

PROPOSED NEW ANNEX TO TIR Y CAPEL CARE HOME, SECOND AVEUE LLAY, LL12 0TJ

DRAINAGE STRATEGY (Rev P1)

1.0 INTRODUCTION

1.1 Background

- 1.1.1 A full planning application is being submitted for approval to construct an annex building to the Tir y Capel Care Home, Second Avenue, Llay, LL12 0TJ (grid reference 333223E 355696N). The proposed building will contain 4 self-contained flats. Caulmert has been appointed to prepare a drainage strategy for surface water and foul drainage from the development, and this report sets out the approach that will be taken.
- 1.1.2 The site is predominantly 'brownfield', located on the land to the south west of Tir y Capel currently used for car parking & to access the rear of properties on Sixth Avenue and Oak Tree Avenue.
- 1.1.3 It has an area of approximately 650m² (0.065Ha), made up of approximately 280m² of grassland and 370m² of tarmac surfaced car park.
- 1.1.4 The plan below shows the location of the site and the key drainage features.

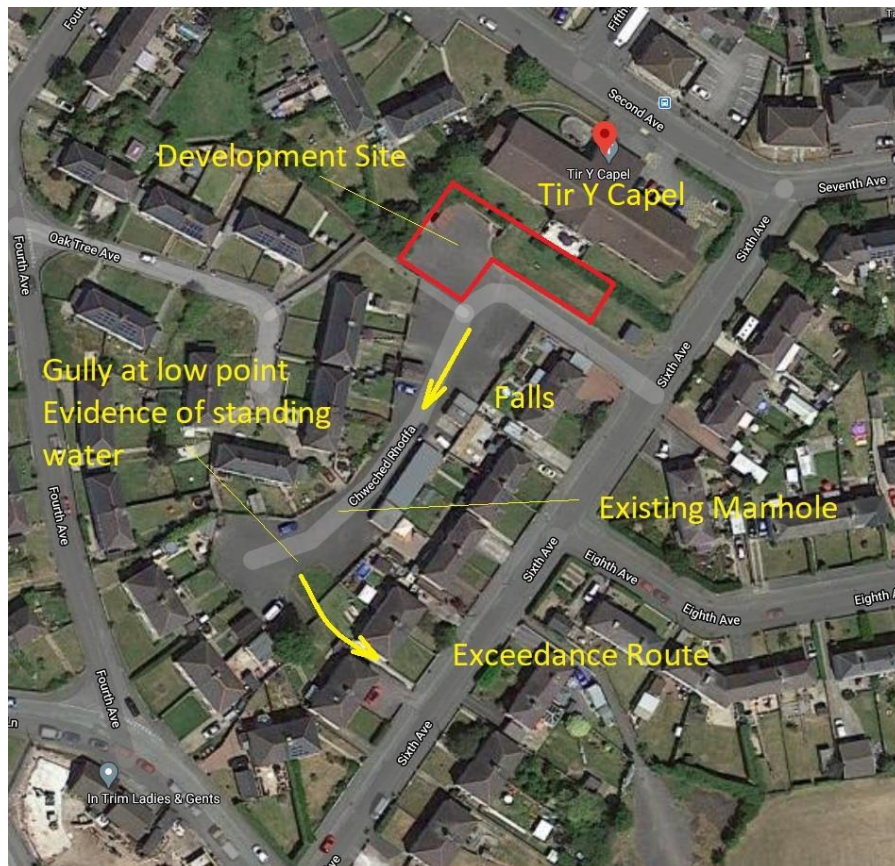


Figure 1: Site Location Plan

1.2 Existing Site Features

- 1.2.1 A topographical survey has been undertaken and a copy is enclosed in Appendix 1.
- 1.2.2 There are separate foul and surface sewers in the vicinity of the site, the location of these are shown on the record drawing provided by Dwr Cymru Welsh Water enclosed in Appendix 2.
- 1.2.3 This area of Llay shown on the drawing to be served by separate foul and surface water sewers. Both sewers run down Sixth Avenue from northeast to southwest. In addition, a foul sewer is shown crossing the car park area. There is a chamber in the car park at the approximate location of this sewer.
- 1.2.4 The site area of approximately 650m² is made up of approximately 280m² of grassland and 370m² of tarmac surfaced car park.
- 1.2.5 Falls on the car park are predominantly to the southwest, away from the proposed building location. The car park also has cross-falls, which are towards a central crease. There are three gullies to pick up surface water. The low point in the car park is by the small, grassed area at the southern end shown on figure 1. There is a gully at this location which is surrounded by silt. clearly water backs up at this point on a regular basis.
- 1.2.6 It is not clear how the gullies from the car park drain. This system requires further investigation. It may be that they drain into the foul sewer.
- 1.2.7 If it is assumed that 80% of the impermeable area drains to the existing gullies then during a 50mm/hr event (using the formula $Q=2.78A\pi$) the run-off rate from the site will be 4.11l/s.
- 1.2.8 The properties on Sixth Avenue are set below the level of the road and also below the level of the car park. The exceedance route for surface water from the car park towards Sixth Avenue is through the gardens of 3 & 5 Sixth Avenue.

1.3 Topography and Flood Risk

- 1.3.1 Information relating to the site from flood maps on the Natural Resources Wales (NRW) website is included in Appendix 3. The site is in DAM Zone A, which is considered to be at little or no risk of fluvial or tidal/coastal flooding.
- 1.3.2 The mapping for surface water flooding shows that some ponding may occur on the north west side of the Tir y Capel building. This is predicted to only occur during low frequency events. Low frequency is defined on the NRW website as having a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- 1.3.3 The surface water flood map also shows low frequency flooding occurring in the car park at the location described in 1.2.5, with a high frequency of flooding occurring around numbers 3 and 5 Sixth Avenue on the exceedance route identified in 1.2.8. High frequency is defined as having a chance of flooding greater than 1 in 30 (3.3%).



1.4 Proposed Development

- 1.4.1 The proposed new annex is a separate two storey building to the south of the existing Tir y Capel building, located at a lower level. It will house four flats, two on the ground floor and two at first floor level. The building footprint is approximately 168m².
- 1.4.2 To link the two buildings together it is proposed to provide an external ramp and stairs. Some dedicated parking bays are also included in the project.
- 1.4.3 Figure 2 shows the location of the proposed building relative to the existing building.

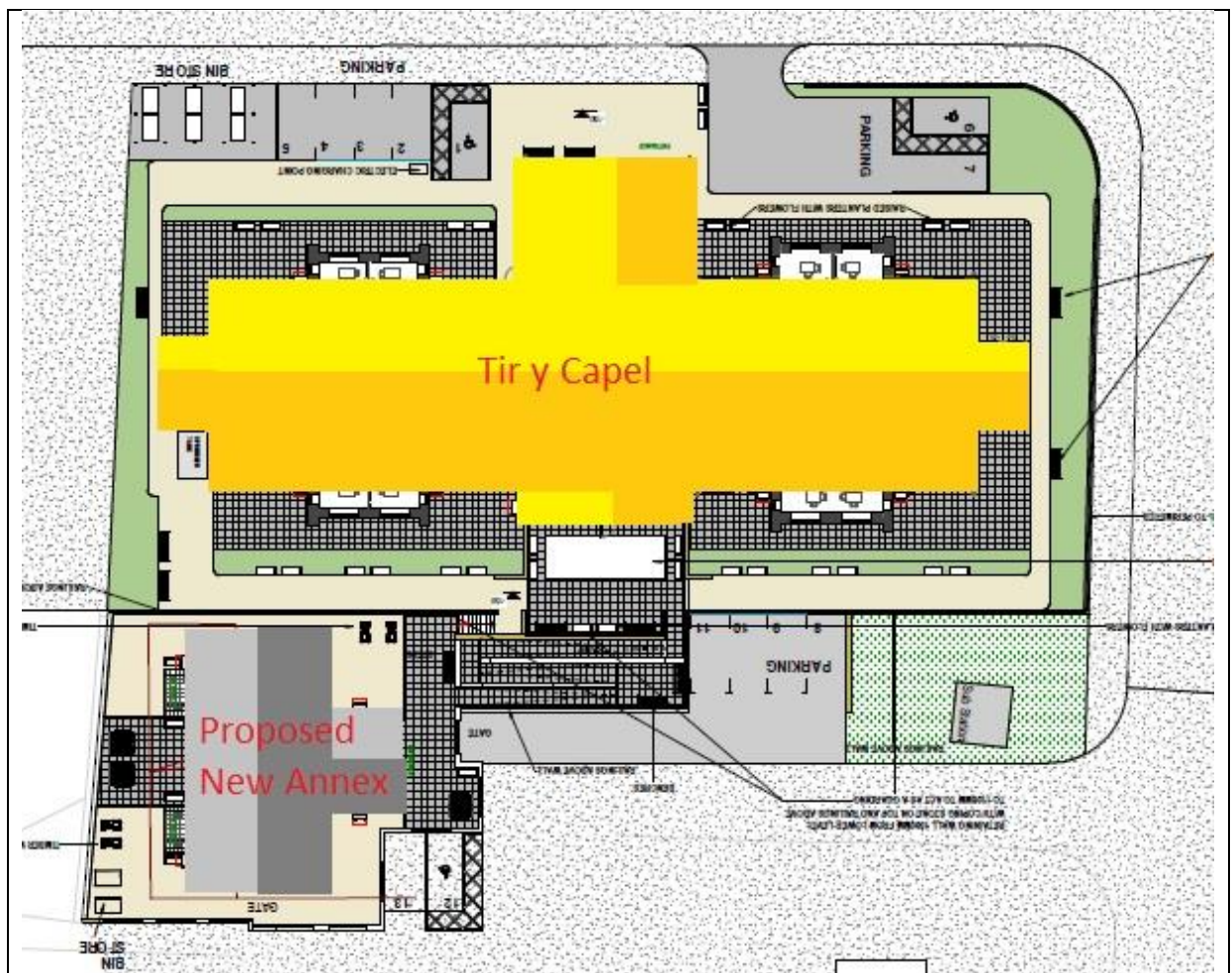


Figure 2: Proposed Development

- 1.4.4 The approximate areas of the various features forming the proposed development are summarised in the table below:

Use		Existing Area (m ²)	Proposed Area (m ²)
Existing	Proposed		
Impervious parking	Buildings	390	168
Soft landscaping	Porous paving	260	482
TOTAL		650	650

Table 1: Proposed Areas

2.0 SUSTAINABLE DRAINAGE

2.1 Project Approach to Sustainable Drainage

2.1.1 This section summarises the outline design for the disposal of surface water from the site. The approach recommended in the Sustainable Drainage Systems Standards for Wales (SDSSfW) and the CIRIA SuDS manual is to manage the quality and quantity of rainwater runoff close to where it falls and to allow its use in a manner which provides amenity benefits to site users and also encourages biodiversity.

2.1.2 The SDSSfW have standards which need to be addressed. These are:

- S1. Surface water runoff destination
- S2. Surface water runoff hydraulic control
- S3. Water Quality
- S4. Amenity
- S5. Biodiversity

2.1.3 Subsequent paragraphs of this section of the report outline how these objectives can be achieved within the drainage design for the proposed new building at Tir y Capel.

2.2 S1. Surface Water Runoff Destination

2.2.1 The Welsh Government standard has five priority levels for surface water runoff. These are:

- Priority 1: Surface water runoff collected for use
- Priority 2: Surface water runoff is infiltrated to ground
- Priority 3: Surface water runoff is discharged to a surface water body
- Priority 4: Surface water runoff is discharged to a surface water sewer, highway drain or another drainage system
- Priority 5: Surface water runoff is discharged to a combined sewer

Information has been gathered specific to the Tir y Capel site and is considered against these priorities below.

2.3 S1. Surface Water Runoff Destination, Priority 1: Runoff Collected for Use

2.3.1 Priority 1 is to collect water for reuse.

2.3.2 No rainwater harvesting is proposed for the development, the demand of non-potable water on site is limited to toilet flushing. No stress on the mains water supply has been identified and the provision of rainwater harvesting is not cost-effective for small housing development.



2.4 S1. Surface Water Runoff Destination, Priority 2: Infiltration to Ground

- 2.4.1 A percolation test was carried out as part of the ground investigation undertaken on the 1st December 2020. The ground consists of stiff clays and it is not practical to dispose of surface water by infiltration. A copy of the site log for the infiltration test is included in Appendix 4.
- 2.4.2 The existing site has a largely impervious surface. The proposal to develop the plot creates an opportunity to provide a porous surface to the parking bays and the other external areas, with the potential to reduce to reduce run-off during high frequency/ low intensity events.
- 2.4.3 By taking the runoff from the roof into the porous surface construction and using this as part of a 'leaky' attenuation storage facility there is an opportunity to dispose of rainwater from high frequency/ low intensity events by slow infiltration. It is proposed to set the outlet height from the on-site attenuation storage at a level to ensure that the first 5mm of rainfall is disposed of by infiltration.

2.5 S1. Surface Water Runoff Destination, Priority 3: Discharge to a Surface Water Body

- 2.5.1 There are no watercourses in the immediate vicinity of the site and the option of discharging to a watercourse is impractical.

2.6 S1. Surface Water Runoff Destination, Priority 4: Discharge to a Surface Water Sewer

- 2.6.1 There is a surface water sewer in Sixth Avenue. As disposal by infiltration is impractical then the most sustainable option available is to discharge into the surface water sewer.
- 2.6.2 While the access road from the site out to Sixth Avenue forms a direct route to the surface water sewer, the access runs with the contours and by the time a sewer from the site reaches Sixth Avenue it may be too low to form a connection.
- 2.6.3 Sixth Avenue falls from the northeast to the southwest. A crude estimate of the gradient of the road is 1 in 35. If the proposed new sewer is too low when it reaches Sixth Avenue then it will still be possible to form a gravity connection by 'chasing' the sewer down the road, with the new sewer being laid at a flatter grade to the existing one. Figure 3 overleaf illustrates the envisaged route for this connection.
- 2.6.4 Given that the proposed development is a single plot and will remain in the ownership of the local authority it is envisaged that ownership and the maintenance responsibility for the drain run from the site to the surface water sewer will rest with the site owner, Wrexham County Borough Council.



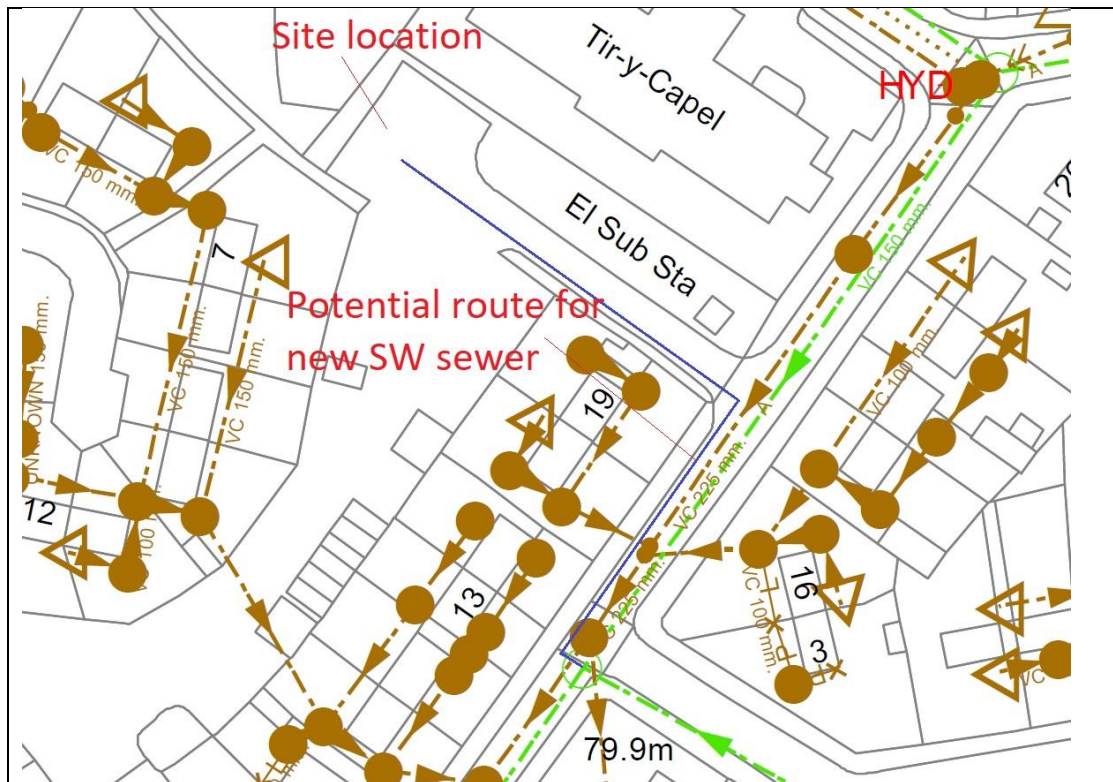


Figure 3: Proposed Development

2.7 S1. Surface Water Runoff Destination, Priority 5: Discharge to a Combined Sewer

- 2.7.1 As there is a surface water sewer in the vicinity of the site there is no requirement to consider discharge to a combined sewer.
- 2.7.2 It is possible the road gullies in the car park may discharge to the foul sewer. A drainage investigation will be required to confirm the location and depth of the foul and surface water sewers in in Sixth Avenue. During this investigation the disposal route from the road gullies in the car park will be investigated.
- 2.7.3 If surface water is currently discharging into the foul sewer then the proposed development will provide a degree of betterment by taking part of the existing surface water flow and diverting it into the surface water sewer.

2.8 S2. Surface Water Runoff Hydraulic Control

- 2.8.1 It is proposed to limit the runoff from the site to 70% of the estimated existing runoff rate noted in 1.2.7. This is 4.1l/s. The discharge rate suggested is 2.9l/s.
- 2.8.2 Using Micro Drainage Approximate Storage Estimate (see Appendix 5) a volume of between 3.3m³ and 7.3m³ of surface water will need to be stored below ground on site to cater for a 1 in 100 year rainfall with 30% climate change allowance.

2.9 S3. Water Quality

- 2.9.1 For developments of this size and nature, the potential for pollution is anticipated to be low.
- 2.9.2 A summary of the quality of water to be discharged from the site is included in Appendix 6. The sources of rainwater to be discharged from the site and their potential for contamination have been assessed using the simple index approach as described in section 26.7.1 of the SuDS manual.
- 2.9.3 The incorporation of porous subbase into the construction of external paved areas will provide sufficient mitigation for the level of potential pollution anticipated.

2.10 S4. Amenity and S5. Biodiversity

- 2.10.1 The guidance in SDSSfW encourages the use of 'softer' drainage solutions. The opportunities to provide amenity and biodiversity options on small sites are limited. It is proposed to provide small rain gardens (using a SuDS planter or similar, see Appendix 7) to allow low-volume rainfall events to be disposed of by infiltration/ evapotranspiration and to provide some amenity benefit to residents and visitors.

2.11 S6. Design of Drainage for Construction, Operation and Maintenance

- 2.11.1 It is envisaged that maintenance responsibility for the surface water drainage will rest with WCBC as the owner and operator of the Tir y Capel care home. The design of the proposed surface water drainage system is to follow the good practice contained in SDSSfW and the CIRIA SuDS manual, including the necessary provisions for future operation and maintenance.

3.0 FLOOD RISK

3.1 Flood Risk Assessment

- 3.1.1 The site is located in Development Advice Map (DAM) zone A.
- 3.1.2 The NRW flood maps (Appendix 3) do not show any risk of flooding in the site.

3.2 Exceedance Routing

- 3.2.1 Exceedance routing of surface water will continue to run down the car park (as currently occurs).
- 3.2.2 Providing the proposed well-considered drainage solution to the site will reduce the volume of runoff into the car park area and reduce flows using the exceedance route.



4.0 CONCLUSION

4.1 Sustainable Drainage

- 4.1.1 The table below summarises how the drainage strategy for the proposed new proposed new annex to the Tir y Capel care home will address the standards and priorities contained in the Sustainable Drainage System Standards for Wales.

Standard	Comments
S1 – Destination	
Priority 1 – Re-use	- Limited demand for non-potable water - No stress on mains - Rainwater harvesting not cost effective
Priority 2 – Infiltration	- Underlying ground is formed of stiff clays - Ground unsuitable for disposal of surface water - Disposal of high frequency/ low intensity rainfall events by infiltration - Reduced area of impermeable surface
Priority 3 – Discharge to surface water body	Disposal to watercourse is impractical
Priority 4 – Discharge to surface water sewer	This is the most practical option, surface water sewer in Sixth Avenue
Priority 5 – Discharge to combined sewer	Not required, connection to SW sewer is practical
S2 – Runoff Hydraulic Control	
	1 in 1 year runoff rate is 4l/s - Limit discharge rate to 2.9l/s subject to agreement with SAB/ DCWW - Attenuation to be provided in porous subbase/ below ground tank for events with return period up to 1 in 100 year+ 30% climate change - Volume of attenuation required between 3.3 & 7.3m³
S3 – Water Quality	
	Use of porous construction to parking areas/ hard standings will provide sufficient mitigation for level of potential pollution anticipated
S4 – Amenity & S5 - Biodiversity	
	Rain garden to downpipes
S6 – Construction, Operation & Maintenance	
	WCBC (as owner & operator of care home)

4.2 Flood Risk

- 4.2.1 No risks identified.



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Approved by	Jonathan Sykes BEng CEng MICE	04.12.20
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Status	For Approval	

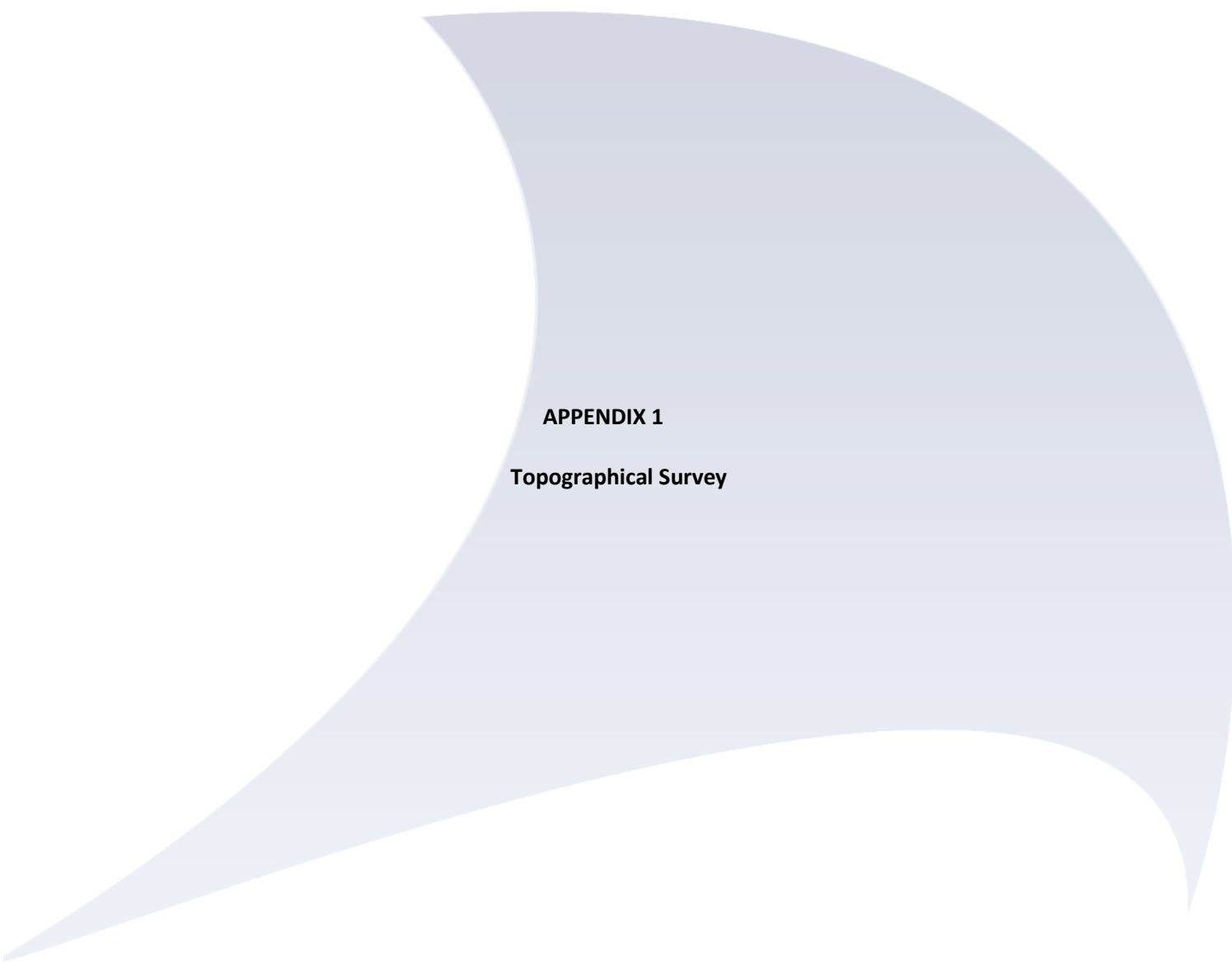
Appendices

- 1 Topographical Survey
- 2 DCWW Record Drawing
- 3 NRW Flood Mapping
- 4 Percolation Test Results
- 5 Approximate Storage Volume
- 6 Water Quality
- 7 SuDS Planters

REVISION HISTORY

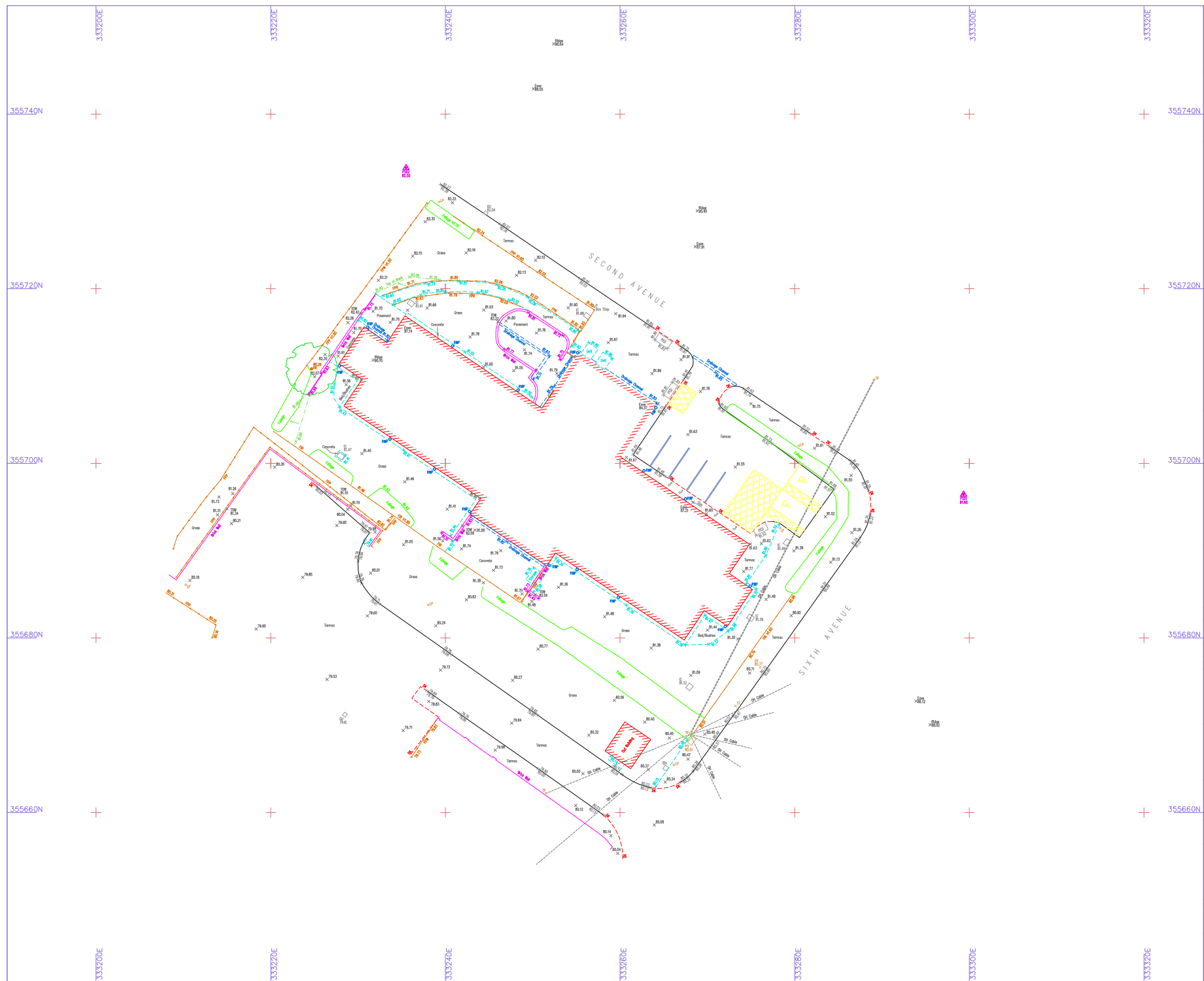
Rev No	Date	Paragraph	Change History
P01	04.12.20		For Approval





APPENDIX 1

Topographical Survey



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This survey has been produced at the survey scale detailed below with its accuracy commensurate with the indicated scale and should only be used for its original intended purpose. Any scaling should only be undertaken using a stable media print produced using the original data. The plotted scale may differ (for presentation purposes) from the survey scale.

It is for the use only of the party to whom it has been addressed and no responsibility is accepted to any third party for the whole or part of its contents. This survey has been prepared on the basis that all information and facts, which may affect the survey, have been disclosed to Family Surveys Ltd by all parties concerned and no liability, our responsibility can be accepted, unless full disclosure has been made.

All ground features that were visible at the time of the survey have been located, however there may have been items obscured. Pipe sizes and flow direction have been visually assessed from the surface and should be considered as approximate only.

All data remains in the ownership of Family Surveys Ltd and any discrepancies between this survey and any other information should be reported to Family Surveys Ltd.

Topographical Legend



Abbreviations

(where applicable)

AB	As Brick	J7	Interests
AC	As C	J8	Interests
AD	As Deck	K1	Kamp Lark
AE	As Deck	K2	Kamp Lark
AL	As Low	M5	Morning Safford
AM	As Low	M6	Morning Safford
AN	As Low	M7	Morning Safford
AO	As Low	M8	Morning Safford
AP	As Low	M9	Morning Safford
AS	As Low	M10	Morning Safford
AT	As Low	M11	Morning Safford
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BT	As Low	M98	Morning Safford
BT	As Low	M99	Morning Safford
BT	As Low	M100	Morning Safford



Survey Control

Station	Easting	Northing	Level
FS01	333299.337	355696.450	81.60
FS02	333235.502	355733.863	82.50

Grid & Datum

Survey Grid: Local Grid ☐ Nat. Grid (GDA78) ☒ Nat. Grid (Geoph. Pos) ☐ Existing Grid ☐
Survey Datum: Local Datum ☐ Nat. Grid (GDA78) ☒ Nat. Grid (Geoph. Pos) ☐ O.S.B.M. ☐

The survey grid & level datum relate to the Ordnance Survey active GPS network (OSGM15) established via Leica SmartNET, plotted with no scale factor applied.

The current survey has been merged with existing survey data, from either a previous project or from a third party. This data may not truly represent current features due to site changes and may have been produced at a different scale to the most recent information.

General Notes

1. Tree canopies have been "trimmed" for clarity and presentation purposes.
2. All arrows on steps / ramps etc indicate an UP direction unless otherwise stated.
3. Site traffic or obstructions encountered at the time of the survey may have resulted in surface features being omitted.

Rev	Date	Description	CAD
Client			

Ellis Williams Architects

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FormbySurveys
Professional Measurement Surveys

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Topographical Survey

Tir-Y-Capel, Llay
Wrexham, LL12 0TJ

Plotted Scale: A1@1:200

Surveyor: SFR	CAD: NT/RJ	Checker: JO	Rev:
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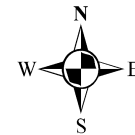
Date of Issue: September 2020	FSL Ref No: 10928_T:200:1:1
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APPENDIX 2

DCWW Record Drawing

,Land adjacent to Tyr y Capel



LEGEND(Representative of most common features)

- | | | |
|-------------------------|------------------------|---|
| Foul chamber | Surface water chamber | Outfall |
| Combined sewer overflow | Combined sewer | Storm Overflow |
| Special purpose chamber | Rising main | Gravity sewer |
| Treatment works | Private sewer | Private sewer subject to Sect. 104 adoption agreement |
| Pumping station | 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:

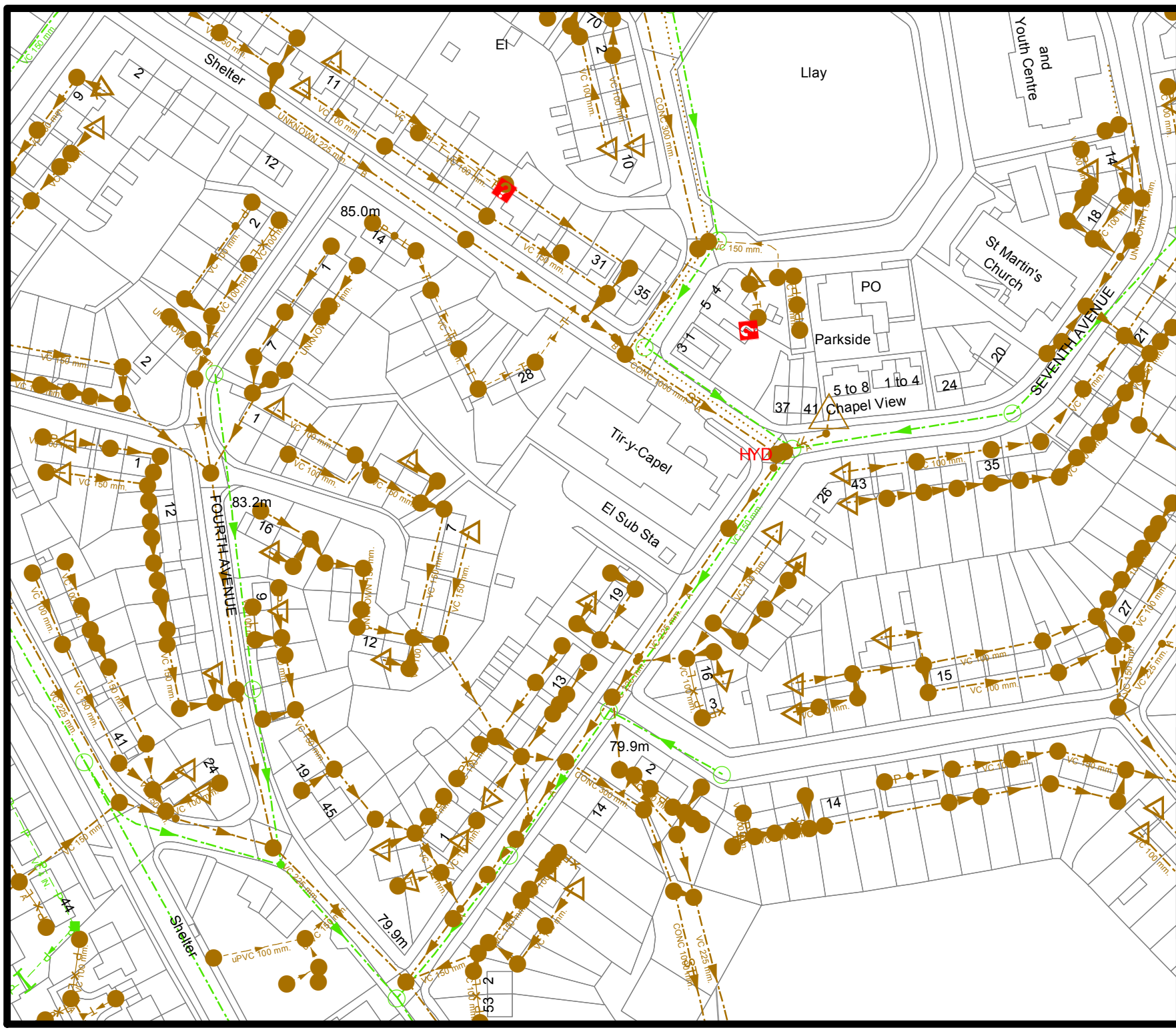
Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible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

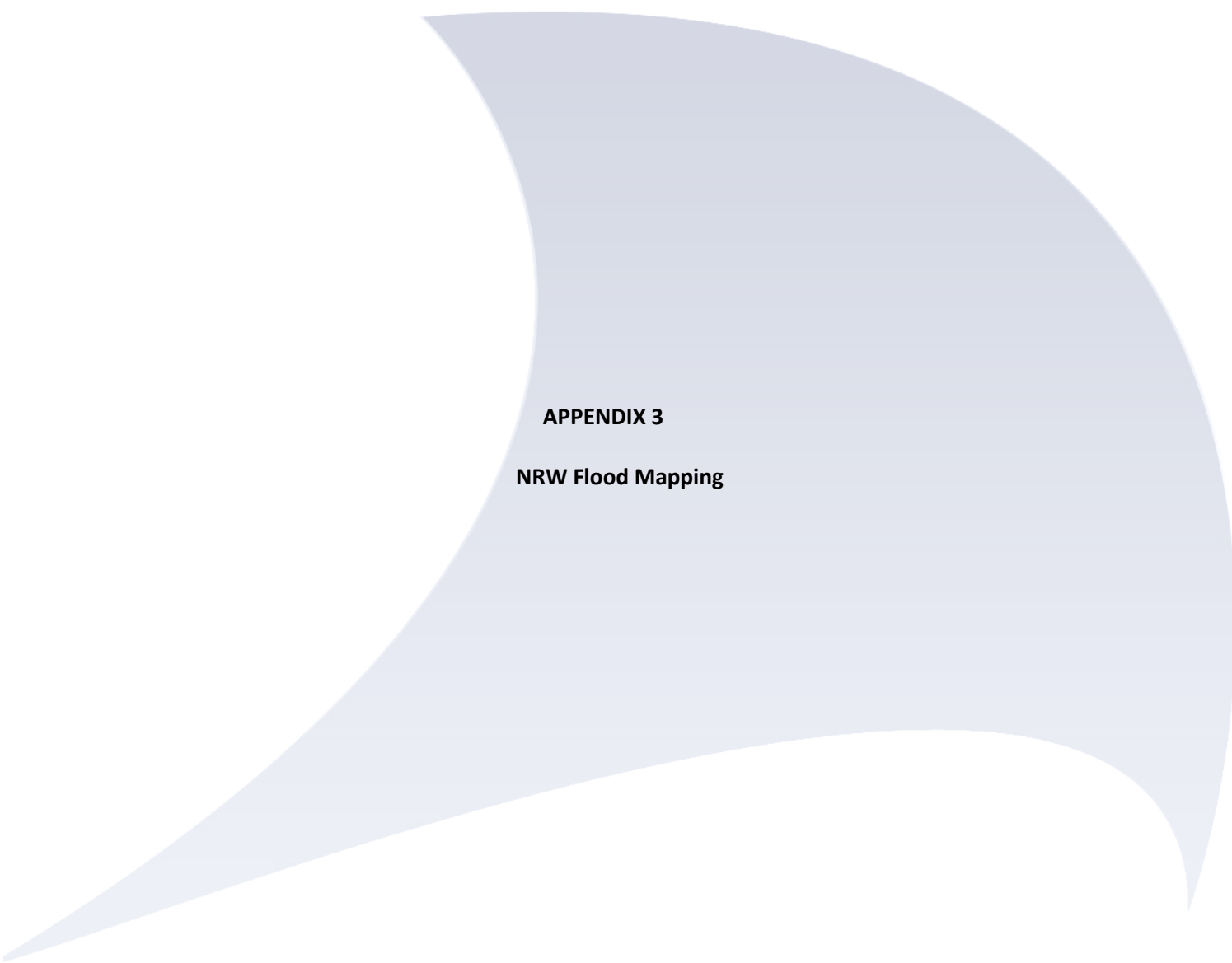
Dŵr Cymru Cynhyrchdy (the Company) gives this information as to the position of its underground apparatus by way of general guidance only and on the basis of the best information available and is not warranted as to its correctness in the event of excavations or other works made in the vicinity of the company's apparatus. This issue of location data is for carrying out any excavations made entirely on your own. The information which is supplied by the Company is given in accordance with statutory requirements of sections 158 and 159 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 1988, or if they do, the position 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 provisions of the New Roads and Street Works Act 1991 and the Company's liability to be compensated for any damage to its apparatus.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 333238,355680
 Map scale: 1:1500
 Printed by: Emma John
 Printed on: 21 Oct 2020





APPENDIX 3

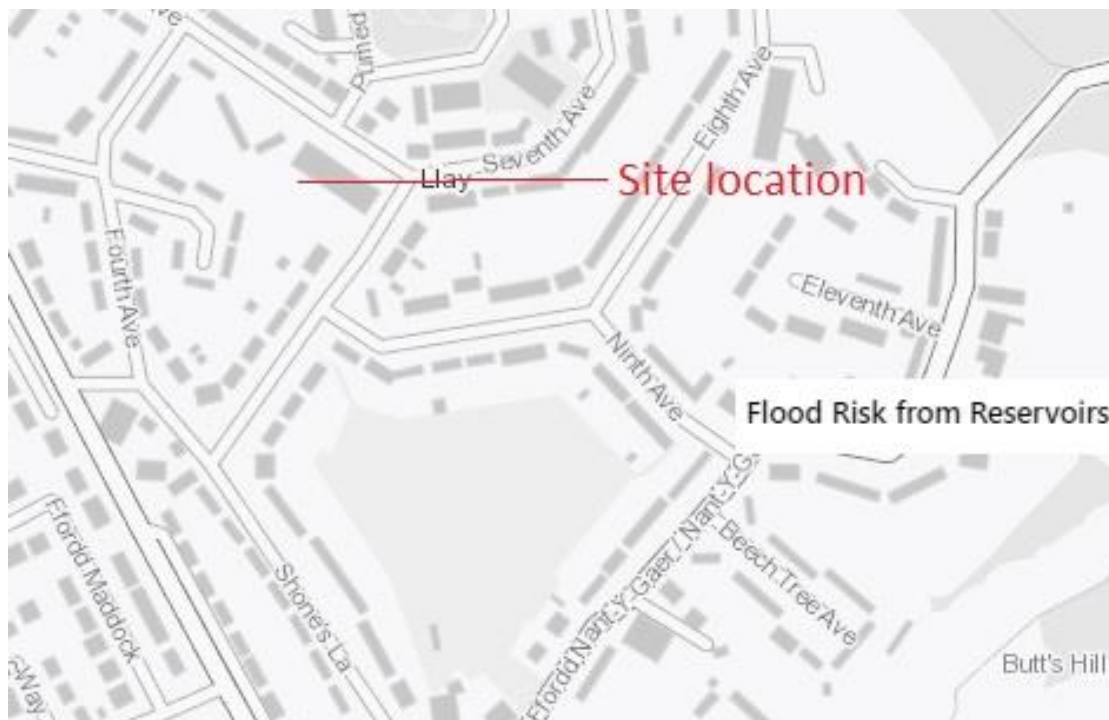
NRW Flood Mapping



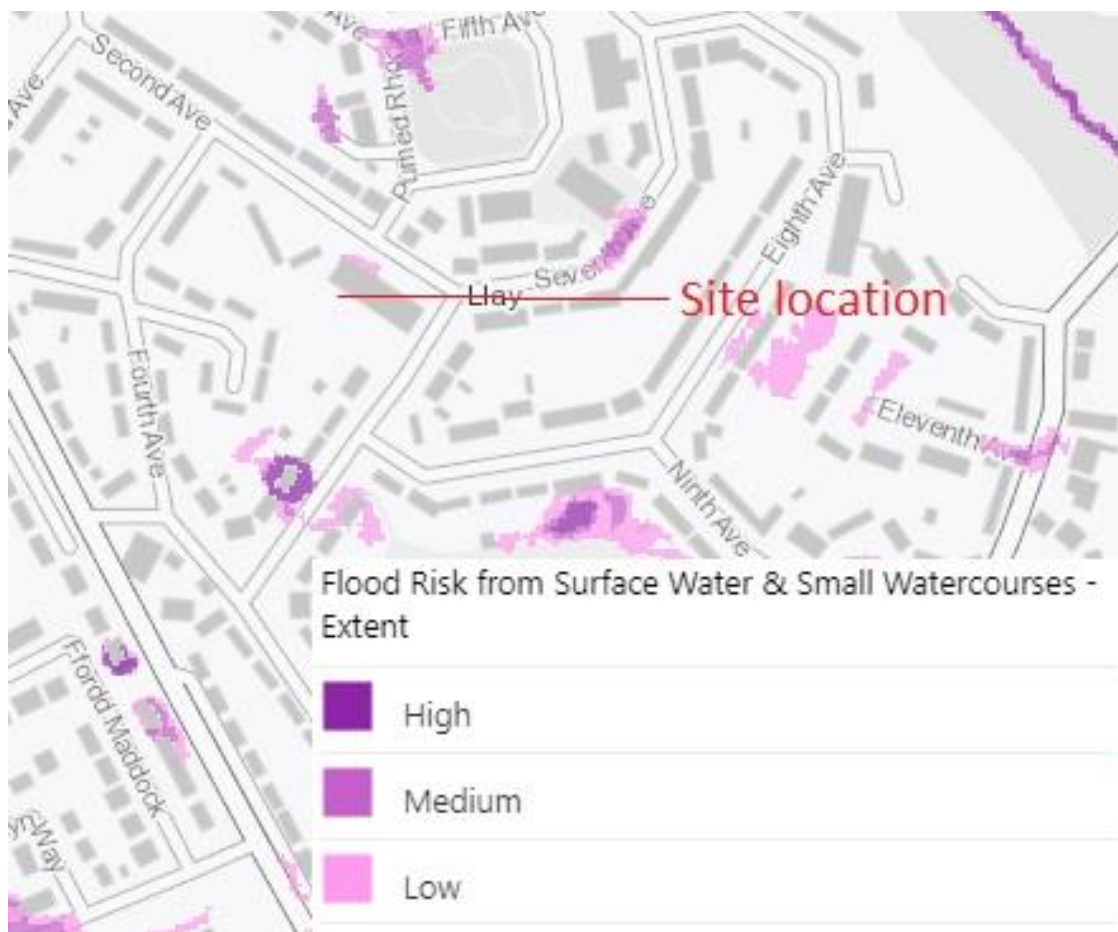
Development Advice Map



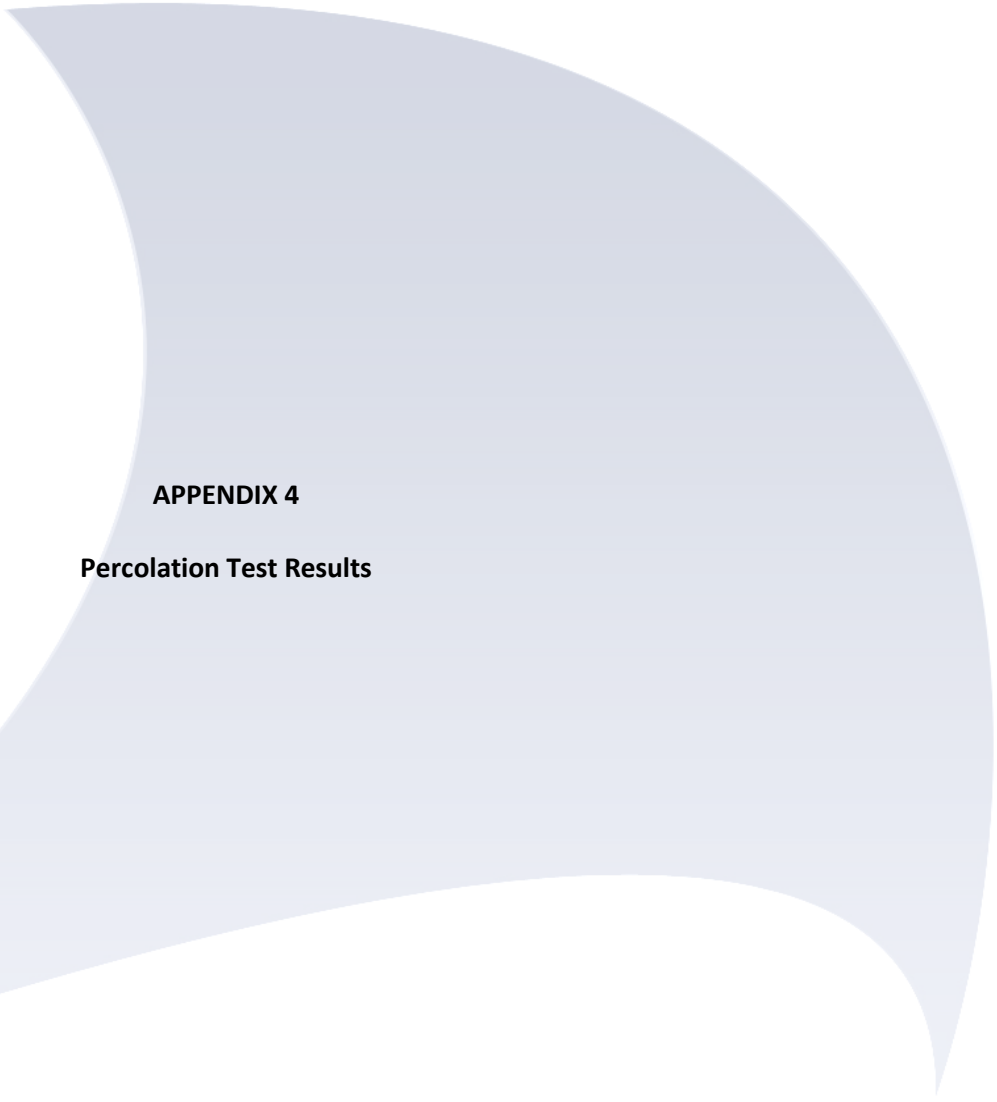
Flood Risk Map – Rivers & Sea



Flood Risk Map – Reservoirs

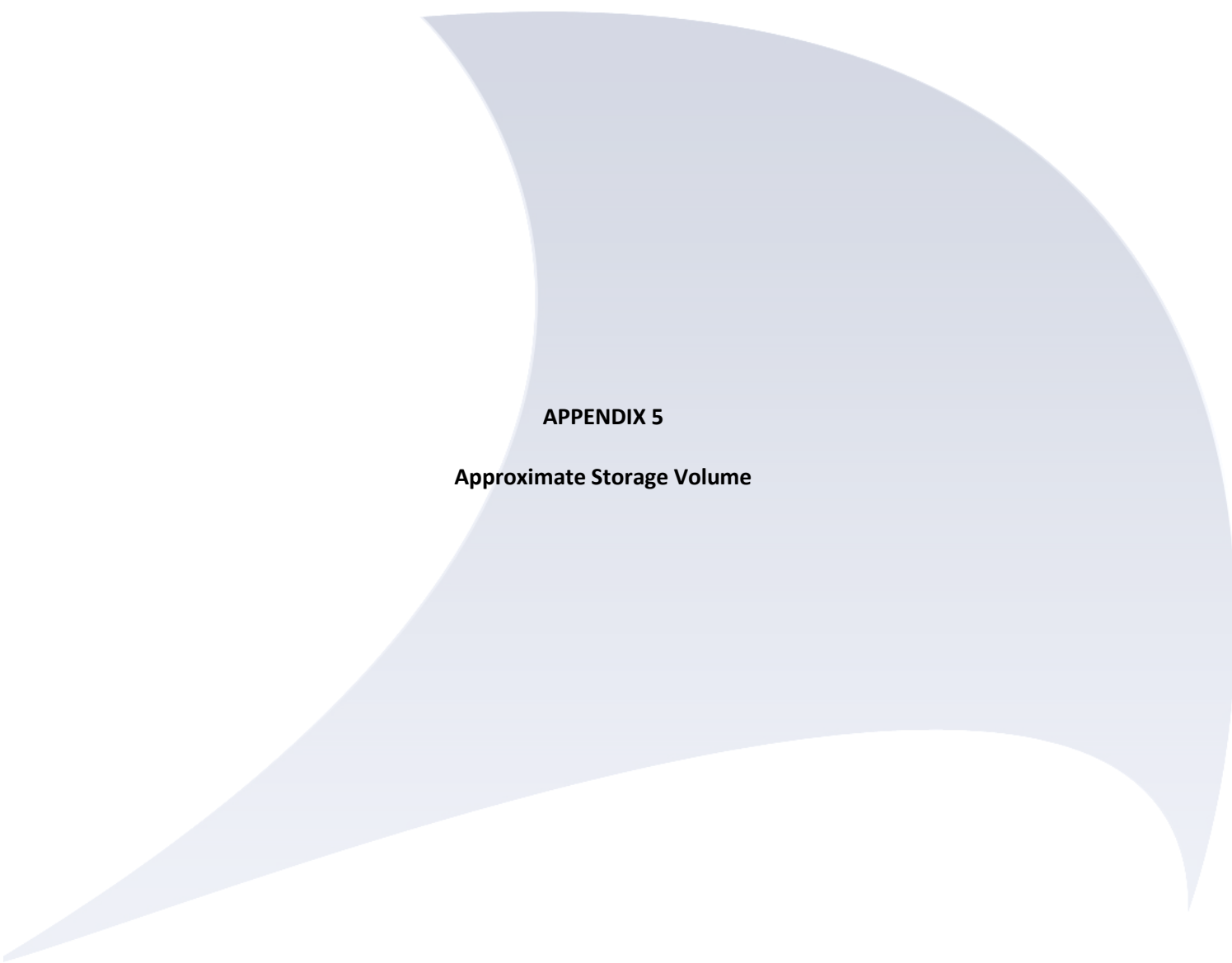


Flood Risk Map – Surface Water



APPENDIX 4

Percolation Test Results



APPENDIX 5

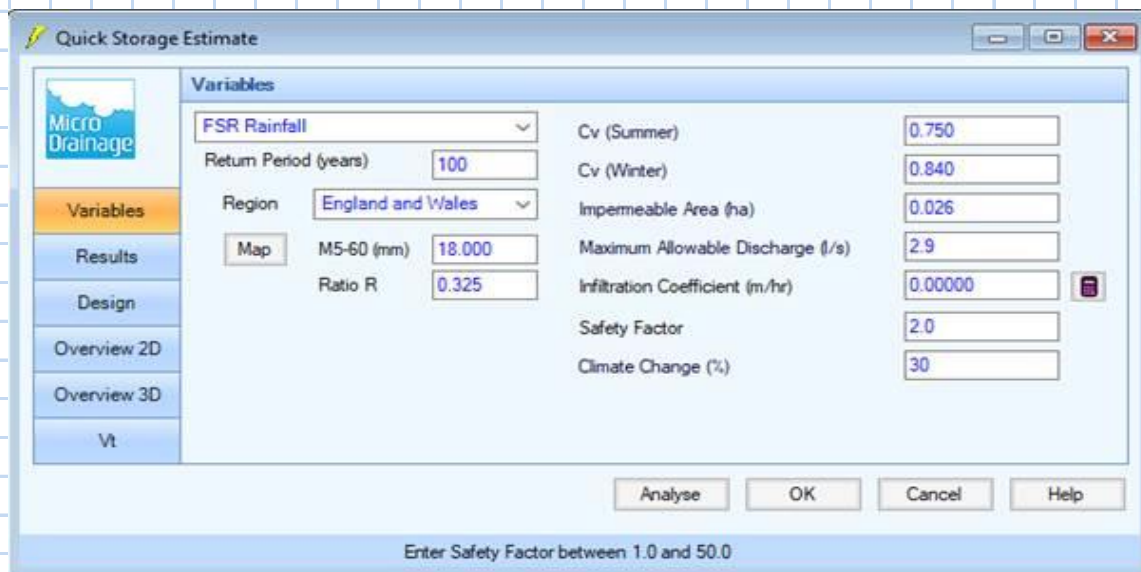
Approximate Storage Volume

Client: Wrexham CBC	Site: Tir y Capel, Llay	Project: Drainage Strategy	Caulmert	
Made by: David High	Date: 04/12/2020	Checked by:	Date:	Sheet no.: 1

Initial Sizing of Attenuation Requirements

Output from WinDes Micro Drainage W12.6

Site parameters (1 in 100 year+ 30% climate change return period)



Quick Storage Estimate

Variables

FSR Rainfall: (Return Period (years))

Region: (Map)

M5-60 (mm): (Ratio R:

Cv (Summer): (Cv (Winter):

Impermeable Area (ha): (Maximum Allowable Discharge (l/s):

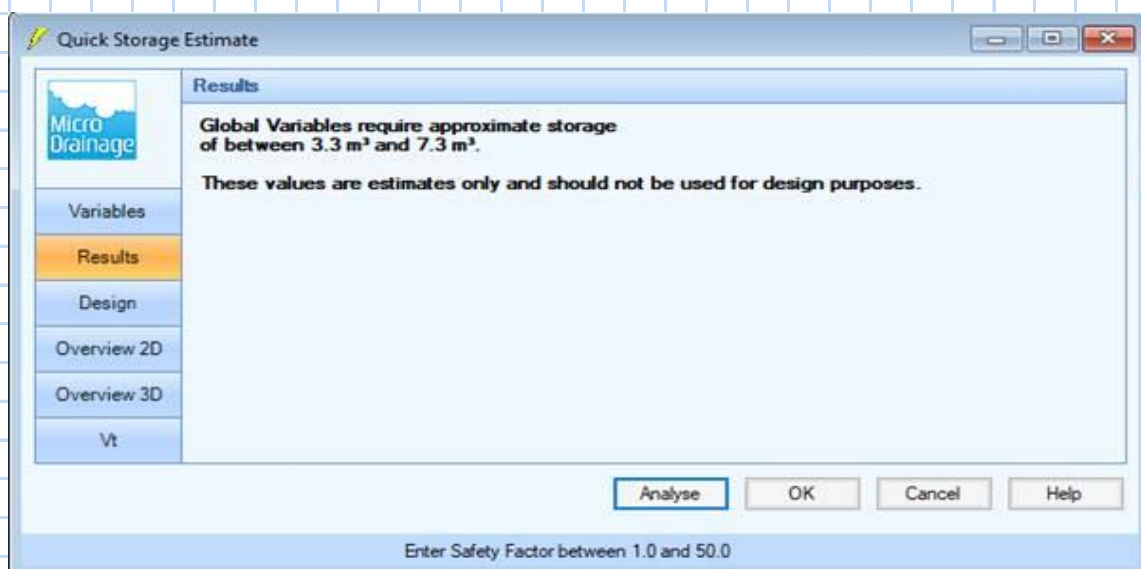
Infiltration Coefficient (m/hr): (Safety Factor:

Climate Change (%):

Buttons: Analyse, OK, Cancel, Help

Enter Safety Factor between 1.0 and 50.0

1 in 100 year+30% CC return period



Quick Storage Estimate

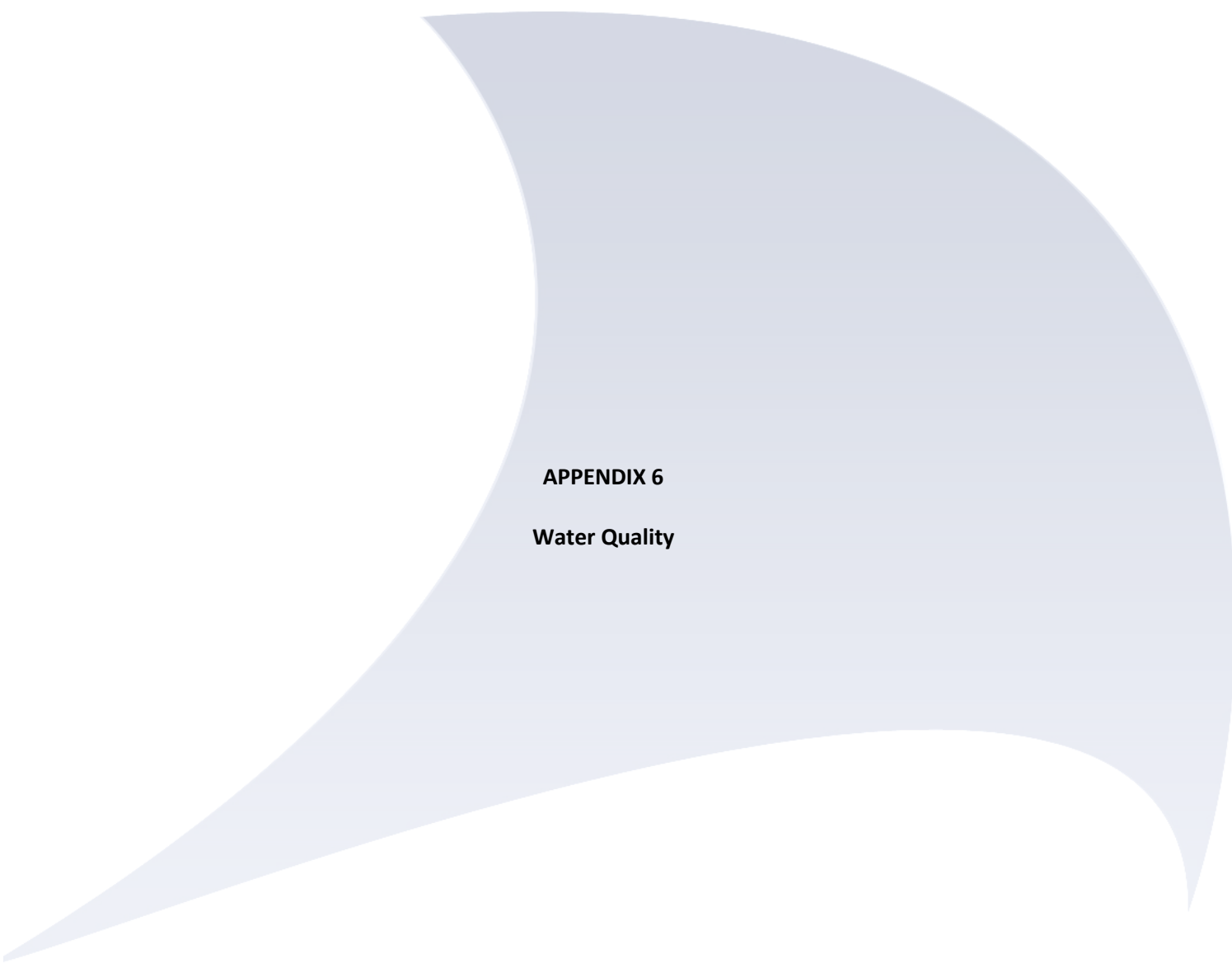
Results

Global Variables require approximate storage of between 3.3 m³ and 7.3 m³.

These values are estimates only and should not be used for design purposes.

Buttons: Analyse, OK, Cancel, Help

Enter Safety Factor between 1.0 and 50.0



APPENDIX 6

Water Quality

CALCULATION SHEET

Client: Wrexham CBC	Site: Tir y Capel, Llay	Project: Drainage Strategy	Caulmert 
Made by: David High	Date: 04/12/2020	Checked by:	Date: Sheet no.: 1

Water Quality Summary

Water quality assessed using Simple Index Approach as described in Section 26.7.1 of the SuDS Manual.

Land Use Type	Residential roofing	Residential parking
Pollution Hazard Level	Very low	Low
Pollution Hazard Indices		
TSS	0.20	0.50
Metals	0.20	0.40
Hydrocarbons	0.05	0.40
SuDS components proposed		
Component 1	Pervious pavement	Pervious pavement
Component 2	None	None
Component 3	None	None
SuDS Pollution Mitigation Indices		
TSS	0.7	0.7
Metals	0.6	0.6
Hydrocarbons	0.7	0.7
Groundwater Protection Type	None	None
GW protection Pollution Mitigation Indices		
TSS	0	0
Metals	0	0
Hydrocarbons	0	0
Combined Pollution Mitigation Indices		
TSS	0.7	0.7
Metals	0.6	0.6
Hydrocarbons	0.7	0.7
Acceptability of Pollution Mitigation		
TSS	Sufficient	Sufficient
Metals	Sufficient	Sufficient
Hydrocarbons	Sufficient	Sufficient



APPENDIX 7

SuDS Planters Brochure (Extract)

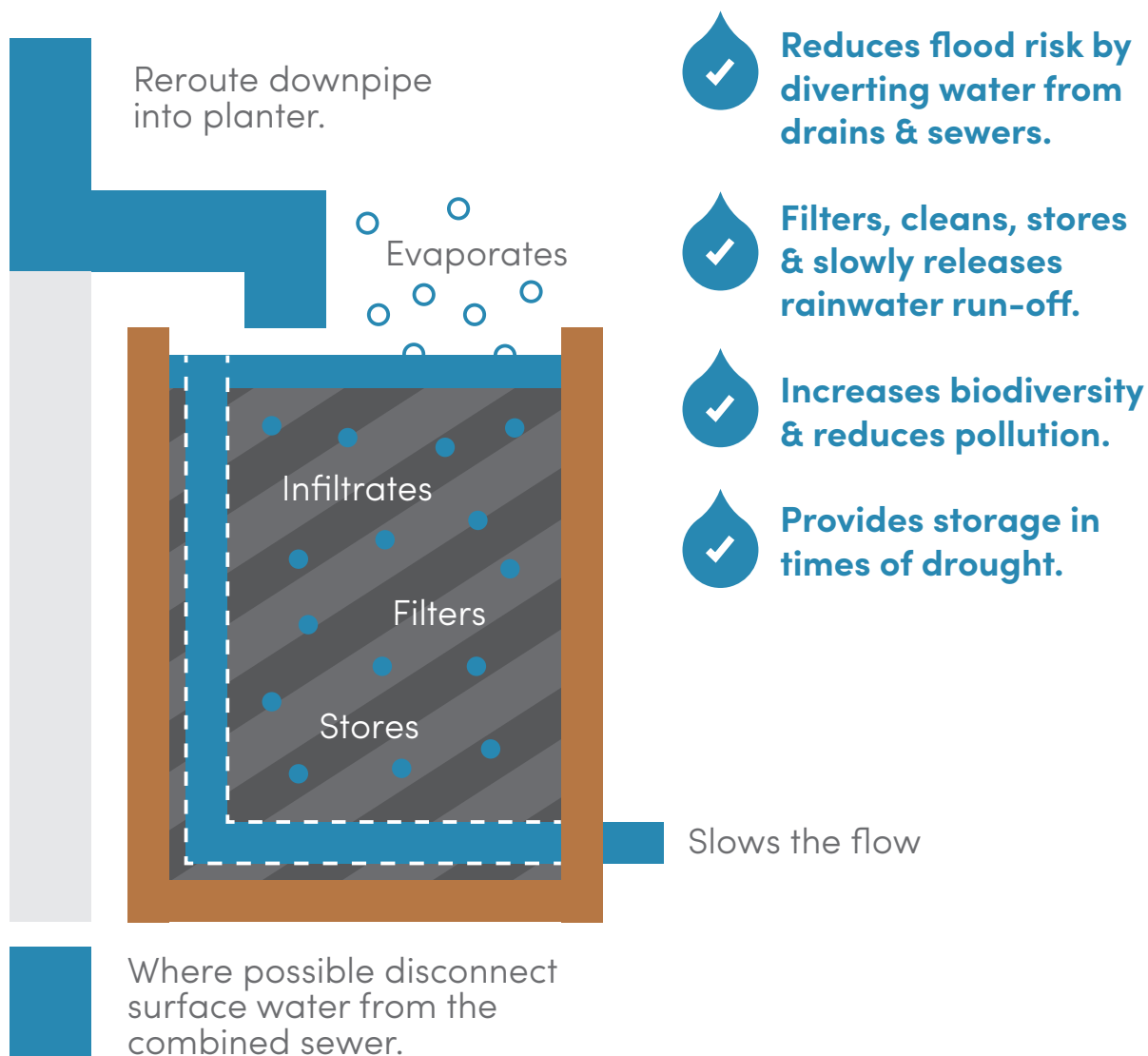
Meet the SuDSPlanter



SuDSPlanter is a uniquely designed rain garden which captures rainwater runoff from roofs, rather than leaving it to flow into the drains and sewers, potentially overloading the system. It's a cleaner, greener more sustainable way to guard against today's increasing risk of flooding and contamination.

The SuDSPlanter provides water storage in dry or drought conditions, as well as storm storage designed to cope in wet environments. This makes the planter ideal for our changing weather patterns, combatting the increasing flood risk and water scarcity which we face.

How it works



The SuDSPlanter is designed to capture rainwater run-off from roofs by rerouting the downpipe into the planter instead of directly into the drains. The planter is made up of a series of layers, acting as both a sponge and a natural filter, attenuating flow and removing sediment and bird poo as the water soaks through to the reservoir below.

Our specially designed growing media provides the perfect environment for plants to thrive; nutrient and water retention, filtration and soil volume to sustain plant growth in both wet and dry conditions.



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