	44.84	42.69	
7104	F	44.34	41.41	
7105	F	44.08	41.78	
7201	F	47.27	46.57	
7202	F	46.32	45.60	
7203	F	0.00	0.00	
7204	F	46.29	45.53	
7205	F	46.51	45.35	
7303	F	49.99	48.27	
7304	F	51.27	50.06	
7305	F	52.58	51.40	
7306	F	52.81	51.17	
8100	F	44.64	43.21	
8201	F	46.35	45.26	
8202	F	46.95	45.16	
8203	F	47.15	0.00	
8204	F	0.00	0.00	
8205	F	0.00	0.00	
8206	F	45.88	42.91	
8301	F	48.98	47.59	
8302	F	0.00	0.00	
9101	F	45.61	43.80	
9201	F	0.00	0.00	
9202	F	49.19	46.80	
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9205	F	0.00	0.00	
9206	F	0.00	0.00	
9301	F	49.27	47.53	
9302	F	49.42	44.52	
9303	F	49.49	44.74	
9304	F	50.26	0.00	
9801	F	43.24	41.25	
9802	F	42.52	39.57	
9803	F	41.87	39.45	
9804	F	40.73	37.33	
9805	F	41.08	0.00	
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9902	F	44.18	42.34	
9903	F	43.36	42.00	
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9905	F	43.64	41.51	
9906	F	42.53	41.23	
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0052	S	47.00	45.65	
0053	S	47.54	45.71	
0054	S	48.40	46.40	
0055	S	48.47	47.12	
0056	S	49.07	47.38	
0150	S	48.22	46.78	
0151	S	47.50	45.67	
0152	S	47.21	45.23	
0153	S	47.27	45.14	
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0252	S	48.48	47.02	
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0352	S	49.81	46.99	
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0952	S	48.12	44.95	
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7151	S	45.81	44.00	
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9352	S	49.60	47.28	
9850	S	48.00	38.52	
9851	S	42.32	38.82	
9852	S	41.91	38.44	
9853	S	41.21	38.37	
9854	S	40.22	38.27	
9950	S	46.60	43.97	
9951	S	45.82	44.47	
9952	S	48.00	42.65	

Appendix F

hr wallingford

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Nadine Hassan
Site name:	Campfield
Site location:	Southwater

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

Site Details

Latitude:	51.01117° N
Longitude:	0.34779° W
Reference:	2160317202
Date:	Nov 27 2024 14:59

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 1.375

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	778	778
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	7.51	7.51
1 in 1 year (l/s):	6.38	6.38
1 in 30 years (l/s):	17.28	17.28
1 in 100 year (l/s):	23.96	23.96
1 in 200 years (l/s):	28.09	28.09

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Nadine Hassan
Site name:	Campfield
Site location:	Southwater

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

Site Details

Latitude:	51.01117° N
Longitude:	0.34779° W
Reference:	2629767661
Date:	Nov 26 2024 16:23

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 4.5

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	778	778
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	24.58	24.58
1 in 1 year (l/s):	20.9	20.9
1 in 30 years (l/s):	56.54	56.54
1 in 100 year (l/s):	78.42	78.42
1 in 200 years (l/s):	91.94	91.94

Appendix G

Nadine Hassan

From:	Stephanie.Bryant <Stephanie.Bryant@horsham.gov.uk>
Sent:	25 October 2024 16:12
To:	Nick Billington
Cc:	Angela Moore
Subject:	RE: Pre-app submission - Land at Campsfield, Southwater

Hi Nick,

I confirm the below reflects our discussion and wider pre-application advice for this site.

Kind regards,
Steph

Stephanie Bryant
Senior Planning Officer

Telephone: 01403 215081
Email: Stephanie.Bryant@horsham.gov.uk

Horsham District Council
50 YEARS

Horsham District Council, Parkside, Chart Way, Horsham, West Sussex RH12 1RL
Telephone: 01403 215100 (calls may be recorded) www.horsham.gov.uk Chief Executive: Jane Eaton

From: Nick Billington <nbillington@slrconsulting.com>
Sent: 25 October 2024 16:07
To: Stephanie.Bryant <Stephanie.Bryant@horsham.gov.uk>
Cc: Angela Moore <amoore@slrconsulting.com>
Subject: RE: Pre-app submission - Land at Campsfield, Southwater

Hi Stephanie,

I should clarify – I didn't mean to suggest below POS would have to be outside of areas of Medium and High surface water flood risk – just roads.

Regards,

Nick Billington
MRTPI
Principal Planning Consultant - Environmental & Social Impact Assessment

O +44 3300 886631
M +44 7974 108360
E nbillington@slrconsulting.com

SLR Consulting Limited
Mountbatten House, 1 Grosvenor Square, Southampton, Hampshire, United Kingdom SO15 2JU

From: Nick Billington <nbillington@slrconsulting.com>
Sent: 25 October 2024 16:00
To: Stephanie.Bryant <Stephanie.Bryant@horsham.gov.uk>
Cc: Angela Moore <amoore@slrconsulting.com>
Subject: RE: Pre-app submission - Land at Campsfield, Southwater

Hi Stephanie,

Thanks for your call. Was good to talk through those couple of points on sequential test and trees. Just to confirm what we discussed:

Application of sequential test
Based on our conversation, you indicated you would be inclined not to require the application of the Flood Risk Sequential test to the site if any proposed roads and POS were located in areas at 'low' (as opposed to very low) risk of surface water flooding and provided they avoided any medium or high risk areas. Homes should be located in the lowest risk areas of surface water flooding.

Trees and RPAs
You confirmed that the tree officer had informed your comments on the RPAs in your most recent addendum response and that based on this it is unlikely, given the site is currently undeveloped, that any encroachment in RPAs would be supported by officers.

If you could please confirm my understanding of our conversation is correct that would be really helpful.

Have a great weekend when you get there.

Kind Regards,

Nick Billington
MRTPI
Principal Planning Consultant - Environmental & Social Impact Assessment

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M +44 7974 108360
E nbillington@slrconsulting.com

SLR Consulting Limited

Appendix H

Project Name:	Campfield, Southwater
Document Reference:	091.5018/DTN/2
Document Name:	Drainage Technical Note
Prepared By:	N Hassan (June 2024)
Checked By:	D Pearson (June 2024)
Approved By:	C Owen-Hughes (June 2024)

Revision Record				
Rev	Date	By	Summary of Changes	Aprvd
1	06/06/24	NOH	First Draft	COH
2	11/06/24	NOH	Client comments addressed	COH

1. EXECUTIVE SUMMARY

1.1 The site falls entirely within flood zone 1

1.2 A small area of (0.136ha) is subject to medium risk of surface water flooding, out of a total site area of 4.2ha.

1.3 None of the proposed dwellings are located in an area of medium surface water flood risk.

1.4 The area of medium surface water flood risk is contained within the landscaped area along the northern boundary, and a small portion of the proposed carriageway.

1.5 Two attenuation swales have been proposed to mitigate the existing surface water flood risk.

1.6 The estimated flood depths a less than 300mm, which is a safe depth to allow emergency access for vehicles.

1.7 The decision to undertake a sequential test for the site lies entirely within the scope of Horsham District Council. However, as demonstrated in the following assessment, the risk posed to the proposed site by surface water flooding is minimal, with any medium surface water flood risk confined to a small area on the northern boundary of the site, far from any proposed dwelling. The recent judgement by the England and Wales Court of Appeal (Civil Division) in the case of Whittaker-Fayed v Secretary of State for Levelling Up, Housing and Communities [2024] EWCA Civ 507 found that local planning authorities should seek to take a balanced and pragmatic approach in the application of the sequential test, and, where suitable, should seek to impose conditions to manage flood risk instead of an automatic application of the sequential test.

1.8 A surface water drainage strategy shall be prepared in accordance with West Sussex County Council's Pro Forma and shall include SuDS features to manage water volume and quality prior to discharging at Qbar rate into an existing watercourse west of the site.

1.9 This drainage technical note should be read in conjunction with Drainage and Flood Risk section within the Pre-App letter.

INTRODUCTION

1.10 This Technical Note has been prepared by Paul Basham Associates on behalf of Miller Homes Ltd. to support the Pre-Application to Horsham District Council, specifically in relation to the sequential test for the proposed site in Campfield, Southwater.

1.11 The proposed development is located entirely within Flood Zone 1, as shown in Figure 1 below.

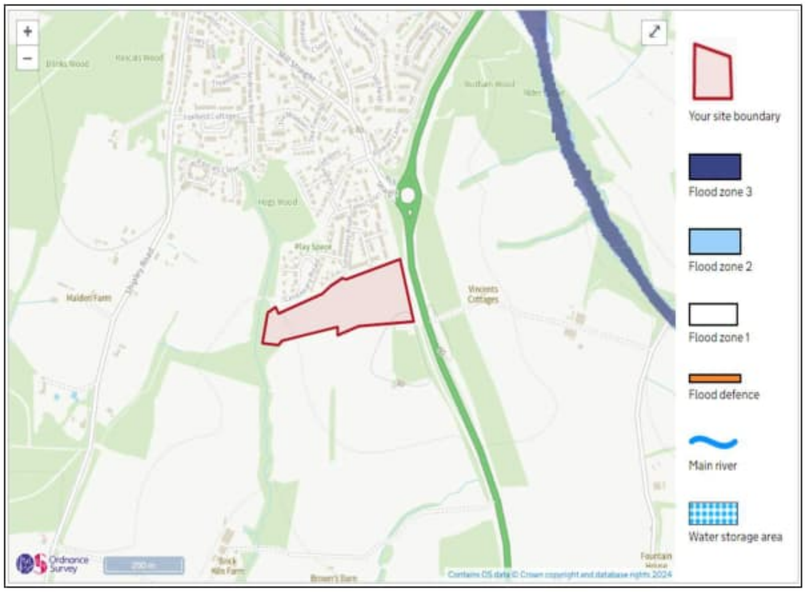


Figure 1: Environment Agency's Flood Map for Planning

1.12 The Environment Agency's (EA) flood risk mapping has been reviewed and a summary of the flood risk is outlined in below. It should be noted that a detailed flood risk assessment showing the EA's flood maps and discussing residual flood risks shall accompany the outline application for the proposed site. This technical note focusses primarily on the flood risk from surface water.

Source of Flood Risk	Flood Risk based on EA mapping
Fluvial/ Tidal	Very Low
Surface Water (Pluvial)	Medium Risk
Ground Water	Unlikely
Reservoirs	Unlikely

Table 1: Summary of EA long-term flood risk

1.13 The surface water flood risk map is shown in Figure 2 and indicates that the site is considered to be at medium risk of surface water flooding, near the northern boundary. A small area of (0.136ha) is subject to medium risk of long-term surface water flooding, out of a total site area of 4.2ha

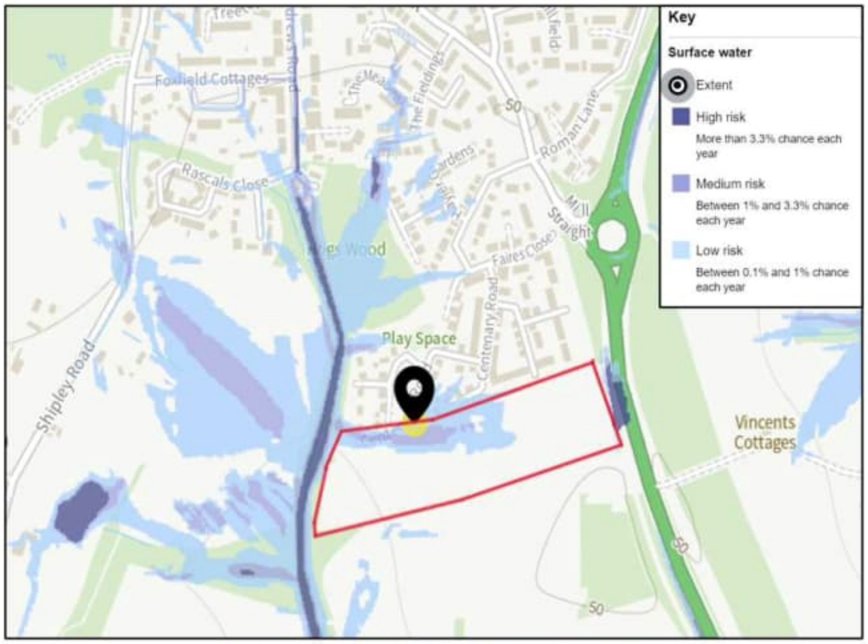


Figure 2: Long term flood risk from surface water

1.14 Figure 3 is extracted from the EA's online flood mapping and indicates the flood depths associated with the medium risk flooding from surface water. The map indicates that flood depths are below 30cm.

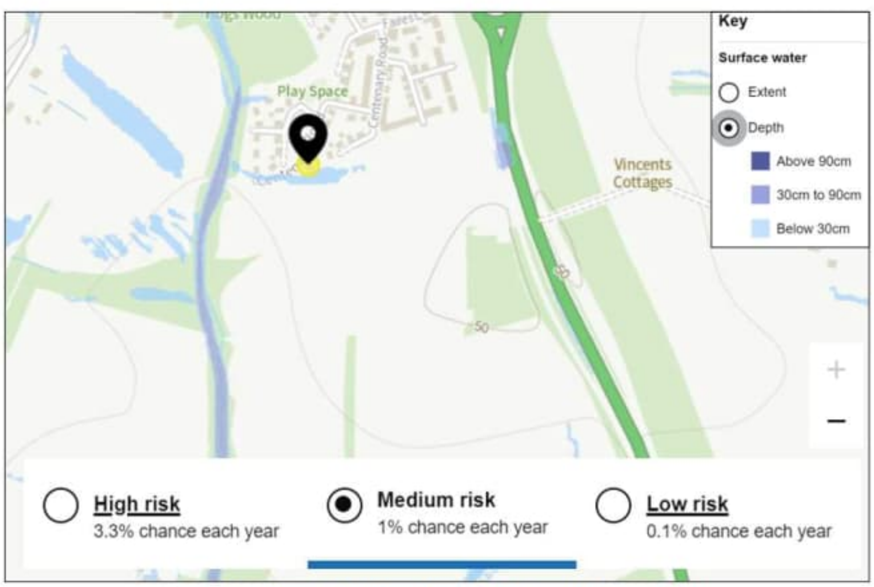


Figure 3: Depth of Surface Water Flooding (Medium Risk)

1.15 Figure 4 shows the EA surface water flood map extents overlaid onto the proposed site layout. Localised areas subject to medium risk of surface water flooding are mostly within a landscaped area, adjacent to the northern boundary and the spine road. Only a very small portion lies across the road, however it should be noted that the maximum estimated flood depths is less than 30cm, which would still allow safe access for vehicles through this portion of the road.

1.16 The medium risk surface water flood extents do not conflict with any proposed dwellings.

1.17 Two inter-connected attenuation swales with a total volume of 413m³ (inclusive of 0.3m freeboard) shall be proposed as shown in Figure 4 to contain the current medium risk surface water floods. The area of the medium risk extents (hatched in purple below) was estimated to be 1359m². Assuming a flood depth of 300mm across the hatched area, the total surface water volume generated from the medium risk area is estimated to be 408m³.

1.18 An enlarged image of the swales is shown in Figure 5, showing existing tree constraints.

Figure 4: Flood Mapping and Proposed Layout

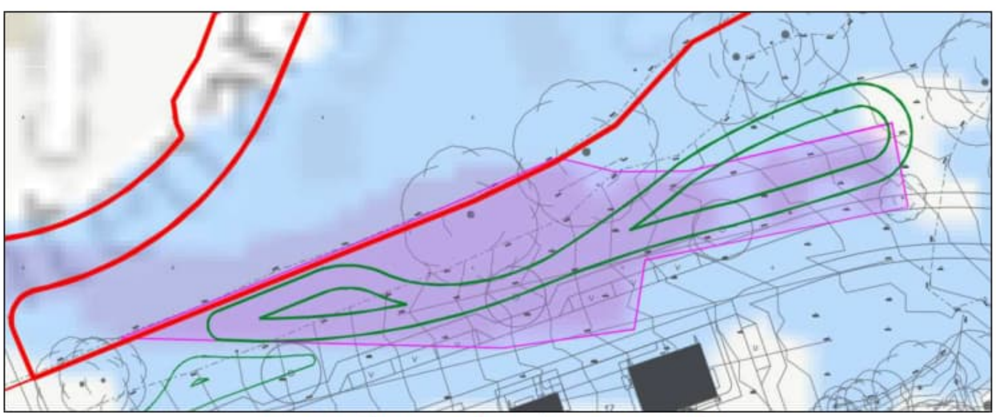


Figure 5: Close-up on Proposed Conveyance Swales

2. SURFACE WATER DRAINAGE PROPOSAL

2.1 A review of the British Geological Survey (BGS) mapping indicates that the bedrock geology beneath the site is *"weald clay formation – mudstone. Sedimentary bedrock formed between 133.9 and 126.3 million years ago during Cretaceous period"*. The site is unlikely to be suitable for infiltration.

2.2 The surface water drainage proposal is to manage surface water runoff at source, attenuate it on site and discharge at Qbar rate to the existing watercourse, which runs along the western boundary of the site.

2.3 Surface water runoff shall be collected and attenuated within a basin proposed in the western portion of the site. The discharge from the basin shall be via a wide earthwork, similar to a shallow swale, to allow water to flow through the woodland as a sheet in effort to minimise impact on the woodland.

2.4 A variety of SuDS features shall also be incorporated such as permeable block paving for carparks and conveyance swales.

3. PLANNING POLICY

3.1 Horsham District Council's (HDC) Local Validation List states that:

> *"A Sequential Test (followed by an Exceptions Test if applicable) will be required for all development where all or part of the site falls within Flood Zones 2 or 3, and/or* ***where there is a medium or high risk of surface water flooding or flooding from other sources****. Exceptions are where the site has been specifically allocated for development in either the local plan or a neighbourhood plan where it was previously subject to a sequential test (provided there have been no significant changes to the known level of flood risk to the site, now or in the future which would have affected the outcome of the test)"*

3.2 Per the above, the area of surface water flood risk is minimal, and is confined to a localised depression. There is no flow path crossing the site, and as per Figure 3, the flood depths are estimated to be lower than 300mm.

4. CONCLUSION

4.1 The site falls entirely within flood zone 1

4.2 A small area of (0.136ha) is subject to medium risk of surface water flooding, out of a total site area of 4.2ha.

4.3 None of the proposed dwellings are located in an area of medium surface water flood risk.

4.4 The area of medium surface water flood risk is contained within the landscaped area along the northern boundary, and a small portion of the proposed carriageway.

4.5 Two attenuation swales have been proposed to mitigate the existing surface water flood risk.

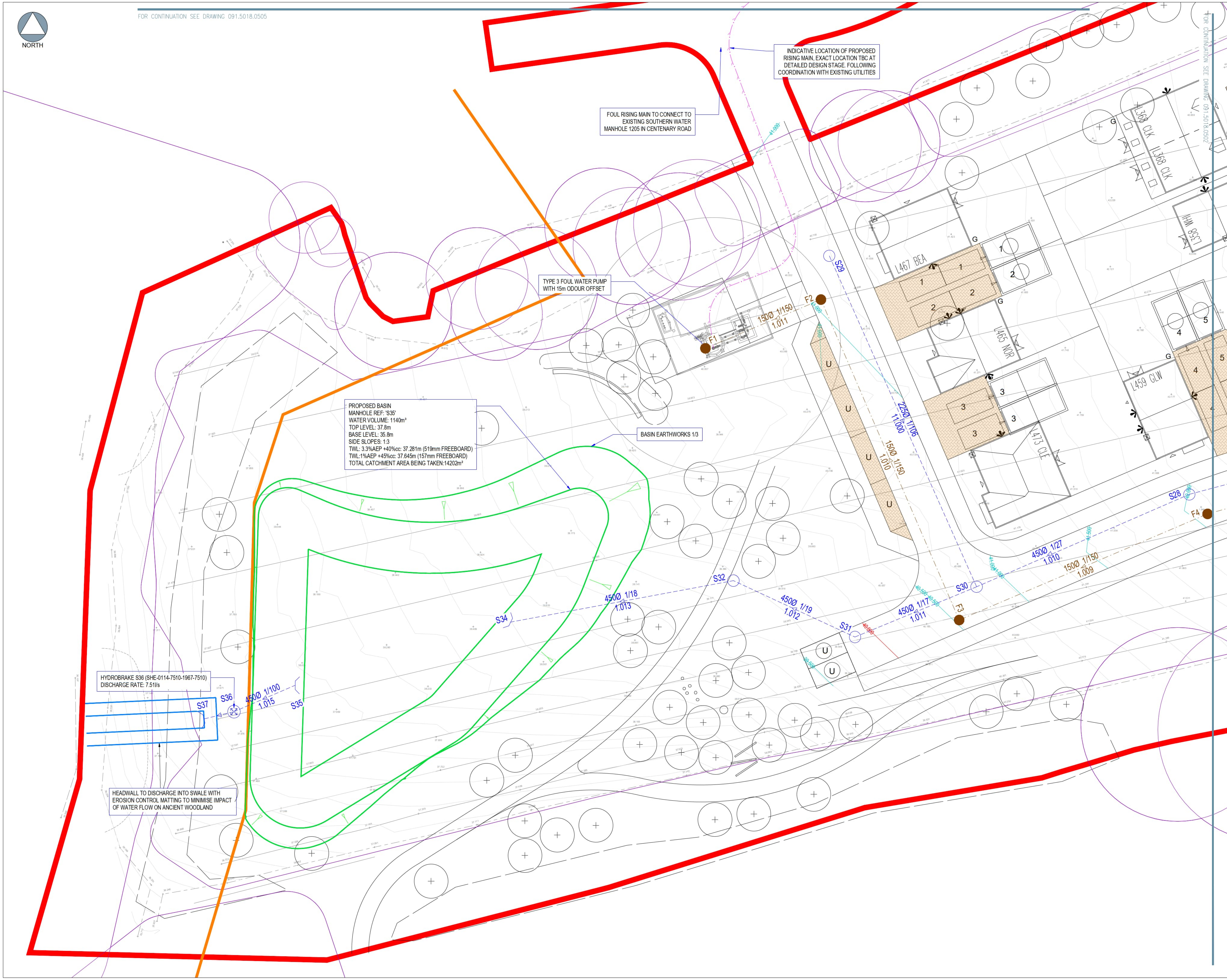
4.6 The estimated flood depths a less than 300mm, which is a safe depth to allow emergency access for vehicles.

4.7 The decision to undertake a sequential test for the site lies entirely within the scope of Horsham District Council. However, as demonstrated in the following assessment, the risk posed to the proposed site by surface water flooding is minimal, with any medium surface water flood risk confined to a small area on the northern boundary of the site, far from any proposed dwelling. The recent judgement by the England and Wales Court of Appeal (Civil Division) in the case of Whittaker-Fayed v Secretary of State for Levelling Up, Housing and Communities [2024] EWCA Civ 507 found that local planning authorities should seek to take a balanced and pragmatic approach in the application of the sequential test, and, where suitable, should seek to impose conditions to manage flood risk instead of an automatic application of the sequential test.

4.8 A surface water drainage strategy shall be prepared in accordance with West Sussex County Council's Pro Forma and shall include SuDS features to manage water volume and quality prior to discharging at Qbar rate into an existing watercourse west of the site.

4.9 This drainage technical note should be read in conjunction with Drainage and Flood Risk section within the Pre-App letter.

Appendix I



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   - 4.2. TOPOGRAPHICAL SURVEY: IR.MHCampsfield.21_01 - Received 15.05.2023
   - 4.3. LANDSCAPE LAYOUT: D3270_FAB-00-XX-RP-L-0002_P04 - Received 25.11.2024
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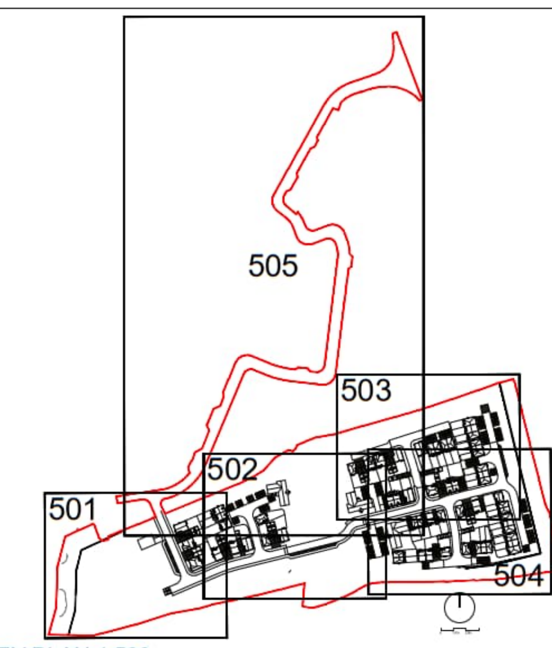
SURFACE WATER NETWORK
FOUL WATER NETWORK
FOUL RISING MAIN
TREE ROOT PROTECTION AREA
ANCIENT WOODLAND OFFSET
PROPOSED BASIN
EXISTING MEDIUM RISK PLUVIAL FLOODING
TYPE C PERMEABLE PAVING
HYDROBRAKE
HEADWALL



KEY PLAN 1:500

1:200 0m 10m

PRELIMINARY

DRAWING/DESIGN IS STILL 'IN DEVELOPMENT'
YOU ARE ADVISED TO MAKE DUE ALLOWANCE

Rev	Description	Date	By	App'd
P02	UPDATED IN LINE WITH LATEST FLOOD MAPPING	28.03.2024	OT	COH
P01	FIRST ISSUE	19.12.2024	LEC	NOH

Paul Basham Associates Ltd
The Bothy, Cams Hall Estate, Fareham, PO16 8UT
01329 711 000
info@paulbashamassociates.com www.paulbashamassociates.com

Client

Project Name
CAMPFIELD, SOUTHWATER

Title
PROPOSED DRAINAGE STRATEGY SHEET 1

Project Phase
PRELIMINARY

Date Created	Drawn By	Approved By	Suitabilty Code
10.12.2024	OT	NOH	-

PBA Project Number	Scale
091.5018	1:200 (AT A1)

PBA Drawing No:	Revison
091.5018.0501	P02

QMS2010/v8/310723/JM

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   - 4.1. ARCHITECTS LAYOUT: 02.40(01)20 - Received 19.03.2025
   - 4.2. TOPOGRAPHICAL SURVEY: IR.MHCampsfield.21_01 - Received 15.05.2023
   - 4.3. LANDSCAPE LAYOUT: D3270_FAB-00-XX-RP-L-0002_P04 - Received 25.11.2024
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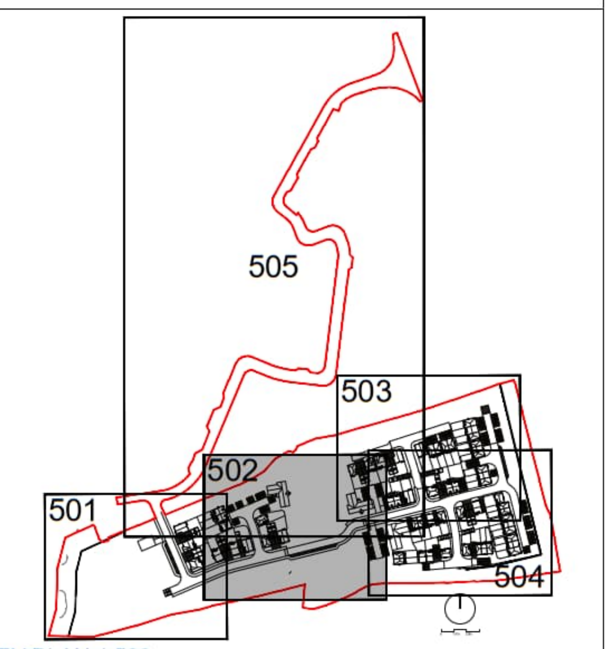
SURFACE WATER NETWORK
FOUL WATER NETWORK
FOUL RISING MAIN
TREE ROOT PROTECTION AREA
ANCIENT WOODLAND OFFSET
PROPOSED BASIN
EXISTING MEDIUM RISK PLUVIAL FLOODING
TYPE C PERMEABLE PAVING
HYDROBRAKE
HEADWALL



KEY PLAN 1:500

1: 200 0m 10m

PRELIMINARY

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Rev	Description	Date	By	App'd
P02	UPDATED IN LINE WITH LATEST FLOOD MAPPING	28.03.2024	OT	COH
P01	FIRST ISSUE	19.12.2024	LEC	NOH

Paul Basham Associates Ltd
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01329 711 000
info@paulbashamassociates.com www.paulbashamassociates.com

Client: Miller Homes

Project Name: CAMPFIELD, SOUTHWATER

Title: PROPOSED DRAINAGE STRATEGY SHEET 2

Project Phase: PRELIMINARY

Date Created	Drawn By	Approved By	Suitability Code
10.12.2024	OT	NOH	-

PBA Project Number	Scale
091.5018	1:200 (AT A1)

PBA Drawing No	Revision
091.5018.0502	P02

GMS2010/v8/310723/JM

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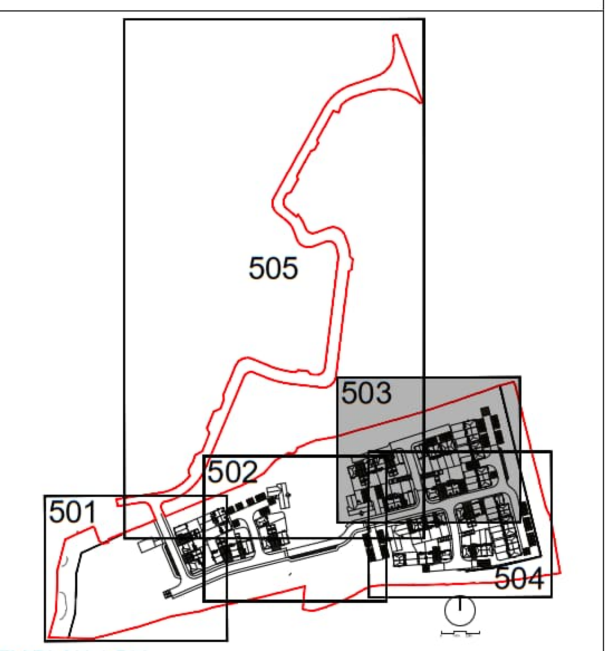
SURFACE WATER NETWORK
FOUL WATER NETWORK
FOUL RISING MAIN
TREE ROOT PROTECTION AREA
ANCIENT WOODLAND OFFSET
PROPOSED BASIN
EXISTING MEDIUM RISK PLUVIAL FLOODING
TYPE C PERMEABLE PAVING
HYDROBRAKE
HEADWALL



KEY PLAN 1:500

1:200 0m 10m

PRELIMINARY

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Rev	Description	Date	By	App'd
P02	UPDATED IN LINE WITH LATEST FLOOD MAPPING	28.03.2024	OT	COH
P01	FIRST ISSUE	19.12.2024	LEC	NOH

Paul Basham Associates Ltd
The Bothy, Cams Hall Estate, Fareham, PO16 8UT
01329 711 000
info@paulbashamassociates.com www.paulbashamassociates.com

Client: miller homes

Project Name: CAMPFIELD, SOUTHWATER

Title: PROPOSED DRAINAGE STRATEGY SHEET 3

Project Phase: PRELIMINARY

Date Created	Drawn By	Approved By	Suitability Code
10.12.2024	OT	NOH	-

PBA Project Number	Scale
091.5018	1:200 (AT A1)

PBA Drawing No:	Revison
091.5018.0503	P02

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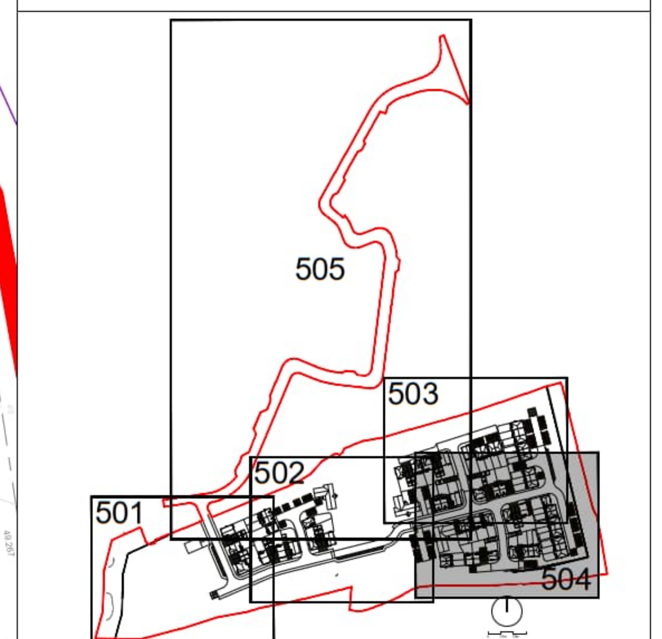

KEY PLAN 1:500

1:200 0m 10m

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Client

Project Name
CAMPFIELD, SOUTHWATER

Title
PROPOSED DRAINAGE STRATEGY
SHEET 4

Project Phase
PRELIMINARY

Date Created	Drawn By	Approved By	Suitability Code
10.12.2024	OT	NOH	-

PBA Project Number	Scale
091.5018	1:200 (AT A1)

PBA Drawing No:	Revison
091.5018.0504	P02

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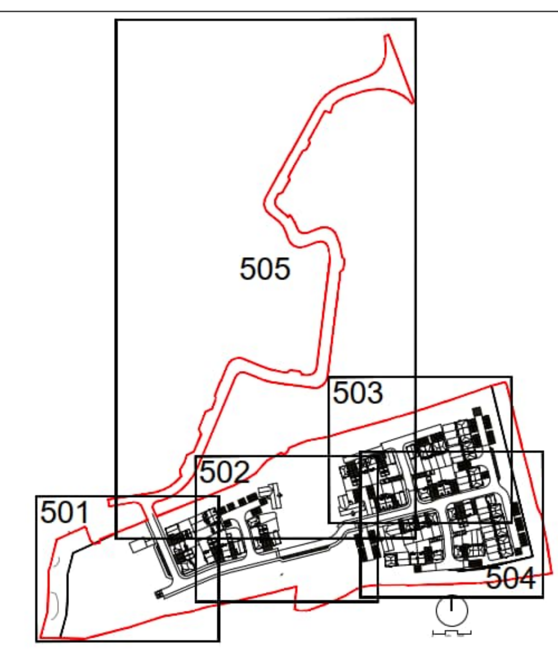

KEY PLAN 1:500

1:500 0m 25m

PRELIMINARY

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P01	FIRST ISSUE	19.12.2024	LEC	NOH

Paul Basham Associates Ltd
The Bothy, Cams Hall Estate, Fareham, PO16 8UT
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info@paulbashamassociates.com www.paulbashamassociates.com

Client: Miller Homes

Project Name: CAMPFIELD, SOUTHWATER

Title: PROPOSED DRAINAGE STRATEGY SHEET 5

Project Phase: PRELIMINARY

Date Created	Drawn By	Approved By	Suitabilty Code
17.12.2024	LC	NOH	-

PBA Project Number	Scale
091.5018	1:500 (AT A1)

PBA Drawing No:	Revison
091.5018.0505	P02

QMS2023/v8/310723/JM

Appendix J

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	Campfield, Southwater, West Sussex, RH13 9FR	Outline & Full
1.2	OS grid reference (easting and northing)	TQ160248 (516087 , 124874)	Outline & Full
1.3	Planning application reference	-	Outline & Full
1.4	Total site area (hectares)	4.5ha	Outline & Full
1.5	Pre-development use	Greenfield	Outline & Full
1.6	Proposed design life	100 Years	Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)	-	Outline & Full
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	Appendix B of FRA Report (Ref: 091.5018FRADS1)	Outline & Full

2. Discharge Hierarchy/Methods of Discharge[1]

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	NA	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	N	Outline & Full
2.3	Hybrid (YES/NO)	N	Outline & Full

[1] Runoff may be discharged via one or multiple methods.

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	Y	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	N	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	N	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS[2] (hectares)	100% (1.375ha)	Outline & Full
3.2	Impermeable area drained pre-development[3] (hectares)	0	Outline & Full
3.3	Impermeable area drained post-development[3] (hectares)	100% (1.375ha)	Outline & Full
3.4	Urban Creep (hectares)	10% (0.1375ha)	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	40% during 1:30 storm event, 45% during 1in100 storm event	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	N- Infiltration not viable (based on Weald Clay geology, BGS Map), GWM to be undertaken ahead of detail design stage, and therefore would be conditioned.	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	-	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	NA	Full
4.4	Infiltration rate	NA	Outline & Full

[2] Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

[3] 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	NA	Full
4.6	Safety factor used for sizing infiltration storage	NA	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates[4]

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	7.51	Outline & Full
5.2	1 in 1 year rainfall (l/s)	6.38	Outline & Full
5.3	1 in 30 year rainfall (l/s)	17.28	Outline & Full
5.4	1 in 100 year rainfall (l/s)	23.96	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	NA	Outline & Full
6.2	1 in 30 year rainfall (l/s)	NA	Outline & Full
6.3	1 in 100 year rainfall (l/s)	NA	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m^3)	NA	Outline & Full
7.2	Attenuation (m^3)	Total attenuation provided: 1140	Outline & Full
7.3	Separate volume designated as long-term storage[5] (m^3)	NA	Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m^3)	NA	Full

[4] Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

[5] In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	7.51 l/s	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	7.51 l/s	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)	7.51 l/s	Outline & Full
		1 in 100 (1%) AEP (m/s)	7.51 l/s	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	7.51 l/s	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		Y	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		Y	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		NA	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		NA	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	N	Outline & Full
9.2	Detailed drainage design layout	NA	Full
9.3	Maintenance strategy	NA	Full

No.	Requirement	Answer	Application Type
9.4	Detailed development layout	NA	Full
9.5	Impermeable area plan	NA	Full
9.6	Phasing plan?	NA	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	NA	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	Oliver Terry
Qualification of person responsible for signing off this proforma	Assistant Civil Engineer
Company	Paul Basham Associates
On behalf of (client's details)	Miller Homes
Date	28.03.2025

Appendix K

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S1	0.115	1.350	Type C	48.534	47.361	0.873	516194.900	124941.420
S2	0.006	1.350	Type C	48.926	47.202	1.424	516206.439	124895.173
S3	0.085	1.350	Type C	50.025	48.490	1.310	516227.815	124844.431
S4	0.011	1.350	Type C	49.287	47.720	1.267	516218.504	124881.826
S5	0.000	1.350	Type B	49.173	47.360	1.513	516214.074	124887.157
S6	0.070	1.200	Type B	49.018	46.870	1.848	516206.265	124888.659
S7	0.035	1.350	Type C	48.302	46.952	1.125	516153.956	124825.895
S8	0.026	1.350	Type C	49.527	48.177	1.200	516186.671	124828.859
S9	0.044	1.200	Type B	48.936	46.778	1.933	516171.214	124828.028
S10	0.006	1.200	Type B	48.494	46.521	1.748	516169.115	124853.614
S11	0.058	1.200	Type B	48.016	44.730	2.986	516162.717	124877.067
S12	0.065	1.200	Type B	46.813	44.542	1.970	516092.688	124909.543
S13	0.049	1.350	Type C	48.388	47.038	1.200	516163.476	124932.836
S14	0.039	1.200	Type A	47.718	44.273	3.145	516133.575	124923.089
S15	0.021	1.200	Type A	47.670	44.206	3.164	516139.439	124903.678
S16	0.073	1.350	Type A	47.660	44.099	3.261	516147.807	124872.853
S17	0.021	1.350	Type C	46.532	45.157	1.150	516104.328	124887.016
S18	0.052	1.350	Type B	46.608	43.970	2.187	516110.334	124863.427
S19	0.069	1.350	Type C	46.342	44.966	1.151	516112.196	124833.420
S20	0.041	1.350	Type B	46.421	43.952	2.019	516104.968	124862.077
S21	0.000	1.350	Type B	45.985	43.510	2.025	516090.465	124858.229
S22	0.098	1.350	Type A	45.679	42.000	3.229	516080.874	124847.905
S23	0.046	1.350	Type C	44.388	43.003	1.235	516022.485	124875.014
S24	0.026	1.350	Type C	43.450	41.900	1.400	515994.800	124862.727
S25	0.022	1.200	Type B	43.884	41.683	1.976	516007.677	124868.629
S26	0.047	1.200	Type B	43.682	41.619	1.838	516012.881	124855.001
S27	0.032	1.350	Type B	43.359	41.364	1.620	516019.165	124832.334
S28	0.052	1.350	Type C	42.009	40.170	1.389	515985.982	124823.461
S29	0.064	1.350	Type C	41.141	39.716	1.200	515943.640	124851.521
S30	0.076	1.350	Type C	40.806	39.164	1.267	515960.966	124812.586
S31	0.010	1.350	Type C	39.883	38.156	1.277	515946.647	124806.675
S32	0.000	1.350	Type B	39.366	37.360	1.556	515932.353	124813.307
S34	0.000	0.000	Type B	37.800	35.800	1.550	515906.152	124808.433
S35	0.000	0.000	Type B	37.800	35.799	1.551	515880.805	124800.999
S36	0.000	1.500	Type B	37.800	35.720	1.930	515873.595	124797.885
S37	0.000	0.000	Type B	37.800	35.570	2.080	515870.071	124797.034

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)
1.000	S1	47.361	S2	47.202	Circ	0.3mØ	47.665	300.0	0.600	0.873
1.001	S2	47.202	S6	46.870	Circ	0.3mØ	6.516	19.6	0.600	1.424
2.000	S3	48.490	S4	47.795	Circ	0.225mØ	38.537	55.4	0.600	1.310
2.001	S4	47.720	S5	47.360	Circ	0.3mØ	6.932	19.3	0.600	1.267
2.002	S5	47.360	S6	46.870	Circ	0.3mØ	7.952	16.2	0.600	1.513
1.002	S6	46.870	S11	44.730	Circ	0.3mØ	45.064	21.1	0.600	1.848
3.000	S7	46.952	S9	46.778	Circ	0.225mØ	17.389	100.0	0.600	1.125
4.000	S8	48.177	S9	46.853	Circ	0.15mØ	15.480	11.7	0.600	1.200
3.001	S9	46.778	S10	46.521	Circ	0.225mØ	25.672	100.0	0.600	1.933
3.002	S10	46.521	S11	44.805	Circ	0.225mØ	24.309	14.2	0.600	1.748
1.003	S11	44.730	S16	44.099	Circ	0.3mØ	15.495	24.6	0.600	2.986
5.000	S12	44.542	S14	44.273	Circ	0.3mØ	43.072	160.0	0.600	1.970
6.000	S13	47.038	S14	44.423	Circ	0.15mØ	31.449	12.0	0.600	1.200
5.001	S14	44.273	S15	44.206	Circ	0.3mØ	20.277	300.0	0.600	3.145
5.002	S15	44.206	S16	44.099	Circ	0.3mØ	31.941	300.0	0.600	3.164
1.004	S16	44.099	S18	43.970	Circ	0.45mØ	38.641	300.0	0.600	3.111
7.000	S17	45.157	S18	44.273	Circ	0.225mØ	24.342	27.6	0.600	1.150
1.005	S18	43.970	S20	43.952	Circ	0.45mØ	5.532	300.0	0.600	2.187
8.000	S19	44.966	S20	44.218	Circ	0.225mØ	29.554	39.5	0.600	1.151
1.006	S20	43.952	S21	43.510	Circ	0.45mØ	15.005	33.9	0.600	2.019
1.007	S21	43.510	S22	42.000	Circ	0.45mØ	14.091	9.3	0.600	2.025

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)
1.008	S22	42.000	S27	41.364	Circ	0.45mØ	63.643	100.1	0.600	3.229
9.000	S23	43.003	S25	41.758	Circ	0.15mØ	16.126	13.0	0.600	1.235
10.000	S24	41.900	S25	41.758	Circ	0.15mØ	14.165	100.0	0.600	1.400
9.001	S25	41.683	S26	41.619	Circ	0.225mØ	14.588	225.0	0.600	1.976
9.002	S26	41.619	S27	41.514	Circ	0.225mØ	23.522	225.0	0.600	1.838
1.009	S27	41.364	S28	40.170	Circ	0.45mØ	34.349	28.8	0.600	1.545
1.010	S28	40.170	S30	39.164	Circ	0.45mØ	27.278	27.1	0.600	1.389
11.000	S29	39.716	S30	39.314	Circ	0.225mØ	42.617	106.0	0.600	1.200
1.011	S30	39.164	S31	38.231	Circ	0.45mØ	15.491	16.6	0.600	1.192
1.012	S31	38.156	S32	37.360	Circ	0.45mØ	15.758	19.8	0.600	1.277
1.013	S32	37.360	S34	35.800	Circ	0.45mØ	26.650	17.1	0.600	1.556
1.014	S34	35.800	S35	35.799	Circ	0.45mØ	26.415	26415.3	0.600	1.550
1.015	S35	35.799	S36	35.720	Circ	0.45mØ	7.853	100.0	0.600	1.551
1.016	S36	35.720	S37	35.570	Circ	0.15mØ	3.626	24.1	0.600	1.930

Outfall Details

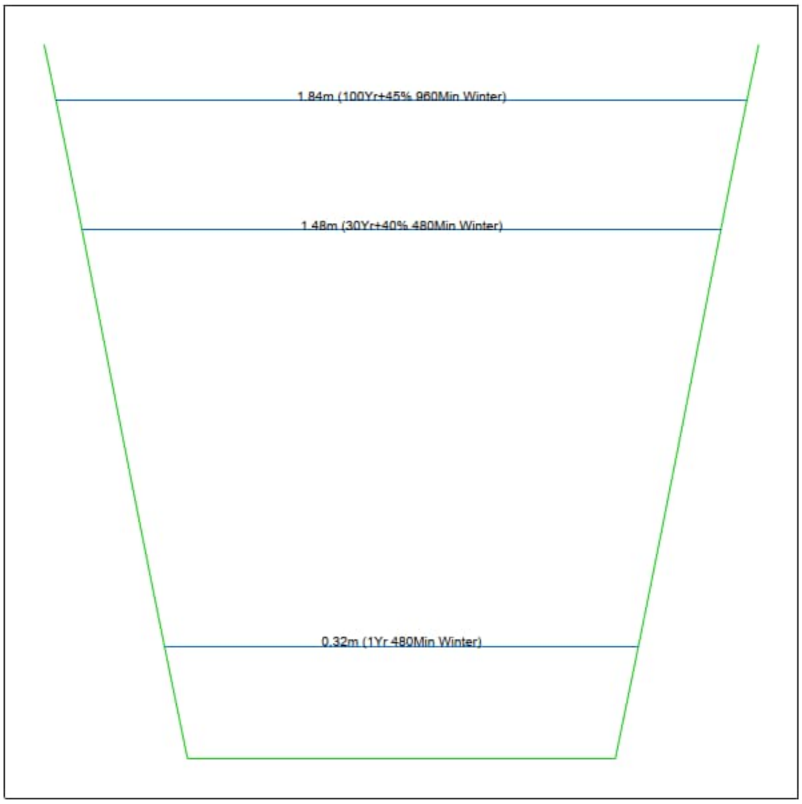
Outfall Manhole S37 : Free Discharge

Flow Control Details

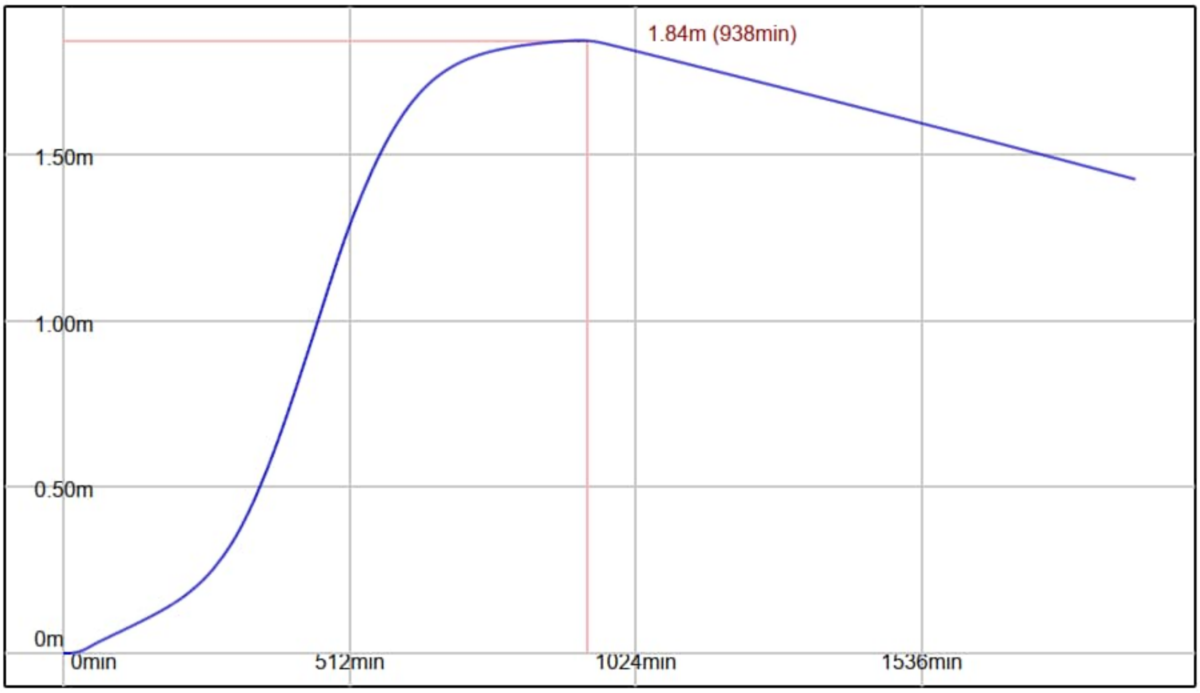
Pond Structure at Manhole S35

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
35.800	2.000	1140.006	37.500	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S35



Pond at S35 (100Yr+45% 960Min Winter)

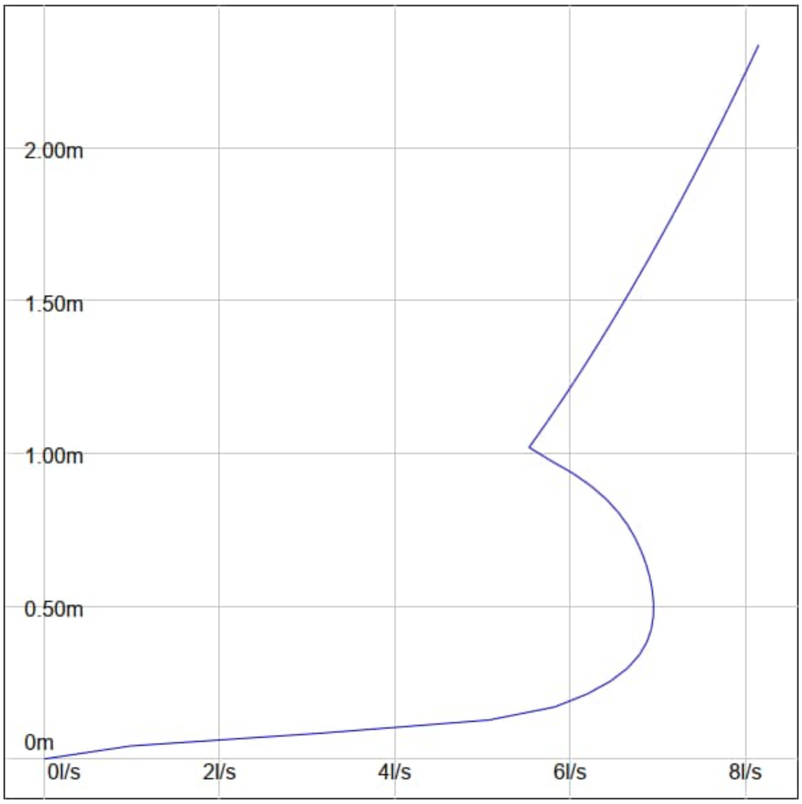


Controls within Manhole S36

Hydro-Brake® Optimum Control at Manhole S36

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0114-7510-1967-7510	1.967	7.510	0.000	0.492	6.954	1.012	5.512

Hydro-Brake® Optimum Control at S36



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_516055_124881_v5_0_1.xml

Summer (Cv: 1.00), Winter (Cv: 1.00)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 180, 240, 480, 960, 1440

Return Periods (yrs) + Climate Change: (1, +0%), (30, +40%), (100, +45%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
1Yr 15Min Winter	15.200	0.00	0.00	30Yr+40% 240Min Summer	17.847	0.00	0.89
1Yr 15Min Summer	15.200	0.00	0.00	30Yr+40% 240Min Winter	17.847	0.00	0.91
1Yr 30Min Winter	9.573	0.00	0.00	30Yr+40% 480Min Summer	10.356	0.00	0.74
1Yr 30Min Summer	9.573	0.00	0.00	30Yr+40% 480Min Winter	10.356	0.00	0.76
1Yr 60Min Winter	6.158	0.00	0.00	30Yr+40% 960Min Summer	5.885	0.00	0.46
1Yr 60Min Summer	6.158	0.00	0.00	30Yr+40% 960Min Winter	5.885	0.00	0.48
1Yr 180Min Winter	4.357	0.00	0.00	30Yr+40% 1440Min Summer	4.232	0.00	0.15
1Yr 180Min Summer	4.357	0.00	0.00	30Yr+40% 1440Min Winter	4.232	0.00	0.20
1Yr 240Min Summer	3.634	0.00	0.03	100Yr+45% 15Min Summer	153.029	0.00	0.98
1Yr 240Min Winter	3.634	0.00	0.02	100Yr+45% 15Min Winter	153.029	0.00	0.95
1Yr 480Min Summer	2.432	0.00	0.04	100Yr+45% 30Min Summer	102.275	0.00	0.96
1Yr 480Min Winter	2.432	0.00	0.04	100Yr+45% 30Min Winter	102.275	0.00	1.11
1Yr 960Min Summer	1.471	0.00	0.04	100Yr+45% 60Min Summer	65.177	0.00	1.01
1Yr 960Min Winter	1.471	0.00	0.05	100Yr+45% 60Min Winter	65.177	0.00	1.00
1Yr 1440Min Winter	1.112	0.00	0.05	100Yr+45% 180Min Summer	28.665	0.00	0.96
1Yr 1440Min Summer	1.112	0.00	0.04	100Yr+45% 180Min Winter	28.665	0.00	0.97
30Yr+40% 15Min Summer	117.210	0.00	0.81	100Yr+45% 240Min Summer	23.017	0.00	0.93
30Yr+40% 15Min Winter	117.210	0.00	0.85	100Yr+45% 240Min Winter	23.017	0.00	0.95
30Yr+40% 30Min Summer	77.706	0.00	0.91	100Yr+45% 480Min Summer	13.370	0.00	0.81
30Yr+40% 30Min Winter	77.706	0.00	0.97	100Yr+45% 480Min Winter	13.370	0.00	0.83
30Yr+40% 60Min Winter	49.124	0.00	0.99	100Yr+45% 960Min Summer	7.670	0.00	0.59
30Yr+40% 60Min Summer	49.124	0.00	0.97	100Yr+45% 960Min Winter	7.670	0.00	0.61
30Yr+40% 180Min Summer	22.217	0.00	0.93	100Yr+45% 1440Min Winter	5.535	0.00	0.42
30Yr+40% 180Min Winter	22.217	0.00	0.94	100Yr+45% 1440Min Summer	5.535	0.00	0.40

Simulation Results

Return Period Yrs: 1.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Winter	8	47.439	0.079	9.264		OK
S2	15 min Winter	9	47.241	0.039	9.412		OK
S3	15 min Winter	8	48.536	0.046	6.861		OK
S4	15 min Winter	8	47.755	0.035	7.472		OK
S5	15 min Winter	9	47.394	0.034	7.463		OK
S6	15 min Winter	9	46.931	0.061	22.313		OK
S7	15 min Winter	8	46.987	0.035	2.849		OK
S8	15 min Winter	8	48.198	0.020	2.103		OK
S9	15 min Winter	8	46.841	0.063	8.370		OK
S10	15 min Winter	9	46.559	0.038	8.673		OK
S11	15 min Winter	9	44.810	0.080	35.571		OK
S12	15 min Winter	8	44.591	0.048	5.270		OK
S13	15 min Winter	8	47.066	0.028	3.975		OK
S14	15 min Winter	9	44.360	0.087	11.869		OK
S15	15 min Winter	9	44.298	0.092	13.667		OK
S16	15 min Winter	9	44.263	0.164	54.619		OK
S17	15 min Winter	8	45.177	0.020	1.730		OK
S18	15 min Winter	9	44.140	0.170	59.840		OK
S19	15 min Winter	8	45.004	0.039	5.523		OK
S20	15 min Winter	9	44.060	0.108	67.154		OK
S21	15 min Winter	9	43.585	0.075	66.905		OK
S22	15 min Winter	10	42.148	0.148	72.747		OK
S23	15 min Winter	8	43.030	0.027	3.698		OK
S24	15 min Winter	8	41.934	0.034	2.129		OK
S25	15 min Winter	8	41.753	0.070	7.483		OK
S26	15 min Winter	9	41.705	0.086	10.859		OK
S27	15 min Winter	10	41.477	0.113	86.460		OK
S28	15 min Winter	10	40.285	0.115	90.379		OK
S29	15 min Winter	9	39.763	0.047	4.835		OK
S30	15 min Winter	10	39.270	0.106	100.028		OK
S31	15 min Winter	10	38.268	0.112	100.981		OK
S32	15 min Winter	10	37.467	0.107	101.095		OK
S34	480 min Winter	357	36.115	0.315	6.900		OK
S35	480 min Winter	359	36.115	0.315	6.660		OK
S36	480 min Winter	365	36.175	0.454	13.060		Surcharged
S37	480 min Winter	345	35.614	0.044	6.911		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	S1	S2	0.059	0.920	8.988	0.141	OK
1.001	15 min Winter	9	S2	S6	0.050	1.220	9.484	0.038	OK
2.000	15 min Winter	9	S3	S4	0.046	1.122	6.619	0.095	OK
2.001	15 min Winter	9	S4	S5	0.034	1.661	7.463	0.029	OK
2.002	15 min Winter	9	S5	S6	0.047	1.051	7.496	0.027	OK
1.002	15 min Winter	9	S6	S11	0.070	1.777	22.438	0.092	OK
3.000	15 min Winter	8	S7	S9	0.049	0.433	2.792	0.054	OK
4.000	15 min Winter	8	S8	S9	0.020	1.442	2.070	0.040	OK
3.001	15 min Winter	9	S9	S10	0.051	1.225	8.202	0.158	OK
3.002	15 min Winter	9	S10	S11	0.038	1.970	8.754	0.063	OK
1.003	15 min Winter	9	S11	S16	0.122	1.331	35.692	0.159	OK
5.000	15 min Winter	9	S12	S14	0.068	0.432	5.073	0.058	OK
6.000	15 min Winter	8	S13	S14	0.028	1.724	3.896	0.076	OK
5.001	15 min Winter	9	S14	S15	0.089	0.681	12.041	0.189	OK
5.002	15 min Winter	9	S15	S16	0.128	0.467	13.422	0.211	OK
1.004	15 min Winter	9	S16	S18	0.167	1.010	54.216	0.292	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
7.000	15 min Winter	8	S17	S18	0.020	0.950	1.673	0.017	OK
1.005	15 min Winter	9	S18	S20	0.139	1.414	58.739	0.316	OK
8.000	15 min Winter	8	S19	S20	0.039	1.186	5.379	0.065	OK
1.006	15 min Winter	9	S20	S21	0.092	2.886	66.905	0.120	OK
1.007	15 min Winter	9	S21	S22	0.111	2.175	66.660	0.063	OK
1.008	15 min Winter	10	S22	S27	0.130	1.937	74.175	0.230	OK
9.000	15 min Winter	8	S23	S25	0.027	1.648	3.650	0.073	OK
10.000	15 min Winter	8	S24	S25	0.034	0.677	2.060	0.116	OK
9.001	15 min Winter	9	S25	S26	0.078	0.608	7.363	0.214	OK
9.002	15 min Winter	9	S26	S27	0.086	0.790	11.045	0.321	OK
1.009	15 min Winter	10	S27	S28	0.114	2.738	87.087	0.144	OK
1.010	15 min Winter	10	S28	S30	0.111	2.988	90.744	0.146	OK
11.000	15 min Winter	9	S29	S30	0.047	0.819	4.949	0.098	OK
1.011	15 min Winter	10	S30	S31	0.106	3.514	100.349	0.126	OK
1.012	15 min Winter	10	S31	S32	0.109	3.380	101.095	0.139	OK
1.013	480 min Winter	331	S32	S34	0.173	0.743	22.984	0.029	OK
1.014	480 min Winter	359	S34	S35	0.315	0.635	22.723	1.241	OK
1.015	480 min Winter	361	S35	S36	0.382	0.648	52.549	0.163	OK
1.016	480 min Winter	349	S36	S37	0.044	1.590	6.911	0.190	OK

Return Period Yrs: 30.0

Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Winter	8	47.596	0.235	71.512		OK
S2	15 min Winter	8	47.311	0.109	73.707		OK
S3	15 min Winter	8	48.634	0.144	52.956		OK
S4	15 min Winter	8	47.817	0.097	58.616		OK
S5	15 min Winter	8	47.452	0.092	58.485		OK
S6	15 min Winter	9	47.064	0.194	170.941		OK
S7	15 min Winter	9	47.066	0.115	20.634		OK
S8	15 min Winter	8	48.235	0.057	16.229		OK
S9	15 min Winter	9	47.058	0.280	60.651		Surcharged
S10	15 min Winter	9	46.630	0.109	64.638		OK
S11	15 min Winter	9	45.669	0.939	269.471		Surcharged
S12	15 min Winter	10	45.208	0.665	31.591		Surcharged
S13	15 min Winter	8	47.120	0.083	30.683		OK
S14	15 min Winter	10	45.172	0.899	76.100		Surcharged
S15	15 min Winter	10	45.079	0.873	87.610		Surcharged
S16	15 min Winter	10	44.882	0.783	380.722		Surcharged
S17	15 min Winter	8	45.212	0.055	13.352		OK
S18	30 min Winter	19	44.417	0.447	340.280		OK
S19	15 min Winter	8	45.078	0.113	42.639		OK
S20	15 min Winter	9	44.281	0.329	486.341		OK
S21	15 min Winter	10	43.778	0.268	484.427		OK
S22	15 min Winter	10	43.338	1.338	519.367		Surcharged
S23	15 min Winter	8	43.084	0.081	28.543		OK
S24	15 min Winter	9	42.423	0.523	15.418		Surcharged
S25	15 min Winter	9	42.340	0.656	53.382		Surcharged
S26	15 min Winter	9	42.202	0.583	78.427		Surcharged
S27	15 min Winter	10	41.723	0.359	612.084		OK
S28	15 min Winter	10	40.533	0.363	636.526		OK
S29	15 min Winter	8	39.862	0.146	39.701		OK
S30	15 min Winter	11	39.594	0.430	675.329		OK
S31	15 min Winter	11	39.053	0.896	682.393		Surcharged
S32	30 min Summer	19	38.413	1.053	657.296		Surcharged
S34	30 min Summer	19	37.393	1.593	659.153		Surcharged
S35	480 min Winter	471	37.281	1.481	6.797		Surcharged
S36	480 min Winter	472	37.290	1.570	7.724		Surcharged
S37	30 min Summer	16	35.614	0.044	6.962		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	8	S1	S2	0.172	1.682	70.228	1.103	OK
1.001	15 min Winter	9	S2	S6	0.151	2.112	73.154	0.291	OK
2.000	15 min Winter	8	S3	S4	0.143	1.947	51.938	0.743	OK
2.001	15 min Winter	8	S4	S5	0.095	3.045	58.485	0.230	OK
2.002	15 min Winter	9	S5	S6	0.143	1.818	58.304	0.210	OK
1.002	15 min Winter	9	S6	S11	0.247	2.815	172.556	0.710	OK
3.000	15 min Winter	9	S7	S9	0.170	0.722	21.798	0.420	OK
4.000	15 min Winter	8	S8	S9	0.104	1.967	16.148	0.308	OK
3.001	15 min Winter	9	S9	S10	0.167	1.996	61.007	1.175	OK
3.002	15 min Winter	9	S10	S11	0.167	2.568	64.107	0.461	OK
1.003	15 min Winter	9	S11	S16	0.300	3.645	257.685	1.145	Surcharged
5.000	15 min Winter	9	S12	S14	0.300	0.614	33.535	0.383	Surcharged
6.000	15 min Winter	8	S13	S14	0.116	2.614	30.490	0.591	OK
5.001	15 min Winter	10	S14	S15	0.300	1.093	77.240	1.213	Surcharged
5.002	15 min Winter	11	S15	S16	0.300	1.279	90.425	1.420	Surcharged
1.004	30 min Winter	19	S16	S18	0.448	2.099	330.948	1.783	OK
7.000	30 min Summer	16	S17	S18	0.096	1.397	12.582	0.127	OK
1.005	15 min Winter	10	S18	S20	0.380	3.074	438.828	2.364	OK
8.000	15 min Winter	8	S19	S20	0.113	2.113	42.068	0.507	OK
1.006	15 min Winter	10	S20	S21	0.296	4.805	491.046	0.883	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.007	15 min Winter	10	S21	S22	0.359	3.674	471.844	0.444	OK
1.008	15 min Winter	10	S22	S27	0.405	3.453	520.286	1.611	OK
9.000	15 min Winter	8	S23	S25	0.116	2.085	28.318	0.570	OK
10.000	15 min Winter	10	S24	S25	0.150	0.896	14.539	0.820	Surcharged
9.001	15 min Winter	9	S25	S26	0.225	1.289	51.258	1.489	OK
9.002	15 min Winter	10	S26	S27	0.219	1.931	76.133	2.211	OK
1.009	15 min Winter	10	S27	S28	0.361	4.471	611.225	1.011	OK
1.010	15 min Winter	11	S28	S30	0.392	4.809	636.125	1.022	OK
11.000	15 min Winter	10	S29	S30	0.177	1.413	38.491	0.763	OK
1.011	15 min Winter	11	S30	S31	0.440	5.683	692.430	0.870	OK
1.012	30 min Summer	18	S31	S32	0.450	5.018	672.596	0.922	OK
1.013	15 min Winter	11	S32	S34	0.450	4.277	680.235	0.866	OK
1.014	15 min Winter	12	S34	S35	0.450	4.573	681.023	37.181	OK
1.015	30 min Winter	17	S35	S36	0.450	0.584	87.084	0.270	OK
1.016	30 min Summer	16	S36	S37	0.044	1.592	6.962	0.191	OK

Return Period Yrs: 100.0

Climate Change %: 45

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	15 min Winter	10	47.725	0.365	72.627		Surcharged
S2	15 min Winter	10	47.537	0.335	75.501		Surcharged
S3	15 min Winter	8	48.666	0.176	69.147		OK
S4	15 min Winter	8	47.832	0.112	76.384		OK
S5	15 min Winter	10	47.507	0.147	64.572		OK
S6	15 min Winter	10	47.507	0.637	185.824		Surcharged
S7	15 min Winter	9	47.329	0.377	26.954		Surcharged
S8	15 min Winter	8	48.244	0.066	21.191		OK
S9	15 min Winter	9	47.286	0.508	79.194		Surcharged
S10	15 min Winter	10	46.769	0.247	77.641		Surcharged
S11	15 min Winter	11	46.314	1.584	281.636		Surcharged
S12	15 min Winter	11	45.690	1.147	31.759		Surcharged
S13	15 min Winter	9	47.143	0.105	37.599		OK
S14	15 min Winter	11	45.655	1.381	78.440		Surcharged
S15	15 min Winter	11	45.553	1.348	92.127		Surcharged
S16	15 min Winter	11	45.341	1.242	414.730		Surcharged
S17	15 min Winter	8	45.220	0.063	17.434		OK
S18	15 min Winter	11	44.751	0.781	452.250		Surcharged
S19	15 min Winter	8	45.098	0.133	55.675		OK
S20	15 min Winter	11	44.651	0.699	506.269		Surcharged
S21	15 min Winter	11	44.313	0.803	505.877		Surcharged
S22	15 min Winter	11	43.996	1.996	552.446		Surcharged
S23	15 min Winter	10	43.268	0.265	28.988		Surcharged
S24	15 min Winter	11	42.970	1.070	12.833		Surcharged
S25	15 min Winter	11	42.889	1.205	50.109		Surcharged
S26	15 min Winter	11	42.755	1.136	73.646		Surcharged
S27	30 min Summer	19	42.314	0.950	628.459		Surcharged
S28	30 min Summer	19	41.127	0.957	646.652		Surcharged
S29	30 min Summer	18	40.241	0.525	36.026		Surcharged
S30	30 min Summer	19	40.125	0.961	704.281		Surcharged
S31	30 min Summer	20	39.465	1.309	695.164		Surcharged
S32	30 min Winter	22	38.801	1.441	670.029		Surcharged
S34	30 min Winter	23	37.757	1.957	656.471		Flood Risk
S35	960 min Winter	924	37.643	1.843	7.364		Flood Risk
S36	960 min Winter	919	37.653	1.932	9.770		Flood Risk
S37	960 min Winter	918	35.616	0.046	7.371		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	10	S1	S2	0.300	1.679	88.908	1.396	Surcharged
1.001	15 min Winter	10	S2	S6	0.300	2.082	84.426	0.335	Surcharged
2.000	15 min Winter	8	S3	S4	0.176	2.038	67.665	0.968	OK
2.001	15 min Winter	10	S4	S5	0.125	3.280	76.234	0.300	OK
2.002	15 min Winter	10	S5	S6	0.224	1.811	76.026	0.274	OK
1.002	30 min Summer	16	S6	S11	0.300	2.993	204.415	0.841	Surcharged
3.000	15 min Winter	9	S7	S9	0.225	0.726	26.028	0.501	OK
4.000	15 min Winter	8	S8	S9	0.108	1.887	21.092	0.403	OK
3.001	15 min Winter	10	S9	S10	0.225	2.066	77.674	1.496	OK
3.002	15 min Winter	10	S10	S11	0.225	2.632	79.049	0.569	OK
1.003	15 min Winter	9	S11	S16	0.300	4.177	295.276	1.312	Surcharged
5.000	15 min Winter	9	S12	S14	0.300	0.625	40.092	0.458	Surcharged
6.000	15 min Winter	9	S13	S14	0.127	2.525	39.292	0.762	OK
5.001	15 min Winter	9	S14	S15	0.300	1.295	91.568	1.438	Surcharged
5.002	15 min Winter	14	S15	S16	0.300	1.574	111.228	1.747	Surcharged
1.004	15 min Winter	9	S16	S18	0.450	2.669	424.497	2.287	OK
7.000	15 min Winter	9	S17	S18	0.143	1.406	17.296	0.174	OK
1.005	30 min Summer	17	S18	S20	0.450	3.151	468.627	2.525	OK
8.000	15 min Winter	9	S19	S20	0.177	2.251	54.934	0.662	OK
1.006	30 min Summer	17	S20	S21	0.450	4.796	544.717	0.979	OK

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.007	15 min Winter	9	S21	S22	0.450	3.796	543.119	0.511	OK
1.008	30 min Summer	17	S22	S27	0.450	3.632	572.688	1.773	OK
9.000	30 min Summer	17	S23	S25	0.150	2.123	34.347	0.691	Surcharged
10.000	15 min Winter	9	S24	S25	0.150	0.911	16.103	0.908	Surcharged
9.001	30 min Summer	16	S25	S26	0.225	1.486	59.085	1.716	OK
9.002	30 min Summer	16	S26	S27	0.225	2.219	88.243	2.563	OK
1.009	30 min Summer	17	S27	S28	0.450	4.365	649.521	1.075	OK
1.010	15 min Winter	9	S28	S30	0.450	4.658	667.517	1.072	OK
11.000	15 min Winter	9	S29	S30	0.225	1.439	49.195	0.976	OK
1.011	15 min Winter	10	S30	S31	0.450	5.720	716.988	0.900	OK
1.012	15 min Winter	10	S31	S32	0.450	4.963	716.740	0.983	OK
1.013	15 min Winter	11	S32	S34	0.450	4.470	710.889	0.905	OK
1.014	15 min Winter	11	S34	S35	0.450	4.799	705.253	38.504	OK
1.015	60 min Winter	26	S35	S36	0.450	0.675	70.479	0.218	OK
1.016	960 min Winter	925	S36	S37	0.046	1.619	7.371	0.203	OK

Appendix L

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Residential roofing				
Pollution Hazard Level	Very low				
Pollution Hazard Indices					
TSS	0.2				
Metals	0.2				
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices					
TSS	0.5	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Metals	0.5				
Hydrocarbons	0.6				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Residential parking				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices		Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
TSS	0.7				
Metals	0.6				
Hydrocarbons	0.7				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)				
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.5				
Metals	0.4				
Hydrocarbons	0.4				
SuDS components proposed					
Component 1	Detention basin	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Groundwater protection type	None				
Groundwater protection Pollution Mitigation Indices					
TSS	0				
Metals	0				
Hydrocarbons	0				
Combined Pollution Mitigation Indices		Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
TSS	0.5				
Metals	0.5				
Hydrocarbons	0.6				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				