

Upper Seagry – Commercial

FRA Addendum 3 (January 2026)

1. Scope of Note

A Flood Risk Assessment (FRA) including a drainage strategy was provided in July 2025 with the planning application for the proposed development of land at Seagry House located off Henn Lane and Startley Road, Upper Seagry, Chippenham, SN15 5HD. The planning application number is PL/2025/06615.

Wiltshire Council (WC) as the Local Planning Authority (LPA) and Lead Local Flood Authority (LLFA) and third parties provided comments on the FRA. These comments were considered and addressed in FRA Addendums provided in October 2025 and November 2025.

The latest response from the Wiltshire Drainage Team dated 25th November 2025 has been included as **Appendix A**.

In this response, they confirmed that they have no objection to the proposed development subject to the applicant addressing the following:

- *The submitted exceedance flow routing does not match the levels shown on the topographic survey in all locations. The applicant should confirm whether any re-levelling is planned to facilitate exceedance routing and submit any supporting topographical map for the proposed ground levels where required.*
- *The access to the site is predicted to flood, therefore in line with the National Planning Policy Framework, an emergency plan needs to be agreed with Wiltshire Council.*
- *With regards the control of surface water discharges from brownfield sites, Wiltshire Council requires post development discharges to be as close as reasonably practicable to greenfield runoff for both peak flow and volume.*

2. Latest Drainage Strategy

The latest drainage strategy plans and calculations are included as **Appendix B**. There has been no (and there does not need to be) any material change to the previously proposed drainage approach and drainage features.

The previous drainage strategy was based on an understanding of post-development site levels derived from the topographical survey. However, in order to adequately address the comments, more detail of these site levels has been provided. These are simply derived from the initial understanding but with a higher level of detail now provided.

The latest drainage strategy plan is included in **Appendix B** as **Figure PDL-01**, with this including the post-development site levels. As with the previous drainage strategy, the site is separated into two drainage catchments; the western catchment (Network 1) and the eastern catchment (Network 2).

The latest catchment assessment plan is included in **Appendix B** as **Figure PDL-03**. This demonstrates that the western catchment includes an area of existing hardstanding, with this assessed using brownfield runoff rates. The remainder of the catchment area is undeveloped, and assessed using greenfield runoff rates. The eastern catchment is wholly undeveloped and therefore assessed using greenfield runoff rates.

The catchment assessment plan provides the existing and proposed runoff rates for key return periods, and also the betterment that is provided by the drainage features included in the proposed development.

A summary of the existing runoff rates and the proposed allowable and proposed actual runoff rates for the western catchment is provided in **Table 1** and for the eastern catchment in **Table 2**. The data in these tables should be read in conjunction with **Figure PDL-01** and **Figure PDL-03**. The actual discharge rates are based on the drainage models as produced for each catchment area in support of the planning application.

Western Discharge Receptor					
Return Period	Pre-Development Runoff Rate (l/s)	Proposed Allowable Runoff Rate (l/s)	Proposed Actual Development Runoff Rate (l/s)	Betterment (Pre-Development vs Allowable)	Betterment (Pre-Development vs Actual)
1 in 2-year (Q_{BAR})	2.2	2.2 (Q_{BAR})	1.4	0%	36%
1 in 30-year	5.0	2.2 (Q_{BAR})	1.7	56%	66%
1 in 100-year	6.2	2.2 (Q_{BAR})	2.2	65%	65%

Table 1 – Western Catchment Discharge Rates

Eastern Discharge Receptor					
Return Period	Pre-Development Runoff Rate (l/s)	Proposed Allowable Runoff Rate (l/s)	Proposed Actual Development Runoff Rate (l/s)	Betterment (Pre-Development vs Allowable)	Betterment (Pre-Development vs Actual)
1 in 2-year (Q_{BAR})	0.6	0.6 (Q_{BAR})	0.4	0%	33%
1 in 30-year	1.2	0.6 (Q_{BAR})	0.5	50%	58%
1 in 100-year	1.4	0.6 (Q_{BAR})	0.6	57%	57%

Table 2 – Eastern Catchment Discharge Rates

The drainage strategy will result in betterment over the existing scenario (i.e. pre-development vs allowable and also pre-development vs actual runoff rates), as shown in **Table 1** and **Table 2**.

In response to the comment from the LLFA, this level of betterment in terms of the control of surface water runoff from the site, part of which is brownfield, is considered to be appropriate.

The post-development overland flow routes are included in **Appendix B** on **Figure PDL-01**. This demonstrates that these flow routes all drain to areas where they would be intercepted and therefore managed by features proposed as part of the drainage strategy.

In response to the comment from the LLFA, this drainage strategy plan now shows the proposed ground levels and the post-development overland flow routes. This therefore addresses the comment on whether this matches the topographic survey and whether any re-levelling is planned to facilitate exceedance routing.

The LLFA have noted that the access to the site is predicted to be affected by surface water flooding, and that in line with the NPPF, an emergency plan would need to be agreed with WC.

As noted in the October 2025 FRA Addendum, the surface water flow path is along a road that is served by an existing drainage network. The benefit provided by drainage networks is not taken into account by the modelling that is used to define surface water flooding. The likelihood of the flood depth being greater than 0.30m is therefore considered to be very low. The proposals are for a commercial development, which is classified as a low vulnerability land use.

As noted in the November 2025 FRA Addendum, the site has two alternative access and egress routes which are unaffected by flood risk. The first route connects the proposed development to Henn Lane which is intended as an emergency access. The second route passes along the existing track to the north along the front of Seagry House. These routes are illustrated in **Figure 1** included below.



Figure 1 – Access and Egress Routes

If required, an emergency access management plan can be provided for the proposed development via the discharge of an appropriately worded planning condition.

3. Summary

It is noted that the LLFA have confirmed that they have no objection to the proposed development subject to provision of further information.

As requested and subsequently agreed, an emergency access management plan can be provided for the proposed development as a discharge of a suitably worded planning condition, if that is still considered to be required.

The additional information requested on the post-development ground levels, overland flow routes, and existing and proposed runoff rates is provided in this FRA Addendum and confirms that the development is acceptable.

Appendix A

Latest Response from LPA (25th November 2025)

To: Development Management

From: Drainage Team Rahul Dixit

Planning App Ref: PL/2025/06615 Service Ref:

Date: 25/11/2025

PROPOSAL

Full Planning Permission for Erection of building comprising 4No. flexible B8 storage and distribution and/or Class E(g) Commercial, Business and Service units and erection of building for mixed agricultural and equestrian workshop, storage and estate office and stables, all following demolition of existing B8 storage building and site remediation, together with associated parking, servicing, drainage, infrastructure, biodiversity net gain and landscaping and alterations to existing vehicular access

SITE LOCATION

Building at Seagry House, Off Henn Lane and Startley Road, Upper Seagry, Chippenham, SN15 5HD

SUMMARY OF THE CONSULTEE POSITION

Object	
Holding Objection: Further information required	
Support	
No comment	
No objection	
No objection subject to conditions	X
Consultation not required	

APPLICATION DOCUMENTS REVIEWED

- Application Form (Aug 2025)
- Design and Access Statement (Aug 2025)
- Access Layout (Aug 2025)
- Flood Risk Assessment and Drainage Strategy (Aug 2025)
- Location Plan (Aug 2025)
- Cover Letter (Aug 2025)
- Phase 1 and 2 Desk Study and Ground Investigation Report (Aug 2025)

- Planning Statement (Aug 2025)
- Topographic Survey (Aug 2025)
- Existing Site plans (Aug 2025)
- Proposed Block A – Elevations and Plans (Aug 2025)
- Proposed Hard Landscaping (Aug 2025)
- Proposed Block B – Elevation and Plans (Oct 2025)
- Whole Site Plan – Proposed (Oct 2025)
- Site Sections (Oct 2025)
- Prelim Access Layout (Oct 2025)
- Site Plan - Proposed (Oct 2025)
- Flood Risk Assessment and Drainage Strategy (Oct 2025)

RELEVANT PLANNING POLICY & GUIDANCE

National Planning Policy Framework (NPPF) [NPPF December 2024 Link](#)
Planning and Flood Risk (Paras 170–182)

Wiltshire Core Strategy – Adopted January 2015 [Wiltshire Core Strategy Link](#)
 Core Policy 67 requires that all new development must address flood risk from all sources and not increase flood risk elsewhere. It supports the use of Sustainable Drainage Systems (SuDS) and requires that developments demonstrate how surface water will be managed sustainably.

Wiltshire Local Plan (emerging) [Local Plan Review Link](#)
 Development must avoid high flood risk areas using the sequential approach. Proposals require a Flood Risk Assessment, Surface Water Drainage Strategy, and Groundwater Assessment where relevant. All schemes must include Sustainable Drainage Systems (SuDS), with major developments achieving a 30% reduction in runoff compared to greenfield rates, following the surface water discharge hierarchy.

Culverting and building over watercourses is discouraged, and natural drainage features should be retained or restored. Drainage strategies must ensure safety during extreme flood events (1-in-100-year + climate change) and provide safe access/egress. SuDS should also deliver biodiversity, amenity, and water quality benefits.

Supplementary Planning Documents

Wiltshire Council Drainage Betterment Strategy (2024) [SPD Link](#)
 This technical guidance outlines expectations for surface water discharge hierarchy, attenuation, exceedance routes, water quality, and post-development monitoring.

Wiltshire Design Guide (March 2024) [SPD Link](#)
 Includes principles of good design, including integration of SuDS and flood resilience.

Other Relevant Policies and Guidance

Planning Practice Guidance (PPG) – Flood Risk and Drainage [Guidance Link](#)
Covers detailed expectations for flood risk assessments, SuDS design, discharge hierarchy, sequential testing and climate change allowances.

Wiltshire SFRA (2024) [SFRA Link](#)

This document underpins the Sequential and Exception Test application and provides site screening evidence.

Section 19 Flood Investigation Reports [Section 19 Reports Link](#)

These documents summarise investigations into significant local flood incidents and establish what caused the flooding, how authorities responded, and actions needed to prevent future floods.

National Standards for Sustainable Drainage Systems (SuDS) June 2025
[Guidance Link](#)

Establishes mandatory criteria for runoff destination hierarchy, interception, flood resilience, water quality, amenity, biodiversity, and long-term maintenance for all new developments in England.

SuDS Manual (CIRIA C753)

This document set outs design principles, especially where attenuation, exceedance routing, and water quality are discussed.

Infiltration drainage design must be supported by ground investigations, including infiltration testing in accordance with *British Research Establishment (BRE) Digest 365 – Soakaway Design*, and groundwater level monitoring that accounts for seasonal variation.

ASSESSMENT OF THE PROPOSAL

Context

In planning terms, flood risk refers to the potential for development to increase the likelihood or severity of flooding on-site or elsewhere, while drainage considerations relate to the capacity of the site and surrounding infrastructure to manage surface water runoff in a sustainable and effective manner.

The local planning authority must be satisfied that the proposed development will not increase flood risk, either on-site or elsewhere, and that surface water will be managed in a sustainable and coordinated manner.

Where necessary, planning conditions or legal agreements may be used to secure the implementation, maintenance, and monitoring of SuDS and other drainage infrastructure.

Assessment

We have reviewed the additional information submitted by the applicant, including revised plans, elevations, sections and the FRA Addendum.

The application has been supported with a Site-Specific Flood Risk Assessment (FRA). It should be noted that our comments below are reliant on the accuracy and completeness of the FRA, and we do not take any responsibility for incorrect data or interpretation made by the authors.

The report confirms that the site is located within Flood Zone 1, indicating a low risk of fluvial or tidal flooding. It also concludes that groundwater flood risk is negligible.

As per SFRA, one of the proposed access routes to Startley Road lies within an area of surface water flood risk. However, a second access route via Henn Lane, outside the surface water flood extents, is proposed to function as an emergency access route. This ensures that safe access and egress can be maintained during flood events. Given that one of the access routes is susceptible to flooding, the applicant should prepare and provide an emergency evacuation plan, even if an alternative access exists. This plan should be agreed upon with Wiltshire Council to ensure clarity and preparedness in case of an emergency.

We have the following comments with regards to the submitted FRA addendum;

The applicant needs to confirm whether any ground re-levelling is required to enable the proposed exceedance flow routing, as the drainage plan only shows arrows denoting exceedance flow route without any proposed grading details.

The drainage strategy for the Western Catchment shows that discharge will be restricted to 2.2 L/s, which is higher than the greenfield QBAR rate. The applicant is requested to provide a detailed justification as to why the discharge rate cannot be restricted to the greenfield QBAR rate.

RECOMMENDATION

No objection subject to the following conditions:

- 1. No development shall take place until a surface water drainage strategy, complying with Wiltshire Council requirements, NPPF, PPG, Non Statutory Technical Standards for SuDS and the National Standards for SuDS has been submitted to and approved in writing by the Local Planning Authority.**

In order to discharge the above drainage condition the following additional information must be provided:

- The submitted exceedance flow routing does not match the levels shown on the topographic survey in all locations. The applicant should confirm whether any re-levelling is planned to facilitate exceedance routing and submit any supporting topographical map for the proposed ground levels where required.
- The access to the site is predicted to flood, therefore in line with the National Planning Policy Framework, an emergency plan needs to be

agreed with Wiltshire Council. Guidance on the preparation of an emergency plan can be found [here](#).

- With regards the control of surface water discharges from brownfield sites, Wiltshire Council requires post development discharges to be as close as reasonably practicable to greenfield runoff for both peak flow and volume. For more information refer to Wiltshire Council's betterment policy update which can be found [here](#).

Informatives

- Wiltshire Council is the land drainage authority under the Land Drainage Act 1991. Land drainage consent is required if a development proposes to discharge flow into an ordinary watercourse or carry out work within 8m of an ordinary watercourse.

An ordinary watercourse is a watercourse that does not form part of a main river. The term watercourse includes all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

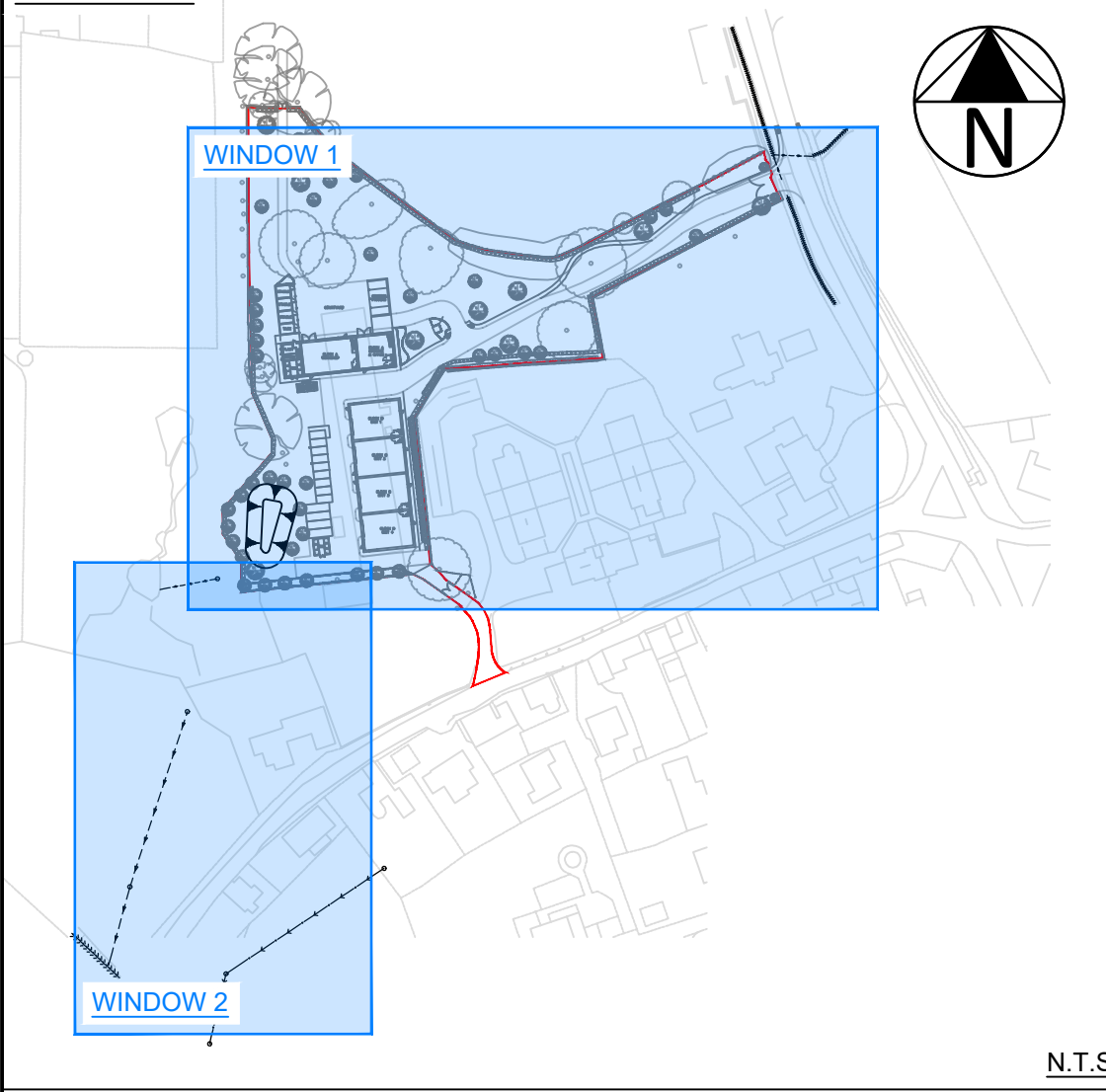
Wiltshire Council's land drainage bylaws can be downloaded [here](#). The land drainage consent application form and guidance notes can be found on our website [here](#).

- All new drainage will need to comply fully with Building Regulations Part H.

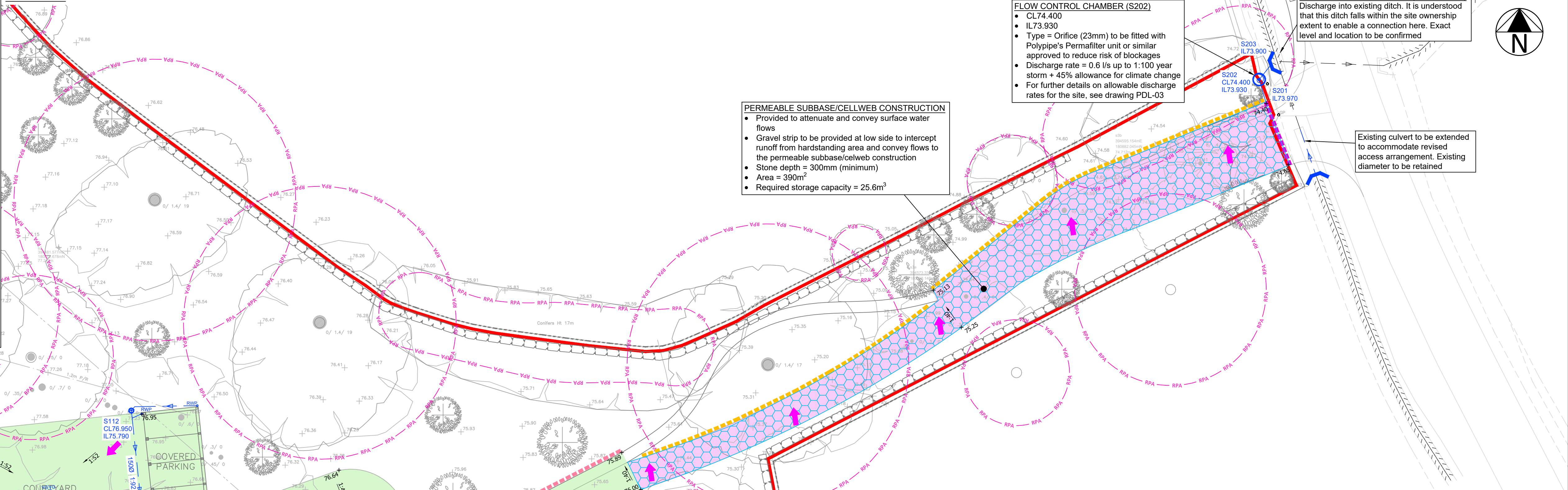
Appendix B

Latest Drainage Strategy Plans and Calculations

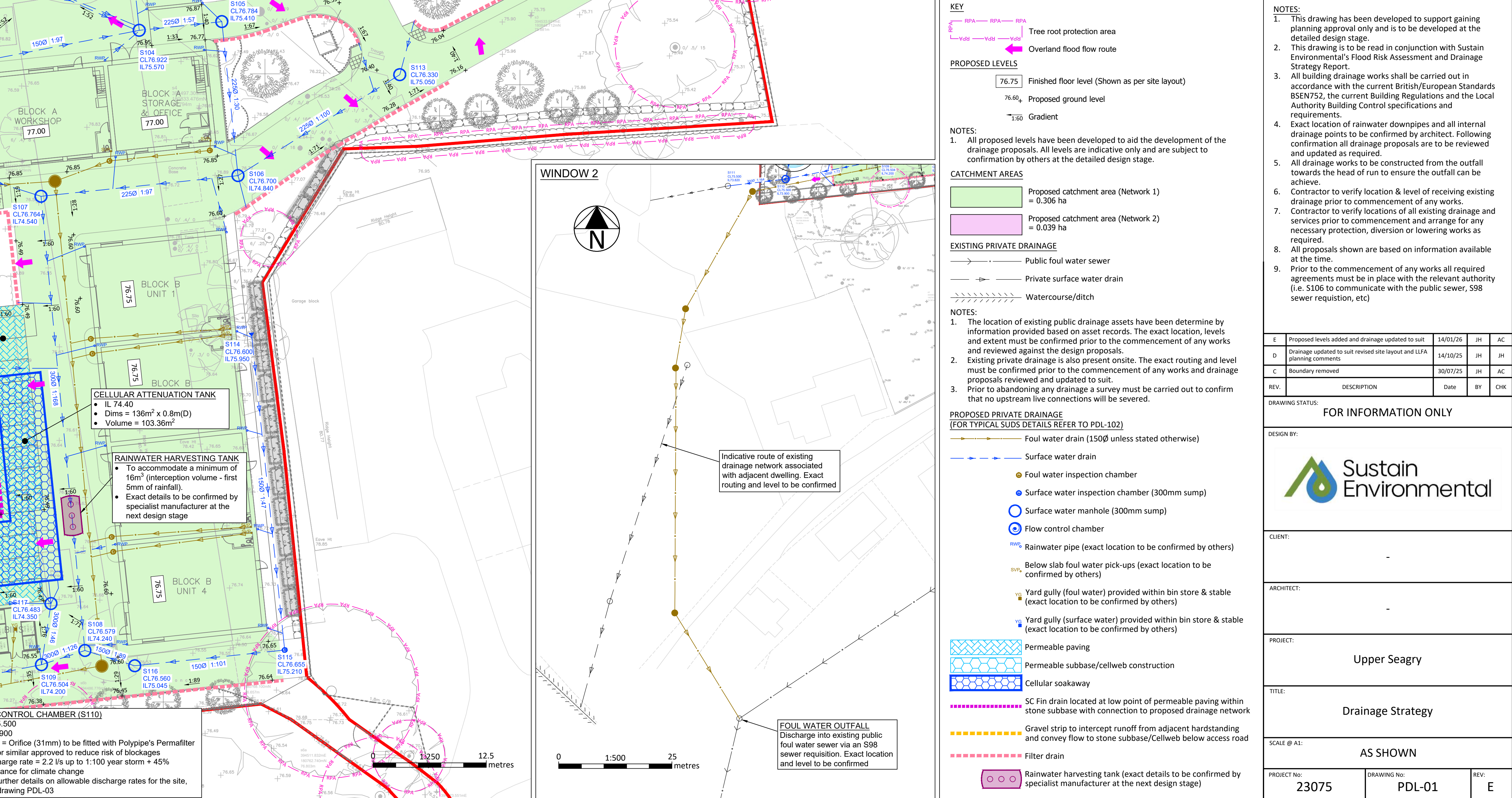
KEY PLAN



WINDOW 1



WINDOW 2



- DETENTION BASIN**
- CL 75.50m
 - IL 74.00m
 - Attenuation depth = 1.2m
 - Freeboard = 300mm
 - Side slope = 1:3
 - Attenuation volume = 169m³

SURFACE WATER OUTFALL (NETWORK 1)
Discharge into existing private surface water drain, exact location and level to be confirmed. It is understood that this drain currently serves the site and is within the ownership extent to enable a connection here.

- PERMEABLE PAVING**
- To receive runoff from adjacent hardstanding areas
 - SC Fin drain provided at low point within stone subbase to convey flows to proposed drainage network

- CELLULAR ATTENUATION TANK**
- IL 74.40
 - Dims = 136m² x 0.8m(D)
 - Volume = 103.36m³

- RAINWATER HARVESTING TANK**
- To accommodate a minimum of 16m³ (interception volume - first 5mm of rainfall).
 - Exact details to be confirmed by specialist manufacturer at the next design stage

- FLOW CONTROL CHAMBER (S110)**
- CL 75.500
 - IL 73.900
 - Type = Orifice (31mm) to be fitted with Polypipe's Permafilter unit or similar approved to reduce risk of blockages
 - Discharge rate = 2.2 l/s up to 1:100 year storm + 45% allowance for climate change
 - For further details on allowable discharge rates for the site, see drawing PDL-03

- PERMEABLE SUBBASE/CELLWEB CONSTRUCTION**
- Provided to attenuate and convey surface water flows
 - Gravel strip to be provided at low side to intercept runoff from hardstanding area and convey flows to the permeable subbase/cellweb construction
 - Stone depth = 300mm (minimum)
 - Area = 390m²
 - Required storage capacity = 25.6m³

- FLOW CONTROL CHAMBER (S202)**
- CL 74.400
 - IL 73.930
 - Type = Orifice (23mm) to be fitted with Polypipe's Permafilter unit or similar approved to reduce risk of blockages
 - Discharge rate = 0.6 l/s up to 1:100 year storm + 45% allowance for climate change
 - For further details on allowable discharge rates for the site, see drawing PDL-03

SURFACE WATER OUTFALL (NETWORK 2)
Discharge into existing ditch. It is understood that this ditch falls within the site ownership extent to enable a connection here. Exact level and location to be confirmed

Existing culvert to be extended to accommodate revised access arrangement. Existing diameter to be retained

KEY

- RPA Tree root protection area
- Overland flood flow route

PROPOSED LEVELS

- 76.75 Finished floor level (Shown as per site layout)
- 76.60 Proposed ground level
- 1:60 Gradient

NOTES:

- All proposed levels have been developed to aid the development of the drainage proposals. All levels are indicative only and are subject to confirmation by others at the detailed design stage.

CATCHMENT AREAS

- Proposed catchment area (Network 1) = 0.306 ha
- Proposed catchment area (Network 2) = 0.039 ha

EXISTING PRIVATE DRAINAGE

- Public foul water sewer
- Private surface water drain
- Watercourse/ditch

NOTES:

- The location of existing public drainage assets have been determine by information provided based on asset records. The exact location, levels and extent must be confirmed prior to the commencement of any works and reviewed against the design proposals.
- Existing private drainage is also present onsite. The exact routing and level must be confirmed prior to the commencement of any works and drainage proposals reviewed and updated to suit.
- Prior to abandoning any drainage a survey must be carried out to confirm that no upstream live connections will be severed.

PROPOSED PRIVATE DRAINAGE (FOR TYPICAL SUDS DETAILS REFER TO PDL-102)

- Foul water drain (1500 unless stated otherwise)
- Surface water drain
- Foul water inspection chamber
- Surface water inspection chamber (300mm sump)
- Surface water manhole (300mm sump)
- Flow control chamber
- Rainwater pipe (exact location to be confirmed by others)
- Below slab foul water pick-ups (exact location to be confirmed by others)
- Yard gully (foul water) provided within bin store & stable (exact location to be confirmed by others)
- Yard gully (surface water) provided within bin store & stable (exact location to be confirmed by others)

- Permeable paving
- Permeable subbase/cellweb construction
- Cellular soakaway
- SC Fin drain located at low point of permeable paving within stone subbase with connection to proposed drainage network
- Gravel strip to intercept runoff from adjacent hardstanding and convey flow to stone subbase/cellweb below access road
- Filter drain
- Rainwater harvesting tank (exact details to be confirmed by specialist manufacturer at the next design stage)

NOTES:

- This drawing has been developed to support gaining planning approval only and is to be developed at the detailed design stage.
- This drawing is to be read in conjunction with Sustain Environmental's Flood Risk Assessment and Drainage Strategy Report.
- All building drainage works shall be carried out in accordance with the current British/European Standards BSEN752, the current Building Regulations and the Local Authority Building Control specifications and requirements.
- Exact location of rainwater downpipes and all internal drainage points to be confirmed by architect. Following confirmation all drainage proposals are to be reviewed and updated as required.
- All drainage works to be constructed from the outfall towards the head of run to ensure the outfall can be achieve.
- Contractor to verify location & level of receiving existing drainage prior to commencement of any works.
- Contractor to verify locations of all existing drainage and services prior to commencement and arrange for any necessary protection, diversion or lowering works as required.
- All proposals shown are based on information available at the time.
- Prior to the commencement of any works all required agreements must be in place with the relevant authority (i.e. S106 to communicate with the public sewer, S98 sewer requisition, etc)

E	Proposed levels added and drainage updated to suit	14/01/26	JH	AC
D	Drainage updated to suit revised site layout and LLFA planning comments	14/10/25	JH	JH
C	Boundary removed	30/07/25	JH	AC
REV.	DESCRIPTION	Date	BY	CHK

DRAWING STATUS: FOR INFORMATION ONLY

DESIGN BY:



CLIENT:

ARCHITECT:

PROJECT:

Upper Seagry

Drainage Strategy

TITLE:

SCALE @ A1:

AS SHOWN

PROJECT NO:

23075

DRAWING NO:

PDL-01

REV:

E

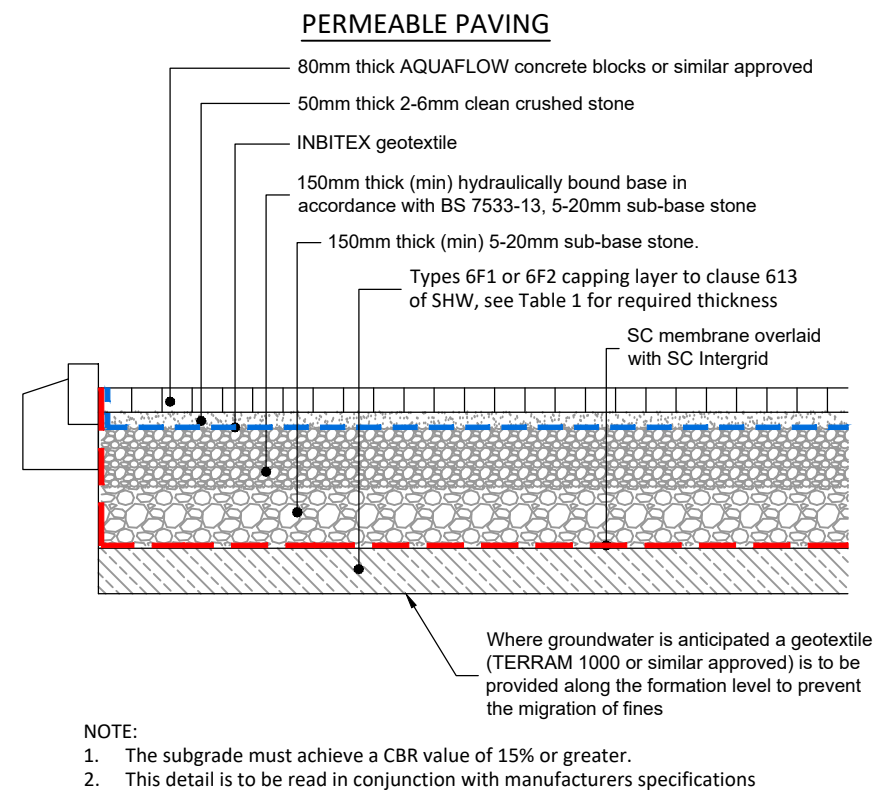
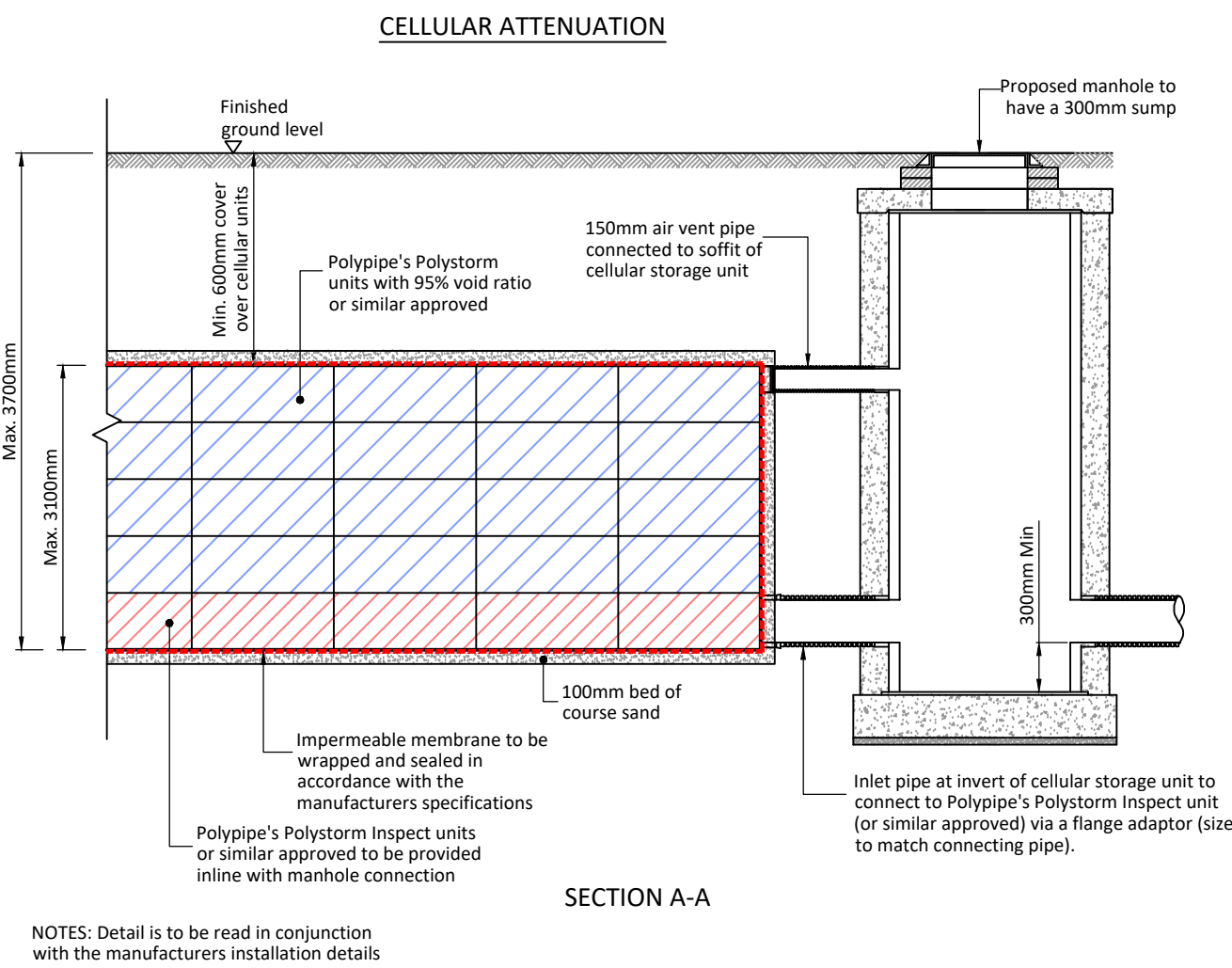
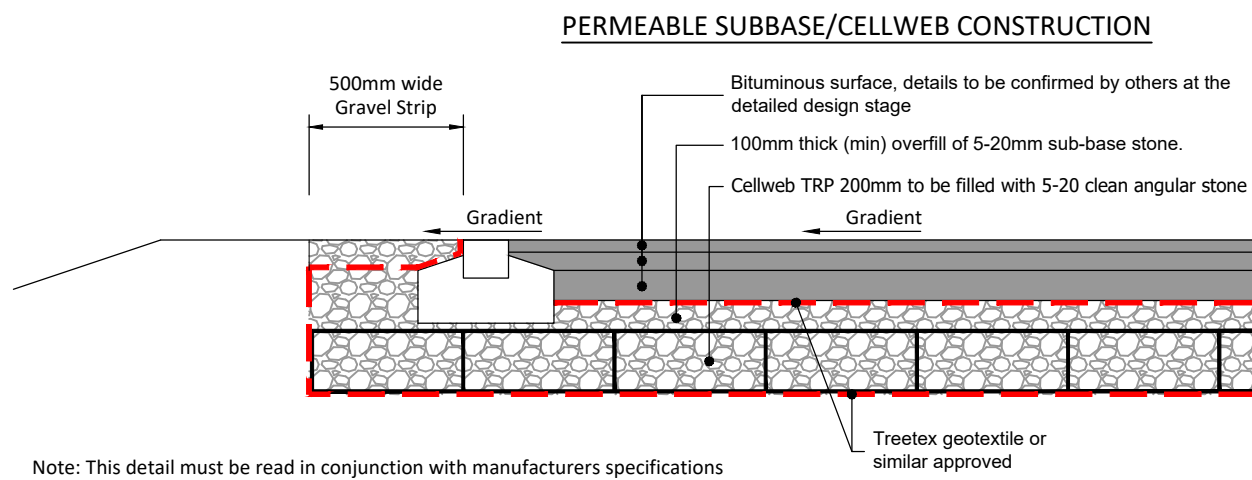
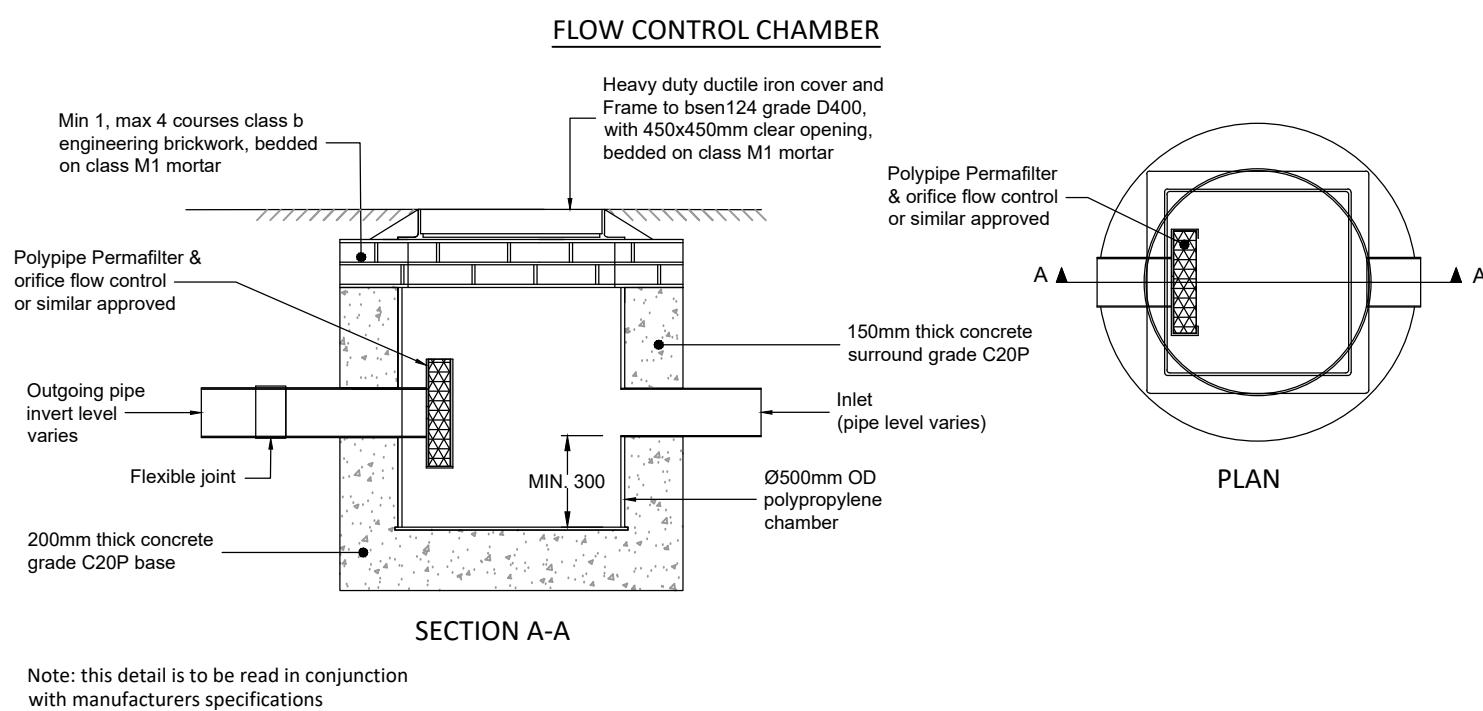
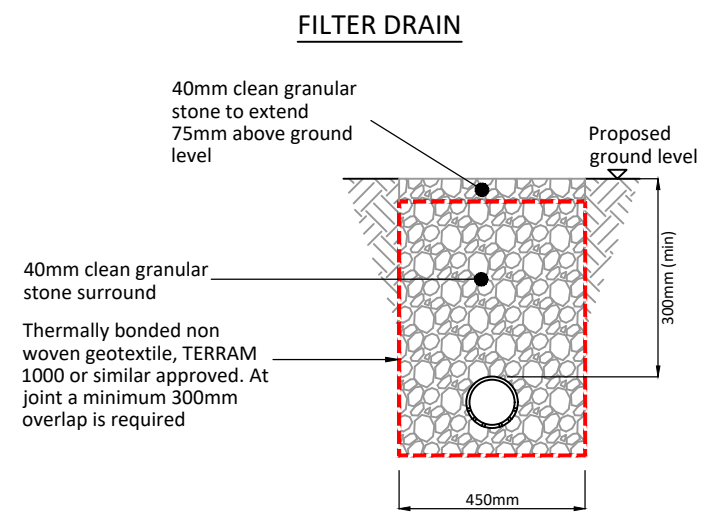
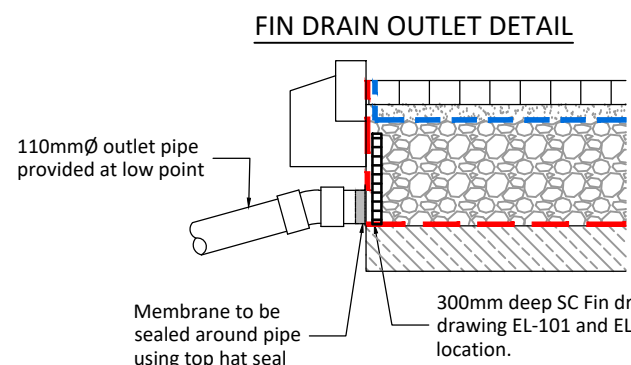
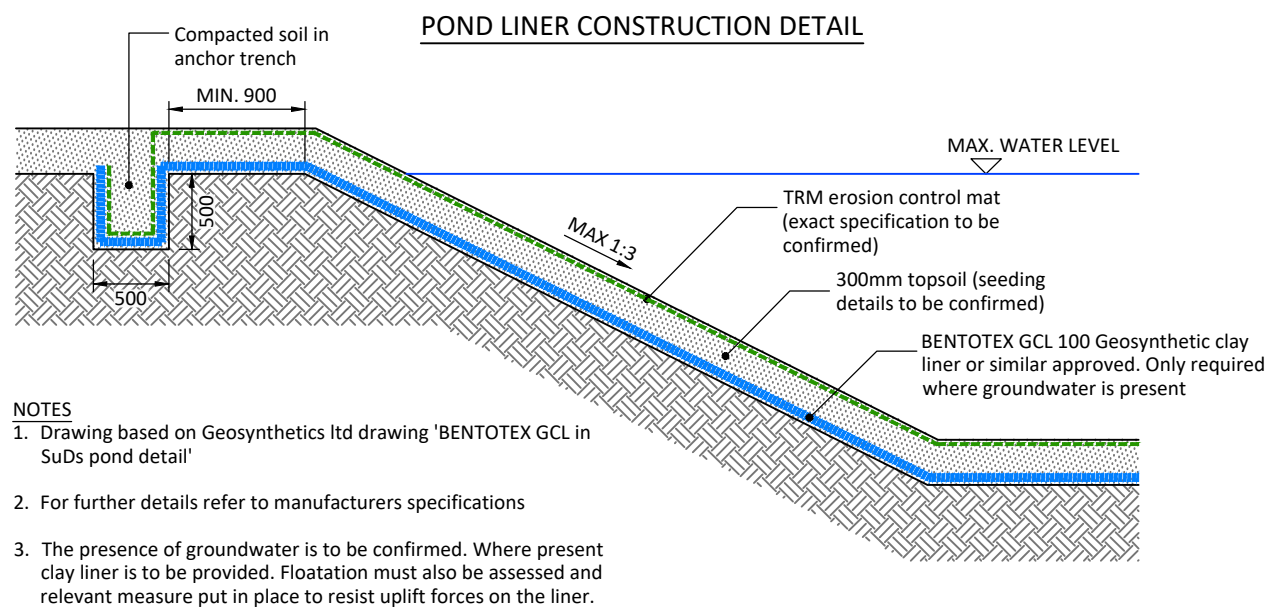


TABLE 1

TOTAL THICKNESS OF CAPPING MATERIAL (EXTRACTED FROM BS7533-13:2009)

SUBGRADE CBR (%)	THICKNESS (mm) (CAPPING)
1	600 (SEE NOTE)
2	350
3	250
4	200
5 or above	150

Note: where CBR values are 1% or below expert advice is to be sought



- NOTES:**
1. This drawing has been developed to support gaining planning approval only and is subject to confirmation at the detailed design stage.
 2. This drawing is to be read in conjunction with Sustain Environmental's Flood Risk Assessment and Drainage Strategy Report.

B	Cellular attenuation detail updated	14/10/25	JH	AC
A	First issue	17/07/25	JH	AC
REV.	DESCRIPTION	Date	BY	CHK.

DRAWING STATUS: **FOR INFORMATION ONLY**



CLIENT:

-

ARCHITECT:

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PROJECT:

Upper Seagry

TITLE:

Drainage Strategy
Typical SuDs Details

SCALE @ A1:

AS SHOWN

PROJECT No:	DRAWING No:	REV:
23075	PDL-02	B



Storm	Greenfield runoff rate
1:1 year storm	0.5 l/s
QBAR	0.6 l/s
1:30 year storm	1.2 l/s
1:100 year storm	1.4 l/s
Above rate is based on a catchment area of 0.112 ha	
PROPOSED ALLOWABLE DISCHARGE RATES	
Storm	Discharge rate
QBAR	0.6 l/s
The above provides a betterment over the existing discharge rates as follows:	
- 1: 2 year storm (QBAR) = 0% betterment	
- 1: 30 year storm = 50% betterment	
- 1: 100 year storm = 57% betterment	

TABLE 2: EASTERN DISCHARGE RECEPTOR	
Storm	Greenfield runoff rate
1:1 year storm	0.5 l/s
QBAR	0.6 l/s
1:30 year storm	1.2 l/s
1:100 year storm	1.4 l/s

Above rate is based on a catchment area of 0.112 ha

PROPOSED ALLOWABLE DISCHARGE RATES	
Storm	Discharge rate
QBAR	0.6 l/s

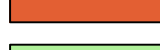
The above provides a betterment over the existing discharge rates as follows:

- 1:2 year storm (QBAR) = 0% betterment
- 1:30 year storm = 50% betterment
- 1:100 year storm = 57% betterment

KEY

 Existing Overland flood flow route

CATCHMENT AREAS

	Existing harstanding area (Western Discharge Receptor) = 0.1 ha
	Proposed harstanding area (Western Discharge Receptor) = 0.133 ha
	Proposed harstanding area (Eastern Discharge Receptor) = 0.112 ha

A	First Issue	14/10/25	JH	
REV.	DESCRIPTION	Date	BY	

DRAWING STATUS: **FOR INFORMATION ONLY**

DESIGN BY:

 Sustain
Environmental

CLIENT:

ARCHITECT:

PROJECT: Upper Seagry

TITLE: **Drainage Strategy
Catchment Assessment**

SCALE @ A1:
0 1:250 12.5 metres

PROJECT No: 23075	DRAWING No: PDL-03	REV: A
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Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
101	0.015	5.00	77.284	450	394461.133	180853.327	1.084	76.200
102	0.015	5.00	77.218	450	394462.816	180837.315	1.178	76.040
103	0.015	5.00	76.950	450	394470.776	180838.151	1.090	75.860
112	0.022	5.00	76.950	450	394489.323	180855.321	1.160	75.790
104	0.022	5.00	76.922	1200	394490.716	180842.062	1.352	75.570
105	0.022	5.00	76.784	1200	394499.834	180843.020	1.374	75.410
113	0.022	5.00	76.330	1200	394519.484	180837.165	1.280	75.050
106	0.022	5.00	76.700	1200	394501.621	180826.018	1.860	74.840
107	0.022	5.00	76.764	1200	394479.861	180823.732	2.224	74.540
114	0.022	5.00	76.600	450	394503.149	180808.141	0.650	75.950
115	0.022	5.00	76.655	1200	394506.777	180773.618	1.445	75.210
116	0.022	5.00	76.560	1200	394490.218	180771.878	1.515	75.045
108	0.022	5.00	76.579	1200	394484.708	180773.565	2.339	74.240
117	0.021	5.00	76.483	1200	394480.968	180778.755	2.133	74.350
109	0.020	5.00	76.504	1200	394479.919	180772.000	2.304	74.200
110			75.500	1500	394458.675	180767.791	1.600	73.900
111			75.500	1200	394445.638	180766.265	1.680	73.820

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	101	102	16.100	0.600	76.200	76.040	0.160	100.6	150	5.27	32.9
1.001	102	103	8.004	0.600	76.040	75.860	0.180	44.5	150	5.36	32.6
1.002	103	104	20.320	0.600	75.860	75.650	0.210	96.8	150	5.69	31.7
2.000	112	104	13.332	0.600	75.790	75.645	0.145	91.9	150	5.21	33.0
1.003	104	105	9.168	0.600	75.570	75.410	0.160	57.3	225	5.78	31.5
1.004	105	106	17.096	0.600	75.410	74.840	0.570	30.0	225	5.89	31.1
3.000	113	106	21.056	0.600	75.050	74.840	0.210	100.3	225	5.27	32.9
1.005	106	107	21.880	0.600	74.840	74.615	0.225	97.2	225	6.17	30.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.001	17.7	1.8	0.934	1.028	0.015	0.0	32	0.640
1.001	1.513	26.7	3.5	1.028	0.940	0.030	0.0	37	1.050
1.002	1.021	18.1	5.2	0.940	1.122	0.045	0.0	55	0.882
2.000	1.048	18.5	2.6	1.010	1.127	0.022	0.0	38	0.746
1.003	1.731	68.8	10.1	1.127	1.149	0.089	0.0	58	1.251
1.004	2.397	95.3	12.5	1.149	1.635	0.111	0.0	55	1.674
3.000	1.305	51.9	2.6	1.055	1.635	0.022	0.0	34	0.682
1.005	1.326	52.7	17.1	1.635	1.924	0.155	0.0	87	1.183

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.006	107	108	50.401	0.600	74.540	74.240	0.300	168.0	300	6.86	28.9
4.000	114	115	34.713	0.600	75.950	75.210	0.740	46.9	150	5.39	32.5
4.001	115	116	16.650	0.600	75.210	75.045	0.165	100.9	150	5.67	31.8
4.002	116	108	5.762	0.600	75.045	74.980	0.065	88.7	150	5.76	31.5
1.007	108	109	5.038	0.600	74.240	74.200	0.040	126.0	300	6.92	28.7
5.000	117	109	6.836	0.600	74.350	74.200	0.150	45.6	300	5.05	33.5
1.008	109	110	21.657	0.600	74.200	73.900	0.300	72.2	300	7.12	28.3
1.009	110	111	13.126	0.600	73.900	73.820	0.080	164.1	300	7.30	28.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.006	1.210	85.5	18.5	1.924	2.039	0.177	0.0	94	0.970
4.000	1.473	26.0	2.6	0.500	1.295	0.022	0.0	32	0.943
4.001	1.000	17.7	5.0	1.295	1.365	0.044	0.0	55	0.864
4.002	1.068	18.9	7.5	1.365	1.449	0.066	0.0	66	1.009
1.007	1.399	98.9	27.5	2.039	2.004	0.265	0.0	108	1.205
5.000	2.335	165.0	2.5	1.833	2.004	0.021	0.0	25	0.860
1.008	1.852	130.9	31.3	2.004	1.300	0.306	0.0	99	1.528
1.009	1.224	86.6	30.9	1.300	1.380	0.306	0.0	124	1.126

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 110 Online Orifice Control

Flap Valve	x	Invert Level (m)	73.900	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.031		

Node 110 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	74.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	63.0	63.0	1.500	297.0	306.4

Node 109 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	74.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	136.0	136.0	0.800	136.0	169.1	0.801	0.0	169.1

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	101	10	76.230	0.030	1.6	0.0048	0.0000	OK
15 minute summer	102	10	76.075	0.035	3.2	0.0055	0.0000	OK
15 minute summer	103	10	75.913	0.053	4.7	0.0085	0.0000	OK
15 minute summer	112	10	75.827	0.037	2.4	0.0059	0.0000	OK
15 minute summer	104	10	75.630	0.060	9.4	0.0674	0.0000	OK
15 minute summer	105	10	75.463	0.053	11.7	0.0596	0.0000	OK
15 minute summer	113	10	75.082	0.032	2.4	0.0365	0.0000	OK
15 minute summer	106	11	74.929	0.089	16.2	0.1004	0.0000	OK
15 minute summer	107	11	74.633	0.093	18.4	0.1054	0.0000	OK
15 minute summer	114	10	75.980	0.030	2.4	0.0048	0.0000	OK
15 minute summer	115	11	75.262	0.052	4.7	0.0591	0.0000	OK
15 minute summer	116	11	75.113	0.068	6.9	0.0774	0.0000	OK
720 minute summer	108	525	74.391	0.151	5.9	0.1709	0.0000	OK
720 minute summer	117	525	74.391	0.041	0.4	0.0465	0.0000	OK
720 minute summer	109	525	74.391	0.191	6.7	0.2162	0.0000	OK
720 minute summer	110	525	74.391	0.491	6.6	37.4729	0.0000	SURCHARGED
720 minute summer	111	525	73.846	0.026	1.4	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	101	1.000	102	1.6	0.563	0.089	0.0452	
15 minute summer	102	1.001	103	3.1	0.732	0.118	0.0347	
15 minute summer	103	1.002	104	4.7	0.849	0.258	0.1114	
15 minute summer	112	2.000	104	2.3	0.708	0.126	0.0441	
15 minute summer	104	1.003	105	9.3	1.201	0.135	0.0708	
15 minute summer	105	1.004	106	11.5	1.105	0.121	0.1844	
15 minute summer	113	3.000	106	2.3	0.281	0.045	0.1892	
15 minute summer	106	1.005	107	16.2	1.147	0.307	0.3092	
15 minute summer	107	1.006	108	18.3	0.817	0.214	1.1300	
15 minute summer	114	4.000	115	2.3	0.597	0.090	0.1383	
15 minute summer	115	4.001	116	4.6	0.695	0.260	0.1105	
15 minute summer	116	4.002	108	6.9	0.934	0.366	0.0426	
720 minute summer	108	1.007	109	5.9	0.775	0.060	0.2089	
720 minute summer	117	5.000	109	0.4	0.134	0.002	0.1817	
720 minute summer	109	1.008	110	6.6	0.241	0.050	1.2754	
720 minute summer	110	1.009	111	1.4	0.454	0.016	0.0395	55.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.61%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	101	10	76.262	0.062	6.1	0.0098	0.0000	OK
15 minute summer	102	10	76.116	0.076	12.1	0.0121	0.0000	OK
15 minute summer	103	11	75.993	0.133	18.3	0.0212	0.0000	OK
15 minute summer	112	10	75.867	0.077	8.9	0.0122	0.0000	OK
15 minute summer	104	10	75.699	0.129	35.4	0.1461	0.0000	OK
15 minute summer	105	11	75.517	0.107	44.1	0.1209	0.0000	OK
15 minute summer	113	11	75.148	0.098	8.9	0.1104	0.0000	OK
15 minute summer	106	11	75.139	0.299	61.6	0.3385	0.0000	SURCHARGED
15 minute summer	107	11	74.740	0.200	67.3	0.2257	0.0000	OK
15 minute summer	114	10	76.010	0.060	8.9	0.0096	0.0000	OK
15 minute summer	115	11	75.453	0.243	17.7	0.2743	0.0000	SURCHARGED
15 minute summer	116	11	75.283	0.238	24.6	0.2693	0.0000	SURCHARGED
600 minute winter	108	555	74.688	0.448	10.8	0.5067	0.0000	SURCHARGED
600 minute winter	117	555	74.688	0.338	0.8	0.3823	0.0000	SURCHARGED
600 minute winter	109	555	74.688	0.488	12.3	37.8257	0.0000	SURCHARGED
600 minute winter	110	555	74.688	0.788	8.6	81.6856	0.0000	SURCHARGED
600 minute winter	111	555	73.849	0.029	1.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	101	1.000	102	6.1	0.775	0.342	0.1273	
15 minute summer	102	1.001	103	12.2	0.942	0.455	0.1017	
15 minute summer	103	1.002	104	17.9	1.132	0.992	0.3252	
15 minute summer	112	2.000	104	8.8	1.005	0.476	0.1170	
15 minute summer	104	1.003	105	35.3	1.674	0.512	0.1930	
15 minute summer	105	1.004	106	43.9	1.436	0.461	0.4988	
15 minute summer	113	3.000	106	9.9	0.374	0.191	0.5924	
15 minute summer	106	1.005	107	58.8	1.481	1.116	0.8415	
15 minute summer	107	1.006	108	67.2	1.127	0.786	2.9594	
15 minute summer	114	4.000	115	8.8	0.790	0.339	0.4202	
15 minute summer	115	4.001	116	16.1	0.917	0.913	0.2931	
15 minute summer	116	4.002	108	24.4	1.384	1.291	0.0996	
600 minute winter	108	1.007	109	10.5	0.726	0.106	0.3548	
600 minute winter	117	5.000	109	1.1	0.133	0.007	0.4814	
600 minute winter	109	1.008	110	8.6	0.232	0.066	1.5251	
600 minute winter	110	1.009	111	1.7	0.487	0.020	0.0471	71.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.57%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	101	12	76.940	0.740	11.3	0.1177	0.0000	SURCHARGED
15 minute summer	102	12	76.904	0.864	18.6	0.1375	0.0000	SURCHARGED
15 minute summer	103	12	76.824	0.964	26.4	0.1533	0.0000	FLOOD RISK
15 minute summer	112	12	76.512	0.722	16.5	0.1149	0.0000	SURCHARGED
15 minute summer	104	12	76.425	0.855	55.5	0.9666	0.0000	SURCHARGED
15 minute summer	105	12	76.304	0.894	68.5	1.0116	0.0000	SURCHARGED
15 minute summer	113	12	76.014	0.964	16.5	1.0897	0.0000	SURCHARGED
15 minute summer	106	12	75.997	1.157	87.3	1.3091	0.0000	SURCHARGED
15 minute summer	107	12	75.234	0.694	100.3	0.7848	0.0000	SURCHARGED
15 minute summer	114	12	76.378	0.428	16.5	0.0680	0.0000	FLOOD RISK
15 minute summer	115	12	76.127	0.917	30.3	1.0369	0.0000	SURCHARGED
15 minute summer	116	11	75.615	0.570	43.2	0.6451	0.0000	SURCHARGED
1440 minute summer	108	1170	75.129	0.889	15.5	1.0051	0.0000	SURCHARGED
1440 minute summer	117	1170	75.129	0.779	1.2	0.8807	0.0000	SURCHARGED
1440 minute summer	109	1170	75.129	0.929	17.8	95.2579	0.0000	SURCHARGED
1440 minute summer	110	1170	75.129	1.229	11.4	172.6388	0.0000	SURCHARGED
1440 minute summer	111	1170	73.853	0.033	2.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	101	1.000	102	8.4	0.798	0.474	0.2834	
15 minute summer	102	1.001	103	16.8	0.955	0.629	0.1409	
15 minute summer	103	1.002	104	25.3	1.437	1.402	0.3577	
15 minute summer	112	2.000	104	15.4	1.063	0.832	0.2347	
15 minute summer	104	1.003	105	52.8	1.663	0.767	0.3646	
15 minute summer	105	1.004	106	60.9	1.532	0.639	0.6799	
15 minute summer	113	3.000	106	16.1	0.434	0.310	0.8374	
15 minute summer	106	1.005	107	87.0	2.187	1.650	0.8702	
15 minute summer	107	1.006	108	99.9	1.419	1.168	3.5492	
15 minute summer	114	4.000	115	14.5	0.923	0.558	0.6111	
15 minute summer	115	4.001	116	28.2	1.605	1.598	0.2931	
15 minute summer	116	4.002	108	42.4	2.407	2.246	0.1004	
1440 minute summer	108	1.007	109	15.4	0.599	0.156	0.3548	
1440 minute summer	117	5.000	109	1.1	0.109	0.007	0.4814	
1440 minute summer	109	1.008	110	11.4	0.161	0.087	1.5251	
1440 minute summer	110	1.009	111	2.2	0.521	0.025	0.0553	168.8

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
201	0.039	5.00	74.400		394610.140	180888.178	0.430
202			74.400	500	394609.439	180890.552	0.470
203			74.400		394610.828	180892.190	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	201	202	2.475	0.600	73.970	73.930	0.040	61.9	100	5.04	33.5
1.001	202	203	2.148	0.600	73.930	73.900	0.030	71.6	100	5.08	33.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.980	7.7	4.7	0.330	0.370	0.039	0.0	57	1.030
1.001	0.911	7.2	4.7	0.370	0.400	0.039	0.0	59	0.971

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)
Rainfall Events	Singular	Skip Steady State	✓	Check Discharge Rate(s) x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume x
Winter CV	1.000	Additional Storage (m³/ha)	0.0	

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 %)
1	0	0	0
30	0	0	0
100	45	0	0

Node 202 Online Orifice Control

Flap Valve	x	Invert Level (m)	73.930	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.023		

Node 201 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	73.970	Slope (1:X)	400.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.300
Safety Factor	2.0	Width (m)	6.000	Inf Depth (m)	
Porosity	0.30	Length (m)	65.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	201	232	74.058	0.088	1.5	2.7692	0.0000	OK
360 minute summer	202	232	74.058	0.128	1.4	0.0250	0.0000	SURCHARGED
360 minute summer	203	232	73.915	0.015	0.4	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)
360 minute summer	201	1.000	202	1.4	0.309	0.180	0.0187	
360 minute summer	202	1.001	203	0.4	0.473	0.052	0.0017	7.1

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.85%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
240 minute summer	201	200	74.147	0.177	4.4	11.1495	0.0000	FLOOD RISK
240 minute summer	202	200	74.146	0.216	1.3	0.0424	0.0000	FLOOD RISK
240 minute summer	203	200	73.918	0.018	0.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
240 minute summer	201	1.000	202	1.3	0.304	0.171	0.0194	
240 minute summer	202	1.001	203	0.5	0.513	0.069	0.0021	12.0

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	201	480	74.269	0.299	2.9	25.4963	0.0000	FLOOD RISK
600 minute winter	202	480	74.269	0.339	1.1	0.0664	0.0000	FLOOD RISK
600 minute winter	203	480	73.920	0.020	0.6	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)
600 minute winter	201	1.000	202	1.1	0.218	0.137	0.0194	
600 minute winter	202	1.001	203	0.6	0.549	0.087	0.0024	25.0