



FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY
FOR
PROPOSED RESIDENTIAL DEVELOPMENT, LAND WEST OF ALLBROOK WAY
EASTLEIGH, HAMPSHIRE
ON BEHALF OF
CRANBURY ESTATES LIMITED

NOVEMBER 2020

[ISSUE 5]

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1.0 INTRODUCTION

- 1.1 This *Flood Risk Assessment & Drainage Strategy* has been prepared by Cole Easdon Consultants Limited (CEC) on behalf of Cranbury Estates Limited in respect of an outline planning application for a residential development on land west of Allbrook Way, Eastleigh, Hampshire. Refer to CEC Figure 6557/500/Figure 1 [*Site Location Plan*] contained within Appendix 1.

Development Proposals

- 1.2 The development proposal comprises the erection of 59 dwellings, together with access off Knowle Hill, parking and landscaping. Refer to Drawing No. BRS.3586_16(J) [*Indicative Site Layout*] prepared by Pegasus in Appendix 2.

Need for Study

- 1.3 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without placing the development itself at risk and without worsening flood risk elsewhere. The study has been undertaken as per guidance provided within national guidance documents, namely *National Planning Policy Framework (NPPF)* and its associated *Planning Practice Guidance (PPG)*. An appropriate surface water management proposal also forms part of this study.
- 1.4 In accordance with the national and local policies, the study will consider to minimise the risk and impact of flooding through:
- *directing development to areas with the lowest probability of flooding;*
 - *ensuring that the development addresses the effective management of all sources of flood risk;*
 - *ensuring that development does not increase the risk of flooding elsewhere, with appropriate inclusion of sustainable drainage measures; and*
 - *ensuring wider environmental benefits of development in relation to flood risk.*

Scope of Study

- 1.5 In Section 2.0, we describe the characteristics of the proposed development site and surrounding area. In Section 3.0, we assess flood risk. In Section 4.0, we discuss surface water and foul drainage proposals. Finally, conclusions are presented in Section 5.0.

1.6 The drainage proposals for the site will be guided by the following national and local guidance:

- *National Planning Policy Framework (July 2018);*
- *Planning Practice Guidance - Flood Risk and Coastal Change (March 2014);*
- *C753 The SuDS Manual (CIRIA, November 2015);*
- *Non-statutory technical standards for sustainable drainage systems (DEFRA, 2015);*
- *Sewerage Sector Guidance Appendix C - Design and Construction Guidance V2;*
- *PUSH Strategic Flood Risk Assessment - Eastleigh Borough Council (2016 update);*
- *Eastleigh Surface Water Management Plan (December 2012); and*
- *Eastleigh Borough Local Plan 2016 - 2036.*

1.7 The following abbreviations have been used in this Report:

- AOD Above Ordnance Datum;
- BGS British Geological Survey;
- EA Environment Agency;
- EBC Eastleigh Borough Council;
- HCC Hampshire County Council;
- LLFA Lead Local Flood Authority;
- LPA Local Planning Authority;
- NPPF National Planning Policy Framework;
- PPG Planning Policy Guidance;
- SfA Sewers for Adoption;
- SFRA Strategic Flood Risk Assessment;
- SSG Sewerage Sector Guidance;
- SuDS Sustainable Drainage Systems; and
- SWMP Surface Water Management Plan.

2.0 THE EXISTING SITE

Site Location and Topography

- 2.1 The site is located in Allbrook within the northern outskirts of Eastleigh, 0.5km to the south east of Junction 12 of the M3. The site is located to the west of the A335 Allbrook Way and to the north of Knowle Hill. Refer to CEC Figure 6557/500/Figure 1 [*Site Location Plan*] in Appendix 1.
- 2.2 The site comprises approx. 4.20 hectares of land (excluding existing property 'Westfield House'), currently in agricultural use. There is an existing access from Knowle Hill from the south. The site is adjoined by Allbrook Way to the east with agricultural land beyond, by Knowle Hill to the south with residential properties beyond, by a footpath to the west with an existing woodland beyond.
- 2.3 The site occupies sloping ground near the top of a hill. Site levels fall from 56.00mAOD within the northern region to 40.00mAOD within the southern extent by Knowles Hill. The A335 is formed in cutting, and remains significantly lower than the site. A topographical survey [*Drawing Reference 19295-200-001, Sheet 1 - 3*] undertaken by Brunel Surveys Limited was made available for this study. This survey is incorporated in CEC Plan 6557/501(C) [*Proposed Drainage Strategy*] included in Appendix 1 of this Report.

Nearby Watercourses/Drainage Features

- 2.4 The River Itchen is located approx. 200m to the south of the site beyond Allbrook Hill. The watercourse occurs as a complex network of open channels, and meanders between Eastleigh and Bishopstoke continuing southerly towards Southampton. The River Itchen is classed as a 'Main River' by the EA and a designated SSSI and SAC.
- 2.5 A tributary of the Itchen is located 160m to the east of the south. The watercourse rises to the north east of the site, continuing southerly and then along and across Allbrook Way to discharge into another watercourse running parallel to the railway line. This then discharges into the River Itchen to the south of Allbrook Way.
- 2.6 A couple of ponds are located within the woodland to the north east, with a small watercourse running in a southerly direction from the pond location.

Existing Drainage Features/Sewers

- 2.7 A public surface water sewer runs from Knowle Hill and across the A335 to discharge into a

600mm sewer at the junction between the A335 and Allbrook Hill. This then continues southerly to discharge into the River Itchen. Refer to Southern Water sewer records in Appendix 3.

- 2.8 A foul sewer is located at the foot of Knowle Hill, which runs across the roundabout to join into a 225mm foul sewer. Refer to Appendix 3.
- 2.9 A set of 24-inch and 36-inch water mains are also located within the southern extent of the site by Knowle Hill. Refer to Appendix 3.

Existing Ground Conditions

- 2.10 Based on BGS records, the area is underlain by London Clay, with superficial deposits of River Terrace Deposits occurring across lower half of the site. This corroborates with BGS borehole logs present in the area. A BGS borehole located to the south of the roundabout confirmed the existence of Gravel/ Gravelly Clay over sandy Clay whilst a borehole to the north shows silty Clay with no superficial deposits. Refer to Appendix 4.
- 2.11 Soakage testing works were undertaken at the site in April 2020 by Structural Soils Limited in 4 No. test pits. Tests failed to work in 2 test pits within the northern extent whilst observed infiltration rates of between 1.59×10^{-5} - 2.9×10^{-6} m/s were observed in test pits within southern extent of the site. Refer to Appendix 4. Yellow brown clayey geology was encountered within the northern extent whilst sandy gravelly clay occurred within the southern extent, confirming the BGS records.
- 2.12 No groundwater was recorded in any of the test pits to a depth of 1.8mbgl. Further groundwater monitoring works have been proposed to capture the seasonal variation in the groundwater levels beneath the site.
- 2.13 London Clay Formation is classed as an 'unproductive' strata whilst superficial deposits are classed as 'Secondary A' aquifer. The site is not located within any Groundwater Source Protection Zone (SPZ).

3.0 FLOOD RISK ISSUES

- 3.1 This Section of the study reviews historical flooding events within the local catchment area and presents an assessment of flood risk to the proposed development from various external sources. Recommended flood risk mitigation measures appropriate to the level of perceived risk are included. Flood risk posed by additional surface water runoff generated by the new development and appropriate mitigation measures are addressed within Section 4.0.

Flood History

- 3.2 Review of SFRA/SWMP studies suggests there has been flooding along Allbrook Hill which has affected some residential and commercial properties. Flooding is thought to be caused due to the lack of capacity and blockages at the culvert, which caused the watercourse to overtop. Studies relate that flooding has been minimal in recent years largely due to the provision of a grill on the main river culvert and its continual maintenance.

Flooding from Fluvial/Tidal Sources

- 3.3 The EA's Flood Map indicates that the site lies within Flood Zone 1. The *NPPF* identifies Flood Zone 1 as low flood risk areas with an annual probability of flooding of less than a 1 in 1000 (0.1%) from rivers or sea. Refer to CEC Figure 6557/500/Figure 2 [*Flood Map*] in Appendix 1.
- 3.4 Based on the *NPPF*/*PPG*, the proposed site usage as 'residential' are classed as 'more vulnerable' development. Such land uses are considered acceptable in Flood Zone 1.

Fluvial/Tidal Flood Risk Mitigation Measures

- 3.5 No mitigation measures are required.

Flooding from Existing Sewers/Drains

- 3.6 The site remains elevated above the existing public sewerage systems, and will not be affected under the events should they flood.
- 3.7 Southern Water have confirmed that the existing system should be able to accept the development flows (both foul and restricted surface water runoff at Q_{bar}) without causing any capacity concerns.

Sewer Flood Risk Mitigation Measures

- 3.8 No mitigation measures are required.

Flooding from Overland Flow (Surface Water)

- 3.9 The site is located near the topographical high point, with limited area to the north west elevated above the site. This comprises greenfield site as woodland, and will generate minimal greenfield runoff towards the site. As such, the possibility of flooding from 'offsite' surface water runoff is limited. This is also confirmed by the EA's Surface Water Flood Map (SWFM), included in Appendix 5.
- 3.10 The SWFM indicates the adjoining A335 which is formed in cutting, and Allbrook Hill running along topographic low point at surface water flood risk. The development proposal will ensure that flooding within the identified vulnerable areas are not worsened compared to the existing situation, as discussed below in Paragraph 3.11.

Overland Flow Flood Risk Mitigation Measures

- 3.11 The development layout will incorporate suitable overland flow routes in the form of roadways and a green corridor to divert overland flows towards low risk areas (e.g. open space, parking etc), away from properties. A landscape corridor included within the western extent of the site will intercept potential offsite overland runoff. A shallow swale will be included within the landscape corridor along the eastern edge to contain overland flow in the event of design exceedance. Refer to CEC Plan 6557/501(C) [*Proposed Drainage Strategy*] in Appendix 1 for overland flow routes provision.
- 3.12 Further precautionary measures will include setting finished floor levels at least 150mm above adjoining ground level and grading land away from the properties.
- 3.13 The development will include adequate drainage provision and SuDS facilities to manage surface water runoff generated by the developed site to ensure surface water runoff and flood risk is not increased within the development site and in areas located downstream. Further details are included in Section 4.0.

Flooding from Groundwater

- 3.14 The area being underlain by Clay, groundwater flood risk is considered low. Perched groundwater may occur within the superficial deposits occurring within lower part of the site. However, given the sloping topography, it is unlikely for groundwater to rise to the

surface within the site to cause flooding. Groundwater levels were recorded at c. 2.0m depth within the BGS boreholes available downhill to the south. Onsite soakage testing works recorded no groundwater to a depth of 1.8mbgl during the work. Considering the tests were carried out following the wettest winter in history, the highest probable groundwater should occur below 1.8m bgl. As such, high groundwater is not considered to be an issue.

Groundwater Flood Risk Mitigation Measures

- 3.15 Precautionary measures will include incorporation of suitable overland flow routes (via roadways, green space, swales) to divert rising groundwater away from properties and setting finished floor levels at least 150mm above adjoining ground level and grading land away from the properties.

Table 3.1: Assessment of Flood Risk to the Development Site Arising from External Sources

Source of Potential Flooding to the Development Site	Flood Risk	Mitigation/Comments
Fluvial	Low	The site is located in Flood Zone 1 with low risk.
Sewers/ Drains	Low	No risk of site flooding from public sewers.
Overland Flow	Low	▪ Limited catchment upstream to generate overland flow towards the site. ▪ Incorporation of overland flow routes via roads, landscape corridors and swales; adequate drainage provision with the inclusion of SuDS; and raised floor levels will keep onsite and offsite flood risk low.
Groundwater	Low	▪ Given its elevated position and sloping topography, chances of flooding from groundwater is low. ▪ Precautionary measures include incorporation of suitable overland flow routes and raised FFLs.

4.0 SURFACE WATER AND FOUL WATER DRAINAGE STRATEGY

- 4.1 This Section details how surface water runoff and foul water arising from the development site will be managed in line with the local and national guidance, namely *NPPF*, *PPG*, *Non statutory technical guidance for SuDS*, *The SuDS Manual*, and *Eastleigh Local Plan*. The proposals will also consider the requirement of the Environment Agency, Sewerage Authority (Southern Water), Local Planning Authority (Eastleigh Borough Council) and Lead Local Flood Authority (Hampshire County Council). HCC's *Surface Water and Sustainable Drainage Guidance for Developers, Designers and Planners* and pre-application advice from the EBC have been referred to.
- 4.2 The emerging *Eastleigh Local Plan Policy AL2 (Land West of Allbrook Way)* in relation to drainage states that '*to preserve water quality and flows into the Lower Itchen, details of Sustainable Urban Drainage with three forms of naturalised filtration and maintenance of runoff at Greenfield rates will be required at the outline stage.*' Sustainable Drainage Systems (SuDS) must be designed in accordance with EBC Local Plan *Policy DM6 - Sustainable surface water management and watercourse management*.

Existing Site Drainage

- 4.3 The existing site as an undeveloped greenfield land comprises no formal drainage system, and drains naturally as overland flow towards offsite land with limited infiltration.

Surface Water (SuDS) Drainage Proposal

- 4.4 Based on the current layout (Drawing No. BRS.3586_16(J) [*Indicative Site Layout*], by Pegasus, in Appendix 2), the new development will comprise some 1.07ha of hard area. The increased hard areas within the new development tends to generate significant amount of surface water runoff without adequate measures. However, the proposal will adopt sustainable drainage measures to dispose of development surface water runoff thereby ensuring that surface water runoff and flood risk are not increased as a result of the development.
- 4.5 Drainage proposals devised for the development will seek opportunities to reduce the overall level of flood risk in the area and beyond, and integrate water management with green space with benefits for amenity, recreation and wildlife. The proposal will adopt SuDS principles and management train to mimic the existing drainage pattern of the undeveloped greenfield site, and to prevent pollution of the receiving water environment.

The opportunity for surface water runoff disposal via infiltration will be investigated before seeking to discharge into watercourses or sewers in line with the SuDS policy and Building Regulations.

SuDS Feasibility Investigation

- 4.6 The site is underlain by London Clay with negligible infiltration potential. Superficial deposits of River Terrace Deposits occur beneath the lower half of the site which may exhibit some infiltration potential. Soakage tests carried out in April 2020 (in accordance with the BRE365) have confirmed this, with reasonable infiltration rates of between 1.59×10^{-5} - 2.9×10^{-6} m/s observed within the southern half of the site; tests failed to work within the northern extent. No groundwater was recorded to the depth of 1.8mbgl. As stated above, the works followed the wettest winter in record, the highest probable groundwater should occur below 1.8m. Further groundwater monitoring works have been proposed to capture the seasonal variation in the groundwater levels beneath the site.
- 4.7 As such, it is expected that infiltration drainage will be possible within the lower half of the site. However, given the sloping topography and lower values of infiltration observed at the location of the proposed infiltration basin (in the order of 10^{-6}), entire runoff disposal via infiltration is unachievable. As such, a combined infiltration and attenuation-based scheme with a controlled discharge at greenfield rate (Q_{bar}) into the public sewer will be considered for the development site.
- 4.8 Drainage proposals for the site will include hard areas across the northern region draining via cellular tanks into the piped drainage network. The southern region will mostly drain via soakaways. All adoptable highways will drain via trapped gullies into the adoptable piped network. The piped network will comprise oversized pipes with an overflow into the infiltration basins, which will dispose runoff via infiltration once it enters the basins. Swales will be provided alongside the highway to collect overland flows off the highway surface (facilitated by intermittent dropped kerb arrangement) to cater for flows exceeding the piped network capacity. Refer to CEC Plan 6557/501(C) [*Proposed Drainage Strategy*] in Appendix 1. The arrangement will ensure that flows will not enter back into the system from the infiltration features.
- 4.9 The system will finally discharge into the public surface water sewer located at Knowle Hill. Discharge will be limited to the current greenfield rate (Q_{bar}) of 16.9l/s in the 1:100 year + 40% event as generated from 3.30ha of catchment area (excluding some green space

to the west and north). Flow will be controlled with the use of hydrobrakes at two locations as necessitated by the sloping nature of the site to allow holding back of water into the upstream network/storage system.

- 4.10 The proposed drainage/SuDS system in combination will manage surface water runoff for up to the 1:100 year including 40% climate change allowance in line with the EA/NPPF guidance. No flooding will occur for up to the 1:30 year event whilst some flooding will be observed in the 1:100 year + 40% event, which would be directed towards the swales and open space provided around the perimeter. Refer to surface water network calculations and soakaway sizing calculations per 100m² area in Appendix 6. An urban creep factor of 10% has been considered in the design to allow for an increase in impermeable areas across the development over its lifetime (factor applied to the impermeable area within the property curtilage only), increasing the total hard area to 1.11ha. The drainage proposal is subject to an agreement with Southern Water.
- 4.11 The infiltration basin and vegetated swales will be landscaped within the strategic open space to offer a multifaceted benefit of combining flood risk management with water quality protection, biodiversity and recreation.
- 4.12 Hampshire County Council, the LLFA, have approved of the above proposals in principle.
- 4.13 The swales and infiltration basins will be kept as shallow as possible to maintain the buffer of at least 1m above groundwater table. The basins will require to be 1.5m deep (with 1.2m design water level), and hence will be partly formed on an embankment to achieve the required metre buffer above the highest recorded groundwater level at 1.8mbgl. Refer to CEC Plan 5567/501(C) [*Proposed Drainage Strategy*] in Appendix 1.
- 4.14 The proposed discharge rate (16.9l/s) is approx. 70% lower compared to what the existing greenfield site currently generates in the 100-year event (54.1l/s). Refer to calculations in Appendix 6. Based on topography, such greenfield runoff currently directs towards Knowle Hill and downstream area. The proposal with the reduction in such greenfield flows should therefore represent betterment over the current runoff and flooding situation in the local area.
- 4.15 Southern Water in their consultation response have confirmed on the ability of the site to discharge into their existing surface water network at the proposed rate of 16.9l/s.

Southern Water public water mains in the vicinity are to be protected with appropriate easements to the requirement of Southern Water.

Design Exceedance

- 4.16 Should the drainage system and SuDS fail under extreme events or blockages, floodwater will largely be guided toward the storage/infiltration basins and swales integrated within the open space via drop kerb arrangements. The storage features incorporate further freeboard (at least 300mm) to accommodate such flows, preventing it from flowing downstream in an uncontrolled manner. Refer to CEC Plan 5567/501(C) [*Proposed Drainage Strategy*] in Appendix 1.
- 4.17 Further precautionary measures will include setting finished floor levels at least 150mm above adjoining ground level and grading land away from the properties.

Water Quality

- 4.18 Runoff will be appropriately treated within a combination of pre-treatment units (e.g. silt chambers, trap gullies, Petrol Interceptor) and SuDS devices (rainwater butts, soakaways, infiltration basins and vegetated swales) to ensure that runoff entering the River Itchen (via public sewerage system) is of acceptable quality.
- 4.19 An appropriately sized Petrol Interceptor will be incorporated to deal with hydrocarbon issue and sediment (to some extent) from highway runoff. Site management practices to prevent silt from entering the drainage system, including regular maintenance of gullies, Petrol Interceptor, swales and the storage/infiltration basins, as detailed in the SuDS Maintenance Plan below, will ensure that fine sediment does not enter the downstream river system via the onsite drainage.
- 4.20 In line with the Eastleigh Borough's recommendation, three level of treatment will be afforded to runoff from all hard areas as below:
- Adoptable roads - Trap Gullies, Oil Separator and Infiltration Basins and Swales;
 - Private areas (in no infiltration zone) - Rainwater Butts, Catchpits, Oil Separator and Infiltration Basins and Swales; and
 - Private areas (in infiltration zone) - Rainwater Butts, Catchpits and Soakaways.
- 4.21 Consequently, the development will not increase surface water runoff or associated flood risk in the locality and will not adversely affect water quality of the receiving water

environment. SuDS features suitably incorporated within the strategic open / green space will provide wider benefits for surface water and flood risk management, water quality protection, biodiversity and recreation. The proposal therefore accords with the local and national policies and guidance.

Adoption & Maintenance Responsibilities

- 4.22 Long term ownership and maintenance responsibilities for all drainage devices will be secured prior to occupation. It is the responsibility of the developer to put in place suitable management arrangements for the SuDS for the lifetime of the development. The possible maintenance arrangements for onsite drainage infrastructure have been discussed below, and shown in CEC Plan 6557/502(B) [*Proposed SuDS Maintenance Plan*] in Appendix 1.
- 4.23 The piped drainage networks, online flow controls and Petrol Interceptor will be designed meet the criteria within the *Sewerage Sector Guidance (SSG) Appendix C - Design and Construction Guidance* and to Southern Water's requirements, and offered for adoption by Southern Water.
- 4.24 Property owners will be responsible for drainage components and SuDS (e.g. soakaways) located within their curtilage. Where drainage components are located in shared space (e.g. driveways), their maintenance will be shared by the affected property owners.
- 4.25 With regards to the management of SuDS features (infiltration basins, swales etc) located within public open space, following arrangements will apply.
- The developer will set up a Residents' Management Company for the new residential development. The open space areas will ultimately be owned by the Residents' Management Company, with the freehold to the open space land transferred to the Management Company on the sale of the last property.
 - Each property owner will be a member of the Management Company for so long as they own a property on the development. The deed of transfer for each property will contain a clause requiring the residents to pay a contribution towards the cost of maintaining the communal areas and open space and drainage features located in the space.
 - Following the sale of the last property on the site, the developer will set up an agreement with a Grounds Maintenance Company to maintain the open space on behalf of the Management Company. This contract will be terminable by the Management Company/residents if they are not satisfied with the Grounds Maintenance Company's

performance.

- From this time onward, each property will incur an annual maintenance charge (can be paid in quarterly or monthly instalments) for the upkeep of the open space by the Management Company. The maintenance charge will be reviewed annually.
- No maintenance charge will be made until the last property is sold. Up to this point the cost of all maintenance will be the responsibility of the developer and no charge will be made to residents for this.
- Should the Ground's Maintenance Company be not deemed to perform adequately or becomes insolvent, the Residents' Management Company will have the power to engage a new grounds maintenance company to maintain the communal/open space.

4.26 Also note that the new *Sewerage Sector Guidance* provides a framework under which various SuDS features can be adopted as sewerage assets by the sewerage authority under a S104 agreement. Accordingly, the possibility of adoption of site's SuDS features will also be discussed with Southern Water in due course.

Maintenance Plan

4.27 Regular inspection and maintenance are imperative for the effective operation of SuDS devices as designed. Maintenance should be carried out in line with *C753 The SuDS Manual* and/or as per manufacturer's specification, and is briefed below.

Table 4.1: Maintenance Schedule for Infiltration Basin/Swale

Schedule	Maintenance Requirement	Frequency
Regular	Remove litter and debris	Monthly
	Cut grass - for landscaped area and access routes	Monthly during growing season or as required
	Cut grass - meadow grass in and around the basin/swale surface	Half yearly: spring and autumn
	Manage other vegetation and nuisance plants in and around the basin/swale	Monthly at start, then as required.
Occasional	▪ Reseed areas of poor vegetation growth ▪ Prune and trim trees ▪ Remove sediment from pre-treatment system when 50% full	Annually or as required
Remedial	▪ Repair erosion or other damage by reseed ▪ Repair or rehabilitate inlets, outlets and overflows ▪ Rehabilitate uneven surfaces using scarifying and spiking techniques if performance deteriorates; ▪ Relevel uneven surface and design levels	As required

Schedule	Maintenance Requirement	Frequency
Monitoring	- Inspect inlets, outlets, and overflows for blockages, and clear if required - Inspect banksides, structures, pipework etc. for evidence of damage - Inspect erosion or uneven surfaces for ponding and compacting	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half Yearly

Table 4.2: Maintenance Schedule for Cellular Storage/Soakaway

Schedule	Maintenance Requirement	Frequency
Regular	Remove debris from the catchment surface	Monthly
	- Remove sediment from pre-treatment structures and internal forebays; - Inspect for sediment and debris in pre-treatment devices and floor of inspection tube or chamber; - Cleaning of gutters and any filters and downpipes; - Trimming any roots that may be causing blockages.	Annually, or as required based on inspection
Occasional	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber	As required
Remedial	- Reconstruct soakaways and/or replace or clean fill, if performance deteriorates or failure occurs; - Replacement of clogged geotextile; - Repair and rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect inlets, outlets, overflows and vents to ensure they are operating as designed	Annually
	Inspect silt traps and note sediment accumulation rate	Monthly in first year and then annually
	Check soakaways to ensure emptying is occurring	Annually
	Survey inside of tank for sediment build-up and remove as necessary	Every 5 years, or as required

Table 4.3: Maintenance Schedule for Petrol Interceptor

Schedule	Maintenance Requirement	Frequency
Regular	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary
Remedial	Replace malfunctioning parts or structures	As required

Schedule	Maintenance Requirement	Frequency
Monitoring	- Inspect for evidence of poor operation - Inspect filter media and establish appropriate replacement frequencies - Check volume of sludge - Empty the separator, if required - Check the function of the warning device if fitted - Check the thickness of light liquid and monitor oil and sediment levels	Six monthly
	Inspect sediments accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then six monthly
	Inspect the structural condition and in-built parts of the device	Every 5 years

Table 4.4: Maintenance Schedule for Flow Controls, Catchpits and Gullies

Schedule	Maintenance Requirement	Frequency
Regular	- Inspect for accumulation of silt - Inspect for debris and litter - Inspect inlets and outlets for blockages	Every six months
Occasional	- Remove debris and litter - Remove silt	As required

Construction Runoff Management

- 4.28 The construction phase drainage will involve the following arrangements to ensure uncontrolled surface water runoff and sediment/oils/fuels do not enter the River Itchen during construction. Surface water runoff from the site will be managed through a temporary drainage scheme, including measures for removing suspended solids and potential contaminants.
- 4.29 The development should occur in phases, with top soil stripping carried out in phases to control the volume of sediment laden runoff at any time. The access roads and the proposed drainage networks with flow controls and Petrol Interceptor beneath the roads will be laid first. This will be followed by the infiltration basin and swales, as shown in CEC Plan 6557/501(C) [*Proposed Drainage Strategy*] included in Appendix 1. The upper flow control manhole (adjacent to the infiltration basin) has a weir wall arrangement with the lower opening (for hydrobrake) plugged in at this stage to divert construction runoff to the attenuation/infiltration features and prevent silted runoff entering the public sewer. Excess flow (with low sediment) will be able to overtop the weir wall to pass downstream and into the public sewer at a controlled rate with the presence of the downstream hydrobrake. The basin may include a clay lined sediment forebay to settle sediment further. Runoff will then flow into the main basin to dispose via infiltration. Runoff will direct towards the swales as overland flow; several check dams built across the swales will

slow down runoff/sediment.

- 4.30 Further low bunds will be incorporated around the site perimeter to intercept excess overland flows. As such, no uncontrolled runoff or sediment will reach the downstream areas or the River Itchen during construction phase.
- 4.31 At the end of each construction phase, the sediment forebay and flow control chambers will be cleared of sediment. Removed silt may be disposed of by spreading in an area of the site where surface runoff will not convey silt deposits back to the basin/swales.
- 4.32 The infiltration basin and swales will be scoured of sediment from forebay and main basin and swales after the final completion of the development. The basin/swales will be reinstated to the design bed and banks and adjoining open area planted with appropriate vegetation and plantation. All the highway gullies and pipes will be jetted to clear it of debris after the completion of the build. The Petrol Interceptor will be inspected for debris/oil accumulation and cleared if necessary.
- 4.33 The site contractor will adopt best site management practices to separate construction dust, sediment and fuel/oils from mixing with runoff, as part of the wider Construction Environmental Management Plan (CEMP) to be developed by the main site contractor. The CEMP will detail how construction works will be undertaken and managed in accordance with legislative requirements and construction industry best practice to minimise the potential environmental effects of construction activities at the site.

Foul Water Drainage Proposal

- 4.34 The development will discharge into the public foul sewer located at the foot of Knowle Hill by the roundabout. Refer to CEC Plan 6557/501(C) [*Proposed Drainage Strategy*] in Appendix 1.
- 4.35 Southern Water in their consultation response have confirmed that the existing sewerage network has adequate capacity to accept the anticipated foul flows from the development site.
- 4.36 The foul water networks will be designed to the new SSG Appendix C (The Code) and offered for adoption by Southern Water.
- 4.37 The drainage proposals as presented above are subject to appropriate agreements with Southern Water.

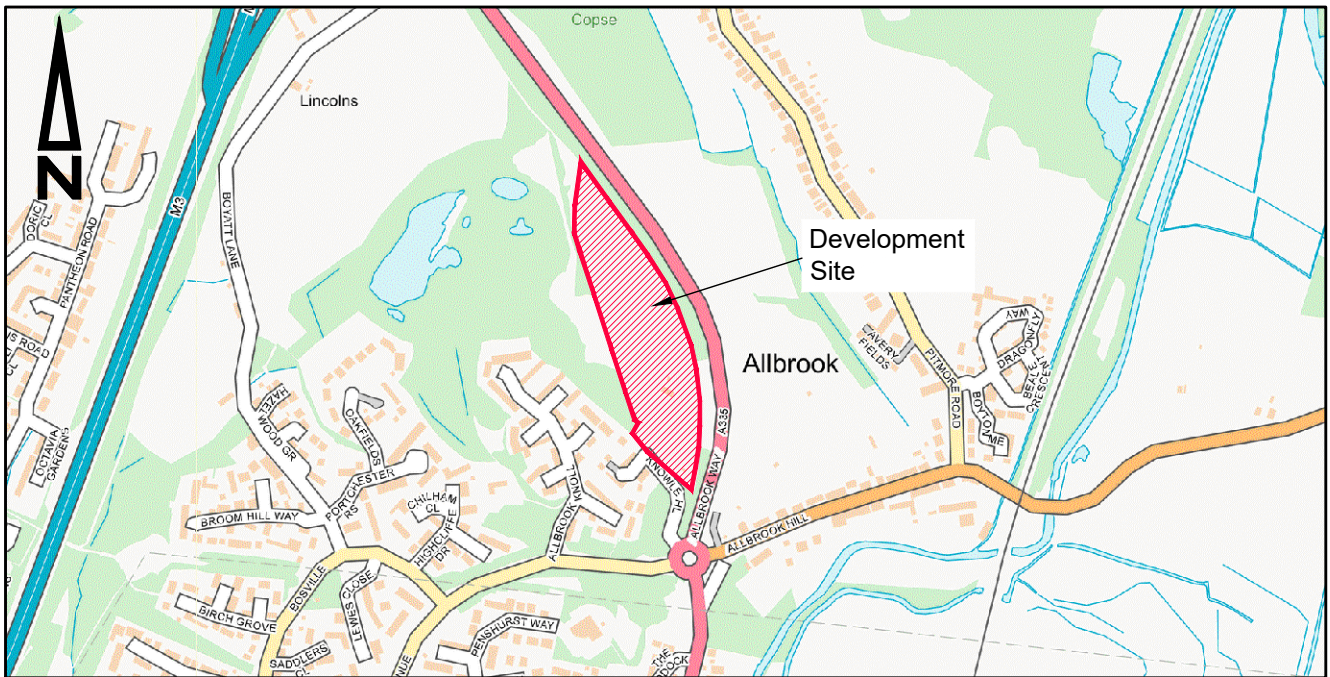
5.0 DISCUSSION AND CONCLUSIONS

- 5.1 This Report discusses flood risk and drainage issues associated with the proposed development on land west of Allbrook Way in Eastleigh. The study considers the requirements of the Environment Agency and guidance contained within the *NPPF*, *PPG* and HCC and EBC's local policies.
- 5.2 The site is located within Flood Zone 1 and is considered to be at low risk of flooding from rivers or sea. No significant flood risk has been identified to the site from sewer, overland runoff and groundwater. However, additional measures to mitigate flood risk includes provision of overland flow routes and landscape corridor and shallow swale features to route flood water away from properties, adequate drainage/SuDS provision to manage developed surface water runoff and raising floor levels across the new properties. Southern Water public water mains in the vicinity are to be protected with appropriate easements to the stipulation of Southern Water.
- 5.3 The *NPPF/PPG* guidance classifies the proposed usage, residential as 'more vulnerable' uses. More vulnerable uses are considered suitable within Flood Zone 1.
- 5.4 Runoff from the development will be managed onsite within combined attenuation/infiltration system (soakaways, infiltration basin, swales, oversized pipes and tanks). Ground conditions supported infiltration within the southern region whilst failed to work within the northern extent of the site. SuDS/drainage system will be designed for the 1:100 year + 40% event. An urban creep of 10% has also been allowed.
- 5.5 The onsite drainage/SuDS system will finally discharge into the public surface water sewer located at Knowle Hill. Discharge will be limited to the current greenfield rate (Q_{bar}) of 16.9l/s in the 1:100 year + 40% event. The proposal with the reduction in the existing greenfield runoff towards downstream area will therefore represent betterment over the current runoff and flooding situation. The proposed connection into the public sewer will be subject to an agreement with Southern Water.
- 5.6 Residual flooding will be guided towards open space and swale features. SuDS features integrated within the landscape across the development will not only contribute in flood risk and surface water management, but also offer diverse benefit of water quality protection, biodiversity and recreation.

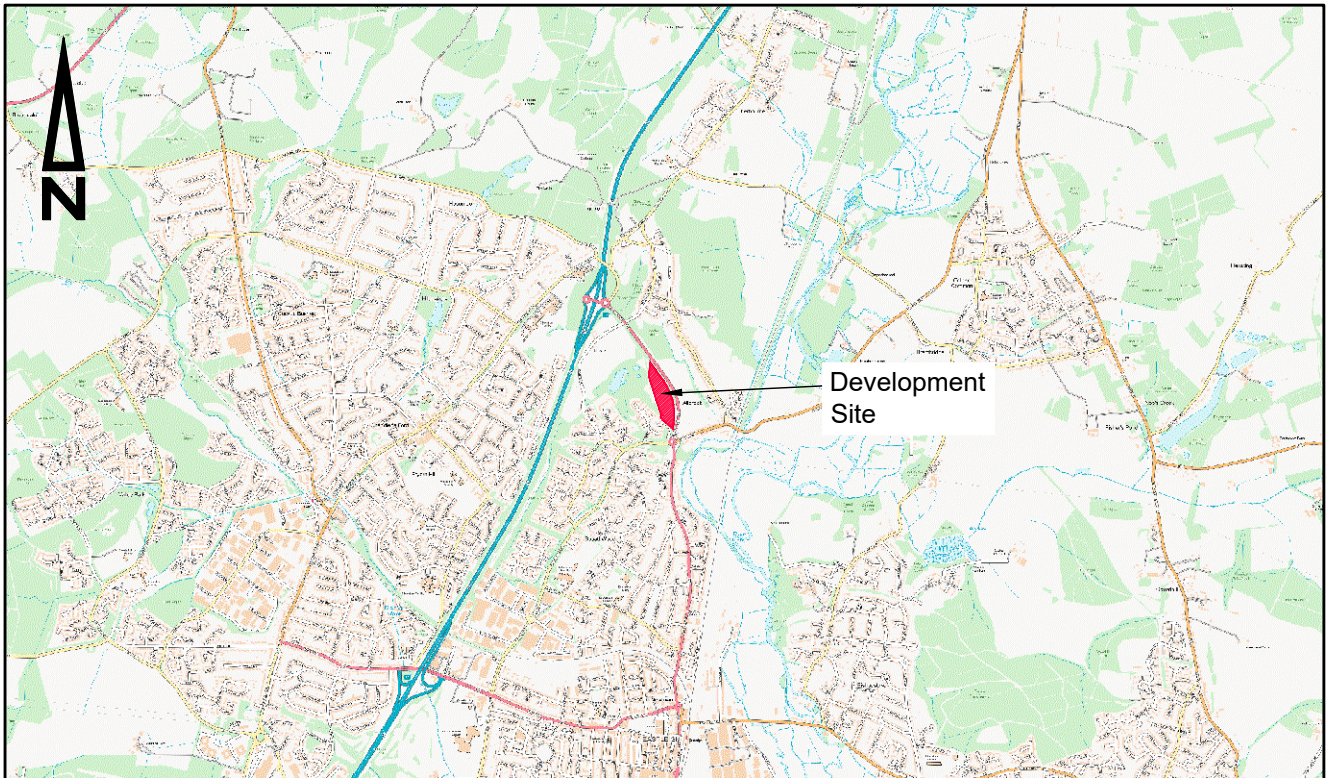
- 5.7 Runoff from all hard areas will receive at least three level of treatment in line with the Eastleigh Borough's requirements. Runoff will be appropriately treated within a combination of pre-treatment units (e.g. silt chambers, trap gullys, Petrol Interceptor) and SuDS devices (rainwater butts, soakaways, infiltration basins and vegetated swales) to ensure that runoff entering the River Itchen (via public sewerage system) is of acceptable quality.
- 5.8 Construction runoff and sediment will be managed with the construction of drainage features (swales, basin and drainage networks and perimeter bunds) at the beginning of the construction phase. Sediment laden runoff will be treated via silt traps, swales and infiltration basin; no uncontrolled runoff will enter the River Itchen. The drainage features will be desilted/scoured and reinstated to the design level to facilitate onsite drainage after the completion of the development.
- 5.9 All SuDS devices will be maintained under a suitable management regime in accordance with the CIRIA guidance or manufacturer's specification to ensure effective functioning of the system in the long term. The piped networks, flow controls and Petrol Interceptor will be adopted and maintained by Southern Water whilst SuDS features in public open space will be maintained by a private arrangement (likely via a Grounds Maintenance Company appointed by the developer on behalf of the Residents' Management Company).
- 5.10 The development will discharge foul flows into the public foul sewer located at the bottom of the Knowle Hill in agreement with Southern Water.
- 5.11 Southern Water have confirmed on the ability of the existing foul and storm networks to accept the proposed (both foul and surface water) flows from the development.
- 5.12 As such, the development proposal meets with the requirements set by the *NPPF/PPG* and local policies and guidance, and should be considered acceptable in terms of drainage and flood risk grounds.

Cole Easdon Consultants Limited
November 2020

Appendix 1



Scale: 1:10,000



Scale: 1:50,000

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Job Title:

Land west of Allbrook Way
Eastleigh

Drawing Title:

Site Location Plan

Client:

Cranbury Estates Ltd

Drawn By

NP

Checked By

RB

Date Drawn

Oct 2018

Drawing No.

6557/500/Figure 1

Drawing Status:

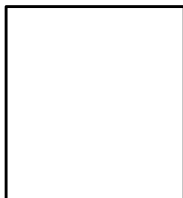
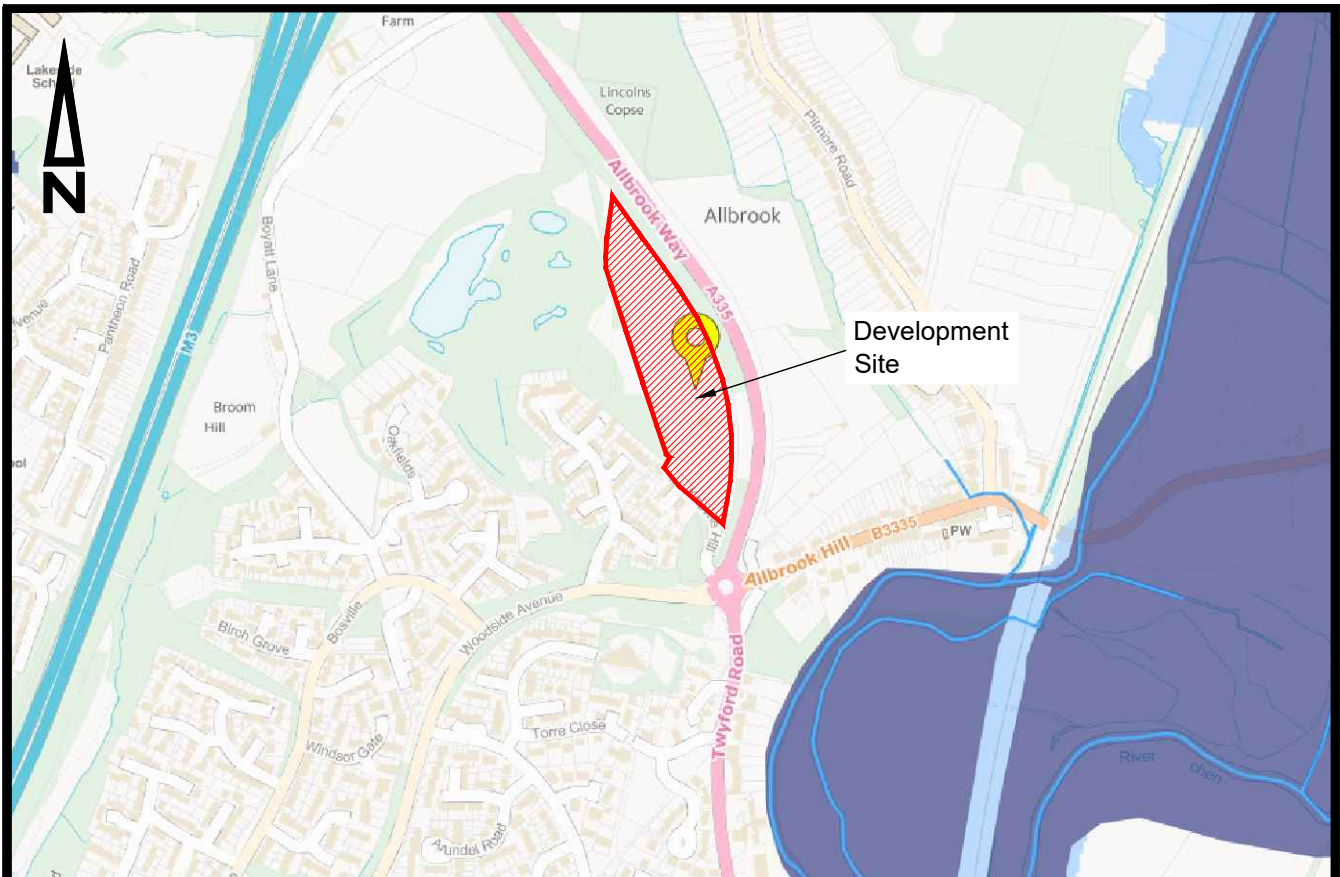
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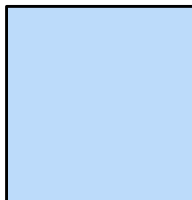
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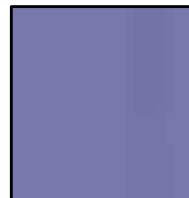
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Flood Zone 1
Low Risk



Flood Zone 2
Medium Risk



Flood Zone 3
High Risk



Main Rivers

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Job Title:

Land west of Allbrook Way
Eastleigh

Drawing Title:

Flood Map

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RB	6557/500/Figure2	-													

Client:

Cranbury Estates Ltd

Drawn By

NP

Date Drawn

Jan 2019

Checked By

RB

Drawing No.

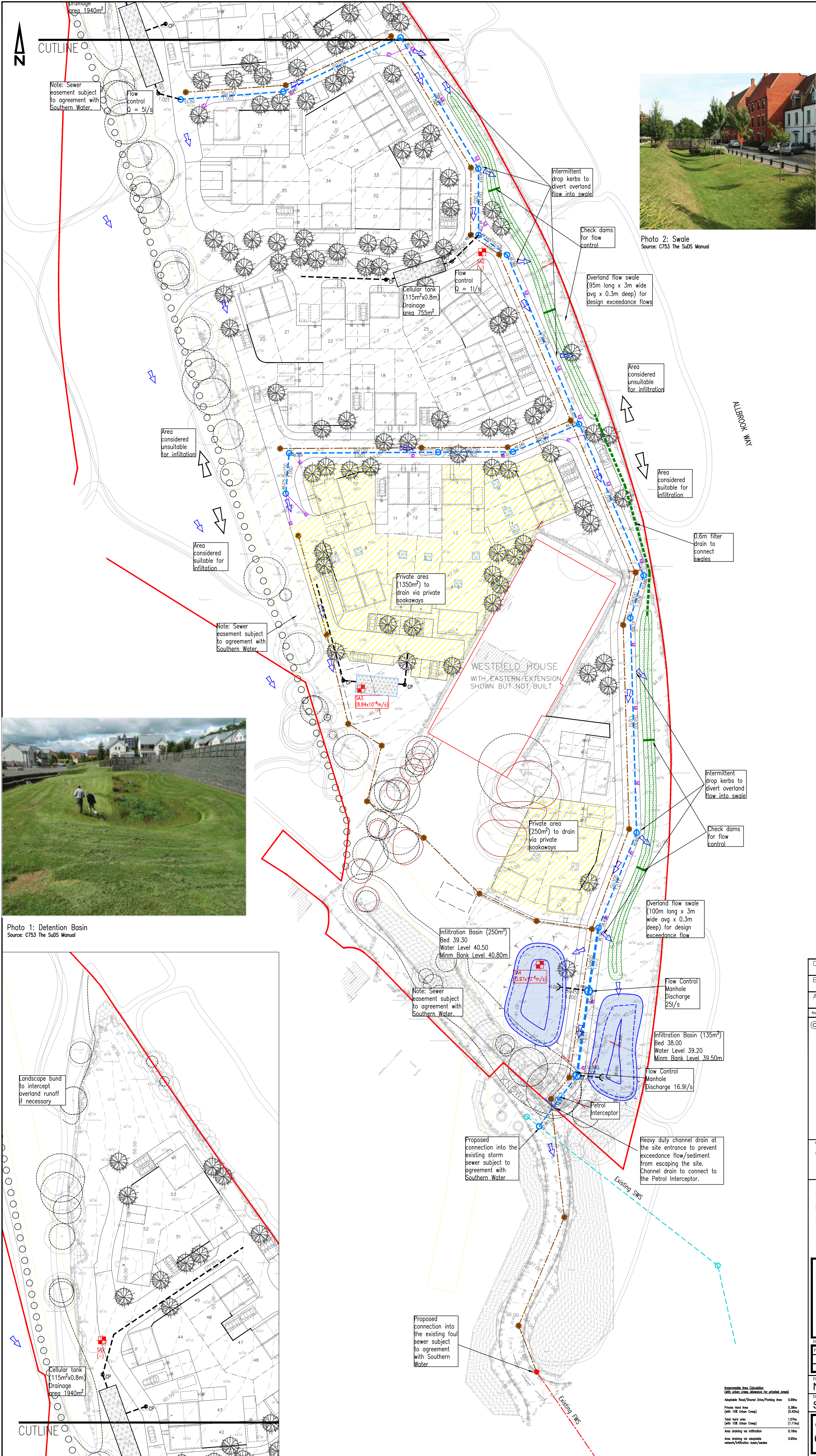
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Revision

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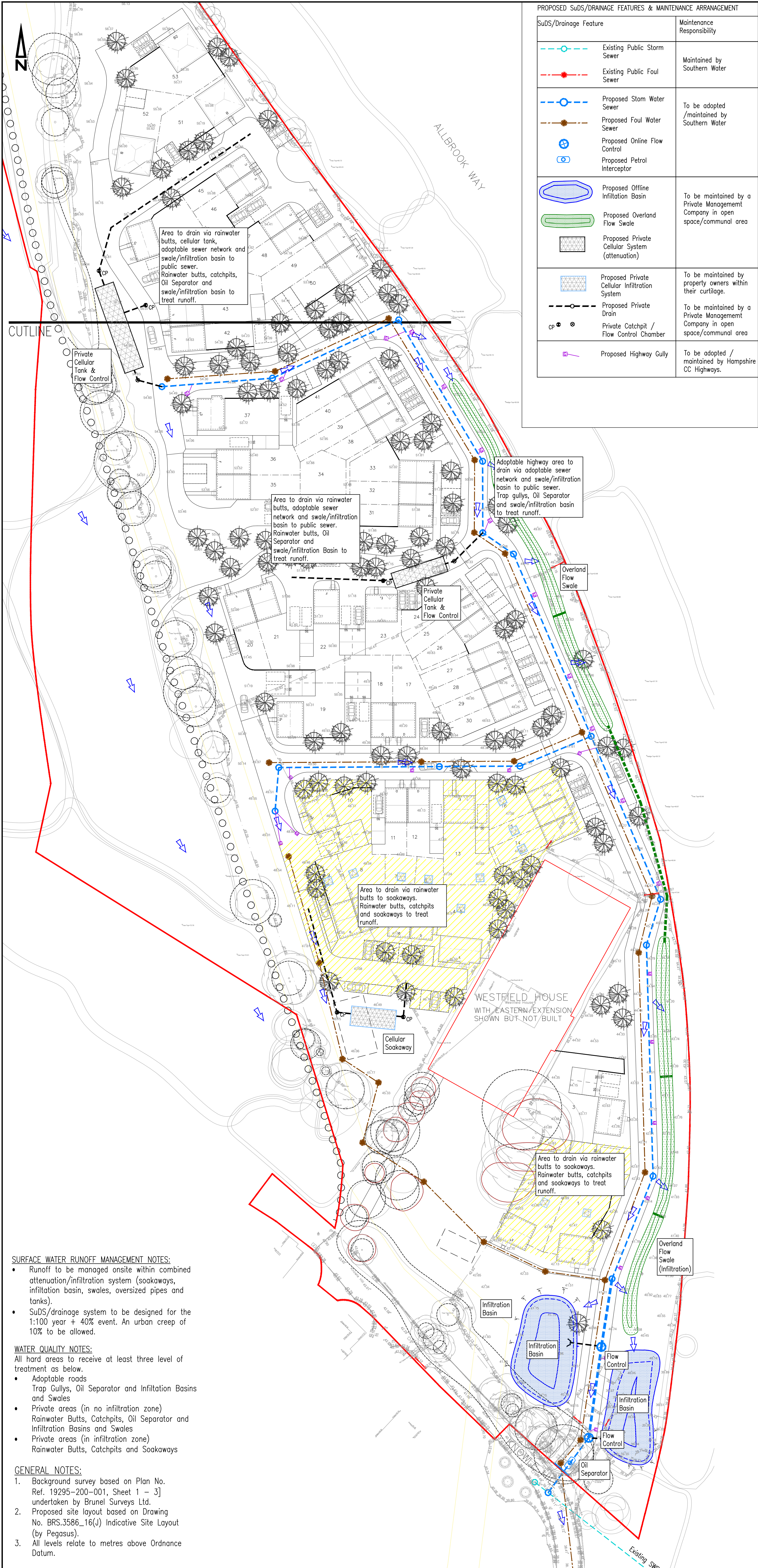
- Application Boundary
- Existing Public Storm Sewer
- Existing Public Foul Sewer
- Existing Site Contour
- Existing Ground Level
- Proposed Storm Water Sewer
- Proposed Foul Water Sewer
- Proposed Offline Infiltration Basin
- Proposed Overland Flow Swale
- Proposed Private Cellular System (attenuation)
- Proposed Private Cellular Infiltration System (to be sized)
- Proposed Online Storm Water Flow Control
- Proposed Petrol Interceptor
- Proposed Private Drain
- Private Catchpit / Flow Control Chamber
- Overland Flow Route
- Area considered unsuitable for infiltration
- Area draining via soakaway

- GENERAL NOTES:**
- Background survey based on Plan No. Ref. 19295-200-001, Sheet 1 - 3] undertaken by Brunel Surveys Ltd.
 - Proposed site layout based on Drawing No. BRS.3586_16(J) Indicative Site Layout (by Pegasus).
 - All levels relate to metres above Ordnance Datum.

- DRAINAGE NOTES:**
- Surface water runoff to be discharged to public surface water sewer at a limited discharge of 16.9l/s (greenfield runoff Qbar) in agreement with Southern Water.
 - Runoff to be managed onsite within combined attenuation/infiltration system (soakaways, infiltration basin, swales, oversized pipes and tanks).
 - SuDS/drainage systems to be designed for up to the 1:100 year + 40% event. An urban creep of 10% has been added to private areas in hard area calculation.
 - Foul water to discharge into SW foul sewer in agreement with Southern Water.
 - Sewer/water main info based on Southern Water sewer records. Exact location and levels to be confirmed on site.
 - Drainage shown subject to detailed design.
 - Existing sewer and water mains to be surveyed and afforded with an easement to the requirement of Southern Water.

- WATER QUALITY NOTES:**
- All hard areas to receive at least three level of treatment as below.
 - Adoptable roads
Trap Gullies, Oil Separator and Swale or Infiltration Basin
 - Private areas (in no infiltration zone)
Rainwater Butts, Catchpits, Oil Separator and Swale or Infiltration Basin
 - Private areas (in infiltration zone)
Rainwater Butts, Catchpits and Soakaways

C	NP	19.11.20	Revised to new layout, notes/key amended
B	NP	14.07.20	Revised to new layout, notes/key amended
A	NP	28.04.20	Drainage revised with combined infiltration/attenuation, notes/key amended to suit
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Client Cranbury Estates Ltd			
Job Title Proposed Residential Development Land West of Allbrook Way Eastleigh			
Drawing Title Proposed Drainage Strategy			
Drawing Status			
FOR COMMENT FOR PLANNING FOR TENDER FOR APPROVAL FOR CONSTRUCTION AS BUILT			
CONSTRUCTION AT CLIENT / CONTRACTOR RISK			
Designed by NP		Drawn by NP	
Date Sept 2019		Scale 1:500 (A1)	
Drg. No. 6557/501		Rev. C	



Maintenance Schedule for Infiltration Basin/Swale		
Schedule	Maintenance Requirement	Frequency
Regular	Remove litter and debris	Monthly
	Cut grass - for landscaped area and access routes	Monthly during growing season or as required
	Cut grass - meadow grass in and around the basin/swale surface	Half yearly: spring and autumn
Occasional	Manage other vegetation and nuisance plants in and around the basin/swale	Monthly at start, then as required.
	Re-seed areas of poor vegetation growth	Annually or as required
	Prune and trim trees	As required
Remedial	Remove sediment from pre-treatment system when 50% full	As required
	Repair erosion or other damage by re-seeding	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
Monitoring	Rehabilitate uneven surfaces using scarifying and spiking techniques if performance deteriorates	As required
	Re-level uneven surface and design levels	As required
	Inspect inlets, outlets, and overflows for blockages, and clear if required	Monthly
Monitoring	Inspect bank/sides, structures, pipework etc. for evidence of damage	Monthly
	Inspect erosion or uneven surfaces for ponding and compacting	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half Yearly

Maintenance Schedule for Cellular Storage/Soakaway		
Schedule	Maintenance Requirement	Frequency
Regular	Remove debris from the catchment surface	Monthly
	Remove sediment from pre-treatment structures and internal forebays	Annually, or as required based on inspection
	Inspect for sediment and debris in pre-treatment devices and floor of inspection tube or chamber	Annually, or as required based on inspection
Occasional	Cleaning of gutters and any filters and downpipes	As required
	Trimming any roots that may be causing blockages	As required
	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber	As required
Remedial	Reconstruct soakaways and/or replace or clean fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile	As required
	Repair and rehabilitate inlets, outlets, overflows and vents	As required
Monitoring	Inspect inlets, outlets, overflows and vents to ensure they are operating as designed	Annually
	Inspect silt traps and note sediment accumulation rate	Monthly in first year and then annually
	Check soakaways to ensure emptying is occurring	Annually
Monitoring	Survey inside of tank for sediment build-up and remove as necessary	Every 5 years, or as required

Maintenance Schedule for Petrol Interceptor		
Schedule	Maintenance Requirement	Frequency
Regular	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary
Remedial	Replace malfunctioning parts or structures	As required
	Inspect for evidence of poor operation	As required
	Inspect filter media and establish appropriate replacement frequencies	As required
Monitoring	Check volume of sludge	Six monthly
	Empty the separator, if required	Six monthly
	Check the function of the warning device if fitted	Six monthly
Monitoring	Check the thickness of light liquid and monitor oil and sediment levels	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then six monthly
	Inspect the structural condition and in built parts of the device	Every 5 years

Maintenance Schedule for Flow Controls, Catchpits and Gullies		
Schedule	Maintenance Requirement	Frequency
Regular	Inspect for accumulation of silt	Every six months
	Inspect for debris and litter	Every six months
	Inspect inlets and outlets for blockages	Every six months
Occasional	Remove debris and litter	As required
	Remove silt	As required

B	NP	20.11.20	Revised to new layout
A	NP	14.07.20	Revised with new layout
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Drawing Title			
Proposed SuDS Maintenance Plan			
Drawing Status			
FOR COMMENT	FOR PLANNING	FOR TENDER	FOR APPROVAL
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