



KAPLAN PROPERTY GROUP

LAND OFF FLEET ROAD, HOLBEACH,
SPALDING, LINCOLNSHIRE
PE12 8NZ

DRAINAGE STRATEGY

FEBRUARY 2021

FW1947_DS_001 V4

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
v1	First Issue.	BM	CB	JD	08.07.2020
v2	Appendix B & E updated and additional SuDS maintenance statement added.	BM	OP	JD	13.07.2020
V3	Drainage Statement and Appendix B, F, E, G, H updated.	RZ	DM	JD	05.10.2020
V4	Drainage Strategy updated to suit new layout, ground investigation and additional drainage surveys.	JD	OP	DM	16.02.2021

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1.0 INTRODUCTION

1.1 BRIEF

1.1.1 Farrow Walsh have been commissioned by Kaplan Property Group, the applicant, to undertake the Drainage Strategy to accompany the planning application for a proposed residential development on land adjacent to Fleet Road, Holbeach, Lincolnshire, PE12 8NZ. The purpose of this document is to report on the Drainage Strategy for the proposed development and provide recommendations as to the use of SuDS within the development.

1.1.2 This report has been prepared using the following guidance documentation:

- National Planning Policy Guidance (NPPG)
- Ciria C753 – The SUDs Manual
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities (EA - February 2016)
- Non-Statutory Technical Standards 2015
- Written Ministerial Statement regarding Sustainable Drainage (HCWS161) 2014
- The Water Framework Directive (2000)
- Building Regulations Part H 2015

1.1.3 Any comments and opinions expressed in this report, including any conclusions are based on the information available to Farrow Walsh Consulting Ltd at the time of writing. The conclusions therefore could differ if the information is found to be inaccurate, incomplete, or misleading. Farrow Walsh Consulting Ltd. Accepts no liability should this be proven to be the case, or, if additional information is made available with respect to this site.

2.0 SITE DETAILS

2.1 SITE LOCATION

- 2.1.1 The development is situated in land south of Fleet Road, Holbeach, PE12 8NZ.
- 2.1.2 The proposed development site is located in the village of Holbeach, located approximately 11 km East of Spalding and approximately 25.5km West of King's Lynn. The site is bound to the North by residential properties which front onto Fleet Road. To the South, East and West the site is bound by agricultural land that is also within the Client's ownership.
- 2.1.3 Please refer to Appendix A, which shows a visual representation as to the site's locations and boundary.

2.2 SITE DESCRIPTION

- 2.2.1 The application site is irregular in shape and covers an area of 3.628 Hectares.
- 2.2.2 The site is classified as greenfield and is currently occupied by agricultural land.
- 2.2.3 The site lies within the Anglian River Basin in the River Nene catchment, classified as a main river by the Environment Agency.
- 2.2.4 The site is bisected by a ditch which runs North – South through the site before joining with another ditch running East – West at the Southern boundary of land under the Client's ownership.

2.3 TOPOGRAPHY

- 2.3.1 The ground levels on the site are recorded to OS datum as between 3.39 to 2.75mAOD. The ground falls gradually from North West to South East.
- 2.3.2 A copy of the topographical survey can be located within Appendix C.

2.4 HYDROLOGICAL CONTEXT

- 2.4.1 An IDB watercourse to the southern boundary of the development, Devil's Hill Drain, runs east to west. There is also a ditch which passes through the site running from north to the south, which the IDB have noted as being a riparian watercourse that they do not maintain, but they do have regulator control over. The outfall is approximately 110m from the boundary. To the north of the site on the northern side of Fleet Road there is also an IDB culverted watercourse within private land.

2.5 GEOLOGICAL CONTEXT

- 2.5.1 The British Geological Society (BGS) online mapping indicates that the superficial site geology is comprised of Tidal Flat Deposits – Clay, Silt and Sand.
- 2.5.2 The bedrock is identified by the British Geological Society as the Ampthill Clay Formation, made up of mudstone.
- 2.5.3 A formal ground investigation has now been undertaken for the site by Ground Engineering Ltd in December 2020. Historic borehole data for the ground in the vicinity of the site indicates the local ground is made up of made ground overlying silty clay, overlying the marine sand formation.
- 2.5.4 An extract from the ground investigation can be found within Appendix D.
- 2.5.5 The ground investigation recorded the ground water level at 1.25-1.35m below existing surveyed ground levels.

2.6 EXISTING DRAINAGE

- 2.6.1 Anglian Water (AW) are responsible for maintaining the public sewers within Holbeach and the Developer Enquiry has been obtained and can be found within Appendix E. Also included is the Anglian Water sewer map for information.
- 2.6.2 These records indicate a 150mm foul sewer which runs from East to West along Fleet Road past the Northern end of the site. To the West of the site, foul sewers running along the various side streets join with the main sewer along Fleet Road.
- 2.6.3 According to the AW sewer mapping, the existing foul water sewer is recorded as being between 2.51m and 2.95m deep outside the development.
- 2.6.4 There are no storm sewers in the vicinity of the site. There is an existing Ø300 drain running north to south which collects the drainage channel and gully at the front of the existing property. The private drain connects into the existing ditch running north to south through the site.
- 2.6.5 The site is undeveloped and drains via greenfield runoff overland flow into the ditch to the southern boundary of the site and also into the ditch which runs through the site.

3.0 DEVELOPMENT PROPOSALS

3.1 PROPOSED DEVELOPMENT OVERVIEW

- 3.1.1 The proposed residential development application is indicated on the development masterplans including in Appendix B and comprises 55 residential units, along with associated parking and community space.
- 3.1.2 The current use of the application site is classified as greenfield.
- 3.1.3 In accordance with Table 2 of NPPG (2019), a residential land use has a flood vulnerability classification of 'more vulnerable'.

4.0 PROPOSED SURFACE WATER DRAINAGE DESIGN STRATEGY

4.1 SURFACE WATER DRAINAGE DESIGN

- 4.1.1 Surface Water runoff from the proposed development should mimic, as far as possible, the surface flows from an undeveloped greenfield site.
- 4.1.2 The site is comprised of greenfield land and the existing flows from the site has been calculated. These can be found within Appendix F.
- 4.1.3 Building Regulations 2010 Part H guidance for disposal of surface water is as follows:
- A soakaway or infiltration system, or where not reasonably practical;
 - A surface water ditch or watercourse, or where not reasonably practical;
 - A below ground sewer
- 4.1.4 The ground investigation confirms that shallow infiltration into the Tidal Flat deposits is achievable, however as the groundwater level was recorded at a level of 1.25m below the existing ground levels and national guidance indicates infiltration should not take place within 1m of the highest recorded groundwater level, infiltration is not deemed suitable as the primary disposal method of surface water at this site. Shallow infiltration will be utilised for permeable parking bays.
- 4.1.5 The nearest watercourse to the site is the IDB maintained ditch running in an East – West direction along the Southern Boundary of land within the Client's ownership. The site generally falls towards to the watercourse.
- 4.1.6 Based on the above points surface water disposal by means of treatment and detention prior to controlled release into the nearby ditches is deemed the most appropriate solution.
- 4.1.7 The development area is 3.628ha and it is proposed that 25% of the development will be impermeable and require collecting and attenuating prior to discharge. For the purposes of this report the impermeable area of the proposed site has been taken as 0.819ha based on the current site layout available.
- 4.1.8 Surface water drainage will be provided in new below ground gravity drains constructed within the adoptable highway, with surplus flows being attenuated using an attenuation basin in conjunction with oversized pipes. The proposed storm water discharge rate based on an area of 3.628 hectares is:
- $Q_{100+40\%cc} = 1.40\text{l/s/ha}$ indirectly to existing IDB regulated ditch (South), through a riparian owner on-site ditch pipework

- 4.1.9 The discharge rate is the maximum given by South Holland District in the outline Planning conditions reference number H05-1183-16. This rate is subject to confirmation by the Environment Agency and the LLFA.
- 4.1.10 By controlling the discharge rate from the site for a 1in100 year + 40% storm event to 1.40 l/s the site is potentially offering a betterment, versus greenfield run-off rate 12.69l/, to the downstream network by utilising on site flood storage.
- 4.1.11 National Planning Policy Guidance requires that climate change allowance is incorporated within the surface water drainage design in accordance with The Environment Agency's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' February 2016 when assessing flood risk for a development.
- 4.1.12 The design life of the development is beyond 2070, therefore in accordance with the Environment Agency guidance the development should make allowances for an increase in extreme rainfall intensity of an additional 40% when compared to the 1961-1990 baseline.
- 4.1.13 In accordance with Lincolnshire County Council guidelines the site should make an allowance for Urban Creep. An allowance of 10% has been allowed for Urban Creep, therefore the proposed impermeable area for which the design is 0.91ha.
- 4.1.14 It is proposed to utilise the existing Ø600 culverted connection into the southern IDB ditch as the outfall location. The discharge rate will be restricted to 1.40 l/s by utilising a vortex flow control manhole up to the 1 in 100 year +40% climate change +10%urban creep, 24 hour storm event. A connection to the watercourse is subject to confirmation and approval by the IDB. It should also be noted that there will likely be a Development Contribution fee associated with the connections to the IDB owned asset and ordinarily this is calculated based on the impermeable area (TBC by IDB).
- 4.1.15 Type A permeable paving will be provided to the shared parking area and parking bays to offer treatment at source for the surface water runoff.
- 4.1.16 Drainage will be conveyed through a series of above ground filter drains and swales which are proposed to be offered for adoption to LCC / Anglian Water. The swales offer treatment and storage at the source before being conveyed to an attenuation basin designed with a minimum free board of 300mm.
- 4.1.17 The Drainage Strategy for the application site can be found within Appendix G along with a copy of the proposed external levels.
- 4.1.18 A copy of the hydraulic modelling for the surface water network can be found within Appendix H.
- 4.1.19 As the outfall will be into the existing watercourse, consideration must be given to the fact that the existing IDB ditch may have high levels of water above the proposed outfall pipe invert level. Therefore, in order

to mitigate for this event the hydraulic modelling has been assessed assuming a surcharged outfall and these calculations can be found in Appendix J.. This confirms that not only minor flooding will occur to the site entrance and this would be contained within the highway extents.

4.1.20 As part of the drainage strategy there is a requirement to raise levels within the site, to mitigate the raising of these levels and prevent runoff draining towards existing properties, a shallow filter drain is proposed to the western site boundary to capture exceedance flows and direct them towards the proposed attenuation basin.

4.1.21 All sewers and drainage are to be constructed in accordance with all relevant industry standards, including but not limited to:

- Building Regulations Approved Document Part H 2010
- Sewers for Adoption 6th Edition

4.1.22 The drawings & schedules of the as-built site drainage system are to be made available to the building occupier to enable drainage maintenance and future works to be undertaken.

4.1 ATTENUATION PROPOSALS

4.1.1 To achieve the reduction in discharge rate the development will provide a combination of permeable paving and attenuation basins to providing storage of runoff for the development with the discharge via a single vortex flow control chamber into the IDB drain / watercourse to the south of the site. Discharge is subject to agreement with the LLFA / IDB.

4.1.2 Green roof systems were considered but deemed impracticable due to the nature of the proposed roofs. Permeable paving is proposed to the driveways of all properties, and swales will provide some storage in extreme storm events. The attenuation basin has been sized to accommodate flows up to the 1 in 100yr + 40% climate change storm event assuming a surcharged outfall.

4.1.3 At this stage it is assumed the basin will be offered to Anglian water for adoption as part of a S104 submission.

4.1.4 In accordance with current Environmental Agency Guidance, the attenuation volume for a site should be calculated based on a 1 in 100 year + climate change allowance.

4.1.5 Calculations showing the volume requirements can be found within Appendix H.

5.0 FOUL WATER DRAINAGE STRATEGY

5.1 FOUL WATER DRAINAGE DESIGN

- 5.1.1 It is proposed that foul drainage will be conveyed from the properties by below ground private gravity sewers within the proposed adoptable highway prior to connection into the existing Anglian Water sewer located within Fleet Road to the North of the site.
- 5.1.2 All foul drainage will be vented in accordance Building Regulations Part H.
- 5.1.3 A Development Enquiry was undertaken at outline planning stage, which is included within Appendix E. It identifies that the Anglian Water foul drainage network in this area has sufficient capacity for the flows from the proposed development.

6.0 WATER QUALITY

6.1 WATER TREATMENT

- 6.1.1 In accordance with Ciria 753, the runoff from the development should undertake sufficient treatment of runoff to improve water quality downstream.
- 6.1.2 The proposed swales and filter drains, basins and permeable paving to driveways will provide benefits to the runoff by removing contaminants and sediment from the storm water that is discharged.

7.0 DRAINAGE MAINTENANCE

7.1 DRAINAGE MAINTENANCE SCHEDULE

- 7.1.1 It should be noted that Anglian Water are open to the adoption of SuDS features and as noted within the Developer Enquiry (Appendix E) and for this reason the maintenance of this feature particularly could be offered to them to maintain along with the adoptable drainage, which is the responsibility of either AW or LCC.
- 7.1.2 The swales and filter drains will be maintained by a combination of LCC and Anglian Water.
- 7.1.3 Much of the remaining drainage will likely be maintained by a private maintenance company upon completion of the development, however at this stage, the details of the company are unknown and therefore maintenance of the drainage assets is the responsibility of the development Owner until such a time whereby it is passed over.
- 7.1.4 Please refer to Appendix I for the proposed Drainage Maintenance Schedule.

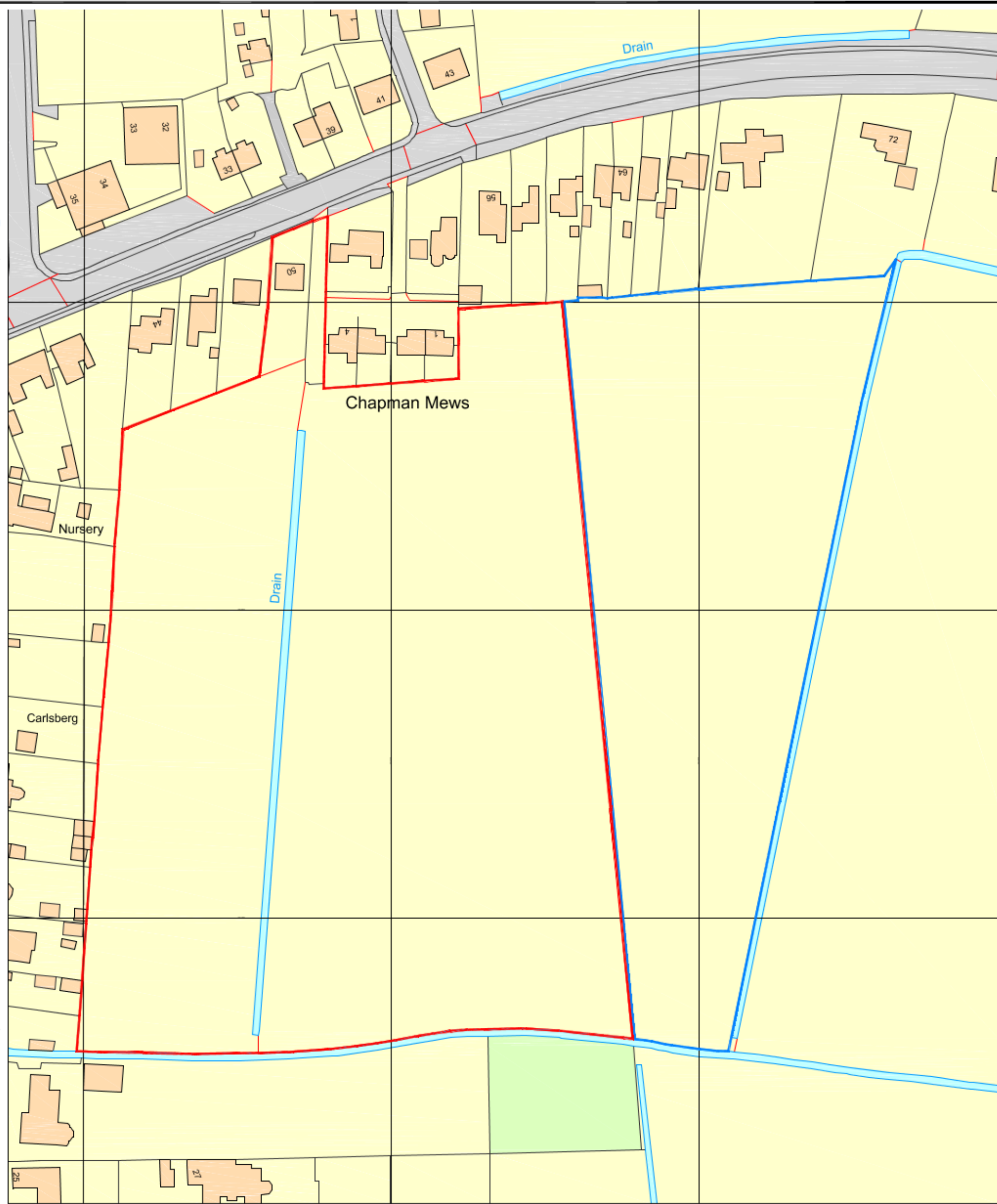
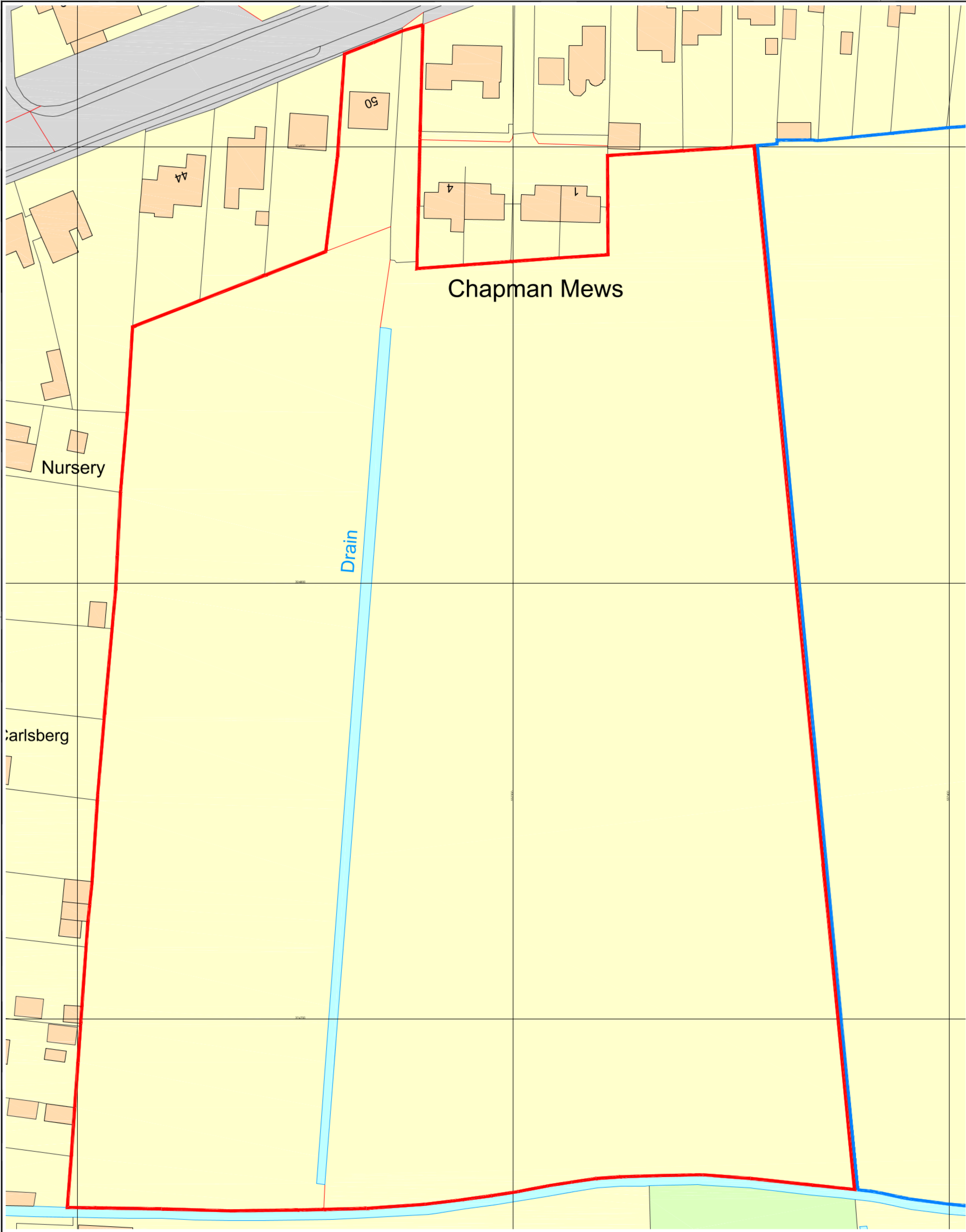
8.0 CONCLUSIONS & RECOMMENDATIONS

8.1 CONCLUSIONS

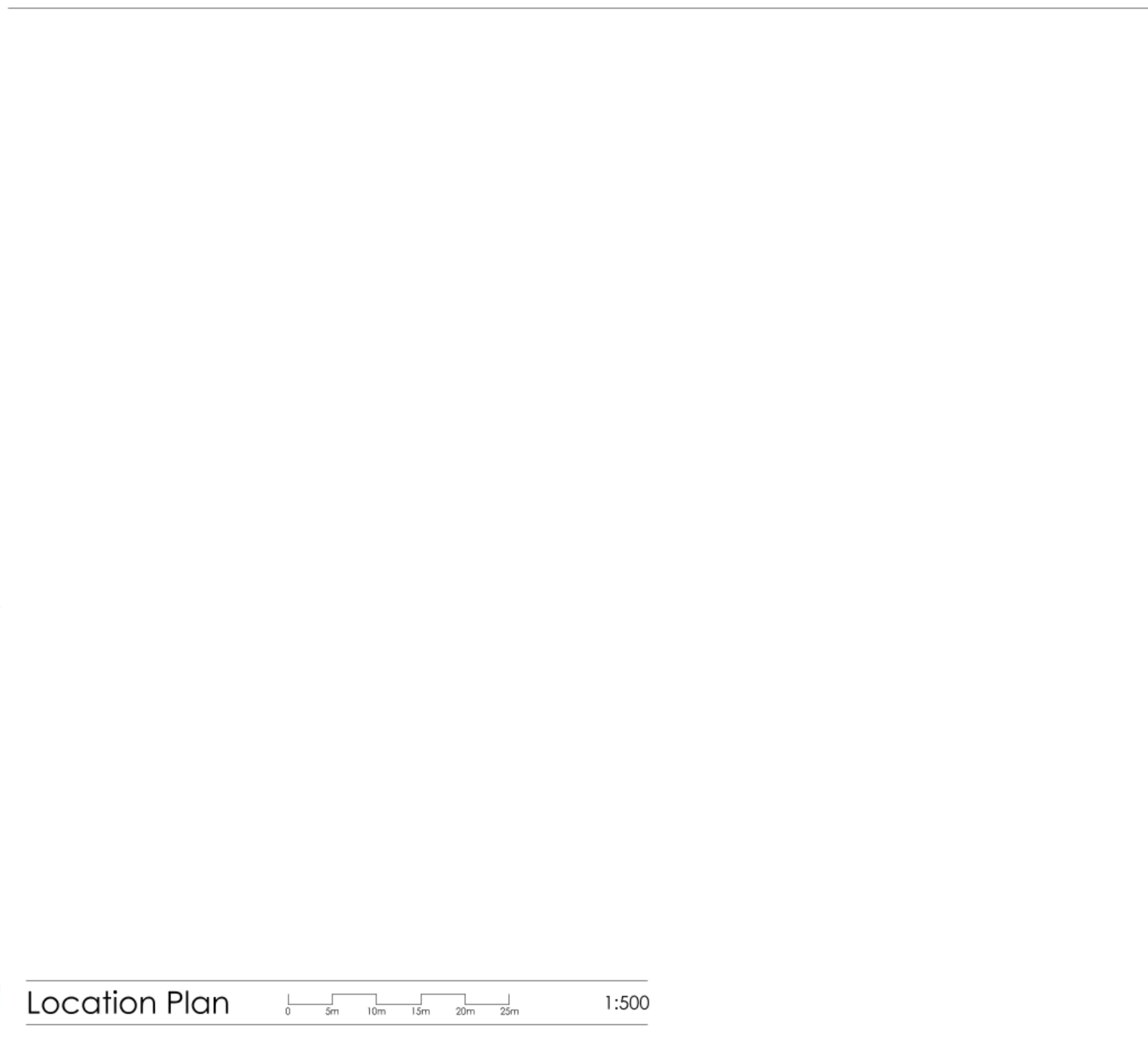
- 8.1.1 The proposed surface water drainage system can be summarised as follows.
- 8.1.2 Surface water runoff from the development to discharge at a maximum rate of 1.40l/s into the IDB regulated ditch to the southern perimeter of the site for a 1 in 100 year + 40%CC (+10% urban creep), 24 hour storm event.
- 8.1.3 Exceedance flows will flow away from the proposed dwellings and be directed towards the existing watercourses to the Southern and Eastern boundaries, where directed toward existing dwellings a filter drain will be provided to prevent overland flows entering third party land.

APPENDICES

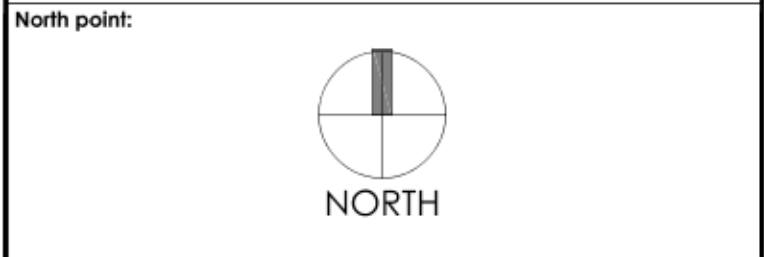
APPENDIX A – SITE LOCATION PLAN



Location Plan



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Notes:

Revision Log:				
B	Red Line updated following confirmation of title.	JAE	Jan 21	
A	Red Line updated for Planning	JAE	July 20	
Rev:	Description:	By:	Date:	

Project:
Proposed Development at
Fleet Road
Holbeach

Client:
Kaplan Property Group

Scale:
0 5m 10m 15m 20m 25m 1:500

Drawn by:	Checked:	Date:	Paper Size:
JAE	JAE	Aug 19	A1

Drawing Title:
Location Plans

Drawing Status:
PLANNING ISSUE

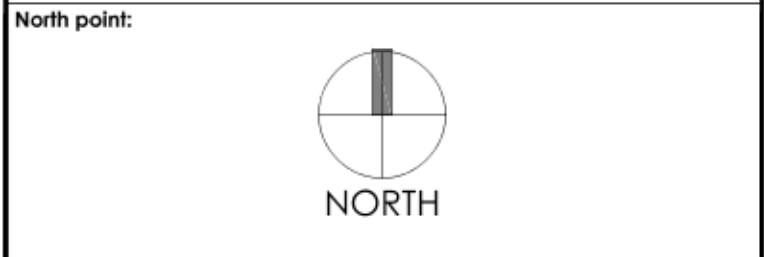
Drawing Number:	Revision Number:
4883/KP/19/001	B

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APPENDIX B – DEVELOPMENT PROPOSALS



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Notes:

Schedule of Accommodation	
55 no. Units -	8 no. x 1 bed 2 person house - 54.3m ² 21 no. x 2 bed 4 person house - 69.3m ² 8 no. x 3 bed 5 person house - 84.6m ² 10 no. x 3 bed 5 person house - 87.6m ² 2 no. x 4 bed 6 person house - 113.6m ² 6 no. x 2 bed 4 person Bungalow - 64m ²
Site Area = 36,340m ² (8.98 acres).	
Overall POS requirement: Under Policy HS11 at 14%	

Revision Log:

Rev:	Description:	By:	Date:
V	Section indicators and soft landscaping added to drawing	JAE	Feb 21
U	Maintenance strip removed	JAE	Feb 21
T	Drainage Strategy added to layout, layout updated accordingly	JAE	Jan 21
S	Minor amendments made to scheme	JAE	Jan 21
R	Scheme re-drawn	JAE	Jan 21
Q	Site Plan updated following client comments	JAE	Jan 21
P	Scheme updated - plot positions revised	JAE	Dec 20
N	Changes made to the housing mix	JAE	Dec 20
M	Changes made following client comments	JAE	Nov 20
L	Layout changes following meeting with client.	JAE	Nov 20
K	Scheme redesigned following feedback from client and planners	JAE	Nov 20
J	Layout updated following meeting with client, planting buffers removed and indicative landscaping taken off drawing	JAE	July 20
H	House types designed and updated for planning application	JAE	July 20
G	Storm water retention basins added	JAE	July 20
F	Plots 41&42 (2b4p) units replaced with 4b6p	JAE	June 20
E	Access highways amendments made to maintain 4.6m strip of asphalt	JAE	May 20
D	Topo added and updated following changes made to masterplan and highways	JAE	Apr 20
C	Phase 1 Layout updated following meeting with client.	JAE	Feb 20
B	Layout updated following revisions to the housing mix.	JAE	Oct 19
A	Site Plan updated following feedback from client.	JAE	Sept 19

Project:
Proposed Development at Fleet Road Holbeach

Client:
Kaplan Property Group

Scale:
0 5m 10m 15m 20m 25m 1:500

Drawn by:	Checked:	Date:	Paper Size:
JAE	JAE	Aug 19	A1

Drawing Title:
Proposed Site Plan

Drawing Status:
PLANNING ISSUE

Drawing Number: 4883/KP/19/002	Revision Number: V
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APPENDIX C – TOPOGRAPHICAL SURVEY

APPENDIX D – GROUND INVESTIGATION

GROUND ENGINEERING

Newark Road

Peterborough

PE1 5UA

Tel: 01733 566566

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GROUND INVESTIGATION REPORT

LAND OFF FLEET ROAD

HOLBEACH

LINCOLNSHIRE

Report Reference C15102A

On behalf of:-

Kaplan Property Group

Unit 6

Kibworth Business Park

Nursery Court

Kibworth

LE8 0EZ

December 2020

GROUND CONDITIONS

The ground conditions have been plotted as a soil profile in Figure 2. The ground conditions comprised a surface layer of made ground to between 0.20m and 0.75m depth, underlain by superficial Tidal Flat Deposits comprising sandy, silty clay to between 0.70m and at least 1.20m depth, and in turn loose Marine Sand which became medium dense with depth. The anticipated Till (Boulder Clay) was not encountered in the boreholes within 15.00m depth. Groundwater was recorded between 1.25m and 1.35m depth during the investigation.

Made Ground

Made ground was encountered to between 0.20m and 0.75m depth. The made ground generally comprised firm or stiff, brown and dark brown, slightly gravelly, sandy, silty clay. The gravel fraction comprised angular to rounded flint, quartzite, igneous rock, and locally (TP1 and TP2) with occasional ash, concrete, brick and plastic fragments.

Tidal Flat Deposits

Beneath the surface made ground at between 0.20m and 0.75m depth, firm or stiff, orange brown, light brown and light grey, sandy, silty clay was encountered. These soils were considered to represent the anticipated superficial Tidal Flat Deposits, and were encountered to depths of between 0.70m (BH2 & TP2) and at least 1.20m (TP3). Trial pits TP1 and TP3 were completed within the Tidal Flat Deposit soils.

Marine Sand

At depths of between 0.70m and 0.85m, light brown, orange brown and light grey, slightly clayey, silty to very silty fine sand, varying to clayey, very sandy silt (BH2), was encountered. These sand soils were initially loose becoming medium dense below about 5.00m depth, which were considered to represent superficial Marine Sand. Below 5.00m depth the

Marine Sand comprised a brown, silty fine sand with occasional shell fragments, which was encountered to at least the base of the boreholes at a depth of 15.00m.

Groundwater

Groundwater seepages were recorded during boring at 3.30m and 3.50m depth. No groundwater was recorded during excavation or on completion of the shallow trial pits. Groundwater was recorded at 1.50m depth in BH2, and was recorded at 2.00m below ground level in BH1, on completion of the boreholes and removal of the casing, however these levels may have still been rising. During monitoring of the standpipes in November 2020 groundwater was recorded at between 1.35m depth (BH1) and 1.25m depth (BH2).

Observations

Live roots were observed to a maximum depth of 0.60m in TP4.

Excavation Stability

The shallow trial pit sides were stable during excavation and on completion to 1.20m depth.

Evidence of Contamination

The made ground encountered during this investigation was not noted to have olfactory or visual evidence of fuel contamination. The made ground contained occasional fragments of ash, concrete, brick and plastic. No asbestos containing materials were noted in the soils during this investigation, or during testing.

Sulphate Conditions

Sulphate analysis of selected samples of soil and groundwater yielded soluble sulphate concentrations within Design Sulphate Class DS-1 of the BRE Special Digest 1, Table C1 (2001), presented in Appendix 1. The pH results of the samples ranged between 6.7 and 8.2 indicating slightly acidic to alkaline conditions.

These results indicate an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 for buried concrete. This ACEC Class should be considered when specifying a Design Chemical Class (DC Class) for buried concrete on this site, as detailed in the above cited BRE document.

Drainage

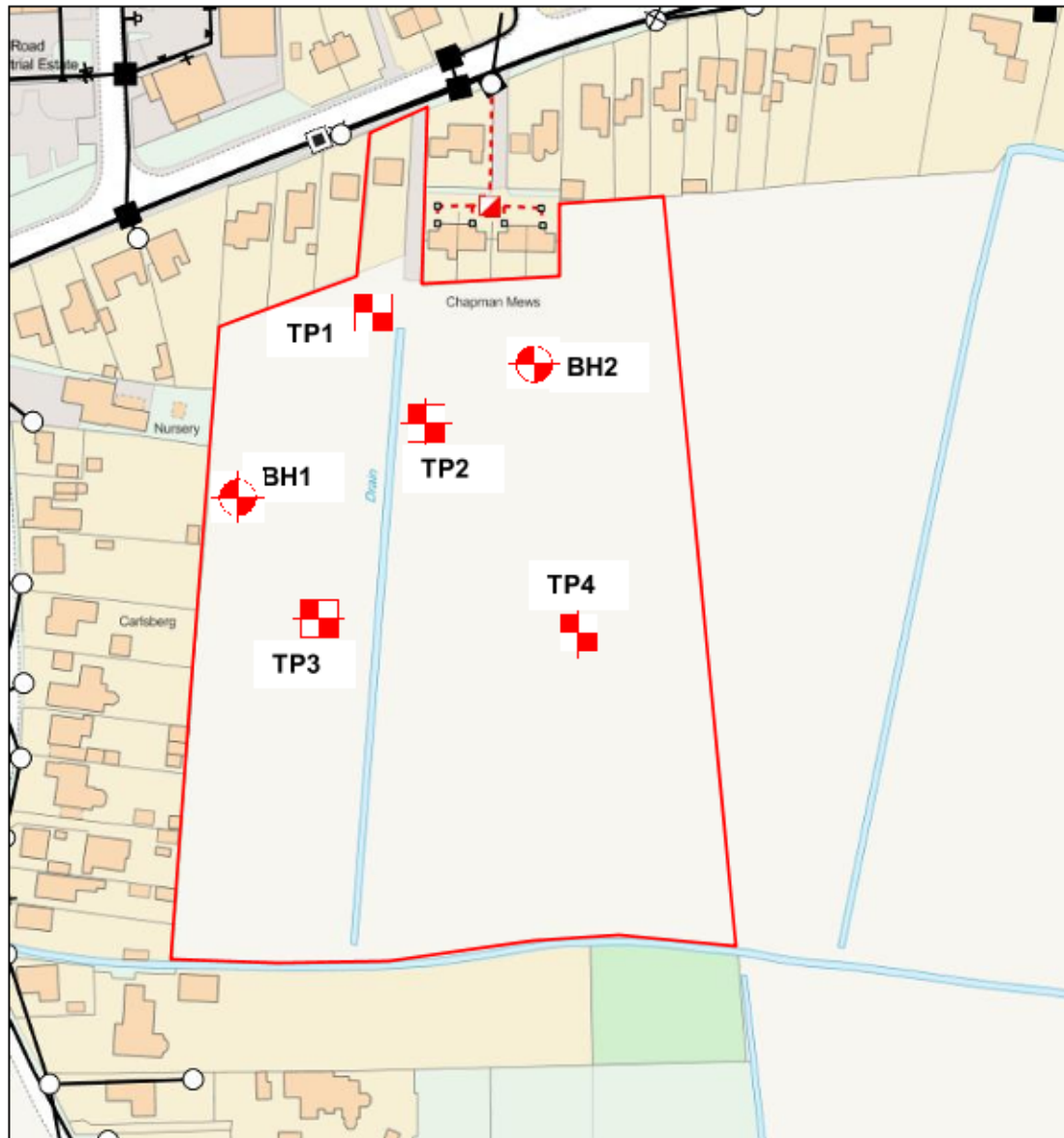
The soakaway test in the northern part of the site (TP1) gave soil infiltration rates (f) between $2.54 \times 10^{-5} \text{ m/s}$ and $4.12 \times 10^{-5} \text{ m/s}$ within the sandy, silty clay Tidal Flat Deposits. These results rate the ground as having a 'good' drainage potential according to Figure 6 of BS8004:1986.

The shallow groundwater table, standing below around 1.25m depth, will limit the effective depth of soakaway drainage on this site. Soakaways should not be located within, or discharged into, thick made ground, since the fill would be susceptible to volume loss on inundation, with resulting subsidence of any structures or hardstanding built on it. There is also potential for movements either due to the removal of fines and subsequent settlement of structures based upon these soils.

Soakaway chambers should have provision for cleaning since they are prone to silting up within the Tidal Flat Deposits.

Exploratory Hole Location Plan

Based on BT plan. With the permission of the Controller of Her Majesty's Stationery Office, © Crown Copyright.
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Not To Scale



Project : Fleet Road, Holbeach, Lincolnshire.

Client : Kaplan Property Limited

**GROUND
ENGINEERING
LIMITED**

Peterborough Tel : 01733 566566

Project No.

C15102A

GROUND ENGINEERING LIMITED Tel: 01793-566566 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH				BOREHOLE BH1				
Samples and in-situ Tests			Date: 05/11/20 to 06/11/20		Hole Size: 150mm dia to 15.00m		Ground Level:				
Depth m	Type	Blows	(Date) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m			
0.10 0.20-0.60	D1 B1				MADE GROUND - Firm, brown, slightly gravelly, sandy, silty CLAY. Gravel is sub-angular to rounded flint and ash.		0.20				
0.75 0.80-1.20	D2 B2				Firm, light brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.75				
1.20-1.70 1.35-1.65	B3 S	N6	1.20	▼s	Loose, light brown, orange brown and light grey, clayey, very silty fine SAND.						
1.65	D3										
2.20-2.70 2.35-2.65	B4 S	N6	1.60		...Becoming slightly clayey below 2.20m depth.						
2.65	D4										
3.20-3.70 3.20 3.35-3.65	B5 W1 S	N7	3.10	▼c	(MARINE SAND)						
3.65	D5										
4.20-4.70 4.35-4.65	B6 S	N8	4.20								
4.65	D6										
5.10-5.60 5.25-5.55	B7 S	N10	5.10		Medium dense, locally loose, brown, silty fine SAND with rare shell fragments.		5.00				
5.55	D7										
6.60-7.10 6.75-7.05	B8 S	N9	6.60		(MARINE SAND)						
7.05	D8										
8.10-8.60 8.25-8.55	B9 S	N12	8.10								
8.55	D9										
9.60-10.10 9.75-10.05	B10 S	N13	9.60				10.00				
REMARKS 1. Excavating a pit from 0.00m to 1.20m for 1 hour 2. Water added from 2.70m to 15.00m 3. Borehole cased to 15.00m depth 4. Gas monitoring standpipe installed to 6.00m depth							Project No 15102A				
							Scale 1:50	Page 1/2			
KEY			N/A - SPT Blows for 0.3m or given penetration			Groundwater Strikes			Groundwater Observations		
D - Disturbed Sample			ES - Environmental Sample			Depth m			Depth m		
U - Undisturbed Sample			V - Vane Shear Test			No Struck			Date		
W - Water Sample			Cohesion () kPa			Rose to			Hole		
S/C - SPT Spoon/Cone			Level on completion			Rate			Casing		
▼ Water Strike			Level casing withdrawn			Cased			Water		
▼ Water Rise			Standpipe Level			Sealed					
						1 3.30 3.30 very slow 3.10 not			05/11/20 6.00 6.00 3.60		
									06/11/20 6.00 6.00 2.00		
									06/11/20 15.00 15.00 1.20		
									06/11/20 15.00 0.00 2.00		
									13/11/20 6.00 1.00 1.35		

GROUND ENGINEERING L I M I T E D Tel: 01733-666666 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH				BOREHOLE BH1				
			Date: 05/11/20 to 06/11/20		Hole Size: 150mm dia to 15.00m			Ground Level:			
Samples and in-situ Tests			(Date)	Inst.	Description of Strata			Legend	Depth m	O.D. Level m	
Depth m	Type	Blows	Casing								
10.05	D10				Medium dense, grey brown, silty fine SAND with rare shell fragments.				10.00		
11.10-11.60	B11										
11.25-11.55	S	N15	11.10								
11.55	D11										
12.60-13.10	B12										
12.75-13.05	S	N18	12.60		(MARINE SAND)						
13.05	D12										
13.50-14.00	B13										
13.65-13.95	S	N21	13.50								
13.95	D13										
14.50-15.00	B14										
14.65-14.95	S	N26	14.50								
14.95	D14								15.00		
					Borehole completed at 15.00m depth						
REMARKS									Project No 15102A		
									Scale 1:50	Page 2/2	
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample S/C - SPT Spoon/Cone ✓ - Water Strike ✗ - Water Rise				N/* - SPT Blows for 0.3m or given penetration ES - Environmental Sample V - Vane Shear Test Cohesion () kPa Level on completion Level casing withdrawn Standpipe Level				Groundwater Strikes Depth m No Struck Rose to Rate Cased Sealed Groundwater Observations Date Hole Casing Water			
								20/11/20 6.00 1.00 1.35 27/11/20 6.00 1.00 1.35			

Borehole Number	Depth (m)	Casing Depth (m)	Depth to Water (m)	Type of Test *	Seating Drive Blows/ Penetration (mm)	Test Drive: 300mm Blows for each successive 75 mm Penetration				N Value	Extra-polated Value
BH1	1.20 - 1.65	1.20		S	2/150	1	1	2	2	6	
	2.20 - 2.65	1.60		S	2/150	2	1	1	2	6	
	3.20 - 3.65	3.10	2.80	S	2/150	1	2	2	2	7	
	4.20 - 4.65	4.20	3.30	S	2/150	2	2	2	2	8	
	5.10 - 5.55	5.10	3.90	S	2/150	2	2	3	3	10	
	6.60 - 7.05	6.60	0.70	S	3/150	2	2	2	3	9	
	8.10 - 8.55	8.10	0.70	S	3/150	3	3	3	3	12	
	9.60 - 10.05	9.60	0.60	S	4/150	3	3	3	4	13	
	11.10 - 11.55	11.10	0.80	S	5/150	3	3	4	5	15	
	12.60 - 13.05	12.60	0.80	S	5/150	3	4	5	6	18	
	13.50 - 13.95	13.50	0.90	S	5/150	4	5	6	6	21	
	14.50 - 14.95	14.50	0.90	S	6/150	6	6	7	7	26	
BH2	1.20 - 1.65	1.20		S	2/150	1	1	2	2	6	
	2.20 - 2.65	1.60		S	2/150	1	1	1	2	5	
	3.20 - 3.65	3.10	2.50	S	2/150	1	1	2	2	6	
	4.20 - 4.65	4.20	3.00	S	2/150	1	2	2	2	7	
	5.20 - 5.65	5.20	3.50	S	2/150	2	2	3	4	11	
	6.70 - 7.15	6.70	4.20	S	2/150	1	2	2	3	8	
	8.20 - 8.65	8.20	0.40	S	4/150	2	3	3	4	12	
	9.70 - 10.15	9.70	0.30	S	4/150	2	3	3	5	13	
	11.20 - 11.65	11.20	0.40	S	5/150	3	4	4	6	17	
	12.70 - 13.15	12.70	0.50	S	5/150	5	5	6	6	22	
	13.50 - 13.95	13.50	0.80	S	6/150	5	6	7	7	25	
	14.50 - 14.95	14.50	0.80	S	7/150	6	7	7	8	28	

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH				BOREHOLE BH2			
Date: 04/11/20 to 05/11/20			Hole Size: 150mm dia to 15.00m				Ground Level:			
Samples and in-situ Tests			(Date)	Inst.	Description of Strata		Legend	Depth m	O.D. Level m	
Depth m	Type	Blows	Casing							
0.10 0.25 0.30-0.70	D1 D2 B1				MADE GROUND - Firm, brown, slightly gravelly, sandy, silty CLAY. Gravel is sub-angular and sub-rounded flint. Firm, light brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)			0.25		
0.70-1.20	B2				Loose, light brown and brown, clayey, very sandy SILT. (MARINE SAND)			0.70		
1.20-1.70 1.35-1.65	B3 S	N6	1.20		Loose, light brown, slightly clayey, very silty fine SAND.			1.20		
1.65	D3				(MARINE SAND)					
2.20-2.70 2.35-2.65	B4 S	N5	1.60							
2.65 2.80	D4 W1									
3.20-3.70 3.35-3.65	B5 S	N6	3.10							
3.65	D5									
4.20-4.70 4.35-4.65	B6 S	N7	4.20							
4.65	D6									
5.20-5.70 5.35-5.65	B7 S	N11	5.20		Medium dense, locally loose, brown, silty fine SAND with rare shell fragments.			5.00		
5.65	D7									
6.70-7.20 6.85-7.15	B8 S	N8	6.70							
7.15	D8				(MARINE SAND)					
8.20-8.70 8.35-8.65	B9 S	N12	8.20							
8.65	D9									
9.70-10.20 9.85-10.15	B10 S	N13	9.70					10.00		
REMARKS 1. Excavating a pit from 0.00m to 1.20m for 1 hour 2. Water added from 2.20m to 12.70m 3. Water added from 13.75m to 14.50m 4. Borehole cased to 15.00m depth 5. Gas monitoring standpipe installed to 6.00m depth							Project No 15102A			
							Scale 1:50	Page 1/2		
KEY			Groundwater Strikes				Groundwater Observations			
D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample W - Water Sample S/C - SPT Spoon/Conc W - Water Strike W - Water Rise			N/A - SPT Blows for 0.3m or given penetration ES - Environmental Sample V - Vane Shear Test Cohesion () kPa Level on completion Level casing withdrawn Standpipe Level				Depth m Date Hole Casing Water			
			No	Struck	Rose to	Rate	Cased	Sealed		
			1	3.50	3.50	very slow	3.20	not	04/11/20	13.20
									05/11/20	13.20
									05/11/20	15.00
									05/11/20	15.00
									13/11/20	6.00
										1.00
										0.80
										2.80
										1.30
										1.50
										1.30

L I M I T E D
Tel: 01783-566556
www.groundengineering.co.uk

Date: 04/11/20
to 05/11/20

BOREHOLE
BH2

Ground
Level:

REMARKS	Project No 15102A	
	Scale 1:50	Page 2/2

KEY	N* - SPT Blows for 0.3m or given penetration ES - Environmental Sample V - Vane Shear Test W - Water Sample Cohesion () kPa S/C - SPT Spoon/Cone Level on completion c/w Level casing withdrawn Water Strike Standpipe Level	Groundwater Strikes						Groundwater Observations			
		Depth m						Date	Depth m		
		No	Struck	Rose to	Rate	Cased	Sealed		Hole	Casing	Water
								20/11/20	6.00	1.00	1.25
								27/11/20	6.00	1.00	1.25

GROUND ENGINEERING L I M I T E D Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH		TRIAL PIT TP1	
Date: 09/11/20			Pit Size: 1.00m L x 0.30m W x 1.00m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				O.D. Level m
0.10	D1			MADE GROUND - Firm, friable, dark brown, slightly gravelly, sandy, silty CLAY. Gravel is fine and medium, angular to rounded flint, quartzite and igneous rock.		0.25
0.10	ES1					
0.30	D2			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY. Gravel is angular to rounded flint, quartzite, plastic, concrete and brick fragments.		
0.30	ES2					
0.65	D3					
0.65	ES3			Firm, brown and orange brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.75
1.00	D4					1.00
				Pit completed at 1.00m depth		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample W - Water Strike W - Water Rise Wc - Level on completion MP - Mackintosh Probe P - Hand Penetrometer C - Cohesion () kPa V - Vane Shear Test C - Cohesion () kPa			REMARKS 1. Live roots observed to 0.30m depth 2. Pit dry 3. Pit sides stable 4. Soakaway test undertaken at 1.00m depth			
			Project No 15102A		Scale 1:25	
			Page 1/1			

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Fleet Road, Holbeach

Project No: C15102A

Sheet No: 1/3

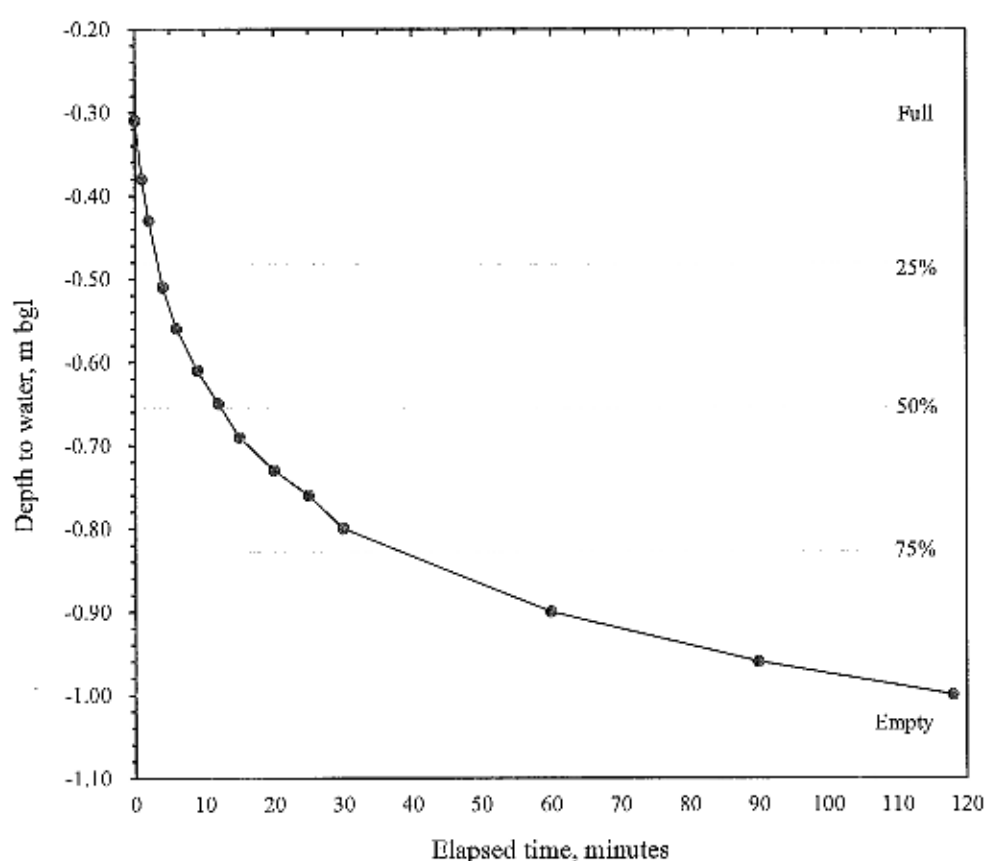
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

Description of Stratum under test: Firm, brown and orange brown, sandy, silty CLAY

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0	0.31
1	0.38
2	0.43
4	0.51
6	0.56
9	0.61
12	0.65
15	0.69
20	0.73
25	0.76
30	0.80
60	0.90
90	0.96
118	1.00



All dimensions given in metres

$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.10$$

$$A50 = 1.20$$

$$T75 - T25 = 35$$

$$f = \underline{4.12E-05} \text{ m/s}$$

Soil Infiltration Rate

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Fleet Road, Holbeach

Project No: C15102A

Sheet No: 2/3

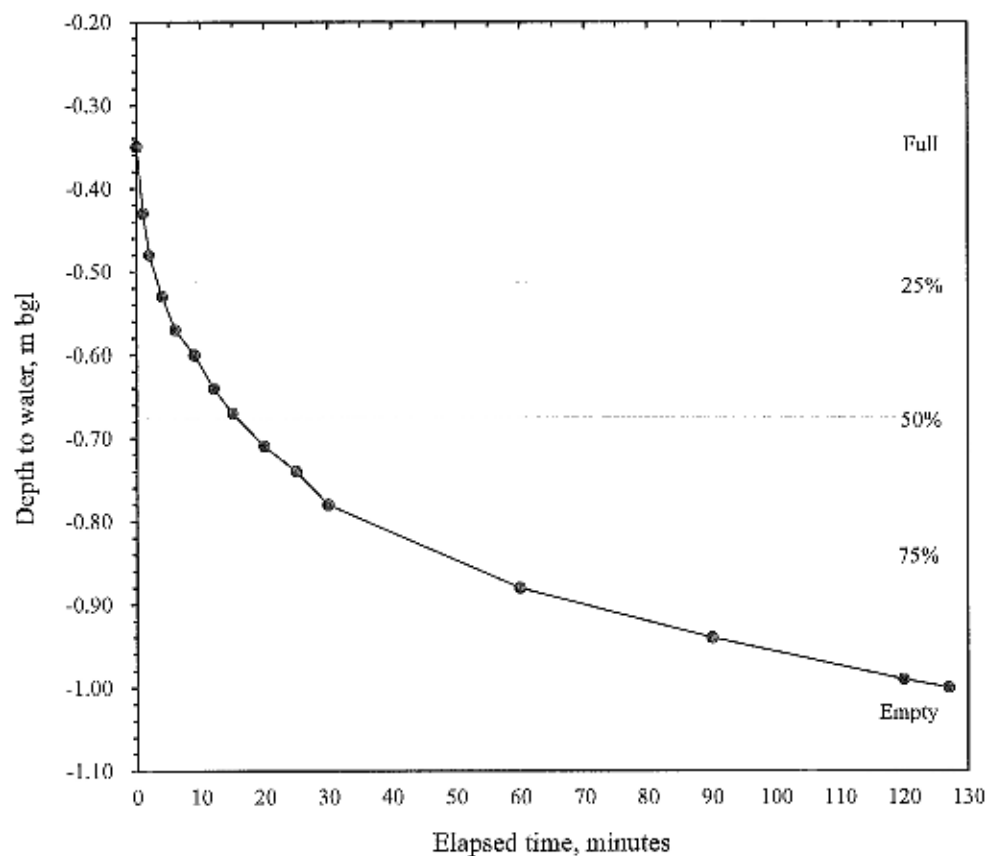
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

Description of Stratum under test: Firm, brown and orange brown, sandy, silty CLAY

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0	0.35
1	0.43
2	0.48
4	0.53
6	0.57
9	0.60
12	0.64
15	0.67
20	0.71
25	0.74
30	0.78
60	0.88
90	0.94
120	0.99
127	1.00



All dimensions given in metres

$$f = \frac{(V75-V25)}{A50(T75-T25)}$$

$$V75-V25 = 0.10$$

$$A50 = 1.15$$

$$T75-T25 = 44$$

Soil Infiltration Rate

$$f = \underline{3.23E-05} \text{ m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Fleet Road, Holbeach

Project No: C15102A

Sheet No: 3/3

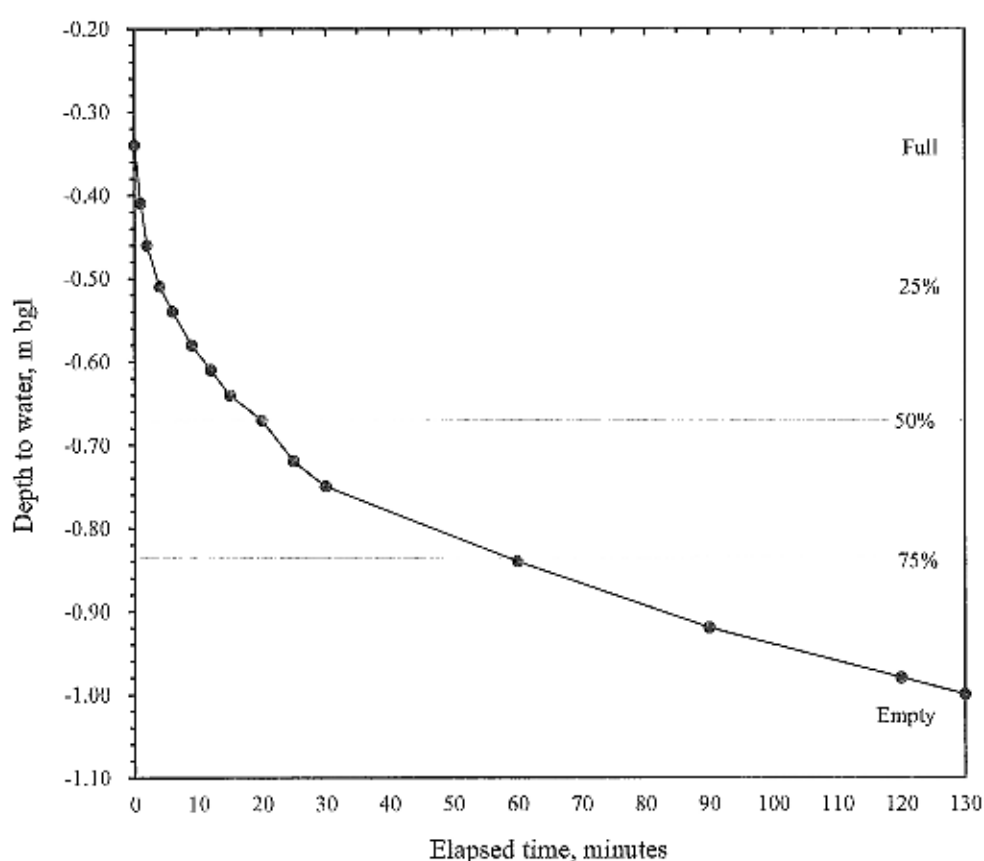
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

Description of Stratum under test: Firm, brown and orange brown, sandy, silty CLAY

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0	0.34
1	0.41
2	0.46
4	0.51
6	0.54
9	0.58
12	0.61
15	0.64
20	0.67
25	0.72
30	0.75
60	0.84
90	0.92
120	0.98
130	1.00



All dimensions given in metres

$$f = (V75 - V25) / A50(T75 - T25)$$

$$V75 - V25 = 0.10$$

$$A50 = 1.16$$

$$T75 - T25 = 56$$

$$f = \underline{2.54E-05} \text{ m/s}$$

Soil Infiltration Rate

GROUND ENGINEERING

L I M I T E D
Tel: 01793-666566
www.groundengineering.co.uk

Site: LAND OFF FLEET ROAD, HOLBEACH

TRIAL PIT
TP2

Date: 09/11/20

Pit Size: 0.35m L x 0.25m W x 1.00m D.

Ground
Level:

Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
0.05	D1			MADE GROUND - Stiff, dark brown, slightly gravelly, silty CLAY. Gravel is angular to rounded flint, quartzite, plastic and brick fragments.		0.40	
0.05	ES1						
0.10	V1	(120)					
0.50-0.70	B1			Stiff, brown, slightly sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.70	
0.50	D2						
0.50	V2	(120)					
0.50-0.72	MP1	100					
0.70-0.80	B2			Medium dense, brown, very silty fine SAND. (MARINE SAND)		1.00	
0.80	D3						
0.90-1.15	MP2	100					
1.00	D4			Pit completed at 1.00m depth			

KEY

D - Disturbed Sample
B - Bulk Sample
U - Undisturbed Sample
R - Root Sample
W - Water Sample
ES - Environmental Sample
W - Water Strike
W - Water Rise
Wc - Level on completion
MP - Mackintosh Probe
P() - Hand Penetrometer
Cohesion () kPa
V - Vane Shear Test
Cohesion () kPa

REMARKS

1. Fibrous live roots observed to 0.50m depth
2. Pit dry
3. Pit sides stable

Project No
15102A

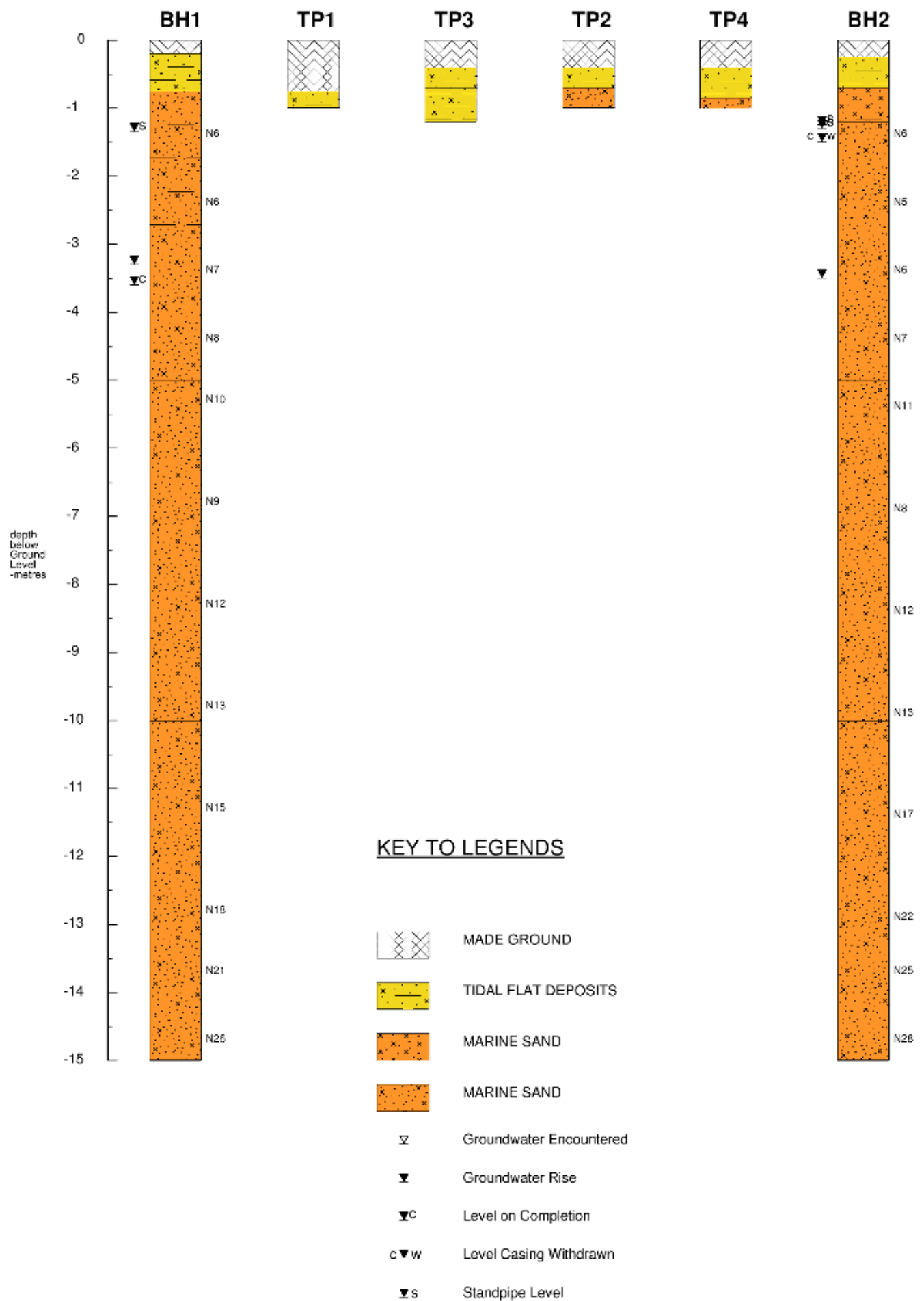
Scale Page
1:25 1/1

GROUND ENGINEERING L I M I T E D Tel: 01733-568568 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH		TRIAL PIT TP3	
Date: 09/11/20			Pit Size: 0.30m L x 0.25m W x 1.20m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	O.D. Level m
Depth m	Type	Result				Depth m
0.10	V1	(62)		MADE GROUND - Firm, dark brown, slightly gravelly, sandy, silty CLAY. Gravel is angular to rounded flint and quartzite.		
0.20	D1					
0.20	ES1					
0.45	D2			Stiff, brown and orange brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.40
0.50-0.70	B1					
0.50	V2	(84)				
0.60-0.77	MP1	100				0.70
0.70	D3					
0.85	V3	(56)		Firm, brown, light brown and light grey, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		
1.20	D4					1.20
1.20	V4	(52)		Pit completed at 1.20m depth		

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample W - Water Strike W - Water Rise c - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Fibrous live roots observed to 0.50m depth 2. Pit dry 3. Pit sides stable	Project No 15102A	
		Scale 1:25	Page 1/1

GROUND ENGINEERING LIMITED Tel: 01733 566566 www.groundengineering.co.uk			Site: LAND OFF FLEET ROAD, HOLBEACH		TRIAL PIT TP4	
Samples and in-situ Tests			Date: 09/11/20	Pit Size: 0.37m L x 0.25m W x 1.00m D.		Ground Level:
Depth m	Type	Result	(Date) Water	Description of Strata	Legend	Depth m
0.10 0.10 0.10	D1 ES1 V1	(80)		MADE GROUND - Stiff, dark brown, slightly gravelly, sandy, silty CLAY. Gravel is angular to rounded flint and quartzite.		0.40
0.50-0.80 0.60	B1 D2			Stiff, brown, orange brown and light grey, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.85
1.00 1.00-1.30	D3 MP1	90		Medium dense, brown and light brown, silty SAND. (MARINE SAND) Pit completed at 1.00m depth		1.00

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental Sample W - Water Strike W - Water Rise c - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Fibrous live roots observed to 0.60m depth 2. Pit dry 3. Pit sides stable	Project No 15102A	
		Scale 1:25	Page 1/1



Project : Land off Fleet Road, Holbeach

Client : Kaplan Property Limited

**GROUND
ENGINEERING
LIMITED**
Tel : 01733 566566

Soil Profile

Fig No. 2

**Project No
C15102A**

**Vertical Scale
1:75**

APPENDIX E – ANGLIAN WATER DEVELOPER ENQUIRY & SEWER MAP



Pre-Planning Assessment Report

Land off Fleet Road, Hollbeach

InFlow Reference: PPE-0081061

Assessment Type: Used Water

Report published: 28/05/2020



Thank you for submitting a pre-planning enquiry.

This has been produced for Farrow Walsh .

Your reference number is **PPE-0081061**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on **0345 60 66 087**, Option 1 or email planningliaison@anglianwater.co.uk

Section 1 - Proposed development

The response within this report has been based on the following information which was submitted as part of your application:

List of planned developments	
Type of development	No. Of units
Dwellings	100

The anticipated residential build rate is:

Year	Y1	Y2
Build rate	50	50

Development type: Greenfield
Planning application status: Unknown
Site grid reference number: TF3733324796

The comments contained within this report relate to the public water mains and sewers indicated on our records.

Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2 - Assets affected

Our records indicate that we have the following types of assets within or overlapping the boundary of your development site as listed in the table below.

Additionally, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence. We are unable to permit development either over or within the easement strip without our prior consent. The extent of the easement is provided in the table below. Please be aware that the existing water mains/public sewers should be located in highway or open space and not in private gardens. This is to ensure available access for any future maintenance and repair and this should be taken into consideration when planning your site layout.

Water and Used water easement information		
Asset type	Pipe size (mm)	Total easement required (m)
Water mains	229	6.00 m either side of the centre line
Sewer mains	150	3.00 m either side of the centre line

If it is not possible to avoid our assets then these may need to be diverted in accordance with Section 185 of the Water Industry Act (1991). You will need to make a formal application if you would like a diversion to be considered.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3 - Water recycling services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and effluent quality arising from your development.

Water recycling centre

The foul drainage from the proposed development is in the catchment of Holbeach Water Recycling Centre, which currently has capacity to treat the flows from your development site. Anglian Water cannot reserve capacity and the available capacity at the water recycling centre can be reduced at any time due to growth, environmental and regulation driven changes.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 150mm diameter sewer via a new connection between manholes 3903 and 2901 in Fleet Road at National Grid Reference NGR TF 37271 24928. Anglian water has assessed the impact of gravity flows from the planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

You indicated on the Pre-Planning Application form that a connection to the public surface water sewer network is not required. Therefore a capacity assessment has not been made on the public surface water network.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our [website](#). We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating that the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our [website](#)

As the proposed method of surface water disposal is not relevant to Anglian Water; we suggest that you contact the relevant Local Authority, Lead Local Flood Authority, the Environment Agency or the Internal Drainage Board, as appropriate.

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

Your development site will be required to pay an infrastructure charge for each new property connecting to the public sewer that benefits from Full planning permission.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

Payment of the infrastructure charge must be made before premises are connected to the public sewer.

Infrastructure charge for water recycling:	£ 570.00
--	-----------------

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 570.00	100	£ 57000

Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non- household premises, the fixed element is calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge.

Details of the relevant multiplier for each fitting can be found at our [website](#).

It has been assumed that the onsite used water network will be provided under Section 104 of the Water Industry Act

It is recommended that you also budget for connection costs.

Please note that we offer alternative types of connections depending on your needs and these costs are available at our [website](#).

Section 4 - Map of Proposed Connection Points



Figure 1: Showing your used water point of connection

Section 5 - Useful information

Water Industry Act – Key used water sections

Section 98:

This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our [website](#) or via our Development Services team on **0345 60 66 087**.

Sustainable drainage systems

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. .

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or SuDS.

SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our [website](#)

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site to discuss your application.

Private sewer transfers

Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

Surface water sewers and lateral drains that do not discharge to the public sewer, e.g. those that discharged to a watercourse.

Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.

Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

It is anticipated that all new sewer applications will need to have an approved Section104 application ahead of a Section 106 connection

Encroachment

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our [website](#)

Locating our assets

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from [digdat](#)

All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge.

We have more information on our [website](#)

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our [website](#)

Section 6 - Disclaimer

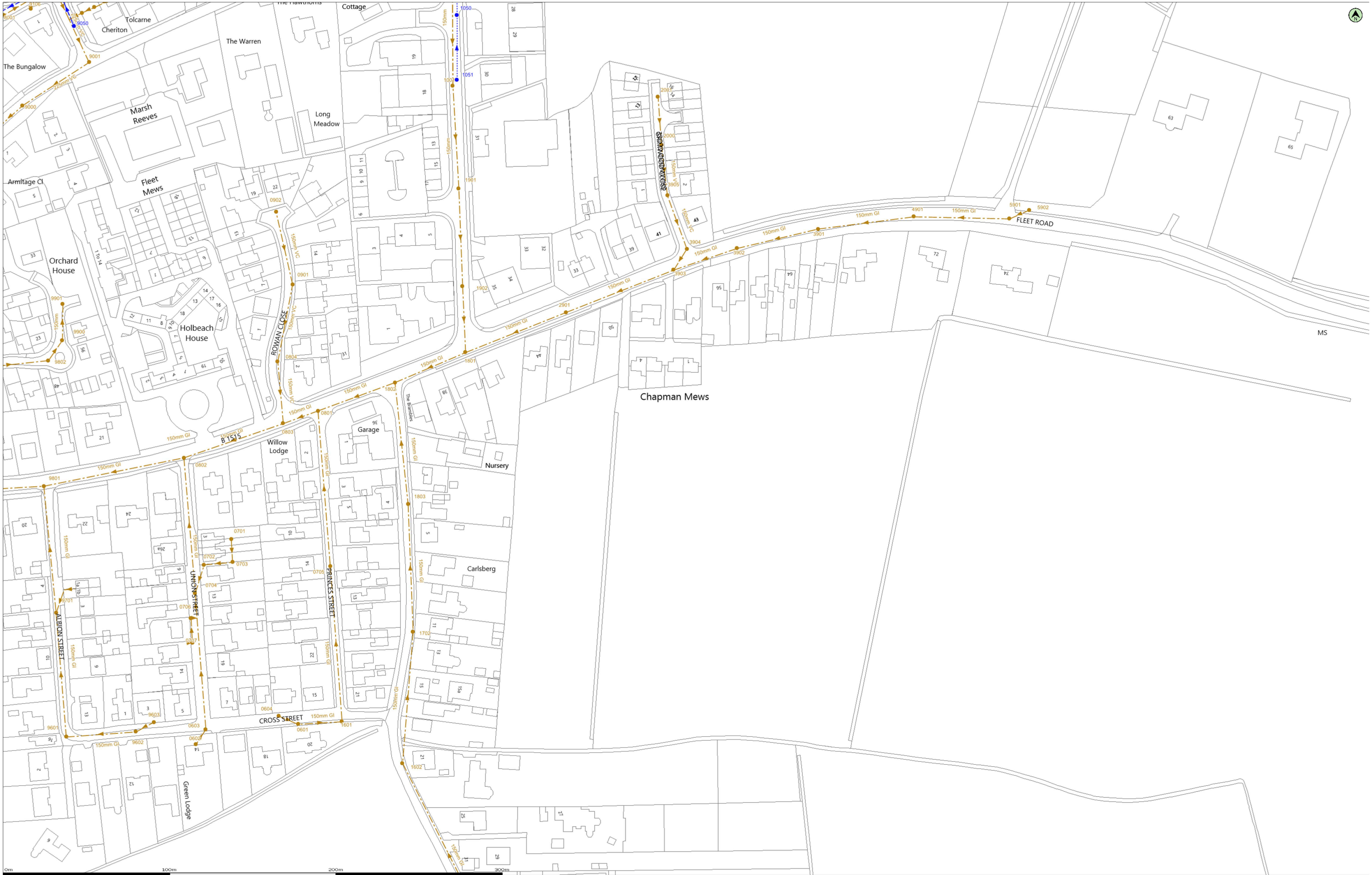
The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content. Furthermore, in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid for the date printed and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s).



(c) Crown copyright and database rights 2020 Ordnance Survey 100022432 Date: 25/03/20 Scale: 1:1000 Map Centre: 537313.324843 Data updated: 06/03/20 Our Ref: 378460 - 1 Wastewater Plan A1

This plan is provided by Anglian Water pursuant to its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2020 Ordnance Survey 100022432. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer	---	Outfall*
Surface Sewer	---	
Combined Sewer	---	
Final Effluent	---	Inlet*
Rising Main*	---	
Private Sewer*	---	
Decommissioned Sewer*	---	Manhole*

	Sewage Treatment Works
	Public Pumping Station
	Decommissioned Pumping Station
*Colour denotes effluent type	

ben@farrowwalsh.co.uk
BM Sewer Map



APPENDIX F – EXISTING GREENFIELD RUNOFF CALCULATIONS

Calculated by:	Rafal Zdanowski
Site name:	Fleet Rd, Holbeach
Site location:	Phase 1 [South + North]

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	52.80363° N
Longitude:	0.03467° E
Reference:	2203509803
Date:	Sep 22 2020 16:38

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	2.448
-----------------------	-------

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	578	578
Hydrological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	2.45	2.45
Growth curve factor 100 years:	3.56	3.56
Growth curve factor 200 years:	4.21	4.21

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

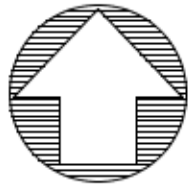
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	3.57	3.57
1 in 1 year (l/s):	3.1	3.1
1 in 30 years (l/s):	8.74	8.74
1 in 100 year (l/s):	12.69	12.69
1 in 200 years (l/s):	15.01	15.01

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX G – PROPOSED DRAINAGE STRATEGY & ENGINEERING LAYOUT



LEGEND

- Development Boundary
- Part M Primary Access
- PLOT FFL 3.500
- + 3.350 Proposed Level
- + Ex.3.35 Existing Level
- Fall Arrow

General Notes

- DO NOT SCALE.
- This drawing is to be read in conjunction with all other relevant drawings and details.
- Should there be any conflict between the details indicated on this drawing and those on other drawings the Engineer should be informed PRIOR to construction on site.
- Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the Contractor commence site work prior to such approval being given it is entirely at their own risk.
- Sketch proposals are for illustrative purposes only and as such are subject to detailed site investigation including ground conditions / contaminants, drainage, design and planning / density negotiations.
- All dimensions are in millimetres unless otherwise stated.
- The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

- This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
- All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
- The design of any temporary works required shall be the responsibility of the Contractor.
- Do not scale this drawing. All dimensions are in millimetres unless noted otherwise. Any discrepancies are to be recorded and reported to the Engineers immediately.
- All work is to be to the satisfaction of the Engineer.
- The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
- All workmanship and materials are to be to current British Standards.
- All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
- Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the Contractor. Any variations are to be recorded and reported to the Engineer immediately.

General Road Notes

This drawing is to be read in conjunction with the local Highway Authority design guide and the general specification for roadworks current at the time of construction.

All works shall be in accordance with the local Highway Authority's approved documents and satisfaction. Any reference to the specification shall mean the general specification for roadworks.

- Prior to any works being carried out within or immediately adjacent to the public highway, a scheme for the safe control of traffic and pedestrians is to be agreed with the highway authority and implemented.
- Working areas within the vicinity of existing trees are to be agreed with the engineer and chestnut fencing erected as directed.
- Special care is to be taken when excavating in the vicinity of existing trees. It is not intended that any tree roots should be severed or damaged and specialist advice should be sought when major roots present a problem. Care is to be taken to avoid damage to branches and foliage.
- It is the Contractor's responsibility to trace and indicate the precise location and nature of all services.
- The Contractor is to provide a CCTV survey of any highway sewers on completion of the 12-month maintenance period. This is to be provided in accordance with the requirements of the local water and highways authorities.
- Safe passage for pedestrians across the site is to be ensured at all times by means of approved fencing to both sides of any footpath route.
- The Health and Safety at Work Act 1981 is to be complied with at all times. Attention is drawn to the wearing of hard hats, reflectorised clothing, and the use of any other required safety equipment.
- The Contractor is to take account of the soils report.
- No completion works will be authorised until a formal certificate of conformance to relevant specification is received from the relevant water authority.
- Compaction control shall be achieved by air void testing for both roadbase and basecourse (maximum air void ratio 6%).
- Any recycled material to be used for highway construction purposes will be allowed subject to it satisfying relevant tests as instructed by this authority.
- The Contractor is to take CBR tests at road formation level, capping layer level, and sub-base level and the highway engineer informed before any construction works carried out on that level.
- All levels and dimensions are to be checked on site before any work commences.
- All private drives which fall towards a public highway and exceed two parking bays in area are to be provided with a suitable gully or drainage channel to prevent water discharging onto the highway.
- Where a driveway falls towards a dwelling it shall be provided with a suitable gully or drainage channel to prevent water damaging the building.

A3	Levels revised to suit latest site plan, levels updated to all roads and plots	MC	DM	JD	12.02.21
A2	Development extents for Phase 1 shown only as requested by Kaplan 02.07.2020.	BM	OP	JD	08.07.20
A1	Issued for Approval.	BM	OP	JD	10.06.20
Rev	Description of updates	Drawn	Checked	App'd	Date
Revision Schedule					



62 Highcross Street, Leicester LE1 4NN
321 Bradford Street, Birmingham B5 6ET
0330 100 0363
www.farrowwalsh.com

FOR APPROVAL

Client:
Kaplan Property Group

Project:
Fleet Road,
Holbeach

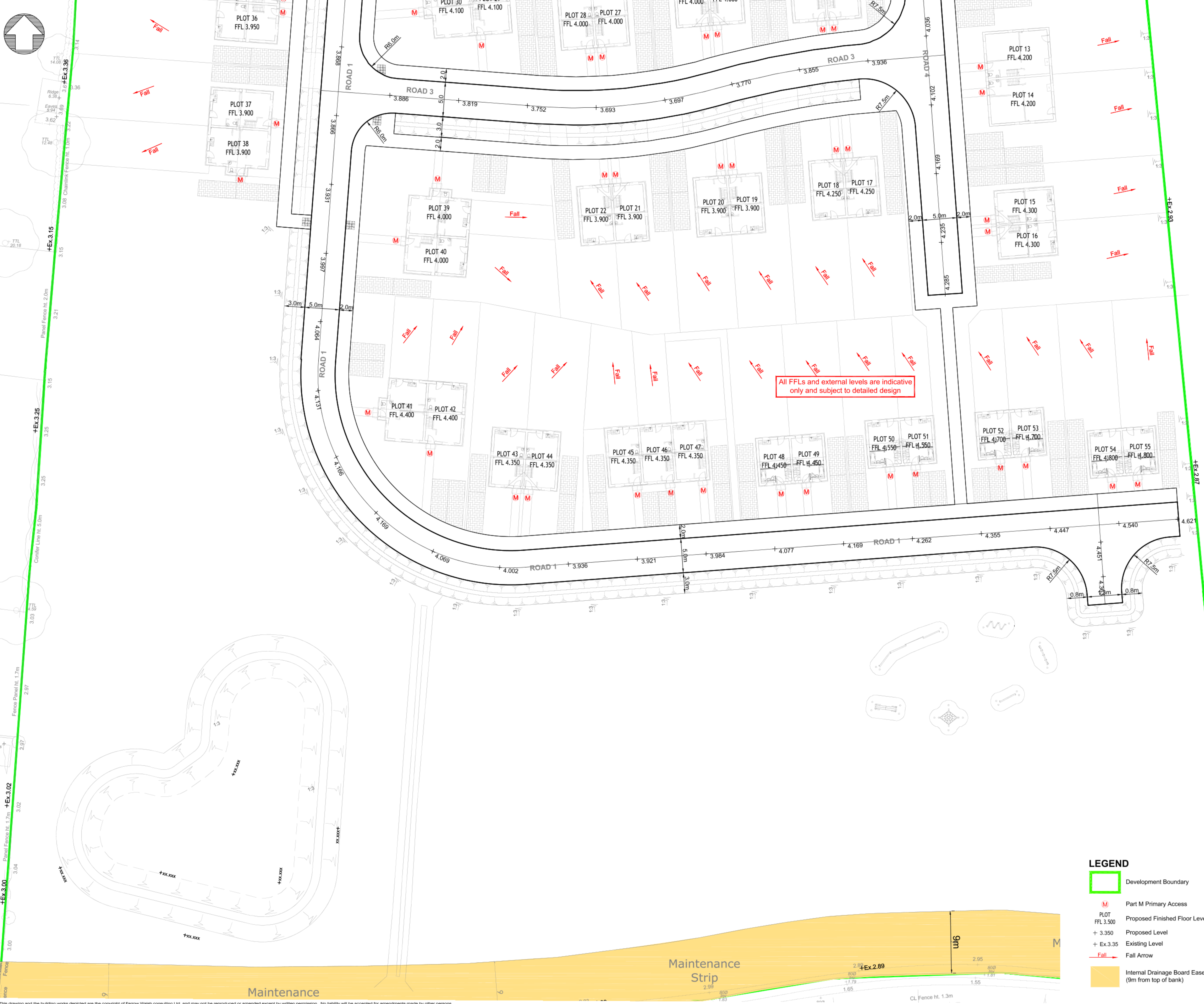
Title:
Engineering Layout
Sheet 1 of 2

Drawn	Checked	Approved	Date:	Scale:
DM	OP	JD	June 2020	1:250 @ A1

Drawing No.	Revision:
FW1947-E-500-01	A3

For Access Arrangement details
refer to drawing FW1947-H-800

All FFLs and external levels are indicative
only and subject to detailed design



- General Notes
- DO NOT SCALE.
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Revision Schedule



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FOR APPROVAL

Client:
Kaplan Property Group

Project:
Fleet Road,
Holbeach

Title:
Engineering Layout
Sheet 2 of 2

Drawn: BM Checked: OP Approved: JD Date: June 2020 Scale: 1:250 @ A1

Drawing No. **FW1947-E-500-02** Revision: **A3**

- LEGEND
- Development Boundary
 - Part M Primary Access
 - PLOT FFL 3.500
 - Proposed Finished Floor Level
 - + 3.350
 - Proposed Level
 - + Ex.3.35
 - Existing Level
 - Fall Arrow
 - Internal Drainage Board Easement (9m from top of bank)

APPENDIX H – STORM WATER HYDRAULIC CALCULATIONS

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.055	5.00	3.579	1200	537340.175	324864.895	0.528
s1a			3.600	300	537338.850	324859.798	0.570
s1b			3.700	300	537332.982	324857.694	0.696
s1c			3.800	300	537323.781	324859.296	0.834
S2L	0.065	5.00	4.375	300	537312.691	324849.473	1.245
S2	0.044	5.00	3.981	1200	537311.780	324858.922	1.064
s2a			4.000	300	537295.886	324857.363	1.148
s2b			4.000	300	537284.097	324854.094	1.198
S3			4.014	1200	537274.507	324859.018	1.256
S4	0.044	5.00	3.253	1200	537265.533	324906.937	0.525
S5	0.010	5.00	3.621	1200	537264.428	324885.055	0.982
S6	0.010	5.00	3.786	1200	537264.629	324874.791	1.189
s7a			3.850	300	537265.162	324868.940	1.277
S7	0.044	5.00	3.979	1200	537264.493	324865.611	1.420
S7a			4.000	300	537258.536	324859.571	1.476
s7b			4.000	300	537250.958	324855.856	1.510
s7c			4.100	300	537245.316	324848.806	1.647
S8	0.043	5.00	4.166	1200	537243.700	324839.081	1.753
S9	0.022	5.00	3.740	1200	537244.053	324803.582	1.472
S10L	0.031	5.00	4.010	1200	537337.372	324819.349	0.983
S10	0.027	5.00	3.878	1200	537329.799	324818.788	1.052
S11	0.031	5.00	4.130	1200	537332.522	324780.841	1.361
S12			4.048	1200	537331.574	324792.847	1.328
S13	0.044	5.00	3.906	1200	537323.888	324792.411	1.217
s13a			3.700	300	537302.969	324788.570	1.098
S14LA	0.038	5.00	3.700	1200	537289.373	324781.188	0.969
S14LB	0.038	5.00	3.900	1200	537288.315	324795.520	1.137
S14	0.045	5.00	3.523	1200	537289.019	324785.981	1.204
s14a			3.600	300	537275.774	324785.854	1.335
S15			3.775	1200	537254.511	324787.437	1.597
S16L	0.048	5.00	3.800	1200	537238.411	324793.998	1.243
S16	0.020	5.00	3.706	1200	537242.913	324788.302	1.576
S17	0.066	5.00	3.835	1200	537241.460	324768.825	1.785
s17a			3.900	300	537240.267	324749.047	1.930
s17b			4.000	300	537245.624	324733.126	2.099
S18	0.043	5.00	4.454	1200	537368.928	324726.026	1.675
s18a			4.250	300	537363.454	324723.478	1.496
S19			3.900	1200	537362.380	324716.857	1.173
S20			3.900	1200	537354.787	324716.096	1.204
s20a			4.000	300	537353.351	324721.768	1.328
S21	0.073	5.00	4.264	1200	537347.964	324724.416	1.617
S22L		5.00	4.200	1200	537277.513	324728.797	1.629
S22	0.022	5.00	3.801	1200	537276.772	324719.131	1.445
S23			3.871	1200	537265.059	324719.846	1.563
S24			3.947	1200	537253.302	324725.046	2.092
HW1			3.000	300	537239.039	324703.458	1.250
HW2		5.00	3.000	300	537239.546	324684.096	1.283
S25			3.200	1200	537247.906	324676.990	1.520

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S26			3.200	1200	537256.267	324669.884	1.550

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	s1a	5.266	0.600	3.051	3.030	0.021	250.8	300	5.09	50.0
1.001	s1a	s1b	6.234	0.600	3.030	3.005	0.025	249.4	300	5.19	50.0
1.002	s1b	s1c	9.339	0.600	3.004	2.966	0.038	245.8	300	5.35	50.0
1.003	s1c	S2	12.007	0.600	2.966	2.917	0.049	245.0	300	5.55	50.0
50.000	S2L	S2	9.493	0.600	3.130	3.067	0.063	150.7	150	5.19	50.0
1.004	S2	s2a	15.971	0.600	2.917	2.852	0.065	245.7	300	5.82	50.0
1.005	s2a	s2b	12.234	0.600	2.852	2.802	0.050	244.7	300	6.02	50.0
1.006	s2b	S3	10.780	0.600	2.802	2.758	0.044	245.0	300	6.20	50.0
1.007	S3	S7	11.990	0.600	2.758	2.709	0.049	244.7	300	6.40	50.0
2.000	S4	S5	21.910	0.600	2.728	2.639	0.089	246.2	450	5.28	50.0
2.001	S5	S6	10.266	0.600	2.639	2.597	0.042	244.4	450	5.41	50.0
2.002	S6	s7a	5.875	0.600	2.597	2.573	0.024	244.8	450	5.49	50.0
2.003	s7a	S7	3.395	0.600	2.573	2.559	0.014	242.5	450	5.53	50.0
1.008	S7	S7a	8.483	0.600	2.559	2.524	0.035	245.0	450	6.51	50.0
1.009	S7a	s7b	8.440	0.600	2.524	2.490	0.034	245.0	450	6.62	50.0
1.010	s7b	s7c	9.030	0.600	2.490	2.453	0.037	245.0	450	6.73	50.0
1.011	s7c	S8	9.859	0.600	2.453	2.413	0.040	245.0	450	6.86	50.0
1.012	S8	S9	35.500	0.600	2.413	2.268	0.145	245.0	450	7.32	50.0
1.013	S9	S16	15.323	0.600	2.268	2.205	0.063	245.0	450	7.52	50.0
51.000	S10L	S10	7.594	0.600	3.027	2.976	0.051	150.0	150	5.15	50.0
3.000	S10	S12	26.003	0.600	2.826	2.720	0.106	245.3	300	5.59	50.0
4.000	S11	S12	12.043	0.600	2.769	2.720	0.049	245.8	300	5.20	50.0
3.001	S12	S13	7.699	0.600	2.720	2.689	0.031	248.4	300	5.72	50.0
3.002	S13	s13a	21.269	0.600	2.689	2.602	0.087	244.5	300	6.07	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	0.988	69.8	7.5	0.228	0.270	0.055	0.0
1.001	0.991	70.0	7.5	0.270	0.395	0.055	0.0
1.002	0.998	70.6	7.5	0.396	0.534	0.055	0.0
1.003	1.000	70.7	7.5	0.534	0.764	0.055	0.0
50.000	0.816	14.4	8.8	1.095	0.764	0.065	0.0
1.004	0.998	70.6	22.2	0.764	0.848	0.164	0.0
1.005	1.000	70.7	22.2	0.848	0.898	0.164	0.0
1.006	1.000	70.7	22.2	0.898	0.956	0.164	0.0
1.007	1.000	70.7	22.2	0.956	0.970	0.164	0.0
2.000	1.291	205.3	6.0	0.075	0.532	0.044	0.0
2.001	1.296	206.1	7.3	0.532	0.739	0.054	0.0
2.002	1.295	205.9	8.7	0.739	0.827	0.064	0.0
2.003	1.301	206.9	8.7	0.827	0.970	0.064	0.0
1.008	1.294	205.8	36.9	0.970	1.026	0.272	0.0
1.009	1.294	205.8	36.9	1.026	1.060	0.272	0.0
1.010	1.294	205.8	36.9	1.060	1.197	0.272	0.0
1.011	1.294	205.8	36.9	1.197	1.303	0.272	0.0
1.012	1.294	205.8	42.7	1.303	1.022	0.315	0.0
1.013	1.294	205.8	45.7	1.022	1.051	0.337	0.0
51.000	0.818	14.5	4.2	0.833	0.752	0.031	0.0
3.000	0.999	70.6	7.9	0.752	1.028	0.058	0.0
4.000	0.998	70.6	4.2	1.061	1.028	0.031	0.0
3.001	0.993	70.2	12.1	1.028	0.917	0.089	0.0
3.002	1.001	70.7	18.0	0.917	0.798	0.133	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.003	s13a	S14	14.188	0.600	2.602	2.469	0.133	106.7	300	6.23	50.0
52.000	S14LA	S14	4.806	0.600	2.731	2.619	0.112	42.9	150	5.05	50.0
53.000	S14LB	S14	9.565	0.600	2.763	2.619	0.144	66.4	150	5.13	50.0
3.004	S14	s14a	13.246	0.600	2.319	2.265	0.054	245.3	450	6.40	50.0
3.005	s14a	S15	21.322	0.600	2.265	2.178	0.087	245.1	450	6.67	50.0
3.006	S15	S16	11.630	0.600	2.178	2.130	0.048	242.3	450	6.82	50.0
54.000	S16L	S16	7.260	0.600	2.557	2.505	0.052	139.6	150	5.14	50.0
1.014	S16	S17	19.531	0.600	2.130	2.050	0.080	244.1	450	7.77	50.0
1.015	S17	s17a	19.815	0.600	2.051	1.970	0.081	244.6	450	8.02	50.0
1.016	s17a	s17b	16.798	0.600	1.970	1.901	0.069	243.4	450	8.24	50.0
1.017	s17b	S24	11.147	0.600	1.901	1.855	0.046	242.3	450	8.38	50.0
5.000	S18	s18a	6.039	0.600	2.779	2.754	0.025	241.6	300	5.10	50.0
5.001	s18a	S19	6.708	0.600	2.754	2.727	0.027	248.4	300	5.21	50.0
5.002	S19	S20	7.631	0.600	2.727	2.696	0.031	246.2	300	5.34	50.0
5.003	S20	s20a	5.850	0.600	2.696	2.672	0.024	243.8	300	5.44	50.0
5.004	s20a	S21	6.003	0.600	2.672	2.647	0.025	240.1	300	5.54	50.0
5.005	S21	S22	71.387	0.600	2.647	2.356	0.291	245.3	300	6.73	50.0
55.000	S22L	S22	9.694	0.600	2.571	2.506	0.065	149.1	150	5.20	50.0
5.006	S22	S23	11.735	0.600	2.356	2.308	0.048	244.5	300	6.92	50.0
5.007	S23	S24	12.856	0.600	2.308	2.081	0.227	56.6	300	7.03	50.0
1.018	S24	HW1	25.875	0.600	1.856	1.750	0.106	244.1	450	8.71	50.0
1.020	HW2	S25	11.945	0.600	1.717	1.680	0.037	322.7	450	5.18	50.0
1.021	S25	S26	10.000	0.600	1.681	1.650	0.031	322.7	375	5.34	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
3.003	1.522	107.6	18.0	0.798	0.754	0.133	0.0
52.000	1.540	27.2	5.1	0.819	0.754	0.038	0.0
53.000	1.235	21.8	5.1	0.987	0.754	0.038	0.0
3.004	1.293	205.7	34.4	0.754	0.885	0.254	0.0
3.005	1.294	205.8	34.4	0.885	1.147	0.254	0.0
3.006	1.301	207.0	34.4	1.147	1.126	0.254	0.0
54.000	0.848	15.0	6.5	1.093	1.051	0.048	0.0
1.014	1.296	206.2	89.3	1.126	1.335	0.659	0.0
1.015	1.295	206.0	98.3	1.334	1.480	0.725	0.0
1.016	1.298	206.5	98.3	1.480	1.649	0.725	0.0
1.017	1.301	207.0	98.3	1.649	1.642	0.725	0.0
5.000	1.007	71.2	5.8	1.375	1.196	0.043	0.0
5.001	0.993	70.2	5.8	1.196	0.873	0.043	0.0
5.002	0.997	70.5	5.8	0.873	0.904	0.043	0.0
5.003	1.002	70.9	5.8	0.904	1.028	0.043	0.0
5.004	1.010	71.4	5.8	1.028	1.317	0.043	0.0
5.005	0.999	70.6	15.7	1.317	1.145	0.116	0.0
55.000	0.820	14.5	0.0	1.479	1.145	0.000	0.0
5.006	1.001	70.7	18.7	1.145	1.263	0.138	0.0
5.007	2.093	147.9	18.7	1.263	1.566	0.138	0.0
1.018	1.296	206.2	117.0	1.641	0.800	0.863	0.0
1.020	1.126	179.1	0.0	0.833	1.070	0.000	0.0
1.021	1.003	110.8	0.0	1.144	1.175	0.000	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.266	250.8	300	1	3.579	3.051	0.228	3.600	3.030	0.270
1.001	6.234	249.4	300	1	3.600	3.030	0.270	3.700	3.005	0.395
1.002	9.339	245.8	300	1	3.700	3.004	0.396	3.800	2.966	0.534
1.003	12.007	245.0	300	1	3.800	2.966	0.534	3.981	2.917	0.764
50.000	9.493	150.7	150	1	4.375	3.130	1.095	3.981	3.067	0.764
1.004	15.971	245.7	300	1	3.981	2.917	0.764	4.000	2.852	0.848
1.005	12.234	244.7	300	1	4.000	2.852	0.848	4.000	2.802	0.898
1.006	10.780	245.0	300	1	4.000	2.802	0.898	4.014	2.758	0.956
1.007	11.990	244.7	300	1	4.014	2.758	0.956	3.979	2.709	0.970
2.000	21.910	246.2	450	1	3.253	2.728	0.075	3.621	2.639	0.532
2.001	10.266	244.4	450	1	3.621	2.639	0.532	3.786	2.597	0.739
2.002	5.875	244.8	450	1	3.786	2.597	0.739	3.850	2.573	0.827
2.003	3.395	242.5	450	1	3.850	2.573	0.827	3.979	2.559	0.970
1.008	8.483	245.0	450	1	3.979	2.559	0.970	4.000	2.524	1.026
1.009	8.440	245.0	450	1	4.000	2.524	1.026	4.000	2.490	1.060
1.010	9.030	245.0	450	1	4.000	2.490	1.060	4.100	2.453	1.197
1.011	9.859	245.0	450	1	4.100	2.453	1.197	4.166	2.413	1.303
1.012	35.500	245.0	450	1	4.166	2.413	1.303	3.740	2.268	1.022
1.013	15.323	245.0	450	1	3.740	2.268	1.022	3.706	2.205	1.051
51.000	7.594	150.0	150	1	4.010	3.027	0.833	3.878	2.976	0.752
3.000	26.003	245.3	300	1	3.878	2.826	0.752	4.048	2.720	1.028
4.000	12.043	245.8	300	1	4.130	2.769	1.061	4.048	2.720	1.028
3.001	7.699	248.4	300	1	4.048	2.720	1.028	3.906	2.689	0.917
3.002	21.269	244.5	300	1	3.906	2.689	0.917	3.700	2.602	0.798
3.003	14.188	106.7	300	1	3.700	2.602	0.798	3.523	2.469	0.754
52.000	4.806	42.9	150	1	3.700	2.731	0.819	3.523	2.619	0.754
53.000	9.565	66.4	150	1	3.900	2.763	0.987	3.523	2.619	0.754
3.004	13.246	245.3	450	1	3.523	2.319	0.754	3.600	2.265	0.885

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	1	s1a	300	Junction	
1.001	s1a	300	Junction		s1b	300	Junction	
1.002	s1b	300	Junction		s1c	300	Junction	
1.003	s1c	300	Junction		S2	1200	Manhole	1
50.000	S2L	300	Manhole	1	S2	1200	Manhole	1
1.004	S2	1200	Manhole	1	s2a	300	Junction	
1.005	s2a	300	Junction		s2b	300	Junction	
1.006	s2b	300	Junction		S3	1200	Manhole	1
1.007	S3	1200	Manhole	1	S7	1200	Manhole	1
2.000	S4	1200	Manhole	1	S5	1200	Manhole	1
2.001	S5	1200	Manhole	1	S6	1200	Manhole	1
2.002	S6	1200	Manhole	1	s7a	300	Junction	
2.003	s7a	300	Junction		S7	1200	Manhole	1
1.008	S7	1200	Manhole	1	S7a	300	Junction	
1.009	S7a	300	Junction		s7b	300	Junction	
1.010	s7b	300	Junction		s7c	300	Junction	
1.011	s7c	300	Junction		S8	1200	Manhole	1
1.012	S8	1200	Manhole	1	S9	1200	Manhole	1
1.013	S9	1200	Manhole	1	S16	1200	Manhole	1
51.000	S10L	1200	Manhole	1	S10	1200	Manhole	1
3.000	S10	1200	Manhole	1	S12	1200	Manhole	1
4.000	S11	1200	Manhole	1	S12	1200	Manhole	1
3.001	S12	1200	Manhole	1	S13	1200	Manhole	1
3.002	S13	1200	Manhole	1	s13a	300	Junction	
3.003	s13a	300	Junction		S14	1200	Manhole	1
52.000	S14LA	1200	Manhole	1	S14	1200	Manhole	1
53.000	S14LB	1200	Manhole	1	S14	1200	Manhole	1
3.004	S14	1200	Manhole	1	s14a	300	Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.005	21.322	245.1	450	1	3.600	2.265	0.885	3.775	2.178	1.147
3.006	11.630	242.3	450	1	3.775	2.178	1.147	3.706	2.130	1.126
54.000	7.260	139.6	150	1	3.800	2.557	1.093	3.706	2.505	1.051
1.014	19.531	244.1	450	1	3.706	2.130	1.126	3.835	2.050	1.335
1.015	19.815	244.6	450	1	3.835	2.051	1.334	3.900	1.970	1.480
1.016	16.798	243.4	450	1	3.900	1.970	1.480	4.000	1.901	1.649
1.017	11.147	242.3	450	1	4.000	1.901	1.649	3.947	1.855	1.642
5.000	6.039	241.6	300	1	4.454	2.779	1.375	4.250	2.754	1.196
5.001	6.708	248.4	300	1	4.250	2.754	1.196	3.900	2.727	0.873
5.002	7.631	246.2	300	1	3.900	2.727	0.873	3.900	2.696	0.904
5.003	5.850	243.8	300	1	3.900	2.696	0.904	4.000	2.672	1.028
5.004	6.003	240.1	300	1	4.000	2.672	1.028	4.264	2.647	1.317
5.005	71.387	245.3	300	1	4.264	2.647	1.317	3.801	2.356	1.145
55.000	9.694	149.1	150	1	4.200	2.571	1.479	3.801	2.506	1.145
5.006	11.735	244.5	300	1	3.801	2.356	1.145	3.871	2.308	1.263
5.007	12.856	56.6	300	1	3.871	2.308	1.263	3.947	2.081	1.566
1.018	25.875	244.1	450	1	3.947	1.856	1.641	3.000	1.750	0.800
1.020	11.945	322.7	450	1	3.000	1.717	0.833	3.200	1.680	1.070
1.021	10.000	322.7	375	1	3.200	1.681	1.144	3.200	1.650	1.175

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.005	s14a	300	Junction		S15	1200	Manhole	1
3.006	S15	1200	Manhole	1	S16	1200	Manhole	1
54.000	S16L	1200	Manhole	1	S16	1200	Manhole	1
1.014	S16	1200	Manhole	1	S17	1200	Manhole	1
1.015	S17	1200	Manhole	1	s17a	300	Junction	
1.016	s17a	300	Junction		s17b	300	Junction	
1.017	s17b	300	Junction		S24	1200	Manhole	1
5.000	S18	1200	Manhole	1	s18a	300	Junction	
5.001	s18a	300	Junction		S19	1200	Manhole	1
5.002	S19	1200	Manhole	1	S20	1200	Manhole	1
5.003	S20	1200	Manhole	1	s20a	300	Junction	
5.004	s20a	300	Junction		S21	1200	Manhole	1
5.005	S21	1200	Manhole	1	S22	1200	Manhole	1
55.000	S22L	1200	Manhole	1	S22	1200	Manhole	1
5.006	S22	1200	Manhole	1	S23	1200	Manhole	1
5.007	S23	1200	Manhole	1	S24	1200	Manhole	1
1.018	S24	1200	Manhole	1	HW1	300	Manhole	1
1.020	HW2	300	Manhole	1	S25	1200	Manhole	1
1.021	S25	1200	Manhole	1	S26	1200	Manhole	1

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S1	537340.175	324864.895	3.579	0.528	1200			
						1.000	3.051	300
s1a	537338.850	324859.798	3.600	0.570	300	1.000	3.030	300
						1.001	3.030	300
s1b	537332.982	324857.694	3.700	0.696	300	1.001	3.005	300
						1.002	3.004	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
s1c	537323.781	324859.296	3.800	0.834	300	1.002	2.966	300
						1.003	2.966	300
S2L	537312.691	324849.473	4.375	1.245	300			
						50.000	3.130	150
S2	537311.780	324858.922	3.981	1.064	1200	50.000	3.067	150
						1.003	2.917	300
						1.004	2.917	300
s2a	537295.886	324857.363	4.000	1.148	300	1.004	2.852	300
						1.005	2.852	300
s2b	537284.097	324854.094	4.000	1.198	300	1.005	2.802	300
						1.006	2.802	300
S3	537274.507	324859.018	4.014	1.256	1200	1.006	2.758	300
						1.007	2.758	300
S4	537265.533	324906.937	3.253	0.525	1200			
						2.000	2.728	450
S5	537264.428	324885.055	3.621	0.982	1200	2.000	2.639	450
						2.001	2.639	450
S6	537264.629	324874.791	3.786	1.189	1200	2.001	2.597	450
						2.002	2.597	450
s7a	537265.162	324868.940	3.850	1.277	300	2.002	2.573	450
						2.003	2.573	450
S7	537264.493	324865.611	3.979	1.420	1200	2.003	2.559	450
						1.007	2.709	300
						1.008	2.559	450
S7a	537258.536	324859.571	4.000	1.476	300	1.008	2.524	450
						1.009	2.524	450
s7b	537250.958	324855.856	4.000	1.510	300	1.009	2.490	450
						1.010	2.490	450
s7c	537245.316	324848.806	4.100	1.647	300	1.010	2.453	450
						1.011	2.453	450
S8	537243.700	324839.081	4.166	1.753	1200	1.011	2.413	450
						1.012	2.413	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S9	537244.053	324803.582	3.740	1.472	1200	1.012	2.268	450
						1.013	2.268	450
S10L	537337.372	324819.349	4.010	0.983	1200			
						51.000	3.027	150
S10	537329.799	324818.788	3.878	1.052	1200	51.000	2.976	150
						3.000	2.826	300
S11	537332.522	324780.841	4.130	1.361	1200			
						4.000	2.769	300
S12	537331.574	324792.847	4.048	1.328	1200	4.000	2.720	300
						3.000	2.720	300
						3.001	2.720	300
S13	537323.888	324792.411	3.906	1.217	1200	3.001	2.689	300
						3.002	2.689	300
s13a	537302.969	324788.570	3.700	1.098	300	3.002	2.602	300
						3.003	2.602	300
S14LA	537289.373	324781.188	3.700	0.969	1200			
						52.000	2.731	150
S14LB	537288.315	324795.520	3.900	1.137	1200			
						53.000	2.763	150
S14	537289.019	324785.981	3.523	1.204	1200	53.000	2.619	150
						52.000	2.619	150
						3.003	2.469	300
						3.004	2.319	450
s14a	537275.774	324785.854	3.600	1.335	300	3.004	2.265	450
						3.005	2.265	450
S15	537254.511	324787.437	3.775	1.597	1200	3.005	2.178	450
						3.006	2.178	450
S16L	537238.411	324793.998	3.800	1.243	1200			
						54.000	2.557	150
S16	537242.913	324788.302	3.706	1.576	1200	54.000	2.505	150
						3.006	2.130	450
						1.013	2.205	450
						1.014	2.130	450
S17	537241.460	324768.825	3.835	1.785	1200	1.014	2.050	450
						1.015	2.051	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
s17a	537240.267	324749.047	3.900	1.930	300	1.015	1.970	450
						1.016	1.970	450
s17b	537245.624	324733.126	4.000	2.099	300	1.016	1.901	450
						1.017	1.901	450
S18	537368.928	324726.026	4.454	1.675	1200			
						5.000	2.779	300
s18a	537363.454	324723.478	4.250	1.496	300	5.000	2.754	300
						5.001	2.754	300
S19	537362.380	324716.857	3.900	1.173	1200	5.001	2.727	300
						5.002	2.727	300
S20	537354.787	324716.096	3.900	1.204	1200	5.002	2.696	300
						5.003	2.696	300
s20a	537353.351	324721.768	4.000	1.328	300	5.003	2.672	300
						5.004	2.672	300
S21	537347.964	324724.416	4.264	1.617	1200	5.004	2.647	300
						5.005	2.647	300
S22L	537277.513	324728.797	4.200	1.629	1200			
						55.000	2.571	150
S22	537276.772	324719.131	3.801	1.445	1200	55.000	2.506	150
						5.005	2.356	300
						5.006	2.356	300
S23	537265.059	324719.846	3.871	1.563	1200	5.006	2.308	300
						5.007	2.308	300
S24	537253.302	324725.046	3.947	2.092	1200	5.007	2.081	300
						1.017	1.855	450
						1.018	1.856	450
HW1	537239.039	324703.458	3.000	1.250	300	1.018	1.750	450
HW2	537239.546	324684.096	3.000	1.283	300			
						1.020	1.717	450
S25	537247.906	324676.990	3.200	1.520	1200	1.020	1.680	450
						1.021	1.681	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S26	537256.267	324669.884	3.200	1.550	1200	1.021	1.650	375

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m ³ /ha)	0.0
M5-60 (mm)	19.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	5.0
Summer CV	0.750	2 year (l/s)	5.0
Winter CV	0.840	30 year (l/s)	5.0
Analysis Speed	Detailed	100 year (l/s)	5.0
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.10	Betterment (%)	0
Greenfield Method	IH124	Region	1	QBar	
Positively Drained Area (ha)		Growth Factor 1 year	0.85	Q 1 year (l/s)	
SAAR (mm)		Growth Factor 30 year	1.95	Q 30 year (l/s)	
Soil Index	1	Growth Factor 100 year	2.48	Q 100 year (l/s)	

Node S25 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	1.681	Product Number	CTL-SHE-0054-1400-1120-1400
Design Depth (m)	1.120	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node HW2 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	19.369
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.717	Main Channel Slope (1:X)	586.9
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.036

Inlets

HW1

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	536.7	0.0	0.600	840.7	0.0	0.601	989.7	0.0	1.280	1314.7	0.0

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.59%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	3.540	0.489	36.0	0.5536	0.0000	FLOOD RISK
15 minute winter	s1a	12	3.536	0.506	32.6	0.0000	0.0000	FLOOD RISK
15 minute winter	s1b	12	3.530	0.526	30.9	0.0000	0.0000	FLOOD RISK
15 minute winter	s1c	12	3.523	0.557	27.5	0.0000	0.0000	FLOOD RISK
15 minute winter	S2L	12	3.873	0.743	42.5	0.0528	0.0000	SURCHARGED
15 minute winter	S2	12	3.514	0.597	92.8	0.6747	0.0000	SURCHARGED
15 minute winter	s2a	12	3.429	0.577	91.2	0.0000	0.0000	SURCHARGED
15 minute winter	s2b	13	3.356	0.554	91.0	0.0000	0.0000	SURCHARGED
15 minute winter	S3	12	3.305	0.547	91.6	0.6181	0.0000	SURCHARGED
15 minute winter	S4	12	3.253	0.525	28.8	0.5938	1.4943	FLOOD
15 minute winter	S5	13	3.246	0.607	46.4	0.6863	0.0000	SURCHARGED
15 minute winter	S6	12	3.264	0.667	39.2	0.7544	0.0000	SURCHARGED
15 minute winter	s7a	12	3.276	0.703	49.9	0.0000	0.0000	SURCHARGED
15 minute winter	S7	12	3.277	0.718	139.4	0.8121	0.0000	SURCHARGED
15 minute winter	S7a	12	3.255	0.731	135.5	0.0000	0.0000	SURCHARGED
15 minute winter	s7b	12	3.230	0.740	137.6	0.0000	0.0000	SURCHARGED
15 minute winter	s7c	12	3.212	0.759	138.9	0.0000	0.0000	SURCHARGED
15 minute winter	S8	12	3.197	0.784	149.7	0.8862	0.0000	SURCHARGED
15 minute winter	S9	12	3.160	0.892	162.2	1.0085	0.0000	SURCHARGED
15 minute winter	S10L	12	3.371	0.344	20.3	0.3891	0.0000	SURCHARGED
15 minute winter	S10	12	3.317	0.491	37.6	0.5552	0.0000	SURCHARGED
15 minute winter	S11	12	3.318	0.549	20.3	0.6214	0.0000	SURCHARGED
15 minute winter	S12	12	3.300	0.580	51.1	0.6563	0.0000	SURCHARGED
15 minute winter	S13	12	3.290	0.601	74.5	0.6793	0.0000	SURCHARGED
15 minute winter	s13a	12	3.233	0.631	72.0	0.0000	0.0000	SURCHARGED
15 minute winter	S14LA	12	3.246	0.515	24.8	0.5828	0.0000	SURCHARGED
15 minute winter	S14LB	12	3.297	0.534	24.8	0.6035	0.0000	SURCHARGED
15 minute winter	S14	12	3.188	0.869	141.8	0.9825	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	32.6	0.887	0.466	0.3708	
15 minute winter	s1a	1.001	s1b	30.9	0.818	0.441	0.4390	
15 minute winter	s1b	1.002	s1c	27.5	0.676	0.390	0.6576	
15 minute winter	s1c	1.003	S2	33.3	0.644	0.472	0.8455	
15 minute winter	S2L	50.000	S2	40.2	2.283	2.786	0.1671	
15 minute winter	S2	1.004	s2a	91.2	1.295	1.292	1.1247	
15 minute winter	s2a	1.005	s2b	91.0	1.292	1.287	0.8615	
15 minute winter	s2b	1.006	S3	91.6	1.331	1.296	0.7591	
15 minute winter	S3	1.007	S7	91.2	1.425	1.290	0.8443	
15 minute winter	S4	2.000	S5	40.2	0.690	0.196	3.4715	
15 minute winter	S5	2.001	S6	36.2	0.597	0.176	1.6266	
15 minute winter	S6	2.002	s7a	45.0	0.638	0.218	0.9309	
15 minute winter	s7a	2.003	S7	-49.9	0.642	-0.241	0.5379	
15 minute winter	S7	1.008	S7a	135.5	1.358	0.659	1.3441	
15 minute winter	S7a	1.009	s7b	137.6	1.326	0.669	1.3373	
15 minute winter	s7b	1.010	s7c	138.9	1.277	0.675	1.4307	
15 minute winter	s7c	1.011	S8	144.8	1.199	0.704	1.5621	
15 minute winter	S8	1.012	S9	159.7	1.177	0.776	5.6247	
15 minute winter	S9	1.013	S16	172.6	1.206	0.839	2.4278	
15 minute winter	S10L	51.000	S10	20.0	1.141	1.383	0.1337	
15 minute winter	S10	3.000	S12	35.6	0.787	0.504	1.8311	
15 minute winter	S11	4.000	S12	17.7	0.527	0.251	0.8481	
15 minute winter	S12	3.001	S13	47.4	0.888	0.675	0.5422	
15 minute winter	S13	3.002	s13a	72.0	1.463	1.018	1.4977	
15 minute winter	s13a	3.003	S14	68.7	1.627	0.639	0.9991	
15 minute winter	S14LA	52.000	S14	23.6	1.728	0.869	0.0846	
15 minute winter	S14LB	53.000	S14	22.4	1.383	1.027	0.1684	
15 minute winter	S14	3.004	s14a	134.5	1.227	0.654	2.0987	

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.59%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	12	3.167	0.902	134.5	0.0000	0.0000	SURCHARGED
15 minute winter	S15	12	3.140	0.962	127.8	1.0879	0.0000	SURCHARGED
15 minute winter	S16L	12	3.264	0.707	31.4	0.7997	0.0000	SURCHARGED
15 minute winter	S16	12	3.126	0.996	298.7	1.1261	0.0000	SURCHARGED
15 minute winter	S17	12	2.958	0.908	329.3	1.0271	0.0000	SURCHARGED
15 minute winter	s17a	12	2.750	0.780	328.6	0.0000	0.0000	SURCHARGED
1440 minute winter	s17b	1440	2.649	0.748	27.6	0.0000	0.0000	SURCHARGED
15 minute winter	S18	11	2.916	0.137	28.1	0.1548	0.0000	OK
15 minute winter	s18a	11	2.903	0.149	27.8	0.0000	0.0000	OK
15 minute winter	S19	11	2.897	0.170	27.3	0.1925	0.0000	OK
15 minute winter	S20	11	2.895	0.199	26.6	0.2253	0.0000	OK
15 minute winter	s20a	11	2.894	0.222	26.6	0.0000	0.0000	OK
15 minute winter	S21	11	2.892	0.245	72.0	0.2766	0.0000	OK
1440 minute winter	S22L	1440	2.649	0.078	0.1	0.0886	0.0000	OK
1440 minute winter	S22	1440	2.649	0.293	4.2	0.3317	0.0000	OK
1440 minute winter	S23	1440	2.649	0.341	13.6	0.3859	0.0000	SURCHARGED
1440 minute winter	S24	1440	2.649	0.794	39.3	0.8982	0.0000	SURCHARGED
1440 minute winter	HW1	1440	2.649	0.899	98.3	0.0638	0.0000	OK
1440 minute winter	HW2	1440	2.649	0.932	39.6	0.0662	0.0000	SURCHARGED
1440 minute winter	S25	1440	2.649	0.969	1.3	1.0962	0.0000	SURCHARGED
1440 minute winter	S26	1440	1.674	0.024	1.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	127.8	0.973	0.621	3.3783	
15 minute winter	S15	3.006	S16	120.3	0.759	0.581	1.8427	
15 minute winter	S16L	54.000	S16	27.8	1.580	1.855	0.1278	
15 minute winter	S16	1.014	S17	295.6	1.866	1.434	3.0946	
15 minute winter	S17	1.015	s17a	328.6	2.074	1.595	3.1396	
15 minute winter	s17a	1.016	s17b	330.2	2.084	1.599	2.6615	
1440 minute winter	s17b	1.017	S24	35.1	0.626	0.170	1.7662	
15 minute winter	S18	5.000	s18a	27.8	0.891	0.391	0.2000	
15 minute winter	s18a	5.001	S19	27.3	0.828	0.389	0.2556	
15 minute winter	S19	5.002	S20	26.6	0.703	0.377	0.3469	
15 minute winter	S20	5.003	s20a	26.6	0.544	0.376	0.3085	
15 minute winter	s20a	5.004	S21	26.8	0.498	0.376	0.3521	
15 minute winter	S21	5.005	S22	72.0	1.180	1.020	4.3583	
1440 minute winter	S22L	55.000	S22	-0.1	-0.011	-0.009	0.1291	
1440 minute winter	S22	5.006	S23	7.0	0.711	0.099	0.8240	
1440 minute winter	S23	5.007	S24	-8.5	0.850	-0.058	0.9053	
1440 minute winter	S24	1.018	HW1	29.1	1.044	0.141	4.0997	
1440 minute winter	HW1	Flow through pond	HW2	-73.9	0.012	-0.002	748.2605	
1440 minute winter	HW2	1.020	S25	1.3	0.090	0.008	1.8926	
1440 minute winter	S25	1.021	S26	1.3	0.386	0.012	0.0337	111.2

APPENDIX I – DRAINAGE MAINTENANCE SCHEDULE

Schedule	Feature	Required Action	Frequency
Regular Maintenance	Filter Drains	Remove Litter (inc leaf litter) and Debris from Filter Drain Surface, Access Chambers and Pre-Treatment Devices.	Monthly (or as required)
		Inspect Filter Drain Surface, Inlet/ Outlet Pipework and Control Systems for Blockages, Clogging, Standing Water and Structural Damage.	Monthly
		Inspect Pre-Treatment Systems, Inlets and Perforated Pipework for Silt Accumulation, and Establish Appropriate Silt Removal Frequencies.	Six monthly
		Remove Sediment from Pre-Treatment Devices.	Six monthly, or as required
	Trees	Remove Litter and Debris.	Monthly (or as required)
		Manage Other Vegetation and Remove Nuisance Plants.	Monthly (at start, then as required)
		Inspect Inlets and Outlets.	Inspect monthly
	Permeable Pavements	Brushing and Vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers recommendations – pay attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
	Detention Basins	Remove Litter and Debris.	Monthly
		Cut Grass – for Spillways and Access Routes.	Monthly (during growing season), or as required
		Cut Grass – Meadow Grass in and Around Basin.	Half yearly (spring – before nesting season, and autumn)
		Manage Other Vegetation and Remove Nuisance Plants.	Monthly (at start, then as required)
		Inspect Outlets, Inlets and Overflows for Blockages and Clear if Required.	Monthly

		Inspect Banksides, Structures, Pipework etc for Evidence of Physical Damage.	Monthly
		Inspect Inlets and Facility Surface for Silt Accumulation. Establish Appropriate Silt Removal Frequencies.	Monthly (for first year), then annually or as required
		Check any Penstocks and Other Mechanical Devices.	Annually
		Tidy All Dead Growth Before Start of Growing Season.	Annually
		Remove Sediment from Inlets, Outlets and Forebay.	Annually (or as required)
		Manage Wetland Plants in Outlet Pool – Where Provided.	Annually

Schedule	Feature	Required Action	Frequency
Occasional Maintenance	Filter Drains	Remove or Control Tree Roots Where They are Encroaching the Sides of the Filter Drain, Using Recommended Methods (e.g. NJUG, 2007 or BS 3998:2010).	As required
		At Locations with High Pollution Loads, Remove Surface Geotextile and Replace, and Wash or Replace Overlaying Filter Medium.	Five yearly, or as required
		Clear Perforated Pipework of Blockages.	As required
	Trees	Check Tree Health and Manage Tree Appropriately.	Annually
		Remove Silt Build-Up from Inlets and Surface and Replace Mulch as Necessary.	Annually, or as required
		Water	As required
	Permeable Pavements	Stabilise and Mow Contributing and Adjacent Areas.	As required
	Detention Basins	Reseed Areas if Poor Vegetation Growth.	As required
		Prune and Trim any Trees and Remove Cuttings.	Every 2 years, or as required
		Remove Sediment from Inlets, Outlets, Forebay and Main Bain when Required.	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided).

Schedule	Feature	Required Action	Frequency
Remedial Actions	Permeable Pavements	Remediate Any Landscaping which, Through Vegetation Maintenance or Soil Slip, has been Raised to within 50mm of the Level of the Paving.	As required
		Remedial Work to any Depressions, Rutting and Cracked or Broken Blocks Considered Detrimental to the Structural Performance or a Hazard to Users, and Replace Lost Jointing Material.	As required
		Rehabilitation of Surface and Upper Substructure by Remedial Sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
	Detention Basins	Remedial Work to any Depressions, Rutting and Cracked or Broken Blocks Considered Detrimental to the Structural Performance or a Hazard to Users, and Replace Lost Jointing Material.	As required
		Rehabilitation of Surface and Upper Substructure by Remedial Sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
		Repair/ Rehabilitation of Inlets, Outlets and Overflows.	As required
		Relevel Uneven Surfaces and Reinstate Design Levels.	As required

APPENDIX J – STORM WATER HYDRAULIC CALCULATIONS WITH SURCHARGED OUTFALL

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.900
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.055	5.00	3.579	1200	537340.175	324864.895	0.528
s1a			3.600	300	537338.850	324859.798	0.570
s1b			3.700	300	537332.982	324857.694	0.696
s1c			3.800	300	537323.781	324859.296	0.834
S2L	0.065	5.00	4.375	300	537312.691	324849.473	1.245
S2	0.044	5.00	3.981	1200	537311.780	324858.922	1.064
s2a			4.000	300	537295.886	324857.363	1.148
s2b			4.000	300	537284.097	324854.094	1.198
S3			4.014	1200	537274.507	324859.018	1.256
S4	0.044	5.00	3.253	1200	537265.533	324906.937	0.525
S5	0.010	5.00	3.621	1200	537264.428	324885.055	0.982
S6	0.010	5.00	3.786	1200	537264.629	324874.791	1.189
s7a			3.850	300	537265.162	324868.940	1.277
S7	0.044	5.00	3.979	1200	537264.493	324865.611	1.420
S7a			4.000	300	537258.536	324859.571	1.476
s7b			4.000	300	537250.958	324855.856	1.510
s7c			4.100	300	537245.316	324848.806	1.647
S8	0.043	5.00	4.166	1200	537243.700	324839.081	1.753
S9	0.022	5.00	3.740	1200	537244.053	324803.582	1.472
S10L	0.031	5.00	4.010	1200	537337.372	324819.349	0.983
S10	0.027	5.00	3.878	1200	537329.799	324818.788	1.052
S11	0.031	5.00	4.130	1200	537332.522	324780.841	1.361
S12			4.048	1200	537331.574	324792.847	1.328
S13	0.044	5.00	3.906	1200	537323.888	324792.411	1.217
s13a			3.700	300	537302.969	324788.570	1.098
S14LA	0.038	5.00	3.700	1200	537289.373	324781.188	0.969
S14LB	0.038	5.00	3.900	1200	537288.315	324795.520	1.137
S14	0.045	5.00	3.523	1200	537289.019	324785.981	1.204
s14a			3.600	300	537275.774	324785.854	1.335
S15			3.775	1200	537254.511	324787.437	1.597
S16L	0.048	5.00	3.800	1200	537238.411	324793.998	1.243
S16	0.020	5.00	3.706	1200	537242.913	324788.302	1.576
S17	0.066	5.00	3.835	1200	537241.460	324768.825	1.785
s17a			3.900	300	537240.267	324749.047	1.930
s17b			4.000	300	537245.624	324733.126	2.099
S18	0.043	5.00	4.454	1200	537368.928	324726.026	1.675
s18a			4.250	300	537363.454	324723.478	1.496
S19			3.900	1200	537362.380	324716.857	1.173
S20			3.900	1200	537354.787	324716.096	1.204
s20a			4.000	300	537353.351	324721.768	1.328
S21	0.073	5.00	4.264	1200	537347.964	324724.416	1.617
S22L		5.00	4.200	1200	537277.513	324728.797	1.629
S22	0.022	5.00	3.801	1200	537276.772	324719.131	1.445
S23			3.871	1200	537265.059	324719.846	1.563
S24			3.947	1200	537253.302	324725.046	2.092
HW1			3.000	300	537239.039	324703.458	1.250
HW2		5.00	3.000	300	537239.546	324684.096	1.283
S25			3.200	1200	537247.906	324676.990	1.520

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S26			3.200	1200	537256.267	324669.884	1.550
Dummy			3.000				1.370

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	s1a	5.266	0.600	3.051	3.030	0.021	250.8	300	5.09	50.0
1.001	s1a	s1b	6.234	0.600	3.030	3.005	0.025	249.4	300	5.19	50.0
1.002	s1b	s1c	9.339	0.600	3.004	2.966	0.038	245.8	300	5.35	50.0
1.003	s1c	S2	12.007	0.600	2.966	2.917	0.049	245.0	300	5.55	50.0
50.000	S2L	S2	9.493	0.600	3.130	3.067	0.063	150.7	150	5.19	50.0
1.004	S2	s2a	15.971	0.600	2.917	2.852	0.065	245.7	300	5.82	50.0
1.005	s2a	s2b	12.234	0.600	2.852	2.802	0.050	244.7	300	6.02	50.0
1.006	s2b	S3	10.780	0.600	2.802	2.758	0.044	245.0	300	6.20	50.0
1.007	S3	S7	11.990	0.600	2.758	2.709	0.049	244.7	300	6.40	50.0
2.000	S4	S5	21.910	0.600	2.728	2.639	0.089	246.2	450	5.28	50.0
2.001	S5	S6	10.266	0.600	2.639	2.597	0.042	244.4	450	5.41	50.0
2.002	S6	s7a	5.875	0.600	2.597	2.573	0.024	244.8	450	5.49	50.0
2.003	s7a	S7	3.395	0.600	2.573	2.559	0.014	242.5	450	5.53	50.0
1.008	S7	S7a	8.483	0.600	2.559	2.524	0.035	245.0	450	6.51	50.0
1.009	S7a	s7b	8.440	0.600	2.524	2.490	0.034	245.0	450	6.62	50.0
1.010	s7b	s7c	9.030	0.600	2.490	2.453	0.037	245.0	450	6.73	50.0
1.011	s7c	S8	9.859	0.600	2.453	2.413	0.040	245.0	450	6.86	50.0
1.012	S8	S9	35.500	0.600	2.413	2.268	0.145	245.0	450	7.32	50.0
1.013	S9	S16	15.323	0.600	2.268	2.205	0.063	245.0	450	7.52	50.0
51.000	S10L	S10	7.594	0.600	3.027	2.976	0.051	150.0	150	5.15	50.0
3.000	S10	S12	26.003	0.600	2.826	2.720	0.106	245.3	300	5.59	50.0
4.000	S11	S12	12.043	0.600	2.769	2.720	0.049	245.8	300	5.20	50.0
3.001	S12	S13	7.699	0.600	2.720	2.689	0.031	248.4	300	5.72	50.0
3.002	S13	s13a	21.269	0.600	2.689	2.602	0.087	244.5	300	6.07	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	0.988	69.8	7.5	0.228	0.270	0.055	0.0
1.001	0.991	70.0	7.5	0.270	0.395	0.055	0.0
1.002	0.998	70.6	7.5	0.396	0.534	0.055	0.0
1.003	1.000	70.7	7.5	0.534	0.764	0.055	0.0
50.000	0.816	14.4	8.8	1.095	0.764	0.065	0.0
1.004	0.998	70.6	22.2	0.764	0.848	0.164	0.0
1.005	1.000	70.7	22.2	0.848	0.898	0.164	0.0
1.006	1.000	70.7	22.2	0.898	0.956	0.164	0.0
1.007	1.000	70.7	22.2	0.956	0.970	0.164	0.0
2.000	1.291	205.3	6.0	0.075	0.532	0.044	0.0
2.001	1.296	206.1	7.3	0.532	0.739	0.054	0.0
2.002	1.295	205.9	8.7	0.739	0.827	0.064	0.0
2.003	1.301	206.9	8.7	0.827	0.970	0.064	0.0
1.008	1.294	205.8	36.9	0.970	1.026	0.272	0.0
1.009	1.294	205.8	36.9	1.026	1.060	0.272	0.0
1.010	1.294	205.8	36.9	1.060	1.197	0.272	0.0
1.011	1.294	205.8	36.9	1.197	1.303	0.272	0.0
1.012	1.294	205.8	42.7	1.303	1.022	0.315	0.0
1.013	1.294	205.8	45.7	1.022	1.051	0.337	0.0
51.000	0.818	14.5	4.2	0.833	0.752	0.031	0.0
3.000	0.999	70.6	7.9	0.752	1.028	0.058	0.0
4.000	0.998	70.6	4.2	1.061	1.028	0.031	0.0
3.001	0.993	70.2	12.1	1.028	0.917	0.089	0.0
3.002	1.001	70.7	18.0	0.917	0.798	0.133	0.0

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.003	s13a	S14	14.188	0.600	2.602	2.469	0.133	106.7	300	6.23	50.0
52.000	S14LA	S14	4.806	0.600	2.731	2.619	0.112	42.9	150	5.05	50.0
53.000	S14LB	S14	9.565	0.600	2.763	2.619	0.144	66.4	150	5.13	50.0
3.004	S14	s14a	13.246	0.600	2.319	2.265	0.054	245.3	450	6.40	50.0
3.005	s14a	S15	21.322	0.600	2.265	2.178	0.087	245.1	450	6.67	50.0
3.006	S15	S16	11.630	0.600	2.178	2.130	0.048	242.3	450	6.82	50.0
54.000	S16L	S16	7.260	0.600	2.557	2.505	0.052	139.6	150	5.14	50.0
1.014	S16	S17	19.531	0.600	2.130	2.050	0.080	244.1	450	7.77	50.0
1.015	S17	s17a	19.815	0.600	2.051	1.970	0.081	244.6	450	8.02	50.0
1.016	s17a	s17b	16.798	0.600	1.970	1.901	0.069	243.4	450	8.24	50.0
1.017	s17b	S24	11.147	0.600	1.901	1.855	0.046	242.3	450	8.38	50.0
5.000	S18	s18a	6.039	0.600	2.779	2.754	0.025	241.6	300	5.10	50.0
5.001	s18a	S19	6.708	0.600	2.754	2.727	0.027	248.4	300	5.21	50.0
5.002	S19	S20	7.631	0.600	2.727	2.696	0.031	246.2	300	5.34	50.0
5.003	S20	s20a	5.850	0.600	2.696	2.672	0.024	243.8	300	5.44	50.0
5.004	s20a	S21	6.003	0.600	2.672	2.647	0.025	240.1	300	5.54	50.0
5.005	S21	S22	71.387	0.600	2.647	2.356	0.291	245.3	300	6.73	50.0
55.000	S22L	S22	9.694	0.600	2.571	2.506	0.065	149.1	150	5.20	50.0
5.006	S22	S23	11.735	0.600	2.356	2.308	0.048	244.5	300	6.92	50.0
5.007	S23	S24	12.856	0.600	2.308	2.081	0.227	56.6	300	7.03	50.0
1.018	S24	HW1	25.875	0.600	1.856	1.750	0.106	244.1	450	8.71	50.0
1.020	HW2	S25	11.945	0.600	1.717	1.680	0.037	322.7	450	5.18	50.0
1.021	S25	S26	10.000	0.600	1.681	1.650	0.031	322.7	375	5.34	50.0
1.022	S26	Dummy	5.000	0.600	1.650	1.630	0.020	250.0	375	5.42	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
3.003	1.522	107.6	18.0	0.798	0.754	0.133	0.0
52.000	1.540	27.2	5.1	0.819	0.754	0.038	0.0
53.000	1.235	21.8	5.1	0.987	0.754	0.038	0.0
3.004	1.293	205.7	34.4	0.754	0.885	0.254	0.0
3.005	1.294	205.8	34.4	0.885	1.147	0.254	0.0
3.006	1.301	207.0	34.4	1.147	1.126	0.254	0.0
54.000	0.848	15.0	6.5	1.093	1.051	0.048	0.0
1.014	1.296	206.2	89.3	1.126	1.335	0.659	0.0
1.015	1.295	206.0	98.3	1.334	1.480	0.725	0.0
1.016	1.298	206.5	98.3	1.480	1.649	0.725	0.0
1.017	1.301	207.0	98.3	1.649	1.642	0.725	0.0
5.000	1.007	71.2	5.8	1.375	1.196	0.043	0.0
5.001	0.993	70.2	5.8	1.196	0.873	0.043	0.0
5.002	0.997	70.5	5.8	0.873	0.904	0.043	0.0
5.003	1.002	70.9	5.8	0.904	1.028	0.043	0.0
5.004	1.010	71.4	5.8	1.028	1.317	0.043	0.0
5.005	0.999	70.6	15.7	1.317	1.145	0.116	0.0
55.000	0.820	14.5	0.0	1.479	1.145	0.000	0.0
5.006	1.001	70.7	18.7	1.145	1.263	0.138	0.0
5.007	2.093	147.9	18.7	1.263	1.566	0.138	0.0
1.018	1.296	206.2	117.0	1.641	0.800	0.863	0.0
1.020	1.126	179.1	0.0	0.833	1.070	0.000	0.0
1.021	1.003	110.8	0.0	1.144	1.175	0.000	0.0
1.022	1.141	126.0	0.0	1.175	0.995	0.000	0.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.266	250.8	300	1	3.579	3.051	0.228	3.600	3.030	0.270
1.001	6.234	249.4	300	1	3.600	3.030	0.270	3.700	3.005	0.395
1.002	9.339	245.8	300	1	3.700	3.004	0.396	3.800	2.966	0.534
1.003	12.007	245.0	300	1	3.800	2.966	0.534	3.981	2.917	0.764
50.000	9.493	150.7	150	1	4.375	3.130	1.095	3.981	3.067	0.764
1.004	15.971	245.7	300	1	3.981	2.917	0.764	4.000	2.852	0.848
1.005	12.234	244.7	300	1	4.000	2.852	0.848	4.000	2.802	0.898
1.006	10.780	245.0	300	1	4.000	2.802	0.898	4.014	2.758	0.956
1.007	11.990	244.7	300	1	4.014	2.758	0.956	3.979	2.709	0.970
2.000	21.910	246.2	450	1	3.253	2.728	0.075	3.621	2.639	0.532
2.001	10.266	244.4	450	1	3.621	2.639	0.532	3.786	2.597	0.739
2.002	5.875	244.8	450	1	3.786	2.597	0.739	3.850	2.573	0.827
2.003	3.395	242.5	450	1	3.850	2.573	0.827	3.979	2.559	0.970
1.008	8.483	245.0	450	1	3.979	2.559	0.970	4.000	2.524	1.026
1.009	8.440	245.0	450	1	4.000	2.524	1.026	4.000	2.490	1.060
1.010	9.030	245.0	450	1	4.000	2.490	1.060	4.100	2.453	1.197
1.011	9.859	245.0	450	1	4.100	2.453	1.197	4.166	2.413	1.303
1.012	35.500	245.0	450	1	4.166	2.413	1.303	3.740	2.268	1.022
1.013	15.323	245.0	450	1	3.740	2.268	1.022	3.706	2.205	1.051
51.000	7.594	150.0	150	1	4.010	3.027	0.833	3.878	2.976	0.752
3.000	26.003	245.3	300	1	3.878	2.826	0.752	4.048	2.720	1.028
4.000	12.043	245.8	300	1	4.130	2.769	1.061	4.048	2.720	1.028
3.001	7.699	248.4	300	1	4.048	2.720	1.028	3.906	2.689	0.917
3.002	21.269	244.5	300	1	3.906	2.689	0.917	3.700	2.602	0.798
3.003	14.188	106.7	300	1	3.700	2.602	0.798	3.523	2.469	0.754
52.000	4.806	42.9	150	1	3.700	2.731	0.819	3.523	2.619	0.754
53.000	9.565	66.4	150	1	3.900	2.763	0.987	3.523	2.619	0.754
3.004	13.246	245.3	450	1	3.523	2.319	0.754	3.600	2.265	0.885

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	1	s1a	300	Junction	
1.001	s1a	300	Junction		s1b	300	Junction	
1.002	s1b	300	Junction		s1c	300	Junction	
1.003	s1c	300	Junction		S2	1200	Manhole	1
50.000	S2L	300	Manhole	1	S2	1200	Manhole	1
1.004	S2	1200	Manhole	1	s2a	300	Junction	
1.005	s2a	300	Junction		s2b	300	Junction	
1.006	s2b	300	Junction		S3	1200	Manhole	1
1.007	S3	1200	Manhole	1	S7	1200	Manhole	1
2.000	S4	1200	Manhole	1	S5	1200	Manhole	1
2.001	S5	1200	Manhole	1	S6	1200	Manhole	1
2.002	S6	1200	Manhole	1	s7a	300	Junction	
2.003	s7a	300	Junction		S7	1200	Manhole	1
1.008	S7	1200	Manhole	1	S7a	300	Junction	
1.009	S7a	300	Junction		s7b	300	Junction	
1.010	s7b	300	Junction		s7c	300	Junction	
1.011	s7c	300	Junction		S8	1200	Manhole	1
1.012	S8	1200	Manhole	1	S9	1200	Manhole	1
1.013	S9	1200	Manhole	1	S16	1200	Manhole	1
51.000	S10L	1200	Manhole	1	S10	1200	Manhole	1
3.000	S10	1200	Manhole	1	S12	1200	Manhole	1
4.000	S11	1200	Manhole	1	S12	1200	Manhole	1
3.001	S12	1200	Manhole	1	S13	1200	Manhole	1
3.002	S13	1200	Manhole	1	s13a	300	Junction	
3.003	s13a	300	Junction		S14	1200	Manhole	1
52.000	S14LA	1200	Manhole	1	S14	1200	Manhole	1
53.000	S14LB	1200	Manhole	1	S14	1200	Manhole	1
3.004	S14	1200	Manhole	1	s14a	300	Junction	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.005	21.322	245.1	450	1	3.600	2.265	0.885	3.775	2.178	1.147
3.006	11.630	242.3	450	1	3.775	2.178	1.147	3.706	2.130	1.126
54.000	7.260	139.6	150	1	3.800	2.557	1.093	3.706	2.505	1.051
1.014	19.531	244.1	450	1	3.706	2.130	1.126	3.835	2.050	1.335
1.015	19.815	244.6	450	1	3.835	2.051	1.334	3.900	1.970	1.480
1.016	16.798	243.4	450	1	3.900	1.970	1.480	4.000	1.901	1.649
1.017	11.147	242.3	450	1	4.000	1.901	1.649	3.947	1.855	1.642
5.000	6.039	241.6	300	1	4.454	2.779	1.375	4.250	2.754	1.196
5.001	6.708	248.4	300	1	4.250	2.754	1.196	3.900	2.727	0.873
5.002	7.631	246.2	300	1	3.900	2.727	0.873	3.900	2.696	0.904
5.003	5.850	243.8	300	1	3.900	2.696	0.904	4.000	2.672	1.028
5.004	6.003	240.1	300	1	4.000	2.672	1.028	4.264	2.647	1.317
5.005	71.387	245.3	300	1	4.264	2.647	1.317	3.801	2.356	1.145
55.000	9.694	149.1	150	1	4.200	2.571	1.479	3.801	2.506	1.145
5.006	11.735	244.5	300	1	3.801	2.356	1.145	3.871	2.308	1.263
5.007	12.856	56.6	300	1	3.871	2.308	1.263	3.947	2.081	1.566
1.018	25.875	244.1	450	1	3.947	1.856	1.641	3.000	1.750	0.800
1.020	11.945	322.7	450	1	3.000	1.717	0.833	3.200	1.680	1.070
1.021	10.000	322.7	375	1	3.200	1.681	1.144	3.200	1.650	1.175
1.022	5.000	250.0	375	1	3.200	1.650	1.175	3.000	1.630	0.995

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.005	s14a	300	Junction		S15	1200	Manhole	1
3.006	S15	1200	Manhole	1	S16	1200	Manhole	1
54.000	S16L	1200	Manhole	1	S16	1200	Manhole	1
1.014	S16	1200	Manhole	1	S17	1200	Manhole	1
1.015	S17	1200	Manhole	1	s17a	300	Junction	
1.016	s17a	300	Junction		s17b	300	Junction	
1.017	s17b	300	Junction		S24	1200	Manhole	1
5.000	S18	1200	Manhole	1	s18a	300	Junction	
5.001	s18a	300	Junction		S19	1200	Manhole	1
5.002	S19	1200	Manhole	1	S20	1200	Manhole	1
5.003	S20	1200	Manhole	1	s20a	300	Junction	
5.004	s20a	300	Junction		S21	1200	Manhole	1
5.005	S21	1200	Manhole	1	S22	1200	Manhole	1
55.000	S22L	1200	Manhole	1	S22	1200	Manhole	1
5.006	S22	1200	Manhole	1	S23	1200	Manhole	1
5.007	S23	1200	Manhole	1	S24	1200	Manhole	1
1.018	S24	1200	Manhole	1	HW1	300	Manhole	1
1.020	HW2	300	Manhole	1	S25	1200	Manhole	1
1.021	S25	1200	Manhole	1	S26	1200	Manhole	1
1.022	S26	1200	Manhole	1	Dummy		Manhole	1

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S1	537340.175	324864.895	3.579	0.528	1200			
s1a	537338.850	324859.798	3.600	0.570	300	1.000	3.051	300
s1b	537332.982	324857.694	3.700	0.696	300	1.001	3.003	300
						1.002	3.004	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
s1c	537323.781	324859.296	3.800	0.834	300	1.002	2.966	300
						1.003	2.966	300
S2L	537312.691	324849.473	4.375	1.245	300			
						50.000	3.130	150
S2	537311.780	324858.922	3.981	1.064	1200	50.000	3.067	150
						1.003	2.917	300
						1.004	2.917	300
s2a	537295.886	324857.363	4.000	1.148	300	1.004	2.852	300
						1.005	2.852	300
s2b	537284.097	324854.094	4.000	1.198	300	1.005	2.802	300
						1.006	2.802	300
S3	537274.507	324859.018	4.014	1.256	1200	1.006	2.758	300
						1.007	2.758	300
S4	537265.533	324906.937	3.253	0.525	1200			
						2.000	2.728	450
S5	537264.428	324885.055	3.621	0.982	1200	2.000	2.639	450
						2.001	2.639	450
S6	537264.629	324874.791	3.786	1.189	1200	2.001	2.597	450
						2.002	2.597	450
s7a	537265.162	324868.940	3.850	1.277	300	2.002	2.573	450
						2.003	2.573	450
S7	537264.493	324865.611	3.979	1.420	1200	2.003	2.559	450
						1.007	2.709	300
						1.008	2.559	450
S7a	537258.536	324859.571	4.000	1.476	300	1.008	2.524	450
						1.009	2.524	450
s7b	537250.958	324855.856	4.000	1.510	300	1.009	2.490	450
						1.010	2.490	450
s7c	537245.316	324848.806	4.100	1.647	300	1.010	2.453	450
						1.011	2.453	450
S8	537243.700	324839.081	4.166	1.753	1200	1.011	2.413	450
						1.012	2.413	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S9	537244.053	324803.582	3.740	1.472	1200	1.012	2.268	450
						1.013	2.268	450
S10L	537337.372	324819.349	4.010	0.983	1200			
						51.000	3.027	150
S10	537329.799	324818.788	3.878	1.052	1200	51.000	2.976	150
						3.000	2.826	300
S11	537332.522	324780.841	4.130	1.361	1200			
						4.000	2.769	300
S12	537331.574	324792.847	4.048	1.328	1200	4.000	2.720	300
						3.000	2.720	300
						3.001	2.720	300
S13	537323.888	324792.411	3.906	1.217	1200	3.001	2.689	300
						3.002	2.689	300
s13a	537302.969	324788.570	3.700	1.098	300	3.002	2.602	300
						3.003	2.602	300
S14LA	537289.373	324781.188	3.700	0.969	1200			
						52.000	2.731	150
S14LB	537288.315	324795.520	3.900	1.137	1200			
						53.000	2.763	150
S14	537289.019	324785.981	3.523	1.204	1200	53.000	2.619	150
						52.000	2.619	150
						3.003	2.469	300
						3.004	2.319	450
s14a	537275.774	324785.854	3.600	1.335	300	3.004	2.265	450
						3.005	2.265	450
S15	537254.511	324787.437	3.775	1.597	1200	3.005	2.178	450
						3.006	2.178	450
S16L	537238.411	324793.998	3.800	1.243	1200			
						54.000	2.557	150
S16	537242.913	324788.302	3.706	1.576	1200	54.000	2.505	150
						3.006	2.130	450
						1.013	2.205	450
						1.014	2.130	450
S17	537241.460	324768.825	3.835	1.785	1200	1.014	2.050	450
						1.015	2.051	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
s17a	537240.267	324749.047	3.900	1.930	300	1.015	1.970	450
						1.016	1.970	450
s17b	537245.624	324733.126	4.000	2.099	300	1.016	1.901	450
						1.017	1.901	450
S18	537368.928	324726.026	4.454	1.675	1200			
						5.000	2.779	300
s18a	537363.454	324723.478	4.250	1.496	300	5.000	2.754	300
						5.001	2.754	300
S19	537362.380	324716.857	3.900	1.173	1200	5.001	2.727	300
						5.002	2.727	300
S20	537354.787	324716.096	3.900	1.204	1200	5.002	2.696	300
						5.003	2.696	300
s20a	537353.351	324721.768	4.000	1.328	300	5.003	2.672	300
						5.004	2.672	300
S21	537347.964	324724.416	4.264	1.617	1200	5.004	2.647	300
						5.005	2.647	300
S22L	537277.513	324728.797	4.200	1.629	1200			
						55.000	2.571	150
S22	537276.772	324719.131	3.801	1.445	1200	55.000	2.506	150
						5.005	2.356	300
						5.006	2.356	300
S23	537265.059	324719.846	3.871	1.563	1200	5.006	2.308	300
						5.007	2.308	300
S24	537253.302	324725.046	3.947	2.092	1200	5.007	2.081	300
						1.017	1.855	450
						1.018	1.856	450
HW1	537239.039	324703.458	3.000	1.250	300	1.018	1.750	450
HW2	537239.546	324684.096	3.000	1.283	300			
						1.020	1.717	450
S25	537247.906	324676.990	3.200	1.520	1200	1.020	1.680	450
						1.021	1.681	375

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Link	IL (m)	Dia (mm)
S26	537256.267	324669.884	3.200	1.550	1200	1.021	1.650	375
						1.022	1.650	375
Dummy			3.000	1.370		1.022	1.630	375

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m ³ /ha)	0.0
M5-60 (mm)	19.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	5.0
Summer CV	0.750	2 year (l/s)	5.0
Winter CV	0.840	30 year (l/s)	5.0
Analysis Speed	Detailed	100 year (l/s)	5.0
Skip Steady State	x	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	40	0	0
2	0	0	0	100	40	10	0
30	0	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	SPR	0.10	Betterment (%)	0
Greenfield Method	IH124	Region	1	QBar	
Positively Drained Area (ha)		Growth Factor 1 year	0.85	Q 1 year (l/s)	
SAAR (mm)		Growth Factor 30 year	1.95	Q 30 year (l/s)	
Soil Index	1	Growth Factor 100 year	2.48	Q 100 year (l/s)	

Node S25 Online Hydro-Brake* Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	1.681	Product Number	CTL-SHE-0054-1400-1120-1400
Design Depth (m)	1.120	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node S26 Offline Orifice Control

Flap Valve	✓	Invert Level (m)	1.650	Discharge Coefficient	0.600
Loop to Node	HW2	Diameter (m)	0.375		

Node HW2 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Main Channel Length (m)	19.369
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.717	Main Channel Slope (1:X)	586.9
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.036

Inlets
HW1

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	536.7	0.0	0.600	840.7	0.0	0.601	989.7	0.0	1.280	1314.7	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	3.116	0.065	7.4	0.0734	0.0000	OK
15 minute winter	s1a	10	3.094	0.064	7.3	0.0000	0.0000	OK
15 minute winter	s1b	10	3.068	0.064	7.2	0.0000	0.0000	OK
15 minute winter	s1c	11	3.031	0.065	7.2	0.0000	0.0000	OK
15 minute winter	S2L	10	3.213	0.083	8.7	0.0059	0.0000	OK
15 minute winter	S2	11	3.029	0.112	21.4	0.1262	0.0000	OK
15 minute winter	s2a	11	2.964	0.112	21.3	0.0000	0.0000	OK
15 minute winter	s2b	11	2.914	0.112	21.4	0.0000	0.0000	OK
15 minute winter	S3	11	2.870	0.112	21.5	0.1263	0.0000	OK
15 minute winter	S4	10	2.779	0.051	5.9	0.0580	0.0000	OK
15 minute winter	S5	11	2.695	0.056	7.1	0.0633	0.0000	OK
15 minute winter	S6	11	2.682	0.085	8.3	0.0960	0.0000	OK
15 minute winter	s7a	11	2.682	0.109	8.2	0.0000	0.0000	OK
15 minute winter	S7	11	2.683	0.124	34.9	0.1398	0.0000	OK
15 minute winter	S7a	11	2.648	0.124	34.9	0.0000	0.0000	OK
15 minute winter	s7b	11	2.614	0.124	34.7	0.0000	0.0000	OK
15 minute winter	s7c	12	2.579	0.126	34.6	0.0000	0.0000	OK
15 minute winter	S8	12	2.545	0.132	39.4	0.1491	0.0000	OK
15 minute winter	S9	12	2.404	0.136	42.2	0.1538	0.0000	OK
15 minute winter	S10L	10	3.081	0.054	4.1	0.0612	0.0000	OK
15 minute winter	S10	10	2.891	0.065	7.6	0.0739	0.0000	OK
15 minute winter	S11	10	2.817	0.048	4.1	0.0547	0.0000	OK
15 minute winter	S12	11	2.805	0.085	11.5	0.0964	0.0000	OK
15 minute winter	S13	11	2.788	0.099	17.0	0.1122	0.0000	OK
15 minute winter	s13a	11	2.682	0.080	17.1	0.0000	0.0000	OK
15 minute winter	S14LA	10	2.775	0.044	5.1	0.0496	0.0000	OK
15 minute winter	S14LB	10	2.812	0.049	5.1	0.0555	0.0000	OK
15 minute winter	S14	11	2.438	0.119	32.5	0.1349	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	7.3	0.660	0.105	0.0586	
15 minute winter	s1a	1.001	s1b	7.2	0.659	0.103	0.0683	
15 minute winter	s1b	1.002	s1c	7.2	0.654	0.101	0.1033	
15 minute winter	s1c	1.003	S2	7.3	0.425	0.104	0.2104	
15 minute winter	S2L	50.000	S2	8.6	0.858	0.595	0.0949	
15 minute winter	S2	1.004	s2a	21.3	0.893	0.302	0.3813	
15 minute winter	s2a	1.005	s2b	21.4	0.895	0.303	0.2925	
15 minute winter	s2b	1.006	S3	21.5	0.898	0.304	0.2577	
15 minute winter	S3	1.007	S7	21.3	0.896	0.301	0.2852	
15 minute winter	S4	2.000	S5	5.8	0.547	0.028	0.2313	
15 minute winter	S5	2.001	S6	7.0	0.494	0.034	0.1643	
15 minute winter	S6	2.002	s7a	8.2	0.393	0.040	0.1481	
15 minute winter	s7a	2.003	S7	8.1	0.254	0.039	0.1104	
15 minute winter	S7	1.008	S7a	34.9	0.985	0.169	0.3004	
15 minute winter	S7a	1.009	s7b	34.7	0.976	0.169	0.3000	
15 minute winter	s7b	1.010	s7c	34.6	0.965	0.168	0.3243	
15 minute winter	s7c	1.011	S8	34.9	0.930	0.169	0.3698	
15 minute winter	S8	1.012	S9	39.9	1.011	0.194	1.4021	
15 minute winter	S9	1.013	S16	42.4	1.052	0.206	0.6176	
15 minute winter	S10L	51.000	S10	4.0	0.709	0.280	0.0433	
15 minute winter	S10	3.000	S12	7.5	0.551	0.106	0.3601	
15 minute winter	S11	4.000	S12	4.0	0.377	0.057	0.1423	
15 minute winter	S12	3.001	S13	11.5	0.628	0.164	0.1415	
15 minute winter	S13	3.002	s13a	17.1	0.968	0.241	0.3763	
15 minute winter	s13a	3.003	S14	17.1	1.132	0.159	0.2139	
15 minute winter	S14LA	52.000	S14	5.1	1.182	0.186	0.0206	
15 minute winter	S14LB	53.000	S14	5.0	1.009	0.231	0.0478	
15 minute winter	S14	3.004	s14a	32.6	0.963	0.158	0.4479	

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	11	2.385	0.120	32.6	0.0000	0.0000	OK
15 minute winter	S15	12	2.324	0.146	32.7	0.1656	0.0000	OK
15 minute winter	S16L	10	2.625	0.068	6.4	0.0767	0.0000	OK
15 minute winter	S16	12	2.327	0.197	81.3	0.2225	0.0000	OK
15 minute winter	S17	12	2.255	0.205	88.7	0.2318	0.0000	OK
15 minute winter	s17a	12	2.177	0.207	89.1	0.0000	0.0000	OK
15 minute winter	s17b	12	2.114	0.213	89.0	0.0000	0.0000	OK
15 minute winter	S18	10	2.836	0.057	5.7	0.0642	0.0000	OK
15 minute winter	s18a	10	2.811	0.057	5.7	0.0000	0.0000	OK
15 minute winter	S19	11	2.784	0.057	5.6	0.0640	0.0000	OK
15 minute winter	S20	11	2.754	0.058	5.6	0.0660	0.0000	OK
15 minute winter	s20a	11	2.739	0.067	5.6	0.0000	0.0000	OK
15 minute winter	S21	11	2.739	0.092	15.0	0.1043	0.0000	OK
15 minute summer	S22L	1	2.571	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S22	11	2.455	0.099	17.6	0.1116	0.0000	OK
15 minute winter	S23	12	2.376	0.068	16.9	0.0771	0.0000	OK
15 minute winter	S24	12	2.078	0.223	105.6	0.2525	0.0000	OK
1440 minute winter	HW1	1560	2.068	0.318	6.3	0.0226	0.0000	OK
1440 minute winter	HW2	1590	2.068	0.351	3.2	0.0249	0.0000	OK
1440 minute winter	S25	1560	2.068	0.388	0.1	0.4389	0.0000	SURCHARGED
1440 minute winter	S26	1650	2.068	0.418	0.1	0.4728	0.0000	SURCHARGED

15 minute summer Dummy 1 2.880 1.250 0.0 0.0000 0.0000 OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	32.7	0.862	0.159	0.8304	
15 minute winter	S15	3.006	S16	31.6	0.586	0.153	0.6470	
15 minute winter	S16L	54.000	S16	6.3	0.818	0.421	0.0560	
15 minute winter	S16	1.014	S17	81.8	1.196	0.397	1.3362	
15 minute winter	S17	1.015	s17a	89.1	1.265	0.432	1.3951	
15 minute winter	s17a	1.016	s17b	89.0	1.230	0.431	1.2155	
15 minute winter	s17b	1.017	S24	88.6	1.165	0.428	0.8480	
15 minute winter	S18	5.000	s18a	5.7	0.612	0.079	0.0558	
15 minute winter	s18a	5.001	S19	5.6	0.607	0.080	0.0618	
15 minute winter	S19	5.002	S20	5.6	0.594	0.079	0.0718	
15 minute winter	S20	5.003	s20a	5.6	0.527	0.079	0.0625	
15 minute winter	s20a	5.004	S21	5.7	0.381	0.079	0.0903	
15 minute winter	S21	5.005	S22	14.8	0.771	0.210	1.3741	
15 minute summer	S22L	55.000	S22	0.0	0.000	0.000	0.0000	
15 minute winter	S22	5.006	S23	16.9	1.063	0.239	0.1886	
15 minute winter	S23	5.007	S24	17.1	1.420	0.115	0.1544	
15 minute winter	S24	1.018	HW1	104.7	2.847	0.508	1.0736	
1440 minute winter	HW1	Flow through pond	HW2	3.2	0.008	0.000	207.9190	
1440 minute winter	HW2	1.020	S25	0.1	0.067	0.001	1.6606	
1440 minute winter	S25	1.021	S26	-0.1	0.092	-0.001	1.1030	
1440 minute winter	S26	1.022	Dummy	0.0	0.000	0.000	0.5515	0.0
1440 minute winter	S26	Orifice	HW2	0.0				0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	3.125	0.074	9.5	0.0833	0.0000	OK
15 minute winter	s1a	10	3.103	0.073	9.4	0.0000	0.0000	OK
15 minute winter	s1b	10	3.078	0.074	9.3	0.0000	0.0000	OK
15 minute winter	s1c	11	3.046	0.080	9.2	0.0000	0.0000	OK
15 minute winter	S2L	10	3.228	0.098	11.2	0.0070	0.0000	OK
15 minute winter	S2	11	3.046	0.129	27.7	0.1455	0.0000	OK
15 minute winter	s2a	11	2.981	0.129	27.6	0.0000	0.0000	OK
15 minute winter	s2b	11	2.931	0.129	27.7	0.0000	0.0000	OK
15 minute winter	S3	11	2.887	0.129	27.8	0.1453	0.0000	OK
15 minute winter	S4	10	2.786	0.058	7.6	0.0656	0.0000	OK
15 minute winter	S5	11	2.702	0.063	9.2	0.0718	0.0000	OK
15 minute winter	S6	11	2.700	0.103	10.7	0.1161	0.0000	OK
15 minute winter	s7a	11	2.700	0.127	10.4	0.0000	0.0000	OK
15 minute winter	S7	11	2.700	0.141	45.3	0.1599	0.0000	OK
15 minute winter	S7a	11	2.666	0.142	45.2	0.0000	0.0000	OK
15 minute winter	s7b	11	2.633	0.143	45.0	0.0000	0.0000	OK
15 minute winter	s7c	11	2.598	0.145	44.7	0.0000	0.0000	OK
15 minute winter	S8	11	2.564	0.151	51.3	0.1705	0.0000	OK
15 minute winter	S9	12	2.424	0.156	54.6	0.1763	0.0000	OK
15 minute winter	S10L	10	3.090	0.063	5.4	0.0709	0.0000	OK
15 minute winter	S10	10	2.901	0.075	10.0	0.0844	0.0000	OK
15 minute winter	S11	10	2.824	0.055	5.4	0.0624	0.0000	OK
15 minute winter	S12	11	2.819	0.099	15.1	0.1119	0.0000	OK
15 minute winter	S13	11	2.803	0.114	22.2	0.1291	0.0000	OK
15 minute winter	s13a	11	2.694	0.092	22.3	0.0000	0.0000	OK
15 minute winter	S14LA	10	2.781	0.050	6.6	0.0568	0.0000	OK
15 minute winter	S14LB	10	2.819	0.056	6.6	0.0636	0.0000	OK
15 minute winter	S14	11	2.456	0.137	42.1	0.1545	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	9.4	0.706	0.135	0.0703	
15 minute winter	s1a	1.001	s1b	9.3	0.705	0.133	0.0825	
15 minute winter	s1b	1.002	s1c	9.2	0.649	0.130	0.1326	
15 minute winter	s1c	1.003	S2	9.5	0.443	0.135	0.2634	
15 minute winter	S2L	50.000	S2	11.1	0.910	0.767	0.1154	
15 minute winter	S2	1.004	s2a	27.6	0.958	0.392	0.4608	
15 minute winter	s2a	1.005	s2b	27.7	0.960	0.392	0.3531	
15 minute winter	s2b	1.006	S3	27.8	0.964	0.393	0.3109	
15 minute winter	S3	1.007	S7	27.7	0.967	0.392	0.3432	
15 minute winter	S4	2.000	S5	7.5	0.592	0.036	0.2776	
15 minute winter	S5	2.001	S6	9.0	0.504	0.044	0.2092	
15 minute winter	S6	2.002	s7a	10.4	0.414	0.051	0.1879	
15 minute winter	s7a	2.003	S7	10.5	0.274	0.051	0.1347	
15 minute winter	S7	1.008	S7a	45.2	1.057	0.220	0.3627	
15 minute winter	S7a	1.009	s7b	45.0	1.047	0.219	0.3633	
15 minute winter	s7b	1.010	s7c	44.7	1.033	0.217	0.3940	
15 minute winter	s7c	1.011	S8	45.0	0.997	0.219	0.4467	
15 minute winter	S8	1.012	S9	51.6	1.084	0.251	1.6902	
15 minute winter	S9	1.013	S16	55.3	1.135	0.269	0.7468	
15 minute winter	S10L	51.000	S10	5.3	0.763	0.367	0.0528	
15 minute winter	S10	3.000	S12	9.8	0.588	0.139	0.4389	
15 minute winter	S11	4.000	S12	5.3	0.387	0.075	0.1735	
15 minute winter	S12	3.001	S13	15.0	0.671	0.214	0.1725	
15 minute winter	S13	3.002	s13a	22.3	1.043	0.316	0.4558	
15 minute winter	s13a	3.003	S14	22.3	1.222	0.207	0.2591	
15 minute winter	S14LA	52.000	S14	6.6	1.271	0.241	0.0248	
15 minute winter	S14LB	53.000	S14	6.5	1.084	0.299	0.0576	
15 minute winter	S14	3.004	s14a	42.3	1.032	0.206	0.5429	

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	11	2.404	0.139	42.3	0.0000	0.0000	OK
15 minute winter	S15	12	2.358	0.180	42.5	0.2036	0.0000	OK
15 minute winter	S16L	10	2.636	0.079	8.3	0.0893	0.0000	OK
15 minute winter	S16	12	2.360	0.230	105.6	0.2597	0.0000	OK
15 minute winter	S17	12	2.290	0.240	115.7	0.2715	0.0000	OK
15 minute winter	s17a	12	2.213	0.243	116.3	0.0000	0.0000	OK
15 minute winter	s17b	12	2.152	0.251	116.1	0.0000	0.0000	OK
15 minute winter	S18	10	2.844	0.065	7.4	0.0731	0.0000	OK
15 minute winter	s18a	10	2.819	0.065	7.3	0.0000	0.0000	OK
15 minute winter	S19	11	2.792	0.065	7.3	0.0731	0.0000	OK
15 minute winter	S20	11	2.764	0.068	7.2	0.0767	0.0000	OK
15 minute winter	s20a	11	2.752	0.080	7.3	0.0000	0.0000	OK
15 minute winter	S21	11	2.753	0.106	19.5	0.1195	0.0000	OK
15 minute summer	S22L	1	2.571	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S22	11	2.470	0.114	22.9	0.1288	0.0000	OK
15 minute winter	S23	12	2.386	0.078	22.2	0.0879	0.0000	OK
1440 minute winter	S24	1530	2.126	0.271	14.0	0.3069	0.0000	OK
1440 minute winter	HW1	1680	2.125	0.375	7.6	0.0267	0.0000	OK
1440 minute winter	HW2	1650	2.125	0.408	3.9	0.0290	0.0000	OK
1440 minute winter	S25	1620	2.125	0.445	0.1	0.5038	0.0000	SURCHARGED
1440 minute winter	S26	1620	2.125	0.475	0.1	0.5377	0.0000	SURCHARGED

15 minute summer Dummy 1 2.880 1.250 0.0 0.0000 0.0000 OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	42.5	0.886	0.206	1.0596	
15 minute winter	S15	3.006	S16	40.9	0.600	0.197	0.8171	
15 minute winter	S16L	54.000	S16	8.2	0.874	0.547	0.0681	
15 minute winter	S16	1.014	S17	106.8	1.277	0.518	1.6337	
15 minute winter	S17	1.015	s17a	116.3	1.347	0.565	1.7105	
15 minute winter	s17a	1.016	s17b	116.1	1.306	0.562	1.4935	
15 minute winter	s17b	1.017	S24	115.7	1.239	0.559	1.0416	
15 minute winter	S18	5.000	s18a	7.3	0.660	0.103	0.0672	
15 minute winter	s18a	5.001	S19	7.3	0.652	0.103	0.0747	
15 minute winter	S19	5.002	S20	7.2	0.630	0.102	0.0879	
15 minute winter	S20	5.003	s20a	7.3	0.540	0.103	0.0791	
15 minute winter	s20a	5.004	S21	7.4	0.399	0.103	0.1119	
15 minute winter	S21	5.005	S22	19.3	0.827	0.273	1.6659	
15 minute summer	S22L	55.000	S22	0.0	0.000	0.000	0.0000	
15 minute winter	S22	5.006	S23	22.2	1.146	0.313	0.2286	
15 minute winter	S23	5.007	S24	22.2	1.532	0.150	0.1860	
1440 minute winter	S24	1.018	HW1	7.6	0.761	0.037	3.1144	
1440 minute winter	HW1	Flow through pond	HW2	3.9	0.010	0.000	249.2791	
1440 minute winter	HW2	1.020	S25	0.1	0.075	0.001	1.8478	
1440 minute winter	S25	1.021	S26	0.1	0.114	0.001	1.1030	
1440 minute winter	S26	1.022	Dummy	0.0	0.000	0.000	0.5515	0.0
1440 minute winter	S26	Orifice	HW2	0.0				0.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	3.155	0.104	18.0	0.1176	0.0000	OK
15 minute winter	s1a	10	3.135	0.105	17.9	0.0000	0.0000	OK
15 minute winter	s1b	11	3.115	0.111	17.7	0.0000	0.0000	OK
15 minute winter	s1c	11	3.106	0.140	17.5	0.0000	0.0000	OK
15 minute winter	S2L	10	3.330	0.200	21.3	0.0142	0.0000	SURCHARGED
15 minute winter	S2	11	3.105	0.188	52.1	0.2127	0.0000	OK
15 minute winter	s2a	11	3.040	0.188	52.1	0.0000	0.0000	OK
15 minute winter	s2b	11	2.989	0.187	52.5	0.0000	0.0000	OK
15 minute winter	S3	11	2.942	0.184	52.5	0.2080	0.0000	OK
15 minute winter	S4	10	2.807	0.079	14.4	0.0893	0.0000	OK
15 minute winter	S5	11	2.758	0.119	17.5	0.1349	0.0000	OK
15 minute winter	S6	11	2.759	0.162	19.7	0.1838	0.0000	OK
15 minute winter	s7a	11	2.760	0.187	19.6	0.0000	0.0000	OK
15 minute winter	S7	11	2.760	0.201	85.6	0.2270	0.0000	OK
15 minute winter	S7a	11	2.726	0.202	85.4	0.0000	0.0000	OK
15 minute winter	s7b	11	2.694	0.204	85.2	0.0000	0.0000	OK
15 minute winter	s7c	11	2.661	0.208	84.8	0.0000	0.0000	OK
15 minute winter	S8	11	2.630	0.217	97.6	0.2458	0.0000	OK
15 minute winter	S9	12	2.515	0.247	103.1	0.2798	0.0000	OK
15 minute winter	S10L	10	3.119	0.092	10.2	0.1037	0.0000	OK
15 minute winter	S10	10	2.930	0.104	18.9	0.1174	0.0000	OK
15 minute winter	S11	11	2.865	0.096	10.2	0.1080	0.0000	OK
15 minute winter	S12	11	2.864	0.144	28.3	0.1626	0.0000	OK
15 minute winter	S13	11	2.850	0.161	41.9	0.1824	0.0000	OK
15 minute winter	s13a	11	2.731	0.129	42.6	0.0000	0.0000	OK
15 minute winter	S14LA	10	2.802	0.071	12.5	0.0805	0.0000	OK
15 minute winter	S14LB	10	2.844	0.081	12.5	0.0915	0.0000	OK
15 minute winter	S14	11	2.521	0.202	79.7	0.2286	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	17.9	0.819	0.256	0.1150	
15 minute winter	s1a	1.001	s1b	17.7	0.790	0.252	0.1412	
15 minute winter	s1b	1.002	s1c	17.5	0.651	0.247	0.2620	
15 minute winter	s1c	1.003	S2	17.8	0.482	0.252	0.4734	
15 minute winter	S2L	50.000	S2	20.9	1.192	1.452	0.1613	
15 minute winter	S2	1.004	s2a	52.1	1.123	0.738	0.7424	
15 minute winter	s2a	1.005	s2b	52.5	1.135	0.743	0.5665	
15 minute winter	s2b	1.006	S3	52.5	1.149	0.743	0.4926	
15 minute winter	S3	1.007	S7	52.4	1.181	0.741	0.5318	
15 minute winter	S4	2.000	S5	14.2	0.652	0.069	0.5675	
15 minute winter	S5	2.001	S6	16.6	0.514	0.081	0.4369	
15 minute winter	S6	2.002	s7a	19.6	0.437	0.095	0.3338	
15 minute winter	s7a	2.003	S7	19.9	0.324	0.096	0.2215	
15 minute winter	S7	1.008	S7a	85.4	1.244	0.415	0.5829	
15 minute winter	S7a	1.009	s7b	85.2	1.227	0.414	0.5863	
15 minute winter	s7b	1.010	s7c	84.8	1.205	0.412	0.6397	
15 minute winter	s7c	1.011	S8	84.9	1.161	0.413	0.7275	
15 minute winter	S8	1.012	S9	97.5	1.186	0.474	2.9192	
15 minute winter	S9	1.013	S16	104.3	1.172	0.507	1.4920	
15 minute winter	S10L	51.000	S10	10.1	0.894	0.696	0.0855	
15 minute winter	S10	3.000	S12	18.6	0.686	0.263	0.7111	
15 minute winter	S11	4.000	S12	9.7	0.428	0.138	0.3169	
15 minute winter	S12	3.001	S13	28.3	0.786	0.403	0.2769	
15 minute winter	S13	3.002	s13a	42.6	1.261	0.601	0.7182	
15 minute winter	s13a	3.003	S14	42.2	1.458	0.393	0.4112	
15 minute winter	S14LA	52.000	S14	12.4	1.510	0.456	0.0395	
15 minute winter	S14LB	53.000	S14	12.4	1.279	0.566	0.0925	
15 minute winter	S14	3.004	s14a	79.7	1.154	0.388	0.9707	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	12	2.490	0.225	79.7	0.0000	0.0000	OK
15 minute winter	S15	12	2.491	0.313	77.7	0.3538	0.0000	OK
15 minute winter	S16L	10	2.679	0.122	15.7	0.1380	0.0000	OK
15 minute winter	S16	12	2.489	0.359	196.2	0.4063	0.0000	OK
15 minute winter	S17	12	2.424	0.374	214.7	0.4230	0.0000	OK
1440 minute winter	s17a	1470	2.348	0.378	11.4	0.0000	0.0000	OK
1440 minute winter	s17b	1500	2.348	0.447	31.7	0.0000	0.0000	OK
15 minute winter	S18	10	2.869	0.090	14.1	0.1020	0.0000	OK
15 minute winter	s18a	10	2.845	0.091	14.0	0.0000	0.0000	OK
15 minute winter	S19	10	2.820	0.093	13.9	0.1049	0.0000	OK
15 minute winter	S20	11	2.801	0.105	13.7	0.1186	0.0000	OK
15 minute winter	s20a	11	2.798	0.126	13.8	0.0000	0.0000	OK
15 minute winter	S21	11	2.798	0.151	37.0	0.1711	0.0000	OK
15 minute summer	S22L	1	2.571	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S22	11	2.519	0.163	43.5	0.1846	0.0000	OK
15 minute winter	S23	11	2.417	0.109	42.9	0.1238	0.0000	OK
1440 minute winter	S24	1500	2.348	0.493	32.5	0.5576	0.0000	SURCHARGED
1440 minute winter	HW1	1590	2.347	0.597	30.9	0.0424	0.0000	OK
1440 minute winter	HW2	1680	2.347	0.630	67.1	0.0447	0.0000	SURCHARGED
1440 minute winter	S25	1620	2.347	0.667	0.3	0.7544	0.0000	SURCHARGED
1440 minute winter	S26	1470	2.347	0.697	0.1	0.7882	0.0000	SURCHARGED

15 minute summer Dummy 1 2.880 1.250 0.0 0.0000 0.0000 OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	77.7	0.935	0.378	2.1003	
15 minute winter	S15	3.006	S16	75.0	0.633	0.362	1.4729	
15 minute winter	S16L	54.000	S16	15.5	1.038	1.035	0.1085	
15 minute winter	S16	1.014	S17	197.8	1.431	0.959	2.7000	
15 minute winter	S17	1.015	s17a	215.2	1.524	1.045	2.7972	
1440 minute winter	s17a	1.016	s17b	19.5	0.668	0.094	2.5226	
1440 minute winter	s17b	1.017	S24	30.8	0.581	0.149	1.7652	
15 minute winter	S18	5.000	s18a	14.0	0.783	0.197	0.1080	
15 minute winter	s18a	5.001	S19	13.9	0.760	0.198	0.1224	
15 minute winter	S19	5.002	S20	13.7	0.688	0.194	0.1542	
15 minute winter	S20	5.003	s20a	13.8	0.554	0.195	0.1464	
15 minute winter	s20a	5.004	S21	13.9	0.443	0.195	0.1912	
15 minute winter	S21	5.005	S22	36.7	0.982	0.520	2.6683	
15 minute summer	S22L	55.000	S22	0.0	0.000	0.000	0.0021	
15 minute winter	S22	5.006	S23	42.9	1.378	0.607	0.3662	
15 minute winter	S23	5.007	S24	42.8	1.732	0.289	0.3712	
1440 minute winter	S24	1.018	HW1	17.7	0.889	0.086	4.0997	
1440 minute winter	HW1	Flow through pond	HW2	67.1	0.012	0.002	426.3602	
1440 minute winter	HW2	1.020	S25	0.3	0.102	0.002	1.8926	
1440 minute winter	S25	1.021	S26	0.1	0.009	0.001	1.1030	
1440 minute winter	S26	1.022	Dummy	0.0	0.000	0.000	0.5515	0.0
1440 minute winter	S26	Orifice	HW2	0.0				0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	3.272	0.221	32.7	0.2500	0.0000	OK
15 minute winter	s1a	13	3.277	0.247	31.4	0.0000	0.0000	OK
15 minute winter	s1b	13	3.268	0.264	29.5	0.0000	0.0000	OK
15 minute winter	s1c	12	3.282	0.316	28.3	0.0000	0.0000	SURCHARGED
15 minute winter	S2L	11	3.685	0.555	38.6	0.0394	0.0000	SURCHARGED
15 minute winter	S2	12	3.279	0.362	88.9	0.4097	0.0000	SURCHARGED
15 minute winter	s2a	12	3.233	0.381	88.6	0.0000	0.0000	SURCHARGED
15 minute winter	s2b	12	3.180	0.378	88.1	0.0000	0.0000	SURCHARGED
15 minute winter	S3	12	3.134	0.376	87.4	0.4250	0.0000	SURCHARGED
15 minute winter	S4	13	3.068	0.340	40.6	0.3850	0.0000	OK
15 minute winter	S5	13	3.061	0.422	31.7	0.4773	0.0000	OK
15 minute winter	S6	13	3.058	0.461	42.1	0.5212	0.0000	SURCHARGED
15 minute winter	s7a	13	3.068	0.495	41.1	0.0000	0.0000	SURCHARGED
15 minute winter	S7	13	3.071	0.512	141.6	0.5790	0.0000	SURCHARGED
15 minute winter	S7a	12	3.083	0.559	140.3	0.0000	0.0000	SURCHARGED
15 minute winter	s7b	12	3.087	0.597	137.7	0.0000	0.0000	SURCHARGED
15 minute winter	s7c	12	3.062	0.609	139.2	0.0000	0.0000	SURCHARGED
15 minute winter	S8	12	3.056	0.643	150.3	0.7274	0.0000	SURCHARGED
15 minute winter	S9	12	2.994	0.726	157.3	0.8209	0.0000	SURCHARGED
15 minute winter	S10L	10	3.177	0.150	18.4	0.1693	0.0000	OK
15 minute winter	S10	12	3.121	0.295	33.9	0.3333	0.0000	OK
15 minute winter	S11	12	3.113	0.344	18.4	0.3889	0.0000	SURCHARGED
15 minute winter	S12	12	3.105	0.385	51.4	0.4352	0.0000	SURCHARGED
15 minute winter	S13	12	3.092	0.403	74.6	0.4563	0.0000	SURCHARGED
15 minute winter	s13a	12	3.016	0.414	69.1	0.0000	0.0000	SURCHARGED
15 minute winter	S14LA	12	3.019	0.288	22.6	0.3259	0.0000	SURCHARGED
15 minute winter	S14LB	11	3.075	0.312	22.6	0.3530	0.0000	SURCHARGED
15 minute winter	S14	12	2.978	0.659	129.1	0.7454	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	31.4	0.881	0.450	0.3083	
15 minute winter	s1a	1.001	s1b	29.5	0.808	0.421	0.3970	
15 minute winter	s1b	1.002	s1c	28.3	0.682	0.401	0.6349	
15 minute winter	s1c	1.003	S2	31.8	0.622	0.451	0.8455	
15 minute winter	S2L	50.000	S2	37.2	2.113	2.579	0.1671	
15 minute winter	S2	1.004	s2a	88.6	1.258	1.255	1.1247	
15 minute winter	s2a	1.005	s2b	88.1	1.272	1.245	0.8615	
15 minute winter	s2b	1.006	S3	87.4	1.317	1.237	0.7591	
15 minute winter	S3	1.007	S7	86.4	1.407	1.222	0.8443	
15 minute winter	S4	2.000	S5	25.8	0.684	0.126	3.1010	
15 minute winter	S5	2.001	S6	31.1	0.533	0.151	1.6058	
15 minute winter	S6	2.002	s7a	41.1	0.553	0.200	0.9309	
15 minute winter	s7a	2.003	S7	47.5	0.571	0.229	0.5379	
15 minute winter	S7	1.008	S7a	140.3	1.380	0.682	1.3441	
15 minute winter	S7a	1.009	s7b	137.7	1.325	0.669	1.3373	
15 minute winter	s7b	1.010	s7c	139.2	1.252	0.676	1.4307	
15 minute winter	s7c	1.011	S8	143.4	1.170	0.697	1.5621	
15 minute winter	S8	1.012	S9	155.0	1.172	0.753	5.6247	
15 minute winter	S9	1.013	S16	175.0	1.130	0.850	2.4278	
15 minute winter	S10L	51.000	S10	17.9	1.067	1.235	0.1271	
15 minute winter	S10	3.000	S12	33.5	0.778	0.475	1.8273	
15 minute winter	S11	4.000	S12	17.9	0.516	0.253	0.8481	
15 minute winter	S12	3.001	S13	48.6	0.871	0.692	0.5422	
15 minute winter	S13	3.002	s13a	69.1	1.429	0.977	1.4977	
15 minute winter	s13a	3.003	S14	66.7	1.591	0.620	0.9991	
15 minute winter	S14LA	52.000	S14	21.1	1.700	0.775	0.0846	
15 minute winter	S14LB	53.000	S14	20.6	1.406	0.943	0.1684	
15 minute winter	S14	3.004	s14a	124.6	1.221	0.606	2.0987	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	12	2.960	0.695	124.6	0.0000	0.0000	SURCHARGED
15 minute winter	S15	12	2.928	0.750	119.0	0.8488	0.0000	SURCHARGED
15 minute winter	S16L	11	3.044	0.487	28.5	0.5507	0.0000	SURCHARGED
15 minute winter	S16	12	2.929	0.799	278.9	0.9040	0.0000	SURCHARGED
15 minute winter	S17	12	2.770	0.720	302.4	0.8149	0.0000	SURCHARGED
1440 minute winter	s17a	1590	2.654	0.684	19.8	0.0000	0.0000	SURCHARGED
1440 minute winter	s17b	1590	2.654	0.753	40.8	0.0000	0.0000	SURCHARGED
15 minute winter	S18	10	2.907	0.128	25.6	0.1446	0.0000	OK
15 minute winter	s18a	11	2.888	0.134	25.4	0.0000	0.0000	OK
15 minute winter	S19	11	2.878	0.151	25.0	0.1703	0.0000	OK
15 minute winter	S20	11	2.875	0.179	24.5	0.2020	0.0000	OK
15 minute winter	s20a	11	2.874	0.202	24.6	0.0000	0.0000	OK
15 minute winter	S21	11	2.872	0.225	66.0	0.2545	0.0000	OK
1440 minute winter	S22L	1560	2.654	0.083	0.0	0.0936	0.0000	OK
1440 minute winter	S22	1560	2.654	0.298	3.8	0.3367	0.0000	OK
1440 minute winter	S23	1590	2.654	0.346	11.7	0.3910	0.0000	SURCHARGED
1440 minute winter	S24	1590	2.654	0.799	44.0	0.9033	0.0000	SURCHARGED
1440 minute winter	HW1	1650	2.654	0.904	88.0	0.0642	0.0000	OK
1440 minute winter	HW2	1650	2.654	0.937	106.5	0.0665	0.0000	SURCHARGED
1440 minute winter	S25	1650	2.654	0.974	0.6	1.1013	0.0000	SURCHARGED
1440 minute winter	S26	1560	2.654	1.004	0.2	1.1351	0.0000	SURCHARGED

15 minute summer Dummy 1 2.880 1.250 0.0 0.0000 0.0000 OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	119.0	0.962	0.578	3.3783	
15 minute winter	S15	3.006	S16	118.1	0.745	0.570	1.8427	
15 minute winter	S16L	54.000	S16	26.8	1.522	1.787	0.1278	
15 minute winter	S16	1.014	S17	276.8	1.747	1.343	3.0946	
15 minute winter	S17	1.015	s17a	300.4	1.896	1.458	3.1396	
1440 minute winter	s17a	1.016	s17b	28.8	0.676	0.140	2.6615	
1440 minute winter	s17b	1.017	S24	40.2	0.581	0.194	1.7662	
15 minute winter	S18	5.000	s18a	25.4	0.881	0.357	0.1774	
15 minute winter	s18a	5.001	S19	25.0	0.819	0.356	0.2209	
15 minute winter	S19	5.002	S20	24.5	0.703	0.348	0.3019	
15 minute winter	S20	5.003	s20a	24.6	0.545	0.347	0.2751	
15 minute winter	s20a	5.004	S21	24.7	0.487	0.346	0.3212	
15 minute winter	S21	5.005	S22	66.0	1.159	0.935	4.0686	
1440 minute winter	S22L	55.000	S22	0.1	0.006	0.006	0.1334	
1440 minute winter	S22	5.006	S23	6.7	0.689	0.094	0.8259	
1440 minute winter	S23	5.007	S24	-5.8	0.824	-0.039	0.9053	
1440 minute winter	S24	1.018	HW1	29.5	1.024	0.143	4.0997	
1440 minute winter	HW1	Flow through pond	HW2	106.5	0.011	0.003	753.3040	
1440 minute winter	HW2	1.020	S25	0.6	0.089	0.003	1.8926	
1440 minute winter	S25	1.021	S26	0.2	0.091	0.002	1.1030	
1440 minute winter	S26	1.022	Dummy	0.0	0.000	0.000	0.5515	0.0
1440 minute winter	S26	Orifice	HW2	0.0				0.0

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	12	3.540	0.489	36.0	0.5536	0.0000	FLOOD RISK
15 minute winter	s1a	12	3.536	0.506	32.6	0.0000	0.0000	FLOOD RISK
15 minute winter	s1b	12	3.530	0.526	30.9	0.0000	0.0000	FLOOD RISK
15 minute winter	s1c	12	3.523	0.557	27.5	0.0000	0.0000	FLOOD RISK
15 minute winter	S2L	12	3.873	0.743	42.5	0.0528	0.0000	SURCHARGED
15 minute winter	S2	12	3.514	0.597	92.8	0.6747	0.0000	SURCHARGED
15 minute winter	s2a	12	3.429	0.577	91.2	0.0000	0.0000	SURCHARGED
15 minute winter	s2b	13	3.356	0.554	91.0	0.0000	0.0000	SURCHARGED
15 minute winter	S3	12	3.305	0.547	91.6	0.6181	0.0000	SURCHARGED
15 minute winter	S4	12	3.253	0.525	28.8	0.5938	1.4943	FLOOD
15 minute winter	S5	13	3.246	0.607	46.4	0.6863	0.0000	SURCHARGED
15 minute winter	S6	12	3.264	0.667	39.2	0.7544	0.0000	SURCHARGED
15 minute winter	s7a	12	3.276	0.703	49.9	0.0000	0.0000	SURCHARGED
15 minute winter	S7	12	3.277	0.718	139.4	0.8121	0.0000	SURCHARGED
15 minute winter	S7a	12	3.255	0.731	135.5	0.0000	0.0000	SURCHARGED
15 minute winter	s7b	12	3.230	0.740	137.6	0.0000	0.0000	SURCHARGED
15 minute winter	s7c	12	3.212	0.759	138.9	0.0000	0.0000	SURCHARGED
15 minute winter	S8	12	3.197	0.784	149.7	0.8862	0.0000	SURCHARGED
15 minute winter	S9	12	3.160	0.892	162.2	1.0085	0.0000	SURCHARGED
15 minute winter	S10L	12	3.371	0.344	20.3	0.3891	0.0000	SURCHARGED
15 minute winter	S10	12	3.317	0.491	37.6	0.5552	0.0000	SURCHARGED
15 minute winter	S11	12	3.318	0.549	20.3	0.6214	0.0000	SURCHARGED
15 minute winter	S12	12	3.300	0.580	51.1	0.6563	0.0000	SURCHARGED
15 minute winter	S13	12	3.290	0.601	74.5	0.6793	0.0000	SURCHARGED
15 minute winter	s13a	12	3.233	0.631	72.0	0.0000	0.0000	SURCHARGED
15 minute winter	S14LA	12	3.246	0.515	24.8	0.5828	0.0000	SURCHARGED
15 minute winter	S14LB	12	3.297	0.534	24.8	0.6035	0.0000	SURCHARGED
15 minute winter	S14	12	3.188	0.869	141.8	0.9825	0.0000	SURCHARGED
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	s1a	32.6	0.887	0.466	0.3708	
15 minute winter	s1a	1.001	s1b	30.9	0.818	0.441	0.4390	
15 minute winter	s1b	1.002	s1c	27.5	0.676	0.390	0.6576	
15 minute winter	s1c	1.003	S2	33.3	0.644	0.472	0.8455	
15 minute winter	S2L	50.000	S2	40.2	2.283	2.786	0.1671	
15 minute winter	S2	1.004	s2a	91.2	1.295	1.292	1.1247	
15 minute winter	s2a	1.005	s2b	91.0	1.292	1.287	0.8615	
15 minute winter	s2b	1.006	S3	91.6	1.331	1.296	0.7591	
15 minute winter	S3	1.007	S7	91.2	1.425	1.290	0.8443	
15 minute winter	S4	2.000	S5	40.2	0.690	0.196	3.4715	
15 minute winter	S5	2.001	S6	36.2	0.597	0.176	1.6266	
15 minute winter	S6	2.002	s7a	45.0	0.638	0.218	0.9309	
15 minute winter	s7a	2.003	S7	-49.9	0.642	-0.241	0.5379	
15 minute winter	S7	1.008	S7a	135.5	1.358	0.659	1.3441	
15 minute winter	S7a	1.009	s7b	137.6	1.326	0.669	1.3373	
15 minute winter	s7b	1.010	s7c	138.9	1.277	0.675	1.4307	
15 minute winter	s7c	1.011	S8	144.8	1.199	0.704	1.5621	
15 minute winter	S8	1.012	S9	159.7	1.177	0.776	5.6247	
15 minute winter	S9	1.013	S16	172.6	1.206	0.839	2.4278	
15 minute winter	S10L	51.000	S10	20.0	1.141	1.383	0.1337	
15 minute winter	S10	3.000	S12	35.6	0.787	0.504	1.8311	
15 minute winter	S11	4.000	S12	17.7	0.527	0.251	0.8481	
15 minute winter	S12	3.001	S13	47.4	0.888	0.675	0.5422	
15 minute winter	S13	3.002	s13a	72.0	1.463	1.018	1.4977	
15 minute winter	s13a	3.003	S14	68.7	1.627	0.639	0.9991	
15 minute winter	S14LA	52.000	S14	23.6	1.728	0.869	0.0846	
15 minute winter	S14LB	53.000	S14	22.4	1.383	1.027	0.1684	
15 minute winter	S14	3.004	s14a	134.5	1.227	0.654	2.0987	

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	s14a	12	3.167	0.902	134.5	0.0000	0.0000	SURCHARGED
15 minute winter	S15	12	3.140	0.962	127.8	1.0879	0.0000	SURCHARGED
15 minute winter	S16L	12	3.264	0.707	31.4	0.7997	0.0000	SURCHARGED
15 minute winter	S16	12	3.126	0.996	298.7	1.1261	0.0000	SURCHARGED
15 minute winter	S17	12	2.958	0.908	329.3	1.0271	0.0000	SURCHARGED
15 minute winter	s17a	12	2.750	0.780	328.6	0.0000	0.0000	SURCHARGED
1440 minute winter	s17b	1530	2.721	0.820	27.9	0.0000	0.0000	SURCHARGED
15 minute winter	S18	11	2.916	0.137	28.1	0.1548	0.0000	OK
15 minute winter	s18a	11	2.903	0.149	27.8	0.0000	0.0000	OK
15 minute winter	S19	11	2.897	0.170	27.3	0.1925	0.0000	OK
15 minute winter	S20	11	2.895	0.199	26.6	0.2253	0.0000	OK
15 minute winter	s20a	11	2.894	0.222	26.6	0.0000	0.0000	OK
15 minute winter	S21	11	2.892	0.245	72.0	0.2766	0.0000	OK
1440 minute winter	S22L	1500	2.721	0.150	0.2	0.1697	0.0000	SURCHARGED
1440 minute winter	S22	1500	2.721	0.365	4.2	0.4126	0.0000	SURCHARGED
1440 minute winter	S23	1530	2.721	0.413	4.2	0.4667	0.0000	SURCHARGED
1440 minute winter	S24	1530	2.721	0.866	58.3	0.9793	0.0000	SURCHARGED
1440 minute winter	HW1	1590	2.721	0.971	102.3	0.0689	0.0000	OK
1440 minute winter	HW2	1590	2.721	1.004	129.9	0.0713	0.0000	FLOOD RISK
1440 minute winter	S25	1680	2.721	1.041	0.6	1.1770	0.0000	SURCHARGED
1440 minute winter	S26	1590	2.721	1.071	0.3	1.2108	0.0000	SURCHARGED

15 minute summer Dummy 1 2.880 1.250 0.0 0.0000 0.0000 OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	s14a	3.005	S15	127.8	0.973	0.621	3.3783	
15 minute winter	S15	3.006	S16	120.3	0.759	0.581	1.8427	
15 minute winter	S16L	54.000	S16	27.8	1.580	1.855	0.1278	
15 minute winter	S16	1.014	S17	295.6	1.866	1.434	3.0946	
15 minute winter	S17	1.015	s17a	328.6	2.074	1.595	3.1396	
15 minute winter	s17a	1.016	s17b	330.2	2.084	1.599	2.6615	
1440 minute winter	s17b	1.017	S24	54.5	0.569	0.263	1.7662	
15 minute winter	S18	5.000	s18a	27.8	0.891	0.391	0.2000	
15 minute winter	s18a	5.001	S19	27.3	0.828	0.389	0.2556	
15 minute winter	S19	5.002	S20	26.6	0.703	0.377	0.3469	
15 minute winter	S20	5.003	s20a	26.6	0.544	0.376	0.3085	
15 minute winter	s20a	5.004	S21	26.8	0.498	0.376	0.3521	
15 minute winter	S21	5.005	S22	72.0	1.180	1.020	4.3583	
1440 minute winter	S22L	55.000	S22	-0.2	-0.013	-0.014	0.1706	
1440 minute winter	S22	5.006	S23	4.2	0.710	0.059	0.8264	
1440 minute winter	S23	5.007	S24	8.8	0.824	0.060	0.9053	
1440 minute winter	S24	1.018	HW1	27.5	1.027	0.133	4.0997	
1440 minute winter	HW1	Flow through pond	HW2	129.9	0.012	0.003	830.8290	
1440 minute winter	HW2	1.020	S25	0.6	0.091	0.003	1.8926	
1440 minute winter	S25	1.021	S26	0.3	0.089	0.003	1.1030	
1440 minute winter	S26	1.022	Dummy	0.0	0.000	0.000	0.5515	0.0
1440 minute winter	S26	Orifice	HW2	0.0				0.0