



Flood Risk Assessment & Drainage Strategy

Hayes Lane, Slinfold

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Charles & Associates

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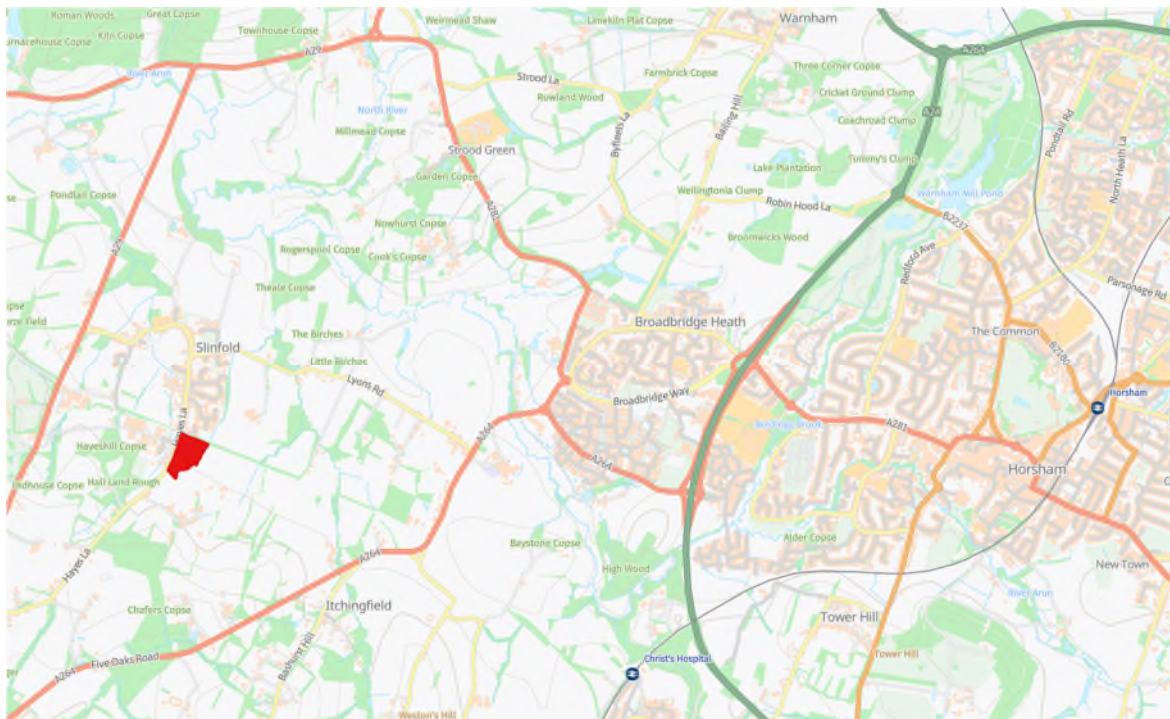
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1 Introduction

1.1 Introduction

- 1.1.1 This Flood Risk Assessment and Drainage Strategy (FRA) has been prepared by Charles and Associates (C&A) on behalf of TIL Co in support of a planning application at Hayes Lane, Slinfold. The development proposal comprises of the erection of 38no. dwellings, (including 13no. on-site affordable housing units), together with access from Hayes Lane, vehicle and cycle parking, landscaping, open space and play provision, sustainable drainage, re-alignment of Public Right of Way No.3782, and land for a scout hut and associated parking. (See **Appendix D** for Site Layout).
- 1.1.2 The site is located as shown in **Figure 1.1** below. The local planning authority is Horsham District Council (HDC) and the Lead Local Flood Authority (LLFA) is West Sussex County Council (WSCC). The site's National Grid Reference is TQ 11801 30715.

Figure 1.1: Site Location



- 1.1.3 This site is part of an allocation for housing under Policy 7 – Slinfold Neighbourhood Plan 2014-31.

1.2 Purpose

- 1.2.1 This FRA has been prepared to demonstrate that flooding and drainage issues will not constrain the development of the site. It also confirms that the site will conform to the recently published national standards for sustainable drainage (SuDS) and the local requirements set out by WSCC as LLFA and also HDC.
- 1.2.2 In terms of surface water drainage and potential for flooding, it examines the sites suitability in planning policy terms and physical characteristics to allow suggested solutions to deal with drainage in the developed state, thus ensuring the site is drained in a sustainable manner while not affecting the surrounding area. The Sustainable Drainage Systems (SuDS scheme) has been designed to conform to non-statutory Technical Guidance for a detailed planning application and the CIRIA SuDS Manual
- 1.2.3 The provisions of the National Planning Policy Framework (NPPF, revised in Dec 2024) have been considered in preparing the Flood Risk Assessment, together with The Flood & Water Management Act 2010. In addition, attention has also been paid to the Planning Practice Guidance (PPG) and policies within the Local Plan. This FRA also follows the guidance provided by West Sussex County Council (WSCC) , as the lead local flood authority (LLFA) and Horsham District Council (HDC) as the local planning authority, on the preparation of the surface water drainage strategy.

1.3 Report Limitations

- 1.3.1 The findings, recommendations and conclusions of this report are based on information obtained from a variety of external sources which are understood to be reputable. However, C&A Consulting Engineers cannot guarantee the authenticity or reliability of any data and/or records provided by third parties.

1.4 Report Updates

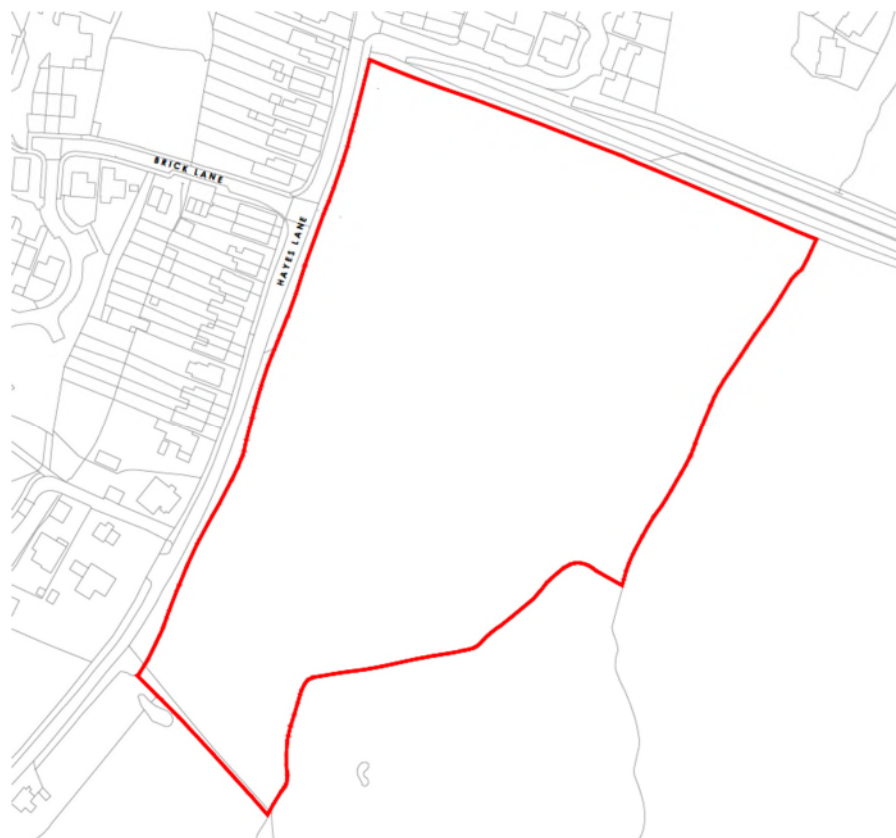
- 1.4.1 This report has been reviewed and approved by the Lead Local Flood Authority (LLFA) subject to various condition see **Appendix G**
- 1.4.2 Since original submission (Rev -/Rev A) this report has been updated following various consultation responses; This includes a permanent water level added within the proposed SuDS Basin and an allocated area for the provision of a scout hut, the FRA has been reviewed and updated to suit.

2 Existing Site

2.1 Site Location

- 2.1.1 The Site is located to the South of Slinfold and is within the catchment of Horsham District Council. The Site is bound by fields to the East and South. To the North it is bound by Downs Link Public Right of Way (PROW) with residential developments beyond. To the west it is bound by Hayes Lane along with residential properties.
- 2.1.2 The Site within the Red line boundary is 3.9ha. The Site is currently greenfield enclosed by dense hedgerow surrounding the Site. Refer to **Figure 2.1** below for a Site Location Plan.

Figure 2.1: Site Location



2.2 Topography and Existing Drainage

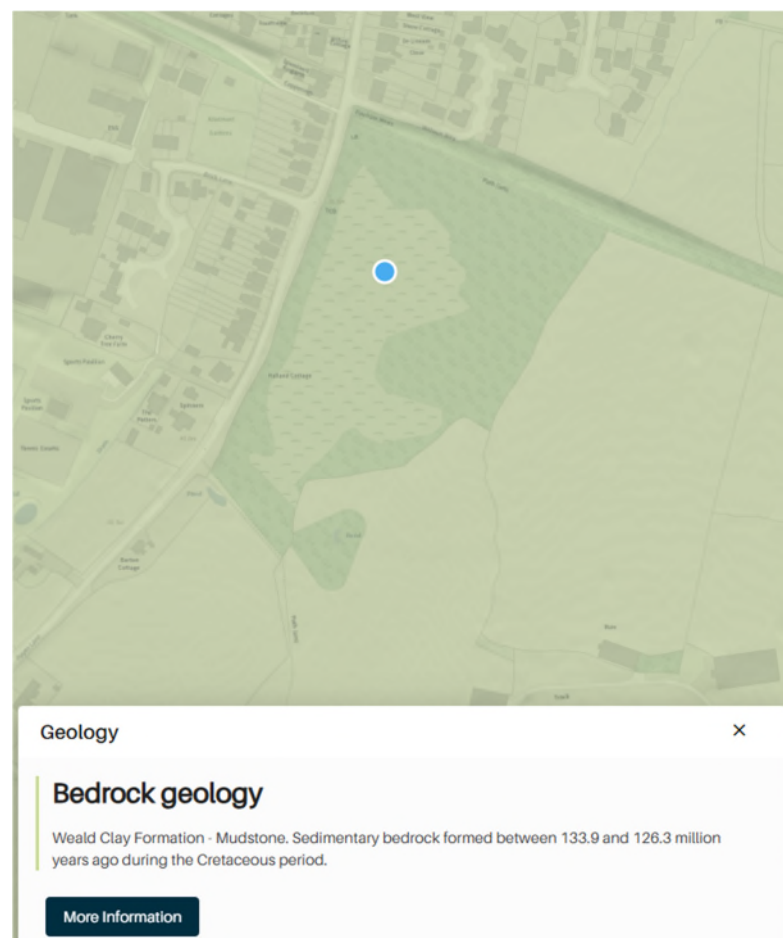
- 2.2.1 The topographic survey (**See Appendix B**) shows that the site slopes generally from south west to north east.
- 2.2.2 The highest point of the site is approximately 41.62m AOD falling to approximately 35.17m in the north east corner of the eastern area of the site.

- 2.2.3 The site area is currently greenfield, having 'natural' drainage. There are no surface water sewers on or close to the site, the closest watercourse being a ditch that runs south to north to the east of the site. The ditch is culverted (675Ø) under the "Downs Link" PROW and eventually discharges to the River Arun approximately 1.44Km north of the site.
- 2.2.4 There are no existing foul water sewers located within the proposed site boundary. The nearest foul sewer is located in Hayes Lane towards to the east of the site. (See **Appendix C** for Southern water Sewer Records).

2.3 Geology

- 2.3.1 A review of the British Geological Society's records confirms that the site is predominantly underlain by the Weald Clay formation, There is no record of superficial deposits, see Figure 2.2.

Figure 2.2: Bedrock Geology

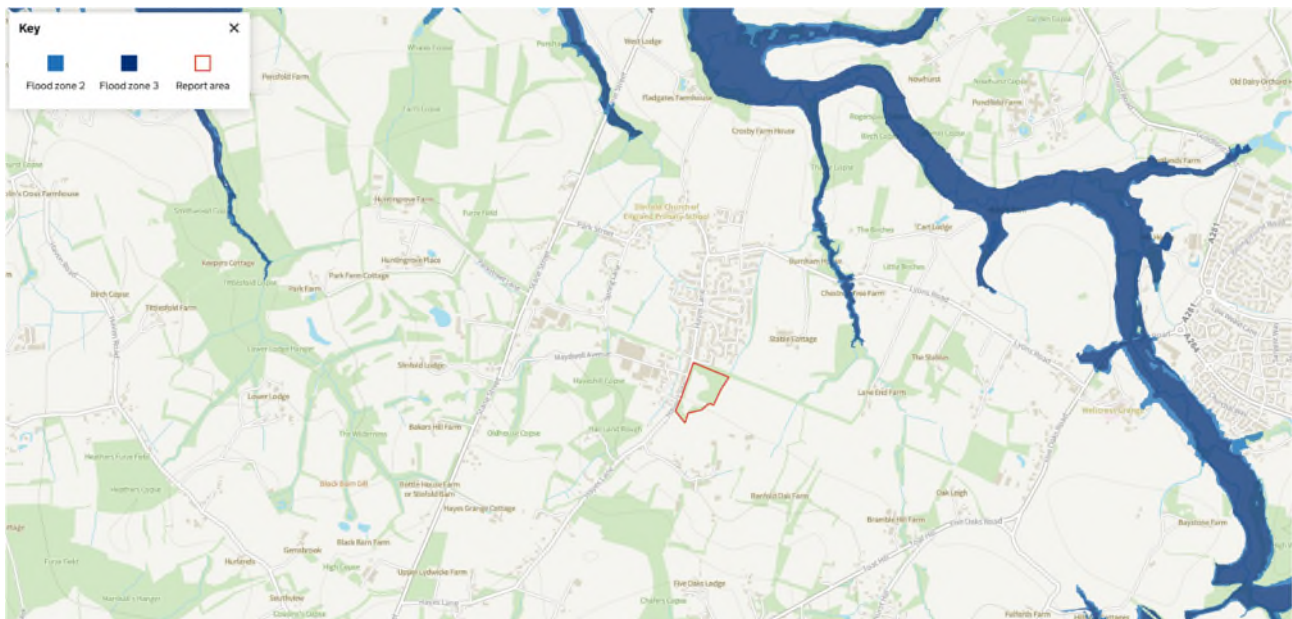


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2.4 Enviroment Agency Flood Data

2.4.1 The Enviroment Agency (EA) flood mapping website provides flood risk information in respect of River and Sea and Surface Water flooding to inform FRAs for planning applications¹. In the case of this site the potential flood risks associated with each of these flood sources is shown on Figures 2.3 and 2.4 below.

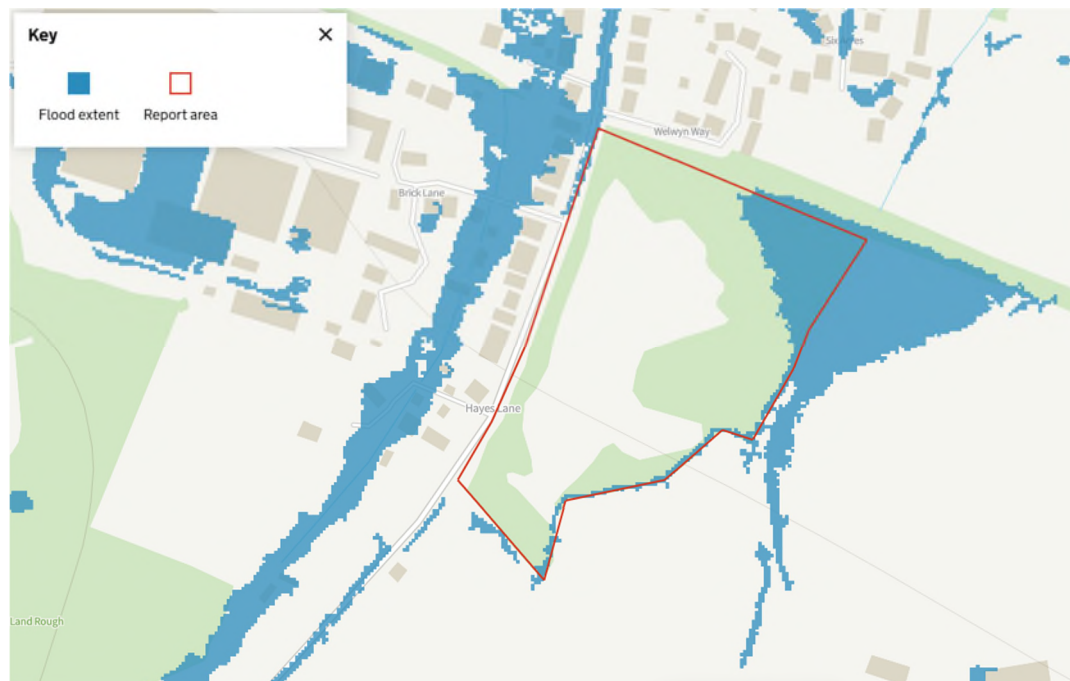
Figure 2.3: Flood Zone Map



2.4.2 This map shows the site is within flood zone 1 which is the lowest flood risk category for flooding from rivers and sea

¹ EA mapping reproduced in this report as public sector information licensed under the Open Government Licence v3.0

Figure 2.4: Surface Water Flooding



- 2.4.3 This map shows that the majority of the site is at very low risk of surface water flooding.
- 2.4.4 An area of surface water flooding (1 in 100 annual exceedance probability) is shown in the northeast of the site. This mapped flood extent represents surface water runoff that is unable to pass through the culvert beneath the PROW. It is assumed that this is either due to flows exceeding the capacity of the 675mm diameter culvert or to represent a blocked or partially blocked culverted pipe. The extent of the modelled surface water flooding is therefore considered to be robust for the purposes of this FRA. The flood extents have been reviewed and updated to suit onsite topographical survey which have been shown on the drainage strategy plan **Appendix F**, this area is within the open space of the proposals and will not have any built development within the extents.
- 2.4.5 The EA website also confirms that the site is at low risk of flooding from either groundwater or artificial sources such as reservoirs. WSCC map confirms low risk of groundwater flooding.

Figure 2.5: Reservoirs Map

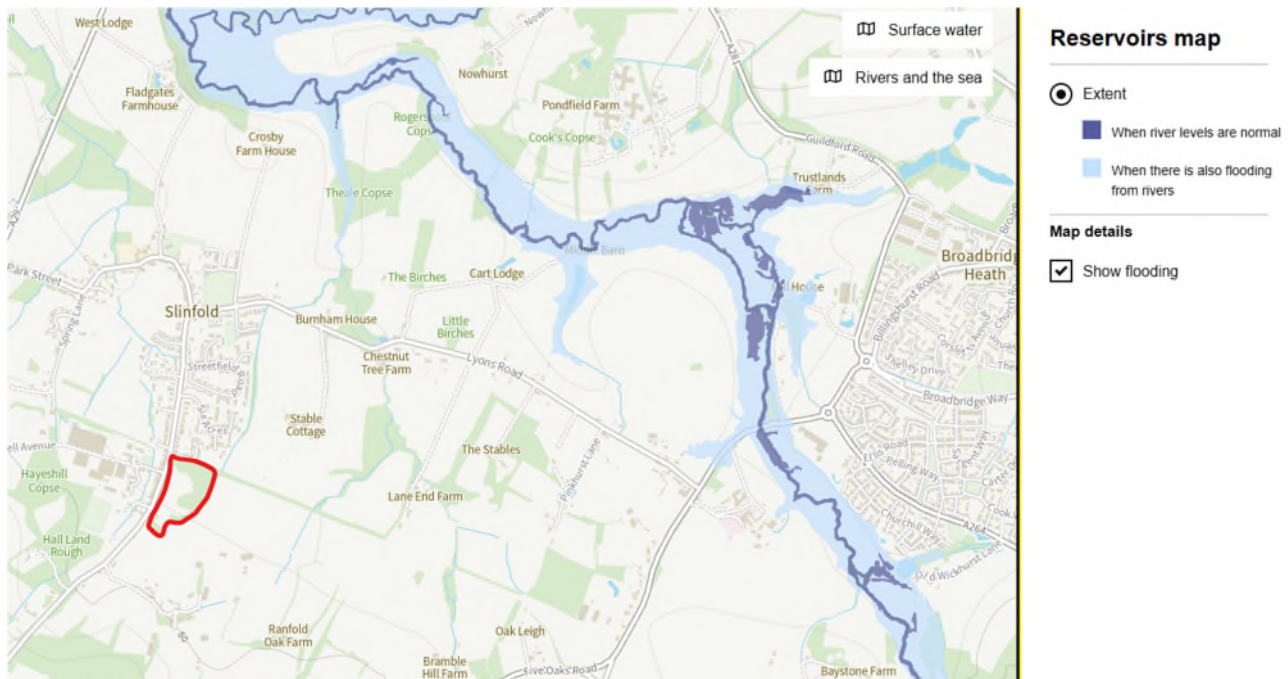
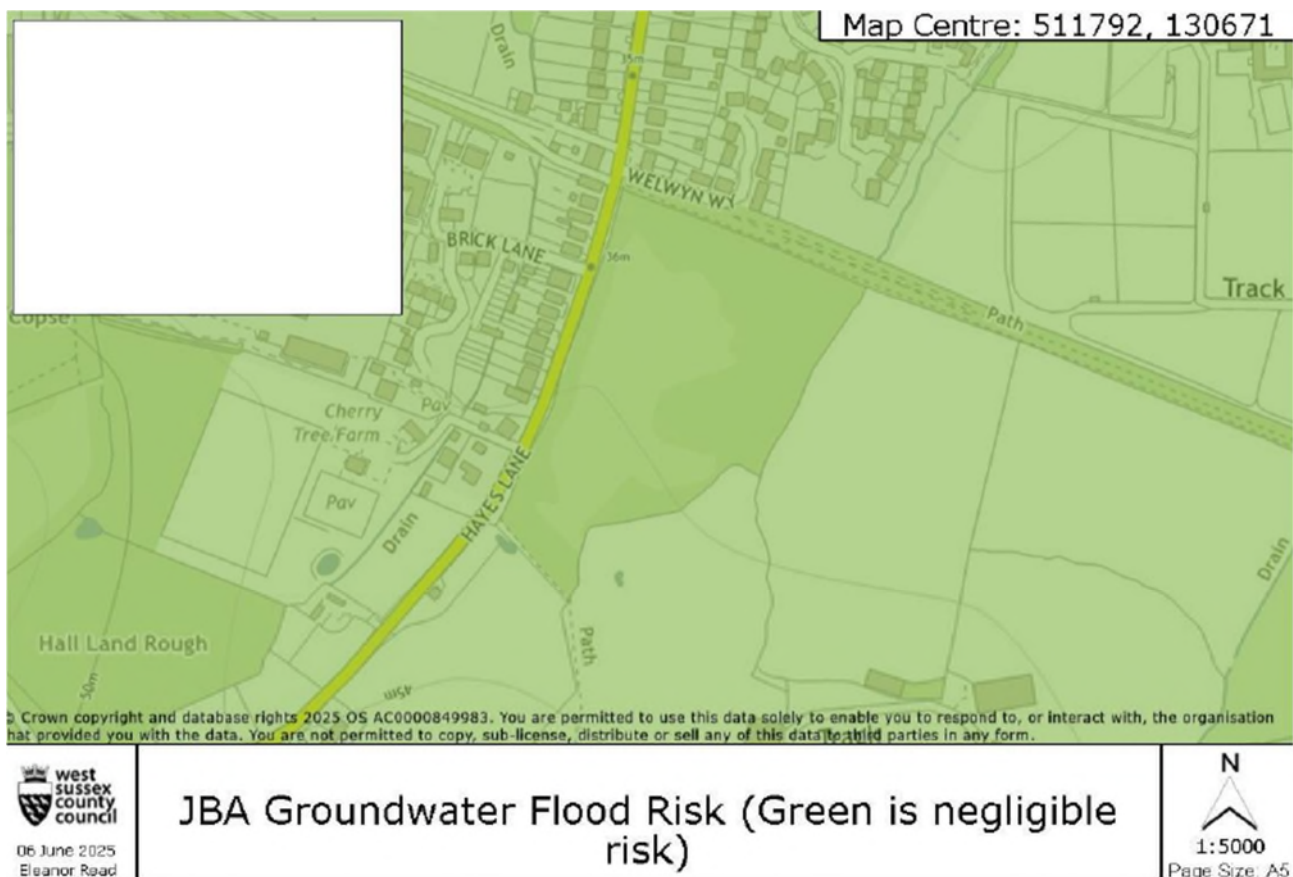


Figure 2.6: Groundwater Flood Risk



3 Development Proposals

- 3.1.1 The detailed planning application is for the construction of up to 38 residential units including affordable dwellings with associated access, parking and landscaping areas at land east of Hayes Lane south of Slinfold in Horsham. A copy of the illustrative masterplan is enclosed at **Appendix D.**
- 3.1.2 The proposed development will be accessed via a simple priority junction off Hayes Lane.
- 3.1.3 The proposed levels of the dwellings roads and parking areas will be designed to generally match the existing ground levels.
- 3.1.4 The foul and surface water arrangements for the development are discussed in Section 7.0 of this report.

4 Planning Policy

4.1 National Planning Policy

4.1.1 NPPF sets out a robust approach to the Sequential Test and is intended to provide a rigorous understanding of flood risk. Its aim is to steer new development to areas at the lowest probability of flooding (i.e. Flood Zone 1 and outside areas at risk from other forms of flooding).

4.1.2 The information related to Sequential test is included within section 172 of the National Planning Policy Framework (NPPF, revised in Dec 2024). This states;

All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

a) applying the sequential test and then, if necessary, the exception test as set out below;

b) safeguarding land from development that is required, or likely to be required, for current or future flood management;

c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

4.1.3 In addition, section 175 of the National Planning Policy Framework (NPPF, revised in Dec 2024) states that;

The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).

- 4.1.4 The NPPF is supported by Planning Practice Guidance (PPG), the latest PPG flood risk update being published in February 2024
- 4.1.5 This guidance provides further information on the requirements for flood risk assessments including sustainable drainage systems (SuDS) which should be included in FRAs. The PPG advises on flood risk vulnerability, flood zone compatibility and operation and maintenance of SuDS systems.

Sequential and Exception Tests

- 4.1.6 In relation to fluvial flood, the proposed development is located in Flood Zone 1 (little to no risk of flooding).
- 4.1.7 The proposed development is allocated in the Slinfold Neighbourhood Plan (2018) which is a 'made' plan and as such forms part of the adopted Development Plan for Horsham, therefore is deemed to have passed the Sequential Test and application of the Exception Test is not necessary.
- 4.1.8 The proposed development is a residential scheme, and therefore, can be classified by NPPF as 'More Vulnerable' to risk of flooding. It is consistent with the appropriate uses for Flood Zone 1, as set out in Table 3 of Planning Practice Guidance.

Climate Change

- 4.1.9 Based on the most recent advice on climate change published by the Environment Agency (EA) peak rainfall intensity, sea level, peak river flow, offshore wind speed and extreme wave heights are all expected to increase in the future. It is recommended that considerations for future climate change are included in Flood Risk Assessments for Proposed Developments.

4.2 Regional Policy

- 4.2.1 As the Lead Local Flood Authority (LLFA), WSCC produced a Drainage and Planning Policy – West Sussex LLFA Policy for the Management of Surface Water in November 2018. The primary objective of this document is to contribute to the achievement of sustainable development and deliver the requirements of the NPPF and specific policies set out by the relevant Local Planning Authority. Key policies included within WSCC policy statement are summarised below.
- 4.2.2 *SuDS Policy 1: Follow the drainage hierarchy*
- 1. Surface runoff not collected for use must be discharged according to the following discharge hierarchy:*
- to ground,
 - to a surface water body,

- to a surface water sewer, highway drain, or another drainage system, or
- to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewerage undertaker.

2. The selection of a discharge point should be clearly demonstrated and evidenced.

4.2.3 SuDS Policy 2: Manage Flood Risk Through Design

1. The drainage scheme proposed is to:

- a. protect people and property on the development site from flooding; and,
- b. avoid creating any additional flood risk outside of the development in any part of the catchment, either upstream or downstream.

2. Any drainage scheme must manage all sources of surface water, including exceedance flows and surface flows from offsite, provide for emergency ingress and egress and ensure adequate connectivity.

3. For large sites where development is to be phased, there will need to be a strategic site surface water management system that allows different parts of the site to be developed at different times while ensuring that each of the design criteria can be met.

4.2.4 SuDS Policy 3: Mimic Natural Flows and Drainage Flow Paths

1. Drainage schemes should be designed to match greenfield discharge rates and follow natural drainage routes as far as possible; pumps should therefore not form part of drainage schemes.

2. Greenfield runoff should be calculated from FEH or a similar approved method. SAAR and any other rainfall data used in run-off storage calculations should be based upon FEH rainfall values.

4.2.5 SuDS Policy 4: Seek to Reduce Existing Flood Risk

1. New development should be designed to take full account of any existing flood risk, irrespective of the source of flooding.

2. Where a site or its immediate surroundings have been identified to be at flood risk, all opportunities to reduce the identified risk should be investigated at an early stage and subsequently incorporated at the detailed design stage.

4.2.6 SuDS Policy 5: Maximise Resilience

1. The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area over the design life of the development. Appropriate allowances should be applied in each case.

2. A sustainable drainage approach which considers control of surface runoff at the surface and at source is preferred and should be explored prior to other design solutions.

3. Culverting an existing watercourse should only be considered if there is no feasible alternative.

4.2.7 SuDS Policy 6: Design to be Maintainable

1. No building is to be occupied until a Verification Report pertaining to the surface water drainage system, carried out by a Chartered Engineer, has been submitted to the Local Planning Authority which demonstrates the suitable operation of the drainage system such that flood risk is appropriately managed, as approved by the Lead Local Flood Authority. The Report shall contain information and evidence (including photographs) of earthworks; details and locations of inlets, outlets and control structures; extent of planting; details of materials utilised in construction including subsoil, topsoil, aggregate and membrane liners; full as built drawings; and topographical survey of 'as constructed' features.

2. The Verification Report should also include an indication of the adopting or maintaining authority or organisation and may require inclusion within a register of drainage features.

4.2.8 SuDS Policy 7: Safeguard Water Quality

1. When designing a surface water management scheme, full consideration should be given to the system's capacity to remove pollutants and to the cleanliness of the water being discharged from the site, irrespective of the receiving system.

2. Interception of small rainfall events should be incorporated into the design of the drainage system.

4.2.9 SuDS Policy 8: Design for Amenity and Multi-Functionality

Drainage design should from the outset consider opportunities for inclusion of amenity and biodiversity objectives and thus provide multi-functional use of open space with appropriate design for drainage measures within the public realm.

4.2.10 SuDS Policy 9: Enhance Biodiversity

Drainage design should from the outset consider opportunities for biodiversity enhancement, through optimising the scope for surface systems, consideration of connectivity to adjacent water bodies or natural habitats, and appropriate planting specification.

4.2.11 SuDS Policy 10: Link to Wider Landscape Objectives

Drainage design should from the outset consider opportunities to contribute to the wider landscape and ensure proposals are coherent with the surrounding landscape character area.

4.3 Local Plan Policy

Horsham District Council Local Plan

4.3.1 The Horsham District Local Plan “(Horsham District Planning Framework) was adopted in November 2015 and sets out the development strategy for Horsham until 2031. The key policy with regard to flooding and drainage is Policy 38, summarised below.

4.3.2 Strategic Policy 38: 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.*

Horsham District Council Surface Water Drainage Statement

- 4.3.3 In order to provide the required information on surface water drainage from the proposed development, the Surface Water Drainage Statement pro-forma must be completed in full and submitted with any planning application which seeks permission for major development.
- 4.3.4 Surface Water Drainage Statement form included in **Appendix J**

Horsham District Strategic Flood Risk Assessment

- 4.3.5 A Strategic Flood Risk Assessment (SFRA) for Horsham District Council was published in April 2010 . The primary objective of the SFRA is to identify the areas within a development plan area that are at risk from all forms of flooding now and in the future taking into account the effects of climate change. This enables the Local Planning Authority (LPA) to select and allocate sustainable development away from flood risk areas.
- 4.3.6 With regards to future development within HDC, flood risk management guidance and FRA requirements for developers are included within Chapter 6.2 of the SFRA and state;
- 1. Flood Risk Assessments (FRAs) should be undertaken for all developments within Flood Zones 2 and 3 and sites with identified flooding sources (according to PPS25 Annex E) to assess the risk of flooding to the development and identify options to mitigate the flood risk to the development, site users and surrounding area;*
 - 2. FRAs are required for all major developments in Flood Zone 1 (according to PPS25 Annex E). These are residential developments consisting of sites greater than 0.5 ha or greater than 10 dwellings and commercial developments that are greater than 1 ha or have a floor area greater than 1000 m² .*
 - 3. Flood Risk to development should be assessed for all forms of flooding;*
 - 4. Surface water flooding should be investigated in detail as part of site specific FRAs for future developments and early liaison with the Environment Agency and Horsham DC is recommended for appropriate management techniques.*
 - 5. Groundwater flooding should be investigated in more detail as part of site specific FRAs for developments located to the south of the District where a potential for groundwater flooding exists (see Level 1 GIS layers and mapping) or where a site is located within a defined groundwater emergence zone.*

6. Where floodplain storage is removed, the development should provide compensatory storage on a level for level and volume for volume basis to ensure that there is no loss in flood storage capacity;

7. When re-developing existing buildings in flood risk areas, the use of flood resilient measures should be promoted at the individual property level.

4.3.7 Sustainable Drainage Systems & Surface Water Management Policy:

1. Sustainable Drainage Systems should be included in new developments unless it is demonstrably not possible to manage surface water using these techniques;

2. PPS25 requires the use of SuDS as an opportunity of managing flood risk, improving water quality and increasing amenity and biodiversity;

3. FRAs are required for all major developments in Flood Zone 1 (according to PPS25 Annex E). These are residential developments consisting of sites greater than 0.5 ha or greater than 10 dwellings and commercial developments that are greater than 1 ha or have a floor area greater than 1000 m² ;

4. Runoff rates from new developments on Greenfield sites should not exceed Greenfield runoff rates pre-development and should allow for climate change;

5. Runoff rates from previously developed developable land should not exceed existing rates of runoff and should seek betterment. In addition, an allowance should be made for climate change;

6. Runoff and/or discharge rates should be restricted to Greenfield runoff rates in areas known to have a history of sewer and/or surface water flooding;

7. Potential overland flow paths should be considered to ensure that buildings do not obstruct flows;

8. Where basements are proposed the risk of surface water flooding should be considered, with possible mitigation options including raised thresholds and inclusion of storage for surface water in such developments;

9. Opportunities should be sought to reduce the risk of flooding from the sewer network through consultation with Southern Water to determine key areas for maintenance and flood alleviation schemes;

10. At the site specific FRA level, the suitability of Sustainable Drainage Systems should be investigated for each development. Areas to north of the District (the High and Low Weald areas) may be more suited to attenuation systems;

11. The vulnerability and importance of local ecological resources, such as water quality and biodiversity, should also be considered when determining the suitability of SuDS.

5 Probability of Flooding

5.1 Definition of the Flood Hazard

5.1.1 Flood Zones are defined in Table 1 of the PPG. The Flood Zones refer to the probability of flooding from rivers, the sea and tidal sources and ignore the presence of existing defences, as these can be breached, overtopped and may not be in existence for the lifetime of the development.

5.2 Sources of Flooding

5.2.1 NPPF identifies six potential sources of flooding that require investigation:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal flooding;
- Flooding from land;
- Flooding from groundwater;
- Flooding from sewers;
- Flooding from reservoirs, canals, and other artificial sources.

5.3 Flooding from Rivers or Fluvial Flooding

5.3.1 The closest main river to the site is the River Arun, approximately 1.44km to the north west. During times of severe storm events, water levels within the watercourses can rise to cause fluvial flooding.

5.3.2 Figure 2.3 shows that the site is in Flood Zone 1 which is defined as land having less than 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year. This is considered to be the lowest flood risk and therefore the site is at little or no risk from fluvial flooding and is deemed to be suitable for all forms of development.

5.4 Flooding from Sea or Tidal Flooding

5.4.1 The site is in flood zone 1 and is remote from the coast and at an elevation of between 42.0m AOD and 35.0m AOD and is therefore not at risk from sea or tidal flooding.

5.5 Flooding from Land (Surface Water Flooding)

- 5.5.1 Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. Increased run-off from developed areas consisting of impermeable surfaces can increase overland flows. If the flow paths of these overland flows are not carefully considered during the detail design and planning of the drainage design, flooding from overland flows could occur.
- 5.5.2 Figure 2.4 shows that an area of the Northern part of the proposed development site has been identified as being at high risk of surface water flooding during extreme rainfall events.
- 5.5.3 An area of surface water flooding (1 in 100 annual exceedance probability) is shown in the northeast of the site. This mapped flood extent represents surface water runoff that is unable to pass through the culvert beneath the PROW. It is assumed that this is either due to flows exceeding the capacity of the 675mm diameter culvert or to represent a blocked or partially blocked culverted pipe. The extent of the modelled surface water flooding is therefore considered to be robust for the purposes of this FRA. The flood extents have been reviewed and updated to suit onsite topographical survey which have been shown on the drainage strategy plan **Appendix F**, this area is within the open space of the proposals and will not have any built development within the extents.

5.6 Flooding from Sewers

- 5.6.1 Every drainage system has a design capacity which at some point can be exceeded. Sewer and surface water flooding generally results in localised short-term flooding caused by intense rainfall events which overload the capacity of local sewers or run off adjacent land as sheet flow. Flooding can also occur as a result of blockage, poor maintenance or structural failure.
- 5.6.2 Southern Water are responsible for the managing the sewer network in and around the proposed development area. There are no public sewers located within the proposed development boundary. The site is therefore not considered to be at risk from sewer flooding.

5.7 Flooding from Groundwater

- 5.7.1 Groundwater flooding in general can occur when water levels in the ground rise above surface elevations. Severe storm events could cause groundwater levels to rise above ground level. Underlying geology is the principal factor that effects groundwater flooding. Groundwater flooding most commonly occurs in low lying areas which are underlain by permeable rocks or aquifers.
- 5.7.2 The EA website notes that “flooding from groundwater is unlikely in this area”. This assessment is supported by the low permeability soil (Weald Clay) and topography of the site.

5.8 Flooding from Reservoirs or other artificial sources

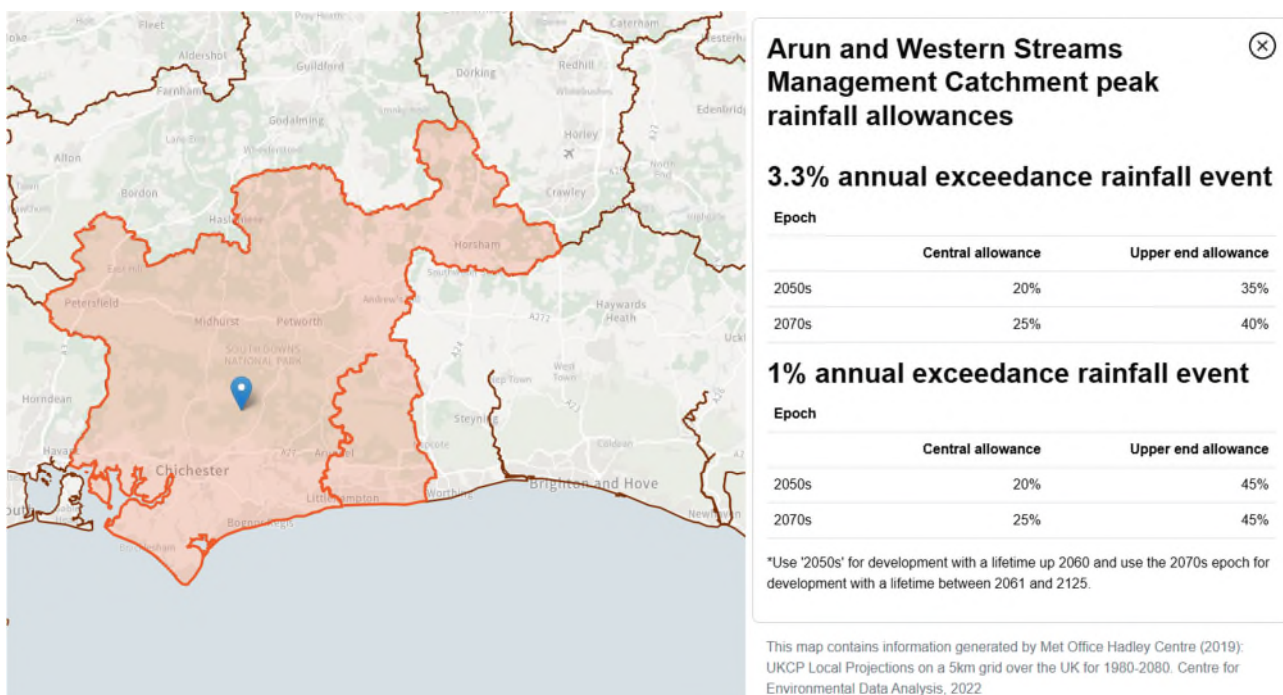
- 5.8.1 There are no artificial sources of water (i.e. reservoirs, dams etc.) or flood defences in the vicinity or upstream of the site. There is therefore no flood risk to the development from these sources.

6 Effect of Climate Change

6.1 Climate Change

- 6.1.1 Based on the most recent advice on climate change reported in PPG, peak rainfall intensity, sea level, peak river flow, offshore wind speed and extreme wave heights are all expected to increase in the future. It is recommended that considerations for future climate change are included in Flood Risk Assessments for proposed developments.
- 6.1.2 In May 2022, the Environment Agency published their latest guidance on how to use climate change allowances in Flood Risk Assessments and Drainage Strategies. The Department for Environment and Rural Affairs has produced a Climate Change Allowance map for the country. The map provides information on the peak rainfall allowance depending on the Management Catchment in which the site is located.
- 6.1.3 Having reviewed the Climate Change Allowance map the site lies within Stour Management Catchment. **Figure 6.1** below summarises climate change allowances within this catchment.

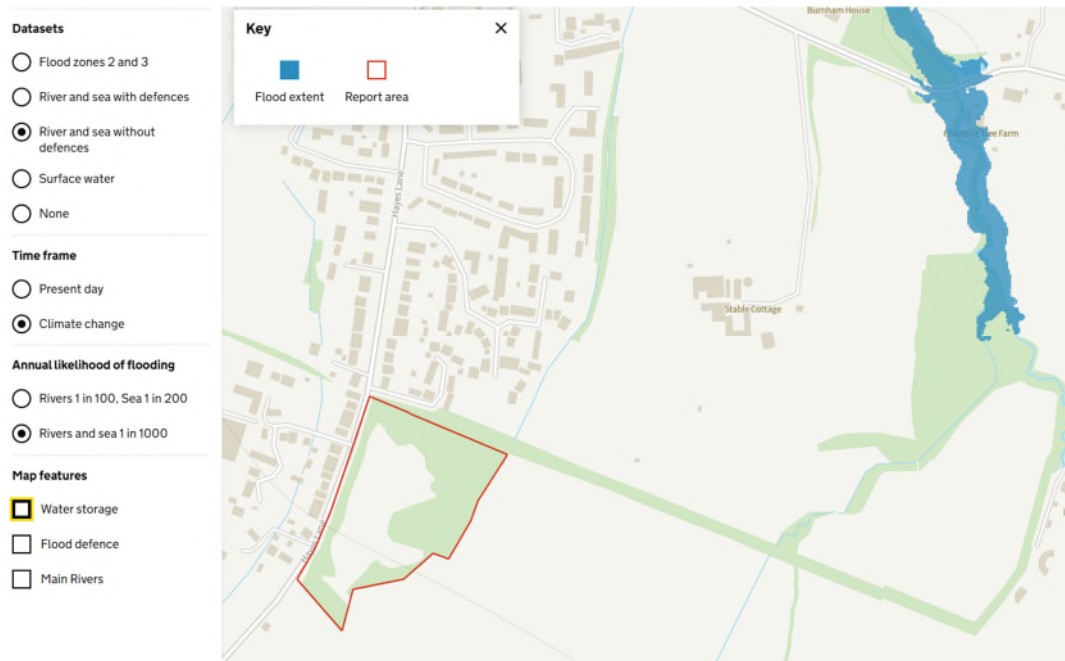
Figure 6.1: Climate Change Allowances



- 6.1.4 The proposed surface water drainage strategy will be designed to cater for the upper allowance for the 2070s epoch, thus providing a suitable surface water drainage solution for the lifetime of the development. All events up to and including the 100 year + 45% climate change event will be catered for within the proposed system. See **Section 7** below for details of the proposed surface water drainage strategy.

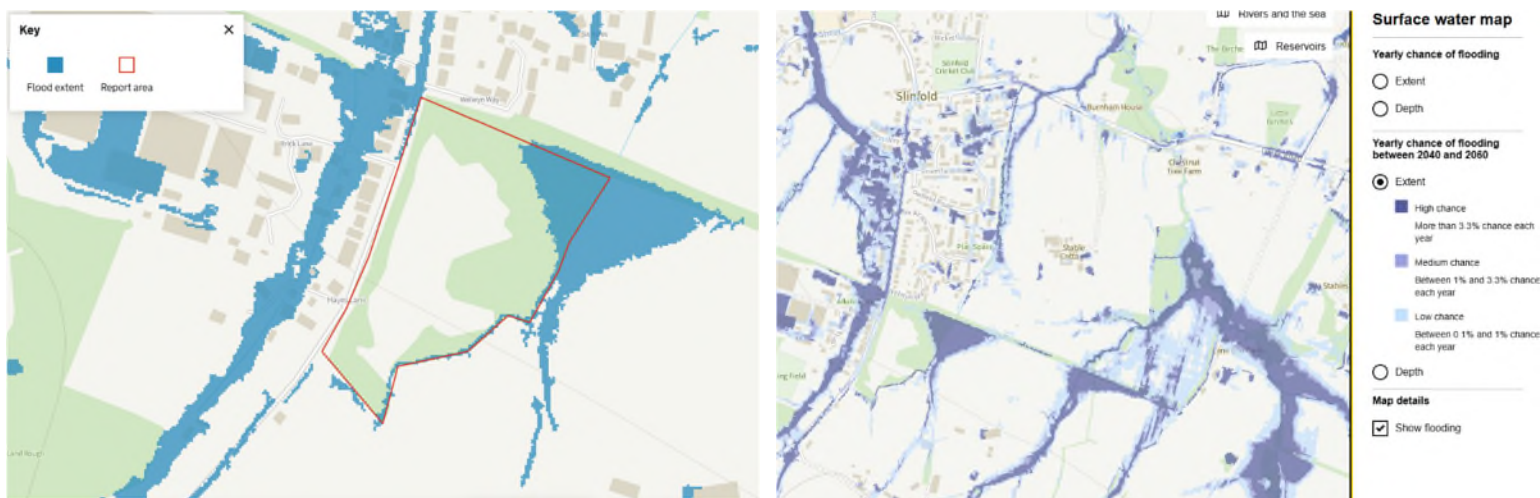
- 6.1.5 When climate change is applied to the current EA flood mapping the Site is shown to not be at a 0.1% (1 in 1000) risk of flooding from rivers for the period 2070 to 2125 and from tidal flooding by the year 2125, see Figure 6.2 below

Figure 6.2: Climate Change Flood Risk from Rivers and Sea

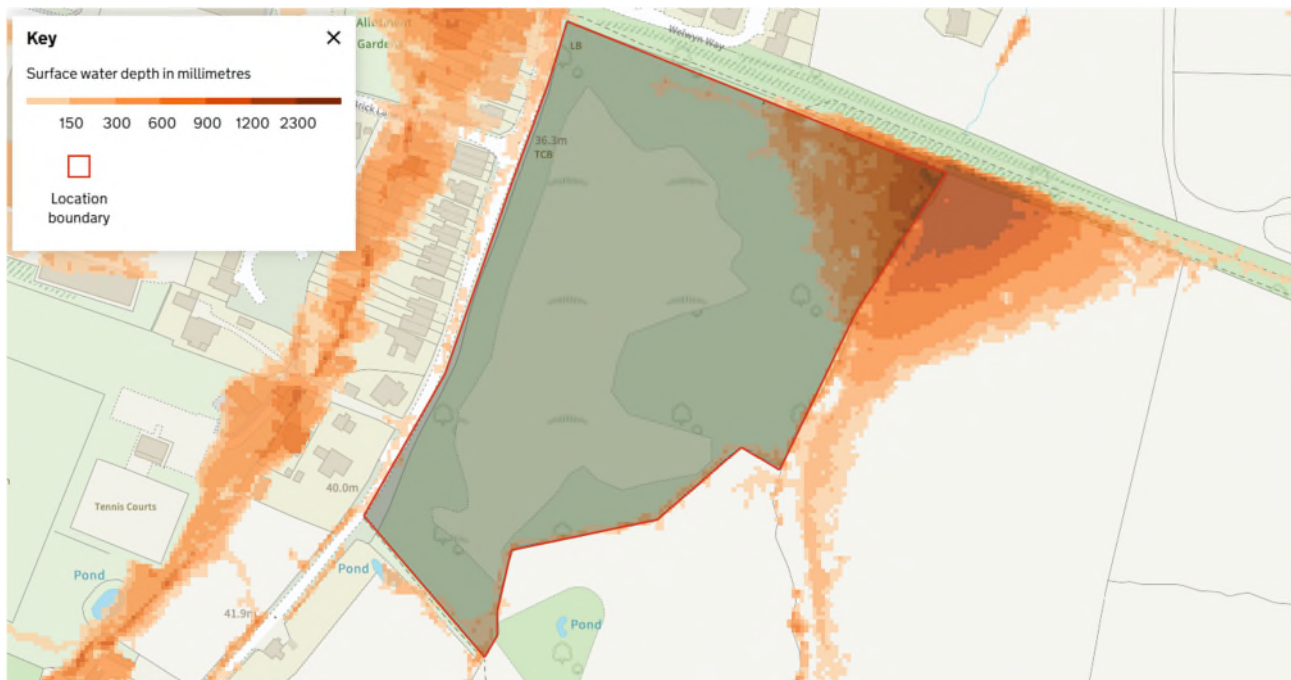


- 6.1.6 A comparison of the surface water flood map for planning and the long term flood risk maps (see Figure 6.3 below) shows that the 1 in 100 climate change surface water flood extent is approximately the same as, or slightly reduced from, the 1 in 100 extent shown on the flood map for planning.

Figure 6.3: Comparison of (1:100 extents vs 1:100 Climate Change mapping)



- 6.1.7 The surface water flood map for planning has since been updated to include climate change extents, the extents have not changed significantly from our previous assessment, the updates to the flooding extents does not change the conclusions of the FRA.

Figure 6.3: Updated 1:100 with Climate Change Flooding extents

7 Surface Water and Foul Drainage Proposals

7.1 Existing Surface Water Run Off

- 7.1.1 The existing site is currently undeveloped and can be considered to exhibit greenfield run-off rates. The development area of the site has a total area of approximately 3.9ha. This has been used to calculate the existing greenfield run off from the site.
- 7.1.2 Greenfield run off rate calculations have been carried out in accordance with FEH methodology, which is a built-in feature of the Site3D software.
- 7.1.3 The greenfield run-off rates for varying return periods for the total site area are shown in Table 7.1 below: Greenfield runoff calculations are included within **Appendix E**

Table 7.1 Existing Greenfield Run-off Rates

Return Period (Years)	Total Calculated Existing Greenfield Site Discharge rate (l/s)
Q_{BAR}	23.01
1 in 1 year	19.56
1 in 30 year	52.93
1 in 100 year	72.41
1 in 200 year	86.07

7.2 Surface Water Drainage Proposals

- 7.2.1 A comprehensive sustainable drainage system will be implemented to prevent runoff from the development increasing flood risk to other areas. This will be fully detailed at the detail drainage design stage of the proposed development, although a preliminary drainage strategy demonstrating that SuDS can be delivered is described below.
- 7.2.2 The proposed development will be designed to current best practice for both piped drainage (Part H of the Building Regulations) and Sustainable Drainage (CIRIA C753 – The SuDS Manual).
- 7.2.3 The Planning Policy Document sets out in SuDS Policy 1, the hierarchy below which should be adopted when selecting surface water discharge options for development run off.
- to ground,
 - to a surface water body,
 - a surface water sewer, highway drain, or another drainage system, or

- to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.

- 7.2.4 The site is underlain by the Weald Clay Formation which is considered unsuitable to support infiltration techniques as a means of disposal of surface water run off.
- 7.2.5 Surface water runoff will therefore be attenuated and discharged to the existing watercourse at the eastern site boundary. Discharge rates will be restricted to suit the area of impermeable development (**Figure 7.3**).

Figure 7.1: Network 1 Discharge Flow Rate

Greenfield Runoff

Site Details

Total Area:

Hydrological region and soil type

Hydrological Region:

Soil Type Index:

SAAR:

Greenfield Runoff Rate

QBar: Calculated:

1 in 1 Year:	3.29/s	Factor:	0.85
1 in 30 Year:	8.89/s	Factor:	2.30
1 in 100 Year:	12.33/s	Factor:	3.19
1 in 200 Year:	14.46/s	Factor:	3.74

Figure 7.2: Network 2 Discharge Flow Rate

Greenfield Runoff

Site Details

Total Area:

Hydrological region and soil type

Hydrological Region:

Soil Type Index:

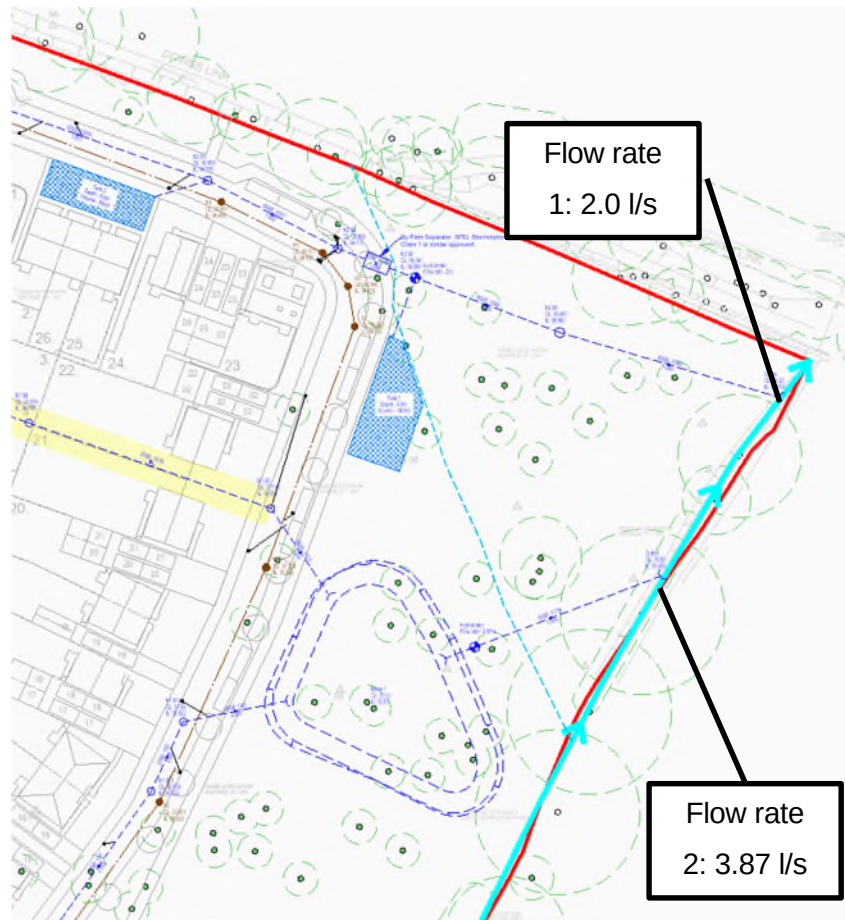
SAAR:

Greenfield Runoff Rate

QBar: Calculated:

1 in 1 Year:	1.39/s	Factor:	0.85
1 in 30 Year:	3.76/s	Factor:	2.30
1 in 100 Year:	5.22/s	Factor:	3.19
1 in 200 Year:	6.12/s	Factor:	3.74

Figure 7.3: Restricted Discharge Flow Rates



7.3 Design Approach

- 7.3.1 The surface water drainage strategy has been developed in line with the National Planning Policy Framework (NPPF), EA standing advice, WSCC's Drainage Policies and the SuDS Manual CIRIA C753.
- 7.3.2 This drainage strategy has been developed in reference to the response received from the LLFA noted earlier.
- 7.3.3 The site has been split into 2 drainage catchment/network areas, one to the north draining direct to the western ditch and a southern catchment to an attenuation pond then to the western ditch. Each catchment will discharge to the existing ditch at QBar rates.
- 7.3.4 A minimum FFL will be set at 36.8m AOD to provide protection from residual risk of surface water flooding.

7.4 Sustainable Drainage Systems

7.4.1 Planning Practice Guidance advises that sustainable drainage systems (or SuDS) should be designed to control surface water runoff close to where it falls combining a mixture of built and nature based techniques to mimic natural drainage as closely as possible and accounting for the predicted impacts of climate change. They provide benefits for water quality, biodiversity and amenity. Sustainable drainage systems provide opportunities to;

- reduce the causes and impacts of flooding,
- remove pollutants from the urban runoff at source,
- combine water management and green space with benefits for amenity, recreation and wildlife.

7.5 Surface Water Drainage Strategy

7.5.1 In view of the requirements of the NPPF, PPG, and the LLFA and design parameters and constraints associated with redeveloping this site, a surface water drainage strategy has been devised and hydraulically modelled to demonstrate that a scheme can be suitably implemented in compliance with current standards and practice without increasing the level of flood risk, when the surface water drainage systems experience run off generated by rainfall equivalent to the 1:100 year rainfall event, including a climate change allowance.

7.5.2 The surface water drainage scheme has been designed to ensure:

- Post development run off for peak storm events does not exceed predevelopment discharge rates
- Sustainable Drainage systems are wholly incorporated within the scheme,
- Consideration is given for the improvement of water quality within the design,
- The designed drainage scheme can satisfactorily retain a critical 1 in 100 year storm event with a 45% climate change allowance and 10% Urban creep.

7.5.3 Two principal surface water run off drainage networks have been established across for the development, see drawing 22-011-007/008 in **Appendix F**. Each of these networks collects run off from development land parcels and main infrastructure and transports it via a piped network and SuDS features to an existing ditch.

7.5.4 Geocellular tanks will be used within the northern catchment to provide adequate storage with the network to achieve a outflow rate at QBar utilising Hydrobrake flow control systems.

- 7.5.5 The Attenuation Pond will be a maximum of 1.6m deep with side slopes no greater than 1 in 6. The pond will feature a permanent water level of 0.6m, further design work to include wet benches, marginal benches and other ecological diversity benefits will be provided as the proposals progress.
- 7.5.6 A preliminary surface water drainage strategy has been prepared and is shown on drawing 22-011-007/008 included in **Appendix F** of this report.

7.6 Foul Water Drainage Proposals

- 7.6.1 The closest foul water sewer to the development is a manhole, number 7702, in Hayes Lane towards the west of the site, see Figure 7.4 below.

Figure 7.4: Foul Sewer Connection Point



- 7.6.2 A pre-application capacity enquiry was submitted in June 2025 to determine the available capacity within the Southern Water (SW) local sewer system.
- 7.6.3 This capacity check by Southern Water, received on 16/06/2025, see **Appendix G** identified that the existing downstream foul network currently has sufficient capacity to serve all of the proposed development.
- 7.6.4 An indicative foul drainage layout has been designed and is shown on drawing 22-011-007/008 included in **Appendix F**.

8 Surface Water Management Measures

8.1 Flood Risk Management Measures

- 8.1.1 PPG requires that the safety of people and the proposed development be considered against each source of flooding identified in Section 5.
- 8.1.2 All residential dwellings will be located within Flood Zone 1 and therefore, even with the potential for climate change, properties will not be at risk of fluvial flooding.
- 8.1.3 All residential dwellings will be located outside of the 1in100 surface water flood extent and FFLs will be set >300mm above flood level, therefore properties will not be at risk of surface water flooding.
- 8.1.4 A preliminary drainage strategy incorporating SuDS has been developed which demonstrates that any increase in run-off from the site over the lifetime of the development will not place properties at risk of surface water flooding.
- 8.1.5 The SuDS system will also be maintained by a suitably qualified Management Company for the lifetime of the development, such that it will not place properties either on the site or elsewhere at an increased risk of surface water flooding. This complies with NPPF guidance and HDC/WSCC SuDS guidance & policies.
- 8.1.6 The flood risk to the proposed development and surrounding area, as a consequence of the development is therefore considered to be very low and no specific flood risk management measures will be required.

8.2 Water Quality

- 8.2.1 It is important to address issues with regards to water quality when considering surface water management.
- 8.2.2 Chapter 26 of the SuDS Manual (2015) provides guidance on methods which should be used to design SuDS to meet water quality design criteria and good practice design standards.
- 8.2.3 Chapter 4 of the SuDS Manual summarises factors, which influence pollution levels in urban run-off. This summary is presented in Table 8.1 below.

Table 8.1 Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices)i.e.. Less than 300 vehicle movements/day	Low	0.5	0.4	0.4

8.2.4 The indicative SuDS mitigation indices for discharge to surface water for the features proposed are summarised in Table 8.2 below (reproduced from appropriate extracts from tables 26.3 of the SuDS Manual C753) and from manufacturer information on the by-pass separator.

Table 8.2 Mitigation Indices

TABLE 26.3 Extract			
Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Pond	0.7	0.7	0.5
Permeable Paving	0.7	0.6	0.7

Proprietary Treatment Systems			
Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
SPEL Stormceptor Class 1 by-pass separator	0.8	0.6	0.9

8.2.5 The majority of run off from this development will be from roof run off, low traffic roads, residential driveways, parking areas etc. and will therefore come within the Low/Very Low hazard classification as noted in Table 8.2 above.

8.2.6 The proposed drainage strategy incorporates a SuDS treatment train for these areas which includes trapped road gullies, catchpit manholes on all roads, diffuser units on all permeable paving and Geocellular systems and Attenuation Pond. By-pass interceptors will be used where the network does not pass through the pond.

8.2.7 From the above Tables it can be seen that mitigation indices for the SuDS features, will be greater than the respective hazard indices.

- 8.2.8 In the majority of cases the run off will pass through more than one component, eg. road gully, by-pass interceptor, catchpit manhole, attenuation pond prior to outfall into the existing ditch. This will provide enhanced mitigation.

8.3 Exceedance Flows

- 8.3.1 Whilst the drainage system has been designed to a very high standard (1 in 100 year storm event plus 45% climate change allowance), it is possible that should more extreme events occur then the design standard for the system may be exceeded.
- 8.3.2 It is best practice therefore to design the system to allow for excess water to discharge overland, primarily into landscaped areas away from built development, thus reducing the risk of flooding these areas during such extreme events.
- 8.3.3 Exceedance flow paths are shown on drawing 22-011-011 in **Appendix H**

8.4 Operation and Maintenance

- 8.4.1 The PPG sets out the requirement for developers to consider the operation, management and maintenance of all SuDS features. The on-Site drainage networks will be offered for adoption under a standard Section 104 Agreement and SuDS will be privately managed and maintained for the lifetime of the development, ensuring that they remain fit for purpose and function satisfactorily.
- 8.4.2 The on-site management team for the development will be responsible for the maintenance of the SuDS included within the Scheme. Maintenance and repairs of SuDS features will be undertaken in line with guidance from the CIRIA SuDS Manual.
- 8.4.3 Maintenance schedule included in **Appendix I**

9 Residual Risks

9.1 Residual Flood Risk

- 9.1.1 As the residential properties will be built in Flood Zone 1 they will not be at significant risk of flooding, even with allowance for climate change.
- 9.1.2 As the residential properties will be built outside and have set FFLs above the 1:100 level of the surface water flooding they will not be at significant risk of residual surface water flooding.
- 9.1.3 Extreme rainfall events are generally predictable, but by their nature predictions are based on probability and thus subject to uncertainty. Therefore, an unquantifiable residual risk remains that events exceeding those predicted may occur, notably surcharging or blockage of sewers or gullies.
- 9.1.4 If the drainage system is overwhelmed, either by a storm event with a magnitude greater than that designed for or due to a blockage, the finished site levels will be designed to ensure that there is no risk of floodwaters ponding to a significant depth. In addition, the overland flow path for any such exceedance storm event will be designed to take overland flow to open space areas.

9.2 Long Term Management

- 9.2.1 The traditional piped networks within the proposed development will be offered for adoption to Southern Water Ltd under a standard Section 104 agreement of the Water Industry Act, (1991). For any additional SuDS elements of the scheme, WSCC, as the Lead Local Flood Authority, will approve the systems in detail. A management Company will be employed to maintain the SuDS elements of the system.

10 Conclusions and Recommendations

10.1 Background

- 10.1.1 This report has been commissioned to assess the risk to, and the impact of, a proposed development of the land east of Hayes Lane, Slinfold in West Sussex. It is proposed to provide 38 residential dwellings with associated access, parking and landscaping.
- 10.1.2 The entire site lies in Flood Zone 1 which is a 'Low Probability' flood area as defined by Table 1 of PPG. The proposed development is identified as 'More Vulnerable' to flooding in Table 2 of PPG. It is consistent with the appropriate uses for Flood Zone 1, as outlined in Table 3 of Planning Practice Guidance.

10.2 Sequential and Exception Tests

- 10.2.1 The proposed development is allocated within the Horsham District Local Plan and the Slinfold Neighbourhood Plan, therefore is deemed to have passed the Sequential Test and application of the Exception Test is not necessary.

10.3 Probability of Flooding

- 10.3.1 Following the application of the Sequential Approach on site, All potential sources of flood risk to the proposed built development, as identified in NPPF have been assessed, as low. In assessing these flood risks, the impacts of climate change have been considered for the lifetime of the proposed development and considered acceptable.

10.4 Proposed Drainage Strategy

- 10.4.1 A comprehensive sustainable drainage strategy will be implemented as part of the development. Surface water run off will be discharged to an existing watercourse in accordance with the hierarchy of discharge. Sustainable drainage systems (SuDS) will be used and will include, a pond providing attenuation, geocellular tanks and permeable paving.
- 10.4.2 The drainage proposals include measures to manage and protect water quality in accordance with the recommendations of the SuDS Manual (CIRIA 753).

Appendix A LLFA Scoping Response

Eleanor Read

Flood Risk Management Officer
Flood Risk Management Team, Planning Services
Eleanor.read@westsussex.gov.uk
www.westsussex.gov.uk

Ground Floor,
Northleigh,
County Hall,
Chichester,
PO19 1RH



Tom Butler
C & A Consulting Engineers Ltd
Landmark House
Station Road
Hook
Hampshire
RG27 9HA

Dear Tom,

WSSC-714986018 – Hayes Lane, Slinfold, West Sussex, RH13 0SN

WSSC Flood Risk Management Team Level 1 Pre-Application Advice has been sought for an approximately 3.9ha site in Horsham district. It is expected that 35 dwellings will be built.

Flood Risk for Hayes Lane:

The proposed site does not lie within Flood Zones 2 or 3, however it is over 1ha therefore a Flood Risk Assessment in line with guidance from the Environment Agency ([Flood risk assessments: applying for planning permission](#)), NPPF and PPG Flood risk and coastal change (August 2022 version; this includes a Site-specific flood risk assessment checklist) will be required. Within the FRA all sources of flooding should be assessed, including flood risk from surface water, ordinary watercourses including ditches, groundwater, artificial sources such as reservoirs and existing drainage infrastructure. The site is not currently located in EA flood warning or alert areas.

The proposed site has areas of low to high surface water flood risk along the southern boundary of the site, as well as a large area of high surface water flood risk in the north-east of the site as identified by the Environment Agency Flood Map for Planning. According to our records there are no ordinary watercourses within the site, although there is one to the north of the site. It is noted that the topographical survey shows there is a ditch along the southern and eastern boundaries of the site. In the FRA/Drainage Strategy it will need to be demonstrated how the watercourse is connected to the wider network. If there are any features outside the red line boundary which could restrict flow, for example a culvert, this must be considered when designing the surface water drainage for the site, to ensure flood risk is not increased within the site or elsewhere. If it is proposed that surface water attenuation features are located within areas of surface water flood risk, compensation will be required to ensure there is enough attenuation on site. Safe access and escape routes for a design flood, considering the impacts of climate change for the lifetime of the development.

According to BGS data the bedrock for the site is Weald Clay Formation. It is noted that winter groundwater monitoring and infiltration testing results have not been provided for our review. Groundwater flood risk details can be found in Appendix A.

Slinfold is not identified as a wetspot in West Sussex Local Flood Risk Management Strategy 2013-2018. Please note the LFRMS is currently being updated, with adoption expected in summer 2025. WSCC have no reports of surface water or groundwater flooding within the red line boundary, although we have had reports of highway flooding along Hayes Lane, along the western boundary of the site. Please note, this does not guarantee that no flooding has occurred within the site boundary or immediate vicinity as flood events might not have been reported to the Flood Risk Management Team.

SuDS Guidance:

While an attenuation basin is mentioned in the scoping report, it is unclear where this will be located in the site layout. Depending on the location of the basin, on-site level for level compensatory storage may be required. This is to ensure there is adequate storage for draining the development, whilst ensuring the pre-existing flood risk on the site does not increase flood risk elsewhere.

The use of Sustainable Drainage Systems (SuDS) should be considered at an early stage in the design process, to integrate SuDS with road networks and other infrastructure. The drainage system should consider the four pillars of SuDS (water quantity, water quality, amenity, and biodiversity) and follow the surface water discharge hierarchy. We expect that investigation into infiltration potential is undertaken using methods in accordance with BRE365. If infiltration testing and groundwater monitoring results are unfavourable for draining the site using infiltration SuDS, any existing runoff rates/volumes must be controlled to a pre-development greenfield runoff rate (Q_{bar}). We would expect that above ground SuDS are used as much as possible to maximise controlling surface water runoff where it falls (e.g. water reuse, green roofs, bioretention areas, ponds, basins, swales etc.).

The FRA/Drainage Strategy should demonstrate there will be sufficient surface water quality treatment by implementing an appropriate amount of water quality treatment stages through the use of SuDS. Chapter 26 of the CIRIA SuDS Manual has lots of guidance for managing surface water quality, including tables for suitability of different SuDS components and the Simple Index Approach. Interception storage should be used in the beginning of the treatment train to ensure the drainage system manages pollutants as close to the source as possible and remove sediment upstream in the system rather than closer to the discharge location.

We would expect that any proposed surface water drainage scheme takes all opportunities to improve any existing risk of flooding to the surrounding road networks. Opportunities should also be considered on how the development may improve flood risk overall by assessing if any additional flood mitigation can be integrated into the scheme, such as storage areas in blue green corridors.

Any phasing of the development must be shown to be able to be developed with a dedicated drainage infrastructure that does not rely on any other phase to be

developed. A drainage phasing timeline will be required to show how each element of the drainage system will be implemented prior to completion of the building phase. Details of the required maintenance of any SuDS features and structures and who will be adopting these features for the lifetime of the development must be provided in accordance with the NPPF.

We require the applicant to submit information and drawings which clearly shows the proposed drainage strategy and exceedance flood flow routes for all areas of development. These plans should include the finished floor levels of all buildings, the proposed finished floor levels and potential exceedance flow route.

Details of the construction phase temporary drainage arrangements are required by the LLFA to ensure there will be no increase in flood risk due to the construction works of the development either onsite or elsewhere. A high-level assessment is required at an initial planning stage. Furthermore, the applicant will also need to submit the proposed construction phasing plans for the development to demonstrate that prior to completing the site there will be no increase in flood risk due to the interim development phases either onsite or elsewhere.

It is unclear what the WSCC Drainage and Planning Policy document is.

When submitting the application to the Local Planning Authority, please submit the SuDS proforma and validation checklist to assist us in reviewing the application and expedite the process. These can be found here: [Flood Risk Management: Pre-application advice](#).

Further guidance on surface water drainage requirements for planning applications within Horsham District Council can be found here: [Surface Water Drainage Statement | Horsham District Council](#)

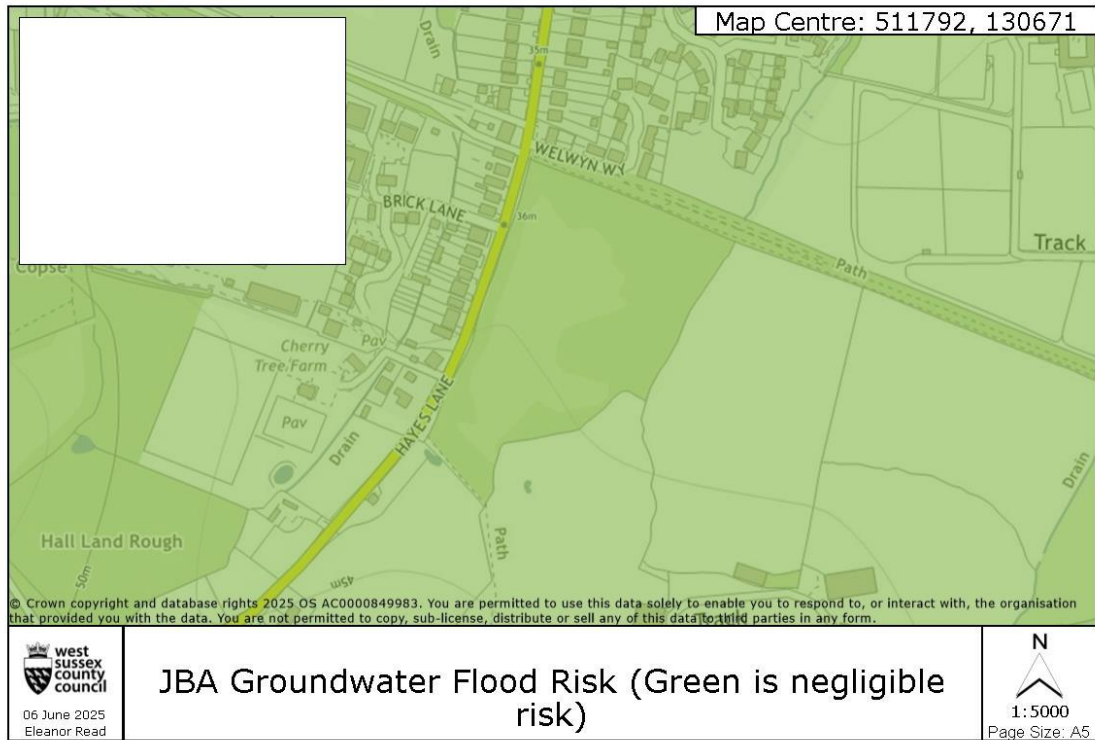
Yours sincerely,

Eleanor Read

Eleanor.read@westsussex.gov.uk

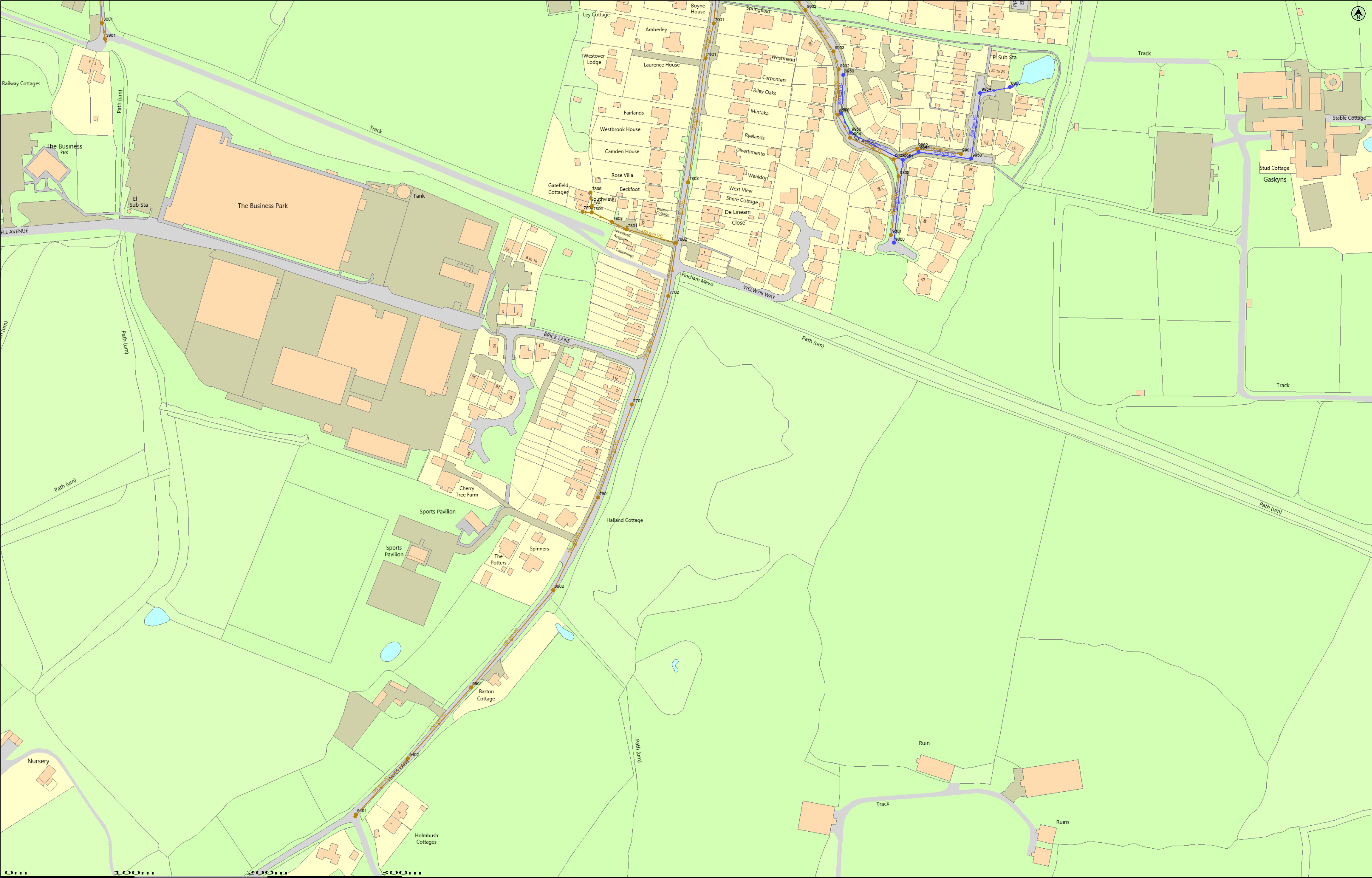
Flood Risk Management Team

Appendix A



Appendix B Topographical Survey

Appendix C Southern Water Sewer Records

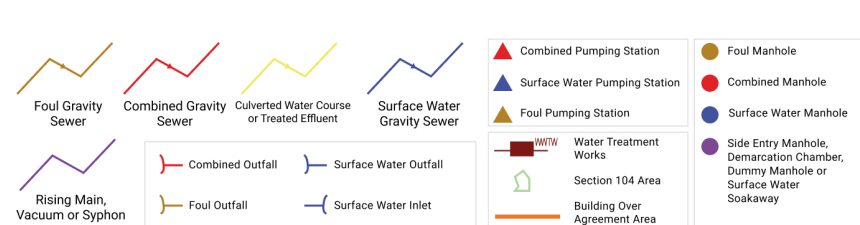


(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 Date: 15/05/25 Scale: 1:1250 Map Centre: 511779.130692 Data updated: 20/03/25 Our Ref: 1770934 - 1 Wastewater Plan A1 Powered by digi&at

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

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



tbutter@c-a.uk.com

Siniford



Appendix D Development Proposals



0 10 20 30 40 50 metres

Site Boundary: 3.93ha

Proposed access point

Visibility splays

Primary street

Secondary street (shared surface)

Footways

Lanes/private drives

Allocated parking

Unallocated parking

Replacement unallocated parking

Existing vegetation and RPAs

Tree planting

SuDS basin

Public footpaths

Public bridleways

Net Developable Area: 1.62ha (4 acres)

Affordable units

Sheds (affordable only)

Garden fences

Garden walls

Bin collection points

Reptile Mitigation Area

C	15.06.26	AL	Layout amendments
B	19.08.25	RC	Minor layout amendments
A	14.08.25	RC	Minor layout amendments
Rev	Date	By	Description

environmental

Dixies Barns, High Street,
Ashwell, Hertfordshire SG7 5NT

t 01462 743647
e ashwell@csaenvironmental.co.uk
w csaenvironmental.co.uk

Project	Land east of Hayes Lane, SLINFOLD		
Title	Planning Layout		
Client	The Incidental Land Company		
Scale	1:1000 @ A3	Drawn	RC
Date	June 2025	Checked	RR
Drawing No.	CSA/5675/111	Rev	C

Appendix E Drainage Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	30	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	999.9		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.024	5.00	38.868	1350	511751.557	130680.942	1.779	37.089
2	0.110	5.00	37.861	1350	511770.937	130732.369	1.500	36.361
3	0.014	5.00	37.710	1350	511773.795	130740.125	1.765	35.945
5	0.119	5.00	37.133	1350	511857.331	130710.493	1.500	35.633
4			37.674	1350	511814.990	130725.512	1.833	35.841
6	0.088	5.00	39.425	1350	511740.876	130652.728	1.350	38.075
7	0.019	5.00	39.194	1350	511745.410	130664.154	1.450	37.744
8			39.216	1350	511778.303	130651.842	1.823	37.393
9	0.048	5.00	39.158	1350	511784.710	130648.597	1.837	37.321
10	0.072	5.00	39.028	1350	511799.371	130616.423	1.915	37.113
11	0.063	5.00	38.776	1350	511808.242	130625.116	1.787	36.989
12	0.011	5.00	38.513	1350	511817.895	130634.577	1.659	36.854
13	0.067	5.00	37.879	1350	511836.142	130660.478	1.350	36.529
14	0.119	5.00	37.690	1350	511841.762	130672.596	1.768	35.922
15			36.047	1200	511917.654	130709.738	0.758	35.289
Basin 1	0.067	5.00	36.500		511876.903	130679.602	1.000	35.500
Outfall			35.800		511930.204	130705.941	0.862	34.938

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	54.958	0.600	37.089	36.361	0.728	75.5	225	5.61	134.9
1.001	2	3	8.370	0.600	36.361	36.095	0.266	31.5	225	5.67	134.4
1.002	3	4	43.710	0.600	35.945	35.841	0.104	420.3	375	6.50	127.5
1.004	5	Basin 1	36.569	0.600	35.633	35.500	0.133	275.0	450	7.61	151.7
2.007	14	Basin 1	35.833	0.600	35.922	35.500	0.422	84.9	450	6.64	126.4
2.000	6	7	12.292	0.600	38.075	37.744	0.331	37.1	225	5.10	139.4
2.001	7	8	35.121	0.600	37.744	37.393	0.351	100.1	300	5.47	136.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.506	59.9	11.7	1.554	1.275	0.024	0.0	67	1.175
1.001	2.340	93.1	65.1	1.275	1.390	0.134	0.0	139	2.528
1.002	0.877	96.9	68.2	1.390	1.458	0.148	0.0	233	0.948
1.004	1.221	194.2	146.4	1.050	0.550	0.267	0.0	293	1.336
2.007	2.207	351.0	222.5	1.318	0.550	0.487	0.0	261	2.330
2.000	2.153	85.6	44.3	1.125	1.225	0.088	0.0	115	2.170
2.001	1.571	111.1	52.7	1.150	1.523	0.107	0.0	146	1.552

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.002	8	9	7.182	0.600	37.393	37.321	0.072	99.8	300	5.54	135.5
2.003	9	11	33.243	0.600	37.321	36.989	0.332	100.1	300	5.90	132.4
3.000	10	11	12.420	0.600	37.113	36.989	0.124	100.2	225	5.16	138.9
2.004	11	12	13.516	0.600	36.989	36.854	0.135	100.1	375	6.02	131.3
2.005	12	13	31.683	0.600	36.854	36.529	0.325	97.5	375	6.31	129.0
2.006	13	14	13.358	0.600	36.529	35.922	0.607	22.0	375	6.37	128.6
1.005	Basin 1	15	51.672	0.600	35.500	35.289	0.211	244.9	300	8.47	141.9
1.003	4	5	44.926	0.600	35.841	35.633	0.208	216.0	375	7.11	122.7
1.006	15	Outfall	13.112	0.600	35.289	34.938	0.351	37.4	300	8.55	113.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
2.002	1.574	111.3	52.4	1.523	1.537	0.107	0.0	145	1.552
2.003	1.571	111.0	74.2	1.537	1.487	0.155	0.0	180	1.678
3.000	1.306	51.9	36.1	1.690	1.562	0.072	0.0	138	1.408
2.004	1.810	200.0	137.6	1.412	1.284	0.290	0.0	229	1.945
2.005	1.835	202.7	140.4	1.284	0.975	0.301	0.0	230	1.975
2.006	3.876	428.1	171.0	0.975	1.393	0.368	0.0	164	3.666
1.005	1.000	70.7	420.9	0.700	0.458	0.821	0.0	300	1.013
1.003	1.229	135.7	65.6	1.458	1.125	0.148	0.0	184	1.220
1.006	2.580	182.4	335.2	0.458	0.562	0.821	0.0	300	2.613

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	54.958	75.5	225	Circular	38.868	37.089	1.554	37.861	36.361	1.275
1.001	8.370	31.5	225	Circular	37.861	36.361	1.275	37.710	36.095	1.390
1.002	43.710	420.3	375	Circular	37.710	35.945	1.390	37.674	35.841	1.458
1.004	36.569	275.0	450	Circular	37.133	35.633	1.050	36.500	35.500	0.550
2.007	35.833	84.9	450	Circular	37.690	35.922	1.318	36.500	35.500	0.550
2.000	12.292	37.1	225	Circular	39.425	38.075	1.125	39.194	37.744	1.225
2.001	35.121	100.1	300	Circular	39.194	37.744	1.150	39.216	37.393	1.523
2.002	7.182	99.8	300	Circular	39.216	37.393	1.523	39.158	37.321	1.537
2.003	33.243	100.1	300	Circular	39.158	37.321	1.537	38.776	36.989	1.487
3.000	12.420	100.2	225	Circular	39.028	37.113	1.690	38.776	36.989	1.562
2.004	13.516	100.1	375	Circular	38.776	36.989	1.412	38.513	36.854	1.284

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1350	Manhole	Adoptable	2	1350	Manhole	Adoptable
1.001	2	1350	Manhole	Adoptable	3	1350	Manhole	Adoptable
1.002	3	1350	Manhole	Adoptable	4	1350	Manhole	Adoptable
1.004	5	1350	Manhole	Adoptable	Basin 1		Junction	
2.007	14	1350	Manhole	Adoptable	Basin 1		Junction	
2.000	6	1350	Manhole	Adoptable	7	1350	Manhole	Adoptable
2.001	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
2.002	8	1350	Manhole	Adoptable	9	1350	Manhole	Adoptable
2.003	9	1350	Manhole	Adoptable	11	1350	Manhole	Adoptable
3.000	10	1350	Manhole	Adoptable	11	1350	Manhole	Adoptable
2.004	11	1350	Manhole	Adoptable	12	1350	Manhole	Adoptable

Pipeline Schedule

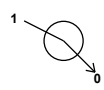
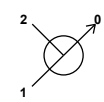
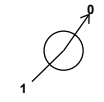
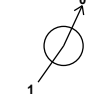
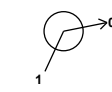
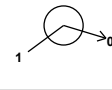
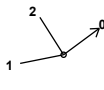
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.005	31.683	97.5	375	Circular	38.513	36.854	1.284	37.879	36.529	0.975
2.006	13.358	22.0	375	Circular	37.879	36.529	0.975	37.690	35.922	1.393
1.005	51.672	244.9	300	Circular	36.500	35.500	0.700	36.047	35.289	0.458
1.003	44.926	216.0	375	Circular	37.674	35.841	1.458	37.133	35.633	1.125
1.006	13.112	37.4	300	Circular	36.047	35.289	0.458	35.800	34.938	0.562

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.005	12	1350	Manhole	Adoptable	13	1350	Manhole	Adoptable
2.006	13	1350	Manhole	Adoptable	14	1350	Manhole	Adoptable
1.005	Basin 1		Junction		15	1200	Manhole	Adoptable
1.003	4	1350	Manhole	Adoptable	5	1350	Manhole	Adoptable
1.006	15	1200	Manhole	Adoptable	Outfall		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	511751.557	130680.942	38.868	1.779	1350				
						0	1.000	37.089	225
2	511770.937	130732.369	37.861	1.500	1350		1	1.000	36.361
						0	1.001	36.361	225
3	511773.795	130740.125	37.710	1.765	1350		1	1.001	36.095
						0	1.002	35.945	375
5	511857.331	130710.493	37.133	1.500	1350		1	1.003	35.633
						0	1.004	35.633	450
4	511814.990	130725.512	37.674	1.833	1350		1	1.002	35.841
						0	1.003	35.841	375
6	511740.876	130652.728	39.425	1.350	1350				
						0	2.000	38.075	225
7	511745.410	130664.154	39.194	1.450	1350		1	2.000	37.744
						0	2.001	37.744	300
8	511778.303	130651.842	39.216	1.823	1350		1	2.001	37.393
						0	2.002	37.393	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	511784.710	130648.597	39.158	1.837	1350		1 2.002	37.321	300
							0 2.003	37.321	300
10	511799.371	130616.423	39.028	1.915	1350		0 3.000	37.113	225
							1 3.000	36.989	225
11	511808.242	130625.116	38.776	1.787	1350		2 2.003	36.989	300
							0 2.004	36.989	375
12	511817.895	130634.577	38.513	1.659	1350		1 2.004	36.854	375
							0 2.005	36.854	375
13	511836.142	130660.478	37.879	1.350	1350		1 2.005	36.529	375
							0 2.006	36.529	375
14	511841.762	130672.596	37.690	1.768	1350		1 2.006	35.922	375
							0 2.007	35.922	450
15	511917.654	130709.738	36.047	0.758	1200		1 1.005	35.289	300
							0 1.006	35.289	300
Basin 1	511876.903	130679.602	36.500	1.000			1 2.007	35.500	450
							2 1.004	35.500	450
							0 1.005	35.500	300
Outfall	511930.204	130705.941	35.800	0.862			1 1.006	34.938	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s) x
Summer CV	1.000	Drain Down Time (mins)	10080	Check Discharge Volume x
Winter CV	1.000	Additional Storage (m³/ha)	0.0	

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	40	0	0
100	45	0	0

Node Basin 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.005	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0094-3900-1000-3900
Invert Level (m)	35.500	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.000	Min Node Diameter (mm)	1200
Design Flow (l/s)	3.9		

Node Basin 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	35.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	1260

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	667.0	0.0	1.000	1450.0	0.0

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	37.168	0.079	16.4	0.1135	0.0000	OK
15 minute summer	2	11	36.670	0.309	91.4	0.4420	0.0000	SURCHARGED
15 minute summer	3	11	36.252	0.307	97.7	0.4388	0.0000	OK
960 minute winter	5	945	36.138	0.505	11.0	0.7226	0.0000	SURCHARGED
960 minute winter	4	945	36.138	0.297	6.1	0.4250	0.0000	OK
15 minute summer	6	10	38.233	0.158	60.2	0.2257	0.0000	OK
15 minute summer	7	10	37.930	0.186	72.9	0.2667	0.0000	OK
15 minute summer	8	11	37.758	0.365	72.7	0.5221	0.0000	SURCHARGED
15 minute summer	9	11	37.704	0.383	100.1	0.5484	0.0000	SURCHARGED
15 minute summer	10	11	37.512	0.399	49.3	0.5710	0.0000	SURCHARGED
15 minute summer	11	11	37.373	0.384	187.1	0.5488	0.0000	SURCHARGED
15 minute summer	12	11	37.175	0.321	193.9	0.4590	0.0000	OK
15 minute summer	13	11	36.764	0.235	236.2	0.3360	0.0000	OK
15 minute summer	14	10	36.268	0.346	315.3	0.4947	0.0000	OK
120 minute summer	15	64	35.320	0.031	3.9	0.0346	0.0000	OK
960 minute winter	Basin 1	945	36.138	0.638	33.1	584.9067	0.0000	SURCHARGED
15 minute summer	Outfall	19	34.968	0.030	3.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	16.1	0.557	0.270	1.4358	
15 minute summer	2	1.001	3	88.6	2.306	0.952	0.3040	
15 minute summer	3	1.002	4	97.6	1.148	1.008	3.7669	
960 minute winter	5	1.004	Basin 1	10.5	0.617	0.054	5.7941	
960 minute winter	4	1.003	5	6.1	0.428	0.045	4.5807	
15 minute summer	6	2.000	7	59.9	1.888	0.699	0.3990	
15 minute summer	7	2.001	8	72.7	1.375	0.654	1.9693	
15 minute summer	8	2.002	9	69.7	1.188	0.626	0.5058	
15 minute summer	9	2.003	11	99.3	1.423	0.895	2.3409	
15 minute summer	10	3.000	11	48.6	1.221	0.935	0.4940	
15 minute summer	11	2.004	12	186.6	1.748	0.933	1.4239	
15 minute summer	12	2.005	13	192.4	2.258	0.950	2.7403	
15 minute summer	13	2.006	14	235.7	2.635	0.551	1.1933	
15 minute summer	14	2.007	Basin 1	314.1	3.888	0.895	3.4001	
120 minute summer	15	1.006	Outfall	3.9	1.047	0.021	0.0488	493.2
960 minute winter	Basin 1	Hydro-Brake®	15	3.9				

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	37.181	0.092	21.4	0.1310	0.0000	OK
15 minute summer	2	11	36.974	0.613	119.2	0.8769	0.0000	SURCHARGED
15 minute summer	3	11	36.343	0.398	125.9	0.5696	0.0000	SURCHARGED
960 minute winter	5	945	36.312	0.679	13.6	0.9715	0.0000	SURCHARGED
960 minute winter	4	945	36.312	0.471	7.9	0.6738	0.0000	SURCHARGED
15 minute summer	6	11	38.844	0.769	78.5	1.0999	0.0000	SURCHARGED
15 minute summer	7	11	38.519	0.775	89.2	1.1096	0.0000	SURCHARGED
15 minute summer	8	12	38.272	0.879	84.8	1.2577	0.0000	SURCHARGED
15 minute summer	9	11	38.197	0.876	121.7	1.2529	0.0000	SURCHARGED
15 minute summer	10	11	37.952	0.839	64.3	1.2004	0.0000	SURCHARGED
15 minute summer	11	11	37.720	0.731	232.8	1.0457	0.0000	SURCHARGED
15 minute summer	12	11	37.421	0.567	240.8	0.8116	0.0000	SURCHARGED
15 minute summer	13	11	36.831	0.302	296.1	0.4320	0.0000	OK
15 minute summer	14	11	36.353	0.431	396.0	0.6168	0.0000	OK
120 minute summer	15	60	35.320	0.031	3.9	0.0346	0.0000	OK
960 minute winter	Basin 1	945	36.312	0.812	42.6	799.5741	0.0000	FLOOD RISK
120 minute summer	Outfall	60	34.968	0.030	3.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	21.1	0.656	0.352	1.5093	
15 minute summer	2	1.001	3	114.0	2.866	1.225	0.3329	
15 minute summer	3	1.002	4	125.4	1.177	1.294	4.5564	
960 minute winter	5	1.004	Basin 1	13.1	0.641	0.068	5.7941	
960 minute winter	4	1.003	5	7.3	0.437	0.054	4.9552	
15 minute summer	6	2.000	7	73.1	1.939	0.854	0.4889	
15 minute summer	7	2.001	8	84.8	1.396	0.764	2.4732	
15 minute summer	8	2.002	9	86.9	1.234	0.781	0.5058	
15 minute summer	9	2.003	11	123.7	1.757	1.114	2.3409	
15 minute summer	10	3.000	11	60.2	1.513	1.158	0.4940	
15 minute summer	11	2.004	12	231.4	2.098	1.157	1.4908	
15 minute summer	12	2.005	13	239.0	2.279	1.179	3.2535	
15 minute summer	13	2.006	14	294.6	2.753	0.688	1.3717	
15 minute summer	14	2.007	Basin 1	393.7	3.906	1.122	4.2929	
120 minute summer	15	1.006	Outfall	3.9	1.047	0.021	0.0488	643.2
960 minute winter	Basin 1	Hydro-Brake®	15	3.9				

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	999.9		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
N2 S1	0.094	5.00	36.538	1500	511779.365	130781.775	1.660
N2 S2			37.209	1500	511800.767	130783.318	2.368
N2 S3	0.061	5.00	36.744	1500	511846.070	130767.303	1.986
N2 S4	0.039	5.00	36.548	1500	511868.844	130755.353	1.835
N2 S6			35.960	1500	511907.603	130740.658	1.318
Outfall			35.200		511945.963	130729.318	0.627
Tank 1	0.056	5.00	36.500		511878.410	130739.852	1.286
Tank 2		5.00	37.200		511836.834	130764.465	2.100
N2 S5	0.023	5.00	36.341	1500	511882.346	130750.234	1.652

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	N2 S1	N2 S2	21.458	0.600	34.878	34.841	0.037	579.9	600	5.36	169.2
1.001	N2 S2	N2 S3	48.050	0.600	34.841	34.758	0.083	578.9	600	6.15	161.4
1.002	N2 S3	N2 S4	25.719	0.600	34.758	34.713	0.045	571.5	600	6.58	157.4
1.004	N2 S5	N2 S6	27.011	0.600	34.689	34.642	0.047	574.7	600	7.27	151.2
1.005	N2 S6	Outfall	40.001	0.600	34.642	34.573	0.069	579.7	600	7.93	145.7
3.000	Tank 1	N2 S5	11.103	0.600	35.214	34.989	0.225	49.3	300	5.08	172.0
2.000	Tank 2	N2 S3	9.662	0.600	35.100	35.058	0.042	230.1	300	5.16	171.2
1.003	N2 S4	N2 S5	14.440	0.600	34.713	34.689	0.024	601.7	600	6.82	155.1

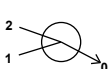
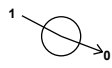
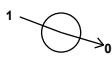
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.004	283.8	57.5	1.060	1.768	0.094	0.0	182	0.793
1.001	1.005	284.1	54.8	1.768	1.386	0.094	0.0	177	0.783
1.002	1.011	285.9	88.2	1.386	1.235	0.155	0.0	228	0.895
1.004	1.008	285.1	149.2	1.052	0.718	0.273	0.0	308	1.020
1.005	1.004	283.9	143.7	0.718	0.027	0.273	0.0	302	1.007
3.000	2.243	158.6	34.8	0.986	1.052	0.056	0.0	95	1.811
2.000	1.032	73.0	0.0	1.800	1.386	0.000	0.0	0	0.000
1.003	0.985	278.6	108.7	1.235	1.052	0.194	0.0	260	0.927

Pipeline Schedule

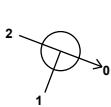
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	21.458	579.9	600	Circular	36.538	34.878	1.060	37.209	34.841	1.768
1.001	48.050	578.9	600	Circular	37.209	34.841	1.768	36.744	34.758	1.386
1.002	25.719	571.5	600	Circular	36.744	34.758	1.386	36.548	34.713	1.235
1.004	27.011	574.7	600	Circular	36.341	34.689	1.052	35.960	34.642	0.718
1.005	40.001	579.7	600	Circular	35.960	34.642	0.718	35.200	34.573	0.027
3.000	11.103	49.3	300	Circular	36.500	35.214	0.986	36.341	34.989	1.052
2.000	9.662	230.1	300	Circular	37.200	35.100	1.800	36.744	35.058	1.386
1.003	14.440	601.7	600	Circular	36.548	34.713	1.235	36.341	34.689	1.052

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	N2 S1	1500	Manhole	Adoptable	N2 S2	1500	Manhole	Adoptable
1.001	N2 S2	1500	Manhole	Adoptable	N2 S3	1500	Manhole	Adoptable
1.002	N2 S3	1500	Manhole	Adoptable	N2 S4	1500	Manhole	Adoptable
1.004	N2 S5	1500	Manhole	Adoptable	N2 S6	1500	Manhole	Adoptable
1.005	N2 S6	1500	Manhole	Adoptable	Outfall		Junction	
3.000	Tank 1		Junction		N2 S5	1500	Manhole	Adoptable
2.000	Tank 2		Junction		N2 S3	1500	Manhole	Adoptable
1.003	N2 S4	1500	Manhole	Adoptable	N2 S5	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
N2 S1	511779.365	130781.775	36.538	1.660	1500				
						0	1.000	34.878	600
N2 S2	511800.767	130783.318	37.209	2.368	1500		1	1.000	34.841
						0	1.001	34.841	600
N2 S3	511846.070	130767.303	36.744	1.986	1500		1	2.000	35.058
						2	1.001	34.758	600
						0	1.002	34.758	600
N2 S4	511868.844	130755.353	36.548	1.835	1500		1	1.002	34.713
						0	1.003	34.713	600
N2 S6	511907.603	130740.658	35.960	1.318	1500		1	1.004	34.642
						0	1.005	34.642	600
Outfall	511945.963	130729.318	35.200	0.627			1	1.005	34.573
Tank 1	511878.410	130739.852	36.500	1.286					
						0	3.000	35.214	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
Tank 2	511836.834	130764.465	37.200	2.100						
N2 S5	511882.346	130750.234	36.341	1.652	1500		0	2.000	35.100	300
							1	3.000	34.989	300
							2	1.003	34.689	600
							0	1.004	34.689	600

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	10080	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
30	40	0	0
100	0	0	0
100	45	0	0

Node N2 S5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	34.689	Product Number	CTL-SHE-0063-2000-1300-2000
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Tank 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	35.214
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.90	Time to half empty (mins)	780

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	175.0	0.0	0.800	175.0	0.0	0.801	0.0	0.0

Node Tank 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	35.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.90	Time to half empty (mins)	1050

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	123.0	0.0	0.800	123.0	0.0	0.801	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.97%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute summer	N2 S1	160	35.144	0.266	4.3	0.4698	0.0000	OK
240 minute summer	N2 S2	160	35.144	0.303	3.3	0.5352	0.0000	OK
240 minute summer	N2 S3	160	35.144	0.386	3.3	0.6821	0.0000	OK
240 minute summer	N2 S4	160	35.144	0.431	2.4	0.7617	0.0000	OK
15 minute summer	N2 S6	27	34.678	0.036	1.7	0.0637	0.0000	OK
15 minute summer	Outfall	28	34.599	0.026	1.7	0.0000	0.0000	OK
120 minute summer	Tank 1	72	35.237	0.023	3.6	3.6833	0.0000	OK
360 minute summer	Tank 2	272	35.140	0.040	2.3	4.4339	0.0000	OK
240 minute summer	N2 S5	160	35.144	0.455	2.7	0.8042	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute summer	N2 S1	1.000	N2 S2	3.3	0.306	0.012	2.8227	
240 minute summer	N2 S2	1.001	N2 S3	1.9	0.190	0.007	8.0294	
240 minute summer	N2 S3	1.002	N2 S4	1.5	0.189	0.005	5.2510	
240 minute summer	N2 S4	1.003	N2 S5	1.5	0.124	0.006	3.2206	
15 minute summer	N2 S6	1.005	Outfall	1.7	0.319	0.006	0.2179	14.1
120 minute summer	Tank 1	3.000	N2 S5	2.0	0.721	0.012	0.1808	
360 minute summer	Tank 2	2.000	N2 S3	-2.3	-0.291	-0.032	0.1021	
240 minute summer	N2 S5	Hydro-Brake®	N2 S6	1.7				

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	N2 S1	352	35.467	0.588	6.1	1.0399	0.0000	OK
360 minute winter	N2 S2	352	35.467	0.626	5.9	1.1053	0.0000	SURCHARGED
360 minute winter	N2 S3	352	35.467	0.709	11.6	1.2519	0.0000	SURCHARGED
360 minute winter	N2 S4	352	35.467	0.754	4.8	1.3315	0.0000	SURCHARGED
15 minute summer	N2 S6	506	34.678	0.036	1.7	0.0637	0.0000	OK
15 minute summer	Outfall	507	34.599	0.026	1.7	0.0000	0.0000	OK
360 minute winter	Tank 1	352	35.467	0.253	7.9	39.7749	0.0000	OK
360 minute winter	Tank 2	352	35.467	0.367	10.4	40.5733	0.0000	SURCHARGED
360 minute winter	N2 S5	352	35.467	0.778	5.9	1.3739	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	N2 S1	1.000	N2 S2	5.9	0.248	0.021	6.0304	
360 minute winter	N2 S2	1.001	N2 S3	5.9	0.203	0.021	13.5346	
360 minute winter	N2 S3	1.002	N2 S4	-4.0	0.186	-0.014	7.2445	
360 minute winter	N2 S4	1.003	N2 S5	4.4	0.123	0.016	4.0674	
15 minute summer	N2 S6	1.005	Outfall	1.7	0.317	0.006	0.2179	57.5
360 minute winter	Tank 1	3.000	N2 S5	-4.3	0.632	-0.027	0.7423	
360 minute winter	Tank 2	2.000	N2 S3	-10.4	-0.724	-0.142	0.6804	
360 minute winter	N2 S5	Hydro-Brake®	N2 S6	1.7				

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	N2 S1	472	35.682	0.804	6.7	1.4208	0.0000	SURCHARGED
480 minute winter	N2 S2	472	35.682	0.841	6.3	1.4862	0.0000	SURCHARGED
480 minute winter	N2 S3	472	35.682	0.924	10.0	1.6329	0.0000	SURCHARGED
480 minute winter	N2 S4	472	35.682	0.969	5.9	1.7124	0.0000	SURCHARGED
480 minute winter	N2 S6	472	34.679	0.037	1.8	0.0649	0.0000	OK
480 minute winter	Outfall	472	34.600	0.027	1.8	0.0000	0.0000	OK
480 minute winter	Tank 1	472	35.682	0.468	9.7	73.7247	0.0000	SURCHARGED
480 minute winter	Tank 2	472	35.682	0.582	8.4	64.4381	0.0000	SURCHARGED
480 minute winter	N2 S5	472	35.682	0.993	7.4	1.7548	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	N2 S1	1.000	N2 S2	6.3	0.254	0.022	6.0442	
480 minute winter	N2 S2	1.001	N2 S3	5.8	0.198	0.020	13.5346	
480 minute winter	N2 S3	1.002	N2 S4	-3.5	0.195	-0.012	7.2445	
480 minute winter	N2 S4	1.003	N2 S5	5.8	0.152	0.021	4.0674	
480 minute winter	N2 S6	1.005	Outfall	1.8	0.318	0.006	0.2253	223.4
480 minute winter	Tank 1	3.000	N2 S5	-5.7	0.590	-0.036	0.7819	
480 minute winter	Tank 2	2.000	N2 S3	-8.4	-0.500	-0.115	0.6804	
480 minute winter	N2 S5	Hydro-Brake®	N2 S6	1.8				

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	N2 S1	472	35.599	0.721	6.0	1.2736	0.0000	SURCHARGED
480 minute winter	N2 S2	472	35.599	0.758	5.6	1.3390	0.0000	SURCHARGED
480 minute winter	N2 S3	472	35.599	0.841	9.5	1.4857	0.0000	SURCHARGED
480 minute winter	N2 S4	472	35.599	0.886	5.0	1.5652	0.0000	SURCHARGED
480 minute winter	N2 S6	472	34.678	0.036	1.7	0.0638	0.0000	OK
480 minute winter	Outfall	472	34.599	0.026	1.7	0.0000	0.0000	OK
480 minute winter	Tank 1	472	35.599	0.385	8.3	60.6060	0.0000	SURCHARGED
480 minute winter	Tank 2	472	35.599	0.499	8.6	55.2158	0.0000	SURCHARGED
480 minute winter	N2 S5	472	35.599	0.910	6.3	1.6076	0.0000	SURCHARGED

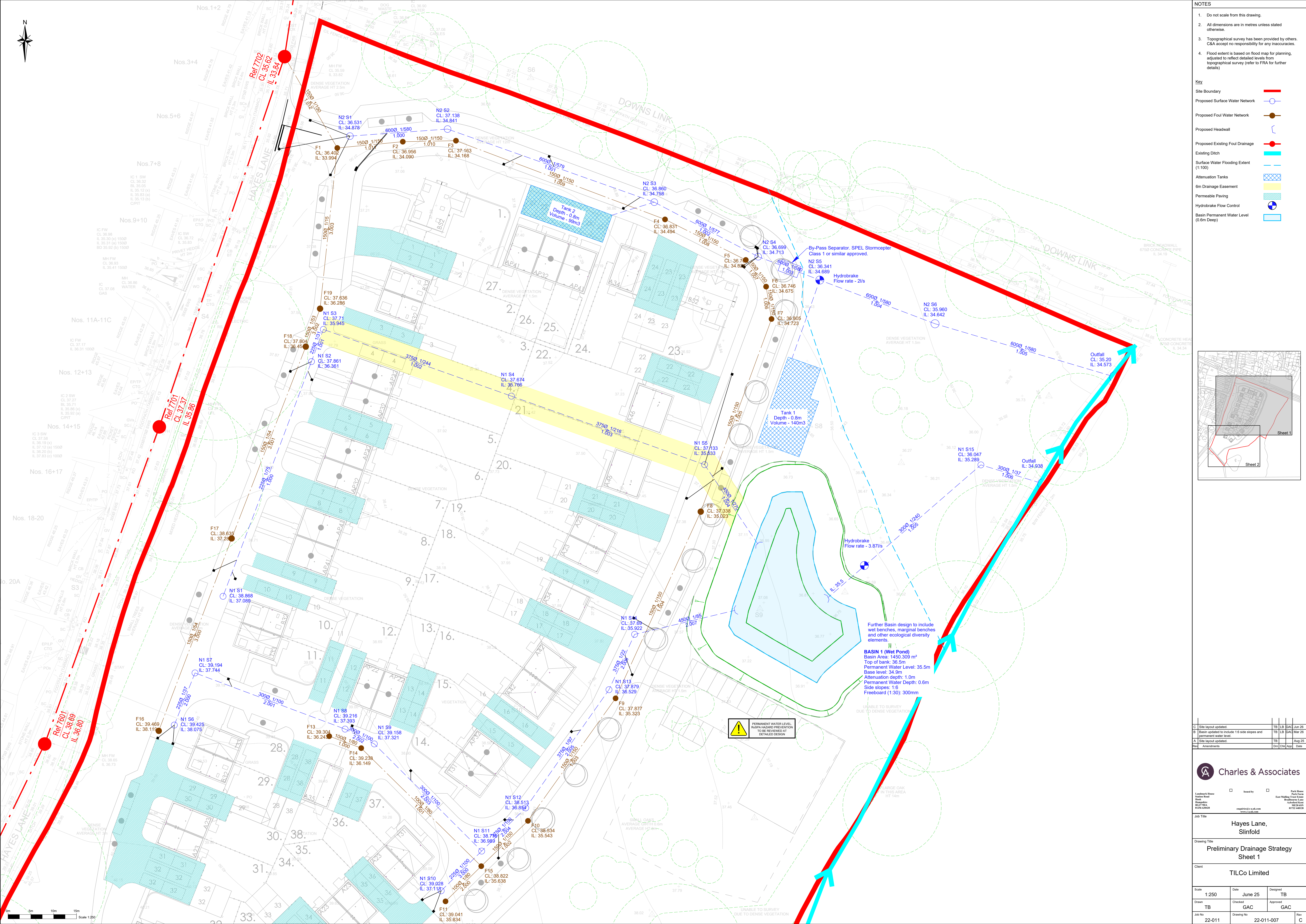
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	N2 S1	1.000	N2 S2	5.6	0.248	0.020	6.0442	
480 minute winter	N2 S2	1.001	N2 S3	4.8	0.193	0.017	13.5346	
480 minute winter	N2 S3	1.002	N2 S4	-3.3	0.197	-0.012	7.2445	
480 minute winter	N2 S4	1.003	N2 S5	4.9	0.143	0.018	4.0674	
480 minute winter	N2 S6	1.005	Outfall	1.7	0.312	0.006	0.2190	199.3
480 minute winter	Tank 1	3.000	N2 S5	-4.7	0.609	-0.030	0.7819	
480 minute winter	Tank 2	2.000	N2 S3	-8.6	-0.512	-0.118	0.6804	
480 minute winter	N2 S5	Hydro-Brake®	N2 S6	1.7				

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	N2 S1	585	35.928	1.050	7.3	1.8548	0.0000	SURCHARGED
600 minute winter	N2 S2	585	35.928	1.087	7.2	1.9205	0.0000	SURCHARGED
600 minute winter	N2 S3	585	35.929	1.171	11.8	2.0683	0.0000	SURCHARGED
600 minute winter	N2 S4	585	35.929	1.216	6.8	2.1482	0.0000	SURCHARGED
600 minute winter	N2 S6	585	34.680	0.038	2.0	0.0679	0.0000	OK
600 minute winter	Outfall	585	34.601	0.028	2.0	0.0000	0.0000	OK
600 minute winter	Tank 1	585	35.928	0.714	11.1	112.5225	0.0000	SURCHARGED
600 minute winter	Tank 2	585	35.929	0.829	7.8	88.6154	0.0000	SURCHARGED
600 minute winter	N2 S5	585	35.929	1.240	8.5	2.1907	0.0000	SURCHARGED

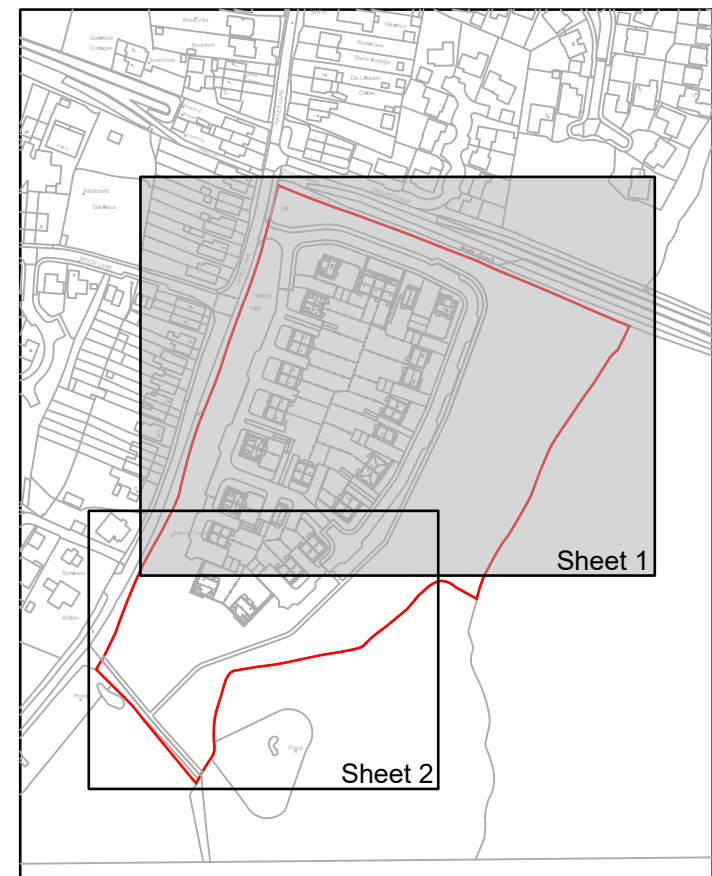
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	N2 S1	1.000	N2 S2	7.2	0.257	0.025	6.0442	
600 minute winter	N2 S2	1.001	N2 S3	7.1	0.188	0.025	13.5346	
600 minute winter	N2 S3	1.002	N2 S4	3.8	0.195	0.013	7.2445	
600 minute winter	N2 S4	1.003	N2 S5	6.7	0.096	0.024	4.0674	
600 minute winter	N2 S6	1.005	Outfall	2.0	0.327	0.007	0.2398	303.1
600 minute winter	Tank 1	3.000	N2 S5	-6.8	0.584	-0.043	0.7819	
600 minute winter	Tank 2	2.000	N2 S3	-7.8	-0.415	-0.107	0.6804	
600 minute winter	N2 S5	Hydro-Brake®	N2 S6	2.0				

Appendix F Drainage Drawings

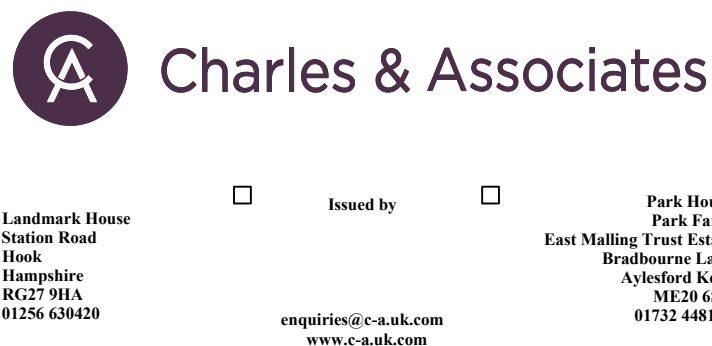


- Key

Site Boundary	
Proposed Surface Water Network	
Proposed Foul Water Network	
Proposed Headwall	
Proposed Existing Foul Drainage	
Existing Ditch	
Surface Water Flooding Extent (1:100)	
Attenuation Tanks	
6m Drainage Easement	
Permeable Paving	
Hydrobrake Flow Control	
Basin Permanent Water Level (0.6m Deep)	



Site layout updated.	TB	LB	GAC	Jun 28
Basin updated to include 1:6 side slopes and permanent water level.	TB	LB	GAC	Mar 26
Site layout updated.	TB			Aug 25
Amendments	Drn	Chk	App	Date

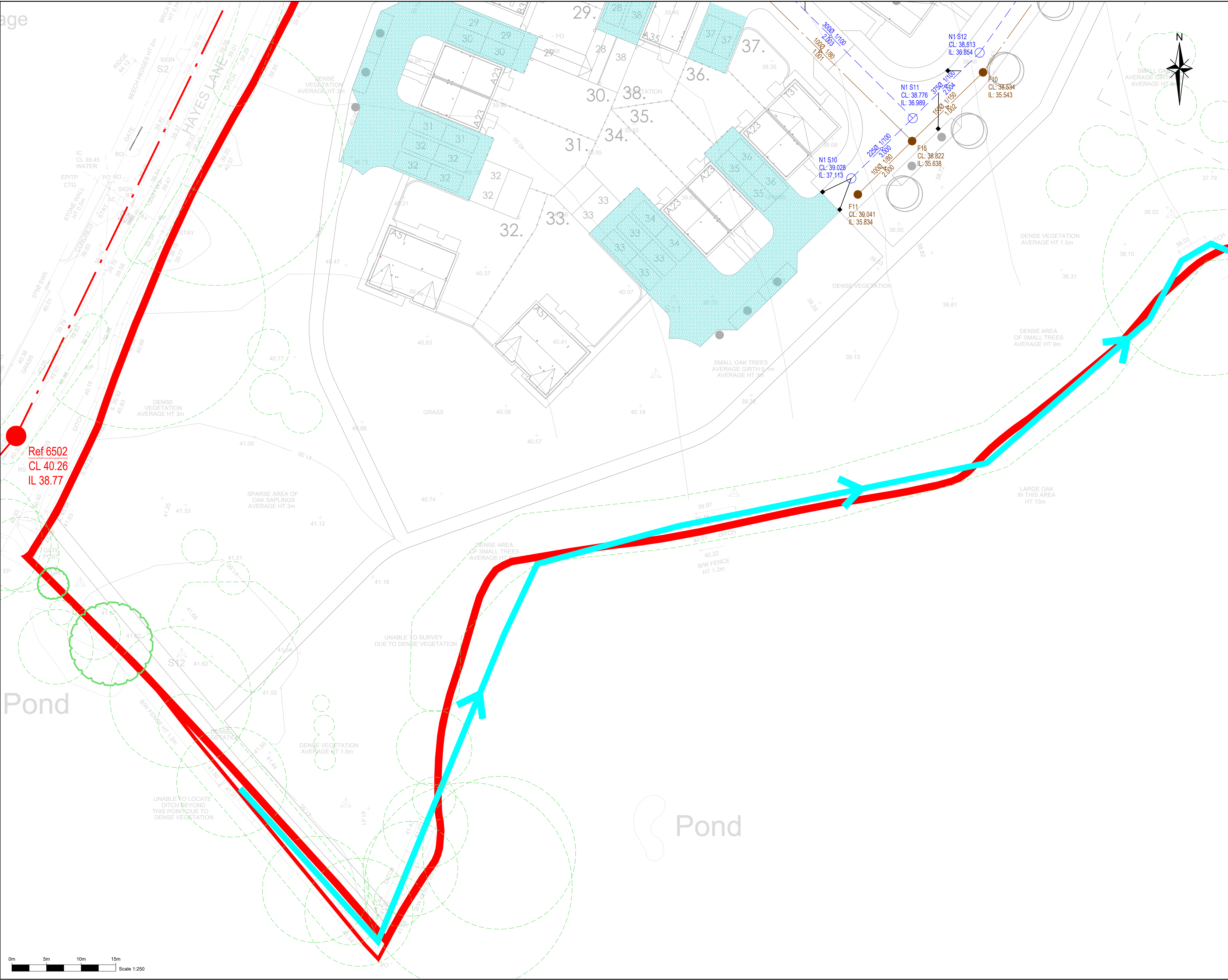


Hayes Lane,
Slinfold

Drawing Title

Preliminary Drainage Strategy
Sheet 1

Scale 1:250	Date June 25	Designed TB	
Drawn TB	Checked GAC	Approved GAC	
Job No 22-011	Drawing No 22-011-007		Rev C



NOTES

- Do not scale from this drawing.
- All dimensions are in metres unless stated otherwise.
- Topographical survey has been provided by others. C&A accept no responsibility for any inaccuracies.
- Flood extent is based on flood map for planning, adjusted to reflect detailed levels from topographical survey (refer to FRA for further details)

Key

Site Boundary	
Proposed Surface Water Network	
Proposed Foul Water Network	
Proposed Headwall	
Proposed Existing Foul Drainage	
Existing Ditch	
Surface Water Flooding Extent (1:100)	
Attenuation Tanks	
6m Drainage Easement	
Permeable Paving	
Hydrobrake Flow Control	

B	Site layout updated.	TB	LB	GAC Jun 26	
A	Site layout updated.	TB	LB	Aug 25	
Rev	Amendments	Drm	Chk	App	Date

Issued by

Landmark House
Station Road
Hook
Hampshire
RG27 9HA
01256 638420

enquiries@c-a.uk.com
www.c-a.uk.com

Park Farm
East Malling Trust Estate
Bradbourne Lane
Aylesford
Kent
ME20 6BN
01732 448120

Job Title

Hayes Lane,
Slinfold

Drawing Title

Preliminary Drainage Strategy
Sheet 2

Client

TILCo Limited

Scale	1:250	Date	June 25	Designed	TB
Drawn	TB	Checked	GAC	Approved	GAC
Job No	22-011	Drawing No	22-011-008	Rev	B



NOTE:
VARYING PIPE SIZES
RECORDED BETWEEN
IC1, IC2 & IC3.
IF CRITICAL CITY
SURVEY RECOMMENDED
TO CONFIRM.



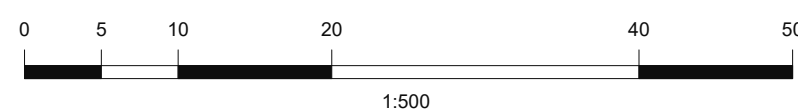
- NOTES
- Do not scale from this drawing.
 - All dimensions are in metres unless stated otherwise.
 - Topographical survey has been provided by others. C&A accept no responsibility for any inaccuracies.
- Key
- Site Boundary —
- Dwelling Roof Catchments +10% (Urban Creep) — XX
- Other Roof Catchments — XX
- Road Catchments — XX
- Permanent Water Catchments — XX

Halland Cottage

Spinners

Pond

Pond



C	Site layout updated.	TB	LB	GAC
B	Indicative Scout Plot Added.	TB	LB	GAC
A	Site layout updated.	TB		
Rev	Amendments	On	Off	App

**Charles & Associates**

Landmark's House

Station Road

Sheff

Wiltshire

Wiltshire

Wiltshire

Issued by

www.c-a.co.uk

Park House

East Malling Town Entry

Brighthelm Lane

Wiltshire

Wiltshire

Wiltshire

Job Title
Hayes Lane, Slinfold

Drawing Title
Impermeable Areas Plan

Client
TILCo Limited

Scale	1:500	Date	June 25	Designed	CD
Drawn	CD	Checked	TB	Approved	GAC
Job No	22-011	Drawing No	22-011-012	Rev	C

Appendix G Southern Water Capacity Check



Thomas Butler
Charles & Associates Consulting Engineers Ltd
Landmark House, Station Road
Hook
Hampshire
RG27 9HA

Your ref
20913

Our ref
DSA000044516

Date
16 June 2025

Contact
Tel 0330 303 0119

Dear Mr Butler,

Level 1 Capacity Check Enquiry: Hayes Lane, Slinfold, RH13 0BH.

We have completed the capacity check for the above development site and the results are as follows:

Foul Water

The enquiry has been reassessed to determine the capacity available for 0.32 l/s at manhole reference TQ11307702, Grid Reference: 511765 , 130799.

There is currently adequate capacity in the local sewerage network to accommodate a foul flow of 0.32 l/s for the above development at manhole reference TQ11307702. Southern Water will not permit a surface water connection into the foul network. Please refer to our surface water management policy.

Connecting to our network

It should be noted that this information is only a hydraulic assessment of the existing sewerage network and does not grant approval for a connection to the public sewerage system. A formal Sewer Connection (S106) application is required to be completed and approved by Southern Water Services. To make an application visit: developerservices.southernwater.co.uk

Please note the information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter. **Any revisions in flow rate or alternative point of connection will require a new Pre-Planning Application to be submitted.**



Please get in touch via the Get Connected customer dashboard if you have any queries.

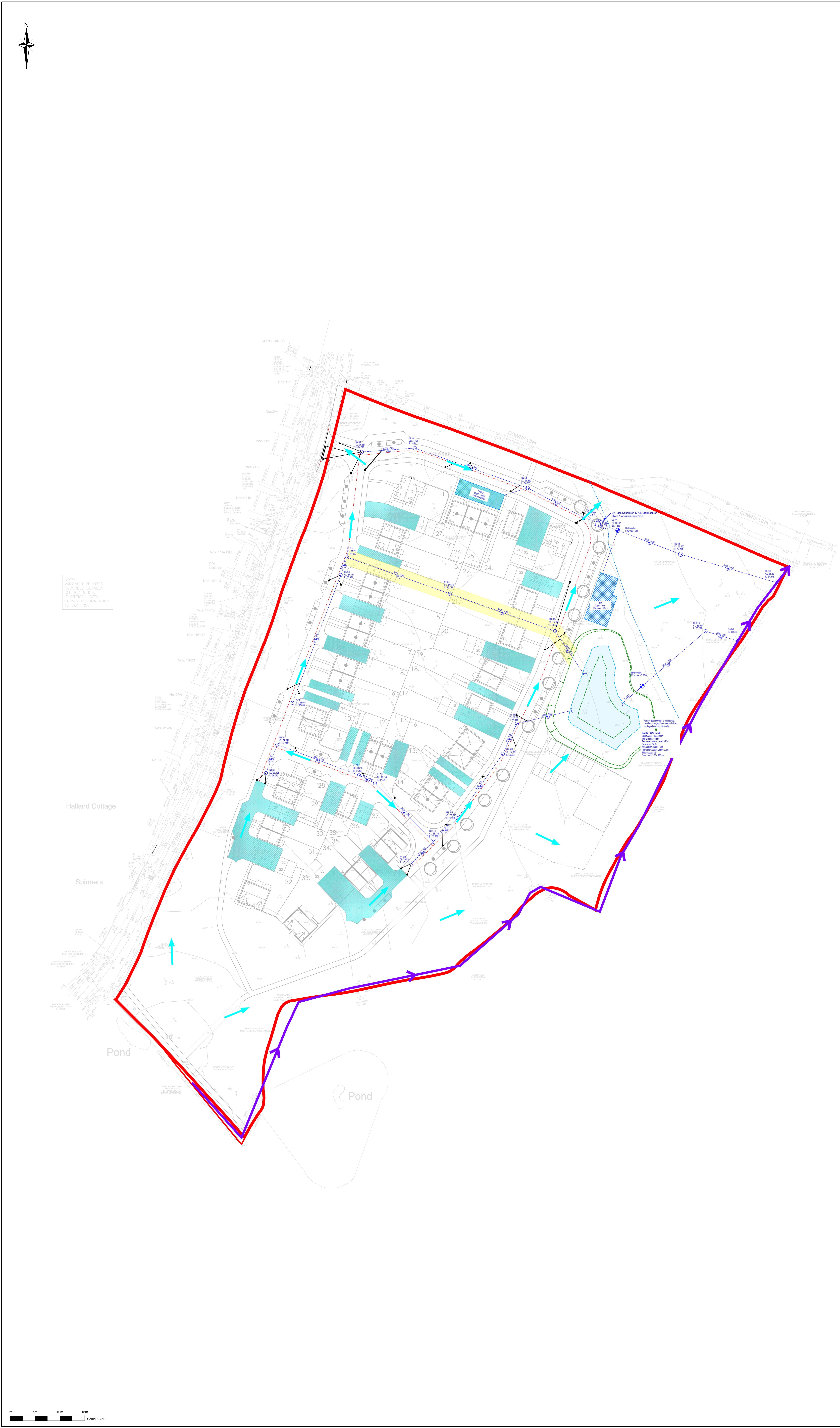
Should it be necessary to contact us please quote our above reference number in all communications relating to this application by email at southernwaterplanning@southernwater.co.uk

Yours sincerely,

Future Growth Planning Team
Developer Services

southernwater.co.uk/developing-building/planning-your-development

Appendix H Exceedance Flow Routes Drawing



- [illegible]

Appendix I Maintenance Schedule



Surface Water Drainage SuDS Maintenance Schedule

Hayes Lane, Slinfold

22-011-005 Rev A

June 2025



Charles & Associates

Document Control Sheet

Project Name:	Hayes Lane, Slinfold
Project Number:	22-011
Report Title:	Surface Water Drainage SuDS Maintenance Schedule
Report Number:	005

Rev	Issue Purpose	Author	Checked	Reviewed	Approved	Date
A	Pond added	TB	LB	TB	GAC	29.06.26

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1 Introduction & Overview

1.1 Introduction

- 1.1.1 This document details the inspection and maintenance specification for the surface water drainage system including sustainable drainage systems (SuDS) and features utilised for the Hayes Lane, Slinfold.
- 1.1.2 This report has been prepared to submit to the Lead Local Flood Authority (West Sussex County Council (WSCC)) and the Local Planning Authority (Horsham District Council (HDC)) as part of a detailed planning application.
- 1.1.3 This report should be read in conjunction with drawings 22-011-007, 22-011-008 and the Flood Risk Assessment.
- 1.1.4 In addition, it will be made available to the adopting body and/or maintenance organisation that will ultimately control the SuDS assets.
- 1.1.5 Most of the piped surface water drainage system on the site will be offered to Southern Water under a Section 104 agreement of the Water Industry Act 1991. Once the system has been vested by Southern Water, they will become responsible for the maintenance of the adopted features of the surface water network including chambers, sewers, storage tanks and flow controls.
- 1.1.6 This document relates to surface water drainage features that will not be adopted by Southern Water. The features listed in this document are to be maintained by a suitably qualified management company.
- 1.1.7 Private drainage relating to individual properties such as gutters, rainwater down pipes, private inspection chambers, rodding eyes, linear channels, yard gullies and domestic soakaways and individual permeably paved drives are to be maintained by the property owner.
- 1.1.8 Maintenance requirements should be reviewed and adjusted as necessary following detailed design, specification and product choice of the drainage components.

1.2 Overview

- 1.2.1 This document is laid out in specific sections pertinent to SuDS type detailing:
 - A description of the SuDS component and its use
 - Maintenance requirements and frequencies
 - Inspection requirements and frequencies

1.2.2 The activities listed are generic to SuDS types and represent the minimum maintenance and inspection requirements. However additional tasks, or varied maintenance frequency may be introduced as required. This may include:

- Measurement and recording of sediment levels
- Photographic recording of problem areas
- Increased frequency of litter removal in areas identified as litter hotspots
- Adjusted timescales of maintenance activities to minimise impact on wildlife (e.g. great crested newts, birds, voles, etc)
- The use of manual methods of maintenance to limit impact on wildlife habitat (e.g. management of emergent vegetation in ponds)

This specification has been based upon CIRIA's latest technical information for SuDS (C753 The SUDS Manual, CIRIA, London: 2015)

2 Permeable Paving

2.1 Description

2.1.1 Permeable paving provides a pavement suitable for pedestrian and vehicular traffic, while allowing rainwater to permeate through the surface and into the underlying sub-base. The water is temporarily stored in the sub-base before discharging to the underlying ground (infiltrating) or discharging to a piped network (tanked).

2.1.2 Permeable paving, together with associated substructures, are an efficient means of managing surface water runoff close to source – intercepting runoff, reducing the volume and frequency of runoff and providing a treatment medium. Treatment processes that occur within the surface structure, the subsurface matrix (including soil layers where infiltration can occur) and the geotextile layers include:

- Filtration
- Adsorption
- Biodegradation
- sedimentation

2.2 Inspection, Maintenance Activities and Frequency

2.2.1 Refer to Table 2.2.1 below for maintenance activities and frequency for permeable paving.

Table 2.2.1: Permeable Paving Inspection, Maintenance Activities and Frequency

Maintenance Category	Maintenance Activity	Frequency	Comments
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Annually (after autumn leaf fall) or reduced frequency, as required, based on site observations of clogging or manufacturer's recommendations.	Particular attention should be paid to areas where water runs onto permeable paving from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required	
	Removal of weeds	As required – once per year on less frequently used pavements	

Maintenance Category	Maintenance Activity	Frequency	Comments
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the paving level	As required	
	Remedial work to any depressions, rutting or cracked/broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required	
	Rehabilitation of surface and upper substructure by remedial sweeping	10 – 15 years	Or as required if infiltration performance is reduced due to significant clogging
Monitoring	Initial inspection	Monthly	For minimum 3 months after installation. If required take remedial action
	Inspect for evidence of poor operation and weed growth	Quarterly, 48 hours after large storms for first 6 months	
	Inspect silt accumulation rates	Annually	
	Monitor inspection chambers	Annually	

3 Geocellular / Modular Systems

3.1 Description

- 3.1.1 Modular plastic geocellular systems with a high void ratio that can be used to create a below ground infiltration (soakaway) or storage structure.

3.2 Inspection, Maintenance Activities and Frequency

- 3.2.1 Refer to Table 4.2.1 below maintenance activities and frequency for geocellular systems.

Table 4.2.1: Geocellular System Inspection, Maintenance Activities and Frequency

Maintenance Category	Maintenance Activity	Frequency	Comments
Regular Maintenance	Inspect and identify any areas that are not operating correctly,	Monthly for 3 months, then 6 monthly	If required, take remedial action.
	Debris removal from catchment surface (where may cause risk to performance)	Monthly	
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter.	Monthly (and after large storms)	Remove and replace surface infiltration medium as necessary
	Remove sediment from pre-treatment structures	Annually or as required	
Remedial Actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required	
Monitoring	Inspect / check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms	

4 Pond

4.1 Description

- 4.1.1 Ponds are surface storage basins or facilities that provide flow control through attenuation of stormwater runoff. They also facilitate some settling of particulate pollutants. Ponds have a permanent water level with an allocation for storage in addition to the permanent water.

4.2 Inspection, Maintenance Activities and Frequency

- 4.2.1 Refer to Table 5.2.1 below maintenance activities and frequency for ponds.

Table 4.2.1: Pond Inspection, Maintenance Activities and Frequency

Maintenance Category	Maintenance Activity	Frequency	Comments
Regular Maintenance	Litter and debris removal	Monthly	
	Grass cutting - for spillways and access routes	Monthly (during growing season), or as required	
	Grass cutting – meadow grass around basin	Half yearly (spring before nesting season and autumn)	
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)	
	Tidy all dead growth before start of growing season	Annually	
	Remove sediment from inlets, outlet and forebay	Annually (or as required)	
	Manage wetland plants – where provided	Annually	
Occasional Maintenance	Re-seed areas of poor vegetation growth	Annually (or as required)	
	Prune and trim trees and remove cuttings	2 years (or as required)	
Remedial Actions	Repair of erosion or other damage by re-seeding or re-turfing	As required	
	Repair/rehabilitation of inlets, outlets and overflows	As required	

Maintenance Category	Maintenance Activity	Frequency	Comments
	Re-level uneven surfaces and reinstate design levels	As required	
Monitoring	Inspect / check all inlets, outlets and overflows for blockage and clear if required	Monthly and after large storms	
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly and after large storms	
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Half yearly	
	Check penstocks and other mechanical devices	Half yearly	
	Inspect inlets and pre-treatment components for silt accumulation.	Half yearly	Includes visual inspection of chamber (where present) & inspection of flow control.
	Check mechanical devices within chambers.	Half yearly	Includes cracking of seals on penstocks, testing Hydro- Brake by-pass door.

5 Oil Interceptor

5.1 Inspection, Maintenance Activities and Frequency

- 5.1.1 Maintenance of the oil interceptor will be required based on manufacturer's recommendations. Details will be confirmed following detailed specification. This will include periodic removal of silts and replacement of filter elements (three, six or twelve-monthly intervals depending on site conditions).

Appendix J Surface Water Drainage Statement

Surface Water Drainage Statement

In order to provide the required information on surface water drainage from the proposed development this pro-forma must be completed in full and be submitted with any planning application which seeks permission for 'major' development. This information contained in this form will be used by West Sussex County Council in its role as Lead Local Flood Authority and 'statutory consultee' on SuDs for all 'major' planning applications. The pro-forma is supported by the [Defra/EA Guidance on Rainfall Runoff Management](#) and can be completed using freely available tools including [SuDS Tools](#). The pro-forma should be considered alongside other supporting SuDS Guidance, but focuses on ensuring flood risk is not made worse elsewhere. The SuDS solution must operate effectively for as long as the development exists. This pro-forma is based upon current industry standard practice.

1. Site Details

Site	Hayes Lane, Slinfold
Address & post code or LPA reference	Hayes Lane, Slinfold, Horsham, West Sussex, England
Grid reference	TQ 11801 30715
Is the existing site developed or Greenfield?	Greenfield
Total Site Area served by drainage system (excluding open space) (Ha)*	0.9 (excludes gardens)
Topographical survey plan showing existing site layout, site levels and drainage system	Yes

* The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers & Local Authorities
Impermeable area (ha) (areas to be shown on a plan)	0	0.9	0.9	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed permeability is equal or less than existing, then section 6 can be skipped & section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)	Watercourse	Watercourse	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

PPG Paragraph 080

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible	Notes for developers & Local Authorities
Existing and proposed micro-drainage calculations	X			Please provide micro-drainage calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration		X		e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse	X			e.g. Is there a watercourse nearby? Please provide details of any watercourse to which the site drains including cross-sections of any adjacent water courses for appropriate distance upstream and downstream of the discharge point (as agreed with the LLFA and/or EA)
To surface water sewer		X		Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above		X		e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	X			Evidence must be provided to demonstrate that the proposed Sustainable Drainage proposal has had regard to the SuDS hierarchy.
Layout plan showing where the sustainable drainage infrastructure will be located on site.	X			Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

Technical Standards S2 and S3

4. Peak Discharge Rates – This is the maximum flow rate at which surface water runoff leaves the site during a particular storm event.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	Notes for developers & Local Authorities
Greenfield QBAR	23.01 (Whole Site) 5.52 (0.9ha)	N/A	N/A	Mean annual Greenfield peak flow - QBAR is approx. 1 in 2 storm events. Use that figure in Section 7a.
1 in 1	19.56 (Whole Site) 4.69 (0.9ha)	5.4	0	Proposed discharge rates (with mitigation) should be no greater than existing rates for all corresponding storm events. e.g. discharging all flow from site at the existing 1 in 100 event increases flood risk during smaller events.
1 in 30	52.93 (Whole Site) 12.69 (0.9ha)	5.6	0	
1 in 100	72.41 (Whole Site) 17.60 (0.9ha)	5.6	0	
1 in 100 plus climate change	N/A	5.9		To mitigate for climate change the proposed 1 in 100 +CC must be no greater than the existing 1 in 100 runoff rate. If not, flood risk increases under climate change should be added to the peak rainfall intensity. EA Guidance - Flood Risk Assessments: Climate Change Allowances (Published Feb 2016) https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Technical Standards S4 to S9

5. Calculate discharge volumes –The total volume of water leaving the development site for a particular rainfall event. Introducing new impermeable surfaces increases surface water runoff and may increase flood risk outside the development.

	Existing Volume (m³)	Proposed Volume (m³)	Difference (m³) (Proposed-Existing)	Notes for developers & Local Authorities
1 in 1	increase in volume due to impermeable area will be managed by limiting discharge to Qbar rates - see section 7a			Proposed discharge volumes (without mitigation) should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30				
1 in 100				

1 in 100 plus climate change		To mitigate for climate change the volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.
------------------------------	--	---

6. Calculate attenuation storage – In order to minimise the negative impact on flood risk resulting from increased volumes runoff from the proposed development, storage must be provided.

		Notes for developers & Local Authorities
Storage volume required to retain discharge rates as existing (m ³)	1155m ³	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Where will the storage be provided on site?	Basin and attenuation tank as per drawings	

7. How is Storm Water stored on site?

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The intention is to not discharge that volume into the watercourses so as not to increase flood risk elsewhere.

			Notes for developers & Local Authorities
Infiltration	State the Site's Geology/drift material overlaying)	Clay	Avoid infiltrating in made ground.
	Does the site have a high ground water table? Yes/No?	No	If yes, please provide details of the site's hydrology.
	Is the site within a known Source Protection Zones (SPZ)? Yes/No?	No	Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	N/A	Infiltration rates should be no lower than 1x10 ⁻⁶ m/s.
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	N/A	Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
	State the distance between a proposed infiltration device base and the ground water (GW) level	N/A	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.
	Were infiltration rates obtained by desk study or infiltration test?	N/A	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back-up attenuation scheme is provided.
Is infiltration feasible?	Yes/No?	No	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

7a. Storage requirements

Where infiltration is not possible, then the developer must confirm that either of the two options below will be implemented for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at **QBAR**. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers & Local Authorities
Please confirm what option has been chosen and how much storage is required on site.	Option 1: 1155m3	The developer at this stage should understand the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Additional Consideration to comply with the Technical Standards and PPG

		Notes for developers & Local Authorities
Which Drainage Systems measures have been used?	Permeable Paving, Catchpit Manholes, Trapped Gullies, By-Pass Separator and Attenuation Basin.	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C753.
How will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	Levels will direct exceedance flows along existing routes towards open space areas via highway corridors.	Safely: not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths
How are rates being restricted?	Hydrobrakes	Hydrobrakes to be used where rates are between 2l/s to 5l/s. Orifices not be used below 5l/s as the pipes may block. Pipes with flows < 2l/s are prone to blockage.
Drainage during construction period		Provide details of how drainage will be managed during the construction period including any necessary connections, impacts, diversions and erosion control.
Key Drainage components / Features	Permeable Paving, Flow controls and Attenuation Basin and attenuation tanks	Which component if blocked (even partial) will lead to flooding?

Technical Standards S10 to S12

9. Management and Maintenance of SuDs

Details are required to be provided of the management and maintenance plan for the SUD, including for the individual plots in perpetuity.

How is the entire drainage system to be maintained in perpetuity?	See Management plan provided.	Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided to show that all parts of SuDs are effective and robust. Provide a management plan to describe the SUDS scheme and set out the management objectives for the site. It should consider how the SuDs will perform and develop over time anticipating any additional maintenance tasks to ensure the system continues to perform as designed. — Specification notes that describe how work is to be undertaken and the materials to be used. — A maintenance schedule describes what work is to be done and when it is to be done using frequency and performance requirements as appropriate. — A site plan showing maintenance areas, control points and outfalls. Responsibility for the management and maintenance of each element of the SUDS scheme will also need to be detailed within the Management Plan. Where open water is involved please provide a health and safety plan within the management plan.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	Individual property owners for on-plot drainage. Southern Water for piped drainage network elements and Client appointed management company for the remainder	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma. Please give details of each feature and how it will be managed in accordance with the details in the management plan.
Please provide details demonstrating that any third party agreements required using land outside the application site have been secured.	N/A	

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.....Tom Butler.....

Qualification of person responsible for signing off this pro-formaEngTech MICE.....

Company.....Charles & Associates.....

On behalf of (Client's details)The Incidental Land Company.....

Date:.....June 2025.....

Appendix K LLFA Response

Sam Whitehouse
Development Control
Horsham District Council
Parkside
Chart Way
Horsham
West Sussex
RH12 1RL

**Lead Local Flood Authority
Ground Floor
Northleigh
County Hall
Chichester
West Sussex
PO19 1RH**

Date 18 March 2026

Planning Reference: **DC/25/2006**

Site Address: **Land East of 1 To 25 Hayes Lane Slinfold West Sussex**

Planning Description: **Outline application with all matters to be reserved except for access and layout, for the erection of 38no. dwellings, (including 13no. on-site affordable housing units), together with access from Hayes Lane, vehicle and cycle parking, landscaping, open space and play provision, sustainable drainage, and re-alignment of Public Right of Way No.3782**

Dear Sam,

Thank you for your consultation on the above site, received on 02 January 2026. For this consultation, we have reviewed the following documents submitted:

- Flood Risk Assessment & Drainage Strategy | prepared by C&A Consulting Engineers | dated August 2025 | Ref: 22-001-003 | Rev A

The applicant has provided a Flood Risk Assessment (FRA) and Drainage Strategy to account for the local flood risk issues and surface water drainage at this location. Following a review of the submitted documents, the details are in accordance with NPPF and local planning policies of Horsham District Council.

Pre-application advice was provided to the applicant that highlighted the LLFAs flood risk concerns and provided guidance on the expected detail required at Outline planning stage. The applicant has provided a detailed FRA and Drainage Strategy that addresses the LLFAs concerns. The FRA acknowledges the surface water flood risk to the east of the site and ensures that no development will be located within this area of risk. It is also noted that the attenuation basin and storage will be located outside of this risk.

We have **no objection subject to conditions being attached to any consent** if this application is approved, and the Applicant is in agreement with pre-commencement conditions. We suggest the following wording. If the following conditions are not included, the development would be contrary to NPPF and local

planning policy and we would **object** until such time that the details below are submitted for review.

Condition 1:

Prior to or in conjunction with the submission of each reserved matters application, in accordance with the approved Flood Risk Assessment and Drainage Strategy (Ref: 22-001-003, Rev A, dated August 2025), detailed designs of a surface water drainage scheme incorporating the following measures shall be submitted to and agreed with the Local Planning Authority. The approved scheme will be implemented prior to the first occupation of the development. The scheme shall address the following matters:

- I. Surface water runoff rates will be attenuated to the QBAR rates of 5.9l/s for the entire site as stated within Section 7 of the FRA and Drainage Strategy. This should be evidence with detailed modelling calculations that use the latest rainfall data, appropriate climate change allowances and include a 10% allowance for urban creep.
- II. Provision of surface water attenuation storage, sized and designed to accommodate the volume of water generated in all rainfall events up to and including the critical storm duration for the 3.33% AEP (1 in 30 year) and 1% AEP (1 in 100) rainfall events (both including allowances for climate change). Priority should be given to open features and underground storage tanks should only be used where open features are not suitable.
- III. Detailed designs, modelling calculations and plans of the drainage conveyance network in the:
 - a. 3.33% AEP (1 in 30 year) critical rainfall event plus climate change to show no flooding outside the drainage features on any part of the site.
 - b. 1% AEP (1 in 100 year) critical rainfall plus climate change event to show, if any, the depth, volume and storage location of any flooding outside the drainage features, ensuring that flooding does not occur in any part of a building or any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development. It will also show that no runoff during this event will leave the site uncontrolled.
 - c. Calculations simulating a submerged should also be provided to ensure no flooding occurs outside of the drainage network within the 3.33% (plus climate change) event and any flooding occurring in the 1% (plus climate change) event is stored safely on site as outlined in points a and b.
- IV. The design of the attenuation basin will incorporate an emergency spillway and any drainage structures include appropriate freeboard allowances. Plans to be submitted showing the routes for the management of exceedance surface water flow routes that minimise the risk to people and property during rainfall events in excess of 1% AEP (1 in 100) rainfall event plus climate change allowance.

- V. Finished ground floor levels of properties are a minimum of 300mm above expected flood levels of all sources of flooding (including the ordinary watercourses, SuDS features and within any proposed drainage scheme) or 150mm above ground level, whichever is the more precautionary.
- VI. Details of how all surface water management features to be designed in accordance with The SuDS Manual (CIRIA C753, 2015), including appropriate treatment stages for water quality prior to discharge.

Reason:

To prevent flooding in accordance with National Planning Policy Framework paragraphs 181, 182 and 187 by ensuring the satisfactory management of local sources of flooding surface water flow paths, storage and disposal of surface water from the site in a range of rainfall events and ensuring the SuDS proposed operates as designed for the lifetime of the development.

Condition 2:

Prior to or in conjunction with the submission of each Reserved Matters application a detailed Site SuDS Phase plan which aligns with the site phasing plan shall be submitted to and approved in writing by the Local Planning Authority. This SuDS Phasing plan shall ensure that each phase does not exceed the agreed discharge rates for that phase and that source control measures are installed within each phase to adequately address the phases own surface water runoff. The plan shall ensure that each SuDS component is adequately protected throughout the development of the scheme. The plan shall show all exceedance routes throughout the site clearance and construction of the scheme ensuring flood risk is not increased elsewhere or to the site itself and that the site remains safe for all exceedance event flow routes for the lifetime of the development during rainfall (i.e. greater than design events or during blockage) and how property on and off site will be protected.

Reason: To ensure that the development achieves a high standard of sustainability and ensure the flood risk is adequately addressed for each new dwelling and not increased in accordance with NPPF and Policies of Horsham District Council.

Condition 3:

Construction shall not begin until a detailed construction phase surface water management plan for the site has been submitted to and approved in writing by the Local Planning Authority. The scheme shall subsequently be carried out in accordance with the approved details.

Reason: To ensure that the construction of the site does not result in any flooding both on and off site and that all Surface water Drainage features are adequately protected.

Condition 4:

The development hereby approved shall not be occupied until details of the maintenance and management of the sustainable drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The

drainage scheme shall be implemented prior to the first occupation of the development hereby approved and thereafter managed and maintained in accordance with the approved details in perpetuity. The Local Planning Authority shall be granted access to inspect the sustainable drainage scheme for the lifetime of the development. The details of the scheme to be submitted for approval shall include:

- I. a timetable for its implementation.
- II. details of SuDS feature and connecting drainage structures and maintenance requirement for each aspect including a drawing showing where they are located.
- III. a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime. This will include the name and contact details of any appointed management company.

Reason: To ensure that the development achieves a high standard of sustainability and ensure the flood risk is adequately addressed for each new dwelling and not increased in accordance with NPPF and Policies of Horsham District Council.

Condition 5:

Prior to first use of each phase of the development a detailed verification report, (appended with substantiating evidence demonstrating the approved construction details and specifications have been implemented in accordance with the surface water drainage scheme), has been submitted to and approved (in writing) by the Local Planning Authority. The verification report shall include a full set of “as built” drawings plus photographs of excavations (including soil profiles/horizons), any installation of any surface water drainage structures and control mechanisms.

Reason: To ensure that the development achieves a high standard of sustainability and ensure the flood risk is adequately addressed for each new dwelling and not increased in accordance with NPPF and Policies of Horsham District Council.

Informative:

Erection of flow control structures or any culverting of an ordinary watercourse requires consent from the appropriate authority, which in this instance is West Sussex Lead Local Flood Authority. It is advised to discuss proposals for any works at an early stage of proposals.

Yours sincerely

Flood Risk Management Team