HADSCAL - Hay-On-Wye

HADSCAL Ltd

Technical Note – Drainage Strategy

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DOCUMENT CONTROL

Document Status

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1.0 INTRODUCTION

1.1 K-Ten Consulting Ltd (K-Ten) provide professional Flood Risk, Infrastructure and Drainage services throughout the UK.

1.2 K-Ten have been commissioned by HADSCAL Ltd to prepare a Drainage Strategy to support the proposed planning application and inform the separate SAB application process for the proposed development at HADSCAL - Hay-On-Wye, Hay-on-Wye, Powys, HR3 5DS.

1.3 The proposed development comprises community, commercial and leisure facilities, including a community building, swimming pool, sports and fitness facilities, business units, a multi-use games area, associated parking and landscaping.

1.4 This technical note sets out the proposed surface water and foul drainage arrangements, with consideration of flood risk, water quality and nutrient screening. It has been prepared with reference to the Welsh statutory SuDS standards and Powys County Council requirements, identifying the further information required to progress detailed design and SAB approval.

2.0 EXISTING SITE DETAILS

Site Location

2.1 The site is located adjacent to Hay and St Mary's Football Ground, off Brecon Road and Forest Road, Hay-on-Wye, Powys. The approximate site coordinates are OS X 322921, OS Y 241819, National Grid Reference SO 22921 41819, with the nearest postcode HR3 5DS.



2.2 The site comprises predominantly grassed recreational land associated with the existing sports facilities, together with an existing car park and access. A greenfield runoff basis is proposed for the discharge assessment, subject to confirmation of the contributing catchment and agreement with Powys SAB.

2.3 Refer to **Appendix A** for the site proposals.

Existing Hydrology

2.4 The site lies within the River Wye catchment. The River Wye is located to the northwest of the site and is designated as a Special Area of Conservation.

2.5 An unnamed drainage ditch runs along the northwestern boundary of the existing playing field. The infiltration investigation report identifies this as intercepting runoff from the playing fields, the site and land to the southeast.

2.6 The ditch discharges into an existing 450mm diameter concrete culvert. The report confirms that the culvert has not been inspected or traced, so its downstream route, condition and capacity remain to be established.

Topography

2.7 A topographical survey of the site has been completed, recording existing ground levels and site features. The survey date and reference were not identified within the supplied information.

2.8 The land generally falls towards the northwest. Levels shown within the development area range from approximately 105.00m along the southern edge to approximately 100.00m across the northern and central areas.

2.9 Ground levels across the proposed building footprints are generally around 100.00m to 102.00m, with higher ground towards the southern boundary.

2.10 Refer to **Appendix B** for topographical survey.

Existing Drainage

2.11 Dŵr Cymru Welsh Water asset records, dated 16 March 2026, identify public combined sewers within the surrounding roads.

2.12 A 225mm diameter vitrified clay combined sewer is shown to the east of the site. Its precise position, cover and invert levels require confirmation to establish the feasibility of the proposed foul connection.

2.13 Refer to **Appendix C** for sewer records.

2.14 Existing private drainage connections have not been confirmed. The drainage investigation identifies a surface water drain apparently serving the adjacent surgery car park and access road, although its route and connections have not been traced.

2.15 The drainage layouts also identify an existing 150mm drain crossing the playing field and a 225mm surface water drain believed to serve highway drainage. Their routes, ownership and connectivity require confirmation.

Soil conditions

2.16 H+H Drainage undertook ground investigations on 5 May 2026, with infiltration monitoring recorded between 5 and 8 May 2026. The findings are presented in their report dated 14 May 2026.

2.17 At the investigated location, approximately 1.1m of made ground was identified, comprising clay soils, stones, bricks and concrete rubble. Underlying natural ground was described as clayish material containing river stones. Ground conditions elsewhere within the site may vary.

2.18 Two infiltration test pits were excavated. Both measured approximately 400mm wide by 1500mm long, with depths of 1500mm and 600mm respectively.

2.19 The deeper pit recorded only a limited reduction in water level over 24 hours. Three filling cycles were recorded in the shallower pit, with slow drainage throughout. The results indicate poor infiltration performance at the tested locations and do not support reliance on infiltration as the sole surface water disposal method.

2.20 No groundwater was encountered in a separate trial hole excavated to 2.65m below ground level. This represents conditions at the time of investigation and does not establish the maximum seasonal groundwater level.

2.21 Refer to **Appendix D** for the infiltration testing.

3.0 POLICY & GUIDANCE

Planning Policy Wales

3.1 Planning Policy Wales sets out the Welsh Government's planning policies. Development proposals should consider flood risk, protect water quality and incorporate sustainable drainage appropriate to the site and proposed use.

Technical Advice Note 15

3.2 Technical Advice Note 15: Development, Flooding and Coastal Erosion supplements Planning Policy Wales and provides guidance on assessing flood risk within the planning process.

3.3 The NRW Flood Map for Planning provides the starting point for assessing mapped flood risk, including the effects of climate change. Site specific considerations include existing watercourses, surface water routes, groundwater and the potential effects of the development on surrounding land.

Flood and Water Management Act 2010

3.4 Schedule 3 of the Flood and Water Management Act 2010 establishes the statutory framework for approving and adopting sustainable drainage systems in Wales.

3.5 Where applicable, SAB approval is required separately from planning permission and must be obtained before construction work begins. Powys County Council is the SuDS Approving Body for this site.

The SuDS Manual CIRIA C753 2015

3.6 **T**he SuDS Manual provides technical guidance on the planning, design, construction, operation and maintenance of sustainable drainage systems. It considers runoff quantity, water quality, amenity and biodiversity.

Welsh Statutory National Standards for Sustainable Drainage Systems

3.7 The proposed surface water drainage system will be developed in accordance with the Welsh statutory national SuDS standards, which cover:

S1: Surface water runoff destination
S2: Surface water runoff hydraulic control
S3: Water quality
S4: Amenity
S5: Biodiversity
S6: Design of drainage for construction, operation and maintenance

3.8 The drainage strategy considers these standards through the proposed discharge destination, source control, attenuation, treatment and landscaped drainage features. Detailed construction and management arrangements fall within the separate SAB submission.

Climate Change

3.9 Rainfall allowances will adhere to the current Welsh Government climate change guidance, taking account of the development lifetime and SAB requirements. The hydraulic model includes a 40% rainfall uplift for the 1 in 100 year event.

Building Regulations

3.10 Building drainage will be designed with reference to the applicable Welsh Building Regulations Approved Document H. Connections to public sewers and any proposed adoption will also require agreement with Dŵr Cymru Welsh Water.

Phosphorus and Nutrient Screening

3.11 NRW guidance identifies the need to consider nutrient effects where development could affect a nutrient sensitive Special Area of Conservation. Relevant considerations include changes in wastewater loading, the receiving wastewater treatment works and surface water discharge pathways.

3.12 The assessment considers the existing and proposed site uses, drainage destinations and potential pathways to the designated river. Connection to a public sewer does not, by itself, demonstrate that nutrient effects can be excluded.

4.0 FLOOD RISK

4.1 Fluvial flooding occurs when the capacity of an existing watercourse is breached leading to water levels overtopping the banks into surrounding floodplain areas.

4.2 In accordance with the NRW Flood Map for Planning, checked on 20 October 2026, the proposed development area lies outside the mapped river and sea Flood Zones 2 and 3.

4.3 NRW mapping identifies surface water and small watercourse flood routes along nearby roads and drainage corridors. Existing ditches, local ground levels and drainage infrastructure influence potential flow routes around the site. The absence of mapped river and sea flooding does not exclude local flooding from surface water, drainage surcharge or blockage.

4.4 Pluvial flooding occurs when rainfall exceeds the capacity of drainage systems or the ground's ability to absorb water, resulting in ponding and overland flows. Local topography and the condition of drainage infrastructure influence the location and extent of flooding.

4.5 An existing ditch along the northwestern boundary of the playing field intercepts runoff from surrounding land and discharges into a 450mm diameter culvert. The culvert has not been inspected or traced, and its condition, downstream connectivity and capacity have not been established.

4.6 This section summarises flood risk considerations relevant to the drainage strategy and does not constitute a standalone Flood Consequences Assessment.

5.0 PROPOSED SURFACE WATER DRAINAGE STRATEGY

5.1 The proposed surface water drainage strategy incorporates SuDS to attenuate runoff and control discharge from the development.

5.2 The surface water discharge hierarchy prioritises the following destinations, in order of preference:

a) Collection for reuse
b) Infiltration into the ground
c) Discharge to a surface water body
d) Discharge to a surface water sewer or another drainage system
e) Discharge to a combined sewer.

5.3 No reduction in runoff or attenuation storage has been attributed to rainwater reuse within the current assessment.

5.4 Infiltration testing undertaken by H+H Drainage identified poor infiltration performance at the tested locations. Infiltration is therefore not proposed as the primary means of surface water disposal.

5.5 Greenfield runoff rates have been estimated using the UK SuDS runoff estimation tool and IH124 methodology for an assessment area of 1.22ha. The calculation adopts an annual average rainfall of 898mm, WRAP soil type 2, a standard percentage runoff of 0.30 and hydrological region 9.

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	1.230	Betterment (%)	0
SAAR (mm)	898	QBar	3.0
Soil Index	3	Q 1 year (l/s)	2.6
SPR	0.30	Q 30 year (l/s)	5.9
Region	1	Q 100 year (l/s)	7.4
Growth Factor 1 year	0.85		

5.6 The proposed final flow control adopts a design discharge of 2.6l/s, corresponding to the calculated 1 year greenfield runoff rate and below QBar. Attenuation storage is provided upstream of the control to manage runoff during higher return period events.

5.7 Surface water is proposed to discharge at a controlled rate to the existing ditch north of the site. The connection remains subject to confirmation of the ditch and culvert levels, downstream connectivity, condition and capacity, together with ownership and the necessary drainage rights.

5.8 The proposed strategy comprises permeable paving, porous asphalt, two dry attenuation basins and landscaped swales, connected through a surface water pipe network and a series of flow controls.

5.9 Parking areas are proposed to incorporate System C permeable paving, comprising a permeable surface over an open graded aggregate storage layer with an impermeable liner and controlled drainage outlet. The system provides attenuation without relying on infiltration into the underlying ground.

5.10 The principal parking storage areas comprise approximately 3969m² and 1444m², each with an aggregate depth of 600mm and porosity of 30%, providing nominal void storage of approximately 714m³ and 260m³ respectively. Both stores have a modelled base level of 98.700mAOD. The hydraulic model represents the storage dimensions, porosity, base levels and slopes.

5.11 Porous asphalt is proposed as the surface of the multi-use games area, with attenuation storage within the underlying aggregate construction. The storage area comprises approximately 480m², with an aggregate depth of 500mm and porosity of 30%, providing nominal void storage of 72m³. The store has a modelled base level of 99.900mAOD. The hydraulic model represents the storage dimensions, porosity, base level and slope.

5.12 BA-01 has a base level of 99.045mAOD and top level of 100.500mAOD. The preliminary 100 year plus 40% climate change simulation predicts a peak water level of 99.983mAOD, peak depth of 0.938m and stored volume of approximately 201m³, providing 517mm freeboard.

5.13 BA-02 is connected to the final flow control chamber and has a base level of 98.400mAOD and top level of 99.400mAOD. The preliminary 100 year plus 40% climate change simulation predicts a peak water level of 99.285mAOD, giving a maximum water depth of 0.885m and 115mm freeboard.

5.14 Landscaped swales are proposed for surface water conveyance. No separate attenuation storage allowance has been attributed to these features within the hydraulic model.

5.15 Roof runoff is proposed to discharge through rainwater pipes into the surface water drainage network.

5.16 An upstream 21mm diameter orifice at OR-01 is modelled with a design discharge of 1.0l/s at 1.000m head.

5.17 A Hydro-Brake at FC-02 controls the final discharge to the receiving ditch. The final flow control is modelled with a design discharge of 2.6l/s at a design head of 1.170m.

5.18 Simulations have been undertaken using Causeway Flow design software to assess the proposed surface water drainage network and attenuation storage using the following parameters:

- Rainfall methodology – FEH-22
- Runoff coefficients, CV (summer and winter) – 1.0
- Infiltration rate – zero; no infiltration allowance
- Storm durations – 15 to 1440 minutes
- Storm events – 1 year, 30 year, 100 year and 100 year plus 40% climate change

- Porosity of granular storage – 30%
- Porosity of open basin storage – 100%
- Additional storage allowance – 20m³/ha.

5.19 The hydraulic model represents the connected catchments, pipework, attenuation stores and flow controls.

5.20 The 1440 minute winter event controls the principal storage water levels and represents the longest duration included in the current assessment.

5.21 The 100 year plus 40% climate change simulation predicts approximately 0.19m³ of surface flooding at SW-18 during the 15 minute summer event. This minor volume is proposed to be accommodated within the external parking area.

5.22 Refer to **Appendix E** for the hydraulic calculations.

5.23 Exceedance flows are proposed to follow external parking and landscaped areas, away from buildings and neighbouring land.

5.24 Refer to **Appendix F** for the overland flow routes.

5.25 Existing field and highway drainage is proposed to be retained, with no proposed connections to these drains.

5.26 The proposed basins and swales provide opportunities for landscape integration, amenity and biodiversity benefits.

5.27 The relevant design references comprise the applicable Welsh Building Regulations Approved Document H, Welsh statutory SuDS standards and Powys SAB requirements.

5.28 The strategy supports the planning application. Separate SAB approval and any applicable watercourse permissions are required for implementation.

5.29 Refer to **Appendix G** for the drainage strategy.

6.0 SURFACE WATER QUALITY

6.1 Water quality has been assessed in accordance with The SuDS Manual (CIRIA C753) which states the design of surface water should consider minimising contaminants within surface water runoff discharged from the site.

6.2 The level of treatment required is dependent on the proposed land use according to the pollution hazard indices (refer to SuDS Manual table 26.2).

6.3 To ensure that adequate treatment is provided the SuDS mitigation indices for the development must equal or exceed, the pollution hazard indices shown within SuDS Manual table 26.2.

6.4 Refer to below Water Quality Indices Table, as per C753 SuDS Manual, confirming compliance with mitigation indices against Pollution Hazard indices.

	Pollution Hazard Level	**Total susp solids**	**Metals**	**Hydrocarbons**
Land Use: **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
Total:		0.3	0.2	0.05
SuDS Component 1: **Permeable Pavement** **Detention Basin**		0.7 0.5 (x0.5)	0.6 0.5 (x0.5)	0.7 0.6 (x0.5)
Total:		0.95	0.85	1.0
TOTAL SUDS MITIGATION > POLLUTION HAZARD INDICES		**Yes**	**Yes**	**Yes**

Water Quality Indices (C753 The SuDS Manual)

	Pollution Hazard Level	**Total susp solids**	**Metals**	**Hydrocarbons**
Land Use: **Individual property driveways, residential car parks, low traffic roads (e.g. cul de sacs, home zones and general access roads) and non – residential car parking with infrequent change (e.g. schools, offices) i.e. < 300 traffic movements/day.**	Low	0.5	0.4	0.4
Total:		0.5	0.4	0.4
SuDS Component 1: **Permeable Pavement**		0.7	0.6	0.7
Total:		0.7	0.6	0.7
TOTAL SUDS MITIGATION > POLLUTION HAZARD INDICES		**Yes**	**Yes**	**Yes**

6.5 It is also good practice that gullies and chambers have suitable silt traps/catchpits to reduce sediments within the drainage system.

7.0 PROPOSED FOUL DRAINAGE STRATEGY

7.1 Foul drainage is proposed to connect to the existing 225mm public combined sewer east of the site. Welsh Water asset records identify the receiving sewer as combined. Its precise position and receiving chamber cover and invert levels remain to be confirmed before gravity connection feasibility can be established.

7.2 The proposed foul connection is subject to Dŵr Cymru Welsh Water's agreement regarding the connection point, receiving network and treatment capacity. Connection and any proposed adoption require the relevant undertaker agreements.

7.3 The connection route must be checked against ownership, access rights, utilities, cover, gradients and construction constraints. If gravity drainage cannot be demonstrated, review the layout and levels before assessing an alternative arrangement. A pumped solution is not included in the current concept.

7.4 The proposed backwash holding tank is intended to balance intermittent pool discharge before controlled release to foul drainage. The pool specialist must provide backwash frequency, volume, instantaneous flow, chemical characteristics and any other pool emptying or cleaning discharges. The tank must be sized from those operating requirements and the discharge rate accepted by the undertaker.

7.5 Pool backwash is proposed to remain separate from the surface water system and discharge to the foul network through the holding tank. Acceptance of the discharge, including any trade effluent consent and treatment requirements, is subject to Dŵr Cymru Welsh Water's requirements.

7.6 Changes in foul loading and the eventual treatment destination will inform the nutrient screening. Routine sanitary flows, pool backwash and exceptional pool emptying will be distinguished so that sewer capacity and balancing storage are assessed on a consistent basis.

8.0 PHOSPHORUS AND NUTRIENT SCREENING

8.1 The site lies within the River Wye catchment. Foul drainage is proposed to connect to the existing public combined sewer east of the site.

8.2 The Bannau Brycheiniog National Park Authority Nutrient Statement, dated December 2024, specifically addresses connections to Hay-on-Wye Wastewater Treatment Works. The works is located in England, operated by Dŵr Cymru Welsh Water and regulated by the Environment Agency.

8.3 The statement records advice from Natural England and NRW that the river stretch downstream of the treatment works meets its phosphorus targets and that nutrient neutrality requirements do not apply to connections considered under that advice. It anticipates screening out the majority of developments proposing new connections to Hay-on-Wye Wastewater Treatment Works, with continued consultation with Dŵr Cymru Welsh Water.

8.4 This provides a basis for screening the proposed foul connection without assuming that a nutrient budget or phosphorus mitigation is required. Application of this position to the development depends on confirmation that the receiving sewer drains to Hay-on-Wye Wastewater Treatment Works and acceptance by the determining Local Planning Authority.

8.5 The proposed foul system collects sanitary wastewater and controlled pool backwash discharges. Pool backwash is proposed to pass through a holding tank before discharge to the foul network and remains separate from the surface water system. Acceptance of pool discharges is subject to Dŵr Cymru Welsh Water's discharge requirements.

8.6 Surface water is managed separately through the proposed SuDS network, with controlled discharge to the existing ditch north of the site. Pool backwash and other foul wastewater are excluded from this system.

8.7 The published Hay-on-Wye position supports a potential conclusion of no likely significant phosphorus effects from the proposed foul connection. This section provides supporting information for the Local Planning Authority's Habitats Regulations Assessment and does not constitute its screening determination.

9.0 MAINTENANCE AND MANAGEMENT

9.1 Maintenance of SuDS features is required in order to ensure that the surface water drainage system operates effectively, and the risk of flooding of the site is reduced.

9.2 A maintenance schedule should be undertaken to ensure that the drainage system remains fully operational for the design lifetime. The below table summarises a maintenance plan for the drainage systems and components within the development.

9.3 The SuDS Manual (CIRIA C753) and specific product suppliers guidelines should also be referred to for further information on maintenance and frequency.

9.4 The proposed adoption and maintenance arrangements will be agreed with Powys SAB, Dŵr Cymru Welsh Water and the landowner as appropriate. The final arrangement will identify responsibility, funding and permanent maintenance access for each drainage component. Private maintenance will not be assumed for components intended for adoption.

9.5 The maintenance schedule will be tailored to the components included in the final design. It will cover permeable paving, porous asphalt, swales, the basins, pipework, chambers, flow controls, sediment collection points and the outfall. Pool backwash tank maintenance will follow the specialist operating requirements.

9.6 Flow controls will remain accessible for inspection and clearance. Inspection frequencies will reflect blockage risk, sediment accumulation and performance following significant rainfall.

9.7 Construction drainage measures will protect the receiving ditch and completed SuDS from sediment, concrete washout, fuels and other pollutants. Completed permeable surfaces and aggregate storage layers will be protected from construction traffic and clogging.

9.8 Handover information will identify the completed drainage arrangement, operating instructions, inspection requirements and responsible maintenance parties.

Drainage Component	Required Action	Typical Frequency
General pipework, manholes, chambers, silt traps and headwalls	Stabilise adjacent areas	As required
	Remove weeds and vegetation	As required
	Clear/Jet any poor performing structures	As required
	Inspect all drainage features for poor operation	3 monthly, 48 hours after large storms in first six months
	Monitor inspection chambers and silt traps. Inspect silt accumulation and determine silt clearance frequencies	Annually
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first year of operation, then every six months
Swales	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly, or when required

	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation establish appropriate silt removal frequencies	Half Yearly
	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
Pervious Pavements	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers recommendations – pay particular attention to areas where water runs onto previous surface from adjacent impermeable areas as this area is most likely to collect the most sediment
	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
Detention Basins	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (During growing season), or as required
	Cut grass – mewdow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually

	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in chapter 23)
	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

APPENDIX A

SITE PROPOSALS



Paper size: A3

Drawn by: SO

Date: 20.2.26

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Draft Development Plan

HADSCAL Land

Location: Hay on Wye HR3 5DY
Client Name: T Steadman

1:500
Draft Development Plan

Scale bar 1:500

0 10 50

2 HCC P01B

APPENDIX B

TOPOGRAPHICAL PLAN


N
1:500
Site
Plan
Paper size: A3
Drawn by:
Date:
Topographical Survey Area
Existing
HADSCAL
Location: Hay on Wye
Client Name: T Steadman
Scale bar 1:500
0
10
50
© CO2 Architects. 2022
HM 001
2

APPENDIX C

SEWER RECORDS

Dŵr Cymru
Welsh Water

HADSCAL HR3 5DY

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ("the Company") gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref:	322751,241903
Map scale:	1:3500
Printed by:	Cecile Leston
Printed on:	16 Mar 2026

APPENDIX D

INFILTRATION TESTING

H+H Drainage

Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

Infiltration Testing

The Proposed Community, Commercial & Leisure Development at Hay-on-Wye, HR3 5DS

14th May 2026

Prepared by Alex Taysum-Hunter

H+H Drainage is the trading name of Taysum-Hunter Ltd.
Registered in England & Wales, Registration number 7357577

H+H Drainage

Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

The site is located within the River Wye Catchment. The River Wye is a Special Area of Conservation (SAC). SAC's are amongst the most important and sensitive sites across the European Union and are afforded the highest levels of protection under the Habitat Regulations.

The River Wye SAC is in place to maintain or, where necessary, restore the river to high ecological status, including its largely unmodified and undisturbed physical character, so that all of its special features are able to sustain themselves in the long-term as part of a naturally functioning ecosystem.

Allowing the natural processes of erosion and deposition to operate without undue interference and maintaining or restoring connectivity maintains the physical river habitat, which forms the foundation for this ecosystem. The quality and quantity of water, including natural flow variability, and the quality of adjacent habitats are maintained or restored to a level necessary to maintain the features in favourable condition for the foreseeable future.

The presence of the River Wye SAC and its special wildlife enhances the economic and social values of the area by providing a high-quality environment for ecotourism, outdoor activities and peaceful enjoyment by local people and visitors. The river catchment's functions of controlling flooding and supplying clean water are recognised and promoted through appropriate land management. The river is a focus for education to promote increased understanding of its biodiversity and the essential life support functions of its ecosystems.

As can be seen in the following map, the site lies within the Upper River Wye Sub-Catchment.

H+H Drainage

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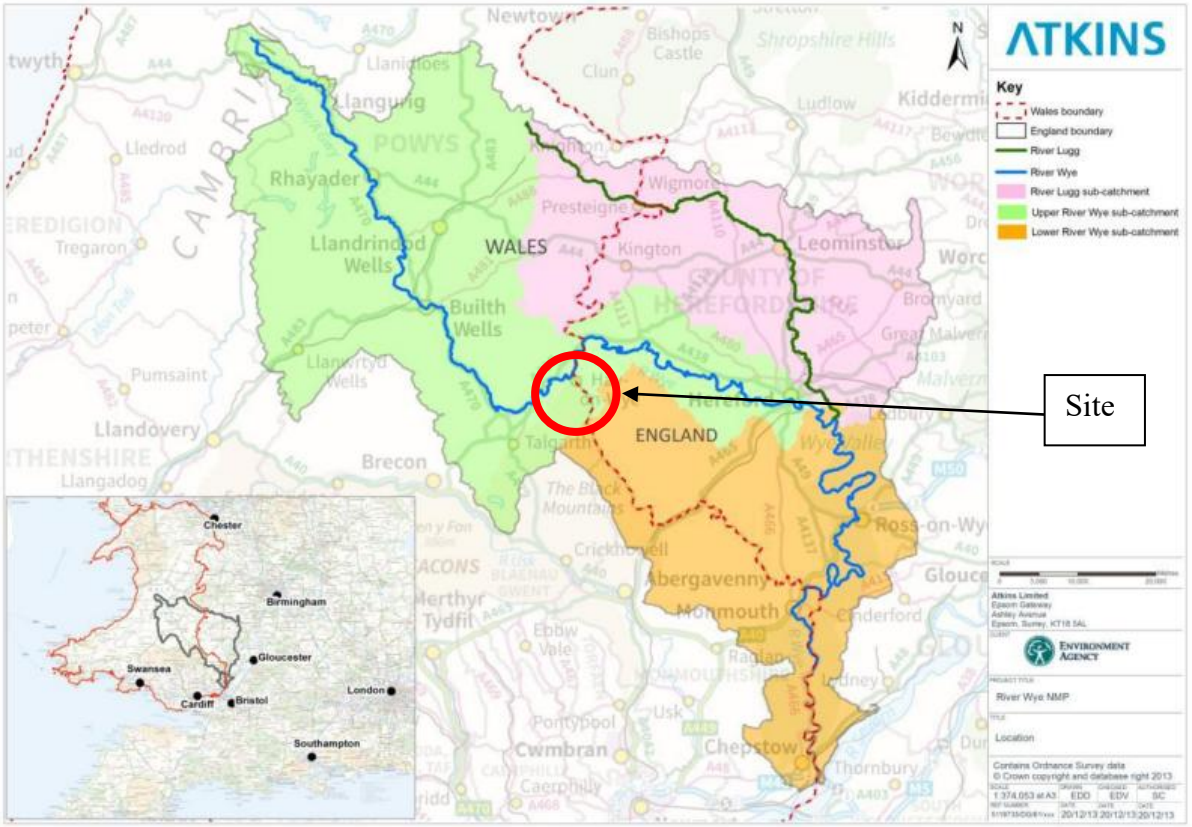

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H+H Drainage

Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

Site Location and conditions

Adj to Hay & St Mary's Football Ground, Forest Road, Hay-on-Wye HR3 5DS

SO 22921 41819

X (Easting): 322921
Y(Northing): 241819

Latitude: 52.069351
Longitude: -3.1259151

What3words: exclusive.hippy.repelled



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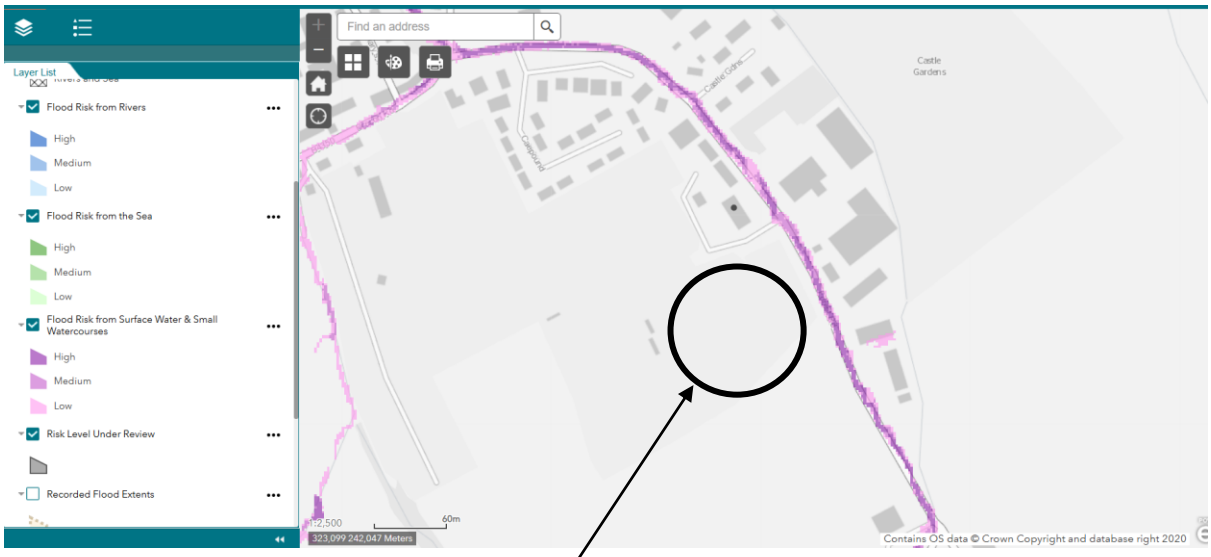
As can be seen below, there is no surface water flooding or fluvial flooding recorded at this site:



Test Area

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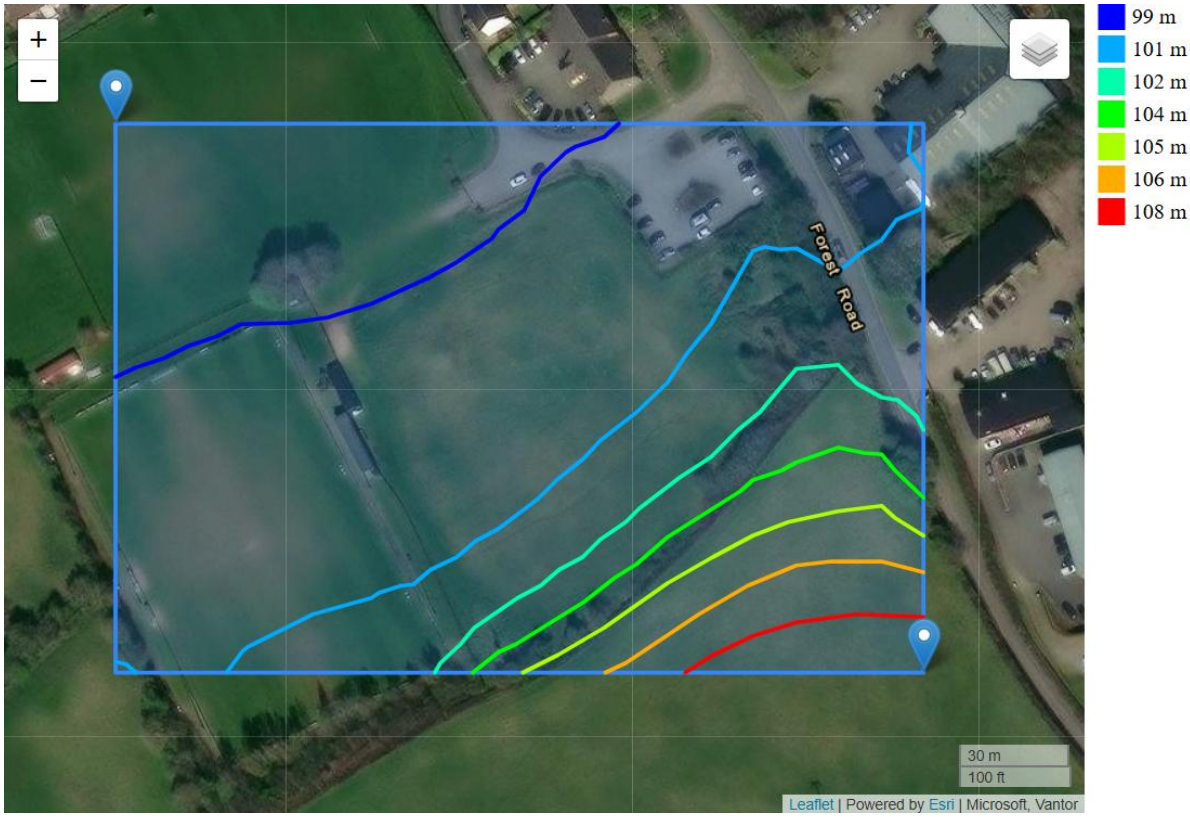
As can be seen below, the test area is primarily level and the surrounding land falls gently to the northwest.



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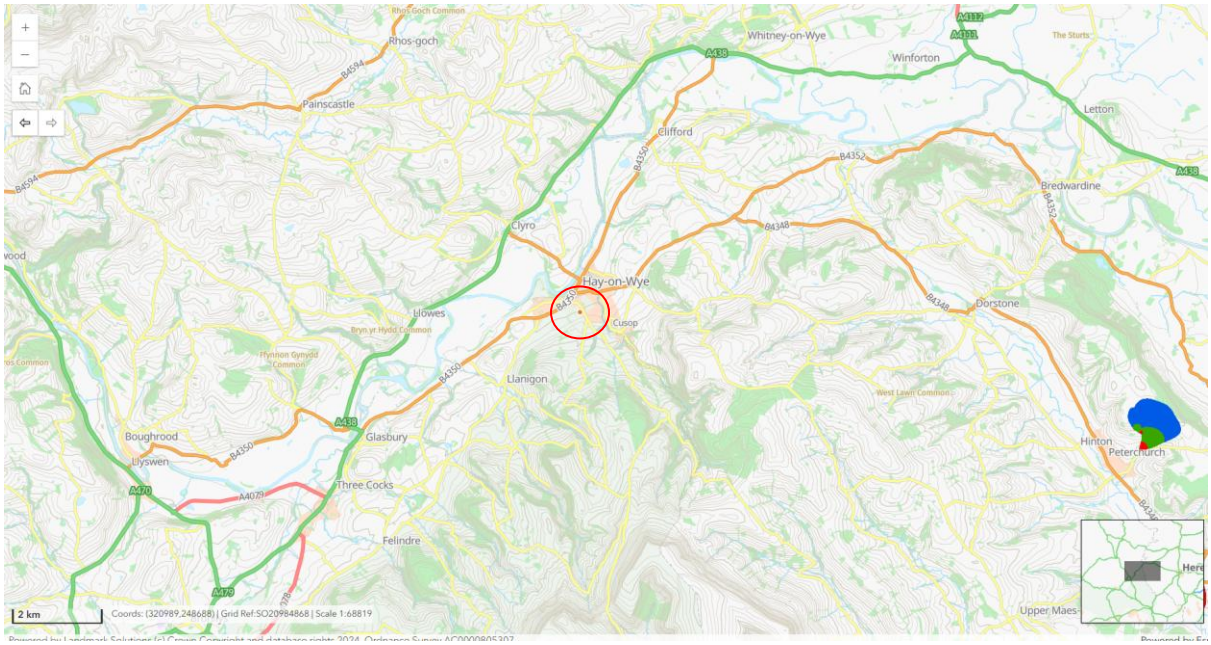
The flowing map shows that there are no SPZ1 or SPZ2 areas highlighted within 10km of the site.



Designations

Land-Based Designations

Non-statutory

Source Protection Zones merged (England)

- Zone I - Inner Protection Zone
- Zone I - Subsurface Activity
- Zone II - Outer Protection Zone
- Zone II - Subsurface Activity
- Zone III - Total Catchment
- Zone III - Subsurface Activity
- Zone of Special Interest

H+H Drainage

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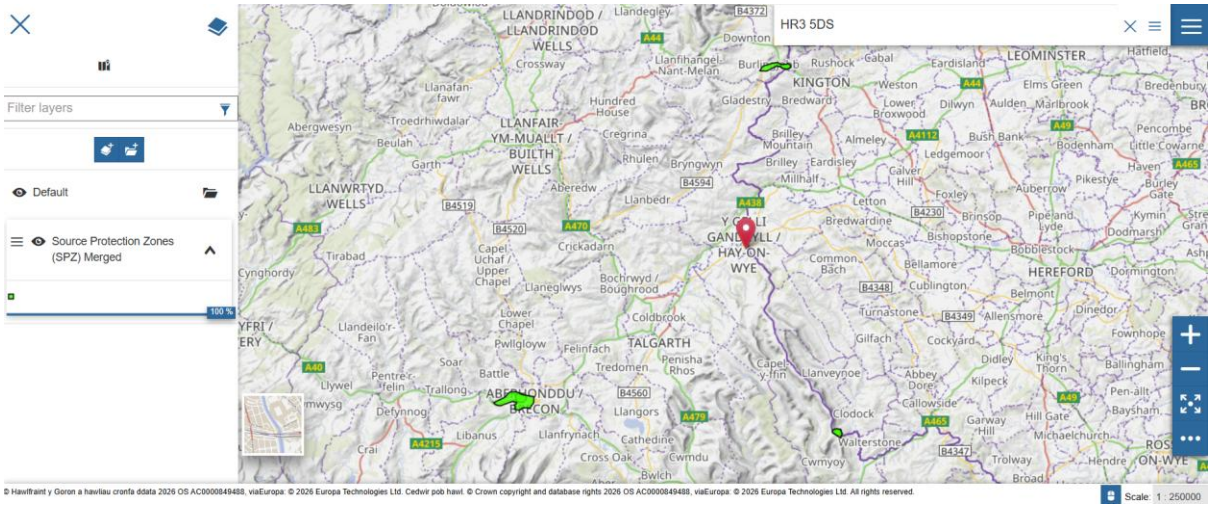

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Ground testing and on-site investigation

Site investigations were undertaken on the 5th May 2026.

Initially, a ground water level assessment trial hole (GWLA) was excavated to a depth of 2.65m below local ground level.

We can confirm that no ground water was encountered at 2.65m below ground level.

As can be seen below, the GWLA demonstrated that the test area is formed from made-up ground. This made-up ground was found to consist of clay soils, stones, bricks and concrete rubble. This made-up ground was found to be approximately 1.1m deep.

Below the made-up ground, the natural ground was found to be clayish with river stones.

W3W = unusually.slurs.buildings





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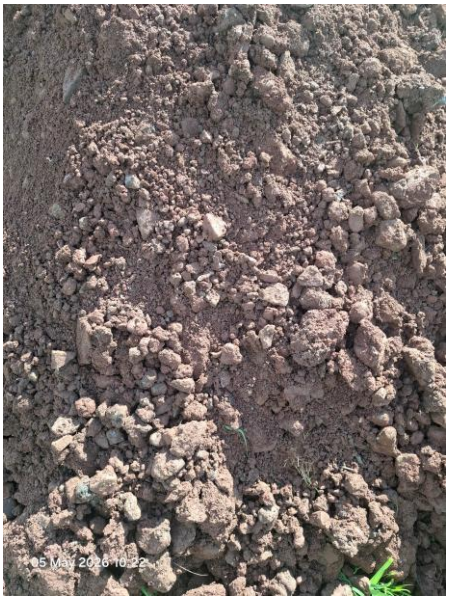







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Percolation tests

No percolation testing was completed at this site.

H+H Drainage

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BRE Digest 365 Infiltration Tests.

Two infiltration test holes were excavated. These infiltration test holes were excavated in line with BRE Digest 365.

Infiltration test hole 1 (INF1) was excavated to a depth of 1500mm below ground level and was 400mm wide x 1500mm long. W3W = reserving.energetic.blacken









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H+H Drainage

Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

Site Name: HADSCAL

Date: 05-06/05/2026

Weather conditions: Dry

Hole reference	Hole Depth		Hole Width		Hole Length		Inlet invert		
IFT1	1500mm		400mm		1500mm		mm		
TEST 1			TEST 2				TEST 3		
Time (mins)	Depth to Water		Time (mins)		Depth to Water		Time (mins)		Depth to Water
0mins (START)	500mm		0mins (START)				0mins (START)		
15mins	510mm		15mins				15mins		
30mins	520mm		30mins				30mins		
45mins	525mm		45mins				45mins		
60mins (1 hour)	530mm		60mins (1 hour)				60mins (1 hour)		
75mins	535mm		75mins				75mins		
90mins	535mm		90mins				90mins		
105mins	540mm		105mins				105mins		
120mins (2 hours)	540mm		120mins (2 hours)				120mins (2 hours)		
135mins	545mm		135mins				135mins		
150mins	545mm		150mins				150mins		
165mins	545mm		165mins				165mins		
180mins (3 hours)	545mm		180mins (3 hours)				180mins (3 hours)		
195mins	550mm		195mins				195mins		
210mins	550mm		210mins				210mins		
225mins	550mm		225mins				225mins		
240mins (4 hours)	550mm		240mins (4 hours)				240mins (4 hours)		
255mins	550mm		255mins				255mins		
270mins	555mm		270mins				270mins		
285mins	555mm		285mins				285mins		
300mins (5 hours)	555mm		300mins (5 hours)				300mins (5 hours)		
315mins	555mm		315mins				315mins		
330mins	555mm		330mins				330mins		
345mins	555mm		345mins				345mins		
360mins (6 hours)	555mm		360mins (6 hours)				360mins (6 hours)		
7 hours			7 hours				7 hours		
8 hours			8 hours				8 hours		
9 hours			9 hours				9 hours		
10 hours			10 hours				10 hours		
11 hours			11 hours				11 hours		
12 hours			12 hours				12 hours		
24 hours	605mm		24 hours				24 hours		

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Infiltration test hole 2 (INF2) was excavated to a depth of 600mm below ground level and was 400mm wide x 1500mm long. W3W = motivations.yield.firebird









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Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
Phone: 0845 2008421. Mobile: 07837 628764

Site Name: HADSCAL

Date: 05-08/05/2026

Weather conditions: Dry

Hole reference	Hole Depth		Hole Width		Hole Length		Inlet invert		
IFT2	600mm		400mm		1500mm		mm		
TEST 1			TEST 2				TEST 3		
Time (mins)	Depth to Water		Time (mins)		Depth to Water		Time (mins)		Depth to Water
0mins (START)	200mm		0mins (START)		200mm		0mins (START)		200mm
15mins	220mm		15mins		205mm		15mins		
30mins	230mm		30mins		210mm		30mins		210mm
45mins	240mm		45mins		215mm		45mins		
60mins (1 hour)	250mm		60mins (1 hour)		220mm		60mins (1 hour)		220mm
75mins	260mm		75mins		225mm		75mins		
90mins	265mm		90mins		230mm		90mins		230mm
105mins	270mm		105mins		235mm		105mins		
120mins (2 hours)	275mm		120mins (2 hours)		240mm		120mins (2 hours)		240mm
135mins	280mm		135mins		245mm		135mins		
150mins	285mm		150mins		245mm		150mins		250mm
165mins	290mm		165mins		250mm		165mins		
180mins (3 hours)	295mm		180mins (3 hours)		250mm		180mins (3 hours)		260mm
195mins	300mm		195mins		255mm		195mins		
210mins	305mm		210mins		255mm		210mins		270mm
225mins	310mm		225mins		260mm		225mins		
240mins (4 hours)	315mm		240mins (4 hours)		260mm		240mins (4 hours)		270mm
255mins	320mm		255mins		265mm		255mins		
270mins	325mm		270mins		265mm		270mins		270mm
285mins	330mm		285mins		270mm		285mins		
300mins (5 hours)	330mm		300mins (5 hours)		270mm		300mins (5 hours)		280mm
315mins	335mm		315mins		275mm		315mins		
330mins	335mm		330mins		275mm		330mins		280mm
345mins	340mm		345mins		280mm		345mins		
360mins (6 hours)	340mm		360mins (6 hours)		280mm		360mins (6 hours)		280mm
7 hours			7 hours				7 hours		
8 hours			8 hours				8 hours		
9 hours			9 hours				9 hours		
10 hours			10 hours				10 hours		
11 hours			11 hours				11 hours		
12 hours			12 hours				12 hours		
22 hours	500mm		24 hours		460mm		24 hours		440mm

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H+H Drainage

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Test Hole Locations



Grid Reference	X (Eastings)	Y (Northings)	Latitude	Longitude	Description (Click to Edit)
SO 22910 41853	322910	241853	52.069656	-3.126075	INF1 (1500mm deep)
SO 22917 41846	322917	241846	52.069593	-3.1259690	INF2 (600mm deep)
SO 22899 41847	322899	241847	52.069600	-3.1262332	GWLA

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On-Site Observations

The following photographs show an existing surface water inspection chamber located at W3W epidemics.riper.eyelash

This surface water drain appears to receive surface water from the doctor's surgery carpark and the access road.





This drain has not been inspected or traced.

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There is a ditch along the northwest boundary of the existing playing field. This ditch appears to be in place to defend the properties to the northwest from run-off from the playing fields, the site and the fields to the southeast.

The line of this ditch is shown on the following map.



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The ditch discharges to an existing 450mm diameter concrete pipe culvert.





This pipe / culvert has not been inspected or traced.

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Tremayne, Mortimer's Cross, Herefordshire HR6 9TG
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Grid Reference	X (Eastings)	Y (Northings)	Latitude	Longitude	Description (Click to Edit)
SO 22861 41959	322861	241959	52.070609	-3.1268116	450mm Dia Culvert
SO 22893 41908	322893	241908	52.070147	-3.1263321	Surface Water MH

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APPENDIX E

CALCULATIONS

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓	1 year (l/s)	2.6
Rainfall Events	Singular	Drain Down Time (mins)	240	30 year (l/s)	5.9
Summer CV	1.000	Additional Storage (m³/ha)	20.0	100 year (l/s)	7.4
Winter CV	1.000	Starting Level (m)		Check Discharge Volume	✓
Analysis Speed	Normal	Check Discharge Rate(s)	✓	100 year 360 minute (m³)	

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	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)	1.230	Betterment (%)	0
SAAR (mm)	898	QBar	3.0
Soil Index	3	Q 1 year (l/s)	2.6
SPR	0.30	Q 30 year (l/s)	5.9
Region	1	Q 100 year (l/s)	7.4
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	1.230	Storm Duration (mins)	360
Soil Index	3	Betterment (%)	0
SPR	0.30	PR	
CWI		Runoff Volume (m³)	

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	0.600
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
1	0.040	5.00	100.500	1200	322894.812	241771.939	0.750	99.750
2	0.030	5.00	100.500	1200	322910.731	241779.996	0.930	99.570
3	0.050	5.00	100.500	1200	322919.126	241763.403	1.040	99.460
4	0.000		100.500	1200	322938.039	241773.011	1.165	99.335
5	0.058	5.00	100.500	1200	322929.564	241796.057	0.750	99.750
Pond	0.000		100.500		322946.596	241791.158	1.455	99.045
OR-01	0.028	5.00	100.500	1200	322960.964	241811.911	1.560	98.940
6	0.215	5.00	100.700	1200	322986.593	241846.657	0.900	99.800
7	0.000		100.500	1350	322952.191	241829.245	1.715	98.785
8	0.033	5.00	100.500	1350	322942.167	241849.049	1.860	98.640
9	0.000		100.500	1350	322937.199	241858.864	1.890	98.610
10	0.023	5.00	100.500	1350	322912.339	241846.282	1.960	98.540
11	0.045	5.00	100.500	1200	322872.328	241826.031	0.750	99.750
12	0.023	5.00	100.500	1200	322891.283	241835.625	0.970	99.530
13	0.100	5.00	100.500	1500	322902.222	241841.161	2.065	98.435
14	0.196	5.00	100.400	1200	322932.280	241868.531	0.900	99.500
15	0.066	5.00	100.400	1200	322871.764	241837.902	0.825	99.575
16	0.034	5.00	100.400	1500	322897.324	241850.839	2.065	98.335
17	0.038	5.00	100.300	1500	322895.249	241865.277	1.990	98.310
18	0.037	5.00	100.200	1200	322786.947	241824.346	0.750	99.450
19	0.050	5.00	100.200	1200	322829.379	241845.648	1.225	98.975
20	0.057	5.00	100.200	1200	322865.809	241863.913	1.465	98.735
FC-02	0.000		99.400	1500	322895.876	241884.924	1.400	98.000
21	0.000		98.000	1200	322864.071	241948.716	0.700	97.300
22	0.000		98.000	1200	322848.961	241948.026	0.800	97.200
Outfall	0.000		98.000	1200	322847.405	241950.928	0.850	97.150

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	17.842	0.600	99.750	99.570	0.180	99.1	225	5.23	50.0
1.001	2	3	18.596	0.600	99.570	99.460	0.110	169.1	225	5.54	50.0
1.002	3	4	21.214	0.600	99.460	99.335	0.125	169.7	225	5.89	50.0
1.003	4	Pond	20.063	0.600	99.335	99.120	0.215	93.3	225	6.14	50.0
2.000	5	Pond	17.723	0.600	99.750	99.570	0.180	98.5	225	5.22	50.0
1.004	Pond	OR-01	25.241	0.600	99.045	98.940	0.105	240.4	300	6.55	50.0
1.005	OR-01	7	19.428	0.600	98.940	98.860	0.080	242.8	300	6.88	50.0
3.000	6	7	38.557	0.600	99.800	99.600	0.200	192.8	300	5.57	50.0
1.006	7	8	22.196	0.600	98.785	98.715	0.070	317.1	375	7.24	50.0
1.007	8	9	11.001	0.600	98.640	98.610	0.030	366.7	450	7.41	50.0
1.008	9	10	27.863	0.600	98.610	98.540	0.070	400.0	450	7.87	50.0
1.009	10	13	11.339	0.600	98.540	98.510	0.030	378.0	450	8.06	50.0
4.000	11	12	21.245	0.600	99.750	99.530	0.220	96.6	225	5.27	50.0
4.001	12	13	12.260	0.600	99.530	99.400	0.130	94.3	225	5.42	50.0
1.010	13	16	10.847	0.600	98.435	98.410	0.025	433.9	525	8.23	50.0
5.000	14	16	39.178	0.600	99.500	99.340	0.160	244.9	300	5.65	50.0
6.000	15	16	28.648	0.600	99.575	99.400	0.175	163.7	225	5.47	50.0
1.011	16	17	14.586	0.600	98.335	98.310	0.025	583.5	600	8.47	50.0
1.012	17	FC-02	19.657	0.600	98.310	98.000	0.310	63.4	600	8.58	50.0
7.000	18	19	47.479	0.600	99.450	98.975	0.475	100.0	225	5.61	50.0
7.001	19	20	40.752	0.600	98.975	98.735	0.240	169.8	225	6.28	50.0
7.002	20	17	29.472	0.600	98.735	98.560	0.175	168.4	225	6.77	50.0
1.013	FC-02	21	71.281	0.600	98.000	97.300	0.700	101.8	150	9.77	50.0
1.014	21	22	15.126	0.600	97.300	97.200	0.100	151.3	150	10.08	50.0

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)
1.000	1.313	52.2	10.1	0.525	0.705	0.040	0.0	67	1.024
1.001	1.002	39.9	17.7	0.705	0.815	0.070	0.0	105	0.974
1.002	1.001	39.8	30.4	0.815	0.940	0.120	0.0	147	1.098
1.003	1.354	53.8	30.4	0.940	1.155	0.120	0.0	121	1.392
2.000	1.317	52.4	14.7	0.525	0.705	0.058	0.0	81	1.134
1.004	1.009	71.4	45.0	1.155	1.260	0.178	0.0	173	1.066
1.005	1.004	71.0	52.1	1.260	1.340	0.206	0.0	191	1.094
3.000	1.129	79.8	54.4	0.600	0.600	0.215	0.0	182	1.211
1.006	1.012	111.8	106.5	1.340	1.410	0.421	0.0	294	1.145
1.007	1.056	167.9	114.9	1.410	1.440	0.454	0.0	274	1.133
1.008	1.010	160.7	114.9	1.440	1.510	0.454	0.0	283	1.094
1.009	1.039	165.3	120.7	1.510	1.540	0.477	0.0	286	1.130
4.000	1.330	52.9	11.4	0.525	0.745	0.045	0.0	71	1.066
4.001	1.346	53.5	17.2	0.745	0.875	0.068	0.0	87	1.202
1.010	1.069	231.3	163.2	1.540	1.465	0.645	0.0	326	1.154
5.000	1.000	70.7	49.6	0.600	0.760	0.196	0.0	185	1.079
6.000	1.019	40.5	16.7	0.600	0.775	0.066	0.0	101	0.971
1.011	1.001	282.9	238.1	1.465	1.390	0.941	0.0	424	1.115
1.012	3.061	865.5	284.1	1.390	0.800	1.123	0.0	236	2.757
7.000	1.307	52.0	9.4	0.525	1.000	0.037	0.0	65	0.998
7.001	1.000	39.8	22.0	1.000	1.240	0.087	0.0	120	1.026
7.002	1.004	39.9	36.4	1.240	1.515	0.144	0.0	169	1.134
1.013	0.995	17.6	284.1	1.250	0.550	1.123	0.0	150	1.014
1.014	0.815	14.4	284.1	0.550	0.650	1.123	0.0	150	0.830

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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)
1.015	22	Outfall	3.293	0.600	97.200	97.150	0.050	65.9	150	10.12	50.0

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)
1.015	1.241	21.9	284.1	0.650	0.700	1.123	0.0	150	1.264

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	17.842	99.1	225	Circular_Default Sewer Type	100.500	99.750	0.525	100.500	99.570	0.705
1.001	18.596	169.1	225	Circular_Default Sewer Type	100.500	99.570	0.705	100.500	99.460	0.815
1.002	21.214	169.7	225	Circular_Default Sewer Type	100.500	99.460	0.815	100.500	99.335	0.940
1.003	20.063	93.3	225	Circular_Default Sewer Type	100.500	99.335	0.940	100.500	99.120	1.155
2.000	17.723	98.5	225	Circular_Default Sewer Type	100.500	99.750	0.525	100.500	99.570	0.705
1.004	25.241	240.4	300	Circular_Default Sewer Type	100.500	99.045	1.155	100.500	98.940	1.260
1.005	19.428	242.8	300	Circular_Default Sewer Type	100.500	98.940	1.260	100.500	98.860	1.340
3.000	38.557	192.8	300	Circular_Default Sewer Type	100.700	99.800	0.600	100.500	99.600	0.600
1.006	22.196	317.1	375	Circular_Default Sewer Type	100.500	98.785	1.340	100.500	98.715	1.410
1.007	11.001	366.7	450	Circular_Default Sewer Type	100.500	98.640	1.410	100.500	98.610	1.440
1.008	27.863	400.0	450	Circular_Default Sewer Type	100.500	98.610	1.440	100.500	98.540	1.510
1.009	11.339	378.0	450	Circular_Default Sewer Type	100.500	98.540	1.510	100.500	98.510	1.540
4.000	21.245	96.6	225	Circular_Default Sewer Type	100.500	99.750	0.525	100.500	99.530	0.745
4.001	12.260	94.3	225	Circular_Default Sewer Type	100.500	99.530	0.745	100.500	99.400	0.875
1.010	10.847	433.9	525	Circular_Default Sewer Type	100.500	98.435	1.540	100.400	98.410	1.465
5.000	39.178	244.9	300	Circular_Default Sewer Type	100.400	99.500	0.600	100.400	99.340	0.760
6.000	28.648	163.7	225	Circular_Default Sewer Type	100.400	99.575	0.600	100.400	99.400	0.775
1.011	14.586	583.5	600	Circular_Default Sewer Type	100.400	98.335	1.465	100.300	98.310	1.390
1.012	19.657	63.4	600	Circular_Default Sewer Type	100.300	98.310	1.390	99.400	98.000	0.800

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	4	1200	Manhole	Adoptable	Pond		Junction	
2.000	5	1200	Manhole	Adoptable	Pond		Junction	
1.004	Pond		Junction		OR-01	1200	Manhole	Adoptable
1.005	OR-01	1200	Manhole	Adoptable	7	1350	Manhole	Adoptable
3.000	6	1200	Manhole	Adoptable	7	1350	Manhole	Adoptable
1.006	7	1350	Manhole	Adoptable	8	1350	Manhole	Adoptable
1.007	8	1350	Manhole	Adoptable	9	1350	Manhole	Adoptable
1.008	9	1350	Manhole	Adoptable	10	1350	Manhole	Adoptable
1.009	10	1350	Manhole	Adoptable	13	1500	Manhole	Adoptable
4.000	11	1200	Manhole	Adoptable	12	1200	Manhole	Adoptable
4.001	12	1200	Manhole	Adoptable	13	1500	Manhole	Adoptable
1.010	13	1500	Manhole	Adoptable	16	1500	Manhole	Adoptable
5.000	14	1200	Manhole	Adoptable	16	1500	Manhole	Adoptable
6.000	15	1200	Manhole	Adoptable	16	1500	Manhole	Adoptable
1.011	16	1500	Manhole	Adoptable	17	1500	Manhole	Adoptable
1.012	17	1500	Manhole	Adoptable	FC-02	1500	Manhole	Adoptable

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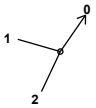
Pipeline Schedule

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)
7.000	47.479	100.0	225	Circular_Default Sewer Type	100.200	99.450	0.525	100.200	98.975	1.000
7.001	40.752	169.8	225	Circular_Default Sewer Type	100.200	98.975	1.000	100.200	98.735	1.240
7.002	29.472	168.4	225	Circular_Default Sewer Type	100.200	98.735	1.240	100.300	98.560	1.515
1.013	71.281	101.8	150	Circular_Default Sewer Type	99.400	98.000	1.250	98.000	97.300	0.550
1.014	15.126	151.3	150	Circular_Default Sewer Type	98.000	97.300	0.550	98.000	97.200	0.650
1.015	3.293	65.9	150	Circular_Default Sewer Type	98.000	97.200	0.650	98.000	97.150	0.700

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
7.000	18	1200	Manhole	Adoptable	19	1200	Manhole	Adoptable
7.001	19	1200	Manhole	Adoptable	20	1200	Manhole	Adoptable
7.002	20	1200	Manhole	Adoptable	17	1500	Manhole	Adoptable
1.013	FC-02	1500	Manhole	Adoptable	21	1200	Manhole	Adoptable
1.014	21	1200	Manhole	Adoptable	22	1200	Manhole	Adoptable
1.015	22	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	322894.812	241771.939	100.500	0.750	1200	 0	1.000	99.750	225
2	322910.731	241779.996	100.500	0.930	1200	1	1.000	99.570	225
						 0	1.001	99.570	225
3	322919.126	241763.403	100.500	1.040	1200	 1	1.001	99.460	225
						0	1.002	99.460	225
4	322938.039	241773.011	100.500	1.165	1200	 1	1.002	99.335	225
						0	1.003	99.335	225
5	322929.564	241796.057	100.500	0.750	1200	 0	2.000	99.750	225
Pond	322946.596	241791.158	100.500	1.455		 1	2.000	99.570	225
						2	1.003	99.120	225
						0	1.004	99.045	300
OR-01	322960.964	241811.911	100.500	1.560	1200	 1	1.004	98.940	300
						0	1.005	98.940	300
6	322986.593	241846.657	100.700	0.900	1200	 0	3.000	99.800	300

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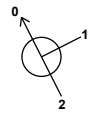
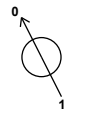
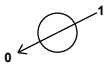
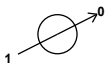
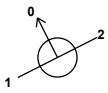
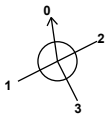
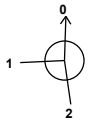
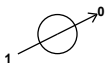
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
7	322952.191	241829.245	100.500	1.715	1350		1	3.000	99.600	300
							2	1.005	98.860	300
							0	1.006	98.785	375
8	322942.167	241849.049	100.500	1.860	1350		1	1.006	98.715	375
							0	1.007	98.640	450
9	322937.199	241858.864	100.500	1.890	1350		1	1.007	98.610	450
							0	1.008	98.610	450
10	322912.339	241846.282	100.500	1.960	1350		1	1.008	98.540	450
							0	1.009	98.540	450
11	322872.328	241826.031	100.500	0.750	1200		0	4.000	99.750	225
12	322891.283	241835.625	100.500	0.970	1200		1	4.000	99.530	225
							0	4.001	99.530	225
13	322902.222	241841.161	100.500	2.065	1500		1	4.001	99.400	225
							2	1.009	98.510	450
							0	1.010	98.435	525
14	322932.280	241868.531	100.400	0.900	1200		0	5.000	99.500	300
15	322871.764	241837.902	100.400	0.825	1200		0	6.000	99.575	225
16	322897.324	241850.839	100.400	2.065	1500		1	6.000	99.400	225
							2	5.000	99.340	300
							3	1.010	98.410	525
							0	1.011	98.335	600
17	322895.249	241865.277	100.300	1.990	1500		1	7.002	98.560	225
							2	1.011	98.310	600
							0	1.012	98.310	600
18	322786.947	241824.346	100.200	0.750	1200		0	7.000	99.450	225
19	322829.379	241845.648	100.200	1.225	1200		1	7.000	98.975	225
							0	7.001	98.975	225

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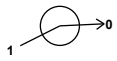
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
20	322865.809	241863.913	100.200	1.465	1200	1	7.001	98.735	225
									
						0	7.002	98.735	225
FC-02	322895.876	241884.924	99.400	1.400	1500	1	1.012	98.000	600
									
						0	1.013	98.000	150
21	322864.071	241948.716	98.000	0.700	1200	1	1.013	97.300	150
									
						0	1.014	97.300	150
22	322848.961	241948.026	98.000	0.800	1200	1	1.014	97.200	150
									
						0	1.015	97.200	150
Outfall	322847.405	241950.928	98.000	0.850	1200	1	1.015	97.150	150
									

Node OR-01 Online Orifice Control

Flap Valve	x	Invert Level (m)	98.940	Diameter (m)	0.021
Downstream Link	1.005	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	1.0		

Node FC-02 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.013	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0074-2600-1170-2600
Invert Level (m)	98.000	Min Outlet Diameter (m)	0.100
Design Depth (m)	1.170	Min Node Diameter (mm)	1200
Design Flow (l/s)	2.6		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	99.900	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.500
Safety Factor	2.0	Width (m)	16.000	Inf Depth (m)	
Porosity	0.30	Length (m)	30.000		

Node Pond Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	99.045
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)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	0.500	200.0	0.0	1.000	400.0	0.0	1.450	675.0	277.4

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Node FC-02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	98.700	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	63.000	Inf Depth (m)	
Porosity	0.30	Length (m)	63.000		

Node FC-02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	98.700	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.600
Safety Factor	2.0	Width (m)	38.000	Inf Depth (m)	
Porosity	0.30	Length (m)	38.000		

Node FC-02 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.400
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	40.0	40.0	1.000	150.0	154.8

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	99.790	0.040	3.7	0.0878	0.0000	OK
15 minute summer	2	11	99.630	0.060	6.4	0.1069	0.0000	OK
15 minute summer	3	11	99.543	0.083	10.8	0.1737	0.0000	OK
15 minute summer	4	11	99.404	0.069	10.8	0.0781	0.0000	OK
15 minute summer	5	10	99.799	0.049	5.4	0.1300	0.0000	OK
1440 minute summer	Pond	1020	99.321	0.276	2.5	35.2713	0.0000	OK
1440 minute summer	OR-01	1020	99.321	0.381	0.6	0.5682	0.0000	SURCHARGED
15 minute summer	6	11	99.902	0.102	19.9	0.6051	0.0000	OK
15 minute summer	7	11	98.894	0.109	19.6	0.1562	0.0000	OK
960 minute winter	8	915	98.801	0.161	3.6	0.2875	0.0000	OK
960 minute winter	9	915	98.801	0.191	3.5	0.2733	0.0000	OK
960 minute winter	10	915	98.801	0.261	3.8	0.4348	0.0000	OK
15 minute summer	11	10	99.792	0.042	4.2	0.0985	0.0000	OK
15 minute summer	12	11	99.583	0.053	6.2	0.0857	0.0000	OK
960 minute winter	13	915	98.801	0.366	5.8	1.0013	0.0000	OK
15 minute summer	14	11	99.604	0.104	18.2	0.5690	0.0000	OK
15 minute summer	15	11	99.634	0.059	6.1	0.1608	0.0000	OK
960 minute winter	16	915	98.801	0.466	9.4	0.9766	0.0000	OK
960 minute winter	17	915	98.801	0.491	11.6	1.0551	0.0000	OK
15 minute summer	18	11	99.488	0.038	3.4	0.0814	0.0000	OK
15 minute summer	19	11	99.041	0.066	7.9	0.1286	0.0000	OK
15 minute summer	20	11	98.822	0.087	12.6	0.1659	0.0000	OK
960 minute winter	FC-02	915	98.801	0.801	11.5	144.5204	0.0000	SURCHARGED
240 minute winter	21	36	97.344	0.044	2.5	0.0493	0.0000	OK
600 minute winter	22	105	97.237	0.037	2.5	0.0419	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	3.6	0.557	0.069	0.1178	
15 minute summer	2	1.001	3	6.3	0.584	0.159	0.2027	
15 minute summer	3	1.002	4	10.8	0.919	0.272	0.2503	
15 minute summer	4	1.003	Pond	10.7	1.053	0.199	0.2040	
15 minute summer	5	2.000	Pond	5.2	0.845	0.100	0.1100	
1440 minute summer	Pond	1.004	OR-01	0.6	0.092	0.008	1.7453	
1440 minute summer	OR-01	1.005	7	0.6	0.323	0.008	0.0333	
15 minute summer	6	3.000	7	19.3	0.929	0.242	0.8015	
15 minute summer	7	1.006	8	19.3	0.779	0.173	0.5532	
960 minute winter	8	1.007	9	3.5	0.372	0.021	0.6321	
960 minute winter	9	1.008	10	3.5	0.334	0.022	2.2195	
960 minute winter	10	1.009	13	3.7	0.396	0.022	1.1548	
15 minute summer	11	4.000	12	4.1	0.674	0.078	0.1305	
15 minute summer	12	4.001	13	6.1	0.881	0.115	0.0856	
960 minute winter	13	1.010	16	5.8	0.392	0.025	1.8070	
15 minute summer	14	5.000	16	17.5	0.831	0.248	0.8272	
15 minute summer	15	6.000	16	5.9	0.727	0.146	0.2331	
960 minute winter	16	1.011	17	9.3	0.412	0.033	3.5128	
960 minute winter	17	1.012	FC-02	11.5	0.296	0.013	5.1945	
15 minute summer	18	7.000	19	3.3	0.487	0.064	0.3366	
15 minute summer	19	7.001	20	7.6	0.638	0.190	0.4855	
15 minute summer	20	7.002	17	12.1	0.876	0.303	0.4612	
960 minute winter	FC-02	Hydro-Brake®	21	2.5				
240 minute winter	21	1.014	22	2.5	0.654	0.173	0.0577	
600 minute winter	22	1.015	Outfall	2.5	0.781	0.113	0.0105	106.9

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	Outfall	105	97.184	0.034	2.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	99.834	0.084	15.8	0.1841	0.0000	OK
15 minute summer	2	11	99.739	0.169	27.4	0.2998	0.0000	OK
15 minute summer	3	11	99.697	0.237	45.7	0.4955	0.0000	SURCHARGED
1440 minute summer	4	1200	99.661	0.326	3.9	0.3687	0.0000	SURCHARGED
15 minute summer	5	10	99.856	0.106	22.9	0.2838	0.0000	OK
1440 minute summer	Pond	1200	99.661	0.616	5.8	100.8937	0.0000	SURCHARGED
1440 minute summer	OR-01	1200	99.661	0.721	0.9	1.0743	0.0000	SURCHARGED
15 minute summer	6	11	100.071	0.271	84.7	1.6040	0.0000	OK
15 minute summer	7	11	99.043	0.258	82.5	0.3693	0.0000	OK
1440 minute winter	8	1410	99.012	0.372	6.0	0.6646	0.0000	OK
1440 minute winter	9	1410	99.012	0.402	5.9	0.5754	0.0000	OK
1440 minute winter	10	1410	99.012	0.472	6.3	0.7865	0.0000	SURCHARGED
15 minute summer	11	10	99.841	0.091	17.7	0.2131	0.0000	OK
15 minute summer	12	10	99.651	0.121	26.6	0.1941	0.0000	OK
1440 minute winter	13	1410	99.012	0.577	9.9	1.5790	0.0000	SURCHARGED
15 minute summer	14	11	99.773	0.273	77.2	1.4984	0.0000	OK
15 minute summer	15	10	99.709	0.134	26.0	0.3672	0.0000	OK
1440 minute winter	16	1410	99.012	0.677	16.2	1.4192	0.0000	SURCHARGED
1440 minute winter	17	1410	99.012	0.702	20.0	1.5088	0.0000	SURCHARGED
15 minute summer	18	10	99.530	0.080	14.6	0.1696	0.0000	OK
15 minute summer	19	12	99.225	0.250	33.9	0.4870	0.0000	SURCHARGED
15 minute summer	20	12	99.086	0.351	50.1	0.6705	0.0000	SURCHARGED
1440 minute winter	FC-02	1410	99.012	1.012	19.9	508.0095	0.0000	SURCHARGED
15 minute winter	21	5	97.344	0.044	2.5	0.0499	0.0000	OK
1440 minute winter	22	120	97.237	0.037	2.5	0.0419	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	15.6	0.772	0.299	0.4026	
15 minute summer	2	1.001	3	26.0	0.776	0.652	0.6670	
15 minute summer	3	1.002	4	44.1	1.252	1.108	0.7420	
1440 minute summer	4	1.003	Pond	3.7	0.469	0.069	0.7979	
15 minute summer	5	2.000	Pond	22.5	1.255	0.430	0.3183	
1440 minute summer	Pond	1.004	OR-01	0.7	0.045	0.010	1.7775	
1440 minute summer	OR-01	1.005	7	0.8	0.343	0.011	0.4464	
15 minute summer	6	3.000	7	82.0	1.318	1.027	2.3784	
15 minute summer	7	1.006	8	80.5	1.105	0.720	1.7434	
1440 minute winter	8	1.007	9	5.9	0.322	0.035	1.5932	
1440 minute winter	9	1.008	10	5.8	0.302	0.036	4.2897	
1440 minute winter	10	1.009	13	6.2	0.354	0.038	1.7966	
15 minute summer	11	4.000	12	17.5	0.950	0.331	0.3915	
15 minute summer	12	4.001	13	26.2	1.280	0.489	0.2514	
1440 minute winter	13	1.010	16	9.8	0.381	0.043	2.3433	
15 minute summer	14	5.000	16	74.6	1.220	1.055	2.3679	
15 minute summer	15	6.000	16	25.4	1.061	0.627	0.6855	
1440 minute winter	16	1.011	17	16.2	0.395	0.057	4.1085	
1440 minute winter	17	1.012	FC-02	19.9	0.177	0.023	5.5369	
15 minute summer	18	7.000	19	14.3	0.703	0.275	1.2137	
15 minute summer	19	7.001	20	29.6	0.855	0.744	1.6208	
15 minute summer	20	7.002	17	46.2	1.161	1.156	1.1721	
1440 minute winter	FC-02	Hydro-Brake®	21	2.5				
15 minute winter	21	1.014	22	2.5	0.691	0.173	0.0572	
1440 minute winter	22	1.015	Outfall	2.5	0.781	0.113	0.0105	227.2

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Outfall	120	97.184	0.034	2.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)

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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	99.898	0.148	19.9	0.3250	0.0000	OK
15 minute summer	2	11	99.881	0.311	32.4	0.5526	0.0000	SURCHARGED
15 minute summer	3	11	99.795	0.335	54.9	0.7015	0.0000	SURCHARGED
1440 minute winter	4	1380	99.775	0.440	3.1	0.4979	0.0000	SURCHARGED
15 minute summer	5	10	99.872	0.122	28.9	0.3267	0.0000	OK
1440 minute winter	Pond	1380	99.775	0.730	4.5	131.6461	0.0000	SURCHARGED
1440 minute winter	OR-01	1380	99.775	0.835	0.8	1.2445	0.0000	SURCHARGED
15 minute summer	6	11	100.213	0.413	106.8	2.4431	0.0000	SURCHARGED
15 minute summer	7	12	99.143	0.358	102.4	0.5124	0.0000	OK
1440 minute winter	8	1410	99.100	0.460	7.2	0.8218	0.0000	SURCHARGED
1440 minute winter	9	1410	99.100	0.490	7.1	0.7014	0.0000	SURCHARGED
1440 minute winter	10	1410	99.100	0.560	7.6	0.9332	0.0000	SURCHARGED
15 minute summer	11	10	99.856	0.106	22.4	0.2470	0.0000	OK
15 minute summer	12	10	99.671	0.141	33.6	0.2265	0.0000	OK
1440 minute winter	13	1410	99.100	0.665	12.0	1.8198	0.0000	SURCHARGED
15 minute summer	14	11	99.894	0.394	97.4	2.1597	0.0000	SURCHARGED
15 minute summer	15	10	99.734	0.159	32.8	0.4336	0.0000	OK
1440 minute winter	16	1410	99.100	0.765	19.8	1.6037	0.0000	SURCHARGED
1440 minute winter	17	1410	99.100	0.790	24.4	1.6980	0.0000	SURCHARGED
15 minute summer	18	12	99.549	0.099	18.4	0.2099	0.0000	OK
15 minute summer	19	12	99.525	0.550	42.9	1.0704	0.0000	SURCHARGED
15 minute summer	20	12	99.316	0.581	59.6	1.1084	0.0000	SURCHARGED
1440 minute winter	FC-02	1410	99.100	1.100	24.4	660.9478	0.0000	FLOOD RISK
1440 minute winter	21	1410	97.344	0.044	2.5	0.0498	0.0000	OK
1440 minute winter	22	1410	97.237	0.037	2.5	0.0423	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	18.4	0.797	0.352	0.6015	
15 minute summer	2	1.001	3	31.8	0.799	0.797	0.7396	
15 minute summer	3	1.002	4	53.9	1.364	1.356	0.8084	
1440 minute winter	4	1.003	Pond	3.0	0.473	0.056	0.7979	
15 minute summer	5	2.000	Pond	28.5	1.328	0.543	0.3797	
1440 minute winter	Pond	1.004	OR-01	0.7	0.054	0.010	1.7775	
1440 minute winter	OR-01	1.005	7	0.8	0.342	0.011	0.9589	
15 minute summer	6	3.000	7	102.4	1.471	1.283	2.5573	
15 minute summer	7	1.006	8	97.7	1.111	0.874	2.4126	
1440 minute winter	8	1.007	9	7.1	0.328	0.042	1.7430	
1440 minute winter	9	1.008	10	7.0	0.323	0.043	4.4147	
1440 minute winter	10	1.009	13	7.5	0.381	0.045	1.7966	
15 minute summer	11	4.000	12	22.1	0.992	0.418	0.4734	
15 minute summer	12	4.001	13	33.1	1.348	0.618	0.3019	
1440 minute winter	13	1.010	16	11.9	0.385	0.051	2.3433	
15 minute summer	14	5.000	16	93.7	1.358	1.326	2.5547	
15 minute summer	15	6.000	16	32.1	1.111	0.792	0.8272	
1440 minute winter	16	1.011	17	19.7	0.429	0.070	4.1085	
1440 minute winter	17	1.012	FC-02	24.4	0.163	0.028	5.5369	
15 minute summer	18	7.000	19	18.1	0.722	0.348	1.3438	
15 minute summer	19	7.001	20	36.1	0.908	0.908	1.6208	
15 minute summer	20	7.002	17	58.1	1.462	1.455	1.1721	
1440 minute winter	FC-02	Hydro-Brake®	21	2.5				
1440 minute winter	21	1.014	22	2.5	0.657	0.176	0.0584	
1440 minute winter	22	1.015	Outfall	2.5	0.784	0.115	0.0106	232.3

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Results for 100 year Critical Storm Duration. Lowest mass balance: 99.77%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Outfall	1410	97.184	0.034	2.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	11	100.208	0.457	27.9	1.0055	0.0000	FLOOD RISK
15 minute summer	2	11	100.151	0.581	45.6	1.0320	0.0000	SURCHARGED
15 minute summer	3	12	99.992	0.532	78.1	3.1683	0.0000	SURCHARGED
1440 minute winter	4	1410	99.983	0.648	4.3	0.7331	0.0000	SURCHARGED
1440 minute winter	5	1410	99.983	0.233	2.2	0.6245	0.0000	SURCHARGED
1440 minute winter	Pond	1410	99.983	0.938	6.7	201.0422	0.0000	SURCHARGED
1440 minute winter	OR-01	1410	99.983	1.043	1.0	1.5543	0.0000	SURCHARGED
15 minute summer	6	11	100.602	0.802	149.6	4.7399	0.0000	FLOOD RISK
15 minute summer	7	11	99.617	0.832	141.1	1.1911	0.0000	SURCHARGED
15 minute summer	8	11	99.463	0.823	161.0	1.4692	0.0000	SURCHARGED
15 minute summer	9	11	99.409	0.799	160.0	1.1427	0.0000	SURCHARGED
15 minute summer	10	11	99.315	0.775	174.7	1.2905	0.0000	SURCHARGED
15 minute summer	11	10	99.879	0.129	31.3	0.3017	0.0000	OK
15 minute summer	12	10	99.713	0.183	47.1	0.2931	0.0000	OK
1440 minute winter	13	1440	99.285	0.850	16.7	2.3248	0.0000	SURCHARGED
15 minute summer	14	11	100.214	0.713	136.4	3.9149	0.0000	FLOOD RISK
15 minute summer	15	11	99.813	0.238	45.9	0.6512	0.0000	SURCHARGED
1440 minute winter	16	1440	99.285	0.950	27.7	1.9906	0.0000	SURCHARGED
1440 minute winter	17	1440	99.285	0.975	34.3	2.0947	0.0000	SURCHARGED
15 minute summer	18	12	100.200	0.750	25.8	1.5885	0.1898	FLOOD
15 minute summer	19	12	100.146	1.171	56.2	2.2805	0.0000	FLOOD RISK
15 minute summer	20	12	99.792	1.057	79.2	2.0173	0.0000	SURCHARGED
1440 minute winter	FC-02	1440	99.285	1.285	34.2	984.5563	0.0000	FLOOD RISK
1440 minute winter	21	1440	97.346	0.046	2.7	0.0517	0.0000	OK
1440 minute winter	22	1440	97.239	0.039	2.7	0.0439	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	25.7	0.817	0.492	0.7096	
15 minute summer	2	1.001	3	44.8	1.127	1.124	0.7396	
15 minute summer	3	1.002	4	61.4	1.545	1.544	0.8437	
1440 minute winter	4	1.003	Pond	4.3	0.494	0.079	0.7979	
1440 minute winter	5	2.000	Pond	2.2	0.637	0.042	0.7049	
1440 minute winter	Pond	1.004	OR-01	0.8	0.056	0.011	1.7775	
1440 minute winter	OR-01	1.005	7	0.8	0.341	0.011	1.3681	
15 minute summer	6	3.000	7	141.1	2.004	1.768	2.6703	
15 minute summer	7	1.006	8	139.2	1.262	1.245	2.4482	
15 minute summer	8	1.007	9	160.0	1.010	0.953	1.7430	
15 minute summer	9	1.008	10	162.0	1.023	1.009	4.4147	
15 minute summer	10	1.009	13	176.6	1.115	1.068	1.7966	
15 minute summer	11	4.000	12	31.1	1.059	0.588	0.6177	
15 minute summer	12	4.001	13	46.4	1.435	0.866	0.3963	
1440 minute winter	13	1.010	16	16.6	0.403	0.072	2.3433	
15 minute summer	14	5.000	16	129.7	1.843	1.834	2.6906	
15 minute summer	15	6.000	16	44.3	1.179	1.094	1.0472	
1440 minute winter	16	1.011	17	27.7	0.410	0.098	4.1085	
1440 minute winter	17	1.012	FC-02	34.2	0.134	0.040	5.5369	
15 minute summer	18	7.000	19	23.1	0.764	0.444	1.8883	
15 minute summer	19	7.001	20	46.2	1.161	1.161	1.6208	
15 minute summer	20	7.002	17	76.7	1.928	1.920	1.1721	
1440 minute winter	FC-02	Hydro-Brake®	21	2.7				
1440 minute winter	21	1.014	22	2.7	0.669	0.189	0.0616	
1440 minute winter	22	1.015	Outfall	2.7	0.799	0.124	0.0112	242.6

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.65%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Outfall	1440	97.186	0.036	2.7	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)

Water Quality (TSS)

Node	Treatment	Effectiveness	SuDS Component	Mitigation TSS	Cumulative TSS
3	Carpark	1.0	Pond	0.700	0.000
Pond	Depth/Area	1.0	Pond	0.700	0.000
FC-02	Carpark	1.0	Permeable Surface	0.700	
	Carpark	1.0	Pond	0.700	
	Depth/Area	1.0	Pond	0.700	0.000
Outfall					0.000

Water Quality (Metals)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Metals	Cumulative Metals
3	Carpark	1.0	Pond	0.700	0.000
Pond	Depth/Area	1.0	Pond	0.700	0.000
FC-02	Carpark	1.0	Permeable Surface	0.600	
	Carpark	1.0	Pond	0.700	
	Depth/Area	1.0	Pond	0.700	0.000
Outfall					0.000

Water Quality (Hydrocarbons)

Node	Treatment	Effectiveness	SuDS Component	Mitigation Hydrocarbons	Cumulative Hydrocarbons
3	Carpark	1.0	Pond	0.500	0.000
Pond	Depth/Area	1.0	Pond	0.500	0.000
FC-02	Carpark	1.0	Permeable Surface	0.700	
	Carpark	1.0	Pond	0.500	
	Depth/Area	1.0	Pond	0.500	0.000
Outfall					0.000

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APPENDIX F

OVERLAND FLOW ROUTES



Notes:

1. Do not scale from this drawing. All dimensions are in metres unless noted otherwise.
2. Drawing to be read in conjunction with all other consultants drawings. Any discrepancies are to be reported to the engineer immediately.
3. Position of existing services/statutory undertakers apparatus are to be checked by the contractor prior to starting work.

Rev	Date	Details	Drawn
B	02.11.26	CLIENT / PROJECT TITLE UPDATED	JM
A	21.10.26	ISSUED FOR PLANNING	JM

K-Ten Consulting

CLIENT:
HADSCAL LTD

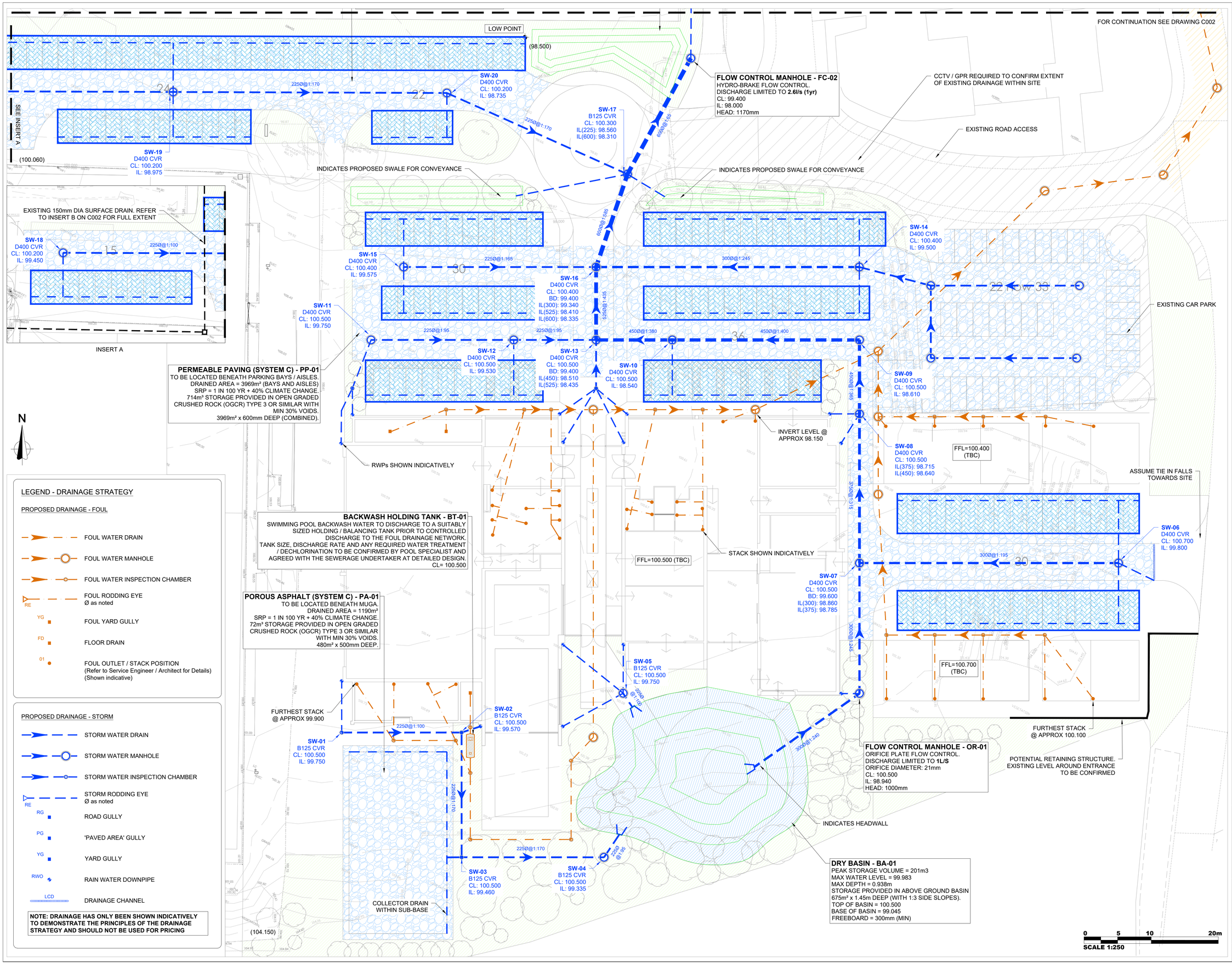
PROJECT:
HADSCAL
HAY-ON-WYE

TITLE:
OVERLAND FLOW ROUTE

SCALE @ A1:	DATE:	STATUS:	
NTS	11.09.26	FOR APPROVAL	
JOB NO:		DRAWING NO:	REVISION:
25-3141		C003	B

APPENDIX G

DRAINAGE STRATEGY



LEGEND - DRAINAGE STRATEGY

PROPOSED DRAINAGE - FOUL

- FOUL WATER DRAIN
- FOUL WATER MANHOLE
- FOUL WATER INSPECTION CHAMBER
- RE — FOUL RODDING EYE Ø as noted
- YG — FOUL YARD GULLY
- FD — FLOOR DRAIN
- 01 — FOUL OUTLET / STACK POSITION (Refer to Service Engineer / Architect for Details) (Shown indicative)

PROPOSED DRAINAGE - STORM

- STORM WATER DRAIN
- STORM WATER MANHOLE
- STORM WATER INSPECTION CHAMBER
- RE — STORM RODDING EYE Ø as noted
- RG — ROAD GULLY
- PG — 'PAVED AREA' GULLY
- YG — YARD GULLY
- RWO — RAIN WATER DOWNPIPE
- LCD — DRAINAGE CHANNEL

NOTE: DRAINAGE HAS ONLY BEEN SHOWN INDICATIVELY TO DEMONSTRATE THE PRINCIPLES OF THE DRAINAGE STRATEGY AND SHOULD NOT BE USED FOR PRICING

Notes:

1. Do not scale from this drawing. All dimensions are in metres unless noted otherwise.
2. Drawing to be read in conjunction with all other consultants drawings. Any discrepancies are to be reported to the engineer immediately.
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Rev	Date	Details	Drawn
D	02.11.26	CLIENT / PROJECT TITLE UPDATED	JM
C	21.10.26	ISSUED FOR PLANNING	JM
B	19.10.26	UPDATED FOLLOWING SITE VISIT	JM
A	11.09.26	ISSUED FOR COMMENT	JM

K-Ten Consulting

CLIENT:
HADSCAL LTD

PROJECT:
HADSCAL
HAY-ON-WYE

TITLE:
DRAINAGE STRATEGY
SHEET 1

SCALE @ A1:	DATE:	STATUS:	
1:250	11.09.26	FOR APPROVAL	
JOB NO:		DRAWING NO:	REVISION:
25-3141		C001	D

N

0 5 10 20m

SCALE 1:250

CAEPOUND

SEE INSERT B FOR DITCH CONTINUATION AND PITCH EXTENTS

LOWEST INVERT LEVEL @ APPROX 97.150

INDICATES HEADWALL

450mm DIA. CULVERT DISCHARGING FROM DITCH TO THE EAST, AS MENTIONED IN H&H DRAINAGE (INFILTRATION) REPORT

1500@1:165

(97.900)

INDICATES EXISTING DITCH LOCATED NORTH OF SITE, AS MENTIONED IN H&H DRAINAGE (INFILTRATION) REPORT

SW-22
B125 CVR
CL: 98.000
IL: 97.200

1500@1:150

SW-21
B125 CVR
CL: 98.000
IL: 97.300

FURTHER INVESTIGATION REQUIRED TO DETERMINE CATCHMENTS / CAPACITY / ROUTE / DOWNSTREAM NETWORK OF EXISTING DITCH TO CONFIRM FEASIBILITY OF CONNECTION FROM PROPOSED SITE

EXISTING 225mm DIA SURFACE DRAIN. ASSUMED HIGHWAY DRAIN. TAKEN FROM SITE VISIT. TO BE RETAINED. CONTRACTOR TO REVIEW AND CONFIRM IF THERE IS A CLASH WITH THE PROPOSED OUTFALL.

1500@1:100

DRY BASIN - BA-02
PEAK STORAGE VOLUME = TBC
MAX WATER LEVEL = 99.285
MAX DEPTH = 885mm
STORAGE PROVIDED IN ABOVE GROUND BASIN
150m² x 1m DEEP (WITH 1:3 SIDE SLOPES).
TOP OF BASIN = 99.400
BASE OF BASIN = 98.400
FREEBOARD = 115mm

PERMEABLE PAVING (SYSTEM C) - PP-02
TO BE LOCATED BENEATH PARKING BAYS / AISLE.
DRAINED AREA = 1444m² (BAYS AND AISLES)
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
280m³ STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
1444m² x 600mm DEEP (COMBINED).

LOW POINT

(98.500)

SW-20
D400 CVR
CL: 100.200
IL: 98.735

2250@1:170

SW-17
B125 CVR
CL: 100.300
IL(225): 98.560
IL(600): 98.310

600@1:165

FLOW CONTROL MANHOLE - FC-02
HYDRO-BRAKE FLOW CONTROL.
DISCHARGE LIMITED TO **2.6l/s (1yr)**
CL: 99.400
IL: 98.000
HEAD: 1170mm

INDICATES PROPOSED SWALE FOR CONVEYANCE

INDICATES PROPOSED SWALE FOR CONVEYANCE

CCTV / GPR REQUIRED TO CONFIRM EXTENT OF EXISTING DRAINAGE WITHIN SITE

EXISTING ROAD ACCESS

FOR CONTINUATION SEE DRAWING C001

EXISTING 225mm DIA VC COMBINED SEWER

WELSH WATER TO PROVIDE COVER AND INVERT TO CONFIRM FEASIBILITY OF FOUL CONNECTION. TBC

WW-9902
CL:UNKNOWN
IL: UNKNOWN

LOWEST INVERT LEVEL @ APPROX 96.880

POTENTIAL SECTION 104 ADOPTED DRAINAGE RUN TO CONNECT TO EXISTING FOUL SEWER IN CARRIAGEWAY

EXISTING 150mm DIA SURFACE DRAIN. ASSUMED CONNECTS EXISTING DITCHES ACROSS FIELD. TO BE RETAINED

INSERT B

LEGEND - DRAINAGE STRATEGY

PROPOSED DRAINAGE - FOUL

- FOUL WATER DRAIN
- FOUL WATER MANHOLE
- FOUL WATER INSPECTION CHAMBER
- RE — FOUL RODDING EYE, Ø as noted
- YG — FOUL YARD GULLY
- FD — FLOOR DRAIN
- 01 — FOUL OUTLET / STACK POSITION (Refer to Service Engineer / Architect for Details) (Shown indicative)

PROPOSED DRAINAGE - STORM

- STORM WATER DRAIN
- STORM WATER MANHOLE
- STORM WATER INSPECTION CHAMBER
- RE — STORM RODDING EYE, Ø as noted
- RG — ROAD GULLY
- PG — 'PAVED AREA' GULLY
- YG — YARD GULLY
- RWO — RAIN WATER DOWNPIPE
- LCD — DRAINAGE CHANNEL

NOTE: DRAINAGE HAS ONLY BEEN SHOWN INDICATIVELY TO DEMONSTRATE THE PRINCIPLES OF THE DRAINAGE STRATEGY AND SHOULD NOT BE USED FOR PRICING

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PROJECT:
HADSCAL
HAY-ON-WYE

TITLE:
DRAINAGE STRATEGY
SHEET 2

SCALE @ A1:	DATE:	STATUS:	
1:250	11.09.26	FOR APPROVAL	
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