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# Land north of Balcombe Road, Haywards Heath: Outline Drainage Strategy

P25012\_R2  
December 2025



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## Document Control

### Title

Land north of Balcombe Road, Haywards Heath: Outline Drainage Strategy

### Client

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# 1. Introduction

## 1.1. Instruction

Aqua Terra Consultants Ltd (Aqua Terra) was instructed by Fairfax Acquisitions Ltd (the Client) on behalf of SDP to provide an Outline Drainage (SuDS) Strategy to support a residential led development on a parcel of land north of Balcombe Road, Haywards Heath (the Site).

## 1.2. Background

The SuDS Strategy is to support an outline planning application for the erection of up to 125 dwellings, together with the provision of landscaping, open space, and associated development works, with access from Balcombe Road. An illustrative masterplan depicting the proposed development was provided to Aqua Terra which is included as Figure 3-1.

## 1.3. Scope

This report provides an outline SuDS strategy to mitigate the potential increase in runoff and deterioration in water quality as well as providing amenity and biodiversity benefits as a result of the proposed development. The scope of work undertaken for this assessment includes the following:

- Review of the baseline hydrology, hydrogeology and flood risk for the Site;
- Review of national, regional and local guidance and policies on surface water management;
- Details of the proposed development and outline planning application;
- Estimated surface water runoff rates and preliminary attenuation storage requirements;
- Assessment of potential surface water runoff destinations;
- An appraisal of potentially feasible SuDS features for the Site; and,
- An outline SuDS strategy for managing surface water runoff from the proposed development.

## 1.4. Data Sources

The information and assessments in this report are predominantly based on secondary data analyses associated with both the Site itself and the surrounding land area. The main sources of data utilised in this assessment are summarised below:

- The proposed development plans as provided by the Client;
- LiDAR Digital Terrain Model (DTM) data obtained through data.gov.uk (DeFRA, 2020-22);
- Environment Agency (EA) flood risk data (Flood map for planning) obtained through data.gov.uk (Environment Agency, 2025);
- Soilsclapes soil mapping (Cranfield Soil and AgriFood Institute, 2024);
- British Geological Survey (BGS) 1:50,000 scale mapping and borehole logs (British Geological Society, 2025);
- Hydrological descriptor data from the Flood Estimation Handbook (FEH) website (CEH, 2025);
- Mid Sussex District Plan 2014-2031 (Mid Sussex District Council, 2018);
- Mid Sussex Strategic Flood Risk Assessment Level 1 (aegaea, 2024);
- West Sussex Preliminary Flood Risk Assessment (West Sussex County Council, 2011);
- West Sussex Local Flood Risk Management Strategy: 2015 - 2030 (West Sussex County Council, 2025); and,
- Land north of Balcombe Road, Farm: Flood Risk Assessment (Aqua Terra Consultants Ltd, 2025).

## 1.5. Limitations

This report is written strictly for the benefit of the Client and bound by the conditions presented in Appendix A.

## 2. Site setting

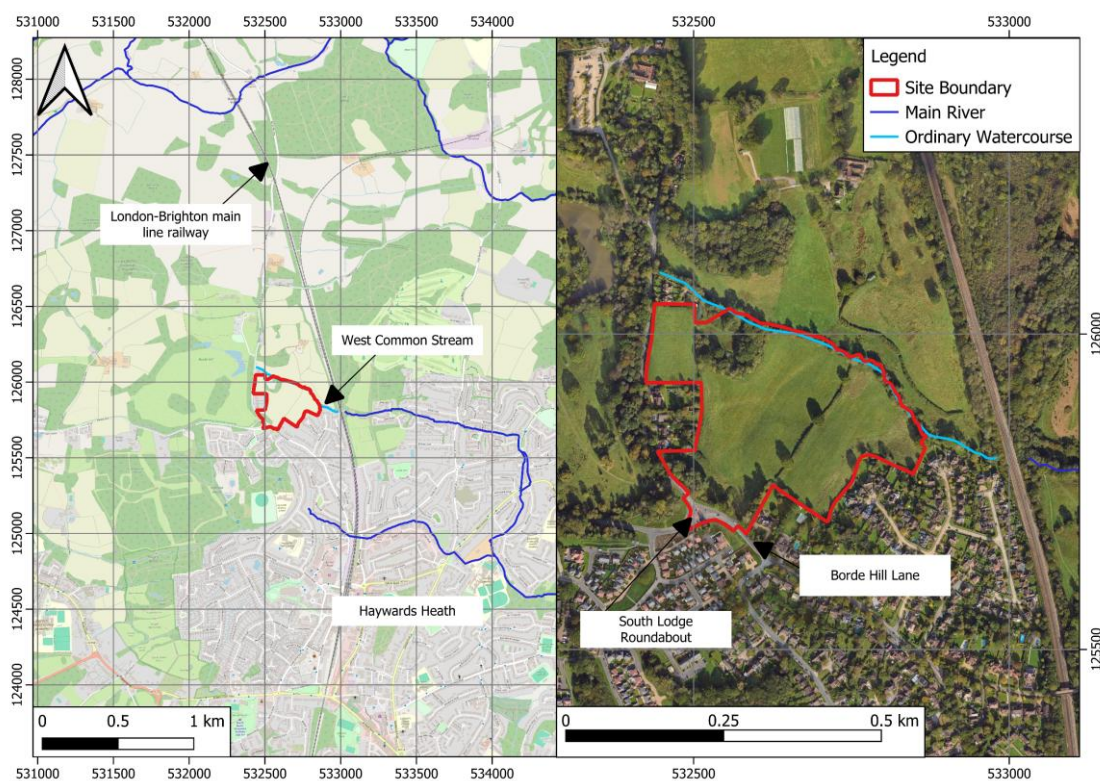
The following section collates and presents available information pertinent to the Site and its local environs.

### 2.1. Site location and description

The Site is located on the outskirts of Haywards Heath as shown in Figure 2-1, between Borde Hill Lane and the London-Brighton main railway line. The National Grid Reference for the approximate centre of the Site is 532685, 125872.

The Site currently comprises predominantly agricultural land with small areas of woodland and covers an approximate area of 9.4 ha. There is a small watercourse (West Common Stream) located along the northern boundary of the Site, flowing north-west to south-east.

Figure 2-1 Site location



Contains Open Street Map data © OpenStreetMap and Bing Aerial imagery © Microsoft

### 2.2. Topography and current drainage arrangements

Figure 2-2 presents LiDAR topographical data. Ground elevations in the area around the Site slope generally north-eastwards. The ground elevation at the Site falls from approximately 76.0m above Ordnance Datum (m aOD) in the southwest to a minimum of approximately 50.7m aOD in the northeast, where West Common Stream leaves the Site. Topographic survey was completed for the Site by Marvin & Partners Limited in 2023 and is provided in Appendix B.

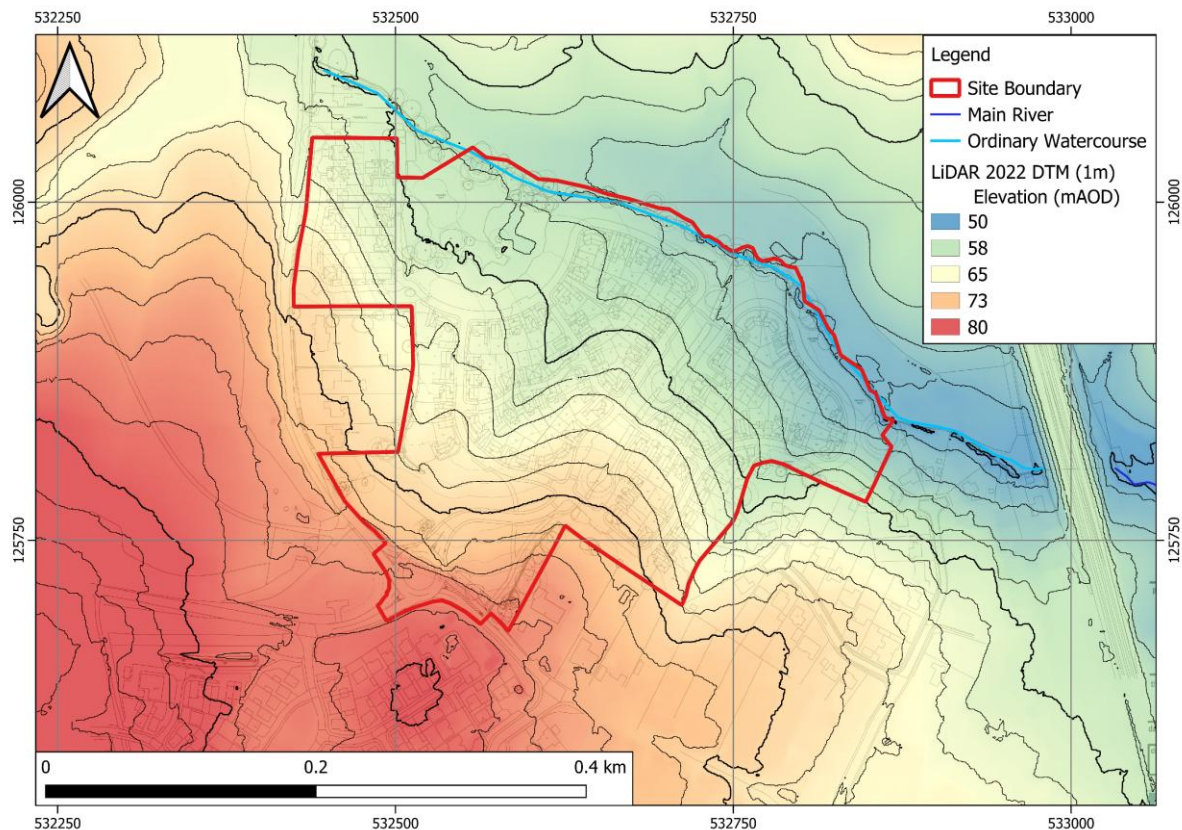
At present, the Site does not have a formal drainage system and surface water runoff will either infiltrate or flow overland with the topography towards West Common Stream. Figure 2-3 shows the



surface water flood risk areas across the Site which give a good indication of the likely drainage paths across the Site. The Flood Risk Assessment describes these flow paths and mitigation measures to ensure that the development will remain safe during its lifetime.

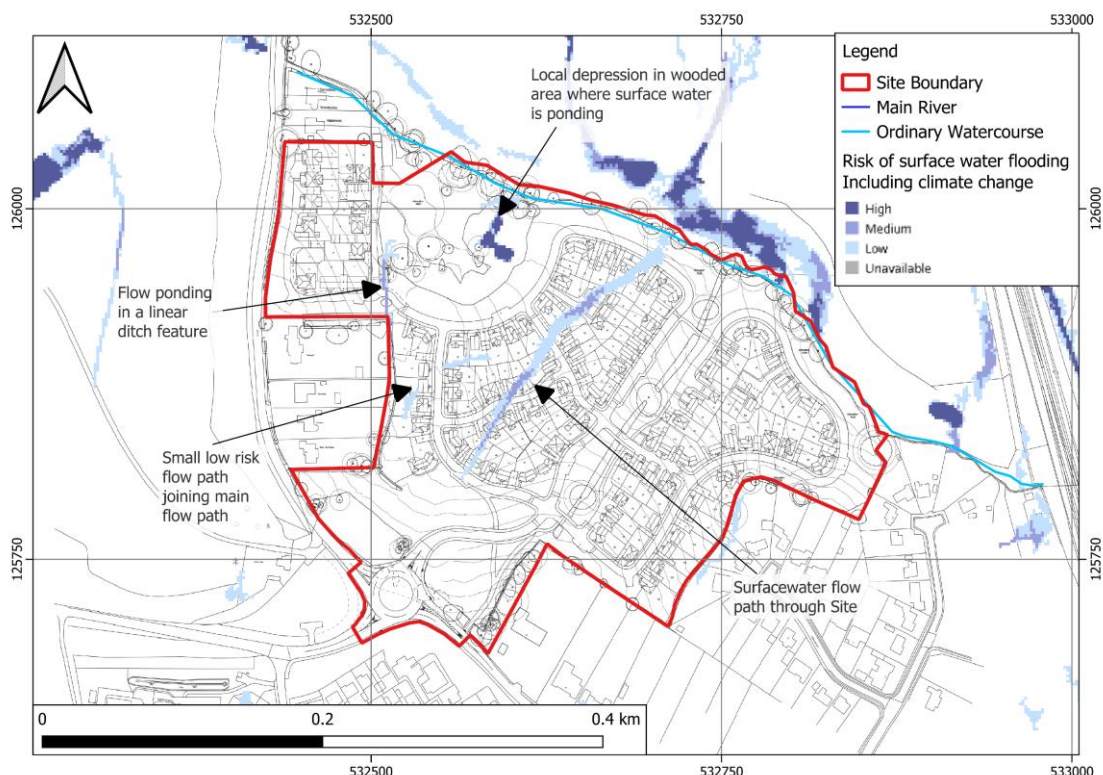
Public sewer asset plans (see Appendix C) confirm that there are no existing public sewers crossing the Site. The nearest accessible foul sewer is in Balcombe Road to the south of the Site, however it is understood that works are in progress for Borde Hill Estate to for sewerage connection works which will include foul water rising main adjacent to South Lodge Roundabout.

Figure 2-2 Existing ground elevations from LiDAR data



Contains Open Street Map data © OpenStreetMap

Figure 2-3 Risk of flooding from surface water



## 2.3. Soils, geology and hydrogeology

### 2.3.1. Published soils and geology

A review of British Geological Survey (BGS) 1:50,000 scale mapping (Reigate, Sheet 286) indicates the geological sequence underlying the Site is as follows:

- Soils: Slightly acid loamy and clayey soils with impeded drainage across the Site.
- Superficial geology (see Figure 2-4): None across the majority of the Site, a narrow band of Head Deposits (clay, silt and gravel) runs across the northern boundary and north-eastern corner, following the path of the watercourse.
- Solid geology (see Figure 2-5): Predominantly the Wadhurst Clay Formation (mudstone) across the northern half of the Site. The Cuckfield Stone Bed (sandstone) lies across the southern half of the Site, with small areas of the Upper Tunbridge Wells Sand (sandstone and siltstone) and Lower Tunbridge Wells Sand (sandstone, siltstone and mudstone).

There are no historical borehole logs within the Site based on the BGS database, however borehole TQ32NW9 is located 700m to the southeast, on the Upper Tunbridge wells sands confirms layers of Clay & Sandstone, Blue Clay, Sandy Clay and Sandstone & Clay to a depth of 30.5m. Water was struck at a depth of 26.2m, with the rest level rising to 23.2m.

Figure 2-4 Superficial deposits

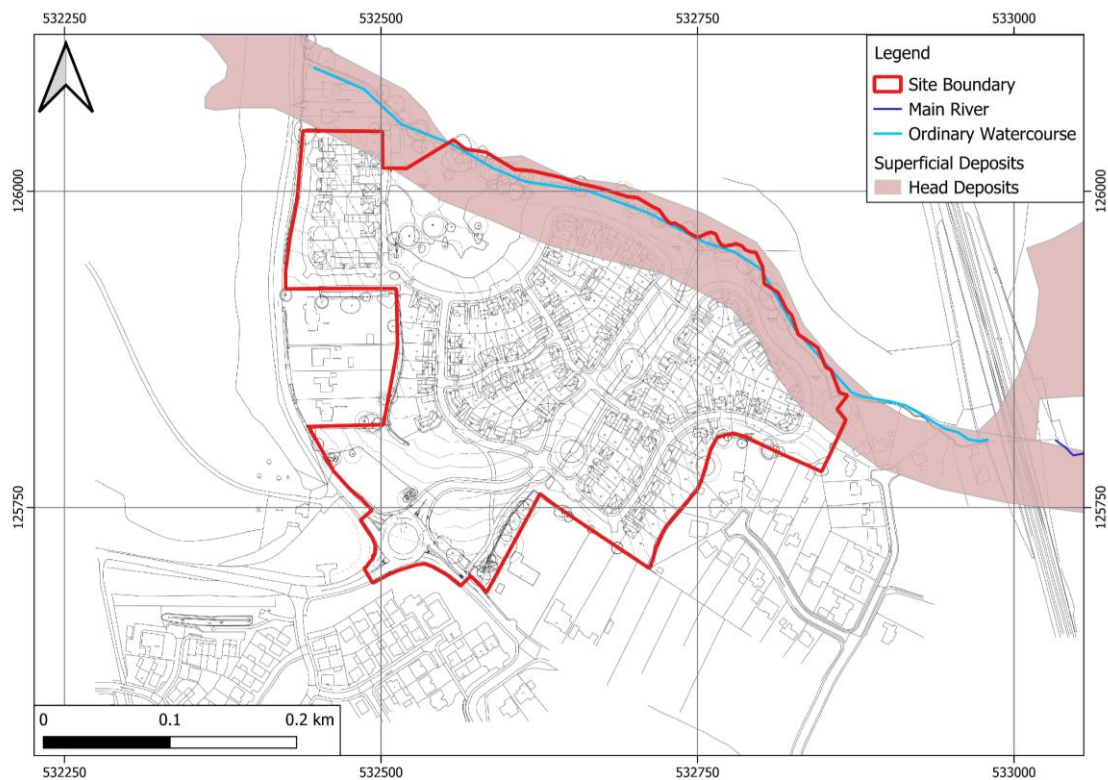
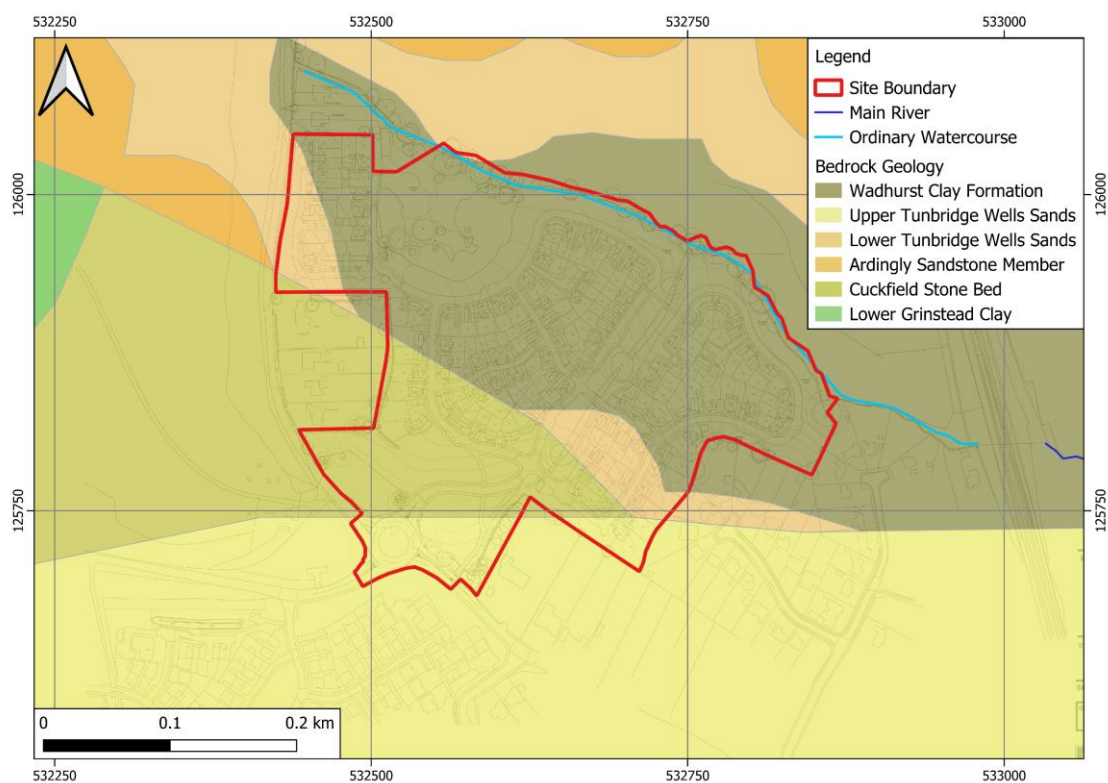


Figure 2-5 Bedrock Geology





### 2.3.2. Hydrogeology

The Head Deposits, along the northern boundary of the Site, are classified as a Secondary (undifferentiated) aquifer. The Cuckfield Stone Bed, Upper Tunbridge Wells Sand and Lower Tunbridge Wells Sand, across the southern half of the Site, are classified as Secondary A aquifers. The Wadhurst Clay Formation which covers the northern half of the Site is classified as unproductive strata.

Mapping indicates that the southern half of the Site is designated as high Groundwater Vulnerability. The land along West Common Stream is classified as having low Groundwater Vulnerability

The Water Framework Directive (WFD) classifies the Adur and Ouse Hastings Beds groundwater body as having an overall, quantitative and chemical rating of good in 2022. The Site does not lie within a source protection zone.

### 2.4. Hydrology

Hydrological descriptors for the Site are provided in Table 2-1.

*Table 2-1 Hydrological point descriptors*

| Descriptor | Value            |
|------------|------------------|
| NGR        | TQ 532625 125852 |
| BFIHOST19  | 0.437            |
| PROPWET    | 0.36             |
| SAAR6190   | 829 mm           |

There are several ponds and lakes in the surrounding area, the closest being Robertsmere Lake 70m west of the Site, on West Common Stream. West Common Stream, an Ordinary watercourse as it passes along the boundary of the Site, is classified as a Main River downstream of the railway line, and flows into Scrase Stream approximately 2km downstream of the Site.

The Site lies within the Scrase Bridge Stream at Haywards Heath water body, which is classified under the WFD as having an ecological rating of moderate in 2022 and a chemical rating of 'fail'. Reasons for not achieving a good ecological status are due to physical modifications and pollution from waste water, and for chemical status due to failing levels of mercury and it's compounds and polybrominated diphenyl ethers (PBDE).



### 3. Proposed development

The Proposed Development comprises the erection of up to 125 dwellings, together with the provision of landscaping, open space, and associated development works, with access from South Lodge Roundabout.

An illustrative masterplan of the proposed development has been supplied to Aqua Terra and is presented in Figure 3-1 and in Appendix D.

*Figure 3-1 Illustrative masterplan*



Source: Paul Hewett (November 2025)

## 4. Sustainable Drainage (SuDS) Strategy

The NPPF stipulates that all new developments must be “safe, without increasing flood risk elsewhere”. The National Standards for Sustainable Drainage Systems (HM Government, 2025) expand on these principles by setting a clear hierarchy for runoff destinations and defining seven technical standards covering runoff control, management of everyday and extreme rainfall, water quality, amenity, biodiversity and consideration of structural design, construction and long-term maintenance.

The proposed drainage design is described under Section 4.1 with subsequent sections covering each of the 7 standards that are required to be demonstrated for all SuDS schemes.

### 4.1. Proposed Drainage Design

An outline SuDS Strategy has been drafted and includes at source controls through porous paving acting as attenuation storage on some of the low traffic and communal parking areas, leading to three detention basins, located throughout the Site before discharging to West Common Stream at the 50% AEP greenfield runoff rate for all storm events up to the design storm.

#### 4.1.1. Assessment of catchment areas

The Site has been split into catchments (see Figure 4-1) based on topography and the layout of the development. The positively drained area for each sub-catchment has been calculated as follows:

**Positively drained area =**

- Public adoptable areas (such as roads, footpaths) +
- 1.1\* Private non-adoptable areas (roofs, driveways and paths) +
- Footprint of key Suds features (such as detention basins) +
- 0.3\*Remaining greenfield area (excluding large open public areas) +

This ensures that urban creep (at 10%) is accounted for in non-adoptable impermeable areas, and an allowance for greenfield runoff that may be intercepted by the drainage network. Figure 4-2 shows the proposed adoptable and non-adoptable areas on Site, along with proposed permeable paving (located only on adoptable areas).

In order to mitigate potential surface water flood risk identified within the Flood Risk Assessment, runoff from the full southern catchment is proposed to be captured via additional gullies within the road network. Therefore the full remaining greenfield area (rather than 30%) has been assumed to ensure there is sufficient capacity within the receiving storage elements for this additional runoff.

Appendix E provides details of how the positively drained area has been calculated for each catchment. ReFH2 hydrographs representing the greenfield areas have been applied to each catchment upstream of respective key SuDS features.

The total positively drained area for the Site is 5.80 ha

Figure 4-1 Urban catchments

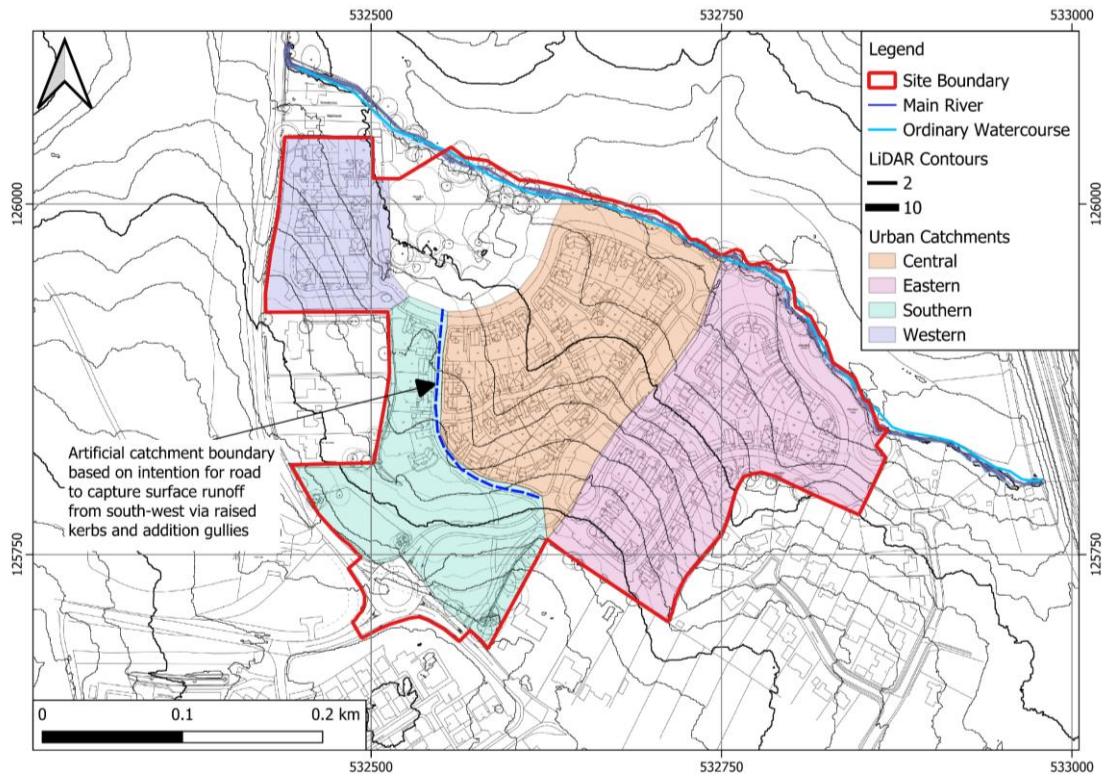
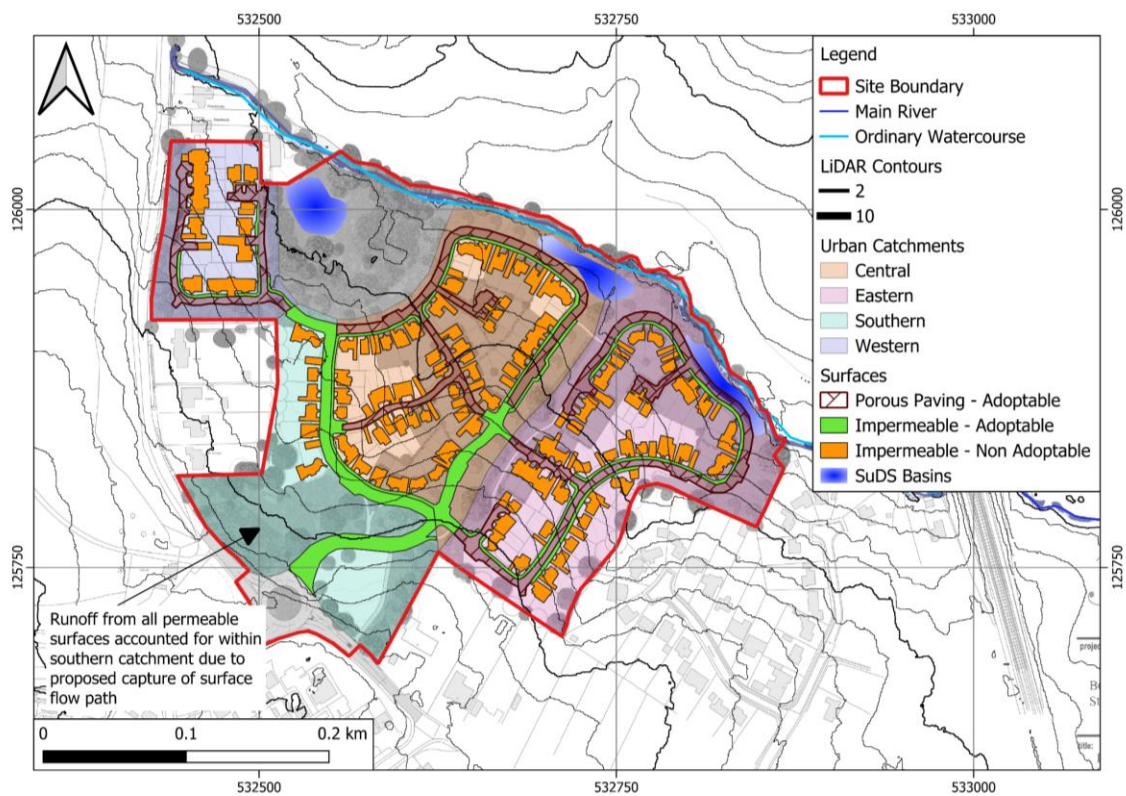


Figure 4-2 Adoptable and non-adoptable areas on Site





#### **4.1.2. Proposed storage and control elements**

Porous paving has been proposed for low traffic roads and communal parking areas (as indicated in Figure 4-4). Areas of porous paving have been assumed to have a 35% porosity and a depth of 0.45m. Orifices have been used as flow controls on the porous paving areas to limit flow rates passing onto downstream detention basins. At this stage in the design, porous paving areas have been amalgamated and therefore the orifice dimensions presented in the hydraulic calculations may not be representative of what will be required when areas of porous paving are sub-divided to enable stepped storage areas accounting for the slope of the Site. As part of the detailed design orifices smaller than 0.05m in diameters must be robustly protected from blockage risk as per the National SuDS Standards. It is proposed that the porous paving could be left un-lined to allow any potential infiltration to occur, as nearby boreholes suggest depth to groundwater is significant. Infiltration is however likely to be limited due to the Wadhurst Clay underlying the northern portion of the Site.

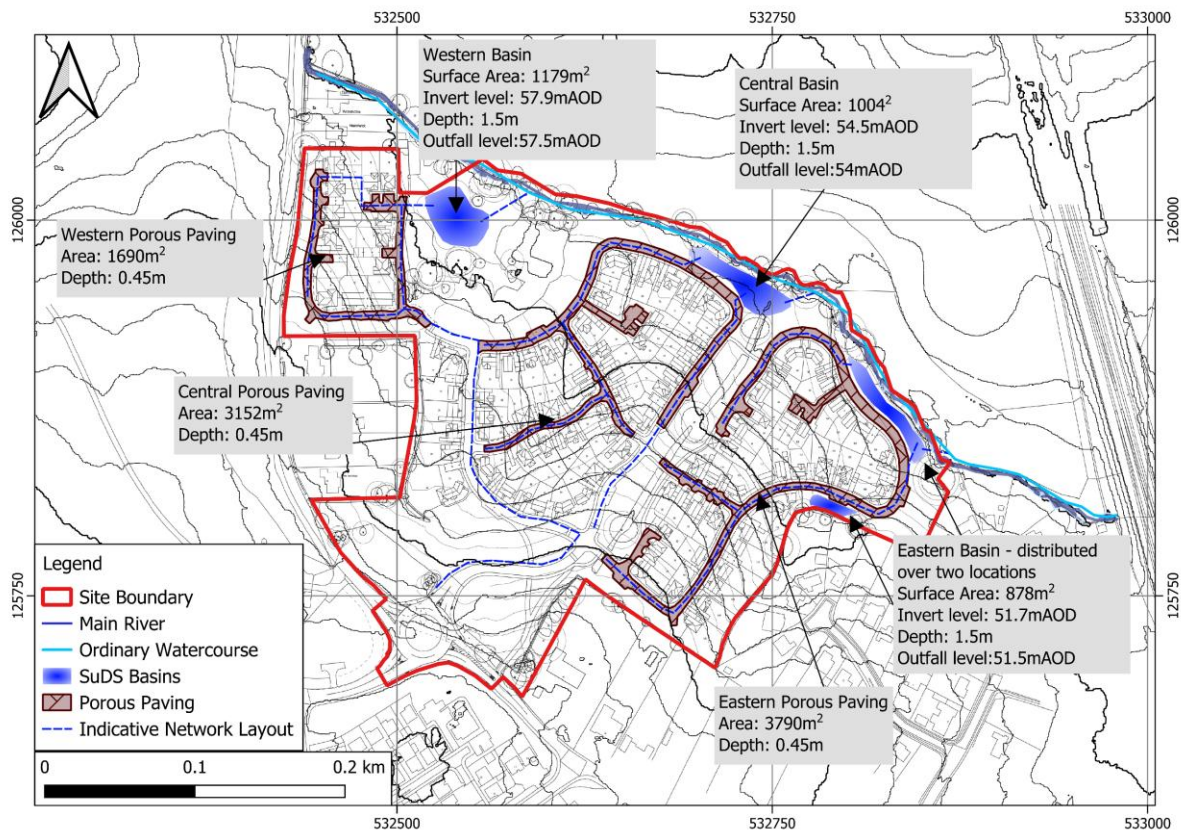
Four detention basins are proposed. The eastern catchment is served by two detention basins of which the upper basin will feed into the lower basin. A single basin has been used to represent the joint capacity of both these basins within the outline drainage calculations. A single detention basin serves the central catchment. The western detention basin serves both the southern and western catchments. Detention basins have been designed with an overall depth of 1.5m, and side slopes of 1:4. Each basin includes a hydrobrake to control discharge to West Common Stream.

As the layout plans for the Site progress, the required storage could be distributed over additional features such as rain gardens or tree pits adjacent to the larger roads to comprise a "SuDS train" within the Site.

Figure 4-3 details the location and key properties of SuDS features. A detailed assessment of outfall invert levels has been undertaken in Section 4.2.3. Details of the modelled scheme in the form of a Causeway Flow report are provided in Appendix F.



Figure 4-3 Properties of key SuDS features



#### 4.1.3. Performance calculation parameters

Causeway Flow has been used to model the proposed drainage design using a source control approach – therefore not all details have been provided but rather the model has been used to confirm that the overall storage provision on Site is sufficient.

For each sub-catchment four inflows have been considered:

1. Rainfall landing directly on porous paving areas, and an equal contribution from neighbouring impermeable surfaces (such as residential roofs). This is routed to the detention basins via a porous paving storage unit.
2. Rainfall landing on remaining impermeable surfaces that have not been assumed to be able to be routed via a porous paving storage unit. This is routed direct to the detention basin
3. Rainfall landing directly on the detention basin
4. A ReFH2 hydrograph routed direct to the detention basin representing runoff from 30% of the permeable surfaces within the catchment (Note this is 100% for the 'southern' catchment as described in Section 4.1.1).

The assumption that each porous paving area can accept up to an equal contribution from adjacent impermeable surfaces is considered acceptable at the outline drainage stage.

Key model parameters are as follows:

- Model run for the 50%, 3.3% and 100% AEP events with a 40% and 45% allowance for climate change for the 3.3% and 100% AEP events respectively, representing the upper end peak rainfall climate change allowance for the Adur and Ouse Management Catchment

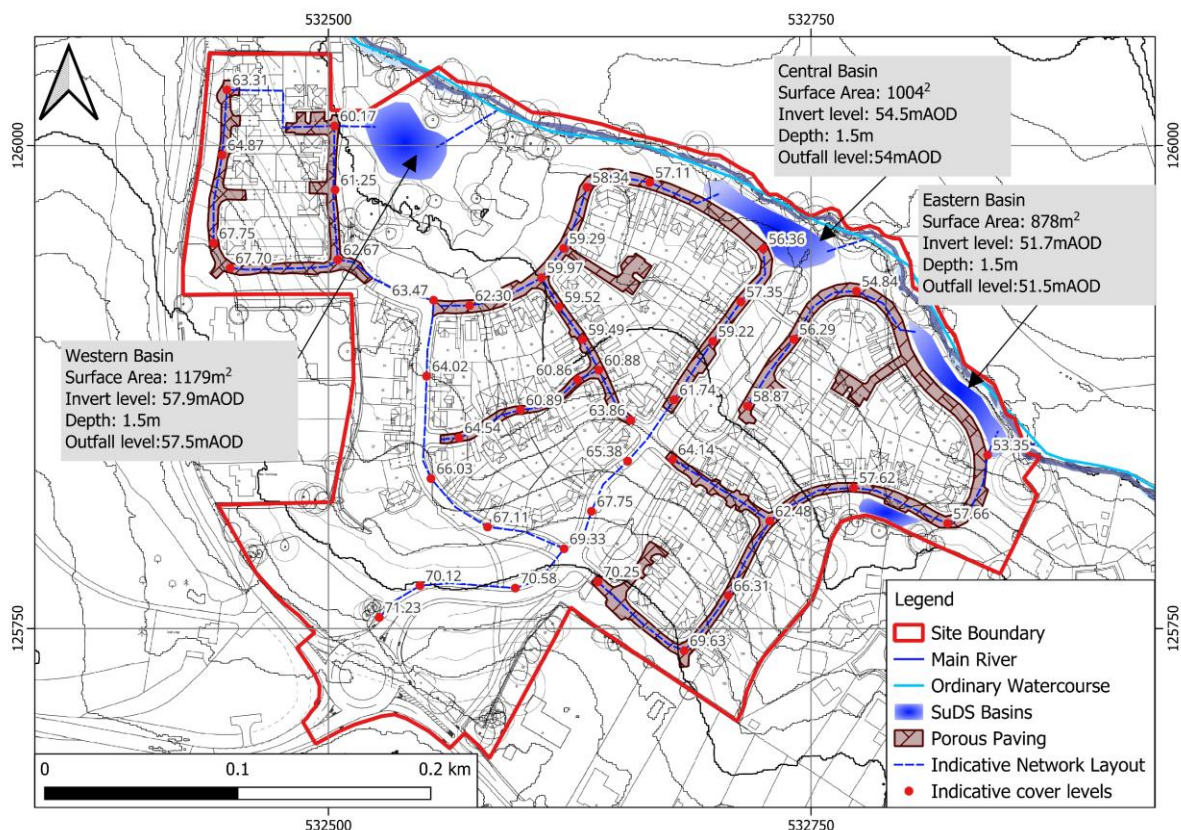
- FEH22 rainfall profiles used, with full range of storm durations from 15 minutes to 1,440 minutes
- Volumetric runoff coefficient set to 1 for both winter and summer storms to represent capture of all runoff from impermeable surfaces
- No infiltration has been assumed for any of the SuDS features

The results from the modelling are presented under the relevant standards, with a detailed output report from Causeway Flow presented in Appendix F.

#### 4.1.4. Feasibility of design

Whilst the performance calculations undertaken provide a simplified representation of the proposed drainage system, in particular with reference to the exclusion of the piped network and relevant invert / cover levels, slopes across the Site are sufficient that a gravity fed system should be possible across the Site and no pumping has been proposed. Figure 4-4 details likely cover levels along proposed drainage routes based on topography, and proposed invert levels for basins and outfalls to demonstrate that the design is feasible. Further assessment of the proposed outfall locations is presented in Section 4.2.4.

Figure 4-4 Proposed cover levels and basin invert / outfall levels



## 4.2. Standard 1: Runoff Destinations

Surface water runoff must be disposed of according to a hierarchy of destinations as follows:

- Priority 1: collected for non-potable use
- Priority 2: Infiltrated to ground
- Priority 3: Discharged to an above ground surface water body
- Priority 4: Discharged to a surface water sewer, or another piped surface water drainage system
- Priority 5: Discharged to a combined sewer

The suitability of each of these options is discussed below.

### 4.2.1. Water re-use

Water re-use (i.e. the use of water butts or more sophisticated tank systems to capture rainwater for re-use) could be implemented at the Site. These sites collect water from clean surfaces (such as rooftops) for (generally non-potable) use on Site.

Rainwater harvesting is particularly useful at Sites with a low infiltration potential and limited space for attenuation features. It also has wider sustainability benefits with regards to lowering the water supply demand. It is anticipated that water re-use will be incorporated as part of the detailed drainage design however they have not been included in the outline strategy to ensure the system has sufficient capacity.

### 4.2.2. Infiltration to ground

The majority of the Site, and in particular the lower slopes of the Site where the main infiltration basins would be required, if infiltration were to be feasible, is underlain by Wadhurst Clay. It is therefore considered that infiltration alone will not be sufficient for discharging surface runoff. There is potential that SuDS features in the southern portion of the Site, underlain by Cuckfield Stone Bed and Upper Tunbridge Wells Sands may have some infiltration potential, and therefore it is proposed that all features are unlined to maximise this potential. The detailed design should include infiltration testing in these regions to determine a likely infiltration rate for inclusion in the detailed assessment.

The current assessment has conservatively assumed no infiltration in order to ensure that storage features are suitably sized if infiltration is found not to be feasible, even in small quantities.

### 4.2.3. Discharge to surface water body

Discharge of runoff at restricted rates to West Common Stream along the northern boundary of the Site is a feasible destination for surface runoff from the Site. Three separate discharge outfalls are proposed, one for each detention basin. A condition survey of the stream should be undertaken to confirm that water can freely flow within the stream without obstruction.

Figure 4-5 to Figure 4-7 show cross-section profiles through each proposed basin location. This demonstrates that the proposed elevations for each basin will allow discharge to West Common stream. The eastern basin is fairly tight, with requirements for banking the lower edge of the basin, therefore the detailed design should assess the potential for including additional attenuation features higher within the catchment to reduce the storage requirements for the detention basin.

Any connection to the West Common Stream is likely to require Ordinary Watercourse Consent.

Figure 4-5 Cross-section profile through western basin

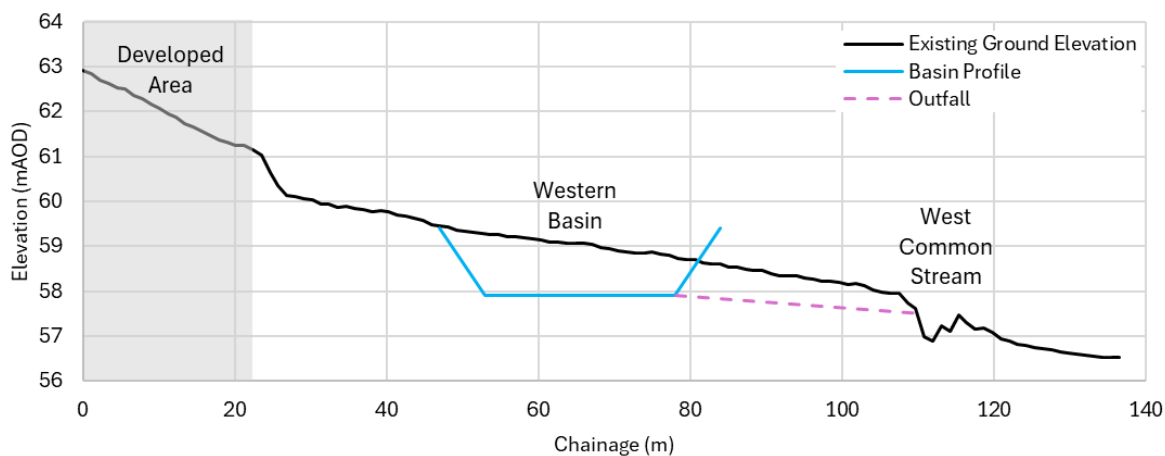


Figure 4-6 Cross-section profile through central basin

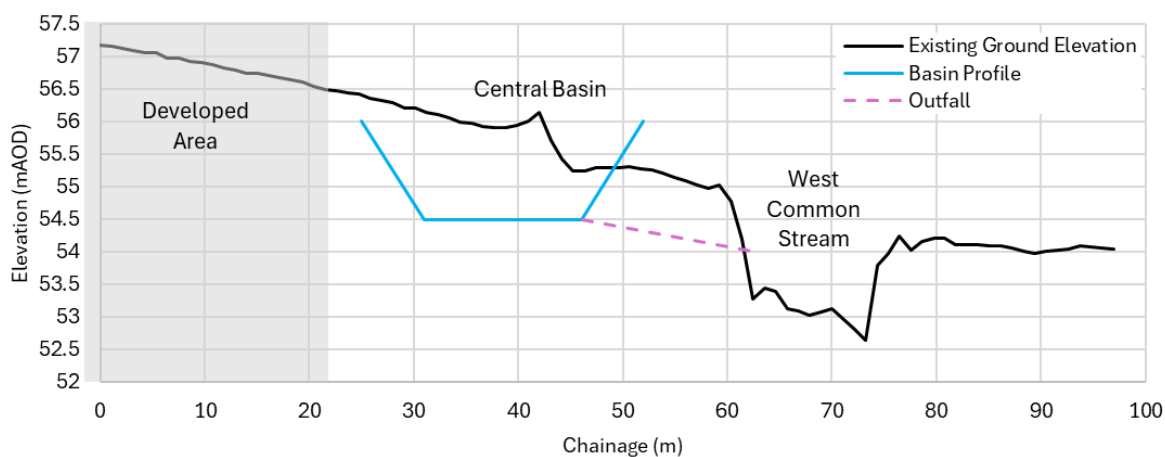
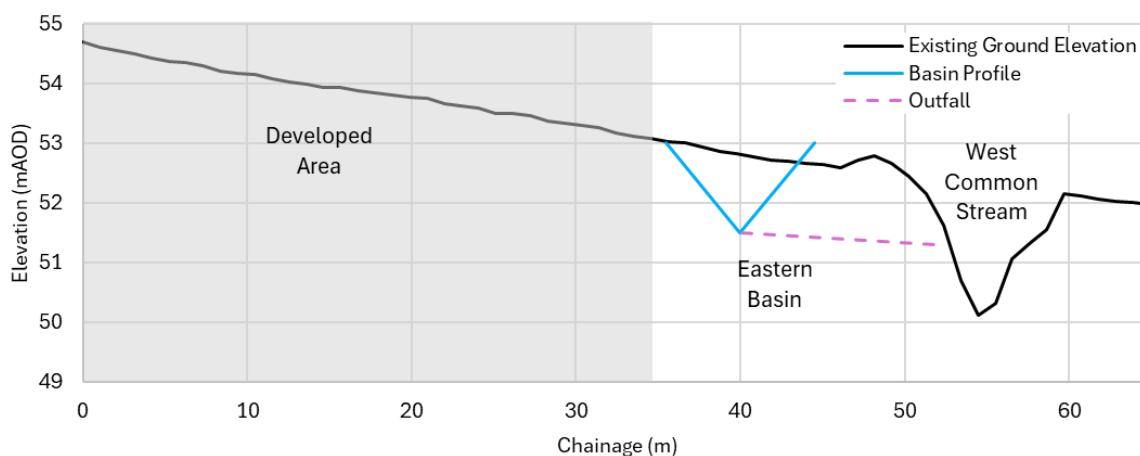


Figure 4-7 Cross-section profile through eastern basin





#### 4.2.4. Discharge to surface water drains and/or combined drain

Given the likely feasibility of discharging to a surface water body, this option would unlikely be used in this instance.

### 4.3. Standard 2: Management of everyday rainfall

Drainage schemes should ensure that at least the first 5mm of rainfall for the majority of rainfall events does not result in runoff from the site to surface waters or piped drainage systems. Runoff from positively drained surfaces, for at least 5mm of rainfall must either be collected for use, infiltrated into the ground, or else captured, conveyed and stored within SuDS features where these features will naturally absorb or retain runoff and therefore not discharge off the Site.

Due to infiltration not being possible / extremely limited on Site, managing the first 5mm of rainfall through infiltration alone is not possible.

The National SuDS standards state that compliance with standard 2 can be assumed for unlined permeable surfaces, for all soil types, which drain an adjacent impermeable area if the additional impermeable area is no greater than the permeable area. This is a constraint that has been used within the drainage design and therefore all flow draining via the porous paving features is deemed to be compliant.

Detention basins with a flat unlined base, where there is not specific provision for routing low flows directly to the outlet can be assumed to comply where the drained impermeable surface area is up to 5 times the vegetated detention basin surface area receiving the runoff for any soil type. Table 4-1 summarises the assessment of management of everyday rainfall for the remaining surfaces that do not drain to porous paving. This demonstrates that the detention basins alone are not sufficient to meet Standard 2. The residual non-compliant surfaces sum to 7,556m<sup>2</sup> (0.75ha), 24% of the total impermeable surfaces on Site.

Rainwater harvesting systems, compliant to BS EN 16941 will be provided for each residential property that does not drain to porous paving to address the 24% of the Site which is currently non-compliant. At the detailed design stage detailed calculations, including details of proposed rainwater harvesting systems will need to be provided to demonstrate compliance with Standard 2. If rainwater harvesting systems alone are not sufficient to address the remaining 24% of the Site, additional measures such as increasing the base of detention basins, or including swales along property frontages could be incorporated into the design.

Table 4-1 Management of everyday rainfall

| Catchment                   | Impermeable surfaces not draining to porous paving (m <sup>2</sup> ) | Detention basin surface area (at base level) (m <sup>2</sup> ) | 5 x Detention Basin area (m <sup>2</sup> ) | Residual 'non-compliant' surface area |
|-----------------------------|--|--|--|---------------------------------------|
| Eastern                     | 3496   | 360  | 1800                                       | 1696                                  |
| Central                     | 6301   | 443  | 2215                                       | 4087                                  |
| Southern & Western Combined | 4584   | 562  | 2810                                       | 1773                                  |

## 4.4. Standard 3: Management of extreme rainfall and flooding

### 4.4.1. Greenfield runoff rates and volumes

The total positively drained area for the Site is 5.80 ha. The ReFH2 method (Using FEH22 rainfall model) has been utilised to estimate the greenfield runoff rates for the Site (see Figure 4-8).

Figure 4-8 Greenfield Runoff Rates

**Pre-development discharge**

Site Makeup: Greenfield (v) OK Cancel

Greenfield Method: ReFH2 (v)

FEH filename: C:\Users\Mary J Fisher\Ac Load

Region: England, Wales, NI (v)

Include Baseflow: ☐

Positively Drained Area (ha): 5.800

Betterment (%): 0

Calc

| Return Period (years) | Q (l/s) |
|-----------------------|---------|
| 2                     | 31.5    |
| 30                    | 77.6    |
| 100                   | 100.2   |

**Note:** FEH point descriptors can be downloaded from [fehweb.ceh.ac.uk](http://fehweb.ceh.ac.uk)

Only XML file format can be used

FEH-22 is the current FEH data and this should be used for new development

**ReFH2 legacy** – Doesn't contain the new BFIHOST19 descriptor  
**ReFH2** – Contains the new BFIHOST19 descriptor

Due to infiltration not being feasible on the Site, the volume of runoff discharged from the proposed development for the 1% AEP, 6 hour rainfall event will be greater than the volume of greenfield runoff for the same rainfall event. Therefore the peak allowable discharge rate from the development for all events up to and including the 1% AEP with Climate change is the 50% AEP greenfield runoff rate (31.5 l/s) based on the National Standards for SuDS.

The Greenfield runoff volume for the Site for the 1% AEP, 6 hour storm duration event has also been calculated and is presented in Figure 4-9.

Figure 4-9 Greenfield Runoff Volume

**Pre-development discharge**

Site Makeup: Greenfield (v) OK Cancel

Greenfield Method: ReFH2 (v)

FEH filename: C:\Users\Mary J Fisher\Ac Load

Region: England, Wales, NI (v)

Include Baseflow: ☐

Positively Drained Area (ha): 5.800

Return Period (years): 100

Storm Duration (mins): 360

Betterment (%): 0

Calc

Runoff Volume (m³): 1121

**Note:** FEH point descriptors can be downloaded from [fehweb.ceh.ac.uk](http://fehweb.ceh.ac.uk)

Only XML file format can be used

FEH-22 is the current FEH data and this should be used for new development

**ReFH2 legacy** – Doesn't contain the new BFIHOST19 descriptor  
**ReFH2** – Contains the new BFIHOST19 descriptor

#### 4.4.2. Performance assessment

The principal SuDS features have been modelled using Causeway Flow software to ensure there is sufficient storage volume within the system and discharge rates can be limited to the 50% AEP greenfield runoff rates.

Table 4-2 and Table 4-3 summarise the model results at the SuDS features for the 3.3% AEP +40% and 1% AEP + 45% scenarios. This confirms that, based on the parameters described above, the proposed drainage scheme will be able to attenuate and discharge runoff to greenfield runoff rates for the 3.3% AEP + 40% and close to greenfield (31.9 l/s compared to 31.5 l/s) for the 1 in 100 +45% scenarios. A small amount of flooding (9.7m<sup>3</sup>) is shown to occur at the central basin. This would spill into West Common Stream following the natural topography.

Detailed model outputs are provided in Appendix F. It should be noted that the model aims to only replicate the key storage features within the proposed scheme.

Table 4-2 Summary of 1 in 30 year + 40% climate change model results

| Feature name           | Critical storm   | Peak water depth (m aOD) | Peak outflow (l/s) | Flood Risk Status |
|------------------------|------------------|--------------------------|--------------------|-------------------|
| Eastern Porous Paving  | 180 Min: Winter  | 1.13                     | 12.2               | OK                |
| Eastern Drainage Basin | 2160 Min: Summer | 1.21                     | 8.7                | OK                |
| Central Porous Paving  | 180 Min: Winter  | 1.19                     | 10.9               | OK                |
| Central Basin          | 1440 Min: Winter | 1.23                     | 8.8                | OK                |
| Western Porous Paving  | 180 Min: Winter  | 1.06                     | 6.4                | OK                |
| Western Basin          | 960 Min: Summer  | 1.10                     | 11.5               | OK                |
| <b>Total Discharge</b> |                  |                          | <b>29.0</b>        |                   |

Table 4-3 Summary of 1 in 100 year + 45% climate change model results

| Feature name           | Critical storm   | Peak water depth (m aOD) | Peak outflow (l/s) | Flood Risk Status            |
|------------------------|------------------|--------------------------|--------------------|------------------------------|
| Eastern Porous Paving  | 240 Min: Winter  | 1.25                     | 12.9               | Flood risk                   |
| Eastern Drainage Basin | 2880 Min: Summer | 1.47                     | 9.6                | OK                           |
| Central Porous Paving  | 240 Min: Winter  | 1.30                     | 11.4               | Flood risk                   |
| Central Basin          | 2160 Min: Summer | 1.50                     | 9.7                | Flood (9.65 m <sup>3</sup> ) |
| Western Porous Paving  | 240 Min: Winter  | 1.17                     | 6.7                | Flood risk                   |
| Western Basin          | 1440 Min: Winter | 1.45                     | 12.6               | OK                           |
| <b>Total Discharge</b> |                  |                          | <b>31.9</b>        |                              |

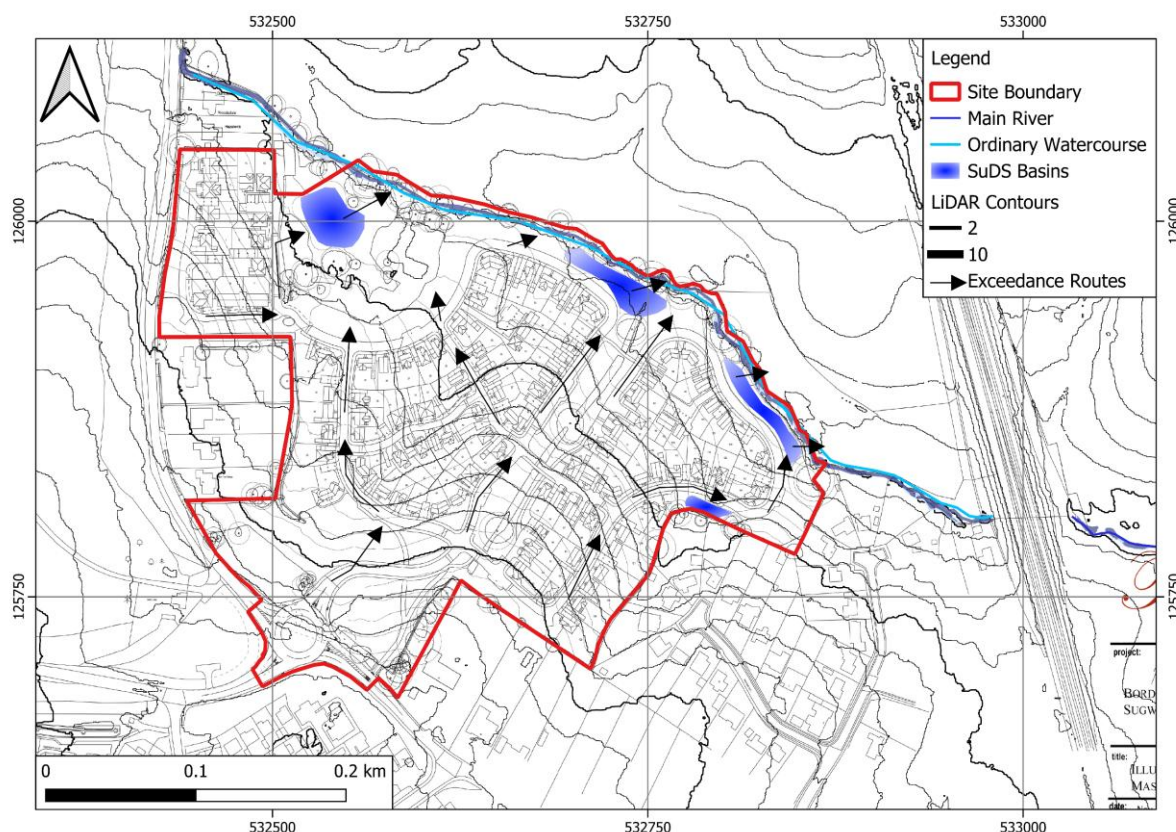
#### 4.4.3. Exceedance flow paths

Whilst the strategy has aimed to ensure no flooding during the extreme 1 in 100 year + 45% climate change scenario, there is always a residual risk that flooding may occur for example due to more extreme events or blockage of structures. Under these conditions, exceedance flows will be designed to follow the existing preferential surface water flow paths towards the north of the Site, via the road

network. Raised kerbs or bunds will be created along roads to direct flows where required. Flow will be directed away from the main access roads, and where already on the road, directed towards the nearest downslope green space to ensure that safe access is maintained for emergency services.

Very high level exceedance flow directions are illustrated in Figure 4-10 based on topographic data. A more detailed analysis of exceedance flows will be undertaken during as part of the detailed drainage strategy.

Figure 4-10 Exceedance flow routes



## 4.5. Standard 4: Water Quality

SuDS techniques can be used to effectively manage the quality of surface water flowing across a site. Different methods can be used to intercept pollutants and allow them to degrade or be stored in-situ without impacting the quality of water further downstream. Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals and various organic and inorganic contaminants). Therefore, the first 5mm to 10mm of rainfall (i.e. the 'first flush') should be adequately treated using SuDS.

The proposed development will primarily consist of residential dwellings, low traffic roads and driveways. The CIRIA SuDS manual categorises runoff from residential dwellings as presenting a very low water quality hazard and runoff from low usage roads and residential driveways as presenting a low hazard rating (see Table 4-4).



Table 4-4 Water quality hazard ratings (CIRIA, 2015)

| Land use   | Hazard level |
|--|--------------|
| Residential roof drainage  | Very low     |
| Residential, amenity uses including low usage car parking spaces and roads, other roof drainage . Non-residential car parking with infrequent change (<e.g. schools, offices, i.e. < 300 traffic movements/day)  | Low          |
| Commercial uses including car parking spaces and roads (e.g. hospitals, retail, excluding low usage roads, trunk roads and motorways)  | Medium       |
| Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemical and fuels (other than domestic fuel oil) are delivered, handled, stored used or manufactured, industrial sites | High         |
| Trunk roads and motorways  | High         |

The CIRIA SuDS manual (CIRIA, 2015) advocates a qualitative approach to designing a SuDS scheme for a site with a low hazard rating. This should provide adequate controls on pollutants contained in runoff water.

As the proposed development is predominantly residential in nature with a low hazard rating, hazard indices of 0.5 for Total Suspended Solids (TSS), 0.4 for Metals and 0.4 for Hydrocarbons are considered applicable.

The measures detailed in Table 4-5 are examples which are suitable for inclusion in a drainage strategy for a residential development to mitigate a potential increase in pollutant load within on-site and off-site runoff – note text in bold are measures included in this SuDS Strategy. Removal indices are included for each feature type relative to the specific pollutant.

Table 4-5 Mitigation indices for SuDS components

| Component type          | TSS        | Metals     | Hydrocarbons |
|-------------------------|------------|------------|--------------|
| Filter drain            | 0.4        | 0.4        | 0.4          |
| Swale                   | 0.5        | 0.6        | 0.6          |
| <b>Permeable paving</b> | <b>0.7</b> | <b>0.6</b> | <b>0.7</b>   |
| <b>Detention basin</b>  | <b>0.5</b> | <b>0.5</b> | <b>0.6</b>   |
| Pond                    | 0.7        | 0.7        | 0.5          |

The inclusion of detention basins within the SuDS strategy for the Site will provide adequate treatment to mitigate the low hazard associated with runoff from the development provided all runoff flows through at least one of these components (as per the outline strategy), and most passing through both permeable paving and detention basins.

Sediment traps (i.e. sumps within the inspection chambers of the final manhole upstream of each feature) will be used to facilitate the maintenance of these SuDS features and reduce the build-up of potentially polluted material.

## 4.6. Standard 5 & 6: Amenity and Biodiversity

SuDS schemes present opportunities to enhance habitat for wildlife on-site and this often improves the biodiversity of the surrounding areas. Ponds, constructed wetlands and other surface water

features are landscape assets that have amenity value and improve the aesthetics of a site more than conventional drainage systems.

The use of grassed detention basins will enhance the biodiversity and amenity value of the Site post-development. Ecological diversity should be enhanced by the use of native planting within/around each feature – further details of this will be provided in the detailed drainage strategy and landscape reports.

#### **4.7. Standard 7: Design of drainage for construction, operation, maintenance, decommissioning and structural integrity**

The Construction (Design and Management) Regulations 2015 include requirements for designers to take account of the health and safety risks associated with the construction, operation and maintenance and decommissioning of the drainage system to minimise these risk as far as reasonably practicable.

SuDS features should be built and operated in accordance with guidance outlined in the CIRIA SuDS Manual.

The drainage design can be delivered as a gravity fed system which reduces the reliance on mechanical systems and the cost of operation.

##### **4.7.1. Maintenance Schedules**

Inspection and long-term maintenance of SuDS components ensure efficient operation and prevents failure. Management of the surface water drainage system will be undertaken by a Management Company.

This section outlines the maintenance and management schedules for the proposed drainage system. The schedules have been formulated in line with guidelines contained within the CIRIA SuDS Manual (CIRIA, 2015). There are three categories of maintenance activities referred to in this report, although not all are required for each SuDS feature:

- **Regular maintenance** – tasks which are required to be undertaken on a weekly or monthly basis, or as required.
- **Occasional maintenance** – tasks which are required to be undertaken periodically, typically at intervals of three months or more.
- **Remedial maintenance** – tasks which are not required on a regular basis but are done when necessary.

This section is intended to give an overview of the operation and maintenance for the range of drainage features included within the surface water drainage strategy and in relation to typical/standard details only.

Maintenance schedules for the proposed SuDS components are provided in the following tables. These schedules are not exhaustive and should be reassessed at regular intervals to determine if any additional maintenance requirements are required to preserve the performance and condition of the drainage system.

Table 4-6 Maintenance for pipes and manholes

| Maintenance schedule   | Required action   | Frequency   |
|------------------------|---|---|
| Regular maintenance    | Remove any accumulation of silt, sediment, leaves and debris etc  | Monthly, or as required                           |
|                        | Inspect for evidence of poor operation  | Monthly (during the first year), then half yearly |
| Occasional maintenance | High pressure water jet removal of silt build-up and avoid blockages, particularly at bends or changes in direction | Six monthly, or as required                       |
|                        | Remove or control tree roots where they are encroaching pipe runs, using recommended methods                        | As required                                       |
| Remedial actions       | Clear pipework and gully grates of blockages  | As required                                       |
|                        | Replace any damaged or failed pipes, gullies or manholes  | As required                                       |

Table 4-7 Maintenance for detention basins

| Maintenance schedule   | Required action   | Frequency  |
|------------------------|---|--|
| Regular maintenance    | Remove any accumulation of silt, sediment, leaves and debris etc            | Monthly, or as required                                  |
|                        | Cut grass – for spillways and access routes                                 | Monthly (during growing season), or as required          |
|                        | Cut grass – meadow grass in and around basin                                | Half yearly (spring – before nesting season, and autumn) |
|                        | Manage other vegetation and remove nuisance plants                          | Monthly (at start), or as required                       |
|                        | Inspect inlets, outlets and overflows for blockages, and clear if required  | Monthly  |
|                        | Inspect banksides, structures, pipework etc for evidence of physical damage | Monthly  |
|                        | Check any penstocks and other mechanical devices                            | Annually   |
|                        | Tidy all dead growth before start of growing season                         | Annually   |
| Occasional maintenance | Reseed areas of poor vegetation growth                                      | As required  |
|                        | Prune and trim any trees and remove cuttings                                | Every 2 years, or as required                            |
|                        | Remove sediment from outlets, forebays and main basin when required         | Every 5 years, or as required                            |

| Maintenance schedule | Required action   | Frequency   |
|----------------------|---|-------------|
| Remedial actions     | Repair erosion or other damage by reseeding or re-turfing | As required |
|                      | Realignment of rip-rap                                    | As required |
|                      | Repair/rehabilitation of inlets, outlets and overflows    | As required |
|                      | Relevel uneven surfaces and reinstate design levels       | As required |

Table 4-8 Maintenance for control devices

| Maintenance schedule   | Required action   | Frequency                   |
|------------------------|---|-----------------------------|
| Regular maintenance    | Inspect/check pipework to ensure that the flow control is in good condition and operating as designed | Monthly                     |
|                        | Inspect for evidence of poor operation  | Monthly, or as required     |
| Occasional maintenance | High pressure water jet removal of silt build-up  | Six monthly, or as required |
| Remedial actions       | Clear pipework of blockages   | As required                 |
|                        | Replace the flow control if it becomes damaged  | As required                 |

## 4.8. Further SuDS considerations

The detailed design strategy should include:

- Assessment of individual porous paving areas, and respective additional contributing areas, with stepped sub-base to ensure minimal slope across each area.
- Means of ensuring that small orifices (< 0.05 diameter) are robustly protected from blockage
- Filter drains and or tree/pits / rain gardens along the main access road in the southern section to promote interception of the first 5 mm of rainfall.
- Infiltration testing in the southern section of the Site (over the Cuckfield Stone Bed and Upper Tunbridge Wells Sands) to determine if any infiltration is likely to be possible, in particular to promote the interception of the first 5 mm of rainfall.
- Consideration of rainwater harvesting calculations to support interception of the first 5mm of rainfall, particularly where runoff from roofs is unable to discharge into adjoining porous paving areas.



## 5. Foul Drainage

Foul water from the proposed development will be managed through a connection to the public foul sewerage network. A capacity check is underway with Southern Water the statutory undertaker responsible for foul water drainage services.

As noted in Section 2.2 works are currently underway for Borde Hill Estate (see Appendix C) to provide a connection for Borde Hill Gardens. This includes a foul water rising main passing through the Site boundary north of South Lodge Roundabout. It is proposed that foul water will discharge from the Site to this rising main, although due to topography this will be required to be pumped.

A formal S106 application will be required to be completed and approved by Southern Water prior to a connection being made. No surface water will be discharged into the foul sewer network.

## 6. Conclusions

This report provides an Outline SuDS Strategy for the Site, a previously undeveloped, 'greenfield' area located to the north of Haywards Heath. The Site currently drains overland towards West Common Stream along the northern boundary of the Site.

It is not considered that infiltration will be feasible on the Site due to the limited permeability of the underlying Wadhurst Clay. Discharge to West Common Stream along the northern boundary of the Site has therefore been proposed. A greenfield 50% AEP discharge rate has been proposed for all events as it is not possible to limit discharge volumes to greenfield volumes.

The potential increase in rainfall intensity due to climate change needs to be considered when designing drainage strategies. A design lifespan of 100 years has been assumed for the development, based upon the EA guidance rainfall increases of 40% and 45% have been applied to the 1 in 30 year and 1 in 100 year events respectively.

The proposed Outline SuDS scheme comprises of storage within porous paving areas in the upper catchment and detention basins prior to discharge to watercourses. Orifices are used to control outflow from the porous paving areas, and hydrobrakes at the detention basins. For the 3.3% AEP with climate change scenario discharge has been limited to the 50% AEP greenfield runoff rate. For the 1% AEP with climate change, discharge is slightly in exceedance of the 50% greenfield runoff even (31.9 l/s compared to 31.5 l/s) with a small (9 m<sup>3</sup>) amount of flooding from the central basin which would spill into West Common Stream.

The Site is not expected to require land raising / lowering to accommodate a gravity driven drainage system as there is a suitable gradient over the Site.

The detailed drainage design should consider the potential for incorporating additional SuDS features such as tree pits along the main access road, and addition swales along frontages to provide a SuDS train giving additional upstream storage and increased amenity and biodiversity benefits. The detailed drainage design will also need to incorporate additional interception features to ensure that the first 5mm of rainfall for the majority of Sites is retained on Site. This is likely to require rainwater harvesting systems at a minimum.

Foul drainage is expected to discharge to the existing sewer network. A pre-planning capacity check is underway with Southern Water for connection to a sewer to the west of the Site. It is understood that works are currently being undertaken to provide a connection Borde Hill Estate to the west of the Site which it may be possible to connect into. Foul drainage will require pumping due to the topography of the Site.

## 7. References

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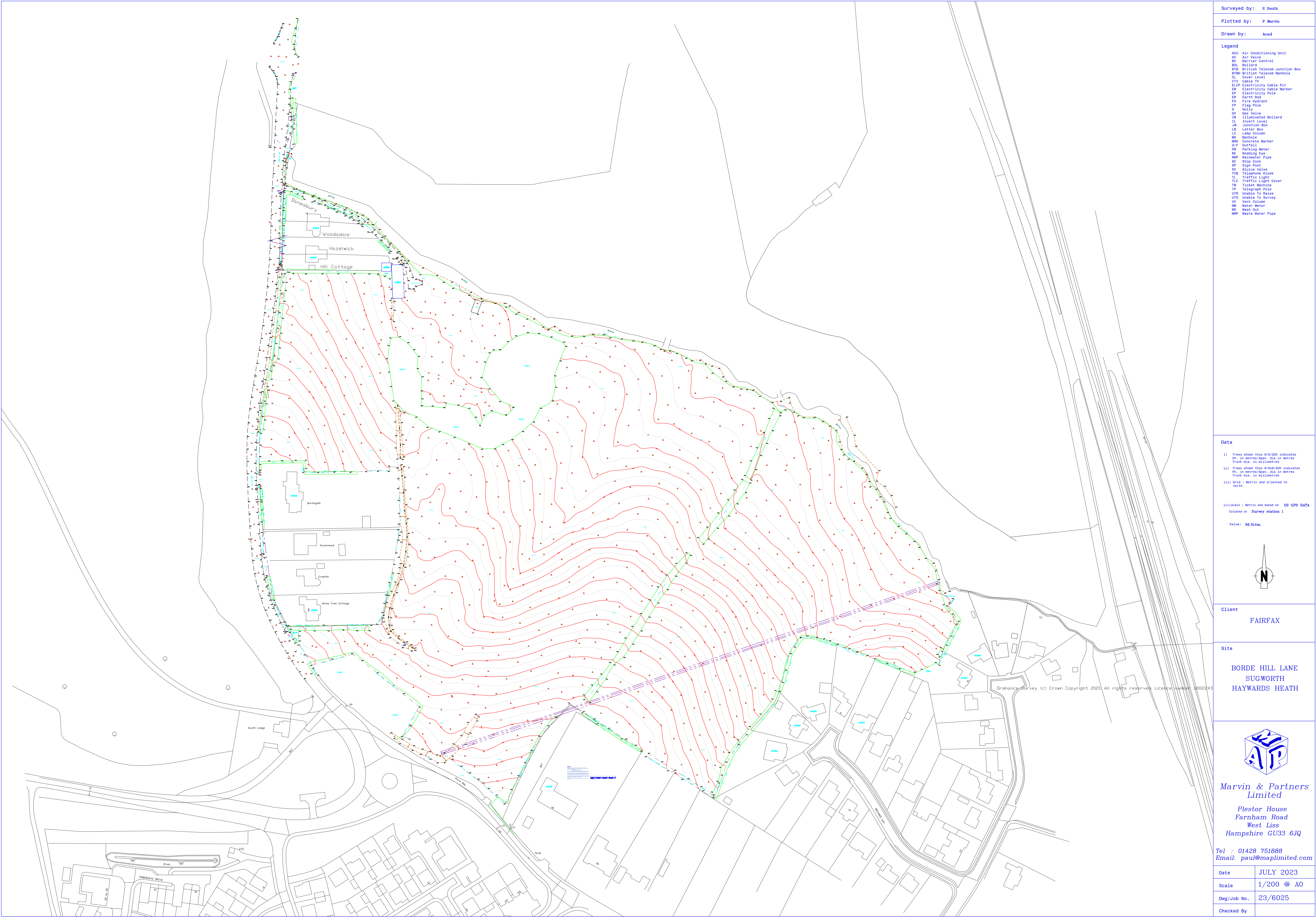
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Surveyed by: S Smith

Plotted by: P Marvin

Drawn by: Acad

Legend

AGU

Air Conditioning Unit

AV

Air Valve

BC

Barrier Control

BOL

Bollard

BTB

British Telecom Junction Box

BTM

British Telecom Manhole

CL

Cover Level

CTV

Cable TV

ELP

Electricity Cable Pit

EM

Electricity Cable Marker

EP

Electricity Pole

ER

Earth Rod

FM

Fine Hydrant

FP

Flag Pole

G

Gully

GV

Gas Valve

IB

Illuminated Bollard

TL

Tower Level

JB

Junction Box

LB

Letter Box

LC

Lamp Column

MB

Manhole

MRK

Concrete Marker

O/F

Outfall

PE

Parking Meter

RE

Rodding Eye

RWP

Rainwater Pipe

SC

Stop Cock

SP

Sign Post

SV

Sluice Valve

TCB

Telephone Kiosk

TL

Traffic Light

TLC

Traffic Light Cover

TW

Ticket Machine

TP

Telegraph Pole

UTR

Unable To Raise

UTS

Unable To Survey

VC

Vent Column

WM

Water Meter

WO

Wash Out

WMP

Waste Water Pipe

Data

i)

Trees shown thus 9/6/200 indicates

HT. in metres/Spac. dia in metres

Trunk dia. in millimetres

ii)

Trees shown thus 9/66/200 indicates

HT. in metres/Spac. dia in metres

Trunk dia. in millimetres

iii)

Grid : Metric and oriented to north

iv)

Levels : Metric and based on OS GPS DATA

Situated on Survey station 1

Value: 56.514m

Client

FAIRFAX

Site

BORDE HILL LANE

SUGWORTH

HAYWARDS HEATH



Marvin & Partners  
Limited

Plestor House  
Farnham Road  
West Liss  
Hampshire GU33 6JQ

Tel : 01428 751888  
Email: paul@maplimited.com

Date

JULY 2023

Scale

1/200 @ A0

Dwg/Job No.

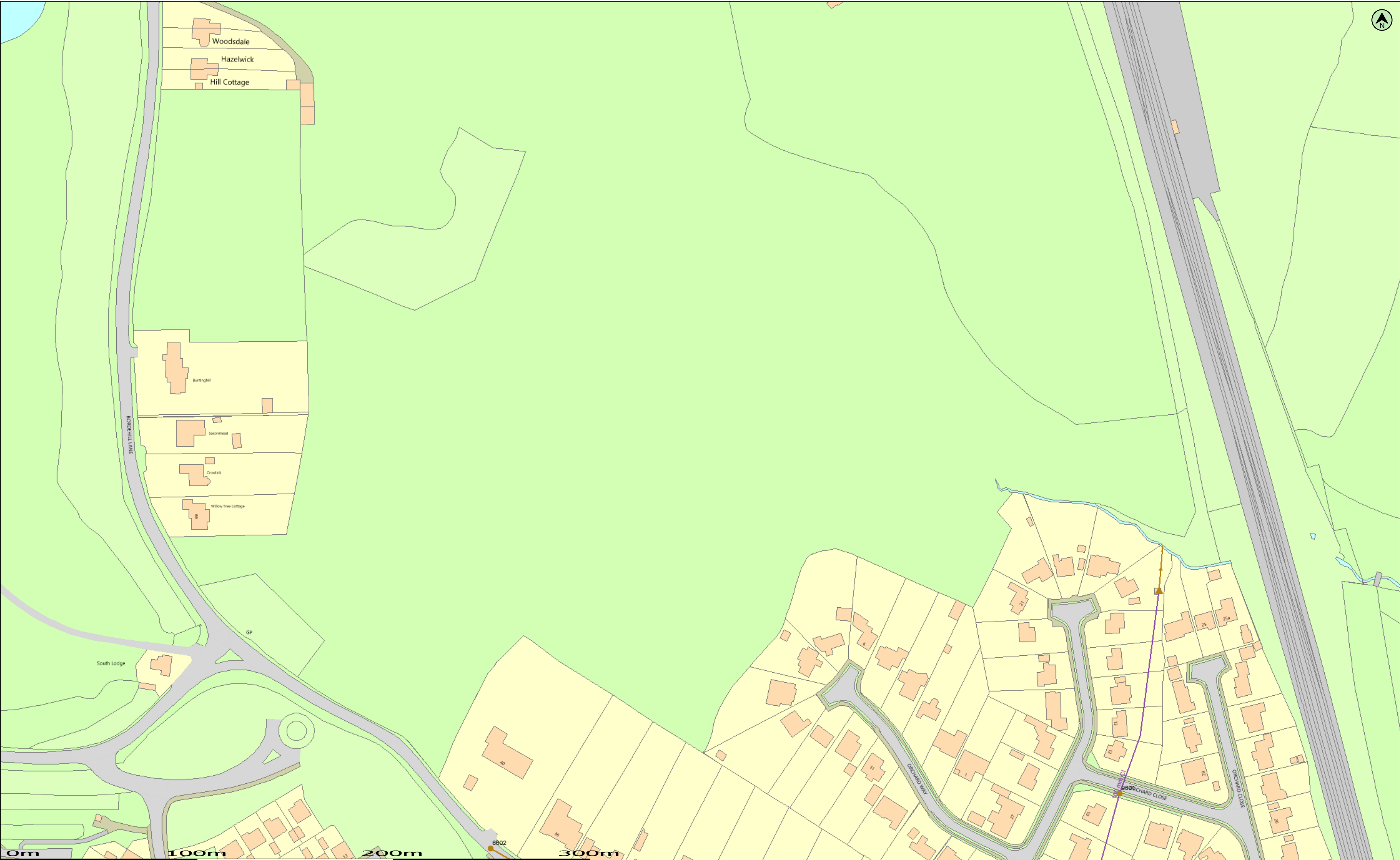
23/6025

Checked By









(c) Crown copyright and database rights 2020 Ordnance Survey 100031673      Date: 04/08/20      Scale: 1:1250      Map Centre: 532710,125868      Data updated: 15/06/20      Our Ref: 422739 - 1      Wastewater Plan A2

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 2020 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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

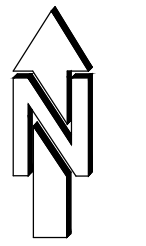
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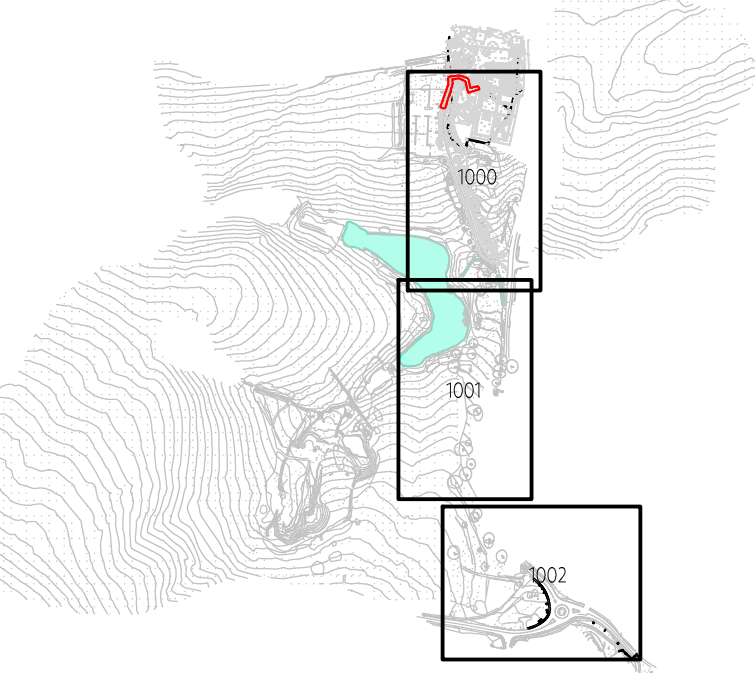
|                      |
|----------------------|
| tomclark@ridge.co.uk |
| Boredehill Lane Sugw |
|                      |







|                      |                |
|----------------------|----------------|
| <b>SITE LOCATION</b> |                |
| OS X (EASTINGS)      | 532411         |
| OS Y (NORTHINGS)     | 126168         |
| NAT GRID             | TQ 32411 26168 |
| POSTCODE             | RH16 1XN       |



KEY PLAN - 1:5000

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KEY











-  EXISTING UNIDENTIFIED MANHOLE COVER
-  PROPOSED FOLL WATER DRAIN
-  PROPOSED FOLL WATER INSPECTION CHAMBER
-  PROPOSED FOLL WATER RISING MAIN
-  SINGLE-LINE WASHOUT CHAMBER
-  TREE ROOT PROTECTION AREA

TABLE 1: DESIGNERS RISK ASSESSMENT

| RISK REFERENCE | RISK DESCRIPTION   | RISK CONSEQUENCE/<br>MITIGATION   |
|----------------|--|---|
| R.01           | INSTALLATION OF NEW REINFORCEMENT POLE ADJACENT TO EXISTING DRAINS.  | TEMPORARY WORKS ARE REQUIRED TO BE ACQUAINTED TO EXISTING DRAINS BY THE CONTRACTOR. SUITABLE TEMPORARY WORKS REQUIRED ARE TO BE PROPOSED BY THE CONTRACTOR.   |
| R.02           | INSTALLATION OF PROPOSED BRANKS THRU TREE ROOT PROTECTION ARE CAUSING DAMAGE TO TREE ROOTS.                        | DAMAGE ROUTES HAVE BEEN PROPOSED TO AVOID THE EXISTENCE WITHIN TREE ROOT PROTECTION AREAS. WORK WITHIN AREAS OUTSIDE ARE RECOMMENDED.   |
| R.03           | PIPES WITHIN TRAFFIC AREAS WITH REDUCED COVER TO THE SURFACE OF THE ROAD WHEN EXCESSIVELY LOADED.                  | ALL AREAS WHERE DRAINS ARE PROPOSED TO PASS THROUGH TREE ROOT PROTECTION AREA IS SUBJECT TO FULL METHODS STATEMENTS FROM AN ARBORICULTURIST.  |
| R.04           | UNIDENTIFIED MANHOLES / SERVICES PRESENT IN THE COURSE OF WORKS. POTENTIALLY CLASHING WITH THE DRAINAGE PROPOSALS. | ALL EXISTING SERVICES ARE TO BE SURVEYED PRIOR TO THE COMMENCEMENT OF WORKS AND COMMUNICATED TO THE DESIGN TEAM. REVIEW OF PLY CATCHES ARE UNDERTAKEN. REVIEW WITH THE DESIGN TEAM AND ADJUST THE DESIGN ACCORDINGLY.   |
| R.05           | THE PROPOSED FLOOD CAPTIALITY, WRETH LEVEL IS BASED ON DESIGN DRAINAGE OF THE SUB-AREA. CHANNING MAY OVERTAKE.     | THREAT LEVELS OF THE EXISTING DRAINAGE SYSTEM, POLE MANHOLES ARE TO BE CONSIDERED. THE COMPLEMENT OF WORKS TO BE UNDERTAKEN IS TO BE WHAT IS SHOWN. THE DESIGN TEAM TO BE ADJUSTED AND CIRCUMSTOTED TO THE DESIGN TEAM. |

TABLE 2: NOTE TO DEVELOPER

| NOTE REFERENCE  | NOTE DESCRIPTION  |
|---|---|
|  <b>N.01</b> | THE PROPOSED PUMP AND RISING MAIN SPECIFICATION/DESIGN IS TO BE IN LINE WITH SPECIALIST'S PROPOSALS.  |
|  <b>N.02</b> | THE PROPOSED POOL WATER OUTFALL IS SUBJECT TO A SECTION 106 APPROVAL WITH SOUTHERN WATER.   |
|  <b>N.03</b> | THE PROPOSED POOL WATER RISING MAIN IS TO STAY WITHIN 2.0M OF THE EXISTING HIGHWAY IN ORDER TO STAY WITHIN HIGHWAY LAND. ANY PIPE WITHIN THIRD PARTY LAND IS SUBJECT TO ALL RELEVANT AGREEMENTS/ APPROVALS. |
|  <b>N.04</b> | WASHOFT CHAMBERS IS IN LINE WITH ADVANTAGE PUMPING SOLUTIONS SPECIFICATIONS.  |

|     |          |  |       |         |
|-----|----------|--|-------|---------|
| 04  | 24/12/24 | OUTFALL ROUTE UPDATED TO SUIT SITE DISCUSSIONS.  | LS    | PH      |
| 03  | 13/11/24 | WASHOUT CHAMBER ADDED.                           | LS    | JL      |
| 02  | 16/08/24 | DRAINAGE ROUTES REVISED TO SUIT CLIENT COMMENTS. | LS    | JL      |
| 01  | 23/07/24 | FIRST ISSUE FOR CLIENT REVIEW.                   | LS    | JL      |
| Rev | Date     | Remarks  | Drawn | Checked |

PWA / GROUP

|                   |                             |                     |
|-------------------|-----------------------------|---------------------|
| CIVIL             | SUMMIT HOUSE, RIPARIAN WAY, | 01535 633350        |
| STRUCTURAL        | THE CROSSINGS, CROSSHILLS,  | info@pwigroup.co.uk |
| GEO-ENVIRONMENTAL | KEIGHLEY, BD20 7BW          | www.pwigroup.co.uk  |

Client

BORDE HILL ESTATE

Project

BORDEN HILL ESTATE FOUL WATER OUTFALL  
BALCOMBE ROAD OUTFALL

|            |                |                |                |                |
|------------|----------------|----------------|----------------|----------------|
| Size<br>A0 | Scale<br>1:250 | Designed<br>LS | Checked<br>JLE | Date<br>JUL 24 |
|------------|----------------|----------------|----------------|----------------|

PRELIMINARY

| Job Number | Originator | Zone | Level | Type | Role | Drawing No. | Revision |
|------------|------------|------|-------|------|------|-------------|----------|
| 23363      | PWA        | 00   | XX    | DR   | C    | 1002        | P0       |