

ONE HORTON HEATH

FLOOD RISK ASSESSMENT ADDENDUM (O/20/89498)

1. Introduction

- 1.1. A Flood Risk Assessment (FRA) was prepared by PFA Consulting (reference G277-DOC01 FRA - Issue 2) to support the Outline Planning Application (OPA) for the proposed One Horton Heath development, under planning application reference number (O/20/89498).
- 1.2. This Flood Risk Assessment Addendum technical note has been prepared by PFA Consulting on behalf of Eastleigh Borough Council to summarise the emergent ecological mitigation measures proposed for the OPA.
- 1.3. This technical note captures the changes incorporated into the proposed water management strategy, relating to water quality, that have evolved through the application process for the One Horton Heath development.

2. Surface Water Management Strategy

- 2.1. This section summaries the proposed water quality measures incorporated within the OPA surface water management strategy.
- 2.2. A sustainable drainage strategy, involving the implementation of SuDS, is proposed for managing surface water on the site.
- 2.3. A full range of SuDS techniques has been considered for use on the site. Through early discussions with the Lead Local Flood Authority (LLFA) and other stakeholders, it was agreed that the Strategic SuDS Features on the site should comprise above ground storage features within the green corridors that follow the existing onsite watercourses. An overview of the proposed SuDS features and their associated outfall locations is shown on drawing numbers G277/38 and G277/39 in **Appendix A**.
- 2.4. Additional source control measures should be utilised within the upstream development parcels. This approach provides flexibility for the detailed design of individual development parcels whilst maximising the water quality, water quantity, amenity and biodiversity benefits of the overall SuDS strategy.
- 2.5. A SuDS 'management train' approach is proposed to be implemented on the site. Guidance on the SuDS Features that should make up the SuDS management train is shown on drawing number G277/24 Rev A, a copy of which is contained in **Appendix B**.
- 2.6. In terms of the SuDS 'management train', the surface water management strategy for the proposed development seeks to address the quality and quantity of runoff as follows:-

i) Prevention

- 2.7. Prevention is the use of good site design and housekeeping measures to prevent pollution. Good site design and housekeeping measures that should be considered include:
 - Minimising the impermeable areas created on the site by providing soft landscaping and planting wherever possible.

- Good site wide housekeeping and maintenance to minimise blockages and prevent pollution arising.
- Provision of water butts for rear gardens.
- The use of green roofs for public / commercial buildings where appropriate.
- The use of rainwater harvesting / reuse systems for public / commercial buildings and irrigation where appropriate.
- Installation of separators and other proprietary pollution control systems where land use requires or specific risks necessitate their use.
- Silt traps and trapped gullies to retain sediment.
- Planting within landscaped areas to encourage nutrient / pollutant uptake and evapotranspiration.
- The implementation of a SuDS Maintenance Strategy. Advice on what should be included within a maintenance strategy for the Strategic SuDS Features is included with this report. The SuDS Maintenance Strategy should become a living document that is continuously reviewed.

ii) Source Control

2.8. Source control is defined in The SuDS Manual 2015 (CIRIA C753) as the control of runoff at or near its source, so that it does not enter the drainage system or is delayed and attenuated before it enters the drainage system. Source Control techniques that should be used within development parcels include the following:

- **Pervious Paving:** Pervious paving intercepts rainfall that lands on its surface before it can run overland into the downstream drainage system. This provides a degree of interception, particularly in the most polluted first-flush events, as well as filtration through the various layers of construction and through the stone sub-base. Pervious paving would typically be used for parking areas such as driveways, parking courts and car parks. Through the inclusion of a suitable flow control device, the stone sub-base in the pervious paving structure can be utilised to provide additional attenuation storage.
- **Bioretention Areas / Rain Gardens:** Bioretention areas utilise planting and constructed soils to intercept rainfall from their contributing catchment areas and contribute to interception storage, evapotranspiration and pollution removal. They can be placed around downpipes to intercept roof runoff, particularly from larger commercial buildings where they can form part of the landscape design. They can also be incorporated into traffic calming infrastructure such as build outs and into roadside planting and tree pits. Bioretention Swales can be installed adjacent to larger areas of highway to provide water quality treatment and attenuation storage along their length.
- **Other filtration techniques:** Filter Trenches and French Drains can be used to intercept runoff from larger parking areas and highway areas. These will provide interception storage and filtration through the stone fill within the trenches.

iii) Site Control

2.9. Site control is the management of water from several sub-catchments within a development parcel. Through close consultation with the layout designers flow conveyance measures such as swales and filter trenches should be incorporated into the development parcels to provide additional attenuation, treatment, amenity and opportunities for habitat creation.

iv) Regional Control

2.10. Regional control is the strategic management of runoff across the wider site. The Strategic SuDS Features will provide the attenuation volume and flow control required to reduce post-development flow rates to below greenfield runoff rates.

- 2.11. The proper implementation of a SuDS management / treatment train using a combination of upstream source control and strategic SuDS features will create greater resilience and allow the system to collect silt at various points which can then be removed as part of periodic maintenance.
- 2.12. Detailed design of the individual development parcels should, where possible, create a diverse SuDS scheme that encourages sedimentation, filtration and biological uptake throughout the site; ensuring that effective maintenance and management procedures are followed will be the key to ensuring the overall effectiveness of the SuDS scheme.

Water Quality

- 2.13. With reference to Chapter 26 of the CIRIA SuDS Manual 2015, and using the simple index approach, to deliver adequate treatment the SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type):

Total SuDS mitigation index > pollution hazard index

- 2.14. From Table 26.2 in the CIRIA SuDS Manual 2015 the pollution hazard indices for each contaminant type for the proposed land use are shown in **Table A** below.

Table A: Pollution hazard indices

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (commercial)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach)	0.05
Property driveways, residential car parks, low traffic roads and non-residential car parking with infrequent change (eg school, offices)	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change, all roads except low traffic roads and trunk roads/motorways.	Medium	0.7	0.6	0.7
Sites with heavy pollution, sites where chemicals and fuels are to be delivered, handled, stored, used or manufactured, industrial sites, trunk roads and motorways.	High	0.8	0.8	0.9

- 2.15. From Table 26.3 in the CIRIA SuDS Manual 2015 the indicative SuDS mitigation indices for discharges to surface waters for the SuDS components proposed on the site are shown in **Table B** below.

Table B: Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	TSS	Metals	Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Hydrodynamic vortex separator *	0.8	0.8	0.8

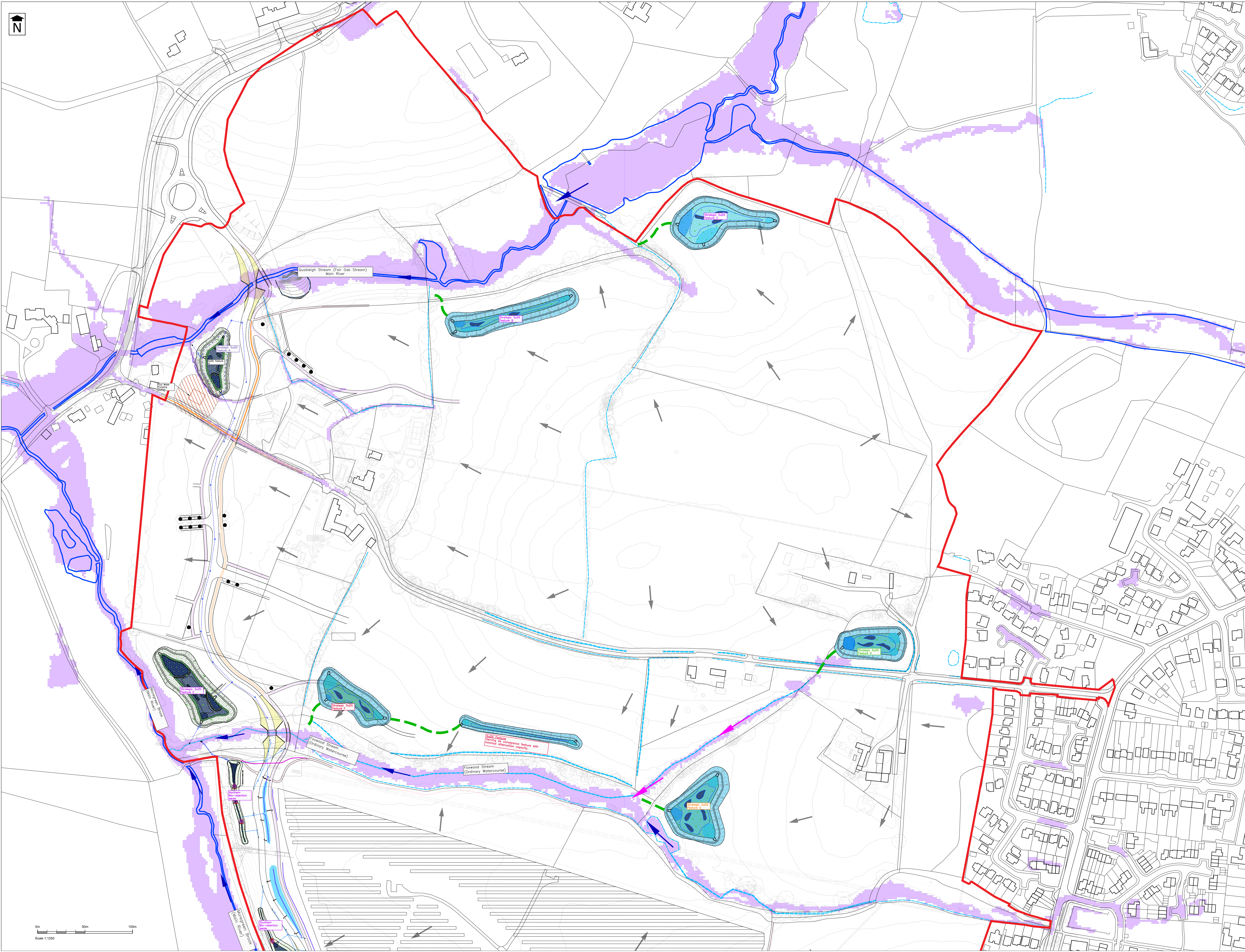
* Proprietary treatment systems must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.

- 2.16. It is proposed that surface water runoff from all development areas on the site will be treated by a SuDS Management Train consisting of source control techniques, strategic SuDS features and mechanical separators. The source control techniques designed for the individual development parcels should take account of the Pollution Hazard Indices and the Mitigation Indices shown in Tables A and B above.
- 2.17. In addition to the upstream source control measures, runoff from all development areas on the site will pass through at least one Strategic SuDS Feature. The Strategic SuDS Features are enhanced features that promote sedimentation and filtration through multiple forms incorporated into the feature's design.
- 2.18. The Strategic SuDS Features will incorporate the following treatment processes as a minimum: -
- Sediment forebays at inlets.
 - Extensive wetland areas incorporating micro pools.
 - Wetland planting.
 - Secondary sedimentation areas prior to outlets.
- 2.19. The incorporation of the above measures forming distinct zones within the Strategic SuDS Features will promote water quality through increased retention times, filtration and sedimentation. Filtration, chemical precipitation, microbial degradation and vegetation uptake are key features/processes associated with these enhanced SuDS features.
- 2.20. As an additional measure, mechanical separation in the form of Downstream Defenders, or similar approved apparatus, will be incorporated downstream of Strategic SuDS Features. This approach has already been implemented for the Southern Access and should be replicated elsewhere on the site. Details of the proposed Downstream Defenders are contained in **Appendix C**.

- 2.21. An example of a typical layout for the Strategic SuDS Features is shown on the 'Typical Layout of Strategic SuDS Features Plan' in **Appendix D**. It is intended that this drawing should be used to inform the detailed design of the Strategic SuDS Features to ensure that the treatment processes outlined above are fully incorporated.
- 2.22. With reference to Tables A and B above it can be seen that the total pollution mitigation associated with the wetland areas equals or exceeds the pollution hazard index (for each contaminant type), for the land uses proposed on the site with the possible exception of B2 and B8 land uses.
- 2.23. Where individual land uses present a 'High' pollution hazard level then bespoke solutions will need to be designed for these locations. For example, bioretention systems and proprietary treatment systems should be considered and their design should be targeted at the specific contaminant types associated with the proposed land use.
- 2.24. Provided that good practice is followed and that suitable housekeeping and maintenance of the SuDS features and wider site is undertaken, based on the Pollution and Mitigation Indices, it is not envisaged that increased sediment loads would occur post construction. On the basis that the post-construction sediment shed would be lower than the existing baseline, there is no requirement for water monitoring or any additional post construction mitigation measures.

3. Summary

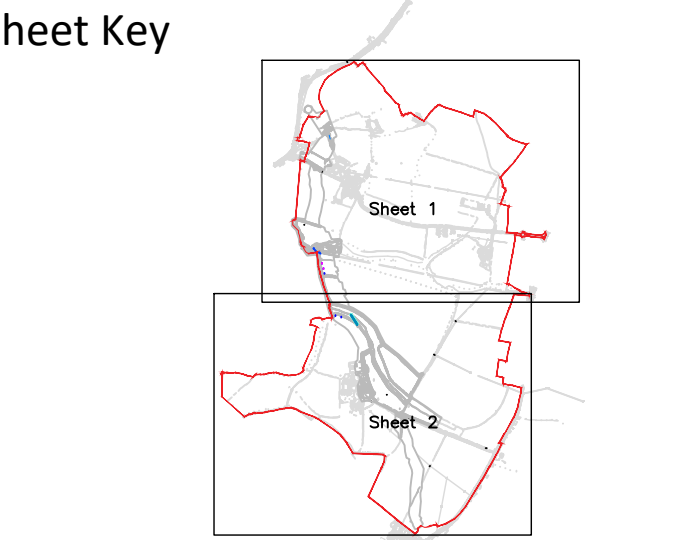
- 3.1. The Strategic SuDS Features proposed should incorporate the distinct treatment processes described above which, together with effective housekeeping and maintenance procedures, would ensure their effectiveness over the lifetime of the development.
- 3.2. Mechanical separation in the form of Downstream Defenders, or similar approved apparatus, will be incorporated downstream of the proposed Strategic SuDS Features.
- 3.3. Detailed design of the individual development parcels should, where possible, create a diverse SuDS scheme that incorporates the principles of the SuDS 'management train' set out in this technical note.



For Planning
This drawing is produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

- NOTES**
1. This drawing is based on the Topographical Survey undertaken by Moyer Brown Limited, Drawing No.1001.21.1, Rev E, dated 05 May 2014 and Encompass Survey's drawing number ENG/ONE-HH-DEC20.
 2. This drawing is based on Clough Architects' Proposed Illustrative Plan drawing Extracts 1 - 7, drawing number Z2100A/20 - 27.
 3. Details of surface water drainage network associated with the carriageway and shared paths/footway of Segment 3 of the Link Road is shown on Rusey & Stagg's Drawings 10413-SD 3-350 - 362, (as revised).
 4. Typical Su20 drainage details, including typical headwall inlets and outlets is shown on drawing G277/30.

- KEY**
- OPA Site Boundary Red Line
 - Ordinary Watercourse/Ditch
 - Main River
 - Proposed Surface Water Sewer
 - Rusey & Stagg's Proposed Surface Water Sewer
 - Rusey & Stagg's Proposed Land Drain
 - Medium Risk of Flooding from Surface Water (1 in 100 year)
 - Overland Flow Route
 - Overland Flow Route Catchment upstream of proposed Link Road
 - Indicative Surface Water Outfall Route



Rev #	Date	Description	Drawn	Check
1	25.02.22	First Issue	DAB	MWS

Status **FOR PLANNING**

Client

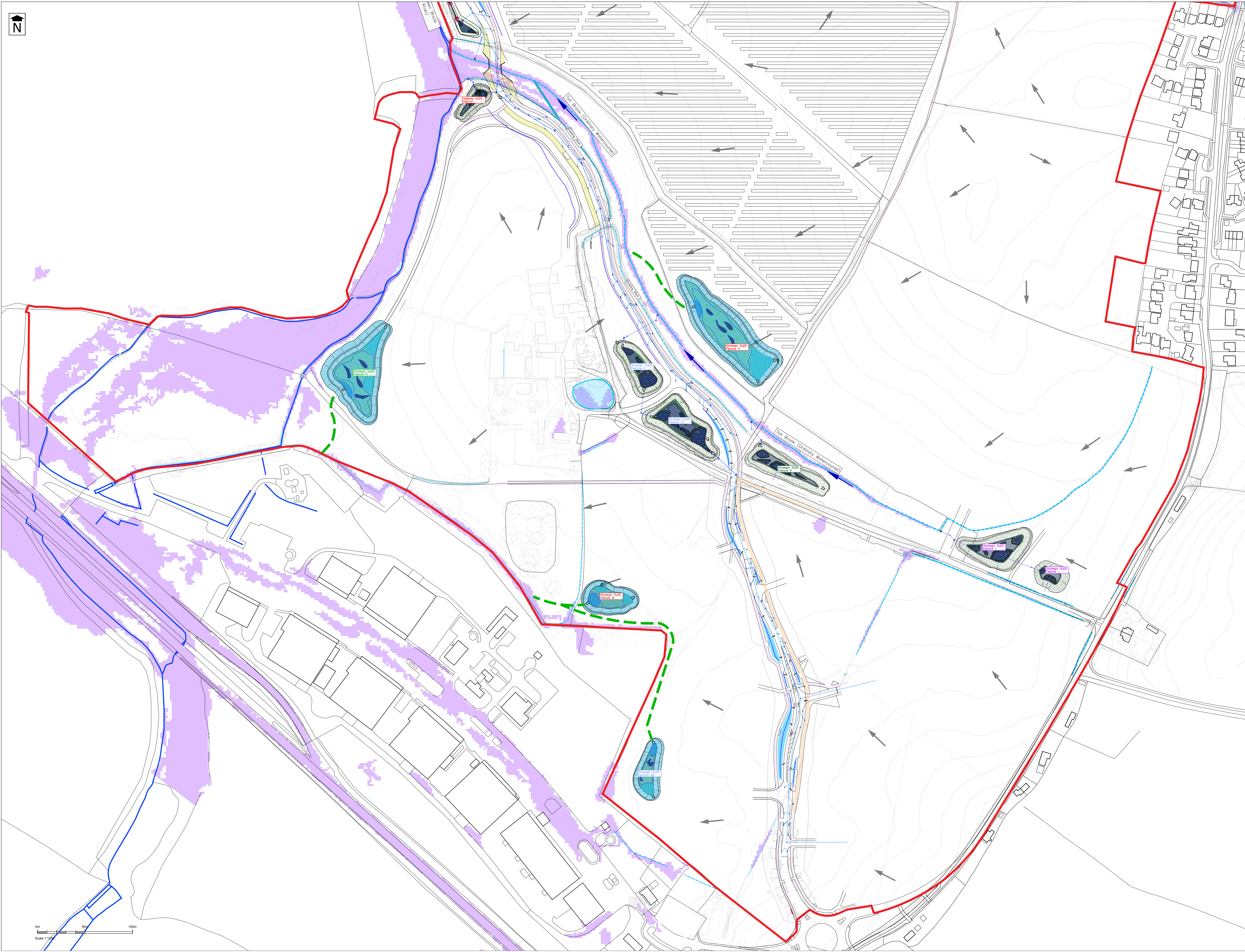
Eastleigh Borough Council

Project

One Horton Heath

Drawing Title
OPA Indicative Outfall Location Plan (Sheet 1 of 2)

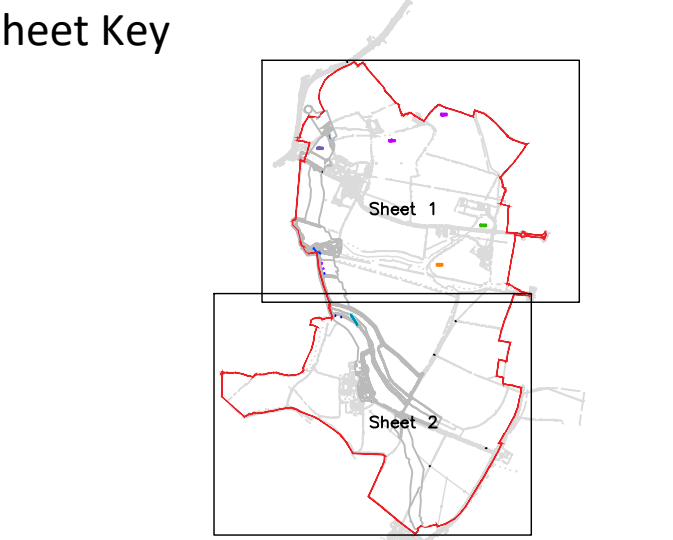
Drawing No. **G277/38**
Date: February 2022 Scale: 1:1250 @ AO
E-Mail: DBuciak@pfaplcn.com



For Planning
This drawing is produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

- NOTES**
- This drawing is based on the Topographical Survey undertaken by Moyer Brown Limited, Drawing No: SAV.1.21.1, Rev E, dated 05 May 2014 and Encompass Survey's drawing number ENG/ONE-HH-DEC20.
 - This drawing is based on Clague Architects' Proposed Illustrative Plan drawing Extracts 1 - 7, drawing number Z2100A/20 - 27.
 - Details of surface water drainage network associated with the carriageway and shared paths/footway of Segment 3 of the Link Road is shown on Reuby & Stagg's Drawings 10413-SD 3-350 - 362, (as revised).
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- KEY**
- OPA Site Boundary Red Line
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1	25.02.22	First Issue	DAB	MWS

Status

FOR PLANNING

Client

Eastleigh Borough Council

Project

One Horton Heath

Drawing Title

**OPA Indicative Outfall
Location Plan
(Sheet 2 of 2)**

Drawing No. **G277/39**

Date: February 2022 Scale: 1:1250 @ A0
E-Mail: DBuciak@pfapl.com

KEY

 Rainfall

 Interception Losses (Evapotranspiration / Infiltration)

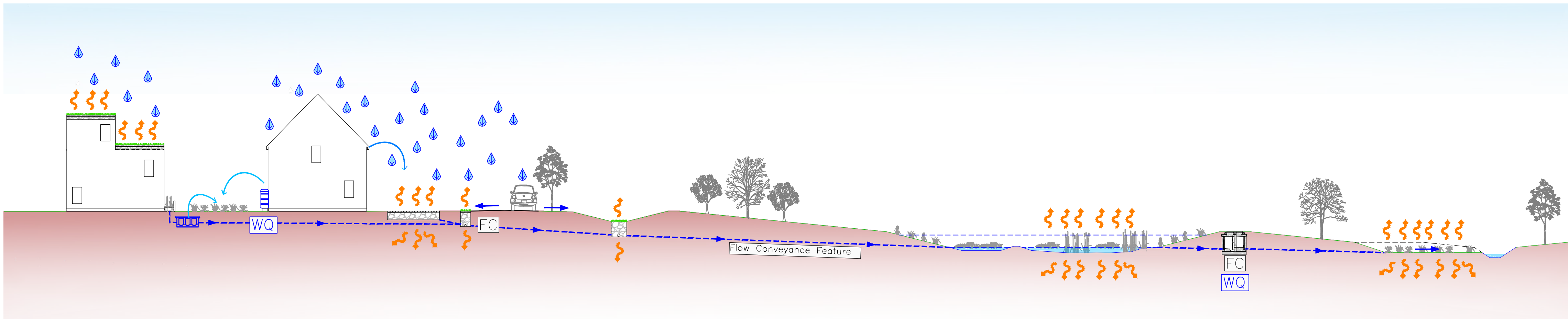
 Water Reuse

 Water Quality Device (Oil Separator / Vortex Separator)

 Flow Control Device (Orifice / Vortex Flow Control)

 Overland Flow

 Surface Water Sewer (connecting SuDS Features)



DEVELOPMENT TYPE	Commercial / Public	Residential	Private / Shared Parking	Public Highway	Conveyance Features	Green Infrastructure / Public Open Space	Watercourse Corridor
MANAGEMENT TRAIN	PREVENTION SOURCE CONTROL SITE / REGIONAL CONTROL						
SuDS FEATURE	Rainwater Harvesting (Reuse for irrigation e.g Rainwater Butts) Green Roofs Bioretention Areas / Rain Gardens Rills	Rainwater Harvesting (Reuse for irrigation e.g Rainwater Butts) Porous Paving Tanks Flow Control Devices	Swales Bioretention Areas Filter Strips Filter Drains		Strategic SuDS incorporating sediment forbays, wetland areas, micropools at the outlet Flow Control Devices Water Quality Devices		Outfall Swale
MAINTENANCE RESPONSIBILITY	Commercial or Public Tenants	Homeowners	Homeowners / Management Company	Highway Authority	Southern Water / Management Company	Southern Water / Management Company	Southern Water / Management Company



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This drawing is produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

NOTES

- Drawing to be read in conjunction with Flood Risk Assessment and Water Management Strategy produced by PFA Consulting (Document Ref: G277-DOC01 Issue 2, Dated May 2021) and Preliminary Water Management Strategy Plan (Drawing No. G277/21 Rev C & G277/22 Rev C).
- Future design of upstream Source Control & Site Control to take account of the principles established in the Water Management Strategy and this drawing.

Rev	Date	Description	Drawn	Check
#	26.11.20	First Issue.	BF	MWS
A	21.05.21	Cross references updated	DAB	MWS

Status
FOR PLANNING

Client
Eastleigh Borough Council

Project
**One Horton Heath
Hampshire**

Drawing Title
SuDS Management Train

Drawing No. **G277/24** Rev A

Date: November 2020 Scale: NTS @ A1
E-Mail: bfox@pfaplc.com

DOWNSTREAM DEFENDER® DESIGN SUMMARY

PROJECT INFORMATION

Reference	SuDS Feature L
Site	One Horton Heath
Designer	Daniel Buciak
Date	16/02/2022 14:12

DESIGN INPUTS

Sediment Type	TFR-FINE
Design Flow Rate (l/s)	11.6
Peak Flow Rate (l/s)	32.5

DESIGN OUTPUTS

Product	HYDRO INTERNATIONAL DOWNSTREAM DEFENDER®
Unit Reference	DD3_1.2M_300DN

UNIT WEIGHTS AND DIMENSIONS

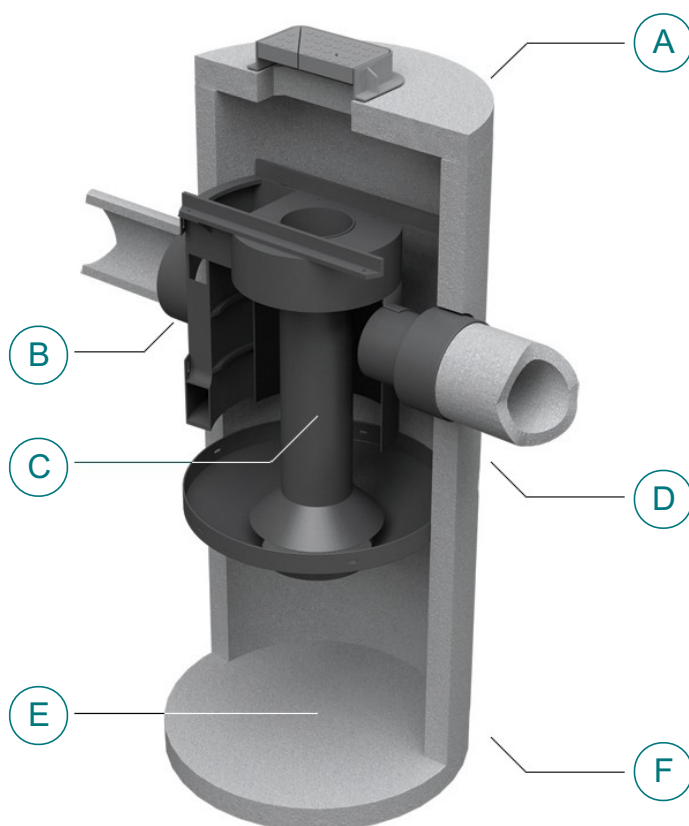
(A) Unit Size (m)	1.20
(B) Inlet Pipe Size (mm)	300
(D) Outlet Pipe Size (mm)	300
(F) Unit Depth (m)	2.83
Inlet Invert Height (m)	1.91
Max. Component Weight (t)	2.2

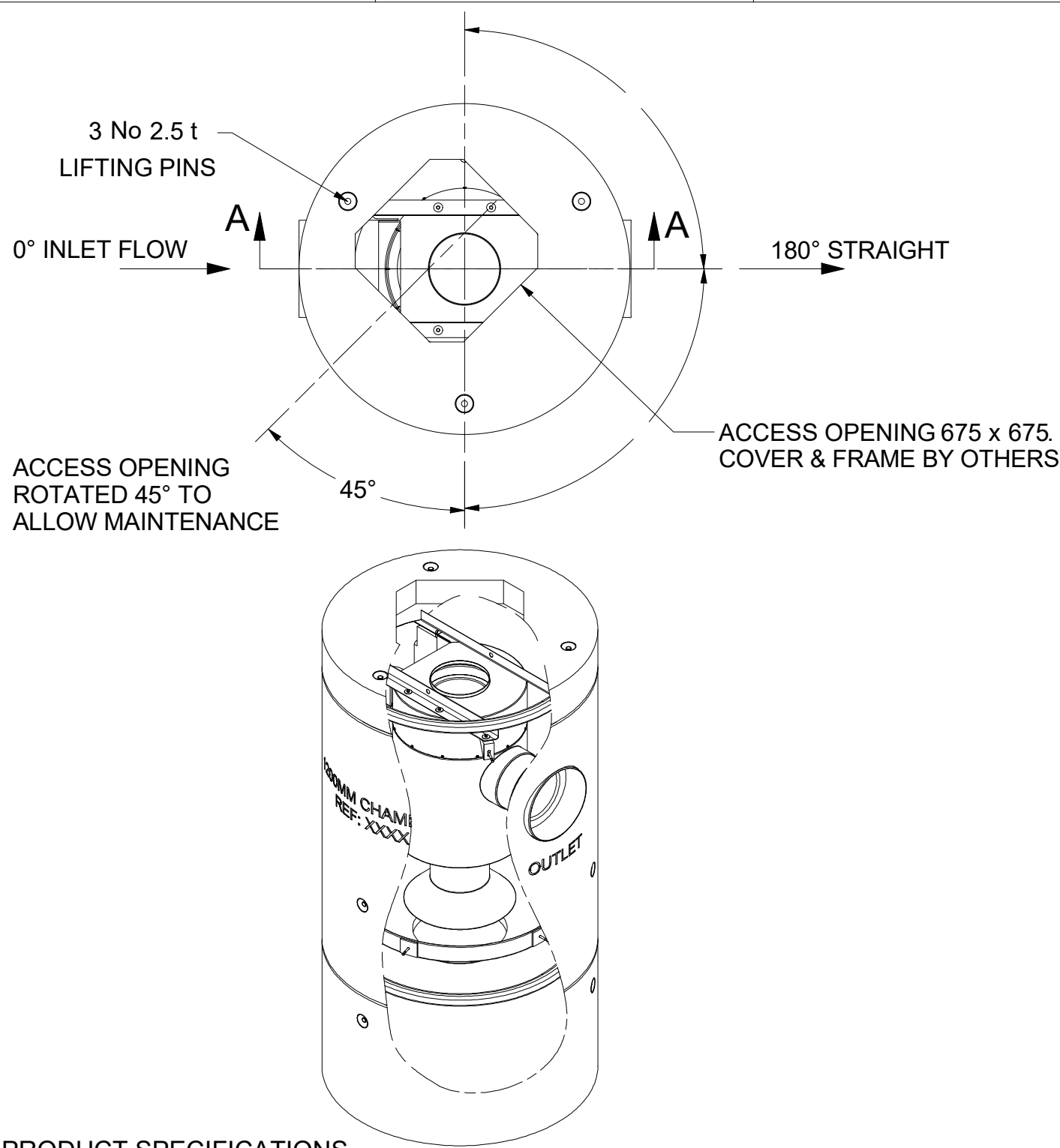
PERFORMANCE AND HYDRAULICS

Max. Treatment Flow-Rate (l/s)	38
Hydraulic Capacity Flow-Rate (l/s)	120
Typical Operating Headloss (mm)	150
Maximum Headloss (mm)	500

STORAGE

(C) Min. Oil Storage Capacity (l)	292.5
(E) Min.Sediment Storage Capacity (m³)	0.39



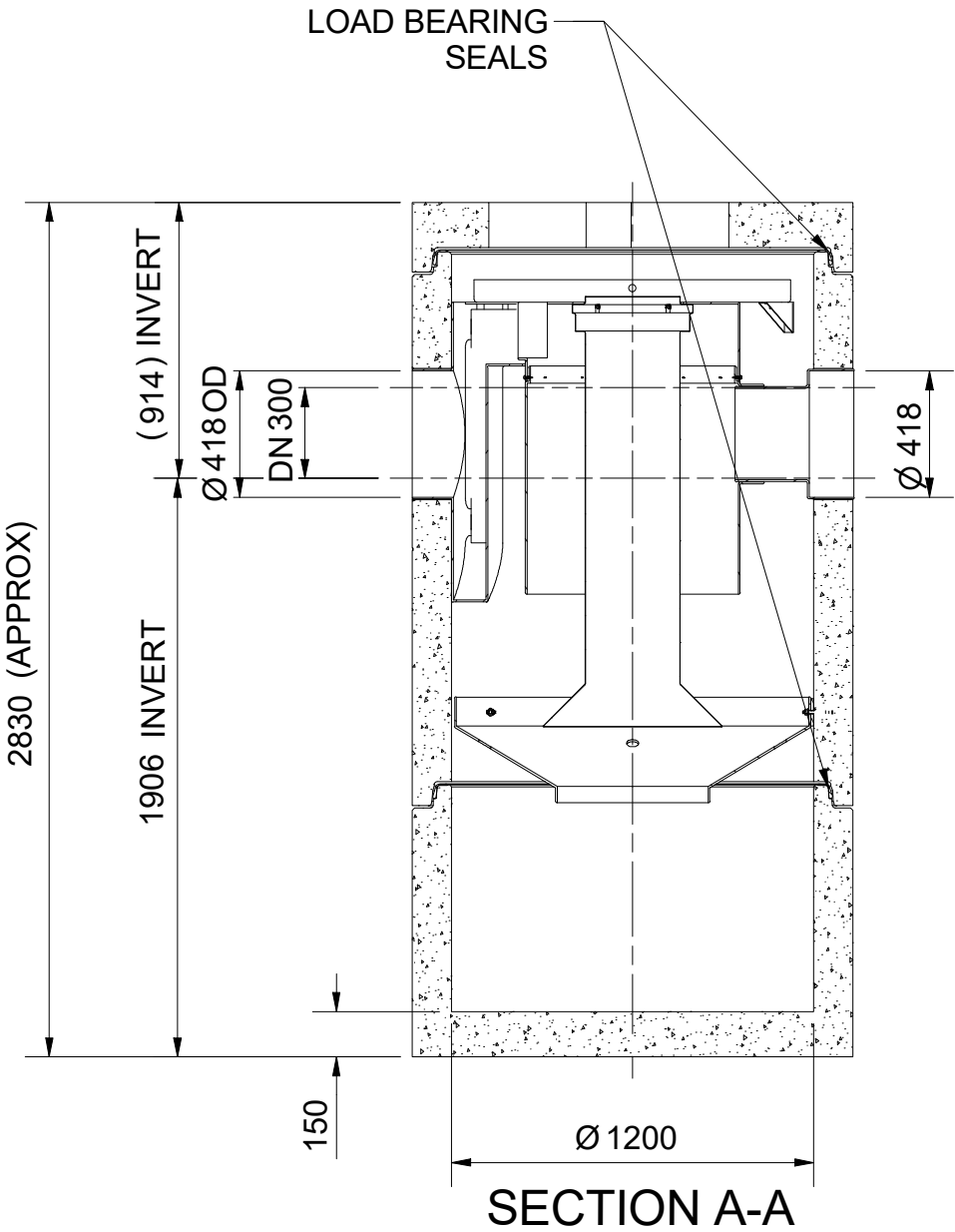


PRODUCT SPECIFICATIONS

TREATMENT FLOW - COARSE	38 l/s
TREATMENT FLOW - FINE	30 l/s
HYDRAULIC CAPACITY	120 l/s
OIL STORAGE CAPACITY	292.5 l
MIN. SEDIMENT STORAGE CAPACITY	0.39 m³

MAXIMUM HEADLOSS AT TREATMENT
FLOW RATE - COARSE (mm) 150

PROJECT			
-	INVERT	MATERIAL	DIAMETER
COVER			
OUTLET			
INLET			



PARTS LIST	
COMPONENT	MASS
1200 PCC Cover slab	0.5 t
1200 PCC Lower Chamber	1.5 t
1200 PCC Upper Section Assembly	2.2 t
DN300 Inlet / Outlet Pipe (By Others)	N/A
Pre Installed Internal Components	N/A
ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF), IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL. ©2019 HYDRO INTERNATIONAL	
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PROJECTION

COMMENTS:

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2. ALL COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE PRODUCTION SPECIFICATION HRD-FM9/15

REVISION HISTORY			
REV	BY	DESCRIPTION	DATE
A	CRA	FIRST ISSUE	04 FEB 19

DATE: 16/10/2018
SCALE: VARIES

DRAWN BY: DGE
CHECKED BY: CJN
APPROVED BY: WCJ

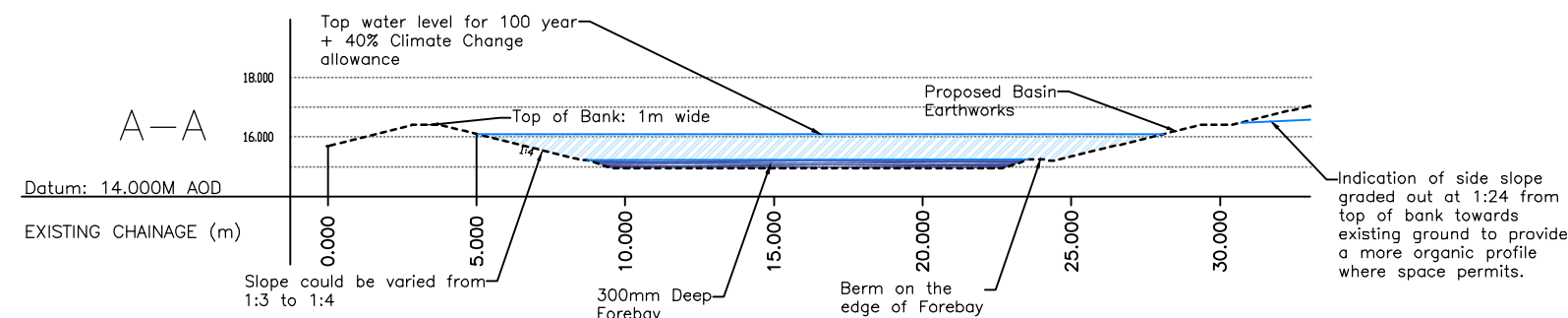
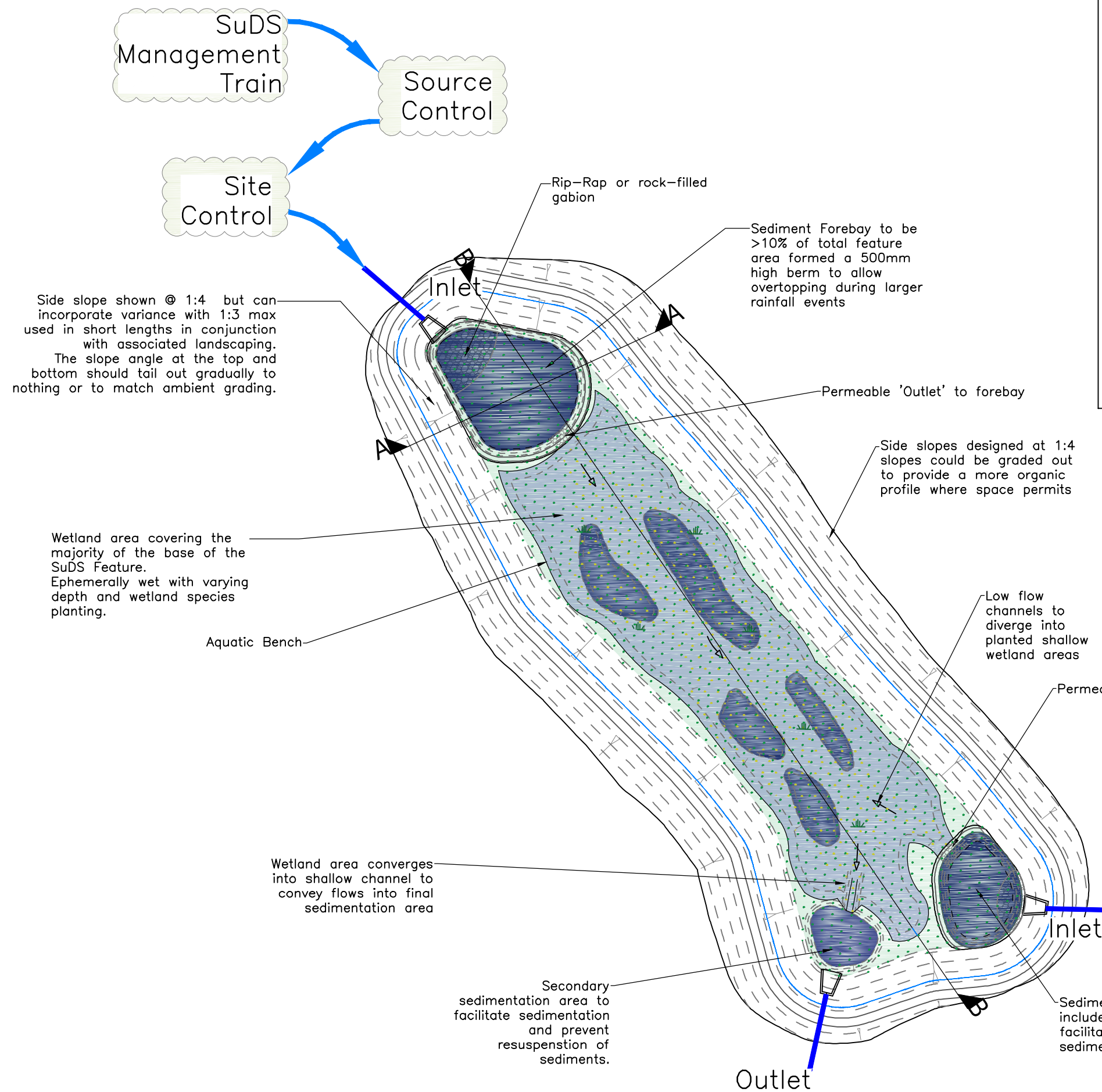
Title
HYDRO INTERNATIONAL
DOWNSTREAM
DEFENDER®

1200 PERFECT MANHOLE
CONCRETE CHAMBER

DESIGN DATA

Shearwater House
Victoria Road
Clevedon, UK
BS21 7RD
Tel: +44 (0)1275 878371
Fax: +44 (0)1275 874979
hydro-int.com

APPROX WEIGHT:	4.28 t	MATERIAL:
REFERENCE:	SuDS Feature L	
DRAWING NO.:	C 1320-1000-01000	
SHEET SIZE:	A3	SHEET: 1 OF 1 Rev: A



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NOTES

1. This drawing shows the typical SuDS feature arrangements for the SuDS features shown on the Preliminary Water Management Strategy Plan, Drawing number G277/21 Rev C & G277/22 Rev C.
2. Upstream SuDS management train principles are outlined in the PFA's Water Management Strategy and depicted on drawing G277/24 dated May 2021.

Rev	Date	Description	Drawn	Check
#	26/11/20	First Issue.	DAB	SAM
A	21/05/21	Cross references updated	DAB	MWS

Status

FOR PLANNING

Client

Eastleigh Borough Council

Project

One Horton Heath
Hampshire

Drawing Title

Typical Layout of Strategic
SuDS Features to Inform
Detailed Design

Drawing No.

G277/23

Rev A

Date: November 2020

Scale: As shown

E-Mail: DBuciak@pfaplc.com

