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Surface Water Drainage Strategy Report

For

Chickerell Town Hall

At

Willowbed Hall, Putton Lane, Chickerell, Weymouth, DT3 4AJ

Client:	Chickerell Town Council
Architect:	Western Design Architects
Job Ref:	25039
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APPENDICES

1.0 Introduction

1.1 Development Background

The site is located at Willowbed Hall, Putton Lane, Chickerell, Weymouth, Dorset, DT3 4AJ. National Grid reference SY 64835 08343

Figure 1: Aerial view of Site (approximate site boundary in red)

Planning Permission is being sought to build a new single storey extension to the existing hall, plus a new access road to the car park. The proposals are shown on the Architects drawings included in Appendix A.

This report summarises the proposed surface water drainage strategy for the site.

1.2 Site Location

The site is situated at off Putton Lane and the existing hall covers an area of approximately 390m², the proposed extension will cover an additional 135m². A new 4.0m wide and 56m long access road will be built around the northern side of the hall, which is currently soft landscaping. The existing macadam surfaced access road via the southern face of the hall, will be converted to 280m² of landscaped area. The remainder of the site car park, will be resurfaced to suit new levels, and the soft landscaping area will remain unchanged.

1.3 Flood Zone (UK Government Indicative Flood Mapping)

Table 1 Flood Zones, from Planning Practice Guidance – Flood risk and coastal change, reproduced in Figure 2 below, defines the flood zones shown on the UK Government's Indicative Flood Map for planning -

Flood Zone	Description
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b Functional Floodplain	Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

Figure 2: Planning Practice Guidance, Flood risk and coastal change.
Table 1 – Flood Zones (August 2022)

The site can be identified from Figure 3 as being located within Flood Zone 1, and therefore at low risk of flooding from fluvial sources and not at risk of flooding from the sea.

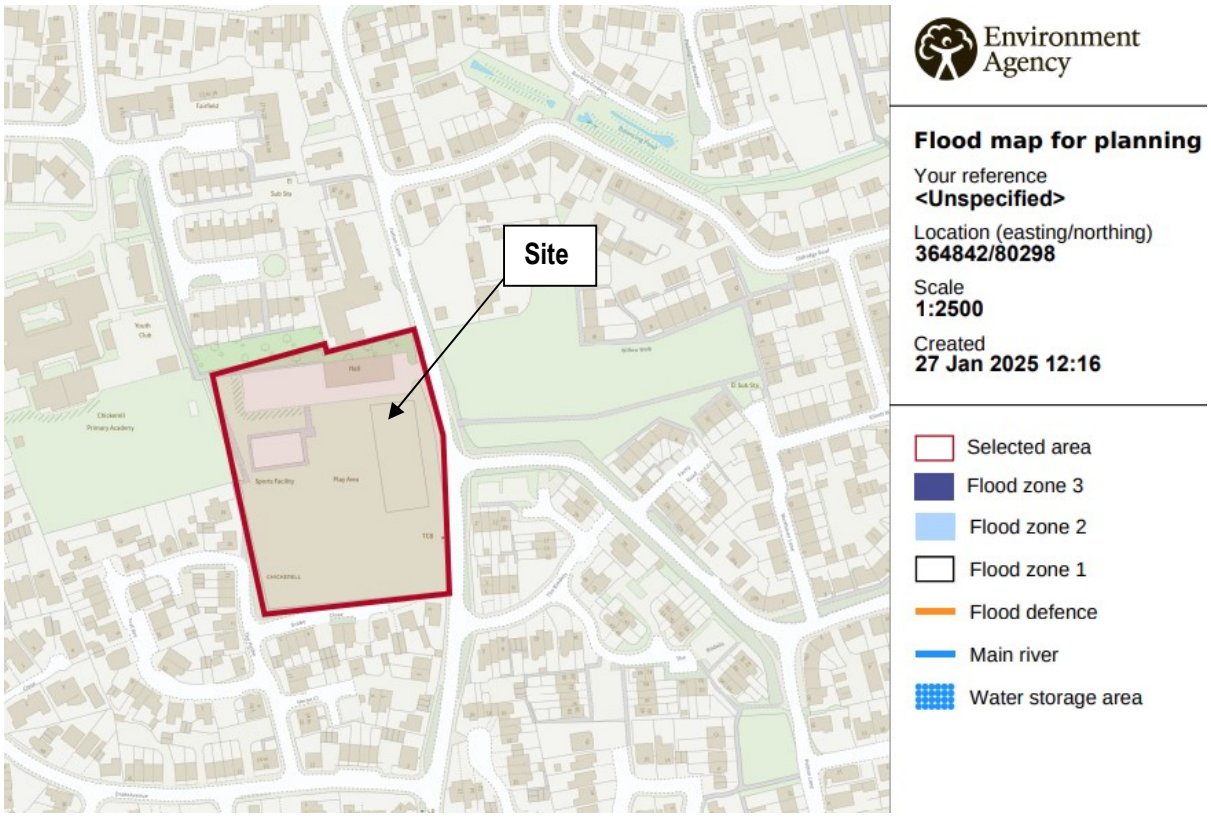


Figure 3: UK Government Indicative Flood mapping from rivers and sea

2.0 Flood Risk Vulnerability and Flood Zone Compatibility

2.1 Flood Zone Vulnerability

In accordance with 'Annex 3: Flood risk vulnerability classification' of the National Planning Policy Framework, the proposed development can be classed as "Less Vulnerable".

Less Vulnerable:

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
- Car parks.

Figure 4: Extract from National Planning Policy Framework Annex 3, (March 2012)

2.2 Flood Zone Compatibility

Table 2 (Flood risk vulnerability and flood zone 'compatibility), from Planning Practice Guidance – Flood risk and coastal change, reproduced in Figure 5 below, shows that 'Less Vulnerable' development in Flood Zone 1 (equivalent to the non-shaded areas of the UK Government Flood Map) is appropriate, without requiring the Sequential Test and Exception Test.

Flood risk Vulnerability classification		Essential infrastructure	Highly Vulnerable	More Vulnerable	Less vulnerable	Water compatible
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	Exception test required	✓	✓	✓
	Zone 3a†	Exception test required †	×	Exception test required	✓	✓
	Zone 3b*	Exception test required *	×	×	×	✓*

Figure 5: Planning Practice Guidance – Flood risk and coastal change, Table 2 (August 2022)

3.0 Potential Sources of Flooding

3.1 River Flooding

UK Government mapping (Figure 3) shows the site to lie outside of the shaded areas and therefore not at risk of flooding from rivers or sea.

3.2 Surface water Flooding

An extract of the UK Government's Indicative Map showing risk of flooding from surface water is shown in Figure 6 below. The site can be identified as being at very low risk of flooding from surface water.

Figure 6: UK Government Indicative map indicating flood risk from surface water

3.3 Groundwater Flooding

Based on Dorset Council Strategic Flood Risk Assessment for the area, the site is not within an area with the potential for groundwater flooding.

3.4 Flooding from Reservoirs

The site is indicated on the UK Government maps as not being at risk of flooding from reservoirs.

4.0 Existing/Proposed Drainage Arrangements

4.1 Site Geology

British Geological Survey mapping indicates that ground conditions are a bedrock of mudstone and sandstone, which may have the potential to support infiltration. A site investigation was conducted in March 2025 and found ground conditions to be clays and silts that were not suitable for infiltration.

4.2 Existing Site Drainage

A survey of the existing drainage found that the existing surface water network currently drains to a Dorset Highways surface water chamber, located outside the site entrance, which discharges to a watercourse on the opposite side of Putton Lane.

The current discharge rate for the existing site was calculated for the following rainfall events

Rainfall Event	1:2 years	1:10 years	1:30 years	1:100 years
Flow Rate	24.5L/s	48.9L/s	63.5L/s	80.7L/s

5.0 Proposed Surface Water and Sustainable Drainage (SuDS)

For sustainable best practice the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. into the ground (infiltration);
2. to a surface water body;
3. to a surface water sewer, highway drain, or another drainage system;
4. to a combined sewer.

Due to the ground conditions being unsuitable for infiltration, and that there is an existing offsite surface water connection, it is intended to continue positively discharging surface water from the site. However, surface water flows will be restricted to a maximum of 5.0L/s for all events up to 1:100 years +45% climate change uplift, which will give a significant improvement on the existing discharge rate.

As the current system discharges into a network owned by Dorset Highways, this has been asked to be disconnected at the insistence of Dorset Highways. Therefore, a new connection will be laid across Putton Lane into the watercourse in the field opposite. The field is already within the ownership of Chickerell Town Council, so permission to access the field is already in place. However permissions will still need to be obtained from Dorset Highways to cross Putton Lane, and an Ordinary Watercourse Consent obtained to discharge into the watercourse.

Drainage design software ‘Flow’, by Causeway Ltd., has been used to prepare the strategy layout using the following criteria:

Return Period	1 year for pipe design, 100 years for overall system design
Maximum Rainfall	999.9mm/hr for pipe design
Climate Change	+45%
Storm Durations	15,30,60,120,180,240,360,480,600,720,960 & 1,440 minutes
Rainfall Methodology	FEH-22
C_v	1.0

The drainage strategy layout has been designed to accommodate a 1 in 100 years event with 45% uplift for climate change below ground. A copy of the drainage strategy layout and supporting calculations can be found in Appendices B and C respectively.

5.1 Proposed Foul Water Drainage

Foul water will continue to be discharge from the site via an existing dedicated foul sewer, connecting to the Wessex Water foul sewer network. It is not intended to make any amendments to this network, other than the addition of a new chamber serving toilets located in the extension. This new chamber will connect into the existing foul network, and discharge with the rest of the foul water.

6.0 Drainage Maintenance

The following is a list of components included within the foul and surface water drainage system which will need to be regularly inspected and maintained:

- Surface water pipework
- Surface water chambers and catchpits
- Soakaways
- Permeable paving
- Proprietary treatment systems

Refer to Appendix D for the recommended frequency of inspection works. A copy of this report should be given over to whoever will be nominated as management agent for the site by the site owner. This will be a live document and any changes to the inspection periods should be recorded and reason given for future reference and review. Additionally, at any changes of ownership or maintenance agent, this document should be transferred to the new party.

Appropriate consideration to Health & Safety for all maintenance items should be undertaken with appropriate measures to protect the users of the site, visitors, environment & operatives undertaking the works. Under the prevailing Health & Safety / Construction Design & Management Regulations method statements should be provided by the maintenance contractor and retained as part of the Management & Maintenance procedures for the site, these should be provided to owner/client for record purposes (O&M records).

Where possible timing for these maintenance works should be programmed when the users are likely to be least inconvenienced. In the event emergency maintenance is required during busy times of the day, appropriate notifications and/or warnings should be given to the users.

7.0 Flood Risk Management Measures

7.1 Flood Mitigation Measures

General ground levels are to be maintained. Surface water will be managed within the development site via the use of an attenuated discharge rate of 5.0L/s, with a design resilience up to 1 in 100 years +45% climate change uplift, giving significant improvement on current discharge rates and reducing downstream flooding.

7.2 Off Site Impacts

Surface water discharge from the development site will be discharged off site at a restricted rate of 5.0L/s, for all events up to 1 in 100 years +45% climate change uplift.

Exceedance flows more than the 1 in 100-year (plus 45% allowance for climate change) design event will spill onto landscaped areas around the building, or flow towards the main entrance and into the drainage serving the public highway.

8.0 Water Quality

8.1 Potential Receptors of Surface Water

Based on available records and surveys surface water from the site would discharge into a watercourse within an area of public open space opposite of Putton Lane.

8.2 Minimum Water Quality Management

Table 4.3 of CIRIA C753 defines the minimum water quality management for discharges to receiving waters. For this site, this will be into a watercourse. Referring to table 4.3 from CIRIA C753 (figure 9), the land use is classified as non-residential car parking with frequent change (e.g. hospitals, retail) all roads except low traffic roads and trunk roads/motorways'

TABLE 4.3 Minimum water quality management requirements for discharges to receiving surface waters and groundwater

Land use	Pollution hazard level	Requirements for discharge to surface waters, including coasts and estuaries[2]	Requirements for discharge to groundwater
Residential roofs	Very low	Removal of gross solids and sediments only	
Individual property driveways, roofs (excluding residential), residential car parks, low traffic roads (eg cul de sacs, home zones, general access roads), non-residential car parking with infrequent change (eg schools, offices)	Low	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources[1]*	Simple index approach[3] *Note: extra measures may be required for discharges to protected resources1* In England and Wales, Risk Screening[4] must be undertaken first to determine whether consultation with the environmental regulator is required. In Northern Ireland, the need for risk screening should be agreed with the environmental regulator.
Trunk roads and motorways	High	Follow the guidance and risk assessment process set out in HA (2009)	
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites	High	Discharges may require an environmental licence or permit[5]. Obtain pre-permitting advice from the environmental regulator. Risk assessment is likely to be required[5].	

Notes

The minimum water quality management requirements for discharges to receiving surface waters and groundwater are presented here. (For Northern Ireland, this guidance should be considered as interim until such time as Northern Ireland publishes its own legislation/policy/guidance.)

1 These are not required in Scotland and Northern Ireland. For England and Wales, see Step 3 of the simple index approach (Section 26.7.1).

Protected surface water resources will include those designated for drinking water abstraction or for other environmental protection reasons. Protected groundwater resources are represented by SPZ1s in England and Wales.

2 In Scotland, the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 General Binding Rules, Rule 10 (d) (iv) effectively provides an exemption from requiring SuDS for coastal discharges. However, control of any contaminants likely to be present in surface water runoff is still required, but can be delivered using alternative methods such as proprietary treatment products. As the term 'SuDS' in this manual includes proprietary treatment products, this exemption is not valid in this context.

3 The application of the simple index approach should follow the approach outlined in Section 26.7.1 (or equivalent approved).

4 Risk screening is an assessment to identify high risk scenarios where the Environment Agency or Natural Resources Wales (NRW) would wish to be consulted regarding infiltration of water from surface runoff in order to agree the proposed design approach. The risk screening method is provided in Section 26.7.2.

5 The risk assessment should determine the appropriate design approach to mitigate risk to acceptable levels following the guidance outlined in Section 26.7.3. This assessment should be approved by the environmental regulator.

Figure 7: Water Quality Management Requirements (CIRIA C753 – Table 4.3)

On this basis, a simple index approach can be adopted, as detailed in Box 26.2 in CIRIA C753.

TABLE 26.2 Pollution hazard indices for different land use classifications

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

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Where a site land use falls outside the defined categories, the indices should be adapted (and agreed with the drainage approving body) or else the more detailed risk assessment method should be adopted.

Where nutrient or bacteria and pathogen removal is important for a particular receiving water, equivalent indices should be developed for these pollutants (if acceptable to the drainage approving body) or the risk assessment method adopted.

Figure 8: Pollution Hazards Indicies (CIRIA C753 – Table 26.2)

For this development, the following pollution hazard indices will be applied:

Land use (Table 4.3)	**Total suspended solids**	**Metals**	**Hydrocarbons**
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail) all roads except low traffic roads and trunk roads/motorways	0.7	0.6	0.7

Table 26.3 of CIRIA C753 indicates the SuDS mitigation indices for discharges to surface waters

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

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

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yuj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Figure 9: Indicative SuDS Mitigation Indices (CIRIA C753 - Table 26.3)

For this development catchpits will be used to remove gross solids and sediments from surface water from roof areas, which satisfies the requirements set out in table 4.3 (figure 7). 'Biobrane'® membranes will be used on all gullies, existing and proposed, to filter surface water flows. These act as a proprietary treatment system to remove pollutants from surface water flows, before discharging into the watercourse. A copy of the 'Biobrane' ® product information can be found in Appendix E.

9.0 Residual Risks

There are no residual flood risks associated with the development proposals.

10.0 Conclusion

This report presents the surface water drainage strategy proposed for this site. The developed area of the site lies within Flood Zone 1 and is therefore at low risk of fluvial flooding.

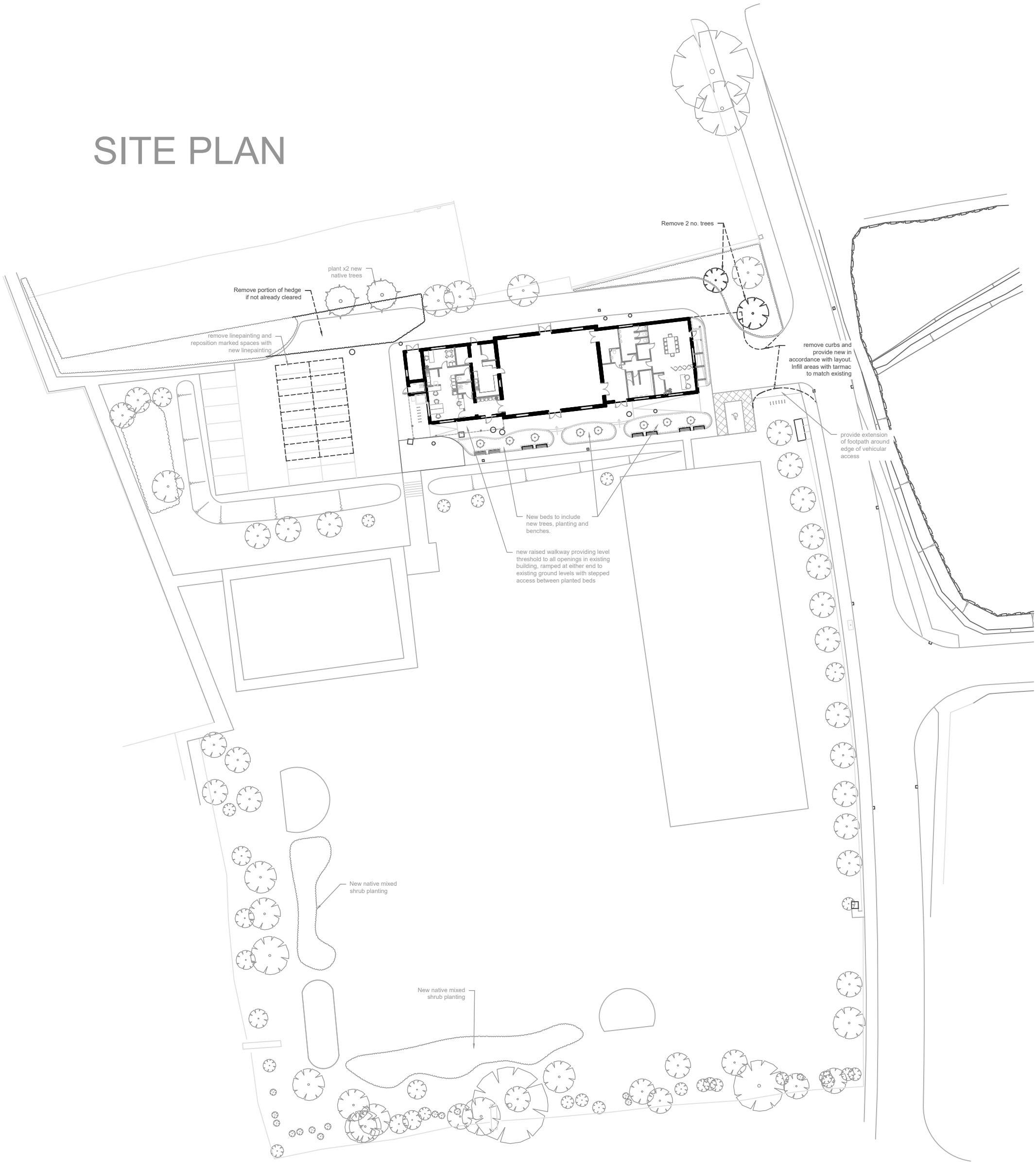
The report demonstrates that the proposed development will have a minimal impact on flood risk, both within the site and off-site. To ensure flood risk is mitigated, surface water will be discharged off site via the use of an attenuated discharge to a watercourse, with an overall design will be to a 1 in 100 years (+45% climate change) standard.

Areas within the proposed drainage system that will require regular maintenance have been highlighted by this report. If regular maintenance is not put in action, this can result in system failure and environmental effects.

The use of leaf guards and catch pits will ensure detritus material can be removed from surface water flows, meanwhile proprietary treatment systems will be used to filter pollutants from surface, therefore the site will not impact on water quality.

Appendix A: Architect's Layout Drawing

SITE PLAN


plant x2 new native trees
Remove portion of hedge if not already cleared
remove linepainting and reposition marked spaces with new linepainting
Remove 2 no. trees
remove curbs and provide new in accordance with layout. Infill areas with tarmac to match existing
provide extension of footpath around edge of vehicular access
New beds to include new trees, planting and benches.
new raised walkway providing level threshold to all openings in existing building, ramped at either end to existing ground levels with stepped access between planted beds
New native mixed shrub planting
New native mixed shrub planting

Appendix B: Site Drainage Strategy – Proposed Layout

THIS DRAWING IS FOR PLANNING PURPOSES ONLY

This drawing has been prepared for submission to fulfil planning permission requirements and is not to be used for construction in anyway. Some elements may still be subject to amendment during scheme development, post planning approval.
Godsell Arnold Partnership Ltd. accept no liabilities if works are constructed based on this drawing.
Godsell Arnold Partnership Ltd. will not be able to assist in any technical questions arising if any construction proceeds based on this planning drawing.

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NOT FOR CONSTRUCTION

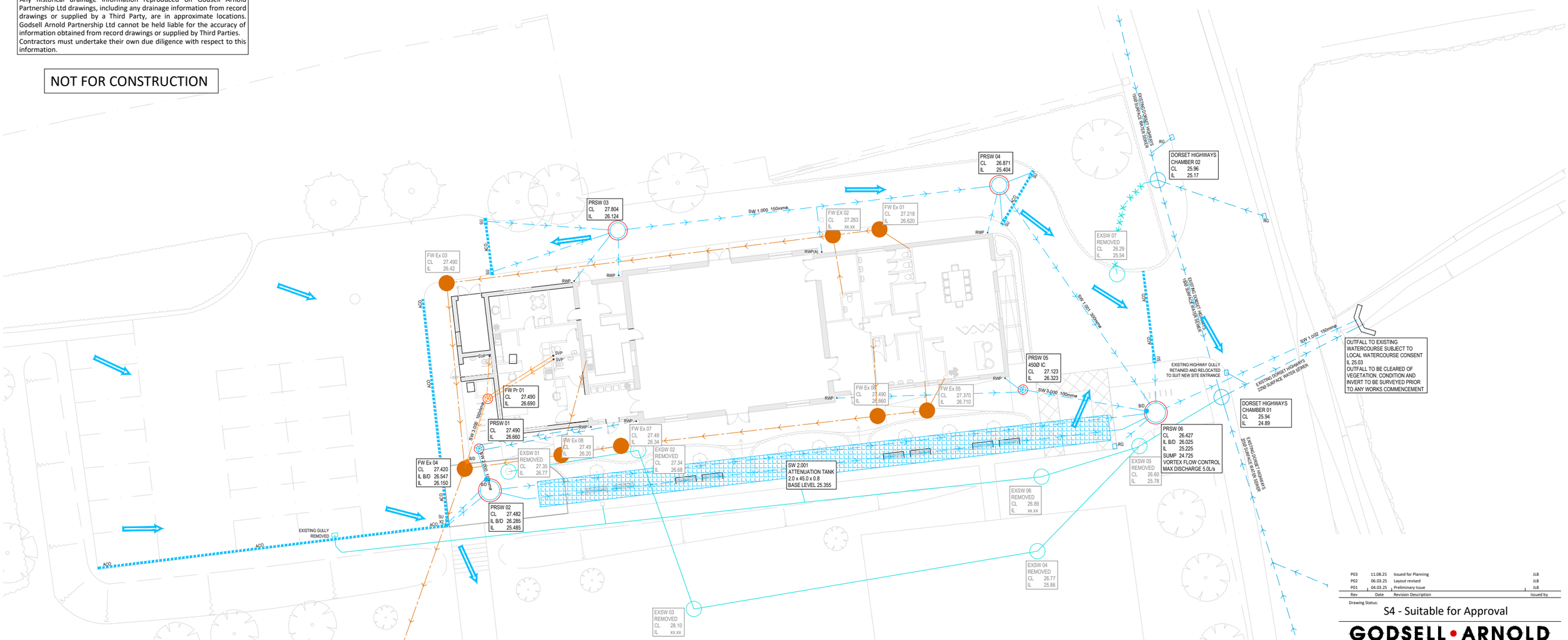
DRAINAGE LEGEND

- Existing surface water sewer (& manhole)
- Existing foul water sewer (& manhole)
- Existing combined sewer (& manhole)
- Proposed surface water sewer (& catchpit)
- Proposed foul water sewer (& manhole)
- AC / IC — Proposed 300Ø access chamber
- AC / IC — Proposed 450Ø inspection chamber
- SU / ACO — Drainage channel (with sump unit)
- Pipeline to be removed / abandoned
- Attenuation tank
- Exceedance flood route

Refer to Architects / M&E Drawings for exact positions of internal connections & RWP's

General Notes

1. These drawings are to be read in conjunction with all relevant Architect's and Engineer's drawings and specifications, refer to Drg. No.00 for Structural Specification
2. Except where specific dimensions are shown on these drawings, all setting out shall be in accordance with the architects drawings and specifications. Any discrepancy between these drawings and the architects drawings or the actual site dimensions should be referred to the engineer immediately and confirmed in writing. The contractor is responsible for the accuracy of all dimensions and the setting out.
3. Do not scale from these drawings. If in doubt, ask.
4. All dimensions are in millimetres unless noted otherwise.
5. All proprietary materials to be in accordance with manufacturers specifications and to Engineer's approval.
6. All proprietary CDP elements shown on the drawings should be treated as indicative and are subject to detailed design by specialist manufacturer/supplier. The contractor should make suitable allowance for third party design/detailing and potential impact on the permanent work design.



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Appendix C: Site Drainage Strategy – Design Calculations

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	0.900
Return Period (years)	1	Maximum Rainfall (mm/hr)	999.9	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	1.000	Connection Type	Level Soffits		
Time of Entry (mins)	4.00	Minimum Backdrop Height (m)	1.200		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Sump (m)	Easting (m)	Northing (m)	Depth (m)
2	0.054	4.00	27.482	1500		253.689	-57.735	1.997
6	0.016	4.00	26.427	1500	0.500	305.847	-51.651	1.702
OUTFALL			25.543			321.614	-44.383	0.513
3	0.029	4.00	27.474	1200		263.699	-37.399	1.350
4	0.024	4.00	26.927	1350		293.621	-33.858	1.523
1	0.015	4.00	27.490	450		252.838	-54.490	0.830
5	0.012	4.00	27.123	450		295.440	-49.859	0.800
DH02		4.00	25.960	600		306.004	-33.464	0.790
DH01			25.940	600		310.992	-50.438	1.050

Links (Input)

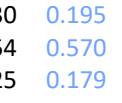
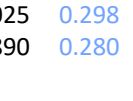
Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.001	2	6	45.000	0.600	25.485	25.225	0.260	173.1	2000	4.23	32.7
1.002	6	OUTFALL	17.362	0.600	25.225	25.030	0.195	89.0	150	4.89	32.7
1.000	3	4	30.131	0.600	26.124	25.554	0.570	52.9	150	4.36	32.7
1.001	4	6	21.588	0.600	25.404	25.225	0.179	120.6	300	4.61	32.7
2.000	1	2	3.355	0.600	26.660	26.285	0.375	8.9	100	4.02	32.7
3.000	5	6	10.560	0.600	26.323	26.025	0.298	35.4	100	4.14	32.7
4.000	DH02	DH01	17.692	0.600	25.170	24.890	0.280	63.2	150	4.23	32.7

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
2.001	45.000	173.1	2000	CRATE 800H	27.482	25.485	1.197	26.427	25.225	0.402
1.002	17.362	89.0	150	Circular	26.427	25.225	1.052	25.543	25.030	0.363
1.000	30.131	52.9	150	Circular	27.474	26.124	1.200	26.927	25.554	1.223
1.001	21.588	120.6	300	Circular	26.927	25.404	1.223	26.427	25.225	0.902
2.000	3.355	8.9	100	Circular	27.490	26.660	0.730	27.482	26.285	1.097
3.000	10.560	35.4	100	Circular	27.123	26.323	0.700	26.427	26.025	0.302
4.000	17.692	63.2	150	Circular	25.960	25.170	0.640	25.940	24.890	0.900

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.001	2	1500	Manhole	PCC RING	6	1500	Manhole	PCC RING
1.002	6	1500	Manhole	PCC RING	OUTFALL		Junction	
1.000	3	1200	Manhole	PCC RING	4	1350	Manhole	PCC RING
1.001	4	1350	Manhole	PCC RING	6	1500	Manhole	PCC RING
2.000	1	450	Manhole	INSPECTION CHAMBER	2	1500	Manhole	PCC RING
3.000	5	450	Manhole	INSPECTION CHAMBER	6	1500	Manhole	PCC RING
4.000	DH02	600	Manhole	Adoptable	DH01	600	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
2	253.689	-57.735	27.482	1.997	1500		1	2.000	26.285	100
							0	2.001	25.485	2000
6	305.847	-51.651	26.427	1.702	1500		1	3.000	26.025	100
							2	2.001	25.225	2000
							3	1.001	25.225	300
							0	1.002	25.225	150
OUTFALL	321.614	-44.383	25.543	0.513			1	1.002	25.030	150
3	263.699	-37.399	27.474	1.350	1200		0	1.000	26.124	150
4	293.621	-33.858	26.927	1.523	1350		1	1.000	25.554	150
							0	1.001	25.404	300
1	252.838	-54.490	27.490	0.830	450		0	2.000	26.660	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
5	295.440	-49.859	27.123	0.800	450	 0	3.000	26.323	100
DH02	306.004	-33.464	25.960	0.790	600	 0	4.000	25.170	150
DH01	310.992	-50.438	25.940	1.050	600	 1	4.000	24.890	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x
Rainfall Events	Singular	Skip Steady State	x	Starting Level (m)			
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Rate(s)	x		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	0	0	0
10	0	0	0	100	20	0	0
30	0	0	0	100	45	0	0
30	40	0	0				

Node 6 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	25.225	Product Number	CTL-SHE-0101-5000-1300-5000
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	10	25.499	0.014	11.6	0.0327	0.0000	OK
120 minute winter	6	82	25.461	0.236	9.0	0.4810	0.0000	SURCHARGED
120 minute winter	OUTFALL	82	25.080	0.050	4.6	0.0000	0.0000	OK
15 minute winter	3	10	26.170	0.046	4.8	0.0713	0.0000	OK
15 minute winter	4	10	25.463	0.059	8.9	0.1042	0.0000	OK
15 minute winter	1	10	26.686	0.026	2.6	0.0137	0.0000	OK
15 minute winter	5	10	26.355	0.032	2.1	0.0149	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	2	2.001	6	11.3	0.146	0.002	8.2474	
120 minute winter	6	1.002	OUTFALL	4.6	0.876	0.243	0.0907	25.3
15 minute winter	3	1.000	4	4.8	1.067	0.194	0.1345	
15 minute winter	4	1.001	6	8.8	0.882	0.087	0.5055	
15 minute winter	1	2.000	2	2.6	1.702	0.127	0.0051	
15 minute winter	5	3.000	6	2.1	1.005	0.206	0.0221	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	2	92	25.615	0.130	10.8	0.3001	0.0000	OK
120 minute winter	6	88	25.616	0.391	15.2	0.7964	0.0000	SURCHARGED
120 minute winter	OUTFALL	88	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.191	0.067	9.7	0.1049	0.0000	OK
120 minute winter	4	88	25.618	0.214	5.7	0.3757	0.0000	OK
15 minute winter	1	10	26.698	0.038	5.1	0.0200	0.0000	OK
15 minute winter	5	10	26.369	0.046	4.1	0.0216	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	2	2.001	6	7.0	0.099	0.001	23.3846	
120 minute winter	6	1.002	OUTFALL	5.0	0.897	0.265	0.0966	45.9
15 minute winter	3	1.000	4	9.7	1.290	0.395	0.2260	
120 minute winter	4	1.001	6	6.3	0.654	0.062	1.3415	
15 minute winter	1	2.000	2	5.1	2.020	0.250	0.0085	
15 minute winter	5	3.000	6	4.1	1.197	0.402	0.0362	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	2	92	25.723	0.238	13.3	0.5490	0.0000	OK
120 minute winter	6	94	25.723	0.498	16.2	1.0149	0.0000	SURCHARGED
30 minute winter	OUTFALL	27	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.202	0.078	12.6	0.1227	0.0000	OK
120 minute winter	4	94	25.723	0.319	7.5	0.5595	0.0000	SURCHARGED
15 minute winter	1	10	26.704	0.044	6.7	0.0235	0.0000	OK
15 minute winter	5	10	26.377	0.054	5.4	0.0256	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	2	2.001	6	7.5	0.102	0.001	33.0716	
120 minute winter	6	1.002	OUTFALL	5.0	0.898	0.266	0.0968	59.2
15 minute winter	3	1.000	4	12.6	1.376	0.513	0.2754	
120 minute winter	4	1.001	6	8.0	0.683	0.079	1.5202	
15 minute winter	1	2.000	2	6.7	2.154	0.328	0.0104	
15 minute winter	5	3.000	6	5.4	1.278	0.529	0.0446	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.90%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	2	114	25.941	0.456	16.8	1.0538	0.0000	OK
120 minute winter	6	114	25.942	0.717	18.6	1.4611	0.0000	SURCHARGED
60 minute winter	OUTFALL	33	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.222	0.098	17.7	0.1534	0.0000	OK
120 minute winter	4	114	25.942	0.538	10.5	0.9431	0.0000	SURCHARGED
15 minute winter	1	10	26.715	0.055	9.3	0.0290	0.0000	OK
15 minute winter	5	10	26.391	0.068	7.5	0.0321	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	2	2.001	6	7.8	0.103	0.001	52.7901	
120 minute winter	6	1.002	OUTFALL	5.0	0.898	0.266	0.0968	82.4
15 minute winter	3	1.000	4	17.7	1.482	0.721	0.3642	
120 minute winter	4	1.001	6	10.2	0.721	0.100	1.5202	
15 minute winter	1	2.000	2	9.3	2.313	0.456	0.0135	
15 minute winter	5	3.000	6	7.5	1.368	0.735	0.0579	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	2	106	25.867	0.382	15.0	0.8816	0.0000	OK
120 minute winter	6	102	25.867	0.642	19.2	1.3086	0.0000	SURCHARGED
15 minute winter	OUTFALL	23	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.215	0.091	16.0	0.1430	0.0000	OK
120 minute winter	4	102	25.868	0.464	9.5	0.8127	0.0000	SURCHARGED
15 minute winter	1	10	26.712	0.052	8.5	0.0274	0.0000	OK
15 minute winter	5	10	26.387	0.064	6.8	0.0299	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	2	2.001	6	7.8	0.105	0.001	46.0443	
120 minute winter	6	1.002	OUTFALL	5.0	0.898	0.266	0.0968	75.3
15 minute winter	3	1.000	4	16.0	1.452	0.652	0.3314	
120 minute winter	4	1.001	6	9.3	0.710	0.092	1.5202	
15 minute winter	1	2.000	2	8.5	2.270	0.416	0.0126	
15 minute winter	5	3.000	6	6.8	1.343	0.666	0.0535	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	2	116	26.022	0.537	17.2	1.2390	0.0000	OK
120 minute winter	6	116	26.022	0.797	20.9	1.6243	0.0000	SURCHARGED
480 minute winter	OUTFALL	240	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.228	0.104	19.2	0.1629	0.0000	OK
120 minute winter	4	116	26.022	0.618	11.4	1.0828	0.0000	SURCHARGED
15 minute winter	1	10	26.718	0.058	10.1	0.0307	0.0000	OK
15 minute winter	5	10	26.396	0.073	8.2	0.0344	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	2	2.001	6	8.4	0.130	0.001	60.0009	
120 minute winter	6	1.002	OUTFALL	5.0	0.898	0.266	0.0968	88.9
15 minute winter	3	1.000	4	19.2	1.504	0.782	0.3941	
120 minute winter	4	1.001	6	11.0	0.722	0.109	1.5202	
15 minute winter	1	2.000	2	10.1	2.351	0.495	0.0144	
15 minute winter	5	3.000	6	8.2	1.388	0.803	0.0624	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	2	172	26.229	0.744	13.5	1.7181	0.0000	OK
180 minute winter	6	172	26.229	1.004	19.2	2.0473	0.0000	FLOOD RISK
30 minute winter	OUTFALL	17	25.083	0.053	5.0	0.0000	0.0000	OK
15 minute winter	3	10	26.247	0.123	23.2	0.1924	0.0000	OK
180 minute winter	4	172	26.229	0.825	10.5	1.4464	0.0000	SURCHARGED
15 minute winter	1	10	26.727	0.067	12.3	0.0355	0.0000	OK
15 minute winter	5	10	26.411	0.088	9.9	0.0415	0.0000	OK
15 minute winter	DH02	1	25.170	0.000	0.0	0.0000	0.0000	OK
15 minute winter	DH01	1	24.890	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	2	2.001	6	5.7	0.116	0.001	78.6750	
180 minute winter	6	1.002	OUTFALL	5.0	0.898	0.266	0.0968	106.2
15 minute winter	3	1.000	4	23.1	1.537	0.942	0.4640	
180 minute winter	4	1.001	6	9.7	0.712	0.096	1.5202	
15 minute winter	1	2.000	2	12.3	2.437	0.602	0.0169	
15 minute winter	5	3.000	6	9.9	1.404	0.970	0.0790	
15 minute winter	DH02	4.000	DH01	0.0	0.000	0.000	0.0000	0.0

Appendix D: Drainage Management Maintenance Tables

Table 32.1 Extracted from SuDS manual CIRIA C753

(Highlighted Items are being used in this project)

Operation & Maintenance Activity	**SuDS Component (Highlighted used)**												
	Pond (C735-Table 23.1)	*Wetland (C735 Table 23.1)*	*Detention Basin (C735 Table 22.1)*	*Infiltration Basin (C735 Table 13.2)*	*Soakaway/Trenches (C735 Table 13.1)*	*Rain Water Harvesting (C735 Table11.6)*	*Filter Drain (C735 Table16.1)*	*Modular Storage (C735 Table 21.3)*	*Pervious Pavement (C735 Table20.15)*	*Swale/Bioretention/treesC735 Tables 17.1,18.3, 19.3)*	*Filter Strip (C735 Table 16.9)*	*Green Roofs (C735 Table 12.5)*	*Proprietary treatment systems (C735 Table 14.2)*
Regular Maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter & Debris Removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass Cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed & Invasive Plant Control	□	□	□	□		□	□		□		□	■	
Shrub Management (including pruning)	□	□	□	□	□					□	□	□	
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional Maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□		
Vacuum sweeping & brushing									□				
Remedial Maintenance													
Structure rehabilitation / repair	□	□	□	□	□	□	□	□	□	□	□	□	□
Infiltration surface reconditioning				□	□	□		□	□	□			

■ Items that will be required

□ Items that may be required

Notes

[1] Sediment should be collected and managed in pre-treatment systems, upstream of the main device

Maintenance Tables

Pipes and chambers

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspection of pipes and chambers	Monthly (and following poor performance)
	Cleaning of pipes and chambers, emptying silt traps	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or servicing of flow control devices	As per manufacturer's guidance
Remedial actions	Repair of pipes/chambers	As required
	Repairs to flow control devices	As required

Proprietary Treatment systems (Table 14.2 SuDS C753)

Maintenance Schedule	Required Action	Typical Frequency
Routine maintenance	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 – indicated by system inspections or immediately following a significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and replace appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Appendix E: “Biobrane” Drain Guard Information

The Intelligent Environmental Solution

Biobrane™ Drain Guard

Bio-Based | Compostable | Sustainable | Environmentally Friendly

Biobrane™ Drain Guards

Biobrane™ Drain Guards are designed to remove sediment and oil pollution from surface water running into gully drains from surrounding construction sites, farms, industrial estates, or other areas prone to storm water pollution and cleaning operations.

Biobrane™ Drain Guards are made from a unique high permeability non-woven, biodegradable, filter fabric that trap solids and absorbs hydrocarbons - but allow water to drain through.

The Drain Guards also incorporate bypass ports to further maintain flow into the drain during storm events.

Biobrane™ Drain Guards are uniquely made from a special plant based biopolymer, providing an environmentally responsible solution. They also incorporate sustainable materials that are fully compostable and biodegradable at end of use.

They are designed to be easily placed directly into the drain gully pot to filter out materials, as they flow into the drain without compromising drainage. They can trap up to 11kg of sediment, sand or debris as well as absorbing up to 2 litres of hydrocarbons.

Features/Benefits:

- Captures oil and sediment before it enters the drain
- Holds up to 11kg of sediment
- Absorbs up to 2 litres of hydrocarbons
- Easy installation and maintenance
- Universal fit
- Compact flat pack design minimises site storage space
- Designed to be used for up to 3 to 6 months under normal conditions

Application Categories: Sediment Pollution Control

Hy-Tex (UK) Limited
Aldington Mill, Mill Lane,
Aldington, Ashford, Kent
TN25 7AJ

01233 720097
sales@hy-tex.co.uk
www.hy-tex.co.uk
01233 720098

Installation

1. Remove catch basin grating.
2. Clean dirt and debris from grating ledge.
3. Insert Drain Guard.
4. Reinstall grate. To insure maximum effectiveness, the Drain Guard skirt should be secured (pinched) between grating and ledge.
5. Cut any excess fabric off with a knife/scissors if desired.

Maintenance and disposal

6. The Drain Guard filters are designed to be used for up to 3 to 6 months under normal conditions.
7. When the unit has collected about 150mm (6 inches) of sediment it is recommended that it removed, emptied and reinstalled.
8. Biobrane™ Drain Guards should be inspected on a regular basis.
9. Where there is heavy contamination, or fine clay particles, present, the unit may have a reduced life expectancy.
10. If water does not freely drain through fabric the unit should be replaced.
11. The unit should also be replaced if free oil can be seen floating and is not being absorbed.

Feature	Biobrane™ Drain Guard
Application	Sediment Filter
Effective Pore Size	92 micron
Sediment Capacity	Approx 11kg
Hydrocarbon Capacity	Up to 2 litres
Permeability	46 litres/m^2/sec
Tensile Strength	6.5 kN/m
Material	PLA biopolymer non-woven, needle punched fabric. UV stabilised
Size	Skirt 90 x 80cm Trap 30 x 30cm x 25cm deep
Weight	280g each
Additional Features	Fully compostable and biodegradable. Made from sustainable plant based resources.

Application Categories: Sediment Pollution Control

Hy-Tex (UK) Limited
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