

CONCEPTUAL DRAINAGE STRATEGY

Thurrock Flexible Generation Plant

Application document number A7.3 APFP Regulations reference 5(2)(q)



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Prepared by:	Prepared for:		
RPS Group	Statera Energy Limited		
Louis Sime Engineer			
Sherwood House Sherwood Avenue Newark Nottinghamshire NG24 1QQ	145 Kensington Church St Kensington London W8 7LP		
T +44 1636 605 700 E	T 020 7186 0580E contact@stateraenergy.co.uk		

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1 INTRODUCTION

- 1.1 RPS has been commissioned by Statera Energy to produce a Conceptual Drainage Strategy in support of a Development Consent Order (DCO) application for a proposed Flexible Generation Plant (FGP) in Thurrock Essex.
- 1.2 The proposed development site, approximately 20ha in size, comprises a new gas fired power and battery storage facility together with gas connection compound and other associated plant infrastructure:
 - Gas engines, air pollutant control and cooling
 - Gas connection compound
 - Substation
 - Battery Storage
 - Carbon capture Ready Area
 - Access Track and Soft Landscaping
- 1.3 The site will be fully secured against access by the general public and will in general not be manned.
- 1.4 The purpose of the Conceptual Drainage Strategy is to outline the design principles for surface water drainage to be adopted for the development of the site. This report has been produced in conjunction with an RPS Flood Risk Assessment contained within Volume 6, Appendix 15.1: Flood Risk Assessment of the Environmental Statement (application document A6).
- 1.5 The contents of this report are to be read in conjunction with all supporting drawings and/or documents referenced herein, appended to this report or submitted in support of the DCO application for this development.

Site Description

- 1.6 The site is located in Thurrock, Essex and consists of approximately 20ha agricultural land, which is split into two distinct fields, north and south, by a land drainage ditch, see RPS drawing 019512-RPS-SI-XX-DR-D-0300.
- 1.7 The Site is bound by agricultural land to the east and west, with an existing National Grid substation on the southern boundary. The River Thames is situated approximately 1km south of the Existing substation. Vehicular access to the site is via an existing access track to the north east which connects to Station Road.
- 1.8 More information regarding the site location and description can been found in Volume 2: Project description of the Environmental Statement (application document A6).
- 1.9 A topographical survey carried out by Survey Solutions dated 28/02/2018, confirmed an average site level of approximately 1.5m AOD. The survey indicates the north field to have a gentle slope from the northwest to the southwest, c.1.4m AOD to c.1.23m AOD and the south field to fall from west to east. c.1.55m AOD to c.1.3mAOD. Some localised raised areas up to 1.8mAOD are also identified in the survey.

1.10 The site and its immediate surroundings are farmland, therefore surface water drainage provisions which currently exist are limited to local field drains / open ditches and/or minor watercourses laid to the perimeter of existing fields.

Ground Conditions

- 1.11 A Phase 2 site investigation was carried out by TerraConsult Ltd to provide information on the condition of the site prior to application for an Environmental Permit. This report contained a summary of the following encountered ground conditions;
 - Topsoil
 - Made Ground
 - Alluvium
 - Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation

More information regarding the location and depths of the encountered ground conditions can be found in the TerraConsult Ltd. Phase 2 Site Investigation Report, Report No 4593/R01 Issue 1.

2 PROPOSED SURFACE WATER DRAINAGE

- 2.1 The proposed new surface water drainage system will be designed using current MicroDrainage Design software by Innovyze, to take account of planning guidance, Lead Local Flood Authorities (LLFA) and Environment Agency (EA) guidance to prevent uncontrolled flooding of the site and surrounding areas.
- 2.2 Due to the nature of the DCO application, the final site layout will be determined within the limits of deviation. At this stage, the drainage strategy for the site has been carefully devised achieve a strategy which adequately manages water quality, water quantity and promotes biodiversity whilst accommodating design flexibility that the DCO and limits of deviation allow. This strategy will be refined at detailed design stage.

In the absence of a finalised site plan, proposals to manage water quality, water quantity and promote biodiversity have been developed conceptually at this stage using an indicative areas plan. The Indicative Drainage Areas plan has been included in Appendix A.

- 2.3 Surface water runoff from the proposed development areas will be managed as follows;
 - Permeable surfaces
 - Landscaping any grassed landscaped areas will drain directly to one of the onsite attenuation basins or any of the series of ditches on the site.
 - Unbound site access roads access roads will be constructed of unbound materials and will therefore generate similar runoff volumes to the naturally occurring clay subgrade. Runoff from these areas will drain as existing to either the attenuation basins, ditches or filter drains.
 - Semi-permeable surfaces
 - Gravelled compound areas Runoff will percolate into the gravel which will be laid to falls to a network of filter drains. A perforated pipe will then carry generated flows to the attenuation basin. The exact arrangement of smaller plant and battery units in these areas is currently unknown. This area has been conservatively assumed to be 50% impermeable surfacing.
 - Carbon capture The areas allocated for carbon capture have been bound by a series of land drainage ditches to intercept overland flows. These ditches will then convey runoff towards the attenuation basins. The exact makeup of these areas is currently unknown and therefore this area has been conservatively assumed to be 50% impermeable surfacing.

- Impermeable surfaces
 - Plant areas It is envisaged that gas reciprocating engines will be located on concrete slabs. The slabs will be laid to crossfalls which direct surface water to a channel/ slot drain. After passing through a proprietary interceptor, surface water will then be directed towards the attenuation basins. Penstocks will also be provided at these locations to allow for containment of spillages.
- 2.4 The areas mentioned above have been set out in an Indicative Areas plan included in Appendix A. Based on this plan, a total impermeable area of 63,500m² has been estimated which equates to approximately 32% of the total site area. These figures have been using to calculated site specific runoff coefficients (Cv) of 0.729 Summer and 0.851 Winter for use in the drainage design. Calculations included in Appendix B.

2.5 For conceptual design purposes the following levels have been assumed;

Table 1: Conceptual Design Levels

Conceptual Design levels	
Existing site levels	Average approximately 1.5mAOD
Attenuation Basin cover level	1.75mAOD
Attenuation Basin invert level	0.75mAOD
Outfall to perimeter ditch level	0.5mAOD
Zone A areas including the gas fired facility, battery storage and customer substation	2.0mAOD

Levels to be reviewed during detailed design

2.6 The proposed level for the gravel compounds and plant areas is set c.840mm below the design flood level for the development. Flood resistant / resilient measures will therefore be incorporated to protect the proposed infrastructure up to this level. Measures may include flood resilient construction and localised bunding. Further details on flood risk and resilience is included in the RPS Flood Risk Assessment contained within Volume 6, Appendix 15.1: Flood Risk Assessment of the Environmental Statement.

Surface Water Quantity

- 2.7 Greenfield runoff rates for the site have been calculated for the site using IH124 Methodology within MicroDrainage software and have been included in Appendix B.
- 2.8 Surface water discharge from the site will be controlled to the equivalent greenfield 1 in 1 year event for all return periods up to and including the critical 1 in 100 year +40%cc event through the use of a flow control device. The site 1 in 1 year greenfield rate has been calculated as 56.4l/s.
- 2.9 Surface water runoff will be collected as per the methods above and discharged into one of the two on-site surface water attenuation basins, designed in accordance with The SuDS Manual, CIRIA Report C753, 2015. The attenuation basins will provide attenuation of flows and assist with removal of sediments from rainwater runoff. The downstream outlet of the attenuation basin will include a sump / catch pit for removal of silt and debris. Each attenuation basin will provide adequate storage for all storm events up to and including the 1:100 year return period with an additional 40% for future climate change.
- 2.10 As per the Indicative areas plan, a proportion of the landscaping areas will drain as per existing arrangements to the perimeter ditches. The runoff from the remainder of the site has been divided between two sub-catchments 1 and 2 which drain to attenuation basins 1 and 2, see RPS drawing 019512-RPS-SI-XX-DR-D-0300. The 56.4I/s discharge rate will therefore be divided proportionally between the attenuation basins to two separate outfalls. The proposed discharge rates from Attenuation basins 1 and 2 are 41.7I/s and 14.7I/s respectively.

- 2.11 Initial attenuation volume estimates indicated that volumes in the region of 20,100m³ would be required to achieve adequate storage to restricted to the greenfield runoff rates. This figure has also been dived proportionally between the two site catchments so that Attenuation basin 1 and Attenuation basin 2 each provide approximately 17,000m³ and 4,500m³ attenuation volume respectively.
- 2.12 Preliminary calculations have been undertaken using MicroDrainage Software and included as Appendix B. These calculations demonstrate that both Attenuation basins 1 and 2 have adequate capacity to attenuate flows from all storms up to and including the 1 in 100 year storm including a 40% allowance for climate change.
- 2.13 The outfalls to the perimeter drainage ditches will be fitted with non-return valves to prevent the ingress of water should the water level in the ditch rise. Due to the distance from the Thames it is not considered likely that the outfall would be submerged for long periods due to tidal influences. In the event that an excessively high tide prevents an outfall from the site for a prolonged period, the site will be allowed to flood as it would in its undeveloped state. Any flooding which occurs due to a submerged outfall is not likely to cause significant disruption as this will be lower than the 2.84mAOD flood resilience level determined by the FRA for the tidal breach scenario.
- 2.14 The proposed surface water drainage layout is shown on RPS drawing 019512-RPS-SI-XX-DR-D-0300 - Indicative Drainage Layout, which is included in Appendix A.

Surface Water Quality

- 2.15 Proposed run-off quality control for the Thurrock FGP Site will include a combination of proprietary pollution interceptors, filter drains, open channels and attenuation basins arranged in a format relative to the pollution hazard level of the different site areas. A general arrangement of these elements has been included as RPS drawing 019512-RPS-SI-XX-DR-D-0300. The exact location and combination of features will be determined in the final Drainage Strategy during detailed design, prior to construction.
- 2.16 A water quality risk assessment has been carried out using the SuDS hazard mitigation indices in accordance with Chapter 26, of The SuDS Manual, CIRIA Report C753, 2015. Under this method of assessment, the worst case area of the development is considered to be the concrete slab, plant areas. Considering the low expected traffic volumes and appropriate containment of any hazardous substances, the residual pollution hazard level is considered to be medium hazard levels similar to that of a commercial yard.
- 2.17 A combination of proprietary interceptor units, filter drains and attenuation basins will be the minimum level of water quality control provided to the plant slab areas. The following table demonstrates that the SuDS Mitigation indices provided by the features exceed that of the associated pollution hazard index.

Table 2: Medium Hazard - Pollution Mitigation

	Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Pollution Hazard Indices	Medium	0.8	0.8	0.9
Proposed SuDS mitigation I ₁ Bypass interceptor unit	-	0.6	0.5	0.6
Proposed SuDS mitigation I ₂ Filter Drain		0.4	0.4	0.5
Proposed SuDS mitigation I₃ Attenuation basin		0.5	0.5	0.5
Total SuDS Mitigation (I ₁ +0.5xI ₂)		1.05	0.95	1.1

2.18 Any areas at risk of spillages or proposed for storage of hazardous chemicals will be subject to specific appropriate containment measures, regulated though the environmental permit. These additional containment measures will ensure there is no risk of pollution to the surface water drainage system.

SuDS Biodiversity and Amenity

- 2.19 The proposed site layout will require infilling of existing land drainage ditches, see RPS drawing 019512-RPS-SI-XX-DR-D-0300. This has been recognised as a potential loss of habitat in an area known to accommodate protected species such as water voles. Working closely with the ecology team, SuDS techniques have been incorporated into the proposed drainage strategy to harness the multiple benefits of SuDS including habitat compensation.
- 2.20 The proposed drainage strategy includes several open ditches to replace those lost through the development proposals. These ditches will be designed with integral weir boards to help retain flows and provide a permanent wetted bench for habitat enhancement. Ditches will be constructed with side slopes as steep as ground conditions will allow, preferably 1:1 slopes with a minimum 2m vegetated strip to provide optimum habitat for native species.
- 2.21 In addition to the new ditches, the attenuation basins will look provide a continuation of this permanent wetted bench. After vegetation begins to establish, the proposed attenuation basins will resemble Figure 2-1 below. The area above the permanent water level will be utilised as surface water attenuation and will therefore be encouraged to flood during high rainfall events. The reciprocal effect of this will encourage the formation of a marsh like environment similar to that of the surrounding area under tidal influence.
- 2.22 Proposed ditches and attenuation Basins have, where possible, been linked to perimeter ditches through parallel sections to provide a continuation of habitat throughout the site.



Figure 2-1 Detention Basin with low flow channel

3 SURFACE WATER DESIGN PARAMETERS

- 3.1 The new surface water drainage system will be designed using current analysis software, MicroDrainage, ensuring planning guidelines are satisfied to prevent uncontrolled flooding of the Thurrock FGP Site and surrounding areas.
- 3.2 At this stage, preliminary calculations have demonstrated the proposed attenuation basins to provide adequate storage to contain all runoff from the 1 in 100 year rainfall event including 40% allowance for climate change.
- 3.3 During detailed design, the network of ditches, filter drains and piped network shown indicatively in drawing 019512-RPS-SI-XX-DR-D-0300 will be designed to the parameters, return periods and storm durations included below.
- 3.4 The drainage network will ensure that no flooding occurs in any area of the site for events up to the 1 in 30 year return period storms. For storms in excess of 1 in 30 year events, controlled temporary overland flooding is permitted with flood depths restricted accordingly to consider Health & Safety using Environment Agency's R&D Technical Report FD2320/TR2, Table 13.1 "Danger to people for different combinations of depth and velocity". Any overland flow will be routed to the onsite attenuation basins. No flooding detrimental to buildings will occur during any storm event as a result of surface water runoff.

Design Parameters

- Rainfall: FEH Data; FEH CD-R version 3 Grid Ref E 566350, N 176250.
- Design Return Period: 2, 30 and 100 (+40% climate change) years.
- Climate change: rainfall profiles increased by 40% for 100 year return period
- Volumetric Runoff coefficient: 0.729 Summer, 0.851 Winter
- Global time of entry: 60mins for filter drain and gravel areas, 10 mins for plant slab
- Infiltration: Ignore for peak flow design
- Backdrops: Allow in design; maximum depth of 1.5m
- Velocity: 0.75 m/s for self-cleansing (private drainage)

Storm Return Periods and Durations

- 2 year return period 15mins to 1440mins storm duration
- 30 year return period 15mins to 1440mins storm duration
- 100 year return period (+40% climate change) 15mins to 1440mins storm duration

4 PROPOSED FOUL WATER DRAINAGE

4.1 The proposed Thurrock FGP will be operated remotely however it is envisaged that staff welfare facilities will be provided. The proposed development will not have a sewer connection. Foul drainage from staff welfare facilities on site will be either to a packaged biological foul treatment plant with discharge to the surface water system or to a storage tank for off-site disposal via road tanker. Any provisions for managing foul flows locally within the site will be designed and specified in accordance with BS EN 12566.

5 CONSTRUCTION STAGE DRAINAGE

- 5.1 During construction of the development, the building contractor will be responsible for management and disposal of rainwater runoff generated from the site in its temporary condition.
- 5.2 The contractor will implement methods to manage drainage during construction in accordance with the Code of Construction Practice (application document A8.6). These methods will address pollution management and control in relation to site plant and vehicles, raw materials storage and waste generation, to ensure that all surface water runoff generated in the temporary condition will be free of contamination.
- 5.3 The site will be subject to topsoil strip and bulk earthworks to prepare the site to the correct level for development. The contractor will provide temporary drainage measures as illustrated within Section 6 of Ciria C532 'Control of Pollution from Construction Sites', to contain runoff within the development site boundary, ensuring that these measures are sized appropriately, and that means to remove excess surface water are available for use at all times.

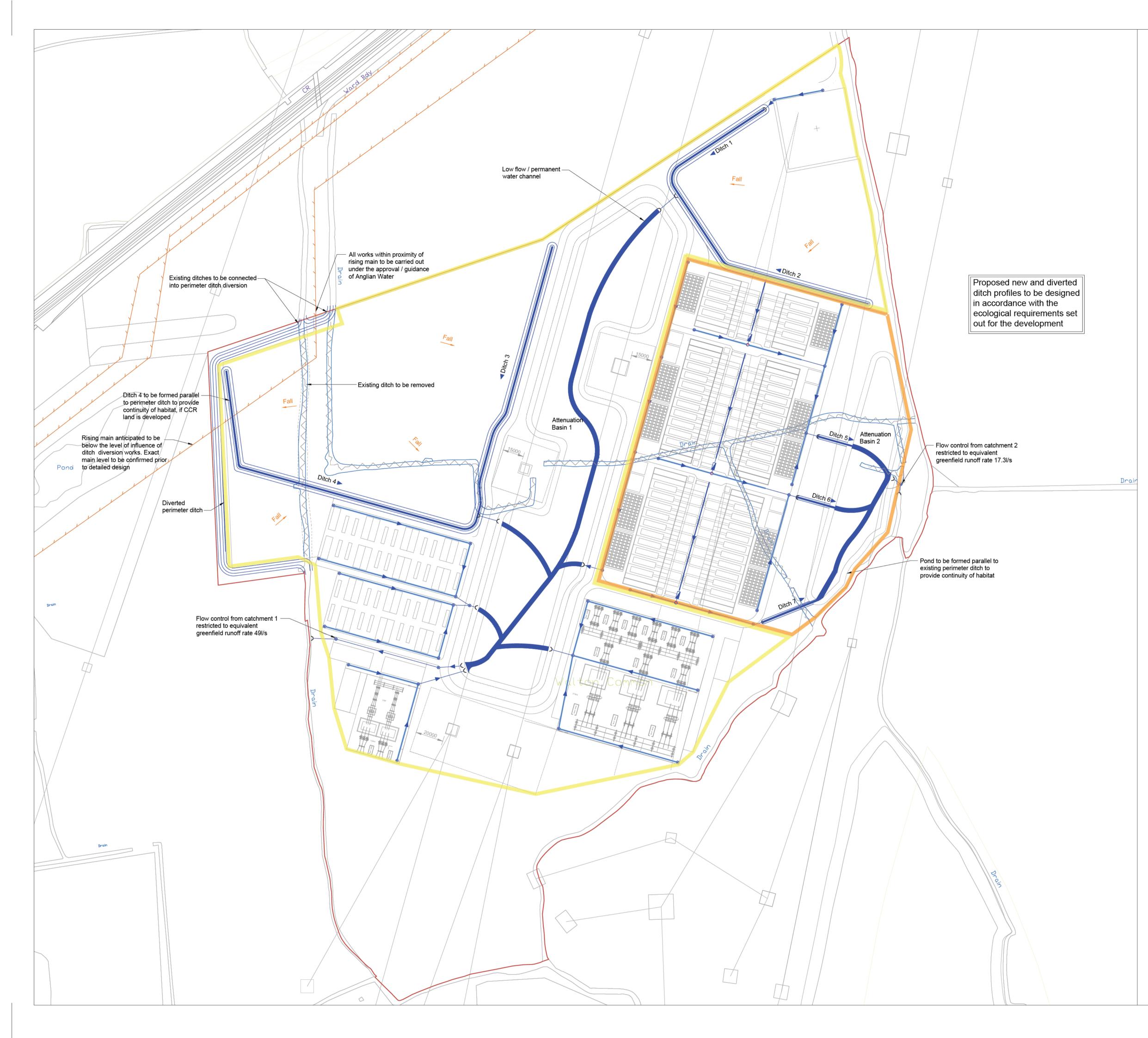
6 MAINTENANCE

6.1 The maintenance for all plot specific drainage infrastructure will be the responsibility of the owner of the proposed development. Details of the maintenance activities for the constructed drainage infrastructure will be passed to the end user as part of an Operation and Maintenance Manual post completion. Typical maintenance activities may include;

Table 3: Typical Maintenance Activities

Element	Access Method	Method of Maintenance	Frequency Required
Roof Gutters	Scaffolding / Cherry pickers to be used where required.	General cleaning of gutters. Jet cleaning where required.	Periodic inspection of gutters to ensure rainwater outlets do not become blocked. Periodic renewal of gutter coatings to prevent corrosion.
Oil / Petrol Separators	In accordance with H&S regulations and confined spaces requirements.	Refer to manufacturer's guidance.	Bi-annual inspection and emptying.
Slot Drains / Kerb Drainage	In accordance with H&S regulations.	Monitor to ensure no blockages develop. Jet cleaning where required.	Bi-annual jet cleaning of channel drains.
Silt-traps and Gullies	In accordance with H&S regulations.	Monitor to ensure no blockages develop.	Bi-annual inspection and emptying of all silt traps and gullies.
Penstock Valves/ Non-Return Flap Valves	In accordance with health and safety regulations and confined spaces requirements.	Monitored to ensure no blockages develop in accordance with the manufacturers recommendations.	Bi-annual inspection or in accordance with the manufacturers recommendations, whichever occurs sooner.
Surface Water Ponds and Swales	s In accordance with H&S regulations	General cleaning and monitoring to ensure no blockage. Remove litter and debris. Cut grass and manage vegetation. Inspect inlets and outlets	and removal of silt and/or debris
Pumps	In accordance with health and safety regulations and confined spaces requirements.	Monitored via visual and audible alarms in development gatehouse to ensure no blockages develop in accordance with the manufacturer's recommendations.	
Headwall	In accordance with health and safety regulations.	Monitored to ensure no blockages develop.	Bi-annual inspection and clearance of any debris

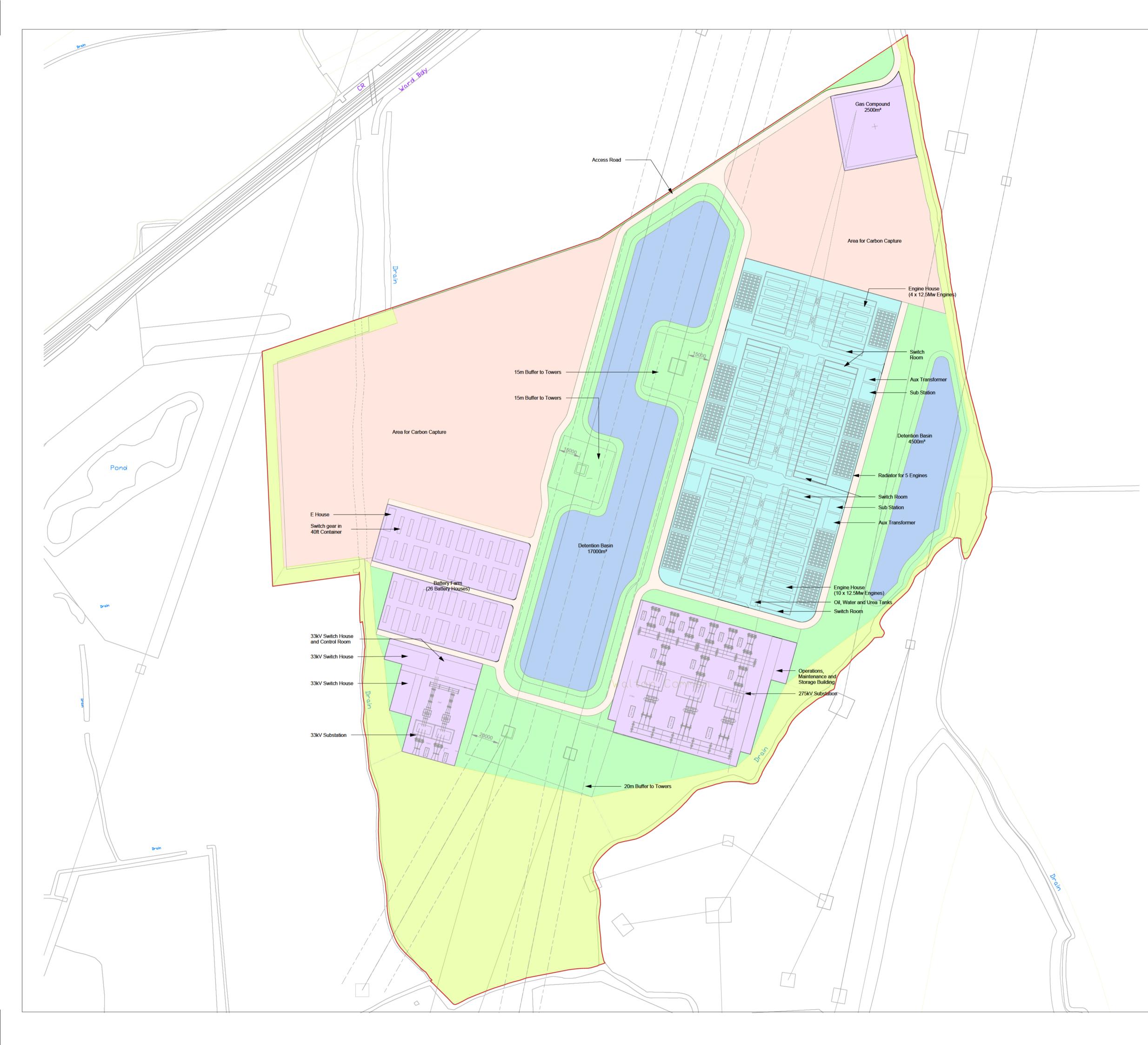
Appendix A – RPS Drawings



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Notes	

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		Drainage Key
		Surface water drain
_		Surface water filter drain (perforated pipe and gravel trench)
		Proposed ditch - min. 600mm depth (engineered to permanently hold water)
_^	·····	Ditch infill
		Interceptor unit
	P	Penstock Isolation Valve
		Foul Rising Main (Anglian Water)
	Fall	Indicative fall
		Catchment 1
		Catchment 2
		Date: 04/40/2040
		Date: 24/10/2019 Created by: LJS
		Checked by: DW Doc no:
		019512-RPS-SI-XX-DR-D-0300
		Scale: A1@ 1:1250 Reference System: OSGB36
		Projection: BNG
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P02		Notes updated as per internal review comments
P03	17/02/20	Notes updated as per internal review comments
		s Reference: 5(2)(o) nent Number: A2.10
	Tł	nurrock Flexible Generation Plant
		Indicative Drainage Layout
	M	AKING
	PS	ASY THURROCK POWER
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Only written o	limensions should be used. should be read in conjunction with all other relevant drawings and
specifications	
Surface Water C	atchments Key
Permeable Areas	
	Stone Access Track
	Landscaping (to drain as
•	existing)
Semi-permeable / (assumed to be 50 coefficient calculat	% impermeable surfaces for runoff
	Gravel compound areas
	Carbon Capture
Impermeable Are	as Plant areas (Concrete slab assumed)
	Date: 24/10/2019
	Created by: LJS Checked by: DW
	Doc no: 019512-RPS-SI-XX-DR-D-0301
	Scale: A1@ 1:1250
	Reference System: OSGB36 Projection: BNG
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	25m SCALE 1:1250
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P02 17/02/	20 Notes updated as per internal review comments
APFP Regulat	tions Reference: 5(2)(o)
	ocument Number: A2.10
	Thurrock Flexible Generation Plant
	Indicative Drainage Areas
	MAKING
rp:	THURROCK POWER

Appendix B – RPS Calculations

B.1 Runoff Coefficient Calculations

Summer CV Calculation

UCWI	80.000] Micro
Soil Index	Map 0.450	Drainag
PIMP (% imperv	vious) 32	ОК
CV	0.729	Cancel
	0.725	Help

Winter CV Calculation

UCWI	130.000] Micro
Soil Index	Nap 0.450	Drainag
PIMP (% imperv	ious) 32	ОК
CV	0.851	Cancel
	0.031	Help

B.2 Greenfield Runoff Rate Calculation

RPS Group Plc		Page 1
Technology Services		
Sherwood House, Sherwood Ave.		
Newark, Nottinghamshire, NG		Micro
Date 18/10/2019 12:36	Designed by louis.sime	Drainage
File	Checked by	Diamage
Innovyze	Source Control 2019.1	

ICP SUDS Mean Annual Flood

Input

Return Period (ye	ars)	1		Soil	0.45	50
Area	(ha)	20.010		Urban	0.00	00
SAAR	(mm)	550	Region	Number	Region	6

Results 1/s

QBAR Rural 66.3 QBAR Urban 66.3 Q1 year 56.4 Q1 year 56.4 Q30 years 150.2 Q100 years 211.5

B.3 Attenuation Basin Calculations

RPS Group Plc							Page 1
Technology Services							
Sherwood House, Sher	wood Ave.						
Newark, Nottinghamsh							Micro
Date 24/10/2019 15:5			igned	by lou	ie eir	20	_ Micro
			-	-		lle	Drainac
File DETENTION BASIN	1.SRCX			by D. W			
Innovyze		Sou	rce C	ontrol	2019.3	1	
Summary	of Results	for 1	00 ye	ar Reti	urn Pe	riod (+40%	<u>)</u>
	-						
	Storm	Max	Max	Max Genturel	Max	Status	
	Event	(m)	(m)	Control (1/s)	(m ³)		
		(/	()	(_/_/	(/		
15	min Summer	1.079	0.329	41.2	5819.	5 ОК	
) min Summer			41.5			
) min Summer			41.6			
) min Summer) min Summer			41.7 41.7			
) min Summer) min Summer				8049.		
) min Summer				8640.		
) min Summer				8842.		
) min Summer			41.7	8968.	8 O.K	
) min Summer				9045.		
) min Summer				9566.		
) min Summer				10205.		
) min Summer) min Summer				10668.		
) min Summer				10242.		
) min Summer				9588.		
7200) min Summer	1.249	0.499	41.7	8968.	о ок	
) min Summer				8380.		
) min Summer				7836.3		
) min Winter) min Winter				6796. 7479.		
	Storm	Rain	Floor			'ime-Peak	
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	Event	(mm/hr)		ded Disc me Vol	narge 1 Lume	(mins)	
	Event			me Vol	-		
4.5		(mm/hr)	Volu (m ³	me Vol) (1	Lume n³)	(mins)	
	min Summer	(mm/hr) 263.696	Volu (m ³	me Vol) (r).0 2	Lume n ³) 906.0	(mins) 27	
30		(mm/hr) 263.696	Volu (m ³	me Vol) (r 0.0 2 0.0 3	Lume n ³) 906.0 153.8	(mins)	
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30 60 120 180 240 360 480	min Summer min Summer min Summer min Summer min Summer min Summer min Summer min Summer	(mm/hr) 263.696 145.425 80.200 44.229 31.226 24.392 17.221 13.452	Volu (m ³)	me Vol) (r).0 2).0 3).0 5).0 5).0 5).0 5).0 5).0 5).0 5).0 5).0 5).0 6).0 6	Lume n ³) 906.0 153.8 057.5 539.9 807.1 980.4 182.2 275.8	(mins) 27 42 72 130 190 250 368 488	
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Sherwood House, She	erwood Ave.					
, Newark, Nottingham:						
ate 24/10/2019 15			igned	h 1	ia aim	
			-	-	is.sim	e
File DETENTION BAS	IN 1.SRCX		cked b	-		
Innovyze		Sou	rce Co	ntrol	2019.1	
6		1	0.0			
Summary	of Result:	s IOT 1	UU yea	r Reti	urn Per	10 a (+4
	Storm	Max	Max	Max	Max	Status
	Event				Volume	
		(m)	-	(l/s)	(m³)	
	co min minter	1 200	0 450	41 7	0011 7	0.17
-	60 min Winteı 20 min Winteı				8211.7	
	.20 min Winter .80 min Winter				8979.2 9430.2	
	40 min Winter				9430.2 9742.2	
	60 min Winter				10154.4	
	80 min Winter					
	500 min Winter				10583.9	
	20 min Winter		0.590	41.7	10697.0	ОК
9	60 min Winter	1.374	0.624	41.7	11357.8	ΟK
	40 min Winter		0.668	41.7	12220.6	ОК
21	.60 min Winter	1.454	0.704	41.7	12912.4	ОК
	80 min Winter				13222.5	
	20 min Winter					
	60 min Winter					
12	200 min Winter					ОК
0.4	AO min Winter	1 260	0.500	41.7	0242.4	0 10
	540 min Winter 980 min Winter	1.269	0.519	41.7	9343.4	ΟK
	40 min Winter	1.269	0.519	41.7	9343.4	ΟK
	40 min Winter	1.269	0.519 0.474	41.7 41.7	9343.4 8506.3	о к о к
	940 min Winte 980 min Winte	1.269 1.224 Rain	0.519 0.474	41.7 41.7 ed Disc	9343.4	о к о к
	340 min Winte 80 min Winte Storm	1.269 1.224 Rain	0.519 0.474 Floode	41.7 41.7 ed Disc e Vo	9343.4 8506.3	0 К 0 К
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100	340 min Winter 80 min Winter Storm Event 60 min Winter	Rain (mm/hr) 80.200	0.519 0.474 Floode Volum (m ³)	41.7 41.7 ed Disc e Vo: (r .0 5	9343.4 8506.3 charge T: lume n ³) 855.7	OK OK (mins) 70
100	340 min Winter 380 min Winter Storm Event 60 min Winter 20 min Winter	Rain (mm/hr) 80.200 44.225	0.519 0.474 Floode Volum (m ³) 0.0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6	9343.4 8506.3 tharge T: lume n ³) 855.7 310.3	0 K 0 K (mins) 70 128
100 1 1 1	340 min Winter 80 min Winter Storm Event 60 min Winter	Rain (mm/hr) 80.200 44.229 31.220	0.519 0.474 Floode Volum (m ³) 0 0. 5 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6	9343.4 8506.3 tharge T: lume n ³) 855.7 310.3 526.5	0 K 0 K (mins) 70 128 188
100 1 1 1 2	340 min Winter 380 min Winter Storm Event 60 min Winter 20 min Winter 80 min Winter	Rain (mm/hr) 80.200 44.229 31.220 24.392	0.519 0.474 Floode Volum (m ³) 0 0. 0 0. 5 0. 2 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6	9343.4 8506.3 tharge T: lume n ³) 855.7 310.3	0 K 0 K (mins) 70 128
100 1 1 1 2 3	 340 min Winter 380 min Winter 380 min Winter 40 min Winter 40 min Winter 	Rain (mm/hr) 80.200 44.229 31.220 24.392 17.221	0.519 0.474 Floode Volum (m ³) 0 0. 0 0. 0 0. 0 0. 0 0. 0 0. 0 0. 0 0	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6 .0 6	9343.4 8506.3 tharge T: lume n ³) 855.7 310.3 526.5 639.2	0 K 0 K (mins) 70 128 188 246
100 1 1 1 2 3 4	 340 min Winter 380 min Winter 380 min Winter 40 min Winter 40 min Winter 40 min Winter 40 min Winter 	Rain (mm/hr) 80.200 44.229 31.220 24.392 17.221 13.452	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T: lume n ³) 855.7 310.3 526.5 639.2 708.2	0 K 0 K (mins) 70 128 188 246 362
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100 1 1 1 2 3 4 6 7	 340 min Winter 380 min Winter 380 min Winter 40 min Winter 	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T: lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8	0 K 0 K (mins) 70 128 188 246 362 480 596
100 11 1 1 1 2 3 4 6 7 9 14	 340 min Winter 380 min Winter 	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.754 5.827	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T: lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6	O K O K (mins) 70 128 188 246 362 480 596 714
100 100 1 1 1 1 2 3 3 4 6 7 9 14 21	 340 min Winter 380 min Winter 380 min Winter 380 min Winter 40 min Winter 	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.754 5.827 4.379	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 ed Disc e Voi (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6 286.6	O K O K (mins) 70 128 188 246 362 480 596 714 944 1404 2076
100 100 1 1 1 1 2 3 3 4 6 7 9 14 21 28	 340 min Winter 380 min Winter 380 min Winter 380 min Winter 40 min Winter 	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.754 5.827 4.379 3.576	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 41.7 ed Disc e Vo: (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6 286.6 777.5	O K O K (mins) 70 128 188 246 362 480 596 714 944 1404 2076 2716
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100 100 1 1 1 2 3 4 6 7 9 14 6 7 9 14 21 28 43 57	540 min Winter 580 min Winter 580 min Winter 590 min Winter 500 min Winter	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.756 5.827 4.379 3.576 2.499 1.938	Floode Volum (m ³) 0.0.0	41.7 41.7 41.7 ed Disc e vo: (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6 286.6 777.5 736.0 066.8	O K O K (mins) 70 128 188 246 362 480 596 714 944 1404 2076 2716 3322 4216
100 100 11 1 2 3 4 6 7 9 14 21 28 43 57 72	540 min Winter 580 min Winter 580 min Winter 590 min Winter 500 min Winter	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.754 5.827 4.379 3.576 2.499 1.938 1.591	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 41.7 ed Disc e vo: (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 harge T: lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6 286.6 777.5 736.0 066.8 368.7	O K O K (mins) 70 128 188 246 362 480 596 714 944 1404 2076 2716 3322 4216 5056
100 100 11 1 1 1 1 2 3 3 4 6 7 9 14 6 7 9 9 14 21 28 43 57 72 86	540 min Winter 580 min Winter 580 min Winter 590 min Winter 500 min Winter	Rain (mm/hr) 80.200 44.229 31.226 24.392 17.221 13.452 11.106 9.497 7.754 5.827 4.379 3.576 2.499 1.938 1.591 1.355	0.519 0.474 Floode Volum (m ³) 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.0. 0.	41.7 41.7 41.7 ed Disc e vo: (r .0 5 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6 .0 6	9343.4 8506.3 charge T lume n ³) 855.7 310.3 526.5 639.2 708.2 668.3 576.8 477.1 267.3 830.6 286.6 777.5 736.0 066.8	O K O K (mins) 70 128 188 246 362 480 596 714 944 1404 2076 2716 3322 4216

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Technology Services Sherwood House, Sherwood Ave. Newark, Nottinghamshire, NG	ge 3
Sherwood House, Sherwood Ave. Newark, Nottinghamshire, NGMinistryDate 24/10/2019 15:56Designed by louis.sime Checked by D. Watson	
Newark, Nottinghamshire, NGDesigned by louis.simeMDate 24/10/2019 15:56Designed by louis.simeDFile DETENTION BASIN 1.SRCXChecked by D. WatsonD	100
Date 24/10/2019 15:56Designed by louis.simeFile DETENTION BASIN 1.SRCXChecked by D. Watson	
File DETENTION BASIN 1.SRCX Checked by D. Watson	
	ainage
Rainfall Details	
Rainfall Model FEH Return Period (years) 100	
FEH Rainfall Version 1999	
Site Location GB 566350 176250 TQ 66350 76250 C (1km) -0.026	
D1 (1km) 0.261	
D2 (1km) 0.415	
D3 (1km) 0.236 E (1km) 0.320	
F (1km) 2.576	
Summer Storms Yes	
Winter StormsYesCv (Summer)0.729	
Cv (Winter) 0.851	
Shortest Storm (mins)15Longest Storm (mins)10080	
Climate Change % +40	
<u>Time Area Diagram</u>	
Total Area (ha) 12.180	
Time (mins) Area Time (mins) Area Time (mins) Area From: To: (ha) From: To: (ha) From: To: (ha)	
0 4 4.060 4 8 4.060 8 12 4.060	

RPS Group Plc		Page 4
Technology Services		
Sherwood House, Sherwood Ave.		
Newark, Nottinghamshire, NG		Micro
Date 24/10/2019 15:56	Designed by louis.sime	
File DETENTION BASIN 1.SRCX	Checked by D. Watson	Drainage
Innovyze	Source Control 2019.1	
	Model Details	
Storage is (Online Cover Level (m) 1.750	
<u>Tank</u>	or Pond Structure	
Inv	vert Level (m) 0.750	
Depth (m) An	rea (m²) Depth (m) Area (m²)	
0.000	17097.0 1.000 20740.0	
<u>Hydro-Brake</u>	Optimum Outflow Control	
Uni	t Reference MD-SHE-0273-4170-1000-4170	
	.gn Head (m) 1.000	
Design	n Flow (1/s) 41.7 Flush-Flo™ Calculated	
	Objective Minimise upstream storage	
	Application Surface	
	np Available Yes	
	.ameter (mm) 273 rt Level (m) 0.750	
Minimum Outlet Pipe Di		
Suggested Manhole Di	ameter (mm) 1800	
Control P	Points Head (m) Flow (l/s)	
	Calculated) 1.000 41.7	
	Calculated) 1.000 41.7 Flush-Flo™ 0.421 41.7	
Design Point (0	Calculated) 1.000 41.7 Flush-Flo™ 0.421 41.7 Kick-Flo® 0.770 36.8	
Design Point (0 Mean Flow over	Calculated) 1.000 41.7 Flush-Flo™ 0.421 41.7 Kick-Flo® 0.770 36.8 Head Range - 33.9	
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File DETENTION BASIN 2.	SRCX		cked by					
Innovyze		Sour	ce Con	trol	2019.1	L		
Summary of 1	Results f	for 10	00 year	Retu	irn Pe	riod (+40%)		
	orm	Max	Max	Max	Max	Status		
Ev	ent 1		Depth Co			•		
		(m)	(m) ((1/s)	(m³)			
15 mi	in Summer 1	1.166	0.416	14.7	1989.2	ОК		
	in Summer 1				2187.6	ОК		
	in Summer 1				2398.6			
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960 mi	n Summer 1	1.396	0.646	14.7	3204.4	O K		
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10080 mi	in Summer 1	1.205	0.455	14.7	2186.2	ОК		
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30 mi	in winter .	1.276	0.526	14.7	2557.2	ОК		
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(m ³) (m ³) 60 min Winter 80.200 0.0 2343.6 70 120 min Winter 44.229 0.0 2427.7 128 180 min Winter 31.226 0.0 2418.9 188 240 min Winter 24.392 0.0 2394.8 246 360 min Winter 17.221 0.0 2343.9 364 480 min Winter 13.452 0.0 2295.7 480 600 min Winter 11.106 0.0 2253.0 598 720 min Winter 9.497 0.0 2214.6 714 960 min Winter 7.754 0.0 2125.8 946 1440 min Winter 5.827 0.0 2008.6 1404 2160 min Winter 4.379 0.0 4334.4 2076 2880 min Winter 3.576 0.0 4171.8 2712 4320 min Winter 1.938 0.0 6468.1 4280 7200 min Winter 1.591 0.0 6620.9 5112 8640 min Winter 1.355 0.0 6732.3 5888	Storm	Rain	Flooded	l Disch	arge T	ime-Peak
60 min Winter80.2000.02343.670120 min Winter44.2290.02427.7128180 min Winter31.2260.02418.9188240 min Winter24.3920.02394.8246360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	Event	(mm/hr)	Volume	Vol	ume	(mins)
120 min Winter44.2290.02427.7128180 min Winter31.2260.02418.9188240 min Winter24.3920.02394.8246360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888			(m³)	(m	3)	
120 min Winter44.2290.02427.7128180 min Winter31.2260.02418.9188240 min Winter24.3920.02394.8246360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	60 min Winte	er 80.200	0.0) 23	343.6	70
180 min Winter31.2260.02418.9188240 min Winter24.3920.02394.8246360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888						
240 min Winter24.3920.02394.8246360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888						
360 min Winter17.2210.02343.9364480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	180 min Winte					
480 min Winter13.4520.02295.7480600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888		er 24.392			394.8	246
600 min Winter11.1060.02253.0598720 min Winter9.4970.02214.6714960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte		0.0) 23		
960 min Winter7.7540.02125.89461440 min Winter5.8270.02008.614042160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte	er 17.221	0.0 0.0) 23) 23	343.9	364
1440 min Winter5.8270.02008.614042160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte 480 min Winte	er 17.221 er 13.452 er 11.106	0.0 0.0 0.0) 23) 23) 22	843.9 295.7	364 480
2160 min Winter4.3790.04334.420762880 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte	er 17.221 er 13.452 er 11.106 er 9.497	0.0 0.0 0.0 0.0) 23) 23) 22) 22	843.9 295.7 253.0	364 480 598
2880 min Winter3.5760.04171.827124320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754	0.0 0.0 0.0 0.0 0.0) 23) 23) 22) 22) 22) 22) 21	843.9 295.7 253.0 214.6 .25.8	364 480 598 714
4320 min Winter2.4990.03832.033725760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754 er 5.827) 23) 23) 22) 22) 22) 22) 21) 20	843.9 295.7 253.0 214.6 .25.8 008.6	364 480 598 714 946 1404
5760 min Winter1.9380.06468.142807200 min Winter1.5910.06620.951128640 min Winter1.3550.06732.35888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379) 23) 23) 22) 22) 22) 22) 22) 22) 22) 22) 22) 21) 20) 43	843.9 295.7 253.0 214.6 25.8 008.6 334.4	364 480 598 714 946 1404 2076
7200 min Winter 1.591 0.0 6620.9 5112 8640 min Winter 1.355 0.0 6732.3 5888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0) 23) 22) 22) 22) 22) 22) 22) 22) 22) 21) 20) 21) 43) 41	843.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8	364 480 598 714 946 1404 2076 2712
8640 min Winter 1.355 0.0 6732.3 5888	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 2880 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499) 23) 22) 22) 22) 22) 22) 22) 22) 21) 20) 21) 20) 41) 38	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0	364 480 598 714 946 1404 2076 2712 3372
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 2160 min Winte 2880 min Winte 4320 min Winte	er 17.221 er 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938) 23) 23) 22) 22) 22) 22) 21) 20) 20) 21) 20) 43) 43) 38) 64	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1	364 480 598 714 946 1404 2076 2712 3372 4280
10000 min winter 1.102 0.0 0001.1 0004	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591		23) 23 22) 22 22) 22 20) 22 21) 21 20) 20 21) 21 32) 32 32) 38 38 64 66 66	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9	364 480 598 714 946 1404 2076 2712 3372 4280 5112
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888
	240 min Winte 360 min Winte 480 min Winte 600 min Winte 720 min Winte 960 min Winte 1440 min Winte 2160 min Winte 4320 min Winte 5760 min Winte 8640 min Winte	er 17.221 13.452 er 11.106 er 9.497 er 7.754 er 5.827 er 4.379 er 3.576 er 2.499 er 1.938 er 1.591 er 1.355		23) 233 22) 222) 22) 222) 22) 222) 21) 211 20) 222) 21) 211 21) 211 21) 211 31) 411 380 640 660 670	343.9 295.7 253.0 214.6 .25.8 008.6 334.4 .71.8 332.0 468.1 520.9 732.3	364 480 598 714 946 1404 2076 2712 3372 4280 5112 5888

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RPS Group Plc		Page 3
Technology Services		
Sherwood House, Sherwood Ave.		
Newark, Nottinghamshire, NG		Micco
Date 24/10/2019 15:59	Designed by louis.sime	Micro
File DETENTION BASIN 2.SRCX	Checked by D. Watson	Drainage
Innovyze	Source Control 2019.1	
Innovyze	Source control 2019.1	
<u>Ra</u>	infall Details	
Rainfall Mode	el FEH	
Return Period (years		
FEH Rainfall Versio		
	on GB 566350 176250 TQ 66350 76250	
C (1km D1 (1km		
D2 (1km		
D3 (1km		
E (1km F. (1km		
F (1kn Summer Storn		
Winter Storn		
Cv (Summer		
Cv (Winter Shortost Storm (mins		
Shortest Storm (mins Longest Storm (mins		
Climate Change		
Tin	ne Area Diagram	
Tota	al Area (ha) 4.170	
	me (mins) Area Time (mins) Area om: To: (ha) From: To: (ha)	
0 4 1.390	4 8 1.390 8 12 1.390	
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RPS Group Plc	Page 4
Technology Services	
Sherwood House, Sherwood Ave.	
Newark, Nottinghamshire, NG	Micro
Date 24/10/2019 15:59	Designed by louis sime
File DETENTION BASIN 2.SRCX	Checked by D. Watson
Innovyze	Source Control 2019.1
	Model Details
Storage is	Online Cover Level (m) 1.750
<u>Tank</u>	or Pond Structure
Inv	vert Level (m) 0.750
Depth (m) A	rea (m²) Depth (m) Area (m²)
0.000	4468.0 1.000 6050.0
<u>Hydro-Brake</u>	® Optimum Outflow Control
Uni	it Reference MD-SHE-0173-1470-1000-1470
	ign Head (m) 1.000
Desigr	n Flow (1/s) 14.7
	Flush-Flo™ Calculated Objective Minimise upstream storage
	Application Surface
Sun	np Available Yes
	iameter (mm) 173 rt Level (m) 0.750
Minimum Outlet Pipe Di	
Suggested Manhole Di	
Control B	Points Head (m) Flow (l/s)
Design Point (Calculated) 1.000 14.7
	Flush-Flo ^m 0.322 14.7
	Kick-Flo® 0.702 12.4
Mean Flow over	Head Range - 12.5
Hydro-Brake® Optimum as specified.	been based on the Head/Discharge relationship for the Should another type of control device other than a nen these storage routing calculations will be
Depth (m) Flow (1/s) Depth (m) Flo	ow (l/s) Depth (m) Flow (l/s) Depth (m) Flow (l/s)
0.100 6.1 1.200	16.0 3.000 24.8 7.000 37.3
0.200 14.2 1.400	17.2 3.500 26.7 7.500 38.6
0.300 14.7 1.600 0.400 14.6 1.800	18.4 4.000 28.5 8.000 39.8 19.4 4.500 30.2 8.500 41.0
0.400 14.8 1.800 0.500 14.3 2.000	19.4 4.500 30.2 8.500 41.0 20.4 5.000 31.7 9.000 42.2
0.600 13.8 2.200	21.4 5.500 33.2 9.500 43.3
0.800 13.2 2.400	22.3 6.000 34.6
1.000 14.7 2.600	23.2 6.500 36.0
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(9)1	