

Old Marsh Farm Barns
Welsh Road
Sealand Flintshire CH5 2LY



Date 27/06/2017 16:21
File

Designed by patricktaylor
Checked by

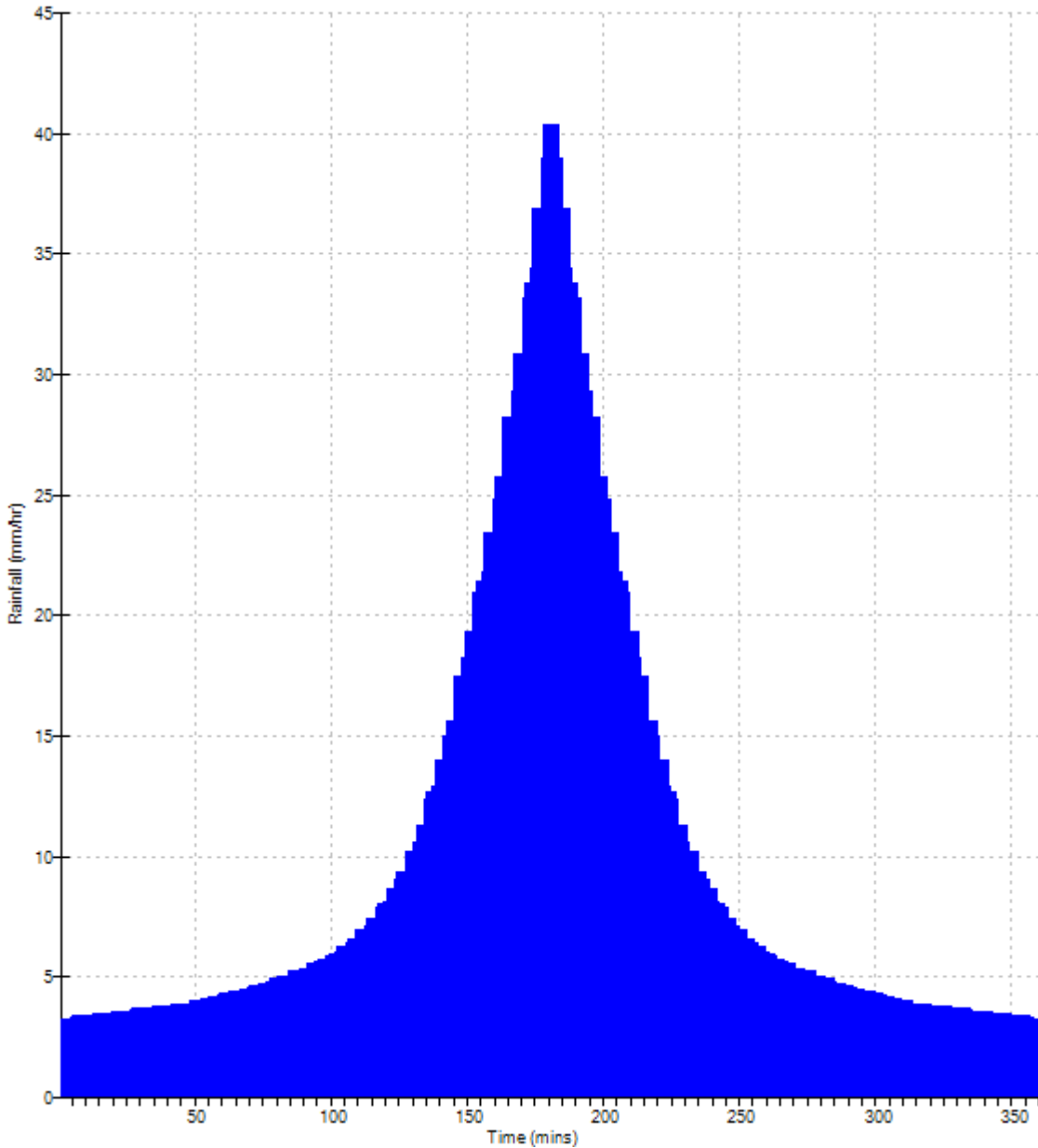
Micro Drainage

Network 2014.1.1

Rainfall profile

Storm duration (mins) 360

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.411
Peak Intensity (mm/hr) 40.405
Ave. Intensity (mm/hr) 10.307
Return Period (years) 100



Old Marsh Farm Barns
Welsh Road
Sealand Flintshire CH5 2LY



Date 27/06/2017 16:23
File

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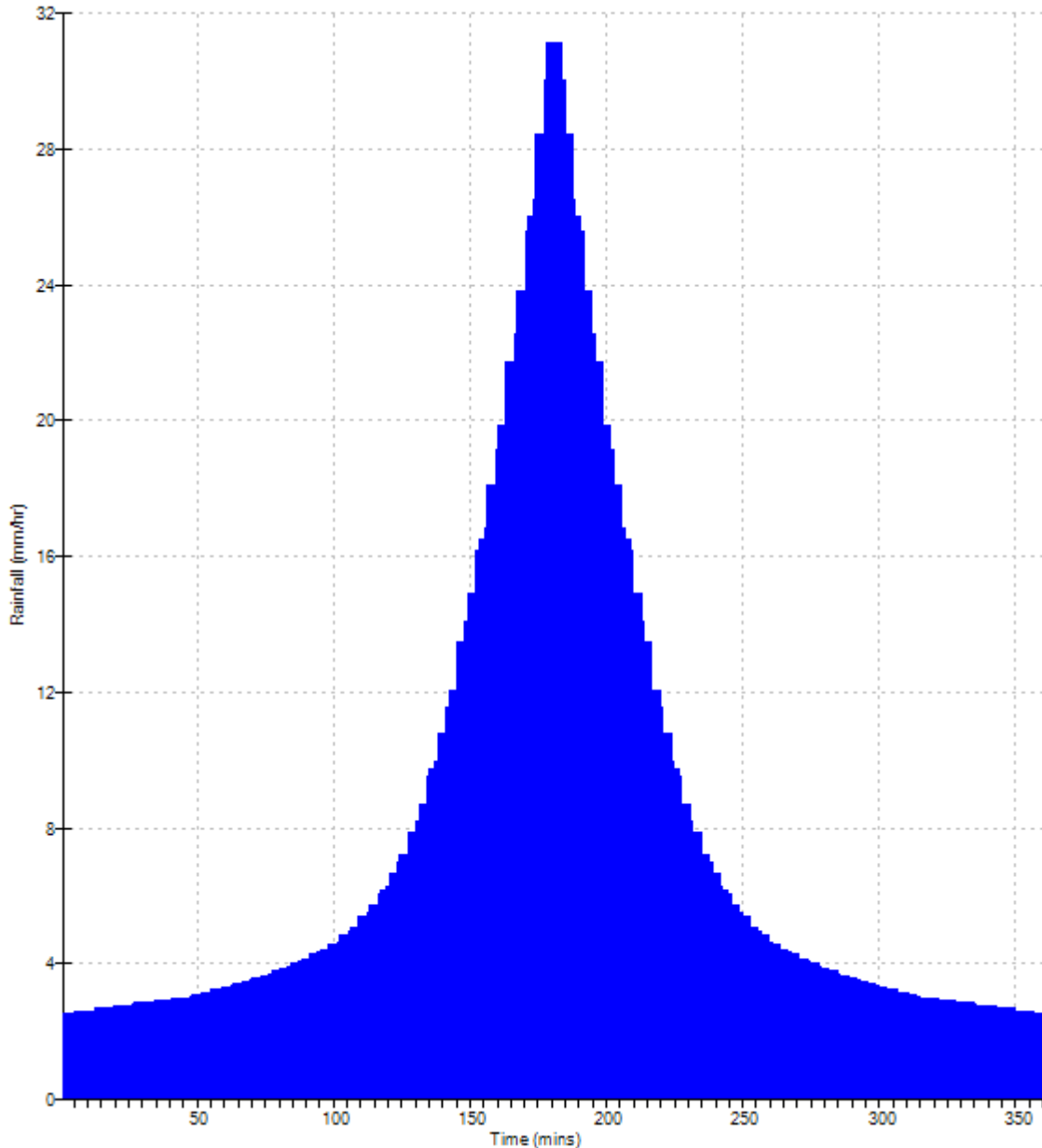
Micro Drainage

Network 2014.1.1

Rainfall profile

Storm duration (mins) 360

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.411
Peak Intensity (mm/hr) 31.140
Ave. Intensity (mm/hr) 7.944
Return Period (years) 30



Old Marsh Farm Barns
Welsh Road
Sealand Flintshire CH5 2LY



Date 27/06/2017 16:20
File

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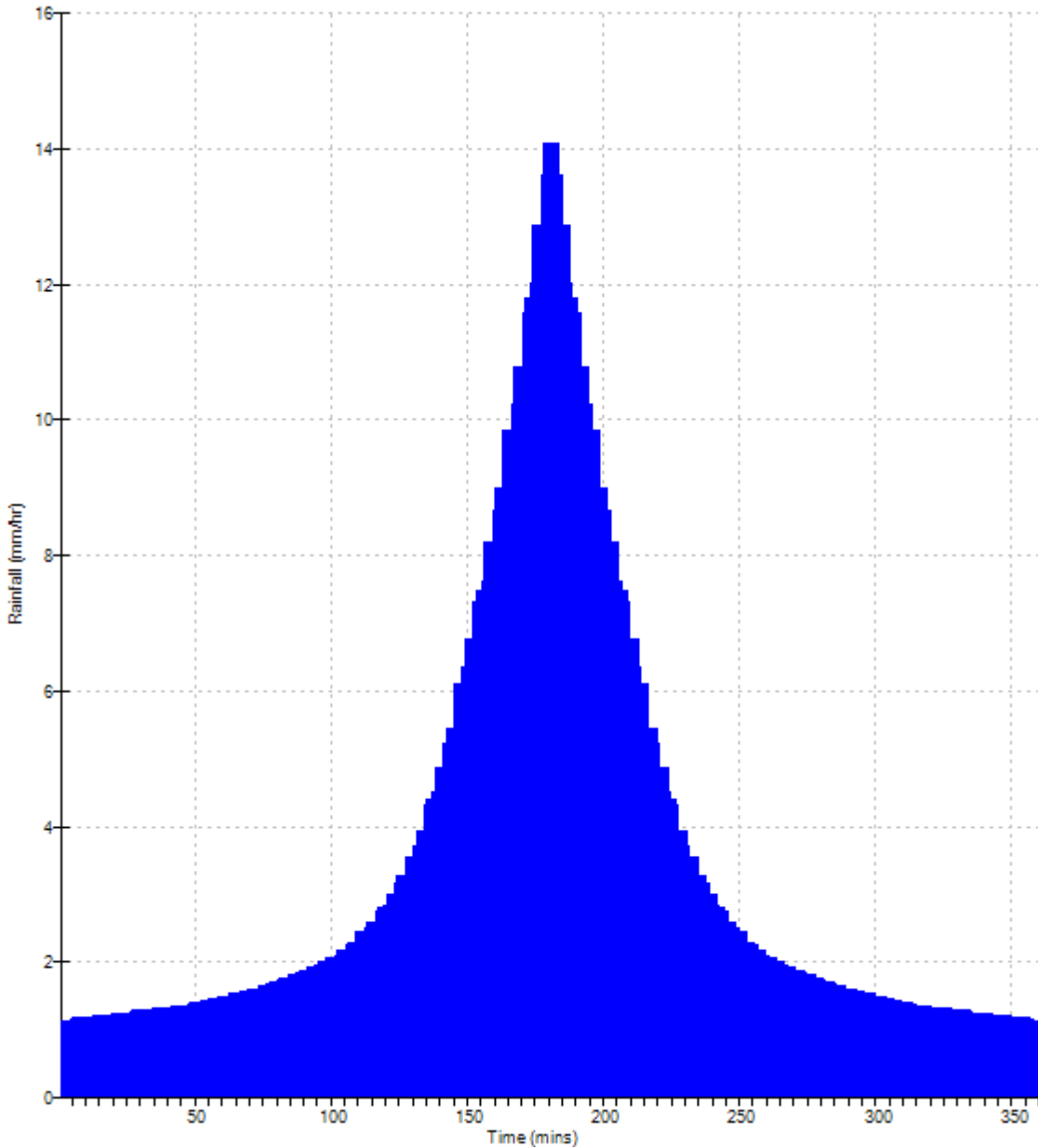
Micro Drainage

Network 2014.1.1

Rainfall profile

Storm duration (mins) 360

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.411
Peak Intensity (mm/hr) 14.100
Ave. Intensity (mm/hr) 3.597
Return Period (years) 1



Old Marsh Farm Barns
Welsh Road
Sealand Flintshire CH5 2LY



Date 27/06/2017 14:33
File

Designed by patricktaylor
Checked by

Micro Drainage

Source Control 2014.1.1

ICP SUDS Mean Annual Flood

Input


Return Period (years)	1	Soil	0.150
Area (ha)	1.970	Urban	0.000
SAAR (mm)	655	Region Number	Region 6

Results 1/s

QBAR Rural 0.7
QBAR Urban 0.7

Q1 year 0.6

Q1 year 0.6
Q30 years 1.7
Q100 years 2.4

Betts Associates Ltd		Page 1
Old Marsh Farm Barns Welsh Road Sealand Flintshire CH5 2LY		
Date 29/06/2017 13:41 File	Designed by patricktaylor Checked by	
Micro Drainage	Source Control 2014.1.1	


Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.412
Areal Reduction Factor	1.00
Area (ha)	1.970
SAAR (mm)	655
CWI	96.900
Urban	0.000
SPR	10.000

Results

Percentage Runoff (%)	6.86
Greenfield Runoff Volume (m ³)	83.557

Betts Associates Ltd		Page 1
Old Marsh Farm Barns Welsh Road Sealand Flintshire CH5 2LY		
Date 29/06/2017 13:43 File	Designed by patricktaylor Checked by	
Micro Drainage	Source Control 2014.1.1	

Greenfield Runoff Volume

FSR Data

Return Period (years)	1
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.412
Areal Reduction Factor	1.00
Area (ha)	1.970
SAAR (mm)	655
CWI	96.900
Urban	0.000
SPR	10.000

Results

Percentage Runoff (%)	2.98
Greenfield Runoff Volume (m ³)	12.634

APPENDIX J: OVERLAND FLOOD FLOW PLANS

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DO NOT SCALE

LEGEND

→ OVERLAND FLOOD FLOWS



REV	DATE	BY	DESCRIPTION	CHK
A	06.07.17	CP	PRELIMINARY ISSUE FOR REVIEW	KW

DRAWING STATUS:

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Wash Road, Seaboard, Eastleigh CH45 2LY
01329 258173
020300900000@btconnect.com

PROJECT:
**BERRY HILL ROAD
ADDERBURY**

TITLE:
**PRE-DEVELOPMENT
OVERLAND FLOOD FLOW PLAN**

DATE: JULY 2017	SCALE & SIZE: 1:750 @ A1	DRAWN: CP	CHECKED: KW
PROJECT NO: HYD250	DRAWING NO: 102	REV: A	

APPENDIX K: EXISTING AND PRELIMINARY DRAINAGE PLAN

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DO NOT SCALE

NOTES

PRE-DEVELOPMENT PERVIOUS AREAS - 4.004ha

PRE-DEVELOPMENT IMPERMEABLE AREAS - 0.110ha

TOTAL SITE AREA - 4.114ha



REV	DATE	BY	DESCRIPTION	KW	CHK
A	06.06.17	CP	PRELIMINARY ISSUE FOR REVIEW		

DRAWING STATUS:

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Wash Road, Seaboard, Eastleigh, CH4 2LY
01329 232973
02030090000@bt.com

PROJECT:	BERRY HILL ROAD ADDERBURY						
TITLE:	PRE-DEVELOPMENT IMPERMEABLE AREAS PLAN						
DATE:	JULY 2017	SCALE @ SIZE:	1:750 @ A1	DRAWN:	CP	CHECKED:	KW
PROJECT No:	HYD250	DRAWING No:	101	REV:	A		



OUR REF. HYD250

EXISTING DRAINAGE SITUATION PLAN

BERRY HILL ROAD, ADDERBURY

Revision: 0

Date: 29.06.17

LEGEND

Site Extents

EXISTING DRAINAGE SEWER INFRASTRUCTURE

Foul Water Sewer

Foul Water Rising Main

Pumping Station

EXISTING DRAINAGE FEATURES

Main River

Notes:

THIS DRAWING IS NOT A DRAINAGE 'DESIGN' IT IS A PRELIMINARY DRAINAGE STRATEGY SHOWING EXISTING SEWER LOCATIONS.

NO HYDRAULIC SIMULATION OR ASSESSMENT OF THESE PROPOSALS HAS BEEN UNDERTAKEN.

PROPOSED POINTS OF CONNECTION TO THE EXISTING WATERCOURSE AND SEWER REQUIRE INVERT LEVELS TO BE ACCURATELY ESTABLISHED. REFER TO PROPOSED DRAINAGE PLAN.

SURCHARGING OF THE PROPOSED OUTFALL WILL REQUIRE MODELLING TO SATISFY THE REQUIREMENTS OF UNITED UTILITIES ALONG WITH FULL HYDRAULIC ANALYSIS.



LEGEND

Site Extents

EXISTING DRAINAGE SEWER INFRASTRUCTURE

- Foul Water Sewer
- Foul Water Rising Main
- Pumping Station

EXISTING DRAINAGE FEATURES

- Main River

PROPOSED DRAINAGE CONNECTIONS

- Primary SW Option: INFILTRATION
- Alternative SW Option WATERCOURSE
- Foul Water Connection

Notes:

THIS DRAWING IS NOT A DRAINAGE 'DESIGN' IT IS A PRELIMINARY DRAINAGE STRATEGY SHOWING EXISTING SEWER LOCATIONS.

NO HYDRAULIC SIMULATION OR ASSESSMENT OF THESE PROPOSALS HAS BEEN UNDERTAKEN.

PROPOSED POINTS OF CONNECTION TO THE EXISTING WATERCOURSE AND SEWER REQUIRE INVERT LEVELS TO BE ACCURATELY ESTABLISHED. REFER TO PROPOSED DRAINAGE PLAN.

SURCHARGING OF THE PROPOSED OUTFALL WILL REQUIRE MODELLING TO SATISFY THE REQUIREMENTS OF UNITED UTILITIES ALONG WITH FULL HYDRAULIC ANALYSIS.



Date: 06.10.17

Revision: 1.0

OUR REF. HYD250


PRELIMINARY DRAINAGE STRATEGY PLAN


BERRY HILL ROAD, ADDERBURY

APPENDIX L: STORMWATER STORAGE ESTIMATES


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1 YEAR RETURN PERIOD STORM EVENT

 Variables Results Design Overview 2D Overview 3D Vt	Variables		
	FSR Rainfall	Cv (Summer)	0.750
	Return Period (years)	Cv (Winter)	0.840
	Region	Impemeable Area (ha)	0.886
	Map	Maximum Allowable Discharge (l/s)	5.0
	M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
	Ratio R	Safety Factor	2.0
	Climate Change (%)	0	


	Results
	<p>Global Variables require approximate storage of between 82 m³ and 131 m³.</p> <p>These values are estimates only and should not be used for design purposes.</p>


30 YEAR RETURN PERIOD STORM EVENT

 Variables Results Design Overview 2D Overview 3D Vt	Variables		
	FSR Rainfall	Cv (Summer)	0.750
	Return Period (years)	Cv (Winter)	0.840
	Region	Impemeable Area (ha)	0.886
	Map	Maximum Allowable Discharge (l/s)	5.0
	M5-60 (mm)	Infiltration Coefficient (m/hr)	0.00000
	Ratio R	Safety Factor	2.0
	Climate Change (%)	0	


	Results
	<p>Global Variables require approximate storage of between 253 m³ and 353 m³.</p> <p>These values are estimates only and should not be used for design purposes.</p>


100 YEAR RETURN PERIOD STORM EVENT + 20% CLIMATE CHANGE

 Variables Results Design Overview 2D Overview 3D Vt	Variables				
	FSR Rainfall	Cv (Summer)	0.750		
	Return Period (years)	100	Cv (Winter)	0.840	
	Region	England and Wales	Impemeable Area (ha)	0.886	
	Map	M5-60 (mm)	20.000	Maximum Allowable Discharge (l/s)	5.0
		Ratio R	0.411	Infiltration Coefficient (m/hr)	0.00000
				Safety Factor	2.0
			Climate Change (%)	20	

	Results
	<p>Global Variables require approximate storage of between 445 m³ and 599 m³.</p> <p>These values are estimates only and should not be used for design purposes.</p>

100 YEAR RETURN PERIOD STORM EVENT + 40% CLIMATE CHANGE

 Variables Results Design Overview 2D Overview 3D Vt	Variables				
	FSR Rainfall	Cv (Summer)	0.750		
	Return Period (years)	100	Cv (Winter)	0.840	
	Region	England and Wales	Impemeable Area (ha)	0.886	
	Map	M5-60 (mm)	20.000	Maximum Allowable Discharge (l/s)	5.0
		Ratio R	0.411	Infiltration Coefficient (m/hr)	0.00000
				Safety Factor	2.0
			Climate Change (%)	40	

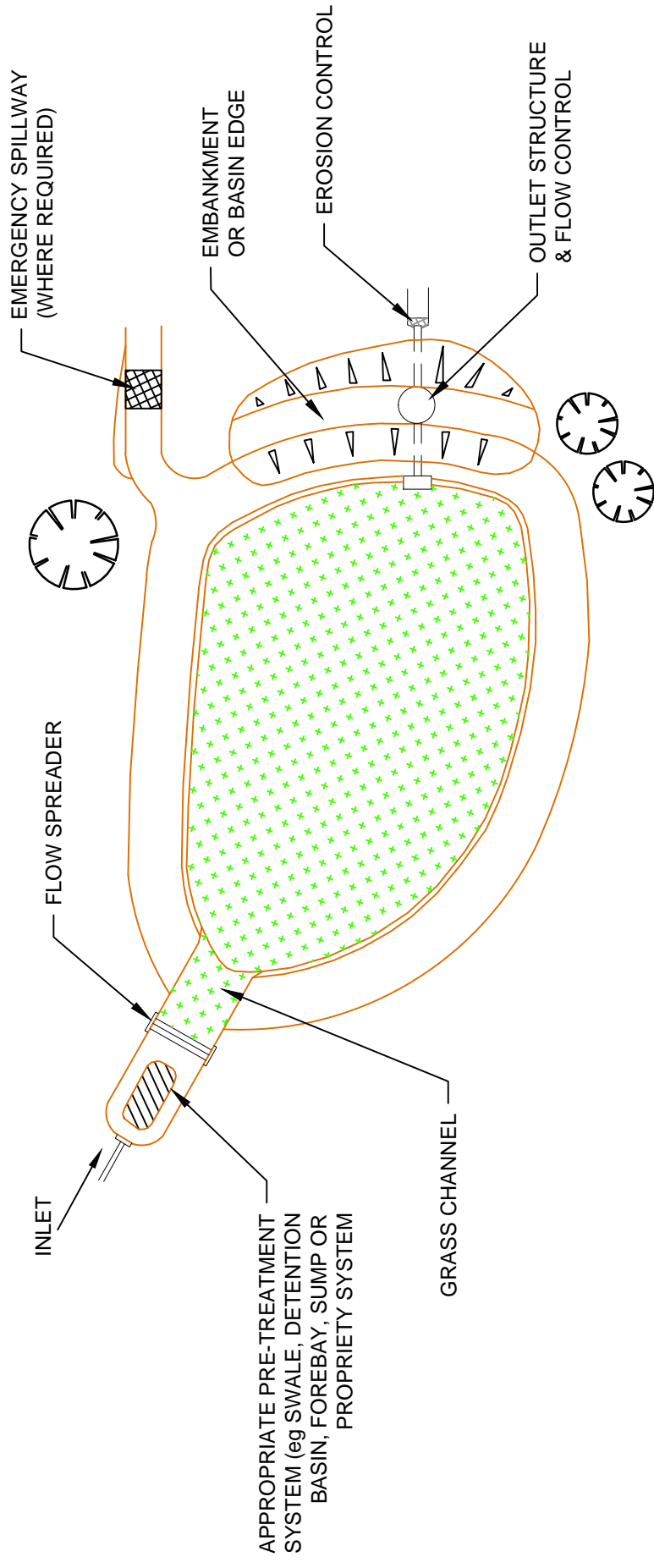
	Results
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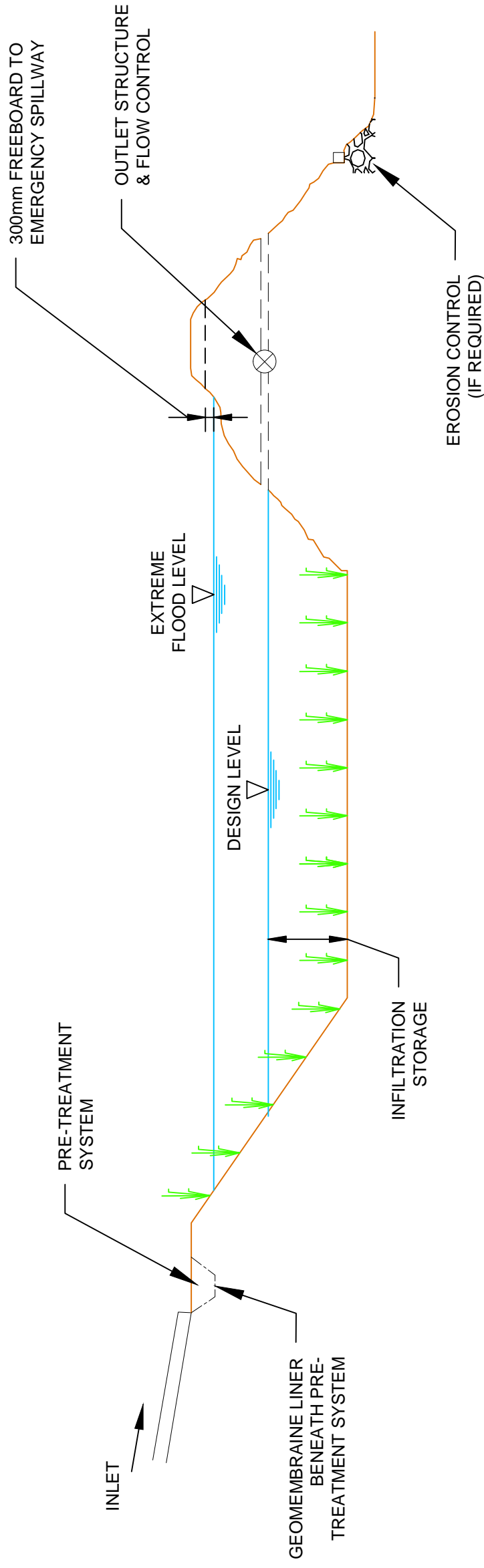
APPENDIX M: TYPICAL SUDS DETAILS

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DO NOT SCALE



PLAN VIEW



ELEVATION

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS:

PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:

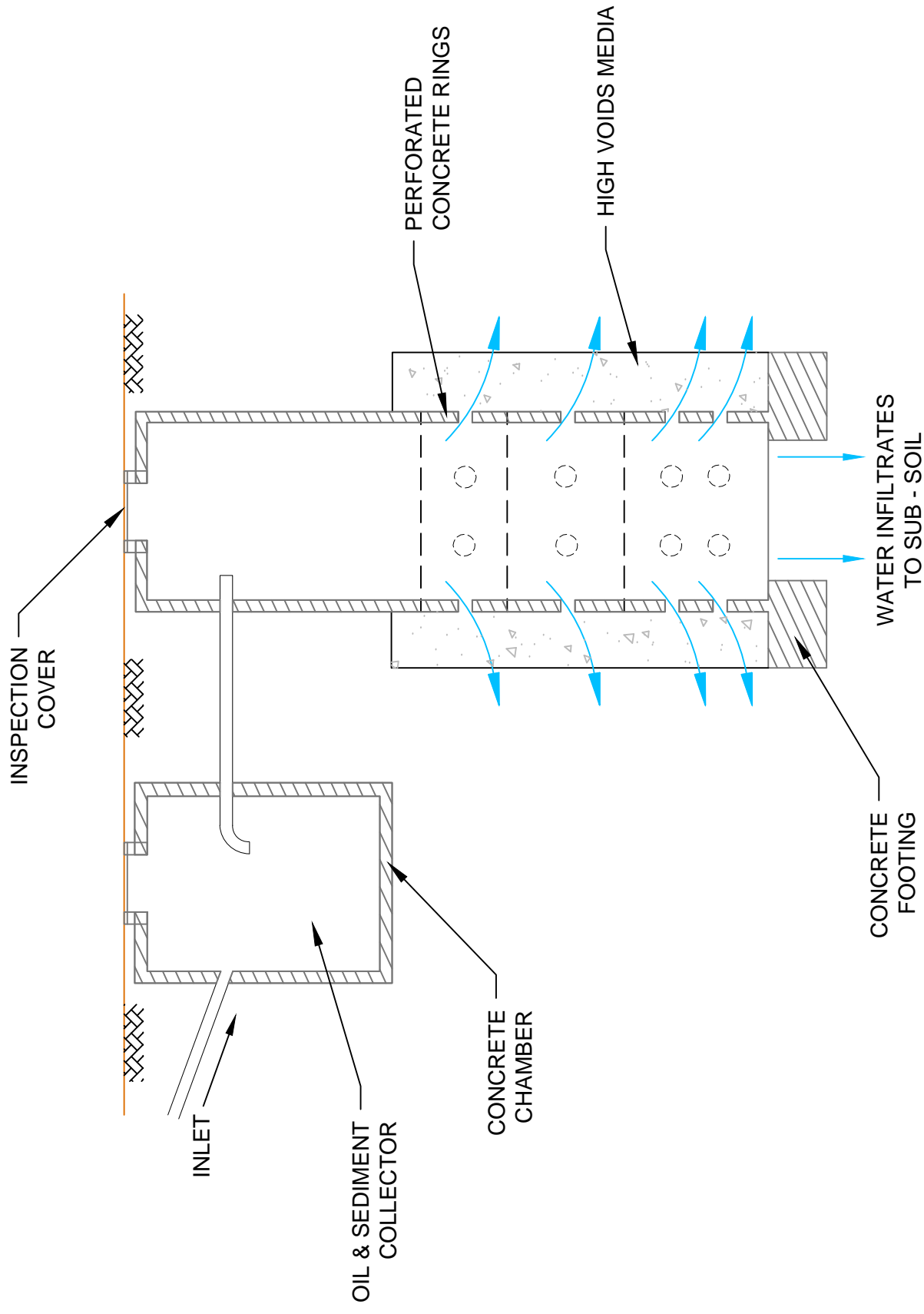
TYPICAL SUDS DETAIL

TITLE:

INFILTRATION BASINS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS	DRAWING No: 109	REV: A	

DO NOT SCALE



SOAKAWAY DETAILS
(INCLUDING PRE-TREATMENT DEVICE)

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:

TYPICAL SUDS DETAIL

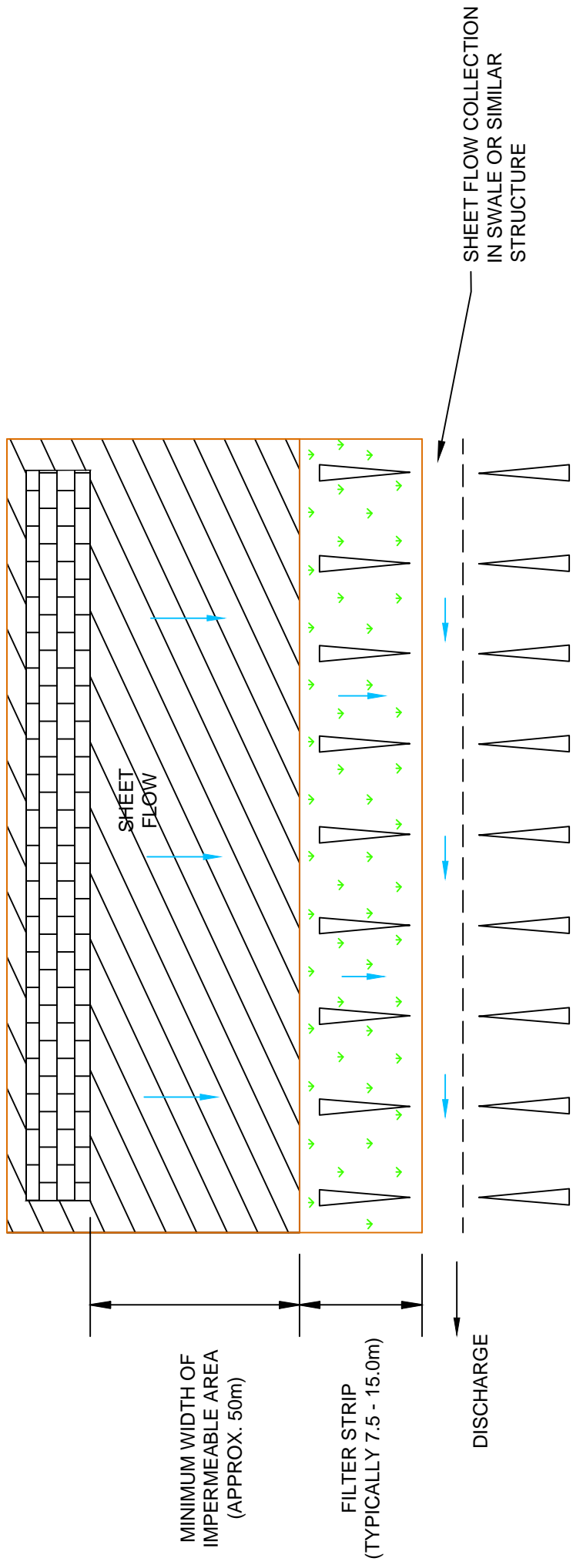
TITLE:

SOAKAWAYS

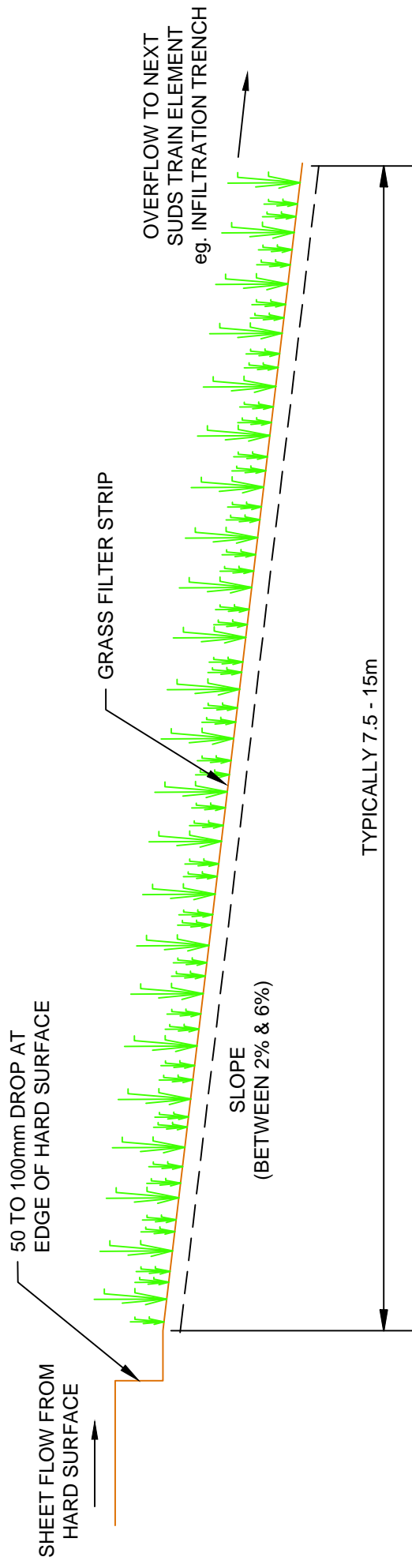
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SEP 2014	@ A3	CP	RDN

PROJECT No:	DRAWING No:	REV:
BETTS	108	A

DO NOT SCALE



PLAN



ELEVATION

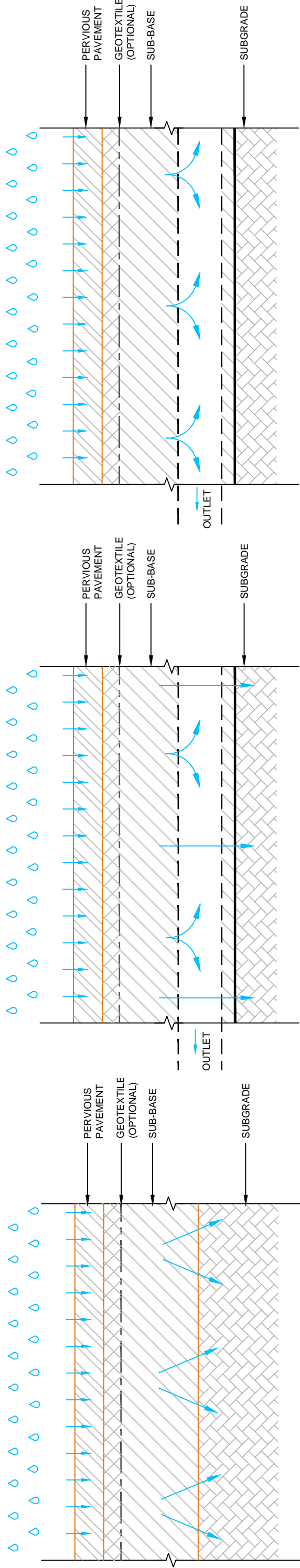
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DRAWING STATUS: PRELIMINARY				

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:				
TITLE:	TYPICAL SUDS DETAIL			
FILTER STRIPS				

DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
SEP 2014	@ A3	CP	RDN
PROJECT No:	DRAWING No:	REV:	
BETTS	107	A	

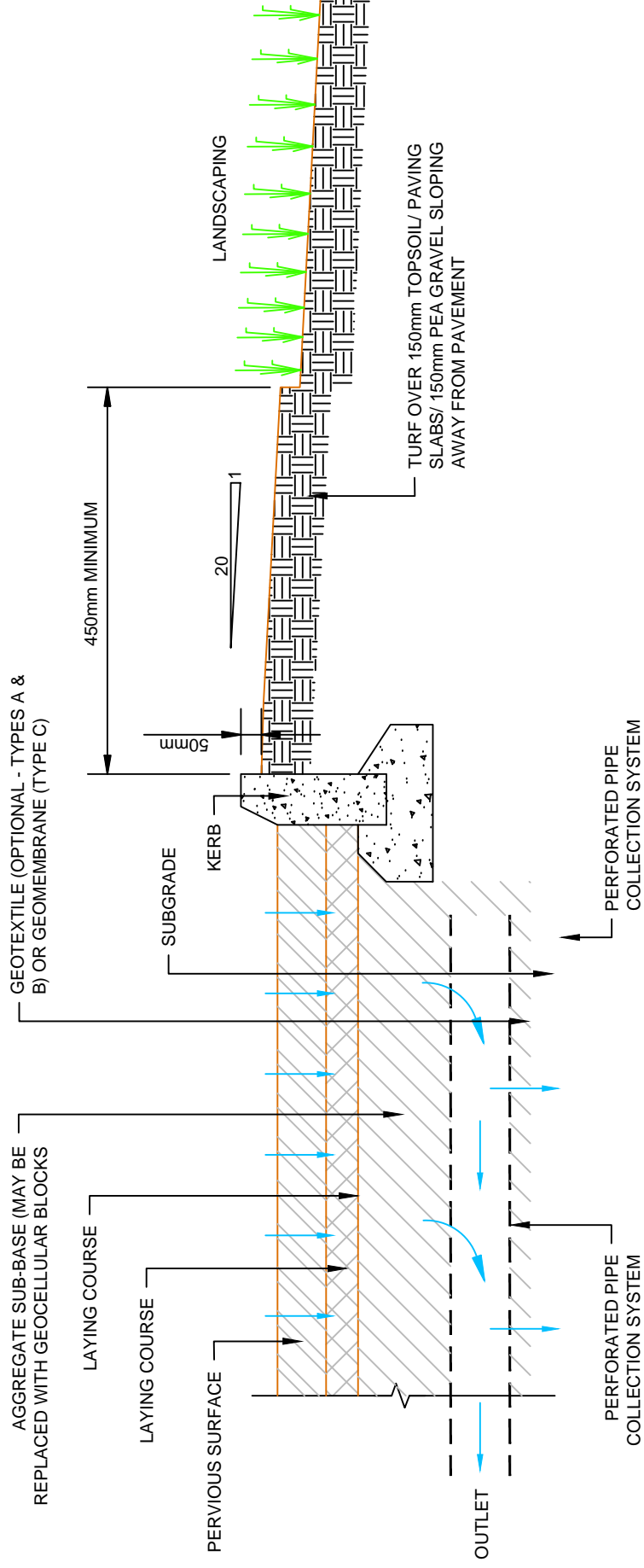
DO NOT SCALE



TYPE A: TOTAL INFILTRATION

TYPE B: PARTIAL INFILTRATION

TYPE C: NO INFILTRATION



LANDSCAPING DETAIL

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS:

PRELIMINARY

BETTS ASSOCIATES
 CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:

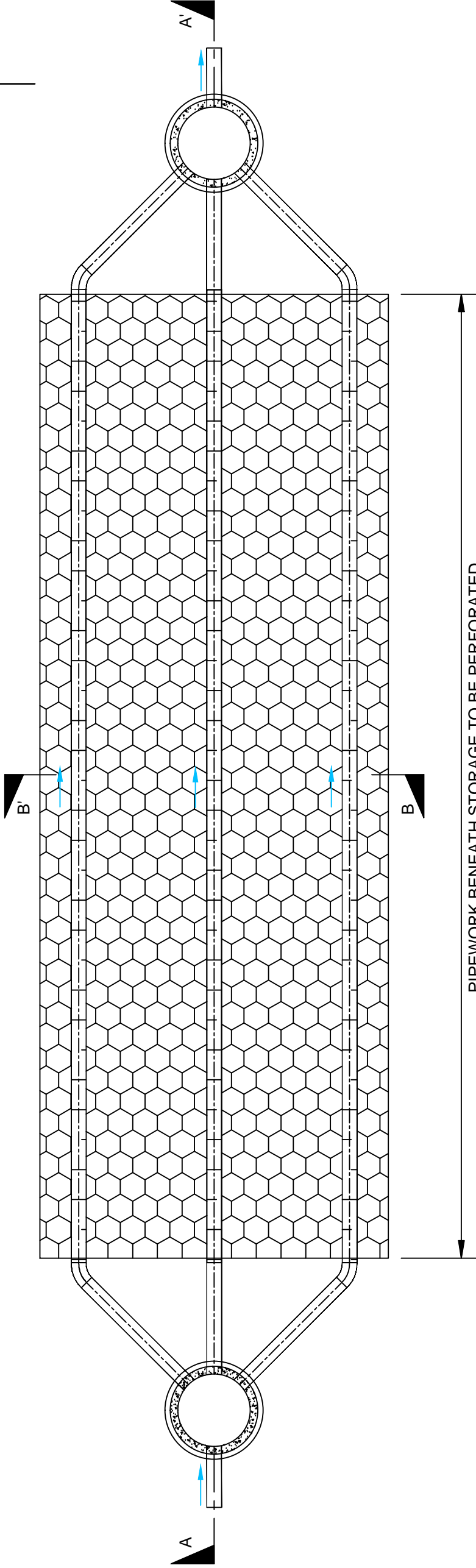
TYPICAL SUDS DETAIL

TITLE:

PERVIOUS PAVEMENTS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS	DRAWING No: 105	REV: A	

DO NOT SCALE

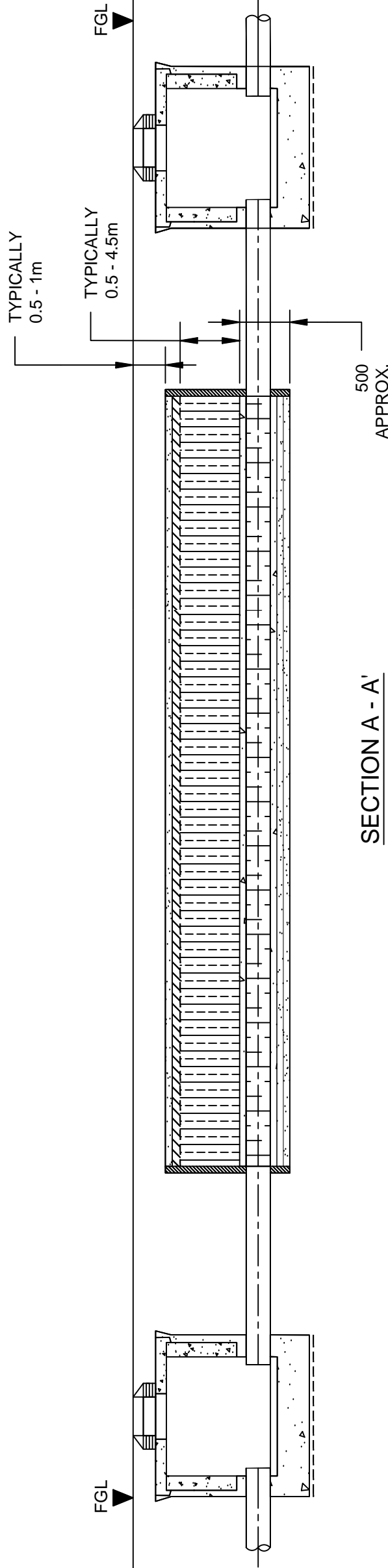


PLAN

REV	DATE	BY	DESCRIPTION	CHK

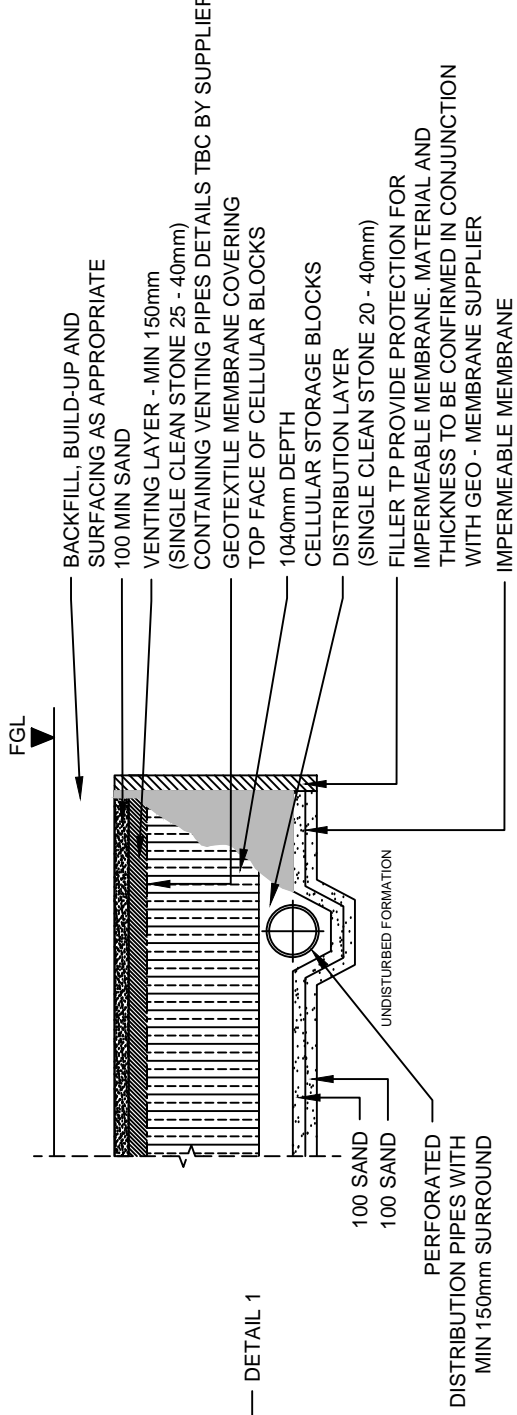
DRAWING STATUS: PRELIMINARY

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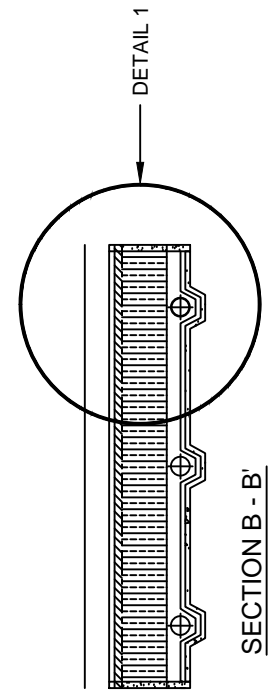


SECTION A - A'

ALL DIMENSIONS AND DEPTHS DEPENDENT ON REQUIRED VOLUME AND LOCAL GROUND CONDITIONS



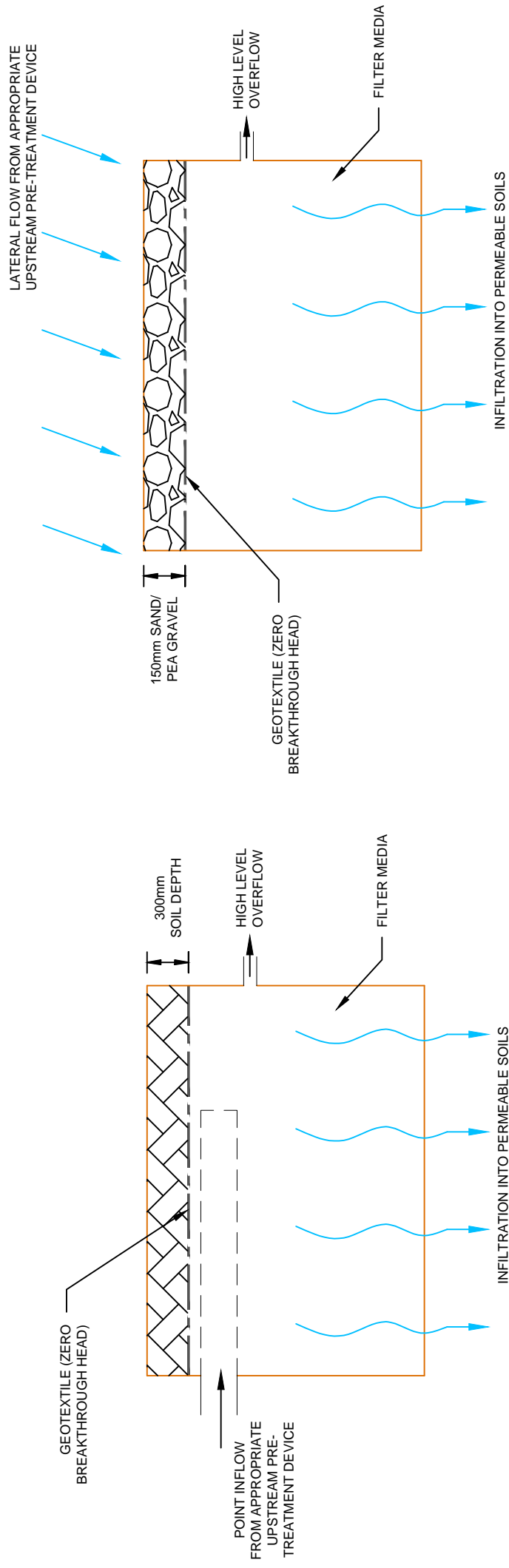
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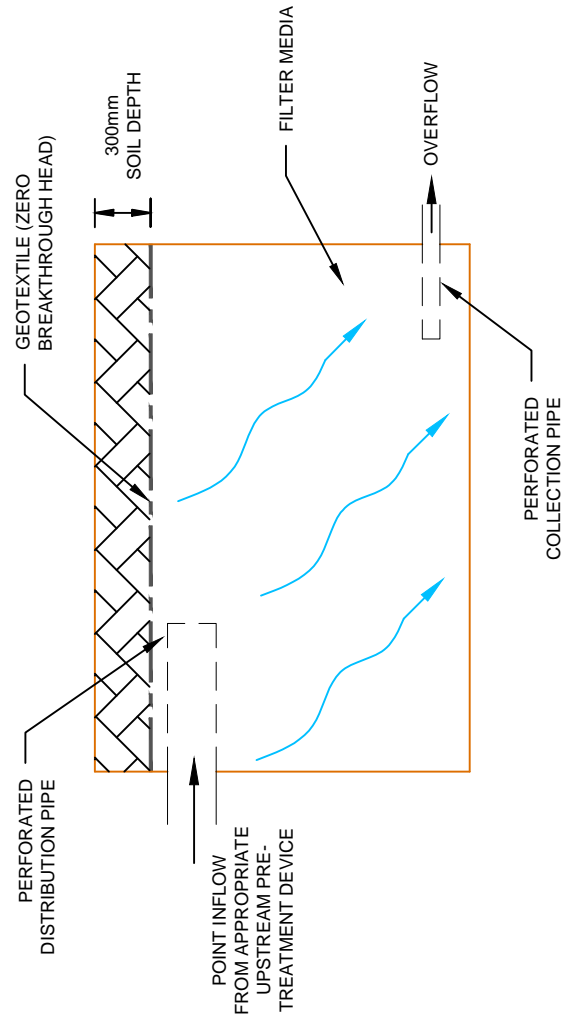
SECTION B - B'

PROJECT:	TYPICAL SUDS DETAIL			
TITLE:	CELLULAR STORAGE			
DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:	REV:
SEP 2014	A3	CP	RDN	A
PROJECT No:	DRAWING No:		REV:	
BETTS	113		A	

DO NOT SCALE



INFILTRATION TRENCH SCHEMATICS



FILTER TRENCH SCHEMATICS

PRELIMINARY

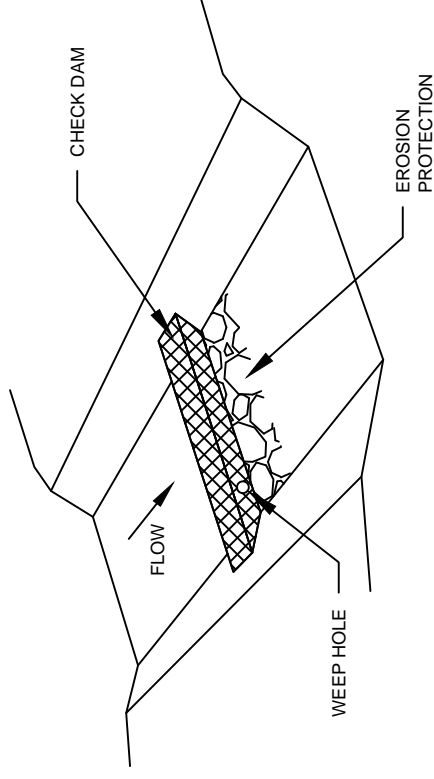
BETTS ASSOCIATES
 CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT: TYPICAL SUDS DETAIL
 TITLE: TRENCHES

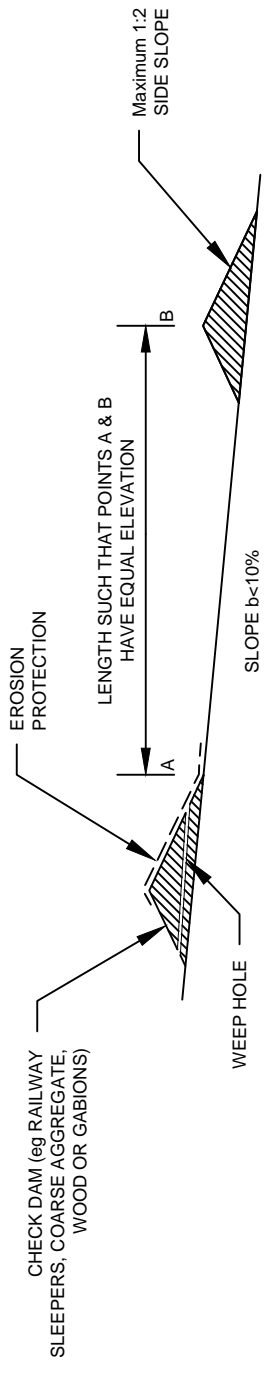
DATE: SEP 2014	SCALE @ SIZE: A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS	DRAWING No: 105	REV: A	

REV	DATE	BY	DESCRIPTION	CHK

DO NOT SCALE

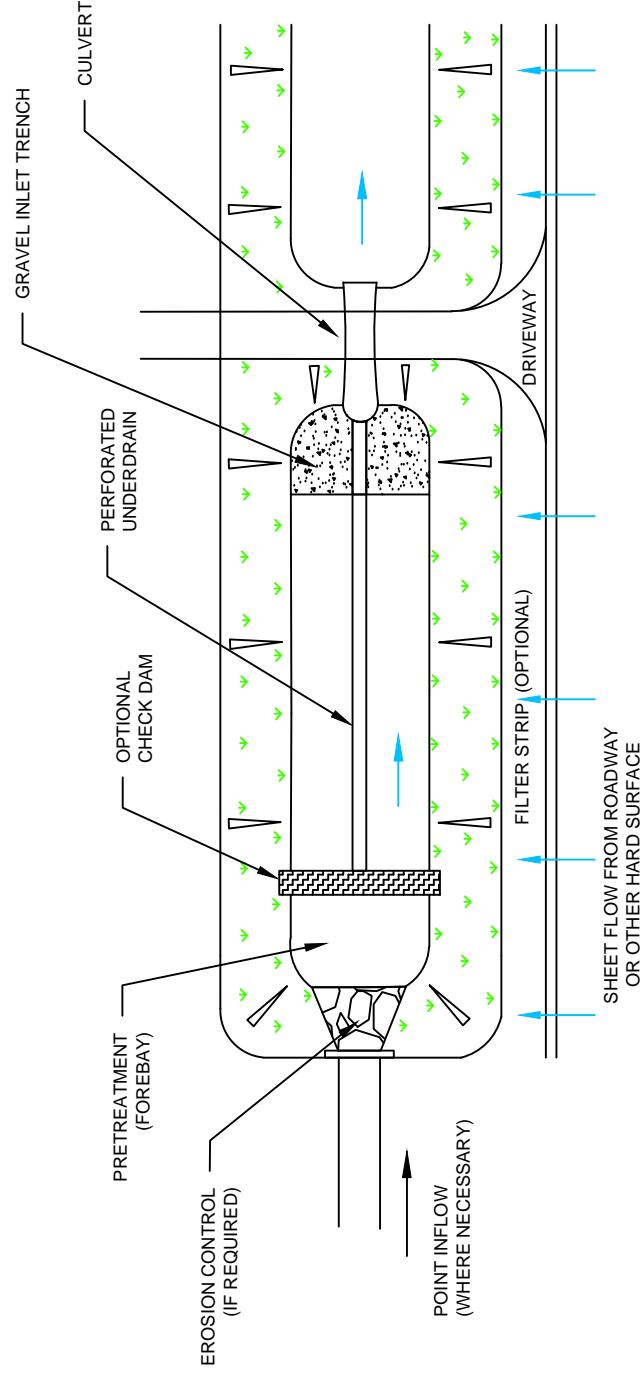


SCHEMATIC



ELEVATION

CHECK DAM



ENHANCED DRY SWALE

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS: **PRELIMINARY**

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:

TYPICAL SUDS DETAIL

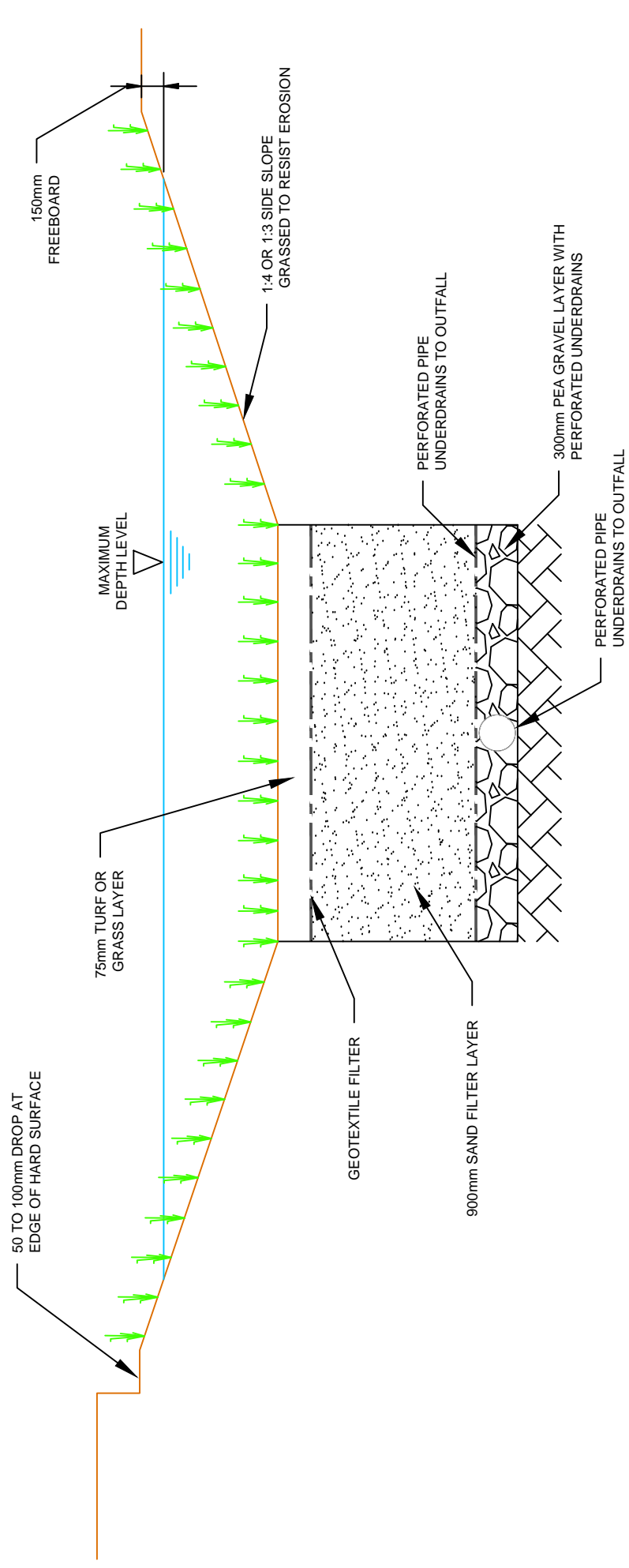
TITLE:

SWALES
(2 of 2)

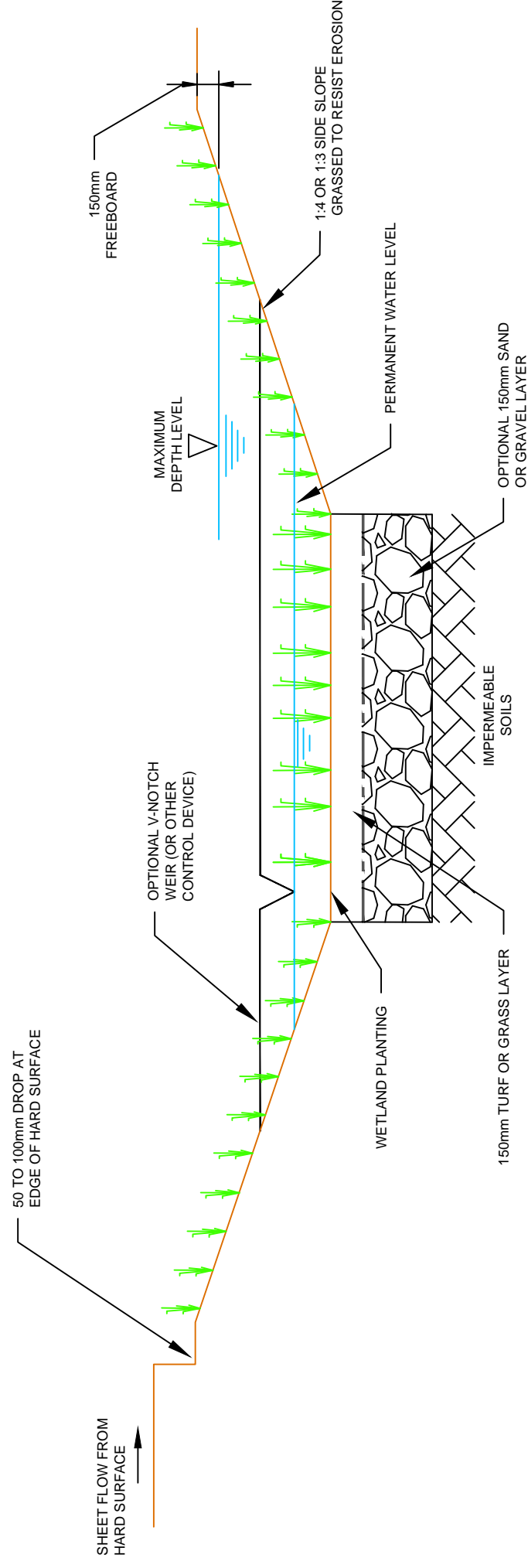
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PROJECT No: BETTS	DRAWING No: 104	REV: A
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DO NOT SCALE



DRY SWALE



WET SWALE

REV	DATE	BY	DESCRIPTION	CHK
DRAWING STATUS: PRELIMINARY				

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 CIVIL AND STRUCTURAL ENGINEERS
 Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
 Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:
 TITLE:

TYPICAL SUDS DETAIL

DATE: SEP 2014	SCALE @ SIZE: A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS	DRAWING No: 103	REV: A	

APPENDIX N: NOTES OF LIMITATIONS

The data essentially comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information.

This report was prepared by Betts Hydro Ltd for the sole and exclusive use of the titled client in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

This document has been prepared for the titled project only and should any third party wish to use or rely upon the contents of the report, written approval from Betts Hydro Ltd must be sought.

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