

Bedford Road, South of Pinchgut Hall, SG5 3RS

Reference: 895 -Rev - V1

Aug-25

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Rev 1 Produced by: ARD 079 721 44579 arge@rida-reports.co.uk

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Drainage Strategy

Purpose of this report

- 1.1 The purpose of this statement is to accompany the technical drawings and details showing the proposed Surface Water drainage system as part of the planning application for this development.

Scope

- 1.2 This Sustainable Drainage Strategy (SDS) outlines the key drainage principles and requirements for the proposed development at Bedford Road, South of Pinchgut Hall, SG5 3RS. It provides a summary of the sustainable drainage system (SuDS) design, based on the specific site conditions and relevant guidelines, including Building Regulations Approved Document Part H and CIRIA C753: The SuDS Manual 2015. As the project progresses and new information becomes available, this strategy will be updated to reflect ongoing changes and the development of the detailed design.

Site Characteristics

- 2.1 The site background is clearly identified through answers to the questions in table 1 below.

Table 1: Site Characteristics . See appendix B for support documentation

TOPIC	QUESTION	ANSWER
Protected species or habitat	Is the site near to designated sites and priority habitats?	No
Flood Plain	Is the site located in the flood plain?	No
Soils and Geology	Soil permeability? - See appendix B for results	No
Space constraints	Space for SuDS components?	Yes
Topography	Sited on a flat site?	Yes
	Sited on a steep slope (5-15%)	No
	Sited on a very steep slope (>15%)	No
Groundwater	Is the site at groundwater flood risk?	No
Contaminated land	Are there contaminated soils on site?	Unknown
Source Protection Zone	Is the site within a SPZ 3?	No
Runoff characteristics	Is the development in a high risk flooding area?	No

Existing and Proposed Site

- 2.2 The distribution of catchment areas for existing and proposed site is as per table 2 below. See appendix A for details

Table 2 : Existing and Proposed catchment areas in hectares

Description	Existing Site	Proposed Site
Impermeable Areas	0.007	0.030
Permeable Areas		
Connected to Drainage	0.000	0.015
Self Draining Areas	0.000	0.000
Areas Draining Away from drainage System	0.562	0.539
Total Development Area	0.569	0.569

- 2.3 It has been assumed that the positively drained areas will have different runoff coefficients depending on the type of surface as follow:

Impermeable Surface	1.0
Permeable Surfaces	0.5
Grass Areas	0.3

Evaluation of Discharge Point

3.1 The SuDS design takes into account Building Regulations Section H3 and the National Planning Practice Guidance. The aim is to discharge surface water run-off as high up the drainage hierarchy, as reasonably practicable:

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

3.2 The discharge point has been evaluated following the NPPG and Building regulations. The findings are in table 3 below.

Table 3: Drainage Hierarchy evaluation

Superficial geology classification	The British Geological Society records show that the superficial deposits are Lowestoft Formation - Diamicton.
Bedrock geology classification	The British Geological Society records of the site show that it is located within the Gault Formation - Mudstone.
Landis Top Soil Infiltration	The SOILSCAPE's records of the site show that it is located within an area of slightly impeded drainage soils.
Groundwater	The British Geological Survey's flood risk susceptibility maps show that the development has potential for groundwater flooding below ground level. Groundwater levels would tend to vary seasonally and are influenced by ground and meteorological conditions and proximity to water features.
Is infiltration feasible?	Infiltration is not possible on this site due to findings on groundwater and soils
Is a discharge to a watercourse feasible?	There is an existing watercourse near the site. It is possible to connect to the watercourse, and it is proposed to discharge into this watercourse.
Is a discharge to a surface water sewer feasible?	There is no surface water sewer in the proximity to the site.
Is a discharge to a combined sewer feasible?	There is no combined water sewer in the proximity to the site.

Existing and Proposed Peak Run-off Calculations

- 4.1 The current site is a Greenfield. The peak runoff rate for the existing site was calculated as per table 4 and discharge rates as per table 5.

Table 4: Peak run-off rate calculation method for existing site

Method Used	Calculation Method
X	Report 124 Flood Estimation for Small Catchments method has been used to estimate the site peak flow rates
	This is a brownfield site, runoff rates are calculated in accordance with best practice simulation modelling and using the modified rational method
	This is a brownfield site where the pre-development drainage isn't known. The runoff rates are calculated using the Greenfield model with soil type 5

- 4.2 The runoff flow produced by the development will be controlled as per table 5.

Table 5: Runoff discharge rate control

Control Used	Description of runoff discharge
	Water will be discharged into the ground via a SuDS as described in table 6 below
X	The peak discharge rate has been reduced to Greenfield Qbar flow
	The peak discharge rate has been taken as 0.7 l/s as it is not possible to reduce it to the Greenfield Qbar rate
	The peak discharge rate has been reduced to Brownfield pre-development 1 in 1 flow
	The peak discharge rate has been reduced by 60% from the existing Brownfield pre-development 1 in 2 flow rate

Run-off flows

- 4.3 The size of the SuDS has been calculated for all events up to the 1 in 100 including an allowance for climate change of 40%. As per tables above, it is proposed to discharge at a rate of 1 l/s. See table 6 for values and appendix C for calculations.

Table 6: Peak discharge rates for SuDS

Return Period Event	Discharge Rate (l/s)			Infiltration Rate (m/hr)
	Existing Greenfield	Existing Brownfield	Proposed	
Qbar	1.30	N/A	N/A	0.0000
1 in 1	1.10	0.00	1.0	0.0000
1 in 2	1.20	0.00	1.0	0.0000
1 in 30	3.30	0.00	1.0	0.0000
1 in 30 + CC	N/A	N/A	1.0	0.0000
1 in 100	4.70	0.10	1.0	0.0000
1 in 100 + CC	N/A	N/A	1.0	0.0000

Proposed Sustainable Drainage System

5.1 The following sustainable drainage systems have been used for this site. The drainage design uses these drainage system through out the site. See table 7 for details.

Table 7: Evaluation of SuDS and Proposed Drainage System

<i>Most Sustainable</i>	SuDS Technique	Feasible	Proposed	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living Roofs					
	Green Roof	Yes	Yes	×	×	×
	Green Blue Roof	Yes	No	×	×	×
	Basins and Ponds			×	×	×
	Rainwater Gardens	Yes	No	×	×	×
	Rainwater Planters	Yes	Yes	×	×	×
	Constructed Wetlands	No	No	×	×	×
	Balancing Pond	No	No	×	×	×
	Detention Basins	Yes	Yes	×	×	×
	Retention Ponds	No	No	×	×	×
	Filters and Swales					
	Filter Strips	No	No	×	×	×
	Swales	No	No	×	×	×
	Infiltration Devices					
	Soakaways Crates	No	No	×	×	×
	Deep Boreholes	No	No	×	×	×
	Infiltration Trenches	No	No	×	×	×
	Infiltration Basin	No	No	×	×	×
	Permeable Surfaces			×	×	
	Permeable Surfaces	Yes	Yes	×	×	
	Filter Drains	No	No	×	×	
	Tanked System					
	Storage Crates	Yes	No	×		
	Oversized Tanks	No	No	×		
	Oversized Pipes	No	No	×		
	Blue Roof	Yes	No	×		
	Water Harvesting	Yes	Yes	×		
<i>Least Sustainable</i>						

- 5.2 The location and details of the SuDS can be seen drainage layouts in appendix D. Calculations are in appendix C.
- 5.3 The drainage calculations demonstrate:
 - No flooding occurs for the 1 in 30 storm events.
 - Any flooding for the 1 in 100 year + 40% climate change event can be safely contained on site
- 5.4 The proposed drainage strategy presents one possible solution to demonstrate that the development can be sustainably drained, to comply with the requirements of the NPPF. Other solutions may be feasible and may prove to be better suited to the site. These will become apparent during the detailed design stage. The strategy above should not therefore be interpreted as the definitive scheme solution.

Management of Exceedance Flows

- 5.5 The drainage network has been designed to attenuate surface runoff for all events up to and including the 1% AEP + CC(1 in 100 years). However consideration has been given to what may happen when the design capacity of the surface water drainage network is exceeded. Surface water will flow to the lowest points within the site. The flood risk to the buildings would therefore remain low. See appendix D.

Water Quality Assessment

- 5.6 The pollution hazard indices for this development has been taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2. The tables below shows the mitigation measure for the highest pollution hazard indices presented in the development.

Table 8: Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
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
0				
0				
TOTAL		0.7	0.6	0.45

Table 9: SuDS Mitigation Indices for worst case**

Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable paving	0.7	0.6	0.7
Pond	0.35	0.35	0.25
0			
0			
TOTAL	1.05	0.95	0.95

** Values already reduced as per CIRIA C753

- 5.7 It is demonstrated that the proposed sustainable systems exceeds the required pollution indices and provides sufficient treatment as part of the surface water management train in accordance with the 2015 SuDS Manual (CIRIA C753)

Maintenance and Management plan responsibility

- 6.1 The SuDS will be maintained by The Owner the property

Maintenance and Management plan for proposed SuDS

- 6.2 The maintenance and Management Plan Guidance from the SuDS Manual, CIRIA C753 (CIRIA, 2015) is to be followed for the effective maintenance of the proposed SuDS techniques outlined above. The maintenance for SuDS structures are as follow:

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular Maintenance	Frequency
Inlets, outlets and surface control structures	
Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris	Monthly
Inspection chambers and below ground control chambers	
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional Maintenance	
Check topsoil levels are 20mm above edges of baskets and chambers to avoid mower damage	As necessary
Remedial work	Frequency
Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.	As required
Repair physical damage if necessary.	As required

Operation and maintenance requirements for pervious pavements		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	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 manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	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
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm 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)
Monitoring	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, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Operation and maintenance requirements for RWH systems		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Operation and maintenance requirements for green roofs		
Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (ie year one), replace dead plants as required	Monthly (but usually responsibility of manufacturer)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Operation and maintenance requirements for ponds and wetlands		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

Appendix A

Drawing Scale Bar			
Drawing scale	Line length	Drawing scale	Line length
1:5	= 0.25 metres	1:200	= 10.0 metres
1:10	= 0.5 metres	1:250	= 12.5 metres
1:20	= 1.0 metres	1:500	= 25.0 metres
1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres
Measure length of line above for checking of scale			

GENERAL NOTES

KEY

- PERMEABLE AREAS
- IMPERMEABLE AREAS
- STUDY AREA

Rev	Details	Date	By	Chd

Drawing Status:
PRELIMINARY



4 Bean Acre Road, Hook Norton, Banbury, Oxfordshire
e: info@rida-reports.co.uk
t: 01608 510 121
www.rida-reports.co.uk

Client:

Project:
Bedford Road, South of Pinchgut Hall, SG5 3RS

Drawing:
**Existing and Proposed Areas
Permeable and Impermeable**

Print: Size:	Project No:	Drawing No:	Revision:
A1	0895	002	P1



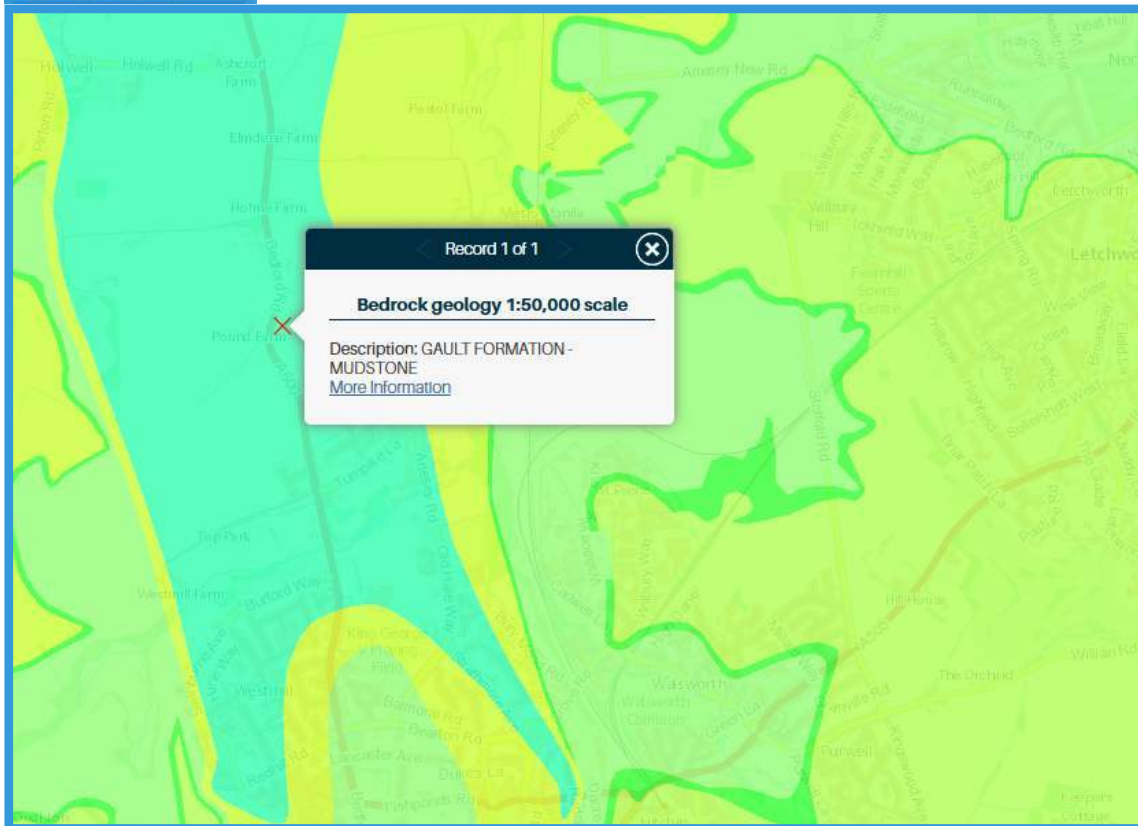
EXISTING SITE
1:200

PROPOSED SITE
1:200

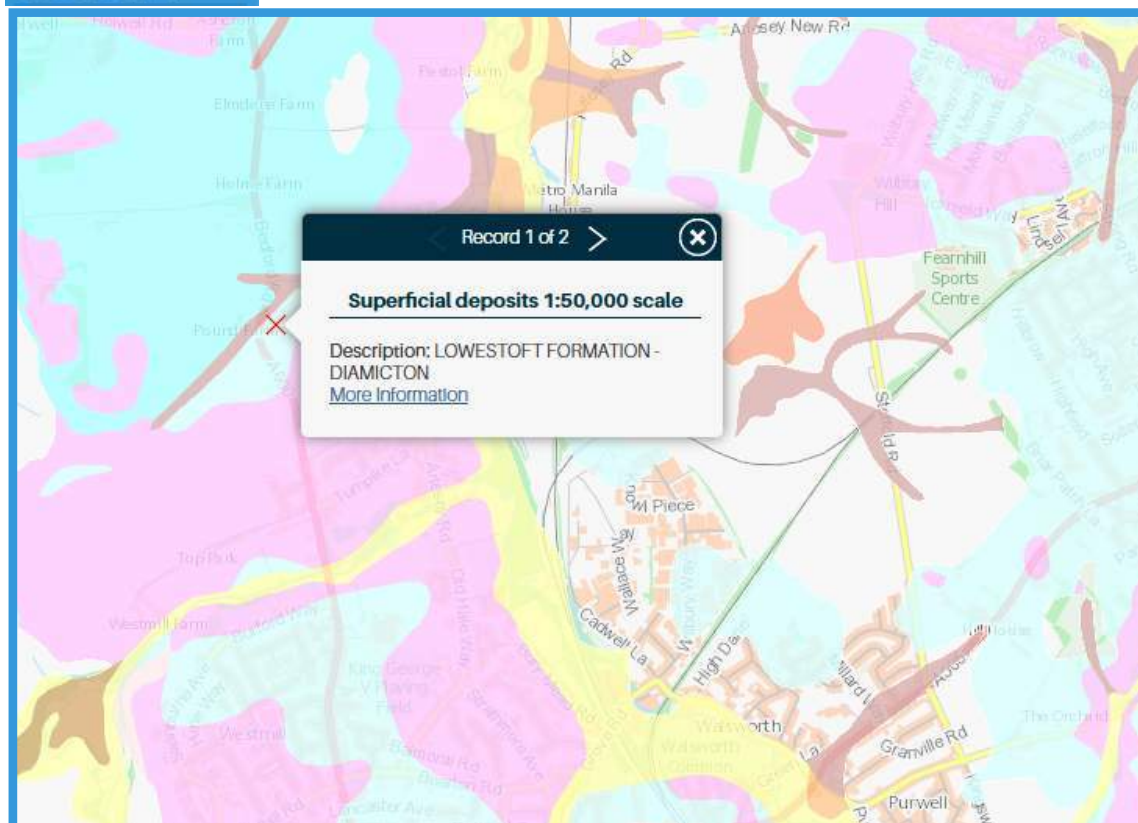
Appendix B



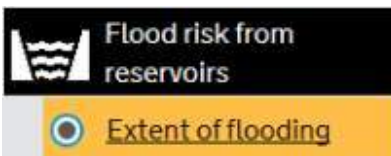
GEOLOGY - BEDROCK - Gault Formation - Mudstone



GEOLOGY - SUPERFICIAL DEPOSITS Lowestoft Formation - Diamicton



Main River Map



- When river levels are normal
- When there is also flooding from rivers

SITE SURFACE WATER FLOOD RISK

High risk means a chance of flooding greater than 3.3% (1:30)

Medium risk means a chance of flooding of btw 1% (1:100) and 3.3%

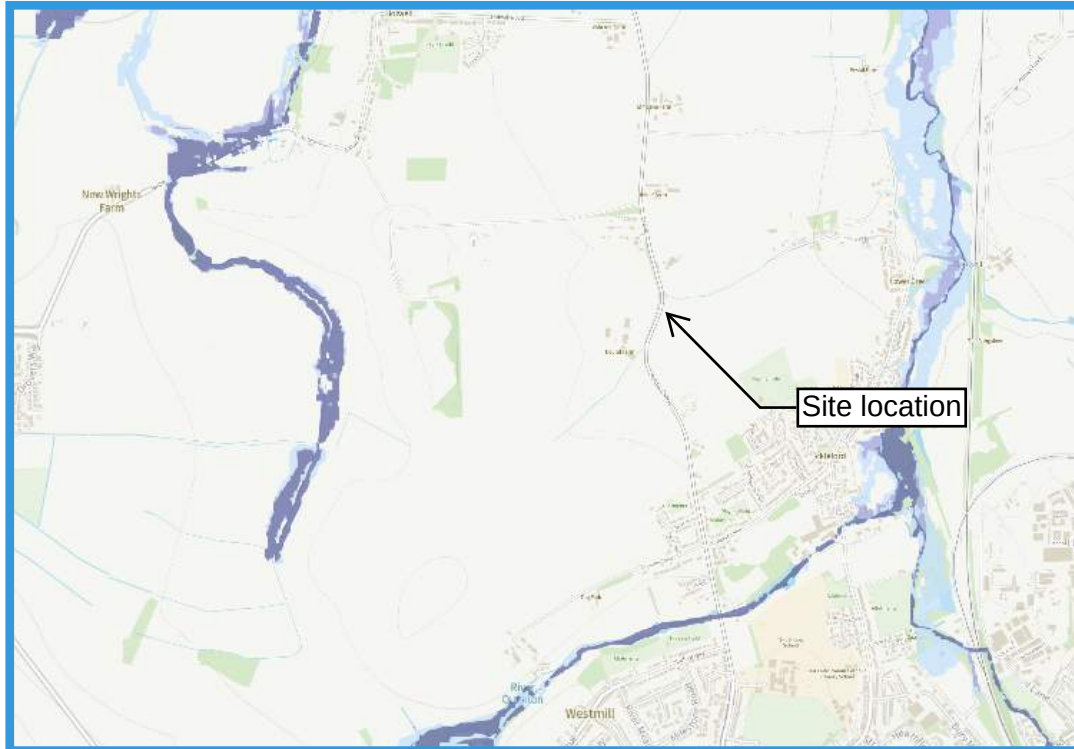
Low risk means a chance of flooding of btw 0.1% (1:1000) and 1%

Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding



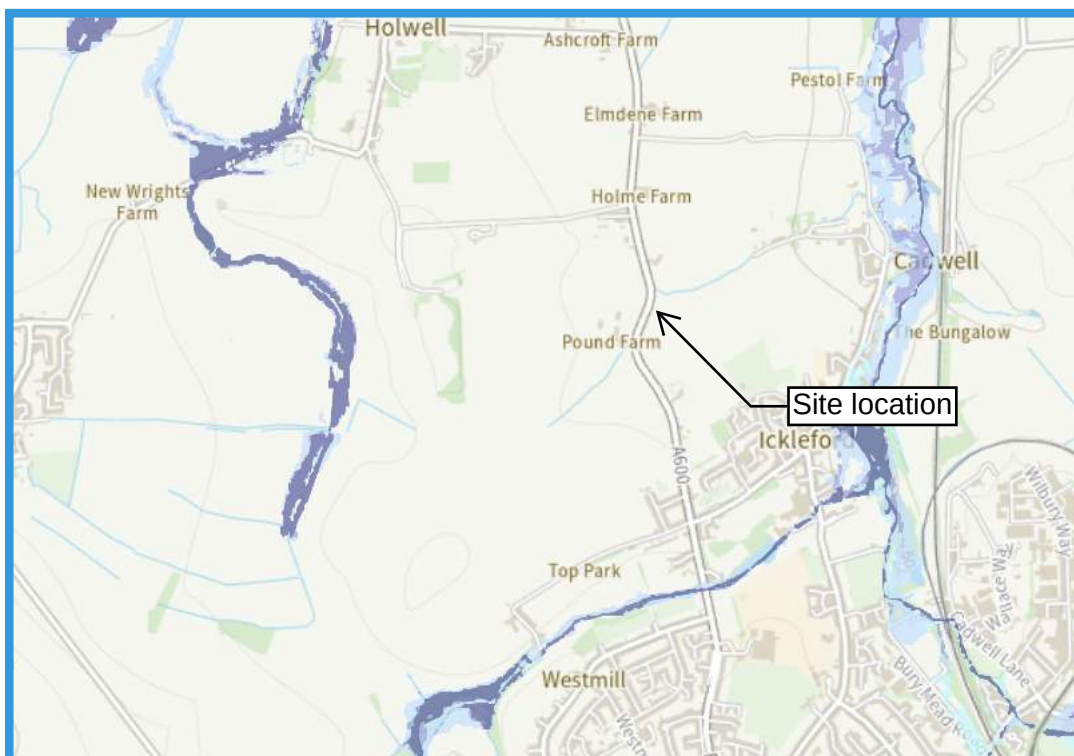
RIVER AND SEA FLOOD RISK MAP

- High - greater than or equal to 1 in 30 (3.3%) chance of flooding in any year
- Medium - Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance of flooding in any given year
- Low - Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year
- Very low - less than 1 in 1000 (0.1%) chance of flooding in any given year



Yearly chance of flooding

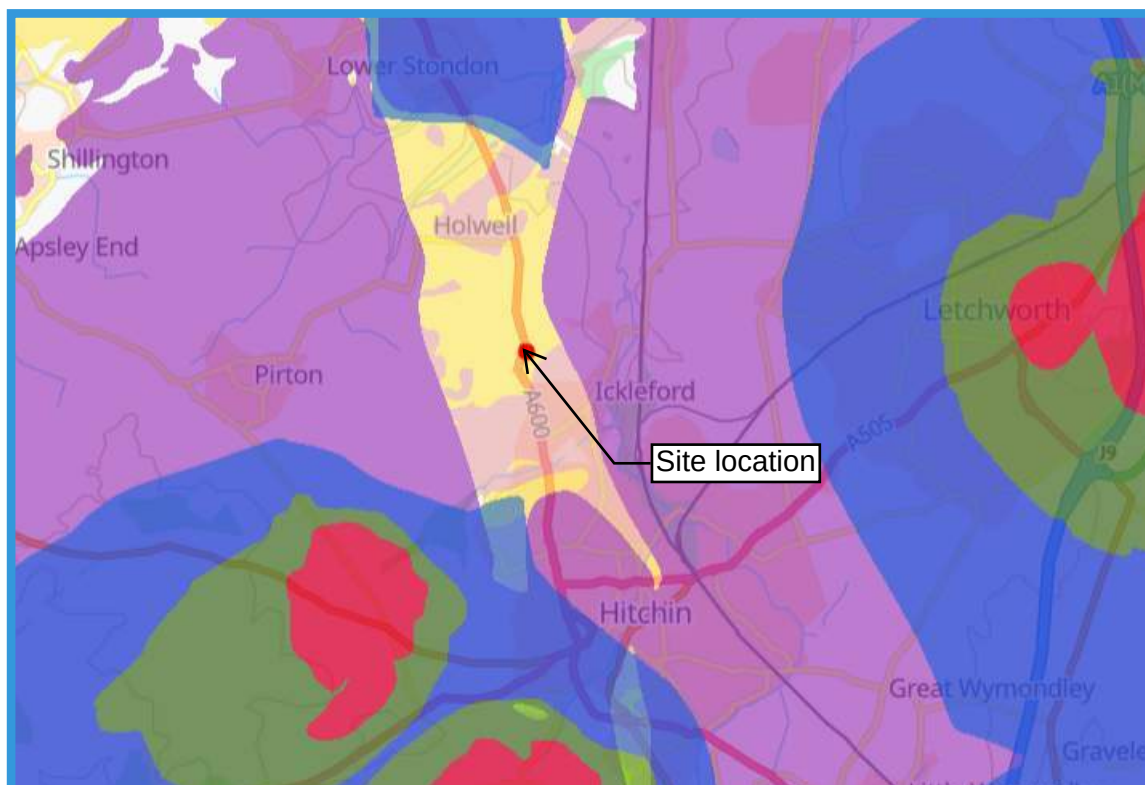
- Flood area (extent)
- High chance
- Medium chance
- Low chance
- Very low chance



Yearly chance of flooding between 2036 and 2069

- Flood area (extent)
- High chance
- Medium chance
- Low chance
- Very low chance
- No data available

MAGIC RESULTS



Site Check Results

Site Check Report generated on Mon Aug 11 2025

The following features have been found in your search area:

You selected the location: Centroid Grid Ref: TL17623216

Aquifer Designation Map (Superficial Drift) (England)

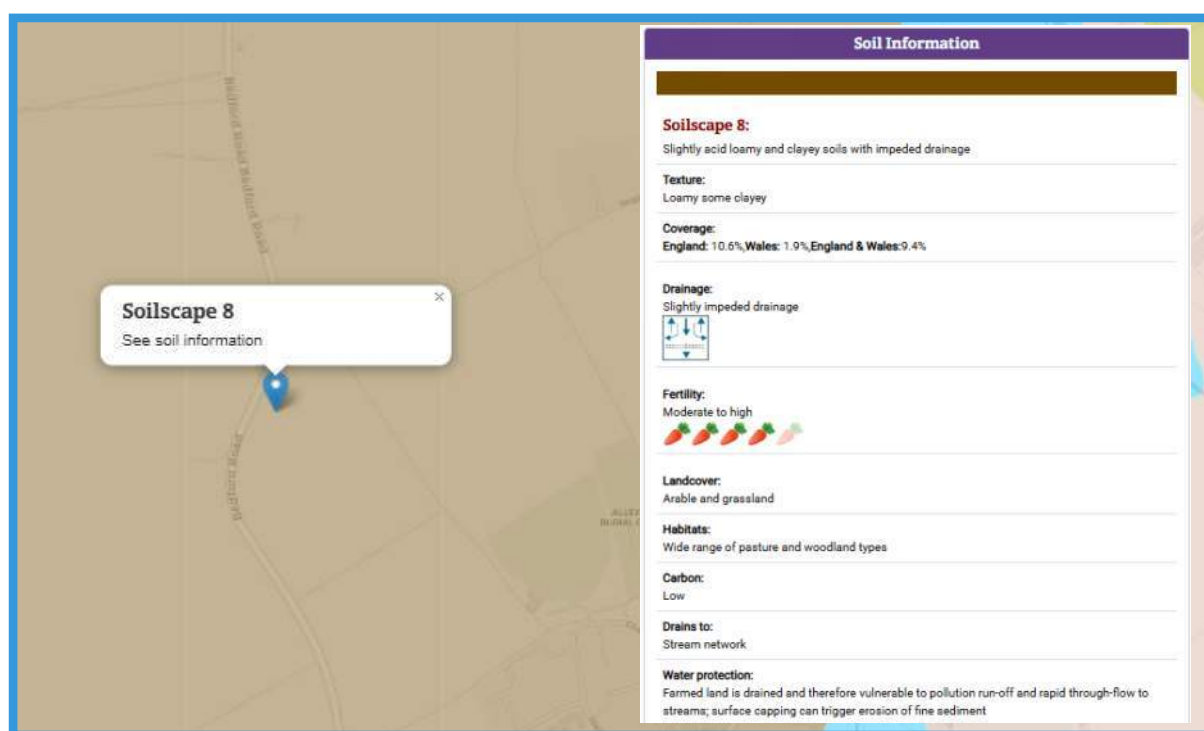
TPOLOGY Secondary (undifferentiated)

Aquifer Designation Map (Bedrock) (England)

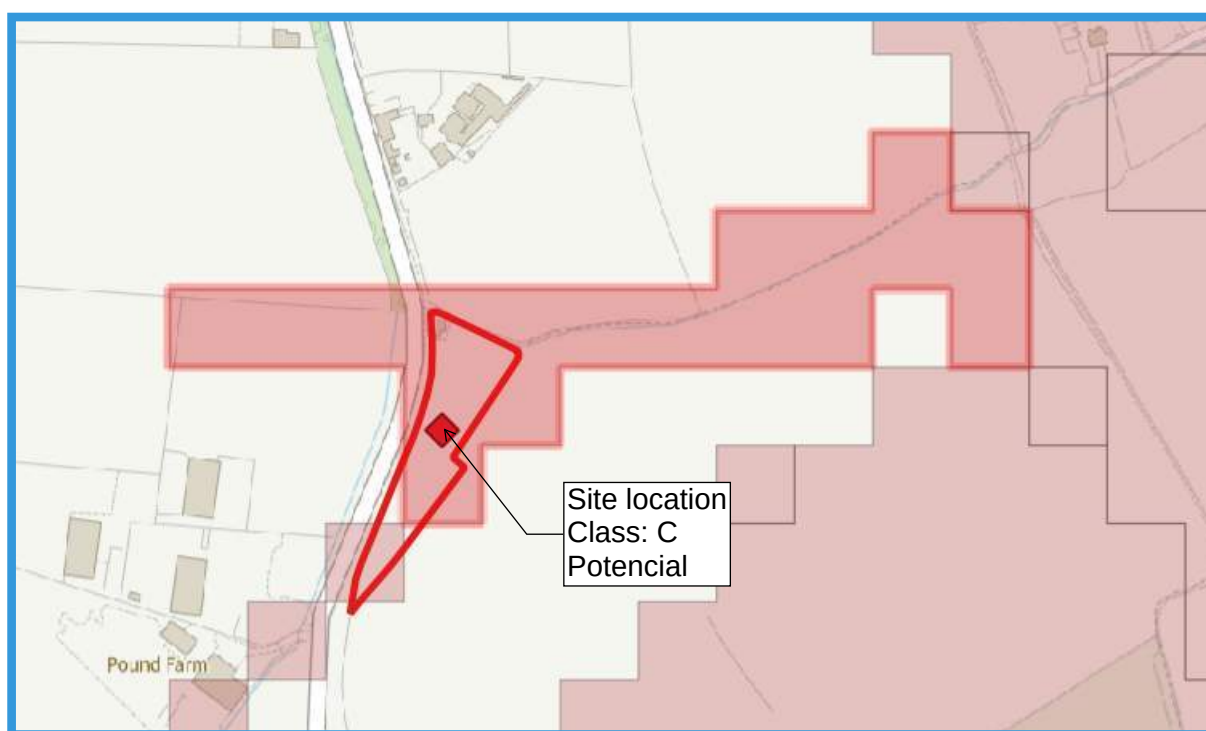
TPOLOGY Unproductive

Source Protection Zones merged (England)

No Features found



GROUND WATER FLOOD RISK



Flood map for planning

Your reference
Unspecified

Location (easting/northing)
517620/232154

Created
12 August 2025 02:10

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



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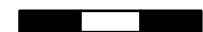
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)ORRG GHIHQFH

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Site Check Report generated on Mon Aug 11 2025

The following features have been found in your search area:

You selected the location: Centroid Grid Ref: TL17623216

Soilscape (England)

ID

8

SOIL_COND

SLIGHTLY ACID LOAMY AND CLAYEY SOILS WITH IMPEDED DRAINAGE

MAIN_SURFA

LOAMY

NAT_DRAIN

SLIGHTLY IMPEDED DRAINAGE

NAT_FERT

MODERATE TO HIGH

SEM_NAT_HA

WIDE RANGE OF PASTURE AND GENERALLY BROADLEAVED AND MIXED WOODLAND TYPES

M_LANDCOV

ARABLE AND GRASSLAND

HYPERLINK

/Metadata_for_magic/soilscape_summary.pdf

Aquifer Designation Map (Superficial Drift) (England)

TPOLOGY

Secondary (undifferentiated)

Aquifer Designation Map (Bedrock) (England)

TPOLOGY

Unproductive

Source Protection Zones merged (England)

No Features found

Biosphere Reserves (England)

No Features found

Biosphere Reserves (England) - points

No Features found

Potential Special Protection Areas (England)

No Features found

Potential Special Protection Areas (England) - points

No Features found

Special Protection Areas (England)

No Features found

Special Protection Areas (England) - points

No Features found

Possible Special Areas of Conservation (England)

No Features found

Possible Special Areas of Conservation (England) - points

No Features found

Special Areas of Conservation (England)

No Features found

Special Areas of Conservation (England) - points

No Features found

SSSI Impact Risk Zones - for LPAs to determine likely impacts on terrestrial SSSIs and when to consult Natural England

No Features found

Sites of Special Scientific Interest (England)

No Features found

Sites of Special Scientific Interest (England) - points

No Features found
Sites of Special Scientific Interest Units (England)
No Features found
Sites of Special Scientific Interest Units (England) - points
No Features found
Proposed Ramsar Sites (England)
No Features found
Proposed Ramsar Sites (England) - points
No Features found
Ramsar Sites (England)
No Features found
Ramsar Sites (England) - points
No Features found
National Parks (England)
No Features found
National Nature Reserves (England)
No Features found
National Nature Reserves (England) - points
No Features found
Moorland Line (England)
No Features found
Local Nature Reserves (England)
No Features found
Local Nature Reserves (England) - points
No Features found
Limestone Pavement Orders (England)
No Features found
Areas of Outstanding Natural Beauty (England)
No Features found

Appendix C

**Design Settings**

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
Rainfall Events	Singular	Additional Storage (m³/ha)	0.0
FSR Region	England and Wales	Starting Level (m)	
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	1.1
Summer CV	1.000	2 year (l/s)	1.2
Winter CV	1.000	30 year (l/s)	3.3
Analysis Speed	Normal	100 year (l/s)	4.7
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.55
Greenfield Method	IH124	Growth Factor 100 year	3.56
Positively Drained Area (ha)	0.569	Betterment (%)	0
SAAR (mm)	580	QBar	1.3
Soil Index	3	Q 1 year (l/s)	1.1
SPR	0.37	Q 2 year (l/s)	1.2
Region	5	Q 30 year (l/s)	3.3
Growth Factor 1 year	0.87	Q 100 year (l/s)	4.7
Growth Factor 2 year	0.89		

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
Rainfall Events	Singular	Additional Storage (m³/ha)	0.0
FSR Region	England and Wales	Starting Level (m)	
M5-60 (mm)	20.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	0.0
Summer CV	1.000	2 year (l/s)	0.0
Winter CV	1.000	30 year (l/s)	0.0
Analysis Speed	Normal	100 year (l/s)	0.1
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Growth Factor 2 year	0.89
Brownfield Method	Greenfield	Growth Factor 30 year	2.55
Greenfield Method	IH124	Growth Factor 100 year	3.56
Positively Drained Area (ha)	0.007	Betterment (%)	0
SAAR (mm)	580	QBar	0.0
Soil Index	5	Q 1 year (l/s)	0.0
SPR	0.37	Q 2 year (l/s)	0.0
Region	5	Q 30 year (l/s)	0.0
Growth Factor 1 year	0.87	Q 100 year (l/s)	0.1

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Inverts
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	6.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.038	6.00	54.000	450	-13.248	56.111	0.600
Attenuation basin			54.000		55.403	55.260	0.700
3			54.000		121.928	54.835	0.800

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	Attenuation basin	10.000	0.012	53.400	53.300	0.100	100.0	225	6.14	50.0
1.001	Attenuation basin	3	10.000	0.012	53.300	53.200	0.100	100.0	150	6.31	50.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Node Attenuation basin Online Orifice Control

Flap Valve	x	Invert Level (m)	53.300	Diameter (m)	0.036
Downstream Link	1.001	Design Depth (m)	0.150	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	1.0		



Node Attenuation basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.300
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	152

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	80.0	0.0	0.300	80.0	0.0	0.310	0.0	0.0

Approval Settings

Node Size	x	Coordinates	x	Full Bore Velocity	x	Time to Half Empty	✓
Node Losses	x	Crossings	x	Proportional Velocity	x	Return Period (years)	10
Link Size	x	Cover Depth	x	Surcharged Depth	x	Discharge Rates	x
Link Length	x	Backdrops	x	Flooding	x	Discharge Volume	x

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.459	0.059	6.0	0.0093	0.0000	OK
240 minute summer	Attenuation basin	160	53.356	0.056	1.9	4.4858	0.0000	OK
240 minute summer	3	160	53.218	0.018	0.5	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	6.0	1.477	0.124	0.0488	
240 minute summer	Attenuation basin	1.001	3	0.5	0.424	0.032	0.0124	6.3

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.465	0.065	7.7	0.0104	0.0000	OK
180 minute summer	Attenuation basin	124	53.369	0.069	2.8	5.5035	0.0000	OK
180 minute summer	3	124	53.220	0.020	0.6	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	7.7	1.558	0.159	0.0602	
180 minute summer	Attenuation basin	1.001	3	0.6	0.442	0.036	0.0136	7.1

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.488	0.088	14.6	0.0140	0.0000	OK
180 minute summer	Attenuation basin	132	53.431	0.131	5.2	10.5026	0.0000	OK
180 minute summer	3	132	53.224	0.024	0.9	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	14.6	1.759	0.301	0.1077	
180 minute summer	Attenuation basin	1.001	3	0.9	0.497	0.054	0.0179	13.2

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.502	0.102	19.7	0.0163	0.0000	OK
240 minute summer	Attenuation basin	168	53.480	0.180	5.9	14.3984	0.0000	SURCHARGED
240 minute summer	3	168	53.226	0.026	1.1	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	19.7	1.860	0.405	0.1478	
240 minute summer	Attenuation basin	1.001	3	1.1	0.524	0.064	0.0203	19.1

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	53.500	0.100	18.9	0.0159	0.0000	OK
180 minute summer	Attenuation basin	140	53.474	0.174	6.8	13.9287	0.0000	SURCHARGED
180 minute summer	3	140	53.226	0.026	1.0	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	18.9	1.850	0.389	0.1414	
180 minute summer	Attenuation basin	1.001	3	1.0	0.521	0.063	0.0200	16.9

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	1	144	53.549	0.149	9.5	0.0237	0.0000	OK
180 minute summer	Attenuation basin	144	53.549	0.249	9.5	19.9421	0.0000	SURCHARGED
180 minute summer	3	144	53.228	0.028	1.3	0.0000	0.0000	OK

Link Event (Outflow)	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	Attenuation basin	26.5	1.950	0.544	0.2030	
180 minute summer	Attenuation basin	1.001	3	1.3	0.553	0.077	0.0230	21.9

Appendix D

Drawing Scale Bar			
Drawing scale	Line length	Drawing scale	Line length
1:5 = 0.25 metres	1:200 = 10.0 metres	1:250 = 12.5 metres	
1:10 = 0.5 metres	1:250 = 12.5 metres	1:500 = 25.0 metres	
1:20 = 1.0 metres	1:500 = 25.0 metres	1:1000 = 50.0 metres	
1:25 = 1.25 metres	1:1000 = 50.0 metres	1:1250 = 62.5 metres	
1:50 = 2.5 metres	1:1250 = 62.5 metres	1:2500 = 125 metres	
1:100 = 5.0 metres	1:2500 = 125 metres		
Measure length of line above for checking of scale			

GENERAL NOTES

1. All dimensions are in millimetres and levels in m AOD unless stated otherwise.
2. Do not scale. If in any doubt, consult Engineer.
3. Read in conjunction with the architects and engineers schedule drawings.
4. Check inverts and sizes of existing pipes prior to the commencement of any work. Report any discrepancies to the engineer and await instructions.
5. The location of services is shown as indicative. This drawing should be read in conjunction with the utilities drawings. No warranty to their accuracy can be given. The contractor shall take all necessary measures to satisfy himself as to the location of the existing services and connection points. Excavation should be undertaken in compliance with HSG47.

KEY

- Proposed Surface Water Sewer Pipe
- Exceedance Flows
- Linear Drainage Channel
- Silt Trap (S) / Rodding Eye (RE)
- Existing Ditch / Watercourse
- Proposed areas of flat green roof
- Proposed permeable paving surface, subject to Architect recommendation

Rev	Details	Date	By	Chd
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Drawing Status: **PRELIMINARY**



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e: info@rida-reports.co.uk
t: 01608 510 121
www.rida-reports.co.uk

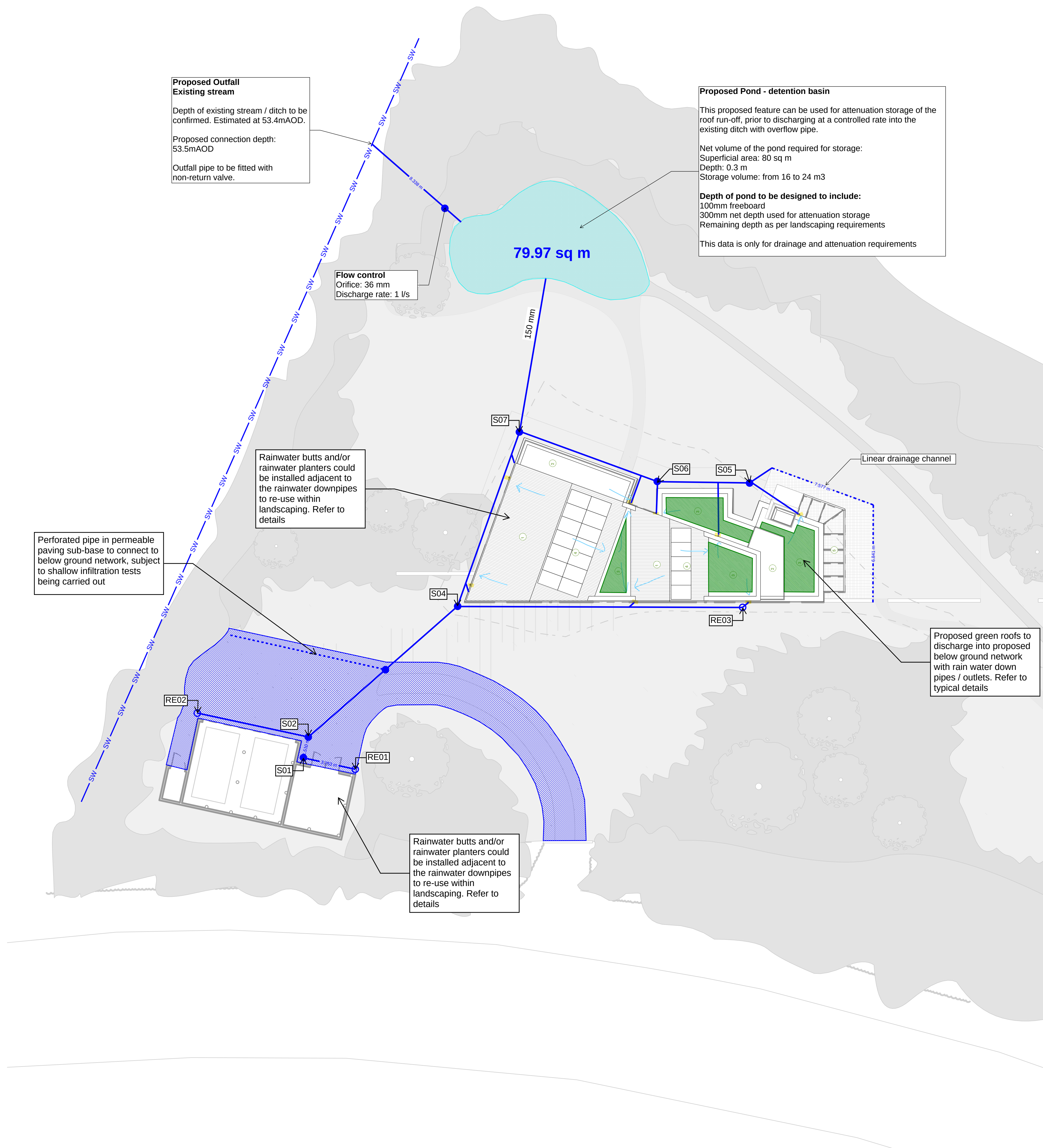
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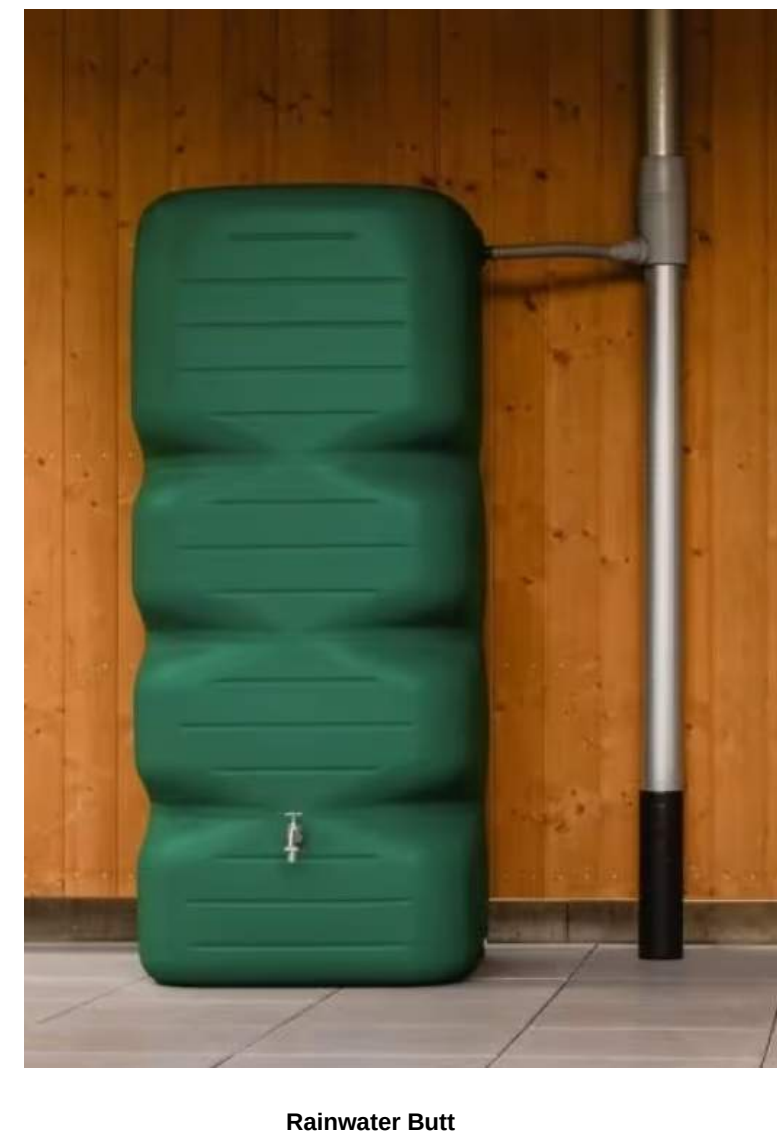
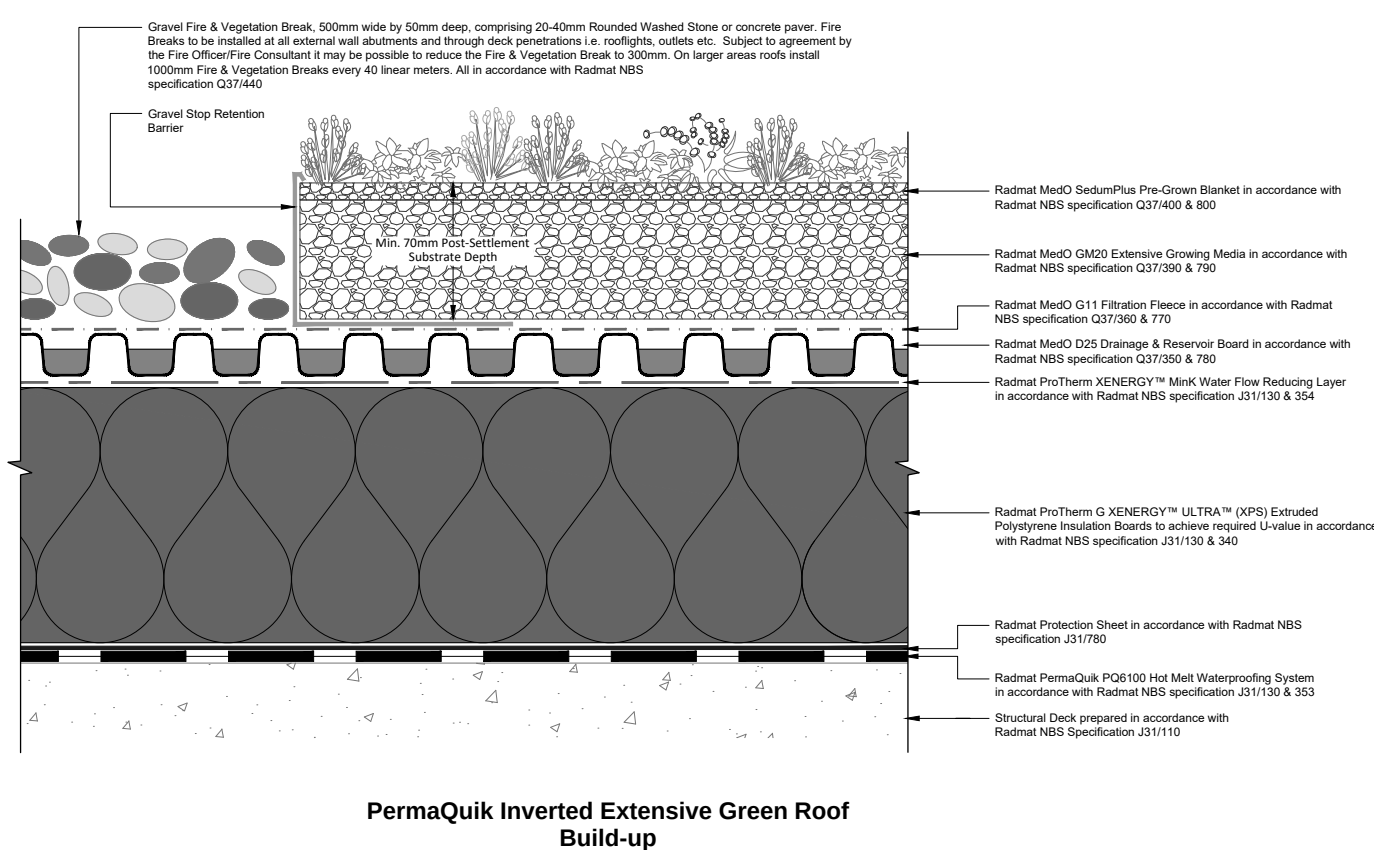
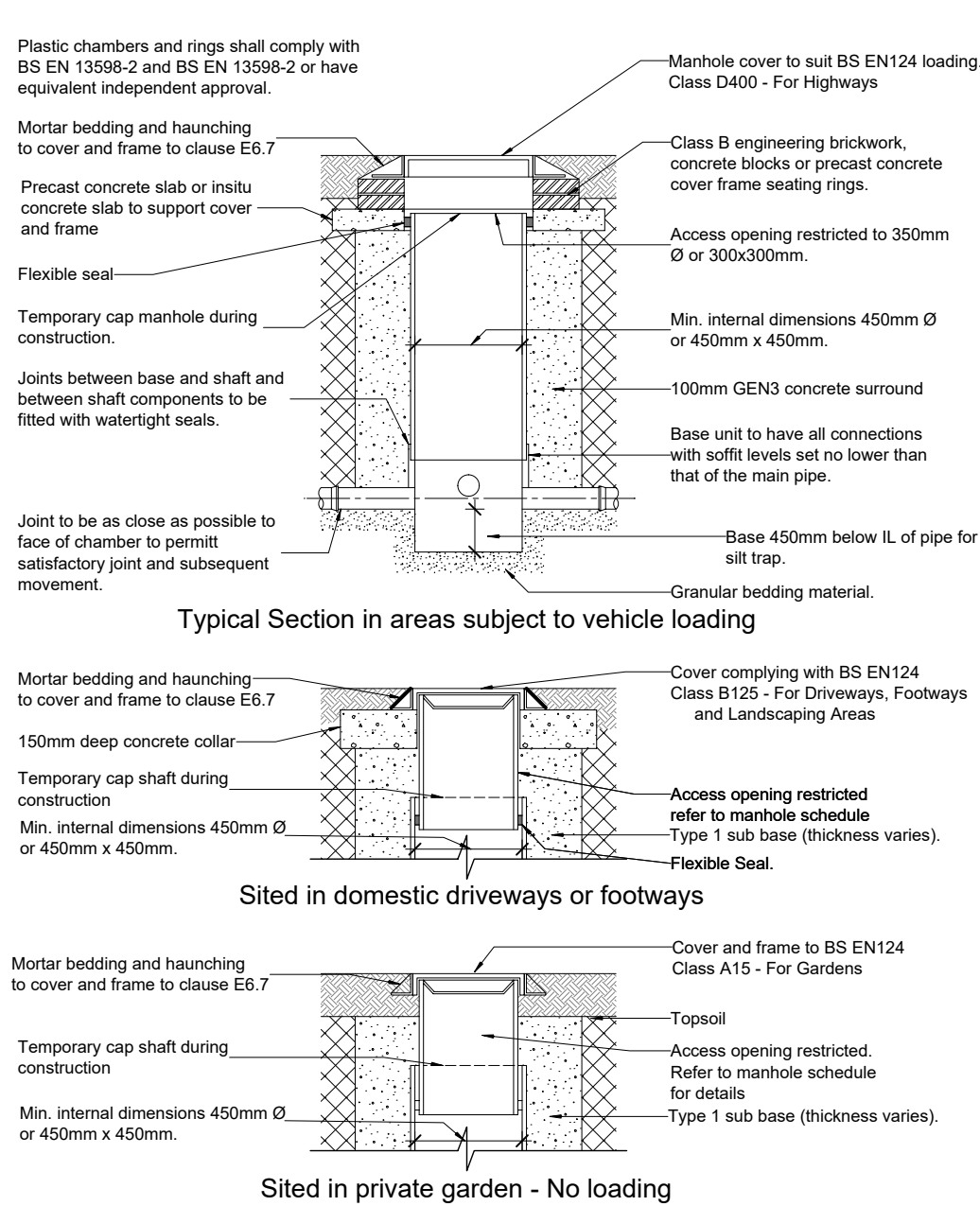
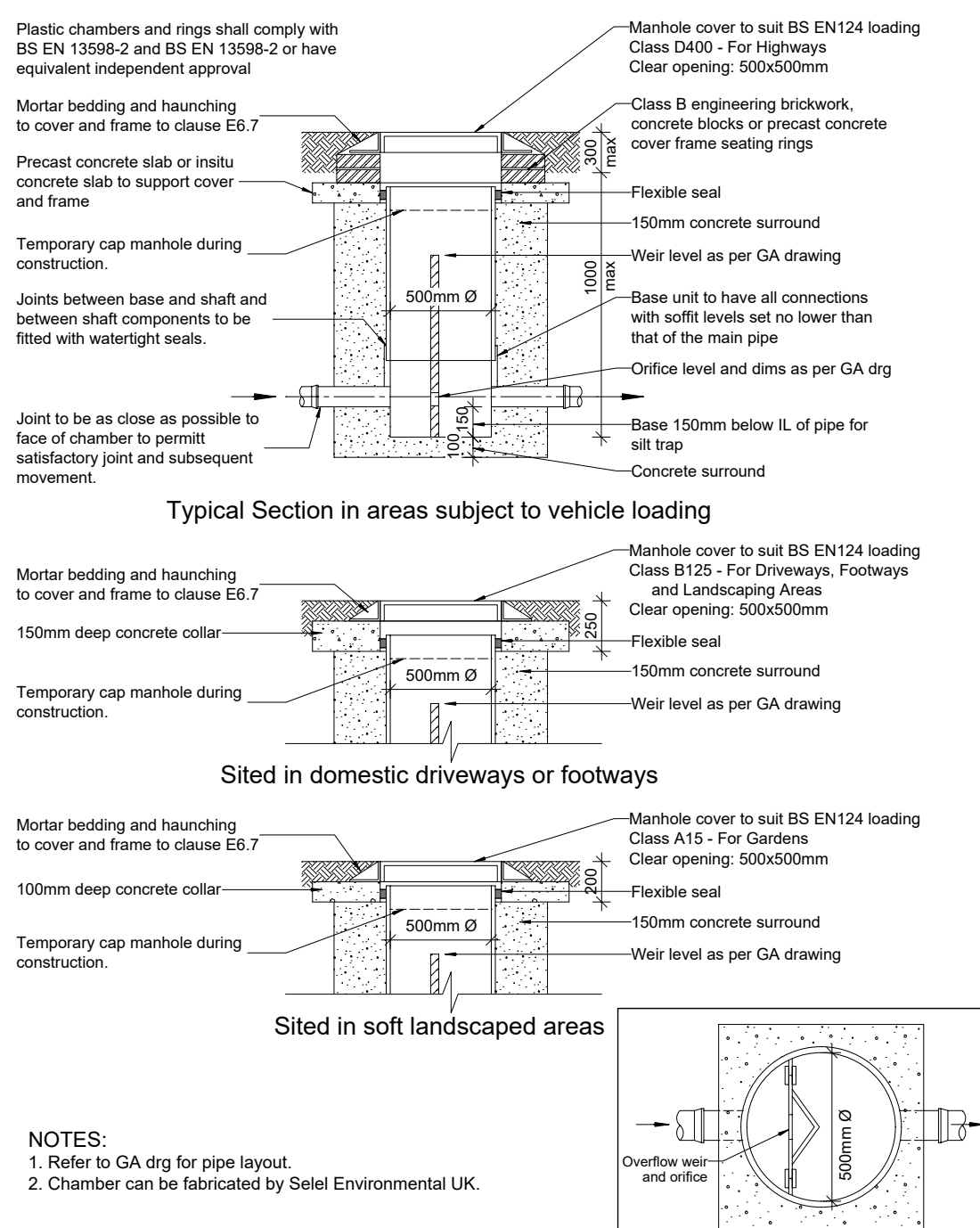
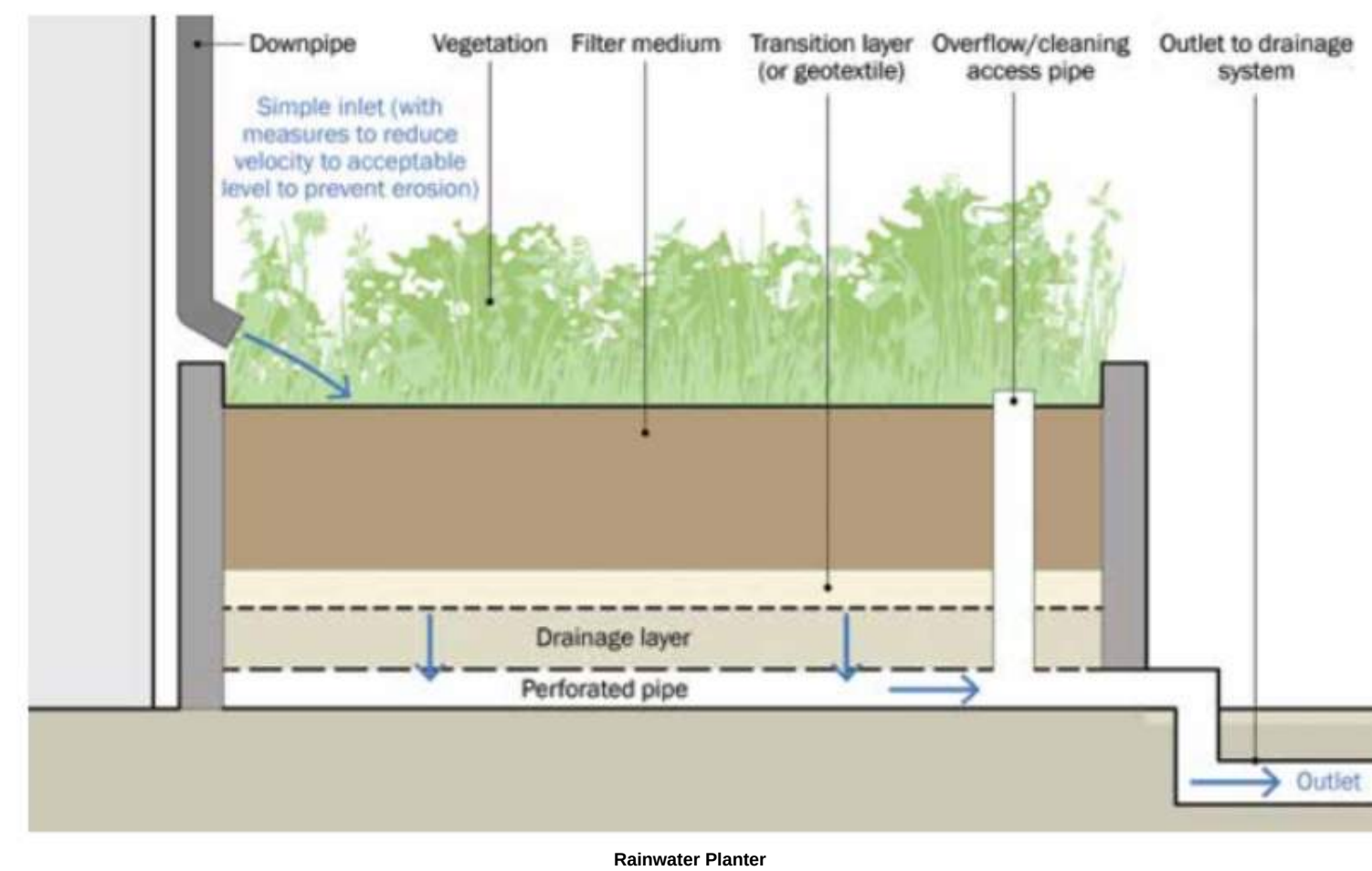
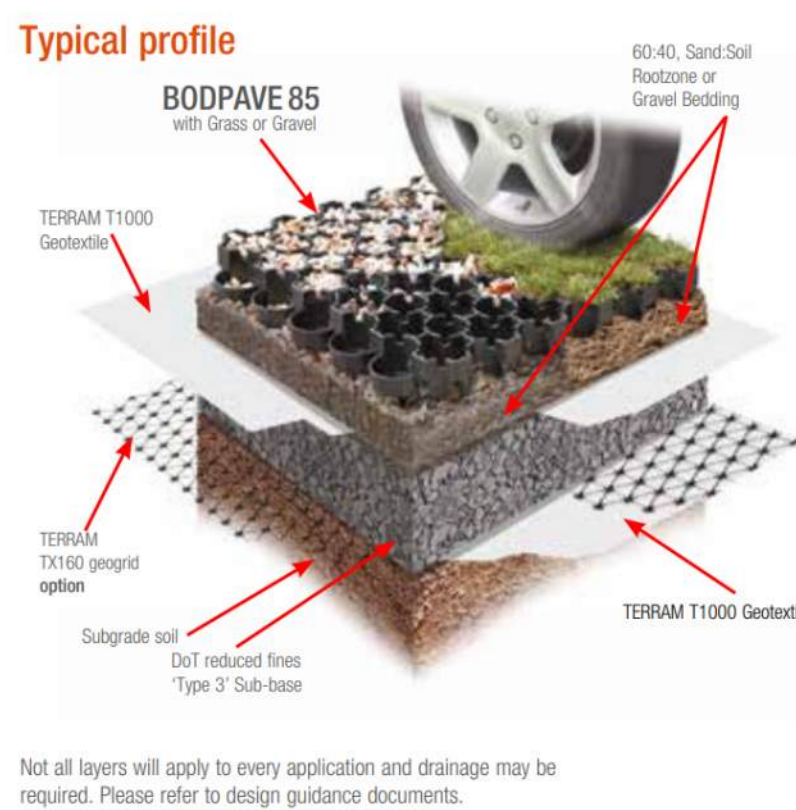
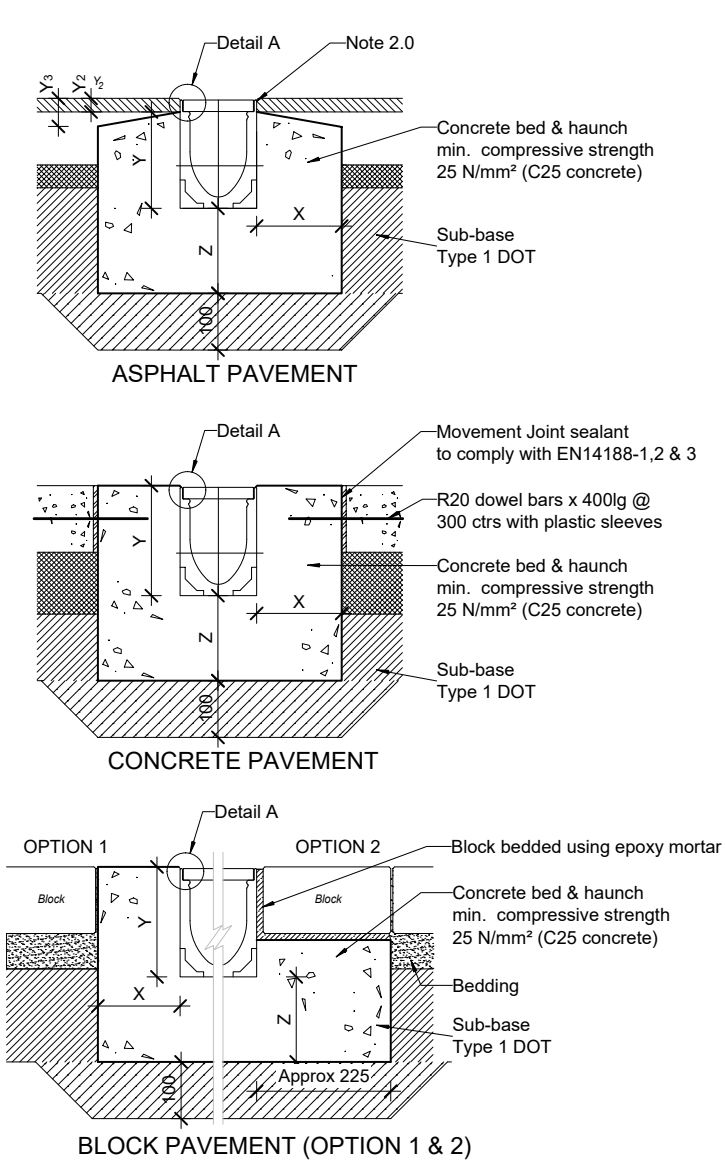
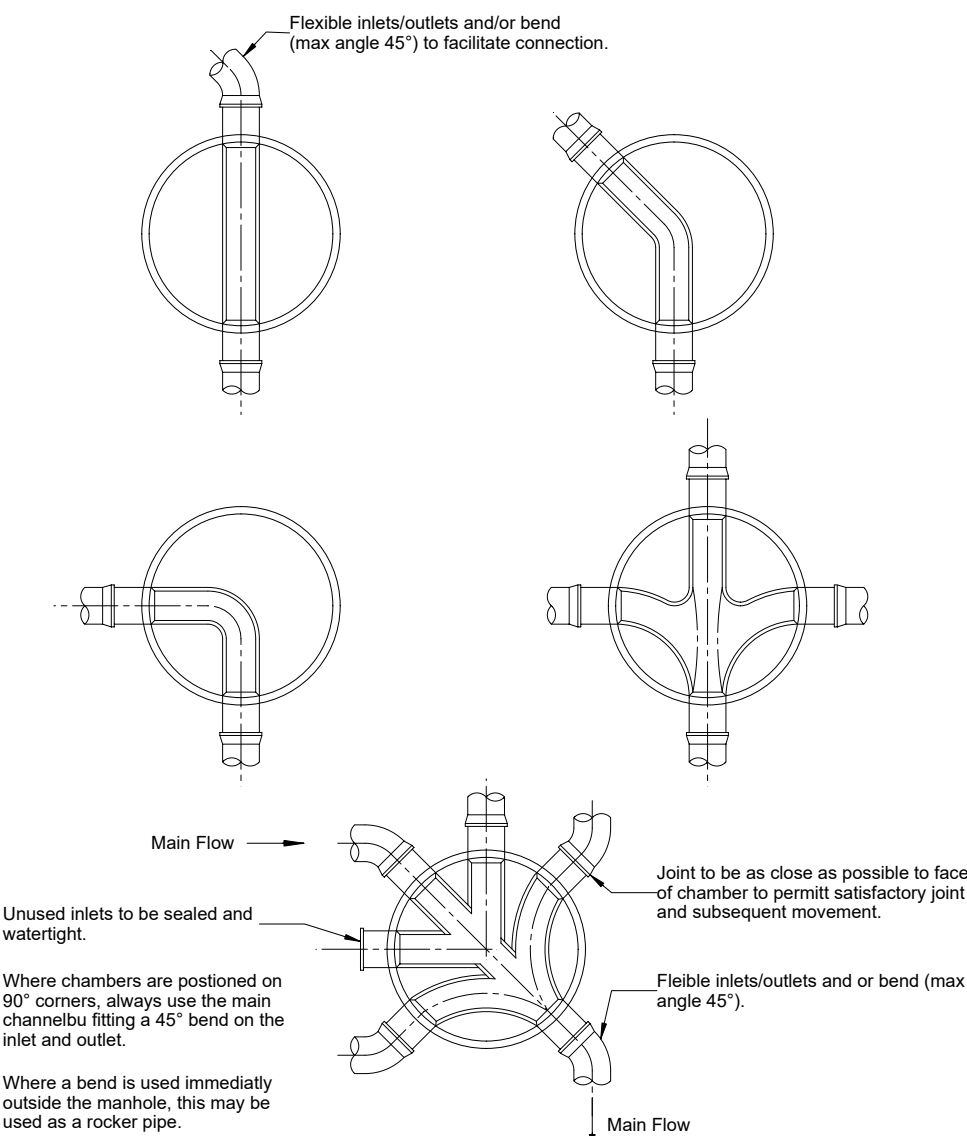
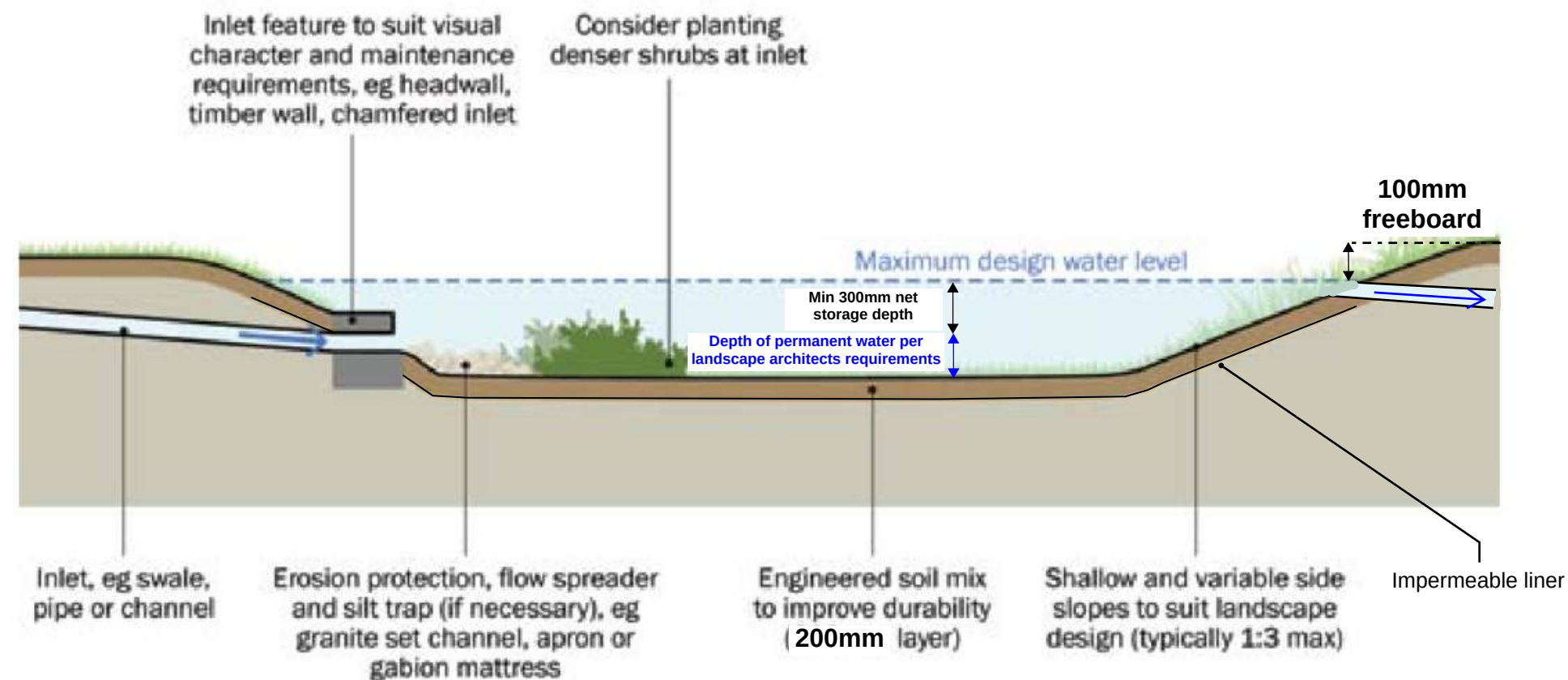
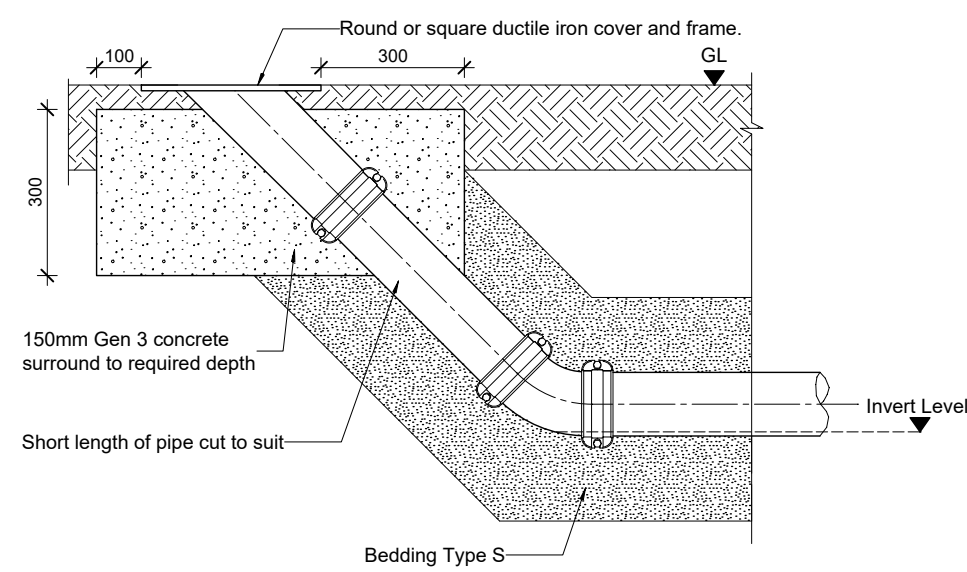
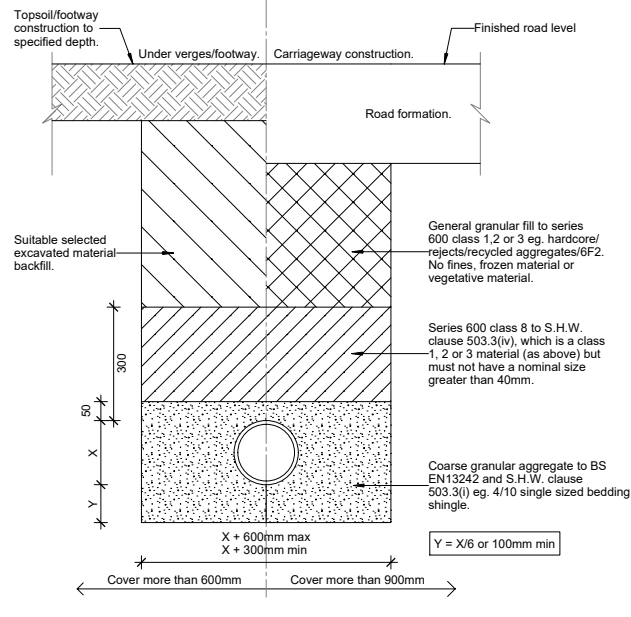
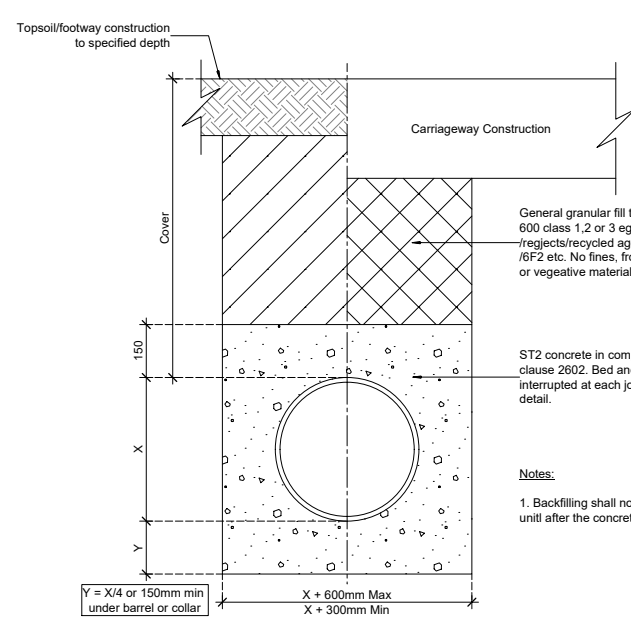
Project:

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Drawing:
Proposed Drainage Strategy

Print Size:	Scale:	Project No:	Drawing No:	Revision:
A1	1:150	0895	003	P1





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Drawing Scale Bar			
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1:25	= 1.25 metres	1:1000	= 50.0 metres
1:50	= 2.5 metres	1:1250	= 62.5 metres
1:100	= 5.0 metres	1:2500	= 125 metres

Measure length of line above for checking of scale

GENERAL NOTES

Rev	Details	Date	By	Chd
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