KAPLAN PROPERTY GROUP

LAND OFF FLEET ROAD, HOLBEACH,

PHASE 2

SPALDING, LINCOLNSHIRE

PE12 8NZ

DRAINAGE STRATEGY

DECEMBER 2022

FW2114_DS_001 V4

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
v1	First Issue.	MC	OP	JD	23.02.2022
v2	Second Issue. Report revised to suit the updated site layout dated 17/05/22. Existing ditch easement shown on the engineering drawings.	MC	OP		18.05.2022
v3	Third Issue. Report revised to suit LCC comments dated 25/10.	MC	OP	JD	02.11.2022
v4	Fourth Issue. Report revised to suit the latest site layout dated 02/12/2022	PU	OP	JD	06.12.2022

CONTENTS

1.0 INTRODUCTION 1
1.1 BRIEF 1
2.0 SITE DETAILS 2
2.1 SITE LOCATION 2
2.2 SITE DESCRIPTION 2
2.3 TOPOGRAPHY 2
2.4 HYDROLOGICAL CONTEXT 2
2.5 GEOLOGICAL CONTEXT 3
2.6 EXISTING DRAINAGE 3
3.0 DEVELOPMENT PROPOSALS 4
3.1 PROPOSED DEVELOPMENT OVERVIEW 4
4.0 PROPOSED SURFACE WATER DRAINAGE DESIGN STRATEGY 5
4.1 SURFACE WATER DRAINAGE DESIGN 5
4.1 ATTENUATION PROPOSALS 7
5.0 FOUL WATER DRAINAGE STRATEGY 8
5.1 FOUL WATER DRAINAGE DESIGN 8
6.0 WATER QUALITY 9
6.1 WATER TREATMENT 9
7.0 DRAINAGE MAINTENANCE 10
7.1 DRAINAGE MAINTENANCE SCHEDULE 10
8.0 CONCLUSIONS & RECOMMENDATIONS 11
8.1 CONCLUSIONS 11

APPENDICES

Appendix A – Site Location Plan

Appendix B – Development Proposals

Appendix C – Topographical Survey

Appendix D – Ground Investigation

Appendix E – Anglian Water Developer Enquiry & Sewer Map

Appendix F – Existing Greenfield Runoff Calculations

Appendix G – Proposed Drainage Strategy & Engineering Layout

Appendix H – Storm Water Hydraulic Calculations

Appendix I – Drainage Maintenance Schedule

Appendix J – Storm Water Hydraulic Calculations With Surcharged Outfall

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 West by Phase 1 development, To the South and East the site is bound by agricultural lands.

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 1.680 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.

2.3 TOPOGRAPHY

2.3.1 The ground levels on the site are recorded to OS datum as between 3.20 to 2.74mAOD. 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 runs parallel with the eastern boundary and discharges into the IDB Ditch.

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 been undertaken for the Phase 1 development 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 for Phase 1 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 within the development.

2.6.5 The site is undeveloped and drains via greenfield runoff overland flow into the ditch to the southern boundary of 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 25 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 for Phase 1 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 1.680ha and it is proposed that 22% 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 0.365ha 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 1.680 hectares is:

- Q100+40%cc = 2.0l/s to existing IDB regulated ditch (South), through a riparian owner

4.1.9 By controlling the discharge rate from the site for a 1in100 year + 40% storm event to 2.0 l/s the site is potentially offering a betterment, versus Qbar run-off rate of 2.44l/s, to the downstream network by utilising on site flood storage.

4.1.10 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.

4.1.11 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.

4.1.12 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 0.401ha.

4.1.13 It is proposed to discharge into the existing IDB watercourse to the southern boundary. The discharge rate will be restricted to 2.0 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).

4.1.14 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.

4.1.15 Drainage will be conveyed through a series of underdrained 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.

4.1.16 The Drainage Strategy for the application site can be found within Appendix G along with a copy of the proposed external levels.

4.1.17 A copy of the hydraulic modelling for the surface water network can be found within Appendix H.

4.1.18 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.

4.1.19 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
- Sewerage Sector Guidance

4.1.20 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 Phase 1 system, which is pending adoption.

5.1.2 All foul drainage will be vented in accordance Building Regulations Part H.

5.1.3 A developer enquiry has been submitted to Anglian Water and can be found within Appendix E. The existing Anglian Water apparatus can accommodate the additional foul flows.

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 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 2.0l/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

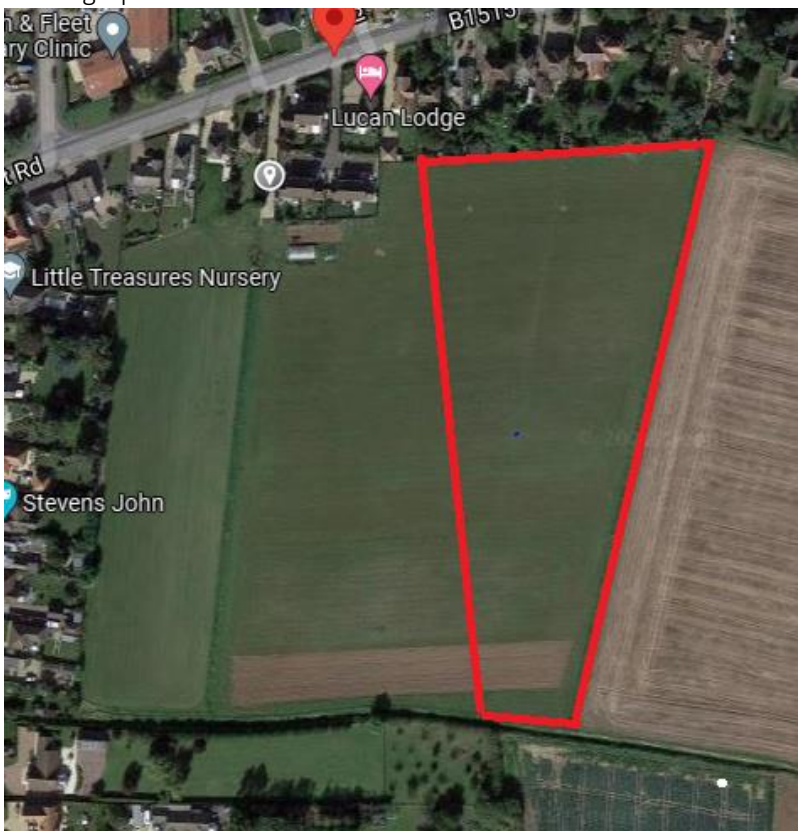
Farrow Walsh Consulting Limited

SITE LOCATION PLAN

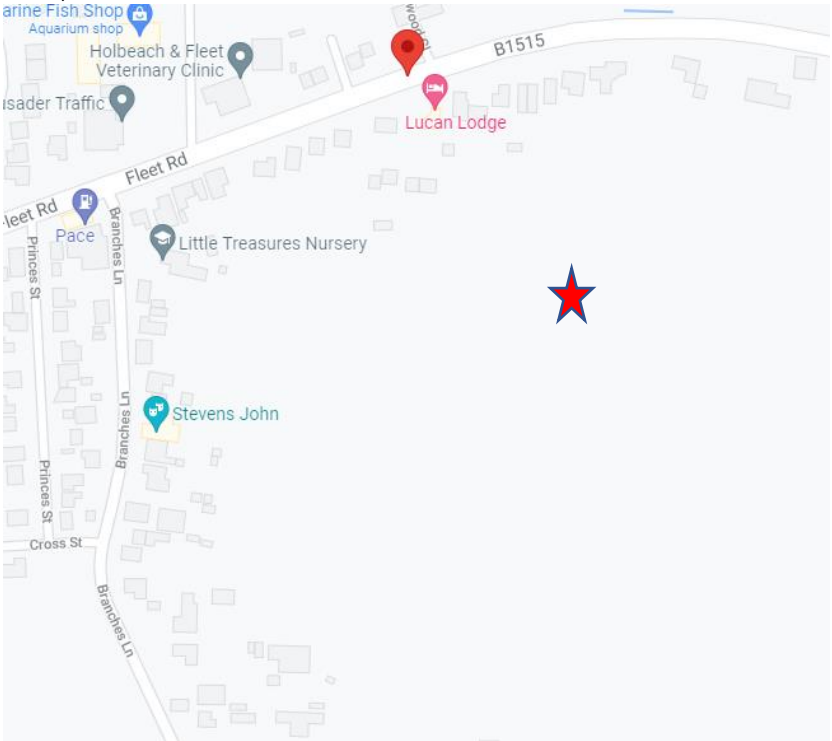
FW2114 Fleet Road, Holbeach Phase 2, PE12 8NZ

X 537397 Y 324839

Site Location – Aerial Photograph



Site Location – Road Map



APPENDIX B – DEVELOPMENT PROPOSALS



Proposed Site Plan 0 5m 10m 15m 20m 25m 1:500

Printed or electronic copies of this drawing can be scaled for planning purposes only. Any discrepancies with this drawing to be reported and clarified prior to commencing work on site, if in doubt - Ask.
Corporate Architecture Ltd accept no responsibility for works not undertaken fully in accordance with this drawing and relevant specifications.
Copyright © Corporate Architecture Limited

North point:

NORTH

Notes:

Phase 2 - Schedule of Accommodation
25 no. Units -

2 no. x 1 bed 2 person house - 54.3m²
10 no. x 2 bed 4 person house - 69.3m²
12 no. x 3 bed 5 person house - 84.6m²
1 no. x 3 bed 5 person house - 87.6m²

Site Area = 11,002m² (2.719 acres).

Overall POS requirement:
Under Policy HS11 at 14%

Development Phase One -

Development Phase Two -

Filter Drain -

Revision Log:

P11	Position of plots revised and highway amended accordingly.	JAE	Nov 22
P10	Scheme updated following client feedback	JAE	Nov 22
P9	Northern boundary fencing clarified	JAE	Oct 22
P8	Minor revisions made for planning	JAE	Sept 22
P7	Filter drain extended. Private drives removed from scheme, Plot 25 relocated away from boundary.	JAE	Sept 22
P6	Filter drain relocated. Landscaping & boundary treatments amended	cd	Aug 22
P5	Levels added to drawing	JAE	July 22
P4	Plot 9 & 10 updated	JAE	May 22
P3	Access Strip added to eastern boundary	JAE	Apr 22
P2	Landscaping added for planning Issue	JAE	Mar 22
P1	FFL's added to drawing	JAE	Mar 22

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	Feb 22	A1

Drawing Title:
Phase 2 - Proposed Site Plan

Drawing Status:
PLANNING ISSUE

Drawing Number:	Revision Number:
5366/KP/22/003	P11

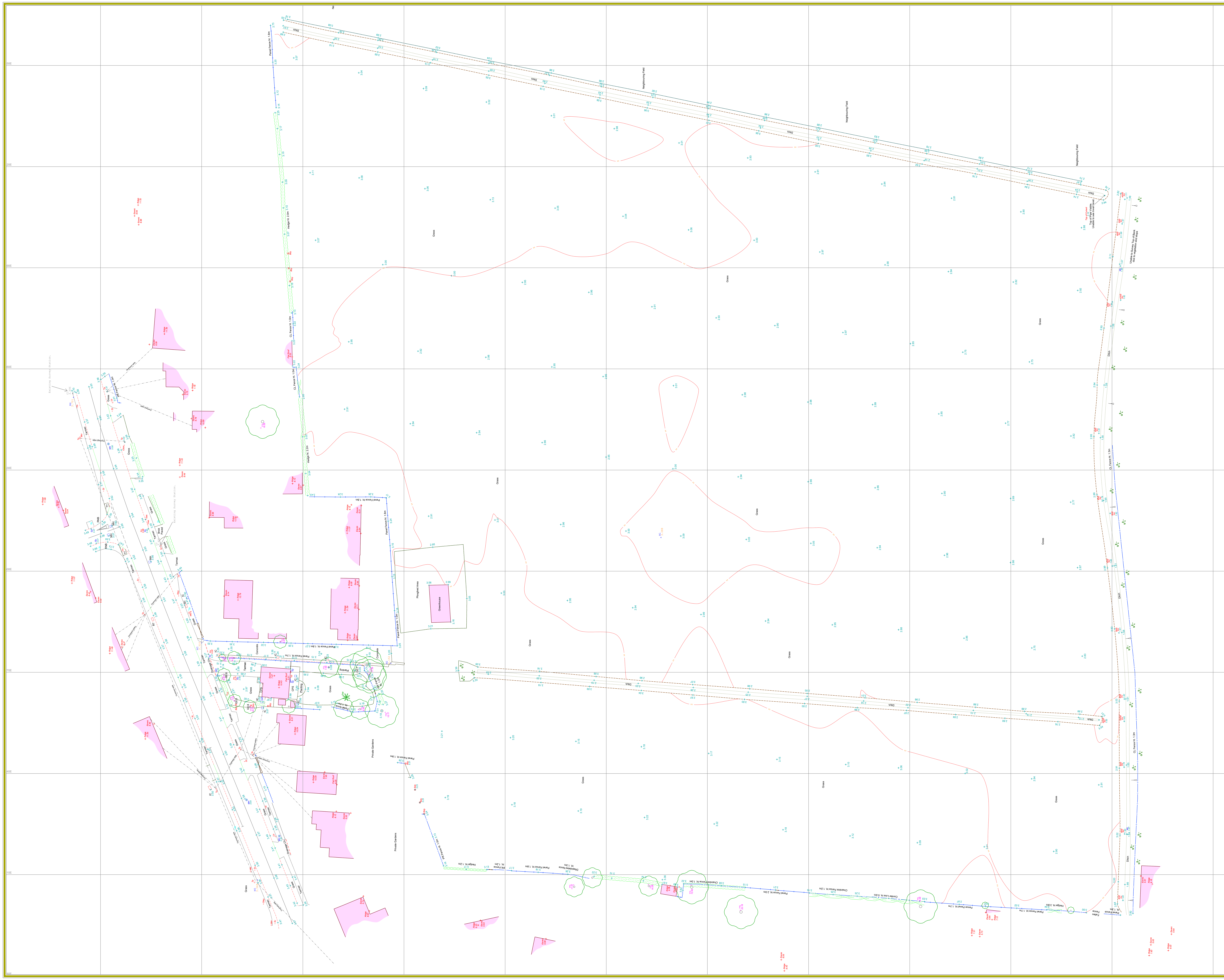
..\Drawing Sheet Images\CA\logo_RGB_Mark_Cropped.jpg

CORPORATE ARCHITECTURE LIMITED
CHARTERED ARCHITECTS

HEAD OFFICE
Venari House, 1 Trimbush Way,
Market Harborough,
Leicestershire, LE16 7XY
Tel: 01858 467476

office@corporatearchitecture.co.uk
www.corporatearchitecture.co.uk

APPENDIX C – TOPOGRAPHICAL SURVEY



Key:

Av	Air valve	G:	Girth circumference	Sv	Stop valve
Bg	Back gully	Gy	Gully	TCB	Telephone call box
BH	Borehole	Ht.	Height	TTL:	Tree top level
BM	Benchmark	IC	Inspection cover	THL	Threshold level
Boll	Bollard	IFL	Internal floor level	TCB	Telephone call box
Bs	Bus stop	IL	Invert level	TL	Traffic light
BT	British Telecom	Lb	Letter box	THL	Threshold level
Bg	Back Gully	Lp	Lamp Post	Tp	Telegraph post
CL	Cover Level	MG	Multigirth	Ts	Traffic signal
CBX	Control box	MH	Manhole	TT	Tactile paving
CPS	Concrete paving slab	Mkr	Marker post	Twl:	Top of wall level
CTV	Cable TV cover	NVP	No visible pipes	UTL	Unable to lift
Elc	Electric cover	PInv	Pipe invert	WL	Water level
Ep	Electricity post	Pb	Post box	Wm	Water meter
Er	Earth rod	Re	Rodding eye	Wo	Wash out
Fh	Fire hydrant	Sp	Sign post		
Fs	Flagstaff	St	Stop tap		

Road
Drop Kerb
Verge Tarmac
Verge Concrete
Verge Grass
Verge
Tops
Bottoms

Ordnance Survey information is provided for a guide only.
OS BUILDING OUTLINE
OS DETAIL

Station	Easting (m)	Northing (m)	Level (m)
M1	537309.986	324793.773	3.088
M2	537272.662	324873.884	3.152
M3	537278.729	324930.024	3.310
M4	537351.556	324968.013	3.701
M5	537208.407	324913.454	3.568

REV	DATE	DESCRIPTION OF WORK	SURVEYOR	CHECKED BY

MAPMATIC
MEASURED SURVEYS

SETTING OUT ■ UTILITY SURVEYS ■ CAMERA SURVEYS ■ FLOOD RISK ASSESSMENT
AERIAL PHOTOGRAPHY ■ EARTHWORK CALCULATIONS ■ MEASURED BUILDING SURVEYS ■ TOPOGRAPHICAL SURVEYS

Mapmatic, Suite 1, Woburn House, South Street, Vernon Gate, Derby, DE1 1UL
Tel: 01332 650 580 www.mapmatic.com Email: info@mapmatic.com

CLIENT
Kaplan Property Group

PROJECT
Site off Fleet Road
Holbeach
PE12 8LA

TITLE
Topographical Survey

Scale	1: 500@A1	Date	26.02.2020
Drawn	JT	Checked	MC
Level datum	GNSS	Grid orientation	GNSS
Job number	3512	Revision	0
Drawing no.	0001	Sheet	1 of 1

Notes:

All critical measurements should be checked on site prior to design. No liability will be taken for this plan if passed onto 3rd parties. Trees and other survey data may be omitted due to dense vegetation. Some services may have been omitted due to parked vehicles and vegetation. Please note the drainage information has been ascertained by visual inspection from the surface and therefore values are estimated.

This survey has been orientated to the Ordnance Survey (OS) national grid via a Global Navigation Satellite System (GNSS) and the OS Active Network (OS NET). A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true OS bearing for angle orientation. No scale factor has been applied to the survey therefore the coordinates shown are arbitrary and not true OS coordinates.
Please refer to the survey station table to enable establishment of the on-site grid.

RICS ICES

Copyright Mapmatic. 07.03.2016

APPENDIX D – GROUND INVESTIGATION

GROUND ENGINEERING LIMITED

Newark Road
Peterborough
PE1 5UA
Tel: 01733 566566
e: admin@groundengineering.co.uk

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

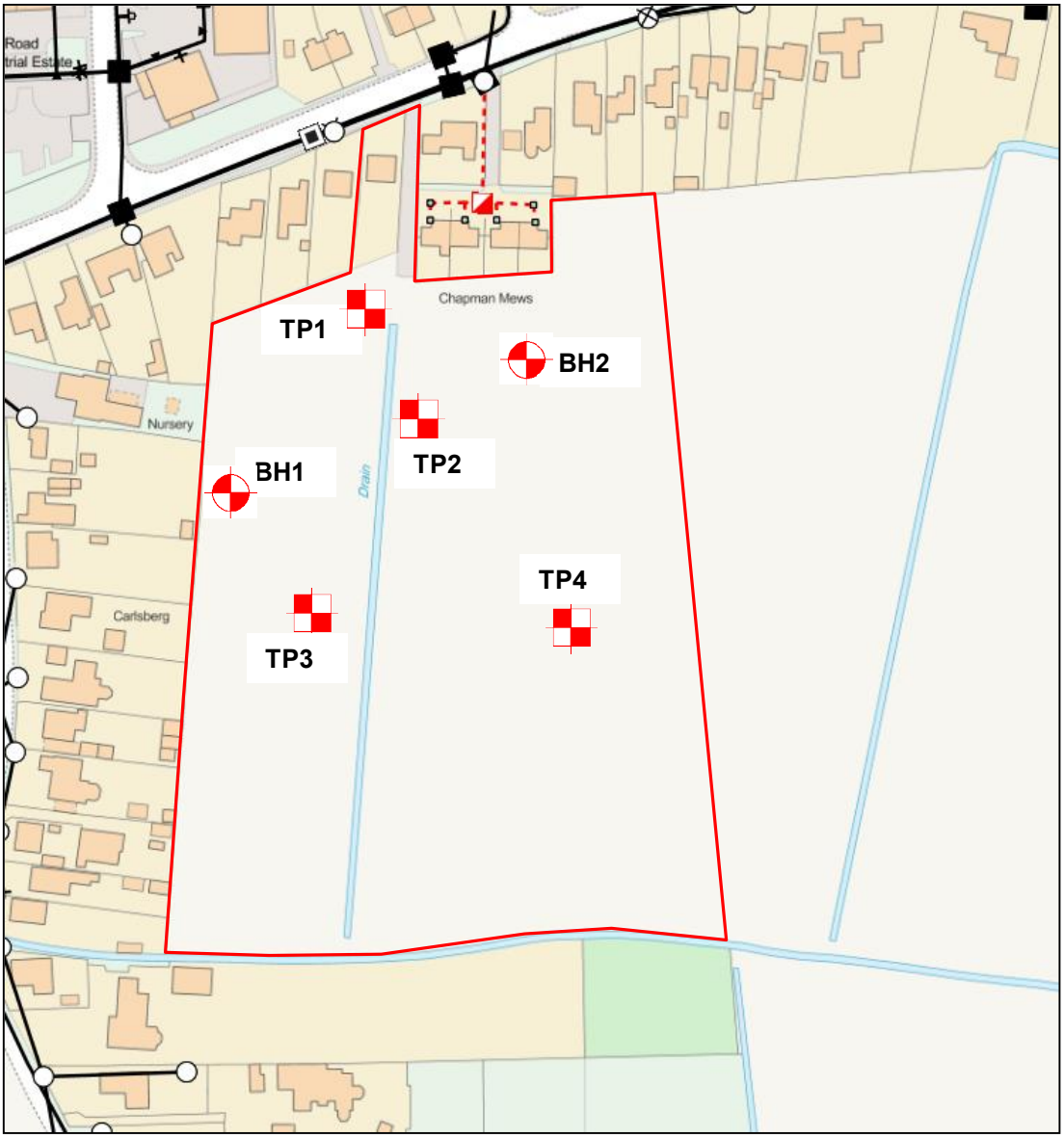
The soakaway test in the northern part of the site (TP1) gave soil infiltration rates (f) between 2.54×10^{-5}m/s and 4.12×10^{-5}m/s within the sandy, silty clay Tidal Flat Deposits. These results rate the ground as having a ógoodô drainage potential according to Figure 6 of BS8004:1986.

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.
All rights reserved. Licence number AL100005523



Not To Scale

Project : Fleet Road, Holbeach, Lincolnshire. **Client : Kaplan Property Limited**	**GROUND ENGINEERING LIMITED** Peterborough Tel : 01733 566566	**Project No.** **C15102A**

GROUND ENGINEERING
L I M I T E D
Tel: 01733-566566
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) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
0.10	D1				MADE GROUND - Firm, brown, slightly gravelly, sandy, silty CLAY. Gravel is sub-angular to rounded flint and ash.		0.20	
0.20-0.60	B1				Firm, light brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.75	
0.75	D2				Loose, light brown, orange brown and light grey, clayey, very silty fine SAND.			
0.80-1.20	B2							
1.20-1.70	B3							
1.35-1.65	S	N6	1.20 ▼s					
1.65	D3							
2.20-2.70	B4				...Becoming slightly clayey below 2.20m depth.			
2.35-2.65	S	N6	1.60					
2.65	D4							
3.20-3.70	B5				(MARINE SAND)			
3.20	W1		3.10 ▼1					
3.35-3.65	S	N7	▼c					
3.65	D5							
4.20-4.70	B6							
4.35-4.65	S	N8	4.20					
4.65	D6						5.00	
5.10-5.60	B7				Medium dense, locally loose, brown, silty fine SAND with rare shell fragments.			
5.25-5.55	S	N10	5.10					
5.55	D7							
6.60-7.10	B8			BENEATH INSTALLATION				
6.75-7.05	S	N9	6.60	BENEATH INSTALLATION				
7.05	D8			BENEATH INSTALLATION				
				BENEATH INSTALLATION	(MARINE SAND)			
8.10-8.60	B9			BENEATH INSTALLATION				
8.25-8.55	S	N12	8.10	BENEATH INSTALLATION				
8.55	D9			BENEATH INSTALLATION				
				BENEATH INSTALLATION				
9.60-10.10	B10			BENEATH INSTALLATION				
9.75-10.05	S	N13	9.60	BENEATH			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
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
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed
1	3.30	3.30	very slow	3.10	not

Groundwater Observations

Date	Depth m Hole	Casing	Water
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 LIMITED

Tel: 01733-566566
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) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
10.05	D10			BENEATH INSTALLATION	Medium dense, grey brown, silty fine SAND with rare shell fragments.		10.00	
11.10-11.60	B11			BENEATH INSTALLATION				
11.25-11.55	S	N15	11.10	BENEATH INSTALLATION				
11.55	D11			BENEATH INSTALLATION				
12.60-13.10	B12			BENEATH INSTALLATION				
12.75-13.05	S	N18	12.60	BENEATH INSTALLATION	(MARINE SAND)			
13.05	D12			BENEATH INSTALLATION				
13.50-14.00	B13			BENEATH INSTALLATION				
13.65-13.95	S	N21	13.50	BENEATH INSTALLATION				
13.95	D13			BENEATH INSTALLATION				
14.50-15.00	B14			BENEATH INSTALLATION				
14.65-14.95	S	N26	14.50	BENEATH INSTALLATION				
14.95	D14			BENEATH INSTALLATION			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
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes						Groundwater Observations			
	Depth m						Depth m		
No	Struck	Rose to	Rate	Cased	Sealed	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

* C denotes test using a solid cone
S denotes test using a split barrel sampler

Results of Standard/Cone Penetration Tests 15102A

LAND OFF FLEET ROAD, HOLBEACH

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) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
0.10	D1				MADE GROUND - Firm, brown, slightly gravelly, sandy, silty CLAY. Gravel is sub-angular and sub-rounded flint.		0.25	
0.25	D2				Firm, light brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		0.70	
0.30-0.70	B1							
0.70-1.20	B2				Loose, light brown and brown, clayey, very sandy SILT. (MARINE SAND)		1.20	
1.20-1.70	B3							
1.35-1.65	S	N6	1.20 ▼s ▼c ▼w		Loose, light brown, slightly clayey, very silty fine SAND.			
1.65	D3							
2.20-2.70	B4							
2.35-2.65	S	N5	1.60					
2.65	D4				(MARINE SAND)			
2.80	W1							
3.20-3.70	B5							
3.35-3.65	S	N6	3.10 ▼1					
3.65	D5							
4.20-4.70	B6							
4.35-4.65	S	N7	4.20					
4.65	D6						5.00	
5.20-5.70	B7				Medium dense, locally loose, brown, silty fine SAND with rare shell fragments.			
5.35-5.65	S	N11	5.20					
5.65	D7							
6.70-7.20	B8			BENEATH INSTALLATION				
6.85-7.15	S	N8	6.70	BENEATH INSTALLATION				
7.15	D8			BENEATH INSTALLATION	(MARINE SAND)			
8.20-8.70	B9			BENEATH INSTALLATION				
8.35-8.65	S	N12	8.20	BENEATH INSTALLATION				
8.65	D9			BENEATH INSTALLATION				
9.70-10.20	B10			BENEATH INSTALLATION				
9.85-10.15	S	N13	9.70	BENEATH			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
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
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Depth m Struck	Rose to	Rate	Cased	Sealed
1	3.50	3.50	very slow	3.20	not

Groundwater Observations

Date	Depth m Hole	Casing	Water
04/11/20	13.20	13.20	0.80
05/11/20	13.20	13.20	2.80
05/11/20	15.00	15.00	1.30
05/11/20	15.00	0.00	1.50
13/11/20	6.00	1.00	1.30

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) Casing	Inst.	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Blows						
10.15	D10			BENEATH INSTALLATION	Medium dense, grey brown, silty fine SAND with rare shell fragments.		10.00	
11.20-11.70	B11			BENEATH INSTALLATION				
11.35-11.65	S	N17	11.20	BENEATH INSTALLATION				
11.65	D11			BENEATH INSTALLATION				
12.70-13.20	B12			BENEATH INSTALLATION				
12.85-13.15	S	N22	12.70	BENEATH INSTALLATION	(MARINE SAND)			
13.15	D12			BENEATH INSTALLATION				
13.50-14.00	B13			BENEATH INSTALLATION				
13.65-13.95	S	N25	13.50	BENEATH INSTALLATION				
13.95	D13			BENEATH INSTALLATION				
14.50-15.00	B14			BENEATH INSTALLATION				
14.65-14.95	S	N28	14.50	BENEATH INSTALLATION				
14.95	D14				Borehole completed at 15.00m depth		15.00	

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
▼c Level on completion
c▼w Level casing withdrawn
▼s Standpipe Level

Groundwater Strikes

No	Struck	Rose to	Depth m Rate	Cased	Sealed

Groundwater Observations

Date	Depth m Hole	Casing	Water
20/11/20	6.00	1.00	1.25
27/11/20	6.00	1.00	1.25

GROUND ENGINEERING LIMITED
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	O.D. Level m
Depth m	Type	Result					
0.10 0.10	D1 ES1			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	
0.30 0.30	D2 ES2			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.		0.75	
0.65 0.65	D3 ES3			Firm, brown and orange brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)		1.00	
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
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test 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

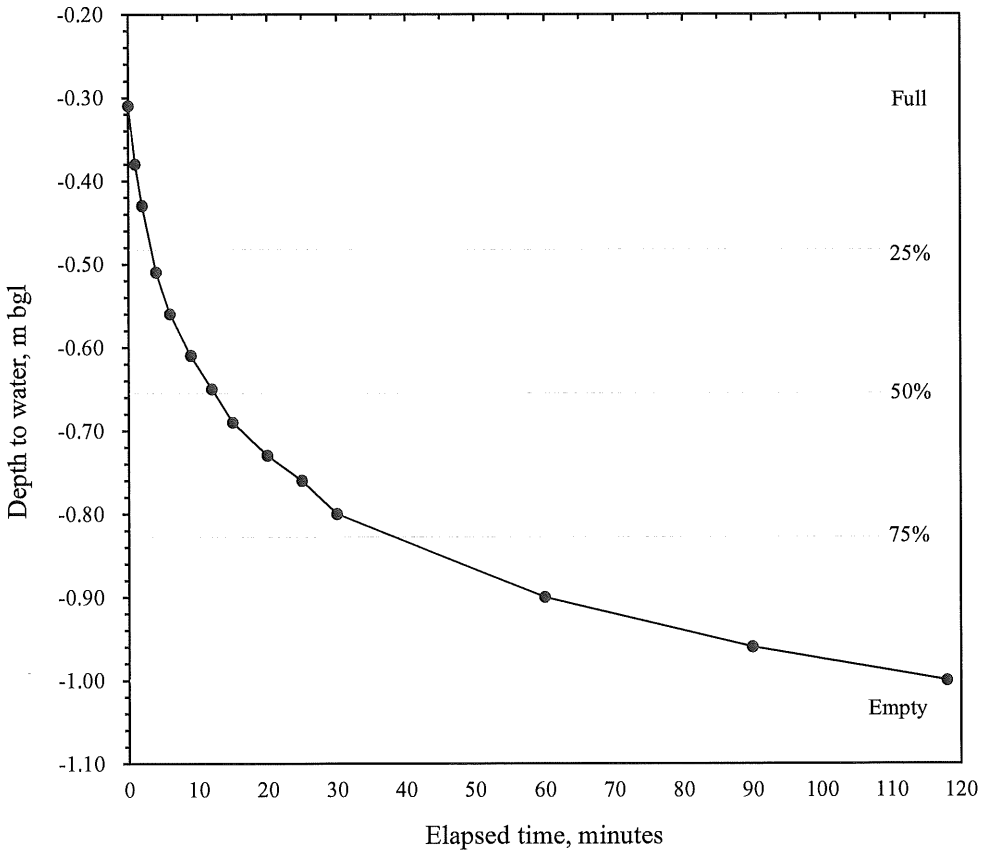
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

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

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

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

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

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

V75-V25 = 0.10
A50 = 1.20
T75-T25 = 35

Soil Infiltration Rate **f = 4.12E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Fleet Road, Holbeach

Project No:C15102A
Sheet No: 2/3

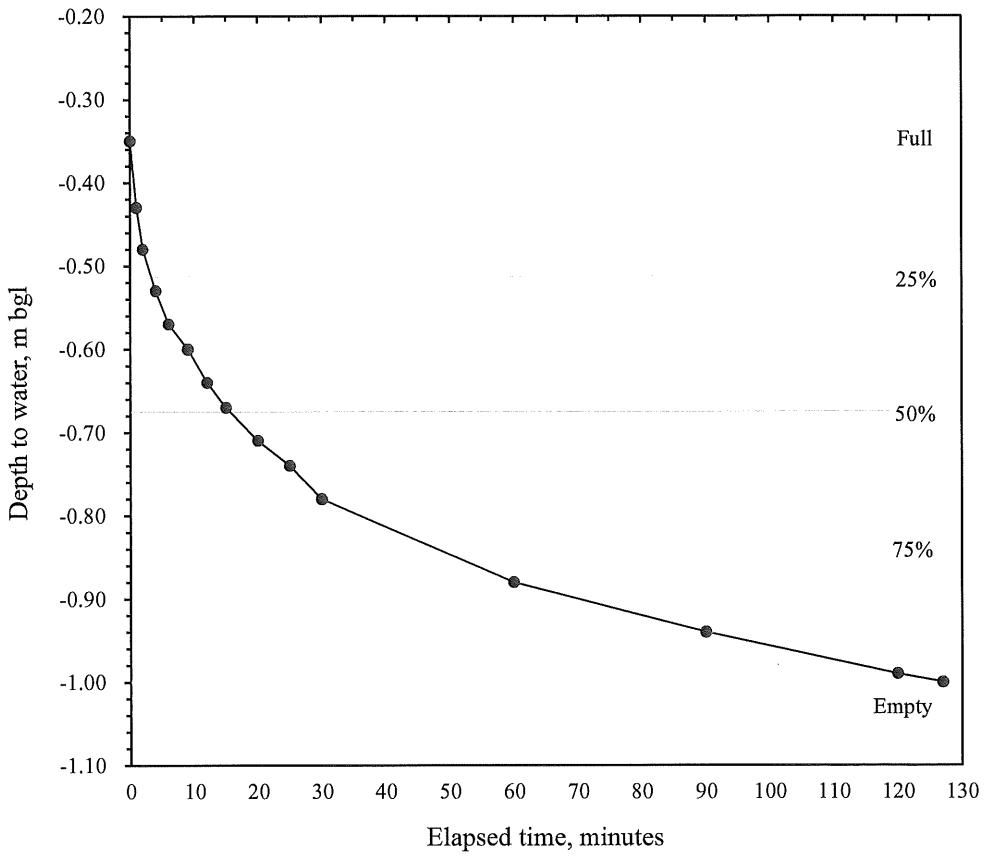
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

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

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

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

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

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

V75-V25 = 0.10
A50 = 1.15
T75-T25 = 44

Soil Infiltration Rate **f = 3.23E-05 m/s**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Fleet Road, Holbeach

Project No:C15102A
Sheet No: 3/3

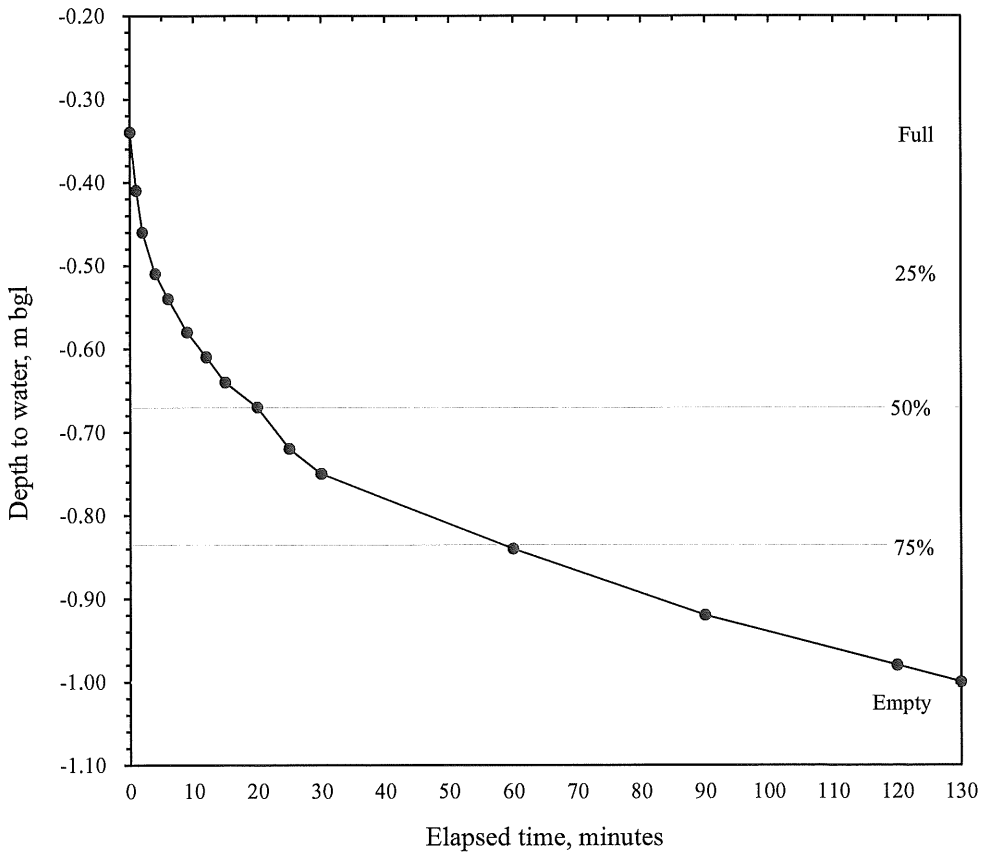
Trial Pit: TP1
Depth: 1.00
Length: 1.00
Width: 0.30

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

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

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

DEPTH TO WATER vs ELAPSED TIME



All dimensions given in metres

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

V75-V25 = 0.10
A50 = 1.16
T75-T25 = 56

Soil Infiltration Rate **f = 2.54E-05 m/s**

GROUND ENGINEERING LIMITED
Tel: 01733-566566
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.			
0.05	ES1						
0.10	V1	(120)					
						0.40	
0.50-0.70	B1			Stiff, brown, slightly sandy, silty CLAY. (TIDAL FLAT DEPOSIT)			
0.50	D2						
0.50	V2	(120)					
0.50-0.72	MP1	100				0.70	
0.70-0.80	B2			Medium dense, brown, very silty fine SAND. (MARINE SAND)			
0.80	D3						
0.90-1.15	MP2	100					
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
- ▽ Water Strike
- ▼ 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
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	Depth m	O.D. Level m
Depth m	Type	Result					
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					0.40	
0.45	D2			Stiff, brown and orange brown, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)			
0.50-0.70	B1						
0.50	V2	(84)					
0.60-0.77	MP1	100				0.70	
0.70	D3			Firm, brown, light brown and light grey, sandy, silty CLAY. (TIDAL FLAT DEPOSIT)			
0.85	V3	(56)					
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
- ▽ Water Strike
- ▼ 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

Date: 09/11/20

Pit Size: 0.37m 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					
0.10	D1			MADE GROUND - Stiff, dark brown, slightly gravelly, sandy, silty CLAY. Gravel is angular to rounded flint and quartzite.			
0.10	ES1						
0.10	V1	(80)					
						0.40	
0.50-0.80	B1			Stiff, brown, orange brown and light grey, sandy, silty CLAY.			
0.60	D2			(TIDAL FLAT DEPOSIT)			
						0.85	
1.00	D3			Medium dense, brown and light brown, silty SAND. (MARINE SAND)		1.00	
1.00-1.30	MP1	90		Pit completed at 1.00m depth			

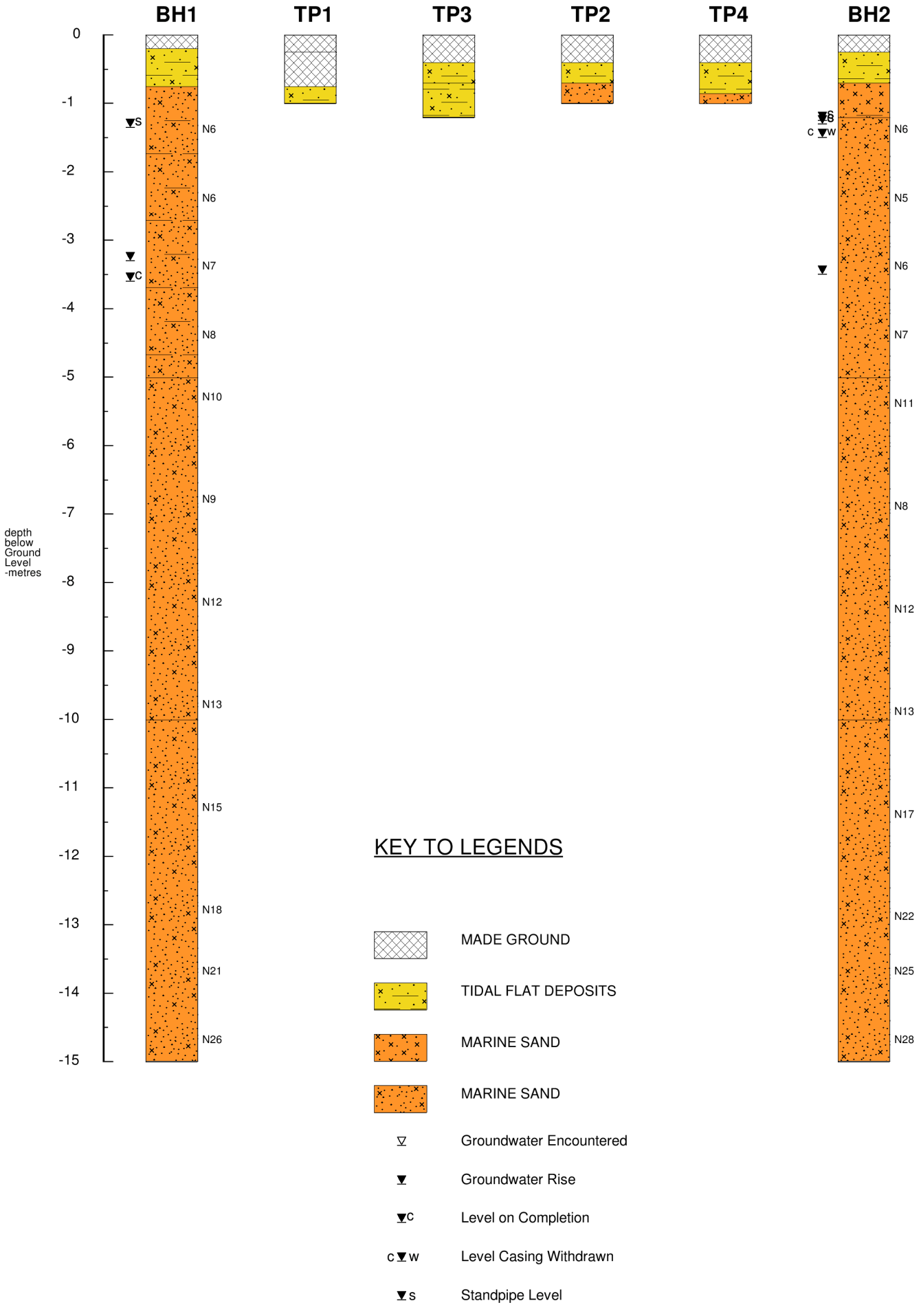
KEY
- D - Disturbed Sample
- B - Bulk Sample
- U - Undisturbed Sample
- R - Root Sample
- W - Water Sample
- ES - Environmental Sample
- ▽ Water Strike
- ▼ Water Rise
- ▼c Level on completion
- MP - Mackintosh Probe
- P( ) - Hand Penetrometer Cohesion ( ) kPa
- V - Vane Shear Test Cohesion ( ) kPa

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

Fleet Road, Holbeach

InFlow Reference: PPE-0140383

Assessment Type: Used Water

Report published: 11/02/2022

Thank you for submitting a pre-planning enquiry.

This has been produced for Farrow Walsh .

Your reference number is **PPE-0140383**.

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 **07929 786 955** 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	25

The anticipated residential build rate is:

Year	Y1
Build rate	25

Development type: Greenfield

Planning application status: Unknown

Site grid reference number: TF3739824786

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 there are no public water mains/public sewers or other assets owned by Anglian Water within the boundary of your development site. However, 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.

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 TF3727124928. 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 than 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:	**£ 573.00**

The Water Recyling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 573.00	25	£ 14325

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

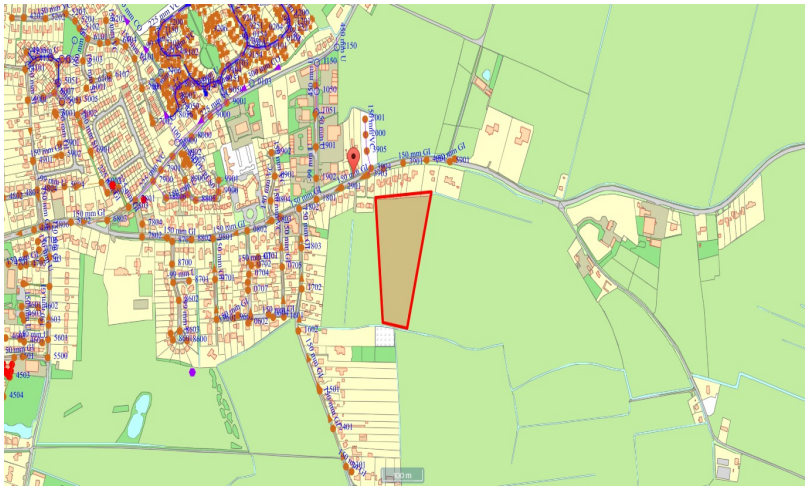


Figure 1:Showing your used water point of connection

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).

APPENDIX F – EXISTING GREENFIELD RUNOFF CALCULATIONS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Olga Prisacaru
Site name:	Holbeach Phase 2
Site location:	Holbeach

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:	52.80208° N
Longitude:	0.02722° E
Reference:	2247579917
Date:	Feb 10 2022 15:35

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 1.68

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):	576	576
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.

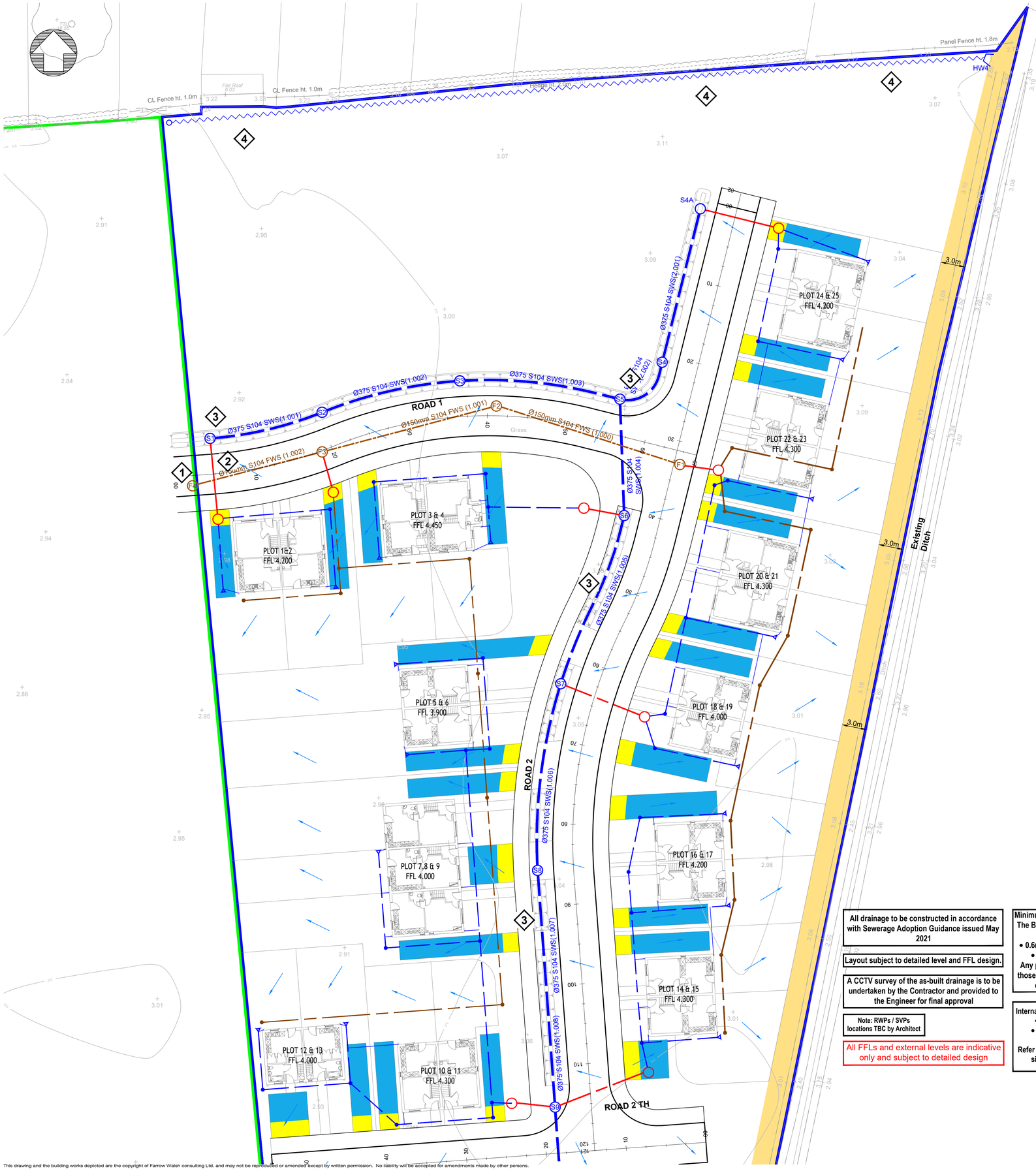
(3) Is SPR/SPRHOST ≤ 0.3?

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):	2.44	2.44
1 in 1 year (l/s):	2.12	2.12
1 in 30 years (l/s):	5.97	5.97
1 in 100 year (l/s):	8.68	8.68
1 in 200 years (l/s):	10.26	10.26

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



NOTES

1. **Foul Water Outfall**
New manhole constructed on line of existing sewer subject to S106 application and consent by Anglian Water.

2. **Mesh Screening**
Mesh screen to be placed over the outlet pipe of chamber F1 during site construction works and removed immediately prior to the first occupancy of the dwellings served by the sewers.

3. **Underdrained Swale**
Underdrained swale adjacent to Highway to be adopted by LCC and AW

4. **Northern Boundary Filter Drain**
Proposed filter drain to discharge into the IDB ditch via an high level overflow

General Notes

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. 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.
4. 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.
5. 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.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. 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.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British A15s.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. 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.

LEGEND

- Development Boundary
- Phase 2 Site Ownership Boundary
- Existing ditch and existing IDB maintained Watercourse easement - 3.0m wide. Permit required for works within easement
- Self infiltrating Permeable Paving with min. 225mm Type 3 voided stone below
- Permeable Paving with Impermeable Membrane liner within 2.0m of highway boundary
- 450mm dia. IC Max Depth 3.0m
- 1200/1500mm dia. PCC
- 1200mm dia. PCC (Laterals)
- Rodding eye (storm only)
- Surface Water
- Phase 1 drainage
- Foul Water
- Road Gully
- Denotes under drained swale to be offered for adoption to LCC / Anglian water
- Surface Water Flow Exceedence Routing
- S104 Easements

Rev	Description of updates	Drawn	Check'd	App'd	Date
A6	Drawing updated to suit the latest site layout dated 02/12/2022	PU	OP	JD	06.12.22
A5	Drawing updated to suit LCC comments dated 25/10/22	MC	OP	JD	02.11.22
A4	Drawing updated to suit comments received 03.09.2022	MC	OP	JD	13.09.22
A3	Drawing updated to suit comments received 26.07.2022	MC	OP	JD	28.07.22
A2	Drawing updated to suit latest site layout received 17.05.2022. Existing ditch easement shown	MC	OP		18.05.22
A1	Issued for Approval.	MC	OP	JD	23.02.22

Revision Schedule

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

All drainage to be constructed in accordance with Sewerage Adoption Guidance issued May 2021

Layout subject to detailed level and FFL design.

A CCTV survey of the as-built drainage is to be undertaken by the Contractor and provided to the Engineer for final approval

Note: RWPs / SVPs locations TBC by Architect

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

Minimum pipe cover to soffits to be as per The Building Regulations 2010 Part H for thermoplastic pipes:
- **0.6m in pedestrian or landscaped areas**
- **0.9m in vehicle accessible areas**

Any pipes with cover to soffit less than those stated above are to have a Class Z concrete pipe bed & surround

Internal foul drain pipe minimum gradients:
- **1:80 from SVP & WC to IC**
- **1:40 from Basin & Sink to IC**

Refer to Archiect's/M&E drawings for pipe sizes and setting-out information.

Site Details

16,845m² / 1.68ha : Development area

0m² / 0.0ha : Existing impermeable area

3,647m² / 0.365ha : Proposed impermeable area

4,012m² / 0.401ha : 10% Urban Creep factor (UC)

2.44 l/s : Existing Q_{BAR} storm discharge rate to sewer

2.0 l/s : Proposed Q100+40% CC + 10% UC storm discharge rate to existing watercourse

Development impermeable areas to be drained into the IDB watercourse via swales and an attenuation basin with minimum SUDs treatment to Ciria753, through gravity sewers.

Existing Greenfield Rate

Storm Event	Existing Max. Discharge Rate
1 in 1 year	0.87 l/s
1 in 30 year	2.45 l/s
1 in 100 year	3.56 l/s

FOR APPROVAL

Client: Kaplan Property Group

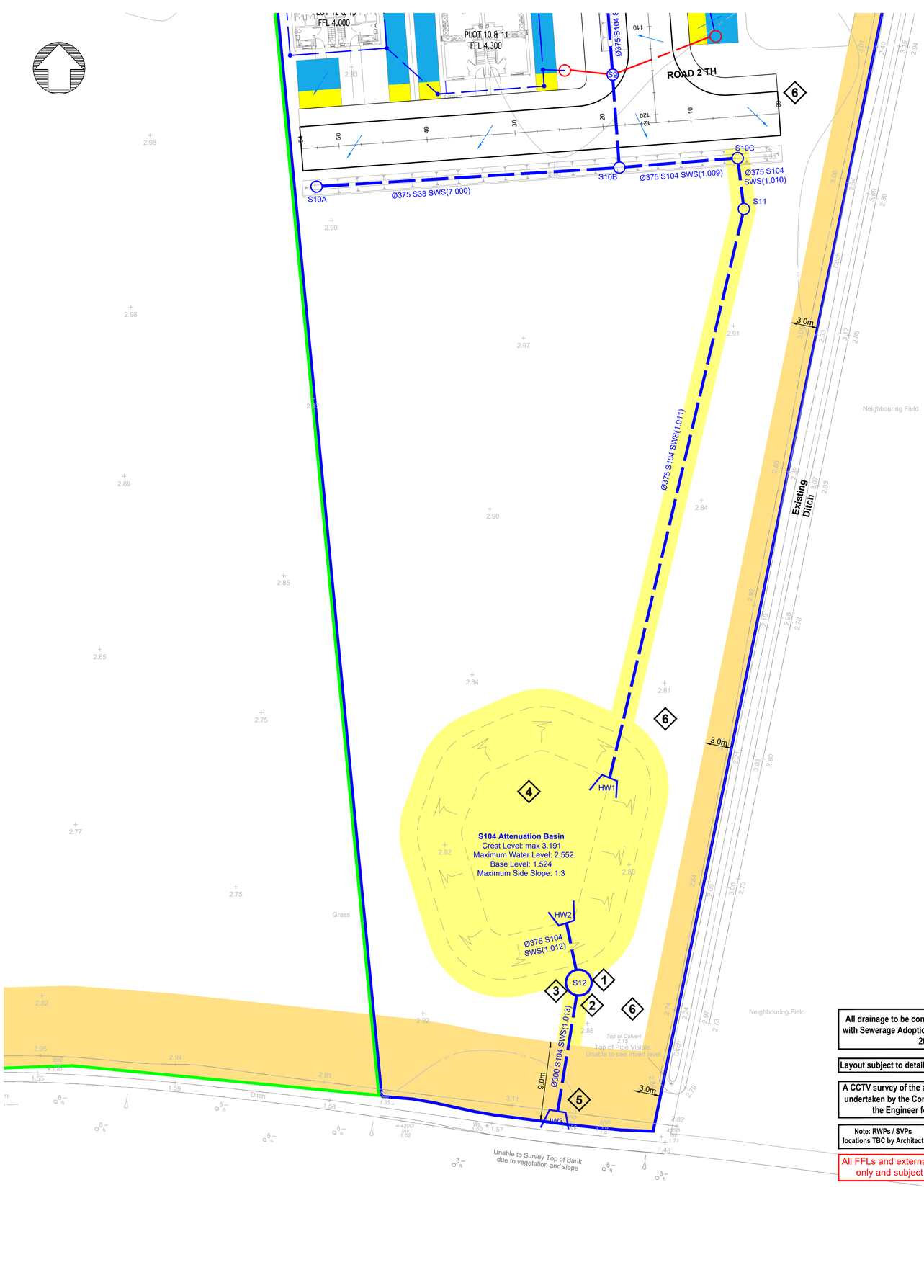
Project: Fleet Road, Holbeach Phase 2

Title: Drainage Strategy, Sheet 1 of 2

Drawn:	Checked:	Approved:	Date:	Scale:
MC	OP	JD	February 2022	1:250 @ A1

Drawing No. **FW2114-D-003-01** Revision: **A6**

This drawing and the building works depicted are the copyright of Farrow Walsh consulting Ltd. and may not be reproduced or amended except by written permission. No liability will be accepted for amendments made by other persons.



NOTES

1 Mesh Screening
Mesh screen to be placed over the outlet pipe of chamber S12 during site construction works and removed immediately prior to the first occupancy of the dwellings served by the sewers.

2 Discharge into IDB maintained watercourse
Discharge into existing watercourse to be max. 2l/s, subject to IDB approval.

3 Flow Control manhole- S12
Flow Control manhole to be constructed with Flow Control Hydrobrake unit limiting flow to 2.0 l/s

4 Attenuation Basin
Attenuation basin to be adopted by Anglian Water. Subject to S104 approval

5 Non-return flap valve
Flap valve fitted to incoming connection to chamber S12 to prevent watercourse flows entering system

6 Northern Boundary Filter Drain
Proposed filter drain to discharge into the dounstream IDB ditch

General Notes

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. 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.
4. 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.
5. 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.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. 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.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British A15s.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. 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.

LEGEND

- Development Boundary
- Phase 2 Site Ownership Boundary
- Existing ditch and existing IDB maintained Watercourse easement - 9.0m/3.0m wide. Permit required for works within easement
- Self infiltrating Permeable Paving with min. 225mm Type 3 voided stone below
- Permeable Paving with Impermeable Membrane liner within 2.0m of highway boundary
- 450mm dia. IC Max Depth 3.0m
- 1500mm dia. PCC
- 1200mm dia. PCC (Laterals)
- Rodding eye (storm only)
- Surface Water
- Phase 1 drainage
- Foul Water
- Road Gully
- Denotes under drained swale to be offered for adoption to LCC / Anglian water
- Surface Water Flow Exceedence Routing
- S104 Easements

Rev	Description of updates	Drawn	Check'd	App'd	Date
A5	Drawing updated to suit the latest site layout dated 02/12/2022	PU	OP	JD	06.12.22
A4	Drawing updated to suit LCC comments dated 25/10/22	MC	OP	JD	02.11.22
A3	Drawing updated to suit comments received 03.09.2022	MC	OP	JD	13.09.22
A2	Drawing updated to suit latest site layout received 17.05.2022. Existing ditch easement shown	MC	OP		18.05.22
A1	Issued for Approval.	MC	OP	JD	23.02.22

Revision Schedule

All drainage to be constructed in accordance with Sewerage Adoption Guidance issued May 2021

Layout subject to detailed level and FFL design.

A CCTV survey of the as-built drainage is to be undertaken by the Contractor and provided to the Engineer for final approval

Note: RWPs / SVPs locations TBC by Architect

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

Minimum pipe cover to soffits to be as per The Building Regulations 2010 Part H for thermoplastic pipes:
- 0.6m in pedestrian or landscaped areas
- 0.9m in vehicle accessible areas

Any pipes with cover to soffit less than those stated above are to have a Class Z concrete pipe bed & surround

Internal foul drain pipe minimum gradients:
- 1:80 from SVP & WC to IC
- 1:40 from Basin & Sink to IC

Refer to Archiect's/M&E drawings for pipe sizes and setting-out information.

Site Details

16,845m² / 1.68ha : Development area

0m² / 0.0ha : Existing impermeable area

3,647m² / 0.365ha : Proposed impermeable area

4,012m² / 0.401ha : 10% Urban Creep factor (UC)

2.44 l/s : Existing Q_{BAR} storm discharge rate to sewer

2.0 l/s : Proposed Q100+40% CC + 10% UC storm discharge rate to existing watercourse

Development impermeable areas to be drained into the IDB watercourse via swales and an attenuation basin with minimum SUDs treatment to Ciria753, through gravity sewers.

Existing Greenfield Rate

Storm Event	Existing Max. Discharge Rate
1 in 1 year	0.87 l/s
1 in 30 year	2.45 l/s
1 in 100 year	3.56 l/s

farrow walsh
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 Phase 2

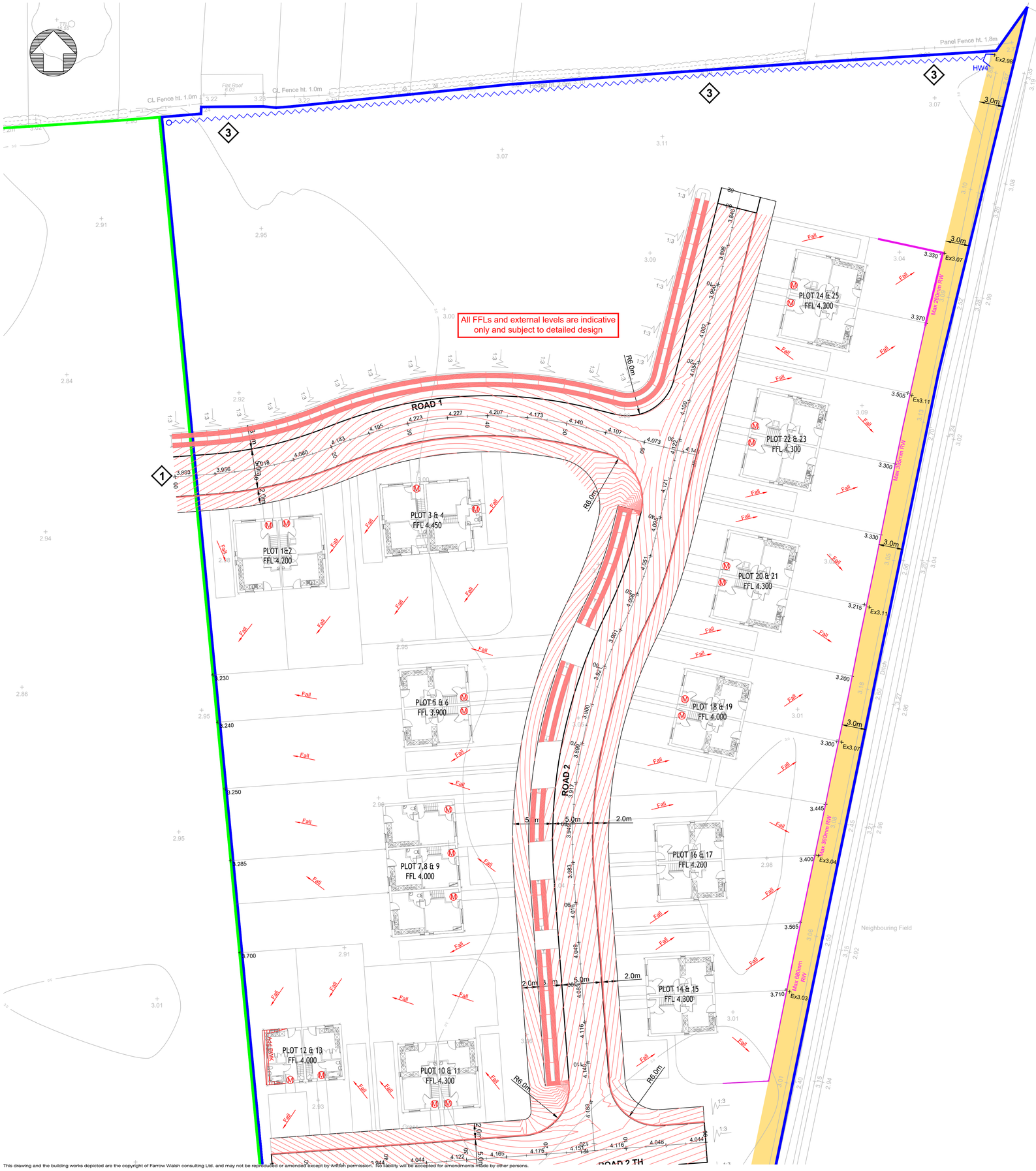
Title: Drainage Strategy, Sheet 2 of 2

Drawn:	Checked:	Approved:	Date:	Scale:
MC	OP	JD	February 2022	1:250 @ A1

Drawing No. FW2114-D-003-02

Revision: A5

This drawing and the building works depicted are the copyright of Farrow Walsh consulting Ltd. and may not be reproduced or amended except by written permission. No liability will be accepted for amendments made by other persons.



LEGEND

- Phase 1 Site Ownership Boundary
- Phase 2 Site Ownership Boundary
- PLOT FFL 59.200 — Proposed Finished Floor Level
- +59.050 — Proposed level
- Fall — Fall Arrow
- SDPC / Max 2 Courses — Raised Secondary DPC to same height as FFL (final extent to be determined by Contractor on site)
- Exposed brickwork below DPC (final extent to be determined by Contractor on site)
- Earthworks Banking (shown where banks are steeper than 1:5)
- Existing ditch and existing IDB maintained Watercourse easement - 9.0m/3.0m wide. Permit required for works within easement
- Filter Drain

1. **Phase 1 Road Levels**
   Constructed Phase 1 road levels TBC prior any construction works
2. **Phase1 - Phase2 Boundary Levels**
   Phase 1 boundary levels to match the proposed Phase 2. Banking to be removed.
3. **Northern Boundary Filter Drain**
   Proposed filter drain to discharge into the IDB ditch via an high level overflow

General Notes

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. 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.
4. 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.
5. 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.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. 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.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British Standards.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. 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.

1. 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.
2. Working areas within the vicinity of existing trees are to be agreed with the engineer and chestnut fencing erected as directed.
3. 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.
4. It is the Contractor's responsibility to trace and indicate the precise location and nature of all services.
5. 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.
6. 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.
7. 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.
8. The Contractor is to take account of the soils report.
9. No completion works will be authorised until a formal certificate of conformance to relevant specification is received from the relevant water authority.
10. Compaction control shall be achieved by air void testing for both roadbase and basecourse (maximum air void ratio 6%).
11. Any recycled material to be used for highway construction purposes will be allowed subject to it satisfying relevant tests as instructed by this authority.
12. 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.
13. All levels and dimensions are to be checked on site before any work commences.
14. 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.
15. Where a driveway falls towards a dwelling it shall be provided with a suitable gully or drainage channel to prevent water damaging the building.

Rev	Description of updates	Drawn	Checked	Appr'd	Date
A6	Drawing updated to suit the latest site layout dated 02/12/2022	PU	OP	JD	06.12.22
A5	Drawing updated to suit LCC comments dated 25/10/22	MC	OP	JD	02.11.22
A4	Northern boundary filter drain revised	MC	OP	JD	13.09.22
A3	Filter drain added to the drawing	MC	OP		14.07.22
A2	Drawing updated to suit latest site layout received 17.05.2022. Existing ditch easement shown	MC	OP		18.05.22
A1	Issued for Approval.	MC	OP	JD	23.02.22

Revision Schedule

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

FOR APPROVAL

Client: Kaplan Property Group

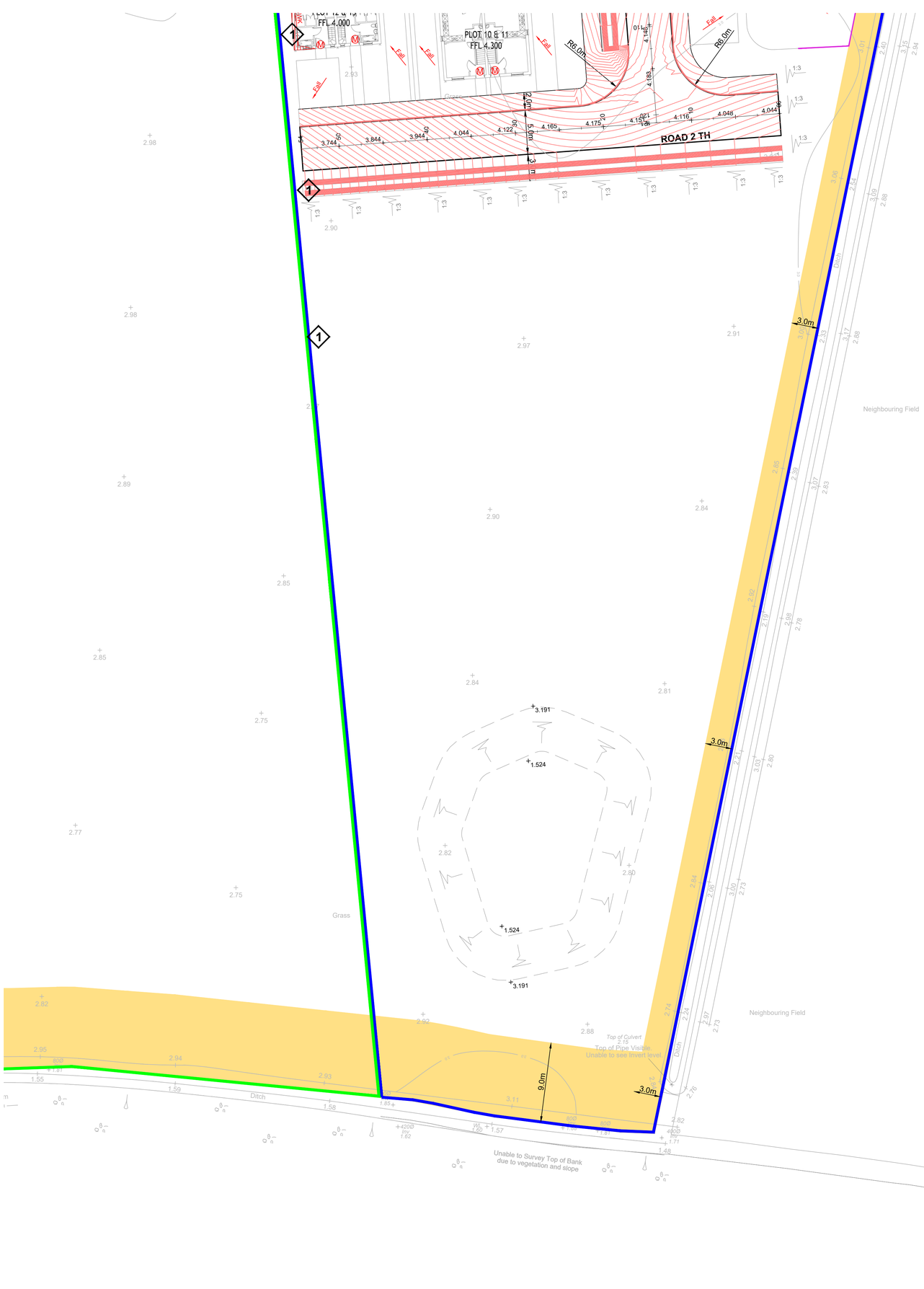
Project: Fleet Road, Holbeach Phase 2

Title: Engineering Layout Sheet 1 of 2

Drawn:	Checked:	Approved:	Date:	Scale:
MC	OP	JD	February 2022	1:250 @ A1

Drawing No. **FW2114-E-001-01** Revision: **A6**

This drawing and the building works depicted are the copyright of Farrow Walsh consulting Ltd. and may not be reproduced or amended except by written permission. No liability will be accepted for amendments made by other persons.



LEGEND

- Phase 1 Site Ownership Boundary
- Phase 2 Site Ownership Boundary
- PLOT FFL 59.200 — Proposed Finished Floor Level
- +59.050 — Proposed level
- Fall — Fall Arrow
- SDPC / Max 2 Courses — Raised Secondary DPC to same height as FFL (final extent to be determined by Contractor on site)
- Exposed brickwork below DPC (height shown, final extent to be determined by Contractor on site)
- Earthworks Banking (shown where banks are steeper than 1:5)
- Existing ditch and existing IDB maintained Watercourse easement - 9.0m/3.0m wide. Permit required for works within easement
- 1 — **Phase1 - Phase2 Boundary Levels** Phase 1 boundary levels to match the proposed Phase 2.

General Notes

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. 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.
4. 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.
5. 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.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. 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.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British Standards.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. 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.

1. 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.
2. Working areas within the vicinity of existing trees are to be agreed with the engineer and chestnut fencing erected as directed.
3. 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.
4. It is the Contractor's responsibility to trace and indicate the precise location and nature of all services.
5. 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.
6. 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.
7. 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.
8. The Contractor is to take account of the soils report.
9. No completion works will be authorised until a formal certificate of conformance to relevant specification is received from the relevant water authority.
10. Compaction control shall be achieved by air void testing for both roadbase and basecourse (maximum air void ratio 6%).
11. Any recycled material to be used for highway construction purposes will be allowed subject to it satisfying relevant tests as instructed by this authority.
12. 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.
13. All levels and dimensions are to be checked on site before any work commences.
14. 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.
15. Where a driveway falls towards a dwelling it shall be provided with a suitable gully or drainage channel to prevent water damaging the building.

Rev	Description of updates	Drawn	Check'd	App'd	Date
A4	Drawing updated to suit the latest site layout dated 02/12/2022	PU	OP	JD	06.12.22
A3	Drawing updated to suit LCC comments dated 25/10/22	MC	OP	JD	02.11.22
A2	Drawing updated to suit latest site layout received 17.05.2022. Existing ditch easement shown	MC	OP		18.05.22
A1	Issued for Approval.	MC	OP	JD	23.02.22

Revision Schedule

farrow walsh
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 Phase2

Title: Engineering Layout Sheet 2 of 2

Drawn:	Checked:	Approved:	Date:	Scale:
MC	OP	JD	February 2022	1:250 @ A1

Drawing No. **FW2114-E-001-02** Revision: **A4**

This drawing and the building works depicted are the copyright of Farrow Walsh consulting Ltd. and may not be reproduced or amended except by written permission. No liability will be accepted for amendments made by other persons.

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)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

1 Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

1 Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1L	0.010	5.00	4.100	1200	537362.619	324850.015	1.200
S1	0.020	5.00	3.664	1200	537361.622	324860.121	1.075
S2	0.014	5.00	3.862	1200	537375.629	324863.385	1.314
S3	0.023	5.00	3.935	1200	537392.847	324867.313	1.438
S4	0.006	5.00	3.778	1200	537418.149	324869.645	1.314
S5	0.028	5.00	3.815	1200	537412.866	324865.027	1.375
S6	0.020	5.00	3.800	1200	537413.395	324850.477	1.419
S7L	0.027	5.00	4.100	1200	537415.948	324825.313	1.475
S7	0.028	5.00	3.616	1200	537405.470	324829.451	1.299
S8	0.031	5.00	3.700	1200	537402.573	324806.115	1.479
S9LA	0.017	5.00	4.300	1200	537397.813	324788.970	1.800
S9LB	0.039	5.00	4.300	1200	537415.095	324790.256	1.902
S9			4.251	1200	537403.796	324789.423	2.078
S11			2.926	1200	537420.229	324770.168	0.871
HW1			3.100	1	537404.427	324696.850	1.351
HW2	0.075	5.00	3.100	1	537399.457	324680.625	1.351
S12			3.100	2700	537400.928	324673.658	1.380
HW3			3.100	1	537398.567	324659.092	1.456
S6L	0.011	5.00	4.000	1200	537408.355	324851.404	1.435
S4A	0.020	5.00	3.073	1200	537418.986	324900.234	0.507
S4AL	0.015	5.00	4.050	1200	537429.038	324901.032	1.050
S10A	0.026	5.00	3.412	1200	537369.627	324772.245	1.181

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S10B	0.033	5.00	3.910	1200	537404.951	324772.245	1.797
S10C			3.818	1200	537419.560	324775.901	1.739

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	S1L	S1	10.154	0.600	2.900	2.814	0.086	118.1	150	5.18	50.0
1.001	S1	S2	14.383	0.600	2.589	2.548	0.041	350.8	375	5.43	50.0
1.002	S2	S3	17.660	0.600	2.548	2.497	0.051	346.3	375	5.74	50.0
1.003	S3	S5	20.149	0.600	2.498	2.440	0.058	347.4	375	6.08	50.0
2.000	S4AL	S4A	10.081	0.600	3.000	2.791	0.209	48.2	150	5.12	50.0
2.001	S4A	S4	19.770	0.600	2.566	2.464	0.102	193.8	375	5.37	50.0
2.002	S4	S5	7.017	0.600	2.464	2.440	0.024	292.4	375	5.48	50.0
1.004	S5	S6	14.559	0.600	2.440	2.381	0.059	246.8	375	6.30	50.0
1.005	S6	S7	22.471	0.600	2.381	2.317	0.064	351.1	375	6.69	50.0
4.000	S7L	S7	11.265	0.600	2.625	2.542	0.083	135.7	150	5.22	50.0
1.006	S7	S8	23.515	0.600	2.317	2.221	0.096	244.9	375	7.03	50.0
1.007	S8	S9	29.678	0.600	2.221	2.173	0.048	618.3	375	7.71	50.0
5.000	S9LA	S9	5.451	0.600	2.500	2.398	0.102	53.4	150	5.07	50.0
6.000	S9LB	S9	12.456	0.600	2.398	2.397	0.001	12456.0	150	7.54	50.0
1.008	S9	S10B	10.534	0.600	2.173	2.113	0.060	175.6	375	7.84	50.0
7.000	S10A	S10B	35.052	0.600	2.231	2.113	0.118	297.1	375	5.56	50.0
1.009	S10B	S10C	13.381	0.600	2.113	2.079	0.034	393.6	375	8.09	50.0
1.010	S10C	S11	5.810	0.600	2.079	2.055	0.024	242.1	375	8.17	50.0
1.011	S11	HW1	66.224	0.600	2.055	1.749	0.306	216.4	375	9.07	50.0
1.012	HW2	S12	7.121	0.600	1.749	1.720	0.029	245.6	375	5.10	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	0.924	16.3	1.4	1.050	0.700	0.700	1.050	0.010	0.0
1.001	0.961	106.2	4.1	0.700	0.939	0.700	0.939	0.030	0.0
1.002	0.968	106.9	6.0	0.939	1.063	0.939	1.063	0.044	0.0
1.003	0.966	106.7	9.1	1.062	1.000	1.000	1.062	0.067	0.0
2.000	1.452	25.7	2.0	0.900	0.132	0.132	0.900	0.015	0.0
2.001	1.298	143.3	4.7	0.132	0.939	0.132	0.939	0.035	0.0
2.002	1.054	116.4	5.6	0.939	1.000	0.939	1.000	0.041	0.0
1.004	1.149	126.9	18.4	1.000	1.044	1.000	1.044	0.136	0.0
1.005	0.961	106.1	22.6	1.044	0.924	0.924	1.044	0.167	0.0
4.000	0.861	15.2	3.7	1.325	0.924	0.924	1.325	0.027	0.0
1.006	1.153	127.3	30.1	0.924	1.104	0.924	1.104	0.222	0.0
1.007	0.721	79.7	34.3	1.104	1.703	1.104	1.703	0.253	0.0
5.000	1.379	24.4	2.3	1.650	1.703	1.650	1.703	0.017	0.0
6.000	0.082	1.4	5.3	1.752	1.704	1.704	1.752	0.039	0.0
1.008	1.364	150.7	41.9	1.703	1.422	1.422	1.703	0.309	0.0
7.000	1.046	115.5	3.5	0.806	1.422	0.806	1.422	0.026	0.0
1.009	0.907	100.2	49.9	1.422	1.364	1.364	1.422	0.368	0.0
1.010	1.160	128.1	49.9	1.364	0.496	0.496	1.364	0.368	0.0
1.011	1.227	135.6	49.9	0.496	0.976	0.496	0.976	0.368	0.0
1.012	1.152	127.2	10.2	0.976	1.005	0.976	1.005	0.075	0.0

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

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)
1.013	S12	HW3	14.757	0.600	1.720	1.644	0.076	194.2	300	5.32	50.0
3.000	S6L	S6	5.124	0.600	2.565	2.531	0.034	150.7	150	5.10	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.013	1.125	79.5	10.2	1.080	1.156	1.080	1.156	0.075	0.0
3.000	0.816	14.4	1.5	1.285	1.119	1.119	1.285	0.011	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	10.154	118.1	150	1	4.100	2.900	1.050	3.664	2.814	0.700
1.001	14.383	350.8	375	1	3.664	2.589	0.700	3.862	2.548	0.939
1.002	17.660	346.3	375	1	3.862	2.548	0.939	3.935	2.497	1.063
1.003	20.149	347.4	375	1	3.935	2.498	1.062	3.815	2.440	1.000
2.000	10.081	48.2	150	1	4.050	3.000	0.900	3.073	2.791	0.132
2.001	19.770	193.8	375	1	3.073	2.566	0.132	3.778	2.464	0.939
2.002	7.017	292.4	375	1	3.778	2.464	0.939	3.815	2.440	1.000
1.004	14.559	246.8	375	1	3.815	2.440	1.000	3.800	2.381	1.044
1.005	22.471	351.1	375	1	3.800	2.381	1.044	3.616	2.317	0.924
4.000	11.265	135.7	150	1	4.100	2.625	1.325	3.616	2.542	0.924
1.006	23.515	244.9	375	1	3.616	2.317	0.924	3.700	2.221	1.104
1.007	29.678	618.3	375	1	3.700	2.221	1.104	4.251	2.173	1.703
5.000	5.451	53.4	150	1	4.300	2.500	1.650	4.251	2.398	1.703
6.000	12.456	12456.0	150	1	4.300	2.398	1.752	4.251	2.397	1.704
1.008	10.534	175.6	375	1	4.251	2.173	1.703	3.910	2.113	1.422
7.000	35.052	297.1	375	1	3.412	2.231	0.806	3.910	2.113	1.422
1.009	13.381	393.6	375	1	3.910	2.113	1.422	3.818	2.079	1.364
1.010	5.810	242.1	375	1	3.818	2.079	1.364	2.926	2.055	0.496

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1L	1200	Manhole	1	S1	1200	Manhole	1
1.001	S1	1200	Manhole	1	S2	1200	Manhole	1
1.002	S2	1200	Manhole	1	S3	1200	Manhole	1
1.003	S3	1200	Manhole	1	S5	1200	Manhole	1
2.000	S4AL	1200	Manhole	1	S4A	1200	Manhole	1
2.001	S4A	1200	Manhole	1	S4	1200	Manhole	1
2.002	S4	1200	Manhole	1	S5	1200	Manhole	1
1.004	S5	1200	Manhole	1	S6	1200	Manhole	1
1.005	S6	1200	Manhole	1	S7	1200	Manhole	1
4.000	S7L	1200	Manhole	1	S7	1200	Manhole	1
1.006	S7	1200	Manhole	1	S8	1200	Manhole	1
1.007	S8	1200	Manhole	1	S9	1200	Manhole	1
5.000	S9LA	1200	Manhole	1	S9	1200	Manhole	1
6.000	S9LB	1200	Manhole	1	S9	1200	Manhole	1
1.008	S9	1200	Manhole	1	S10B	1200	Manhole	1
7.000	S10A	1200	Manhole	1	S10B	1200	Manhole	1
1.009	S10B	1200	Manhole	1	S10C	1200	Manhole	1
1.010	S10C	1200	Manhole	1	S11	1200	Manhole	1

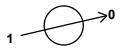
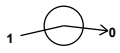
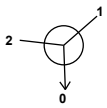
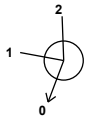
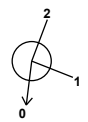
Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

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)
1.011	66.224	216.4	375	1	2.926	2.055	0.496	3.100	1.749	0.976
1.012	7.121	245.6	375	1	3.100	1.749	0.976	3.100	1.720	1.005
1.013	14.757	194.2	300	1	3.100	1.720	1.080	3.100	1.644	1.156
3.000	5.124	150.7	150	1	4.000	2.565	1.285	3.800	2.531	1.119

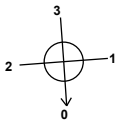
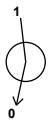
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.011	S11	1200	Manhole	1	HW1	1	Manhole	1
1.012	HW2	1	Manhole	1	S12	2700	Manhole	1
1.013	S12	2700	Manhole	1	HW3	1	Manhole	1
3.000	S6L	1200	Manhole	1	S6	1200	Manhole	1

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1L	537362.619	324850.015	4.100	1.200	1200				
						0	1.000	2.900	150
S1	537361.622	324860.121	3.664	1.075	1200		1	1.000	2.814	150
									
						0	1.001	2.589	375
S2	537375.629	324863.385	3.862	1.314	1200		1	1.001	2.548	375
									
						0	1.002	2.548	375
S3	537392.847	324867.313	3.935	1.438	1200		1	1.002	2.497	375
									
						0	1.003	2.498	375
S4	537418.149	324869.645	3.778	1.314	1200		1	2.001	2.464	375
							0	2.002	2.464	375
S5	537412.866	324865.027	3.815	1.375	1200		1	2.002	2.440	375
							2	1.003	2.440	375
							0	1.004	2.440	375
S6	537413.395	324850.477	3.800	1.419	1200		1	3.000	2.531	150
							2	1.004	2.381	375
							0	1.005	2.381	375
S7L	537415.948	324825.313	4.100	1.475	1200					
							0	4.000	2.625	150
S7	537405.470	324829.451	3.616	1.299	1200		1	4.000	2.542	150
							2	1.005	2.317	375
							0	1.006	2.317	375

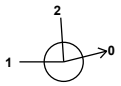
Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S8	537402.573	324806.115	3.700	1.479	1200	 1	1.006	2.221	375
						0	1.007	2.221	375
S9LA	537397.813	324788.970	4.300	1.800	1200				
						0	5.000	2.500	150
S9LB	537415.095	324790.256	4.300	1.902	1200				
						0	6.000	2.398	150
S9	537403.796	324789.423	4.251	2.078	1200	 1	6.000	2.397	150
						2	5.000	2.398	150
						3	1.007	2.173	375
						0	1.008	2.173	375
S11	537420.229	324770.168	2.926	0.871	1200	 1	1.010	2.055	375
						0	1.011	2.055	375
HW1	537404.427	324696.850	3.100	1.351	1	 1	1.011	1.749	375
HW2	537399.457	324680.625	3.100	1.351	1				
						0	1.012	1.749	375
S12	537400.928	324673.658	3.100	1.380	2700	 1	1.012	1.720	375
						0	1.013	1.720	300
HW3	537398.567	324659.092	3.100	1.456	1	 1	1.013	1.644	300
S6L	537408.355	324851.404	4.000	1.435	1200				
						0	3.000	2.565	150
S4A	537418.986	324900.234	3.073	0.507	1200	 1	2.000	2.791	150
						0	2.001	2.566	375
S4AL	537429.038	324901.032	4.050	1.050	1200				
						0	2.000	3.000	150
S10A	537369.627	324772.245	3.412	1.181	1200				
						0	7.000	2.231	375

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10B	537404.951	324772.245	3.910	1.797	1200		1	7.000	2.113	375
							2	1.008	2.113	375
							0	1.009	2.113	375
S10C	537419.560	324775.901	3.818	1.739	1200		1	1.009	2.079	375
							0	1.010	2.079	375

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

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 %)
2	0	0	0
30	0	0	0
100	40	0	0
100	40	10	0

Node S12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.720	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	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)	15.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.749	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.100

Inlets

HW1

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	252.0	0.0	1.442	628.0	0.0	1.443	0.0	0.0

Other (defaults)

Entry Loss (manhole)	0.000	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.000	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	134.275	37.995
2 year 30 minute summer	86.989	24.615
2 year 60 minute summer	58.092	15.352
2 year 120 minute summer	35.471	9.374
2 year 180 minute summer	27.149	6.986
2 year 240 minute summer	21.430	5.663
2 year 360 minute summer	16.342	4.205
2 year 480 minute summer	12.846	3.395
2 year 600 minute summer	10.511	2.875
2 year 720 minute summer	9.363	2.509
2 year 960 minute summer	7.689	2.025
2 year 1440 minute summer	5.582	1.496
30 year 15 minute summer	254.498	72.014
30 year 30 minute summer	165.775	46.909
30 year 60 minute summer	110.635	29.238
30 year 120 minute summer	66.994	17.704
30 year 180 minute summer	50.789	13.070
30 year 240 minute summer	39.713	10.495
30 year 360 minute summer	29.789	7.666
30 year 480 minute summer	23.214	6.135
30 year 600 minute summer	18.859	5.158
30 year 720 minute summer	16.698	4.475
30 year 960 minute summer	13.576	3.575
30 year 1440 minute summer	9.708	2.602
100 year +40% CC 15 minute summer	461.530	130.597
100 year +40% CC 30 minute summer	303.307	85.825
100 year +40% CC 60 minute summer	203.498	53.779
100 year +40% CC 120 minute summer	123.340	32.595
100 year +40% CC 180 minute summer	93.311	24.012
100 year +40% CC 240 minute summer	72.743	19.224
100 year +40% CC 360 minute summer	54.225	13.954
100 year +40% CC 480 minute summer	42.096	11.125
100 year +40% CC 600 minute summer	34.091	9.325
100 year +40% CC 720 minute summer	30.106	8.069
100 year +40% CC 960 minute summer	24.371	6.417
100 year +40% CC 1440 minute summer	17.314	4.640
100 year +40% CC +10% A 15 minute summer	461.530	130.597
100 year +40% CC +10% A 30 minute summer	303.307	85.825
100 year +40% CC +10% A 60 minute summer	203.498	53.779
100 year +40% CC +10% A 120 minute summer	123.340	32.595
100 year +40% CC +10% A 180 minute summer	93.311	24.012
100 year +40% CC +10% A 240 minute summer	72.743	19.224
100 year +40% CC +10% A 360 minute summer	54.225	13.954
100 year +40% CC +10% A 480 minute summer	42.096	11.125
100 year +40% CC +10% A 600 minute summer	34.091	9.325
100 year +40% CC +10% A 720 minute summer	30.106	8.069
100 year +40% CC +10% A 960 minute summer	24.371	6.417
100 year +40% CC +10% A 1440 minute summer	17.314	4.640

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	11	2.932	0.032	1.6	0.0358	0.0000	OK
15 minute summer	S1	10	2.643	0.054	4.9	0.0608	0.0000	OK
15 minute summer	S2	11	2.612	0.064	7.1	0.0726	0.0000	OK
15 minute summer	S3	11	2.577	0.080	10.7	0.0903	0.0000	OK
15 minute summer	S4	11	2.546	0.082	6.7	0.0924	0.0000	OK
15 minute summer	S5	11	2.545	0.105	21.6	0.1190	0.0000	OK
15 minute summer	S6	11	2.507	0.126	26.3	0.1422	0.0000	OK
15 minute summer	S7L	10	2.680	0.055	4.4	0.0619	0.0000	OK
15 minute summer	S7	11	2.449	0.132	34.8	0.1488	0.0000	OK
15 minute summer	S8	11	2.395	0.174	39.3	0.1970	0.0000	OK
15 minute summer	S9LA	10	2.534	0.034	2.8	0.0388	0.0000	OK
15 minute summer	S9LB	10	2.509	0.111	6.4	0.1260	0.0000	OK
15 minute summer	S9	12	2.327	0.154	47.0	0.1738	0.0000	OK
15 minute summer	S11	12	2.227	0.172	54.0	0.1947	0.0000	OK
360 minute summer	HW1	280	1.941	0.192	11.8	0.0000	0.0000	OK
360 minute summer	HW2	280	1.941	0.192	8.1	0.0000	0.0000	OK
360 minute summer	S12	280	1.941	0.221	2.1	1.2682	0.0000	OK
15 minute summer	HW3	1	1.644	0.000	1.8	0.0000	0.0000	OK
15 minute summer	S6L	10	2.600	0.035	1.8	0.0401	0.0000	OK
15 minute summer	S4A	10	2.616	0.050	5.8	0.0571	0.0000	OK
15 minute summer	S4AL	10	3.032	0.032	2.5	0.0356	0.0000	OK
15 minute summer	S10A	12	2.301	0.070	4.3	0.0789	0.0000	OK
15 minute summer	S10B	12	2.295	0.182	54.5	0.2056	0.0000	OK
15 minute summer	S10C	12	2.249	0.170	54.1	0.1928	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 summer	S1L	1.000	S1	1.6	0.592	0.098	0.0274	
15 minute summer	S1	1.001	S2	4.8	0.440	0.045	0.1586	
15 minute summer	S2	1.002	S3	7.0	0.477	0.066	0.2614	
15 minute summer	S3	1.003	S5	10.7	0.509	0.100	0.4240	
15 minute summer	S4	2.002	S5	6.5	0.307	0.056	0.1507	
15 minute summer	S5	1.004	S6	21.4	0.745	0.169	0.4197	
15 minute summer	S6	1.005	S7	26.1	0.783	0.246	0.7505	
15 minute summer	S7L	4.000	S7	4.3	0.748	0.285	0.0654	
15 minute summer	S7	1.006	S8	34.4	0.815	0.270	0.9937	
15 minute summer	S8	1.007	S9	39.0	0.844	0.489	1.3707	
15 minute summer	S9LA	5.000	S9	2.8	0.921	0.114	0.0165	
15 minute summer	S9LB	6.000	S9	6.2	0.553	4.318	0.1397	
15 minute summer	S9	1.008	S10B	47.4	0.993	0.314	0.5026	
15 minute summer	S11	1.011	HW1	54.5	1.863	0.402	2.0795	
360 minute summer	HW1	Flow through pond	HW2	5.6	0.009	0.000	51.1441	
360 minute summer	HW2	1.012	S12	2.1	0.238	0.017	0.4439	
360 minute summer	S12	Hydro-Brake®	HW3	1.9				56.0
15 minute summer	S6L	3.000	S6	1.8	0.558	0.123	0.0162	
15 minute summer	S4A	2.001	S4	5.7	0.502	0.040	0.2606	
15 minute summer	S4AL	2.000	S4A	2.5	0.923	0.096	0.0270	
15 minute summer	S10A	7.000	S10B	4.3	0.183	0.038	1.1748	
15 minute summer	S10B	1.009	S10C	54.1	1.065	0.540	0.6800	
15 minute summer	S10C	1.010	S11	54.0	1.101	0.421	0.2848	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.944	0.044	3.1	0.0498	0.0000	OK
15 minute summer	S1	10	2.663	0.074	9.3	0.0832	0.0000	OK
15 minute summer	S2	11	2.636	0.088	13.6	0.0997	0.0000	OK
15 minute summer	S3	11	2.610	0.113	20.5	0.1279	0.0000	OK
15 minute summer	S4	11	2.594	0.130	12.7	0.1465	0.0000	OK
15 minute summer	S5	11	2.593	0.153	41.0	0.1731	0.0000	OK
15 minute summer	S6	11	2.564	0.183	50.2	0.2070	0.0000	OK
15 minute summer	S7L	10	2.704	0.079	8.4	0.0892	0.0000	OK
15 minute summer	S7	11	2.516	0.199	66.5	0.2255	0.0000	OK
15 minute summer	S8	11	2.477	0.256	75.1	0.2893	0.0000	OK
15 minute summer	S9LA	10	2.547	0.047	5.3	0.0536	0.0000	OK
15 minute summer	S9LB	10	2.565	0.167	12.2	0.1885	0.0000	SURCHARGED
15 minute summer	S9	11	2.404	0.231	90.5	0.2617	0.0000	OK
15 minute summer	S11	12	2.302	0.247	104.7	0.2795	0.0000	OK
360 minute summer	HW1	360	2.123	0.374	21.5	0.0000	0.0000	OK
360 minute summer	HW2	360	2.123	0.374	13.7	0.0000	0.0000	OK
360 minute summer	S12	360	2.123	0.403	2.7	2.3103	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	1.9	0.0000	0.0000	OK
15 minute summer	S6L	10	2.614	0.049	3.4	0.0557	0.0000	OK
15 minute summer	S4A	10	2.635	0.069	10.9	0.0776	0.0000	OK
15 minute summer	S4AL	10	3.043	0.043	4.7	0.0490	0.0000	OK
15 minute summer	S10A	12	2.384	0.153	8.1	0.1726	0.0000	OK
15 minute summer	S10B	12	2.380	0.267	105.7	0.3022	0.0000	OK
15 minute summer	S10C	12	2.327	0.248	104.4	0.2806	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 summer	S1L	1.000	S1	3.1	0.714	0.188	0.0436	
15 minute summer	S1	1.001	S2	9.2	0.527	0.086	0.2508	
15 minute summer	S2	1.002	S3	13.4	0.569	0.125	0.4209	
15 minute summer	S3	1.003	S5	20.3	0.585	0.190	0.7039	
15 minute summer	S4	2.002	S5	12.4	0.330	0.106	0.2665	
15 minute summer	S5	1.004	S6	41.0	0.858	0.323	0.6962	
15 minute summer	S6	1.005	S7	50.1	0.887	0.472	1.2685	
15 minute summer	S7L	4.000	S7	8.3	0.886	0.545	0.1055	
15 minute summer	S7	1.006	S8	65.9	0.942	0.518	1.6414	
15 minute summer	S8	1.007	S9	73.8	0.977	0.926	2.2475	
15 minute summer	S9LA	5.000	S9	5.3	1.105	0.216	0.0260	
15 minute summer	S9LB	6.000	S9	12.0	0.726	8.296	0.1887	
15 minute summer	S9	1.008	S10B	89.4	1.157	0.594	0.8182	
15 minute summer	S11	1.011	HW1	105.8	2.132	0.780	3.5057	
360 minute summer	HW1	Flow through pond	HW2	9.1	0.011	0.001	110.0595	
360 minute summer	HW2	1.012	S12	2.7	0.279	0.021	0.7851	
360 minute summer	S12	Hydro-Brake®	HW3	2.0				60.5
15 minute summer	S6L	3.000	S6	3.4	0.672	0.234	0.0258	
15 minute summer	S4A	2.001	S4	10.8	0.525	0.075	0.4675	
15 minute summer	S4AL	2.000	S4A	4.7	1.108	0.182	0.0424	
15 minute summer	S10A	7.000	S10B	7.6	0.214	0.066	2.2098	
15 minute summer	S10B	1.009	S10C	104.4	1.297	1.042	1.0796	
15 minute summer	S10C	1.010	S11	104.7	1.357	0.817	0.4485	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.961	0.061	5.7	0.0686	0.0000	OK
15 minute summer	S1	13	2.738	0.149	16.9	0.1685	0.0000	OK
15 minute summer	S2	12	2.728	0.180	24.6	0.2040	0.0000	OK
15 minute summer	S3	12	2.719	0.222	36.5	0.2516	0.0000	OK
15 minute summer	S4	12	2.729	0.265	26.5	0.3000	0.0000	OK
15 minute summer	S5	12	2.732	0.292	70.5	0.3303	0.0000	OK
15 minute summer	S6	12	2.718	0.337	83.5	0.3807	0.0000	OK
15 minute summer	S7L	11	2.755	0.130	15.3	0.1468	0.0000	OK
15 minute summer	S7	11	2.701	0.384	109.9	0.4343	0.0000	SURCHARGED
15 minute summer	S8	11	2.655	0.434	118.3	0.4904	0.0000	SURCHARGED
15 minute summer	S9LA	11	2.569	0.069	9.6	0.0777	0.0000	OK
15 minute summer	S9LB	11	2.756	0.358	22.0	0.4050	0.0000	SURCHARGED
15 minute summer	S9	11	2.574	0.401	144.8	0.4532	0.0000	SURCHARGED
720 minute summer	S11	720	2.428	0.373	23.0	0.4216	0.0000	OK
720 minute summer	HW1	720	2.428	0.679	22.4	0.0000	0.0000	OK
720 minute summer	HW2	720	2.428	0.679	13.2	0.0000	0.0000	SURCHARGED
720 minute summer	S12	720	2.428	0.708	3.4	4.0523	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S6L	11	2.733	0.168	6.2	0.1904	0.0000	SURCHARGED
15 minute summer	S4A	12	2.724	0.158	19.7	0.1785	0.0000	OK
15 minute summer	S4AL	10	3.059	0.059	8.5	0.0670	0.0000	OK
15 minute summer	S10A	11	2.528	0.297	14.7	0.3356	0.0000	OK
15 minute summer	S10B	11	2.527	0.414	163.5	0.4683	0.0000	SURCHARGED
15 minute summer	S10C	11	2.437	0.358	165.8	0.4054	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 summer	S1L	1.000	S1	5.6	0.844	0.345	0.0677	
15 minute summer	S1	1.001	S2	16.7	0.589	0.157	0.6557	
15 minute summer	S2	1.002	S3	23.5	0.607	0.220	1.0641	
15 minute summer	S3	1.003	S5	35.8	0.611	0.336	1.6101	
15 minute summer	S4	2.002	S5	25.6	0.341	0.220	0.6156	
15 minute summer	S5	1.004	S6	67.0	0.893	0.528	1.4298	
15 minute summer	S6	1.005	S7	79.0	0.919	0.745	2.4104	
15 minute summer	S7L	4.000	S7	15.1	1.027	0.993	0.1904	
15 minute summer	S7	1.006	S8	100.8	0.991	0.792	2.5936	
15 minute summer	S8	1.007	S9	113.7	1.068	1.427	3.2734	
15 minute summer	S9LA	5.000	S9	9.6	1.276	0.395	0.0694	
15 minute summer	S9LB	6.000	S9	21.5	1.223	14.872	0.2193	
15 minute summer	S9	1.008	S10B	137.3	1.267	0.911	1.1619	
720 minute summer	S11	1.011	HW1	22.4	0.589	0.165	7.3000	
720 minute summer	HW1	Flow through pond	HW2	9.3	0.010	0.001	227.9230	
720 minute summer	HW2	1.012	S12	3.4	0.267	0.027	0.7854	
720 minute summer	S12	Hydro-Brake®	HW3	2.0				91.0
15 minute summer	S6L	3.000	S6	7.6	0.719	0.529	0.0902	
15 minute summer	S4A	2.001	S4	23.8	0.559	0.166	1.2589	
15 minute summer	S4AL	2.000	S4A	8.4	1.306	0.329	0.0651	
15 minute summer	S10A	7.000	S10B	14.3	0.237	0.124	3.5728	
15 minute summer	S10B	1.009	S10C	165.8	1.503	1.655	1.4642	
15 minute summer	S10C	1.010	S11	166.2	1.547	1.298	0.6237	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.964	0.064	6.2	0.0719	0.0000	OK
15 minute summer	S1	12	2.818	0.229	18.5	0.2589	0.0000	OK
15 minute summer	S2	12	2.826	0.278	26.9	0.3146	0.0000	OK
15 minute summer	S3	12	2.803	0.306	39.5	0.3464	0.0000	OK
15 minute summer	S4	13	2.800	0.336	23.7	0.3798	0.0000	OK
15 minute summer	S5	13	2.792	0.352	74.6	0.3987	0.0000	OK
15 minute summer	S6	13	2.778	0.397	86.2	0.4487	0.0000	SURCHARGED
15 minute summer	S7L	11	2.822	0.197	16.8	0.2227	0.0000	SURCHARGED
15 minute summer	S7	12	2.743	0.426	105.0	0.4816	0.0000	SURCHARGED
15 minute summer	S8	12	2.695	0.474	112.8	0.5364	0.0000	SURCHARGED
15 minute summer	S9LA	12	2.628	0.128	10.6	0.1452	0.0000	OK
15 minute summer	S9LB	11	2.831	0.433	24.3	0.4897	0.0000	SURCHARGED
15 minute summer	S9	12	2.619	0.446	142.8	0.5042	0.0000	SURCHARGED
720 minute summer	S11	720	2.486	0.431	25.1	0.4878	0.0000	SURCHARGED
720 minute summer	HW1	720	2.486	0.737	24.6	0.0000	0.0000	OK
720 minute summer	HW2	720	2.486	0.737	17.4	0.0000	0.0000	SURCHARGED
720 minute summer	S12	720	2.486	0.766	6.1	4.3864	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S6L	13	2.783	0.218	6.8	0.2462	0.0000	SURCHARGED
15 minute summer	S4A	13	2.801	0.235	21.6	0.2656	0.0000	OK
15 minute summer	S4AL	10	3.062	0.062	9.3	0.0704	0.0000	OK
15 minute summer	S10A	12	2.572	0.341	16.2	0.3857	0.0000	OK
15 minute summer	S10B	12	2.572	0.459	169.2	0.5193	0.0000	SURCHARGED
960 minute summer	S10C	945	2.488	0.409	20.4	0.4628	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 summer	S1L	1.000	S1	6.1	0.864	0.375	0.0720	
15 minute summer	S1	1.001	S2	18.2	0.597	0.171	1.1370	
15 minute summer	S2	1.002	S3	25.2	0.609	0.236	1.6251	
15 minute summer	S3	1.003	S5	36.3	0.611	0.340	2.0306	
15 minute summer	S4	2.002	S5	21.4	0.332	0.183	0.7427	
15 minute summer	S5	1.004	S6	71.2	0.901	0.561	1.5859	
15 minute summer	S6	1.005	S7	87.5	0.951	0.824	2.4785	
15 minute summer	S7L	4.000	S7	15.7	1.024	1.035	0.1983	
15 minute summer	S7	1.006	S8	105.4	1.001	0.828	2.5936	
15 minute summer	S8	1.007	S9	113.1	1.086	1.419	3.2734	
15 minute summer	S9LA	5.000	S9	10.7	1.268	0.441	0.0917	
15 minute summer	S9LB	6.000	S9	23.1	1.315	16.000	0.2193	
15 minute summer	S9	1.008	S10B	140.0	1.269	0.929	1.1619	
720 minute summer	S11	1.011	HW1	24.6	0.604	0.181	7.3043	
720 minute summer	HW1	Flow through pond	HW2	12.6	0.009	0.001	253.2907	
720 minute summer	HW2	1.012	S12	6.1	0.245	0.048	0.7854	
720 minute summer	S12	Hydro-Brake®	HW3	2.0				93.4
15 minute summer	S6L	3.000	S6	6.2	0.738	0.429	0.0902	
15 minute summer	S4A	2.001	S4	20.0	0.564	0.139	1.7469	
15 minute summer	S4AL	2.000	S4A	9.2	1.339	0.360	0.0696	
15 minute summer	S10A	7.000	S10B	14.3	0.248	0.124	3.7785	
15 minute summer	S10B	1.009	S10C	168.8	1.530	1.685	1.4759	
960 minute summer	S10C	1.010	S11	20.1	0.869	0.157	0.6408	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

APPENDIX I – DRAINAGE MAINTENANCE SCHEDULE

Drainage Maintenance Schedule - Fleet Road, Holbeach Phase 2

Schedule	Feature	Location	Inspection Type	Inspection Frequency	Required Action	Maintenance Works	Maintenance Intervals	Comments
Regular Maintenance	Permeable Paving	Parking bays	Visual	3 Months	Removal of litter and debris	Litter removal	Monthly (or as required).	Maintenace interval subject to condition of porous paving
	Permeable Paving	Parking bays	Visual	3 Times per year (see comments)	Sweeping and jet wash to remove silt and sediment build up from permable paving surface	Silt removal	3 Times per year (see comments)	Inspection/Maintenance should be as follows: - End of winter (April) - Mid Summer (July/Aug) to remove dust, flower/grass deposits - After Autumn leaf fall (November)
	Swales	Entire site	Visual	3 Times per year (see comments)	Remove litter and debris, cut grass, inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding	Silt removal	3 Times per year (see comments)	Maintenance interval subject to Visual Inspection findings
	Flow Control Chamber	At Attenuation Pond Outfall chamber	Visual	3 Months	Removal of litter and debris	Silt / Debris removal	6 Months (or as required)	Maintenance interval subject to Visual Inspection findings
Occasional Maintenance	Foul & Surface Water Chambers	Entire site	Visual	6 Months	Remove silt and leaf build up from gullies, chambers, gutters etc.	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Road & Yard Gullies	Entire site	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Flow Control Chamber	At Attenuation Pond Outfall chamber	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Parking bays	Visual	6 Months	Manual removal of weeds	Weed removal *	6 Months (or as required)	Maintenance interval subject to Visual Inspection findings

Schedule	Feature	Location	Inspection Type	Inspection Frequency	Required Action	Maintenance Works	Maintenance Intervals	Comments
	Atteunation Pond	Southern boundary	Visual	6 Months	Removal from debris	Silt / Debris removal	6 Months (or as required)	Maintenance interval subject to Visual Inspection findings
Remedial Actions	Foul & Surface Water Drainage	Entire site	Visual	12 Months	Remove and dispose of oils or fuel (diesel & petrol) residues using safe standard practices.	Safe removal or contaminant residues	As required.	As required.
	Swales	Entire site	Visual	6Months	Repair erosion, relevel uneven surfaces, scarify and spike topsoil layerto improve infiltration performance, remove built up sediment	Silt/Debris removal	As required.	As required.
	Attenuation Pond	Southern boundary	Visual	6 Months	Removal from debris	Silt / Debris removal	As required.	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Parking bays	Visual	12 Months	Infiltration surface rehabilitation	Replace broken or cracked pavious **	As required or following poor performance.	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Parking bays	Visual	12 Months	Infiltration surface rehabilitation	Relay any areas of settlement	As required or following poor performance.	Maintenance interval subject to Visual Inspection findings
Monitoring	Foul & Surface Water Drainage	Entire site	Visual	12 Months	Walk over inspection for condition (breaks, lifting & missing) of chamber covers and grates.	Replace broken or cracked inspection chamber covers	As required.	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Parking bays	Visual	Monthly for first 3 Months	Initial inspection to ensure performance	Top up grit between paviours	As required.	Maintenance interval subject to Visual Inspection findings
	Attenuation Pond	Southern Boundary	Visual	12 Months	Survey inside of pond for sediment build-up and remove if necessary	Remove sediment as required	5 Years or as required.	Maintenance interval subject to Visual Inspection findings

* If weeds are persitent, weed killer may be used to reduce the requirement for manual weed removal.

** Any block which is to be replaced should be bedded on anew layer of grit / sand.

*** If re-construction is necessary, the following procedure should be followed: 1. Lift surface layer and laying course, 2. Remove and geotextile filter layer, 3. inspect sub-base and wash/replace if required, 4. Renew any geotextile layer as required, 5. Renew laying course, jointing material and block paviours. Note: this is deemed unlikely to occur and thus unlikely to be implemented

Maintenance procedures to be undertaken in accordance with Ciria 753. This schedule should be read in conjunction with all engineering drawings

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)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

1 Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

1 Link Type

Shape	Circular	Auto Increment (mm)	75
Barrels	1	Follow Ground	x

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1L	0.010	5.00	4.100	1200	537362.619	324850.015	1.200
S1	0.020	5.00	3.664	1200	537361.622	324860.121	1.075
S2	0.014	5.00	3.862	1200	537375.629	324863.385	1.314
S3	0.023	5.00	3.935	1200	537392.847	324867.313	1.438
S4	0.006	5.00	3.778	1200	537418.149	324869.645	1.314
S5	0.028	5.00	3.815	1200	537412.866	324865.027	1.375
S6	0.020	5.00	3.800	1200	537413.395	324850.477	1.419
S7L	0.027	5.00	4.100	1200	537415.948	324825.313	1.475
S7	0.028	5.00	3.616	1200	537405.470	324829.451	1.299
S8	0.031	5.00	3.700	1200	537402.573	324806.115	1.479
S9LA	0.017	5.00	4.300	1200	537397.813	324788.970	1.800
S9LB	0.039	5.00	4.300	1200	537415.095	324790.256	1.902
S9			4.251	1200	537403.796	324789.423	2.078
S11			2.926	1200	537420.229	324770.168	0.871
HW1			3.100	1	537404.427	324696.850	1.351
HW2	0.075	5.00	3.100	1	537399.457	324680.625	1.351
S12			3.100	2700	537400.928	324673.658	1.380
HW3			3.100	1	537398.567	324659.092	1.456
S6L	0.011	5.00	4.000	1200	537408.355	324851.404	1.435
S4A	0.020	5.00	3.073	1200	537418.986	324900.234	0.507
S4AL	0.015	5.00	4.050	1200	537429.038	324901.032	1.050
S10A	0.026	5.00	3.412	1200	537369.627	324772.245	1.181

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S10B	0.033	5.00	3.910	1200	537404.951	324772.245	1.797
S10C			3.818	1200	537419.560	324775.901	1.739
dummy			3.100				

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	S1L	S1	10.154	0.600	2.900	2.814	0.086	118.1	150	5.18	50.0
1.001	S1	S2	14.383	0.600	2.589	2.548	0.041	350.8	375	5.43	50.0
1.002	S2	S3	17.660	0.600	2.548	2.497	0.051	346.3	375	5.74	50.0
1.003	S3	S5	20.149	0.600	2.498	2.440	0.058	347.4	375	6.08	50.0
2.000	S4AL	S4A	10.081	0.600	3.000	2.791	0.209	48.2	150	5.12	50.0
2.001	S4A	S4	19.770	0.600	2.566	2.464	0.102	193.8	375	5.37	50.0
2.002	S4	S5	7.017	0.600	2.464	2.440	0.024	292.4	375	5.48	50.0
1.004	S5	S6	14.559	0.600	2.440	2.381	0.059	246.8	375	6.30	50.0
1.005	S6	S7	22.471	0.600	2.381	2.317	0.064	351.1	375	6.69	50.0
4.000	S7L	S7	11.265	0.600	2.625	2.542	0.083	135.7	150	5.22	50.0
1.006	S7	S8	23.515	0.600	2.317	2.221	0.096	244.9	375	7.03	50.0
1.007	S8	S9	29.678	0.600	2.221	2.173	0.048	618.3	375	7.71	50.0
5.000	S9LA	S9	5.451	0.600	2.500	2.398	0.102	53.4	150	5.07	50.0
6.000	S9LB	S9	12.456	0.600	2.398	2.397	0.001	12456.0	150	7.54	50.0
1.008	S9	S10B	10.534	0.600	2.173	2.113	0.060	175.6	375	7.84	50.0
7.000	S10A	S10B	35.052	0.600	2.231	2.113	0.118	297.1	375	5.56	50.0
1.009	S10B	S10C	13.381	0.600	2.113	2.079	0.034	393.6	375	8.09	50.0
1.010	S10C	S11	5.810	0.600	2.079	2.055	0.024	242.1	375	8.17	50.0
1.011	S11	HW1	66.224	0.600	2.055	1.749	0.306	216.4	375	9.07	50.0
1.012	HW2	S12	7.121	0.600	1.749	1.720	0.029	245.6	375	5.10	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	0.924	16.3	1.4	1.050	0.700	0.700	1.050	0.010	0.0
1.001	0.961	106.2	4.1	0.700	0.939	0.700	0.939	0.030	0.0
1.002	0.968	106.9	6.0	0.939	1.063	0.939	1.063	0.044	0.0
1.003	0.966	106.7	9.1	1.062	1.000	1.000	1.062	0.067	0.0
2.000	1.452	25.7	2.0	0.900	0.132	0.132	0.900	0.015	0.0
2.001	1.298	143.3	4.7	0.132	0.939	0.132	0.939	0.035	0.0
2.002	1.054	116.4	5.6	0.939	1.000	0.939	1.000	0.041	0.0
1.004	1.149	126.9	18.4	1.000	1.044	1.000	1.044	0.136	0.0
1.005	0.961	106.1	22.6	1.044	0.924	0.924	1.044	0.167	0.0
4.000	0.861	15.2	3.7	1.325	0.924	0.924	1.325	0.027	0.0
1.006	1.153	127.3	30.1	0.924	1.104	0.924	1.104	0.222	0.0
1.007	0.721	79.7	34.3	1.104	1.703	1.104	1.703	0.253	0.0
5.000	1.379	24.4	2.3	1.650	1.703	1.650	1.703	0.017	0.0
6.000	0.082	1.4	5.3	1.752	1.704	1.704	1.752	0.039	0.0
1.008	1.364	150.7	41.9	1.703	1.422	1.422	1.703	0.309	0.0
7.000	1.046	115.5	3.5	0.806	1.422	0.806	1.422	0.026	0.0
1.009	0.907	100.2	49.9	1.422	1.364	1.364	1.422	0.368	0.0
1.010	1.160	128.1	49.9	1.364	0.496	0.496	1.364	0.368	0.0
1.011	1.227	135.6	49.9	0.496	0.976	0.496	0.976	0.368	0.0
1.012	1.152	127.2	10.2	0.976	1.005	0.976	1.005	0.075	0.0

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

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)
1.013	S12	HW3	14.757	0.600	1.720	1.644	0.076	194.2	300	5.32	50.0
3.000	S6L	S6	5.124	0.600	2.565	2.531	0.034	150.7	150	5.10	50.0
1.014	HW3	DUMMY	5.000		1.644	1.600	0.044	113.6	300		

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Minimum Depth (m)	Maximum Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.013	1.125	79.5	10.2	1.080	1.156	1.080	1.156	0.075	0.0
3.000	0.816	14.4	1.5	1.285	1.119	1.119	1.285	0.011	0.0
1.014				1.156					

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	10.154	118.1	150	1	4.100	2.900	1.050	3.664	2.814	0.700
1.001	14.383	350.8	375	1	3.664	2.589	0.700	3.862	2.548	0.939
1.002	17.660	346.3	375	1	3.862	2.548	0.939	3.935	2.497	1.063
1.003	20.149	347.4	375	1	3.935	2.498	1.062	3.815	2.440	1.000
2.000	10.081	48.2	150	1	4.050	3.000	0.900	3.073	2.791	0.132
2.001	19.770	193.8	375	1	3.073	2.566	0.132	3.778	2.464	0.939
2.002	7.017	292.4	375	1	3.778	2.464	0.939	3.815	2.440	1.000
1.004	14.559	246.8	375	1	3.815	2.440	1.000	3.800	2.381	1.044
1.005	22.471	351.1	375	1	3.800	2.381	1.044	3.616	2.317	0.924
4.000	11.265	135.7	150	1	4.100	2.625	1.325	3.616	2.542	0.924
1.006	23.515	244.9	375	1	3.616	2.317	0.924	3.700	2.221	1.104
1.007	29.678	618.3	375	1	3.700	2.221	1.104	4.251	2.173	1.703
5.000	5.451	53.4	150	1	4.300	2.500	1.650	4.251	2.398	1.703
6.000	12.456	12456.0	150	1	4.300	2.398	1.752	4.251	2.397	1.704
1.008	10.534	175.6	375	1	4.251	2.173	1.703	3.910	2.113	1.422
7.000	35.052	297.1	375	1	3.412	2.231	0.806	3.910	2.113	1.422
1.009	13.381	393.6	375	1	3.910	2.113	1.422	3.818	2.079	1.364

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1L	1200	Manhole	1	S1	1200	Manhole	1
1.001	S1	1200	Manhole	1	S2	1200	Manhole	1
1.002	S2	1200	Manhole	1	S3	1200	Manhole	1
1.003	S3	1200	Manhole	1	S5	1200	Manhole	1
2.000	S4AL	1200	Manhole	1	S4A	1200	Manhole	1
2.001	S4A	1200	Manhole	1	S4	1200	Manhole	1
2.002	S4	1200	Manhole	1	S5	1200	Manhole	1
1.004	S5	1200	Manhole	1	S6	1200	Manhole	1
1.005	S6	1200	Manhole	1	S7	1200	Manhole	1
4.000	S7L	1200	Manhole	1	S7	1200	Manhole	1
1.006	S7	1200	Manhole	1	S8	1200	Manhole	1
1.007	S8	1200	Manhole	1	S9	1200	Manhole	1
5.000	S9LA	1200	Manhole	1	S9	1200	Manhole	1
6.000	S9LB	1200	Manhole	1	S9	1200	Manhole	1
1.008	S9	1200	Manhole	1	S10B	1200	Manhole	1
7.000	S10A	1200	Manhole	1	S10B	1200	Manhole	1
1.009	S10B	1200	Manhole	1	S10C	1200	Manhole	1

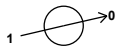
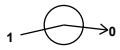
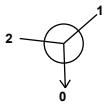
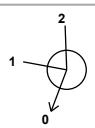
Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

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)
1.010	5.810	242.1	375	1	3.818	2.079	1.364	2.926	2.055	0.496
1.011	66.224	216.4	375	1	2.926	2.055	0.496	3.100	1.749	0.976
1.012	7.121	245.6	375	1	3.100	1.749	0.976	3.100	1.720	1.005
1.013	14.757	194.2	300	1	3.100	1.720	1.080	3.100	1.644	1.156
3.000	5.124	150.7	150	1	4.000	2.565	1.285	3.800	2.531	1.119
1.014	5.000	113.6	300		3.100	1.644	1.156		1.600	

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.010	S10C	1200	Manhole	1	S11	1200	Manhole	1
1.011	S11	1200	Manhole	1	HW1	1	Manhole	1
1.012	HW2	1	Manhole	1	S12	2700	Manhole	1
1.013	S12	2700	Manhole	1	HW3	1	Manhole	1
3.000	S6L	1200	Manhole	1	S6	1200	Manhole	1
1.014	HW3	1	Manhole	1				

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1L	537362.619	324850.015	4.100	1.200	1200				
						0	1.000	2.900	150
S1	537361.622	324860.121	3.664	1.075	1200		1	1.000	2.814	150
						0	1.001	2.589	375
S2	537375.629	324863.385	3.862	1.314	1200		1	1.001	2.548	375
						0	1.002	2.548	375
S3	537392.847	324867.313	3.935	1.438	1200		1	1.002	2.497	375
						0	1.003	2.498	375
S4	537418.149	324869.645	3.778	1.314	1200		1	2.001	2.464	375
						0	2.002	2.464	375
S5	537412.866	324865.027	3.815	1.375	1200		1	2.002	2.440	375
							2	1.003	2.440	375
						0	1.004	2.440	375
S6	537413.395	324850.477	3.800	1.419	1200		1	3.000	2.531	150
							2	1.004	2.381	375
						0	1.005	2.381	375
S7L	537415.948	324825.313	4.100	1.475	1200				
						0	4.000	2.625	150

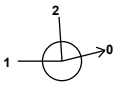
Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S7	537405.470	324829.451	3.616	1.299	1200	1	4.000	2.542	150
						2	1.005	2.317	375
						0	1.006	2.317	375
S8	537402.573	324806.115	3.700	1.479	1200	1	1.006	2.221	375
						0	1.007	2.221	375
S9LA	537397.813	324788.970	4.300	1.800	1200	0	5.000	2.500	150
S9LB	537415.095	324790.256	4.300	1.902	1200	0	6.000	2.398	150
S9	537403.796	324789.423	4.251	2.078	1200	1	6.000	2.397	150
						2	5.000	2.398	150
						3	1.007	2.173	375
						0	1.008	2.173	375
S11	537420.229	324770.168	2.926	0.871	1200	1	1.010	2.055	375
						0	1.011	2.055	375
HW1	537404.427	324696.850	3.100	1.351	1	1	1.011	1.749	375
HW2	537399.457	324680.625	3.100	1.351	1	0	1.012	1.749	375
S12	537400.928	324673.658	3.100	1.380	2700	1	1.012	1.720	375
						0	1.013	1.720	300
HW3	537398.567	324659.092	3.100	1.456	1	1	1.013	1.644	300
S6L	537408.355	324851.404	4.000	1.435	1200	0	3.000	2.565	150
S4A	537418.986	324900.234	3.073	0.507	1200	1	2.000	2.791	150
						0	2.001	2.566	375
S4AL	537429.038	324901.032	4.050	1.050	1200	0	2.000	3.000	150

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10A	537369.627	324772.245	3.412	1.181	1200				
						0	7.000	2.231	375
S10B	537404.951	324772.245	3.910	1.797	1200		1	7.000	2.113	375
							2	1.008	2.113	375
						0	1.009	2.113	375
S10C	537419.560	324775.901	3.818	1.739	1200		1	1.009	2.079	375
									
						0	1.010	2.079	375
dummy			3.100						

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	19.000	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Check Discharge Rate(s)	x
Summer CV	0.750	Check Discharge Volume	x
Analysis Speed	Normal		

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 %)
2	0	0	0
30	0	0	0
100	40	0	0
100	40	10	0

Node dummy Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.250	120	1.250	240	1.250	360	1.250	480	1.250	600	1.250
15	1.250	135	1.250	255	1.250	375	1.250	495	1.250	615	1.250
30	1.250	150	1.250	270	1.250	390	1.250	510	1.250	630	1.250
45	1.250	165	1.250	285	1.250	405	1.250	525	1.250	645	1.250
60	1.250	180	1.250	300	1.250	420	1.250	540	1.250	660	1.250
75	1.250	195	1.250	315	1.250	435	1.250	555	1.250	675	1.250
90	1.250	210	1.250	330	1.250	450	1.250	570	1.250	690	1.250
105	1.250	225	1.250	345	1.250	465	1.250	585	1.250	705	1.250

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
720	1.250	855	1.250	990	1.250	1125	1.250	1260	1.250	1395	1.250
735	1.250	870	1.250	1005	1.250	1140	1.250	1275	1.250	1410	1.250
750	1.250	885	1.250	1020	1.250	1155	1.250	1290	1.250	1425	1.250
765	1.250	900	1.250	1035	1.250	1170	1.250	1305	1.250	1440	1.250
780	1.250	915	1.250	1050	1.250	1185	1.250	1320	1.250		
795	1.250	930	1.250	1065	1.250	1200	1.250	1335	1.250		
810	1.250	945	1.250	1080	1.250	1215	1.250	1350	1.250		
825	1.250	960	1.250	1095	1.250	1230	1.250	1365	1.250		
840	1.250	975	1.250	1110	1.250	1245	1.250	1380	1.250		

Node S12 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	1.720	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	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)	15.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	1.749	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)		Main Channel n	0.100

Inlets

HW1

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	252.0	0.0	1.442	628.0	0.0	1.443	0.0	0.0

Other (defaults)

Entry Loss (manhole)	0.000	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.000	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	134.275	37.995
2 year 30 minute summer	86.989	24.615
2 year 60 minute summer	58.092	15.352
2 year 120 minute summer	35.471	9.374
2 year 180 minute summer	27.149	6.986
2 year 240 minute summer	21.430	5.663
2 year 360 minute summer	16.342	4.205
2 year 480 minute summer	12.846	3.395
2 year 600 minute summer	10.511	2.875
2 year 720 minute summer	9.363	2.509
2 year 960 minute summer	7.689	2.025
2 year 1440 minute summer	5.582	1.496
30 year 15 minute summer	254.498	72.014
30 year 30 minute summer	165.775	46.909

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 60 minute summer	110.635	29.238
30 year 120 minute summer	66.994	17.704
30 year 180 minute summer	50.789	13.070
30 year 240 minute summer	39.713	10.495
30 year 360 minute summer	29.789	7.666
30 year 480 minute summer	23.214	6.135
30 year 600 minute summer	18.859	5.158
30 year 720 minute summer	16.698	4.475
30 year 960 minute summer	13.576	3.575
30 year 1440 minute summer	9.708	2.602
100 year +40% CC 15 minute summer	461.530	130.597
100 year +40% CC 30 minute summer	303.307	85.825
100 year +40% CC 60 minute summer	203.498	53.779
100 year +40% CC 120 minute summer	123.340	32.595
100 year +40% CC 180 minute summer	93.311	24.012
100 year +40% CC 240 minute summer	72.743	19.224
100 year +40% CC 360 minute summer	54.225	13.954
100 year +40% CC 480 minute summer	42.096	11.125
100 year +40% CC 600 minute summer	34.091	9.325
100 year +40% CC 720 minute summer	30.106	8.069
100 year +40% CC 960 minute summer	24.371	6.417
100 year +40% CC 1440 minute summer	17.314	4.640
100 year +40% CC +10% A 15 minute summer	461.530	130.597
100 year +40% CC +10% A 30 minute summer	303.307	85.825
100 year +40% CC +10% A 60 minute summer	203.498	53.779
100 year +40% CC +10% A 120 minute summer	123.340	32.595
100 year +40% CC +10% A 180 minute summer	93.311	24.012
100 year +40% CC +10% A 240 minute summer	72.743	19.224
100 year +40% CC +10% A 360 minute summer	54.225	13.954
100 year +40% CC +10% A 480 minute summer	42.096	11.125
100 year +40% CC +10% A 600 minute summer	34.091	9.325
100 year +40% CC +10% A 720 minute summer	30.106	8.069
100 year +40% CC +10% A 960 minute summer	24.371	6.417
100 year +40% CC +10% A 1440 minute summer	17.314	4.640

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	11	2.932	0.032	1.6	0.0358	0.0000	OK
15 minute summer	S1	10	2.643	0.054	4.9	0.0608	0.0000	OK
15 minute summer	S2	11	2.612	0.064	7.1	0.0726	0.0000	OK
15 minute summer	S3	11	2.577	0.080	10.7	0.0903	0.0000	OK
15 minute summer	S4	11	2.546	0.082	6.7	0.0924	0.0000	OK
15 minute summer	S5	11	2.545	0.105	21.6	0.1190	0.0000	OK
15 minute summer	S6	11	2.507	0.126	26.3	0.1422	0.0000	OK
15 minute summer	S7L	10	2.680	0.055	4.4	0.0619	0.0000	OK
15 minute summer	S7	11	2.449	0.132	34.8	0.1488	0.0000	OK
15 minute summer	S8	11	2.395	0.174	39.3	0.1970	0.0000	OK
15 minute summer	S9LA	10	2.534	0.034	2.8	0.0388	0.0000	OK
15 minute summer	S9LB	10	2.509	0.111	6.4	0.1260	0.0000	OK
15 minute summer	S9	12	2.327	0.154	47.0	0.1738	0.0000	OK
15 minute summer	S11	12	2.227	0.172	54.0	0.1947	0.0000	OK
360 minute summer	HW1	280	1.941	0.192	11.8	0.0000	0.0000	OK
360 minute summer	HW2	280	1.941	0.192	8.1	0.0000	0.0000	OK
360 minute summer	S12	280	1.941	0.221	2.1	1.2682	0.0000	OK
15 minute summer	HW3	1	1.644	0.000	1.8	0.0000	0.0000	OK
15 minute summer	S6L	10	2.600	0.035	1.8	0.0401	0.0000	OK
15 minute summer	S4A	10	2.616	0.050	5.8	0.0571	0.0000	OK
15 minute summer	S4AL	10	3.032	0.032	2.5	0.0356	0.0000	OK
15 minute summer	S10A	12	2.301	0.070	4.3	0.0789	0.0000	OK
15 minute summer	S10B	12	2.295	0.182	54.5	0.2056	0.0000	OK
15 minute summer	S10C	12	2.249	0.170	54.1	0.1928	0.0000	OK
	dummy							

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 summer	S1L	1.000	S1	1.6	0.592	0.098	0.0274	
15 minute summer	S1	1.001	S2	4.8	0.440	0.045	0.1586	
15 minute summer	S2	1.002	S3	7.0	0.477	0.066	0.2614	
15 minute summer	S3	1.003	S5	10.7	0.509	0.100	0.4240	
15 minute summer	S4	2.002	S5	6.5	0.307	0.056	0.1507	
15 minute summer	S5	1.004	S6	21.4	0.745	0.169	0.4197	
15 minute summer	S6	1.005	S7	26.1	0.783	0.246	0.7505	
15 minute summer	S7L	4.000	S7	4.3	0.748	0.285	0.0654	
15 minute summer	S7	1.006	S8	34.4	0.815	0.270	0.9937	
15 minute summer	S8	1.007	S9	39.0	0.844	0.489	1.3707	
15 minute summer	S9LA	5.000	S9	2.8	0.921	0.114	0.0165	
15 minute summer	S9LB	6.000	S9	6.2	0.553	4.318	0.1397	
15 minute summer	S9	1.008	S10B	47.4	0.993	0.314	0.5026	
15 minute summer	S11	1.011	HW1	54.5	1.863	0.402	2.0795	
360 minute summer	HW1	Flow through pond	HW2	5.6	0.009	0.000	51.1441	
360 minute summer	HW2	1.012	S12	2.1	0.238	0.017	0.4439	
360 minute summer	S12	Hydro-Brake®	HW3	1.9				56.0
15 minute summer	S6L	3.000	S6	1.8	0.558	0.123	0.0162	
15 minute summer	S4A	2.001	S4	5.7	0.502	0.040	0.2606	
15 minute summer	S4AL	2.000	S4A	2.5	0.923	0.096	0.0270	
15 minute summer	S10A	7.000	S10B	4.3	0.183	0.038	1.1748	
15 minute summer	S10B	1.009	S10C	54.1	1.065	0.540	0.6800	
15 minute summer	S10C	1.010	S11	54.0	1.101	0.421	0.2848	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.944	0.044	3.1	0.0498	0.0000	OK
15 minute summer	S1	10	2.663	0.074	9.3	0.0832	0.0000	OK
15 minute summer	S2	11	2.636	0.088	13.6	0.0997	0.0000	OK
15 minute summer	S3	11	2.610	0.113	20.5	0.1279	0.0000	OK
15 minute summer	S4	11	2.594	0.130	12.7	0.1465	0.0000	OK
15 minute summer	S5	11	2.593	0.153	41.0	0.1731	0.0000	OK
15 minute summer	S6	11	2.564	0.183	50.2	0.2070	0.0000	OK
15 minute summer	S7L	10	2.704	0.079	8.4	0.0892	0.0000	OK
15 minute summer	S7	11	2.516	0.199	66.5	0.2255	0.0000	OK
15 minute summer	S8	11	2.477	0.256	75.1	0.2893	0.0000	OK
15 minute summer	S9LA	10	2.547	0.047	5.3	0.0536	0.0000	OK
15 minute summer	S9LB	10	2.565	0.167	12.2	0.1885	0.0000	SURCHARGED
15 minute summer	S9	11	2.404	0.231	90.5	0.2617	0.0000	OK
15 minute summer	S11	12	2.302	0.247	104.7	0.2795	0.0000	OK
360 minute summer	HW1	360	2.123	0.374	21.5	0.0000	0.0000	OK
360 minute summer	HW2	360	2.123	0.374	13.7	0.0000	0.0000	OK
360 minute summer	S12	360	2.123	0.403	2.7	2.3103	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	1.9	0.0000	0.0000	OK
15 minute summer	S6L	10	2.614	0.049	3.4	0.0557	0.0000	OK
15 minute summer	S4A	10	2.635	0.069	10.9	0.0776	0.0000	OK
15 minute summer	S4AL	10	3.043	0.043	4.7	0.0490	0.0000	OK
15 minute summer	S10A	12	2.384	0.153	8.1	0.1726	0.0000	OK
15 minute summer	S10B	12	2.380	0.267	105.7	0.3022	0.0000	OK
15 minute summer	S10C	12	2.327	0.248	104.4	0.2806	0.0000	OK
	dummy							

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 summer	S1L	1.000	S1	3.1	0.714	0.188	0.0436	
15 minute summer	S1	1.001	S2	9.2	0.527	0.086	0.2508	
15 minute summer	S2	1.002	S3	13.4	0.569	0.125	0.4209	
15 minute summer	S3	1.003	S5	20.3	0.585	0.190	0.7039	
15 minute summer	S4	2.002	S5	12.4	0.330	0.106	0.2665	
15 minute summer	S5	1.004	S6	41.0	0.858	0.323	0.6962	
15 minute summer	S6	1.005	S7	50.1	0.887	0.472	1.2685	
15 minute summer	S7L	4.000	S7	8.3	0.886	0.545	0.1055	
15 minute summer	S7	1.006	S8	65.9	0.942	0.518	1.6414	
15 minute summer	S8	1.007	S9	73.8	0.977	0.926	2.2475	
15 minute summer	S9LA	5.000	S9	5.3	1.105	0.216	0.0260	
15 minute summer	S9LB	6.000	S9	12.0	0.726	8.296	0.1887	
15 minute summer	S9	1.008	S10B	89.4	1.157	0.594	0.8182	
15 minute summer	S11	1.011	HW1	105.8	2.132	0.780	3.5057	
360 minute summer	HW1	Flow through pond	HW2	9.1	0.011	0.001	110.0595	
360 minute summer	HW2	1.012	S12	2.7	0.279	0.021	0.7851	
360 minute summer	S12	Hydro-Brake®	HW3	2.0				60.5
15 minute summer	S6L	3.000	S6	3.4	0.672	0.234	0.0258	
15 minute summer	S4A	2.001	S4	10.8	0.525	0.075	0.4675	
15 minute summer	S4AL	2.000	S4A	4.7	1.108	0.182	0.0424	
15 minute summer	S10A	7.000	S10B	7.6	0.214	0.066	2.2098	
15 minute summer	S10B	1.009	S10C	104.4	1.297	1.042	1.0796	
15 minute summer	S10C	1.010	S11	104.7	1.357	0.817	0.4485	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.961	0.061	5.7	0.0686	0.0000	OK
15 minute summer	S1	13	2.738	0.149	16.9	0.1685	0.0000	OK
15 minute summer	S2	12	2.728	0.180	24.6	0.2040	0.0000	OK
15 minute summer	S3	12	2.719	0.222	36.5	0.2516	0.0000	OK
15 minute summer	S4	12	2.729	0.265	26.5	0.3000	0.0000	OK
15 minute summer	S5	12	2.732	0.292	70.5	0.3303	0.0000	OK
15 minute summer	S6	12	2.718	0.337	83.5	0.3807	0.0000	OK
15 minute summer	S7L	11	2.755	0.130	15.3	0.1468	0.0000	OK
15 minute summer	S7	11	2.701	0.384	109.9	0.4343	0.0000	SURCHARGED
15 minute summer	S8	11	2.655	0.434	118.3	0.4904	0.0000	SURCHARGED
15 minute summer	S9LA	11	2.569	0.069	9.6	0.0777	0.0000	OK
15 minute summer	S9LB	11	2.756	0.358	22.0	0.4050	0.0000	SURCHARGED
15 minute summer	S9	11	2.574	0.401	144.8	0.4532	0.0000	SURCHARGED
720 minute summer	S11	720	2.428	0.373	23.0	0.4216	0.0000	OK
720 minute summer	HW1	720	2.428	0.679	22.4	0.0000	0.0000	OK
720 minute summer	HW2	720	2.428	0.679	13.2	0.0000	0.0000	SURCHARGED
720 minute summer	S12	720	2.428	0.708	3.4	4.0523	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S6L	11	2.733	0.168	6.2	0.1904	0.0000	SURCHARGED
15 minute summer	S4A	12	2.724	0.158	19.7	0.1785	0.0000	OK
15 minute summer	S4AL	10	3.059	0.059	8.5	0.0670	0.0000	OK
15 minute summer	S10A	11	2.528	0.297	14.7	0.3356	0.0000	OK
15 minute summer	S10B	11	2.527	0.414	163.5	0.4683	0.0000	SURCHARGED
15 minute summer	S10C	11	2.437	0.358	165.8	0.4054	0.0000	OK
	dummy							

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 summer	S1L	1.000	S1	5.6	0.844	0.345	0.0677	
15 minute summer	S1	1.001	S2	16.7	0.589	0.157	0.6557	
15 minute summer	S2	1.002	S3	23.5	0.607	0.220	1.0641	
15 minute summer	S3	1.003	S5	35.8	0.611	0.336	1.6101	
15 minute summer	S4	2.002	S5	25.6	0.341	0.220	0.6156	
15 minute summer	S5	1.004	S6	67.0	0.893	0.528	1.4298	
15 minute summer	S6	1.005	S7	79.0	0.919	0.745	2.4104	
15 minute summer	S7L	4.000	S7	15.1	1.027	0.993	0.1904	
15 minute summer	S7	1.006	S8	100.8	0.991	0.792	2.5936	
15 minute summer	S8	1.007	S9	113.7	1.068	1.427	3.2734	
15 minute summer	S9LA	5.000	S9	9.6	1.276	0.395	0.0694	
15 minute summer	S9LB	6.000	S9	21.5	1.223	14.872	0.2193	
15 minute summer	S9	1.008	S10B	137.3	1.267	0.911	1.1619	
720 minute summer	S11	1.011	HW1	22.4	0.589	0.165	7.3000	
720 minute summer	HW1	Flow through pond	HW2	9.3	0.010	0.001	227.9230	
720 minute summer	HW2	1.012	S12	3.4	0.267	0.027	0.7854	
720 minute summer	S12	Hydro-Brake®	HW3	2.0				91.0
15 minute summer	S6L	3.000	S6	7.6	0.719	0.529	0.0902	
15 minute summer	S4A	2.001	S4	23.8	0.559	0.166	1.2589	
15 minute summer	S4AL	2.000	S4A	8.4	1.306	0.329	0.0651	
15 minute summer	S10A	7.000	S10B	14.3	0.237	0.124	3.5728	
15 minute summer	S10B	1.009	S10C	165.8	1.503	1.655	1.4642	
15 minute summer	S10C	1.010	S11	166.2	1.547	1.298	0.6237	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 98.96%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1L	10	2.964	0.064	6.2	0.0719	0.0000	OK
15 minute summer	S1	12	2.818	0.229	18.5	0.2589	0.0000	OK
15 minute summer	S2	12	2.826	0.278	26.9	0.3146	0.0000	OK
15 minute summer	S3	12	2.803	0.306	39.5	0.3464	0.0000	OK
15 minute summer	S4	13	2.800	0.336	23.7	0.3798	0.0000	OK
15 minute summer	S5	13	2.792	0.352	74.6	0.3987	0.0000	OK
15 minute summer	S6	13	2.778	0.397	86.2	0.4487	0.0000	SURCHARGED
15 minute summer	S7L	11	2.822	0.197	16.8	0.2227	0.0000	SURCHARGED
15 minute summer	S7	12	2.743	0.426	105.0	0.4816	0.0000	SURCHARGED
15 minute summer	S8	12	2.695	0.474	112.8	0.5364	0.0000	SURCHARGED
15 minute summer	S9LA	12	2.628	0.128	10.6	0.1452	0.0000	OK
15 minute summer	S9LB	11	2.831	0.433	24.3	0.4897	0.0000	SURCHARGED
15 minute summer	S9	12	2.619	0.446	142.8	0.5042	0.0000	SURCHARGED
720 minute summer	S11	720	2.486	0.431	25.1	0.4878	0.0000	SURCHARGED
720 minute summer	HW1	720	2.486	0.737	24.6	0.0000	0.0000	OK
720 minute summer	HW2	720	2.486	0.737	17.4	0.0000	0.0000	SURCHARGED
720 minute summer	S12	720	2.486	0.766	6.1	4.3864	0.0000	SURCHARGED
15 minute summer	HW3	1	1.644	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S6L	13	2.783	0.218	6.8	0.2462	0.0000	SURCHARGED
15 minute summer	S4A	13	2.801	0.235	21.6	0.2656	0.0000	OK
15 minute summer	S4AL	10	3.062	0.062	9.3	0.0704	0.0000	OK
15 minute summer	S10A	12	2.572	0.341	16.2	0.3857	0.0000	OK
15 minute summer	S10B	12	2.572	0.459	169.2	0.5193	0.0000	SURCHARGED
960 minute summer	S10C dummy	945	2.488	0.409	20.4	0.4628	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 summer	S1L	1.000	S1	6.1	0.864	0.375	0.0720	
15 minute summer	S1	1.001	S2	18.2	0.597	0.171	1.1370	
15 minute summer	S2	1.002	S3	25.2	0.609	0.236	1.6251	
15 minute summer	S3	1.003	S5	36.3	0.611	0.340	2.0306	
15 minute summer	S4	2.002	S5	21.4	0.332	0.183	0.7427	
15 minute summer	S5	1.004	S6	71.2	0.901	0.561	1.5859	
15 minute summer	S6	1.005	S7	87.5	0.951	0.824	2.4785	
15 minute summer	S7L	4.000	S7	15.7	1.024	1.035	0.1983	
15 minute summer	S7	1.006	S8	105.4	1.001	0.828	2.5936	
15 minute summer	S8	1.007	S9	113.1	1.086	1.419	3.2734	
15 minute summer	S9LA	5.000	S9	10.7	1.268	0.441	0.0917	
15 minute summer	S9LB	6.000	S9	23.1	1.315	16.000	0.2193	
15 minute summer	S9	1.008	S10B	140.0	1.269	0.929	1.1619	
720 minute summer	S11	1.011	HW1	24.6	0.604	0.181	7.3043	
720 minute summer	HW1	Flow through pond	HW2	12.6	0.009	0.001	253.2907	
720 minute summer	HW2	1.012	S12	6.1	0.245	0.048	0.7854	
720 minute summer	S12	Hydro-Brake®	HW3	2.0				93.4
15 minute summer	S6L	3.000	S6	6.2	0.738	0.429	0.0902	
15 minute summer	S4A	2.001	S4	20.0	0.564	0.139	1.7469	
15 minute summer	S4AL	2.000	S4A	9.2	1.339	0.360	0.0696	
15 minute summer	S10A	7.000	S10B	14.3	0.248	0.124	3.7785	
15 minute summer	S10B	1.009	S10C	168.8	1.530	1.685	1.4759	
960 minute summer	S10C	1.010	S11	20.1	0.869	0.157	0.6408	

Flow+ v10.1 Copyright © 1988-2022 Causeway Technologies Ltd