SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

15 High Street,
Spalding,
Lincs. PE11 1TW

Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

FOUL & SURFACE WATER DRAINAGE STRATEGY

FOR

PROPOSED RESIDENTIAL DEVELOPMENT,

OFF SEAGATE ROAD,

LONG SUTTON, SPALDING,

LINCOLNSHIRE

PROJECT No: 22421

DOCUMENT REF: 22421-REP-01A

REVISION: A

DATE: FEB. 2022

For D Brown Builders

D.BROWN BUILDING CONTRACTORS LIMITED

Revisions:

A – 02.02.22 – Strategy updated to suit revised site layout.

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Fax: 01775 712635
Email: src@srcltd.com

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Fax: 01775 712635
Email: src@srcltd.com

1. INTRODUCTION

The following drainage strategy has been prepared on behalf of D Brown Builders to support a full planning application for a proposed 171 plot residential development (plots 10-180 inclusive), at Land off Seagate Road, Long Sutton.

This strategy is based upon Lincs Design Consultancy Site Layout drawing LDC-3699-PL-02 Rev.B, included within Appendix A.

The object of this report is to clarify the design philosophy followed when preparing the proposed foul and surface water drainage arrangement and to outline the proposed solution in sufficient detail for all relevant parties to be able to comment. This assessment also demonstrates that the proposals are within the guidance contained with the National Planning Policy Framework (NPPF).

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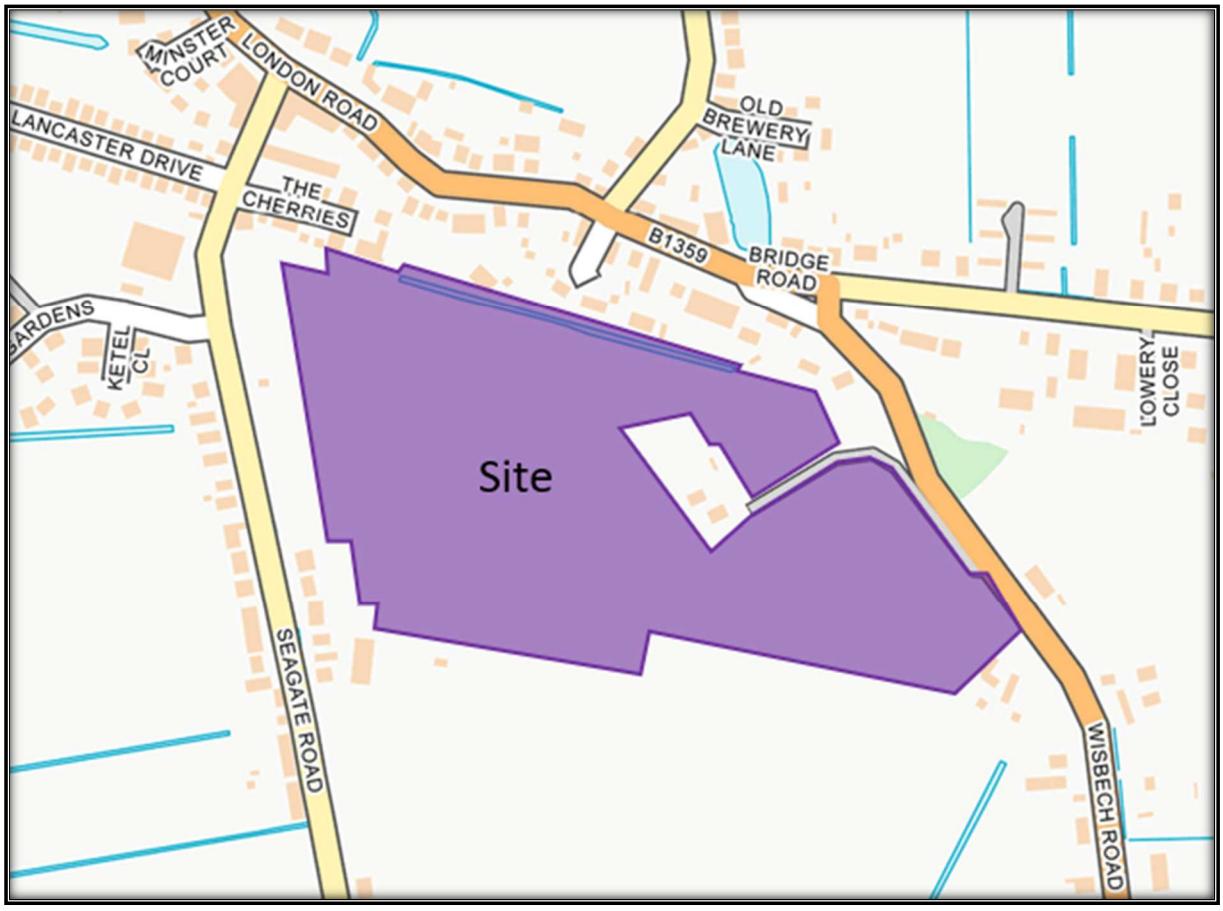
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Fax: 01775 712635
Email: src@srcltd.com

2. LOCATION & SITE DESCRIPTION

See Appendix A for the proposed Block plan.

2.1 Site Location

The site is approximately 9.63 hectare in size and is located off Seagate Road, Long Sutton, National Grid reference TF 436223.



2.2 Site Description

The site is bound by an existing riparian watercourse and residential dwellings to the North, Wisbech Road to the East, agricultural land to the South, and a riparian watercourse and Seagate Road to the West.

The site is a greenfield site used for agriculture and is accessed via Seagate Road and Wisbech Road.

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The topographical survey indicates that the site is relatively flat. The levels along the Eastern site boundary are approximately 3.60m AOD with Wisbech Road lying much higher at 4.40m to 7.50m AOD. The site levels are at their highest local to the existing dwellings within the site, with ground levels of approximately 4.00m AOD. Levels the fall towards the Western boundary/Seagate Road to 3.00m AOD.

2.3 Site Geology

Ground investigations were undertaken in March 2021 by Humberside Materials Laboratory and extracts of the ground investigation test results are included within Appendix B.

The report identifies that the site is underlain with Tidal Flat Deposit silt strata and infiltration testing was proven to be unfeasible.

Ground water was discovered during the investigation and rose to approximately 0.6m to 2.95m below ground level.

2.4 Site Proposals

The proposed development consists of 171 new dwellings. There is a combination of detached, semi-detached, terrace and maisonette properties.

The Lincs Design Consultancy proposed Site Layout drawing LDC-3699-PL-02 Rev.B, included within Appendix A, shows the layout proposals.

3. FLOOD RISK

A site-specific flood risk assessment has been prepared by Lincs Design Consultancy, dated 9th December 2021.

The flood risk assessment has identified that floor levels for 1 storey dwellings are to be raised to a minimum of 1m above existing ground level. Floor levels for the 2 storey dwellings are to be a minimum of 3.7m AOD.

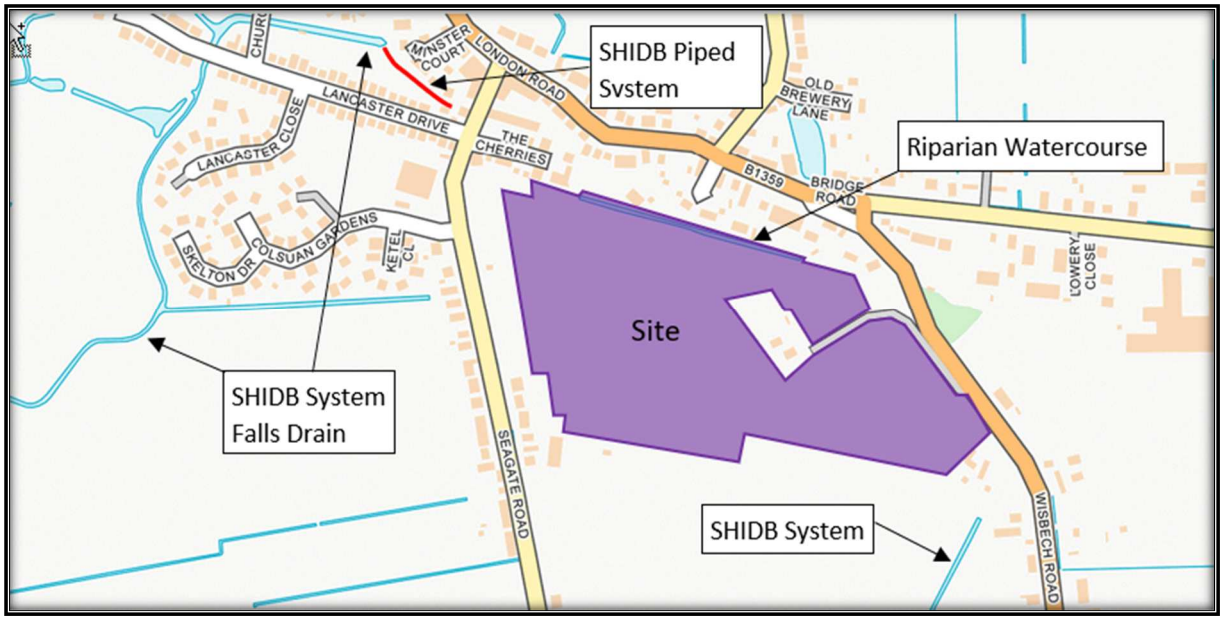
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Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

4. SURFACE WATER

4.1 Existing Surface Water

The site is located within South Holland Internal Drainage Board district. The below map shows the maintained watercourses local to the site.



There are two existing maintained systems local to the site. One being the watercourse to the South-East of the site approximately 50m from the site's boundary.

The other system being to the North-West of the site, the head of this system is piped in a parcel of land accessed off Minster Court before outfalling to Falls Drain.

There is an existing surface water system from the riparian watercourse in the North-West corner of the site which connects to the IDB piped system. The route of this system follows Seagate Road to the North and under the driveway/garden of 28 Seagate Road to connect to the IDB system.

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4.2 SuDS Considerations

The SuDS hierarchy has been given consideration during the proposed drainage design, with the preferential hierarchy considered as follows:

- Infiltration
- Watercourse
- Surface Water Sewer
- Combined Sewer

As highlighted previously within this report, it has been established that the sites geotechnical characteristics do not lend themselves to the use of an infiltration-based strategy, due to the underlying strata & relatively high-water table.

However, the South Holland IDB (SHIDB) maintained watercourse to the North-West lends itself for the surface water discharge from the proposed development. The appropriate SHIDB consents would be obtained at the detailed design stage. Discharge to the SHIDB watercourse to the South-East was considered, however due to the topography of the site falling in an East to West direction a gravity outfall for the site to this location is unfeasible.

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The use of various on-site SuDS features has been explored to improve the water quality of discharge from the site. The following hierarchy has been given consideration during the proposed drainage design.

	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Most Sustainable	**Living roofs**	✔	✔	✔
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	**Tanked systems** - over-sized pipes/tanks - storms cells	✔		

Living roofs have been considered inappropriate for the proposed development due to the style of housing to be provided.

The site does have a nominal gradient which could lend itself to the use of basins and ponds. Their use will be explored and introduced within the public open spaces provided by the development.

Filter strips and swales could be a viable option for collecting the proposed highway surface water run-off. Due to the ground water level these would have to be lined with an impermeable membrane and designed to convey water and not designed to use any infiltration. Their use would improve the water quality and slow down run-off into the proposed downstream network.

Permeable surfaces to the proposed driveways will be explored however the systems will have to be tanked, i.e. Type C system, due to the relatively high ground water levels. Permeable surfacing of the adoptable Highway will not be feasible due

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to poor CBR values obtain during the ground investigations and LCC adoption criteria regarding this.

If the above solutions cannot be accommodated to attenuate the surface water run-off a tanked system could be introduced.

4.3 Surface Water Proposals

As discussed previously as an infiltration-based strategy cannot be introduce, therefore surface water is to be discharged into the SHIDB maintained system to the North-West.

The site area associated with this application is 9.63 hectare, therefore as demonstrated by the following QBar calculations existing run off totals 14.11 litres per second.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	14.11	14.11
1 in 1 year (l/s):	12.28	12.28
1 in 30 years (l/s):	34.58	34.58
1 in 100 year (l/s):	50.24	50.24
1 in 200 years (l/s):	59.41	59.41

However, following previous communication with SHIDB they will only allow discharge into their system at 1.4l/s/ha. The total impermeable/contributing area to the proposed drainage system is 5.085ha, therefore the proposed discharge rate is to be 7.1 litres per second.

A HydroBrake will be introduced into the downstream elements of the proposed drainage system to reduce flows to this rate.

To attenuate the flows above 7.1 litres per second a number of devices will be introduced upstream to attenuate the additional flows.

The drainage arrangement drawings, 22421/01,02,03&04 included within Appendix C, demonstrate the sites surface water drainage proposals. Surface water is to be captured from the adoptable roads and footpaths, shared and private driveways, and the proposed dwelling roofs. As no infiltration is feasible the area for the filter drains,

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attenuation basins and the improved watercourse/swale has also been attributed to the proposed drainage system.

The natural topography of the site provides a nominal fall from the East to the Western outfall location. The proposed drainage/road design follows this general fall, albeit site levels will need to be nominally raised to suit the FRA and to enable a gravity system.

It is proposed that a filter strip and filter drain is to be located adjacent to the majority of the proposed highway. This will collect the run-off from the surface of the footpath and carriageway, providing cleaning at source as the run-off passes the filter strip and soaks into the lined open graded stone material and perforated pipe. This in itself provides two treatment trains to the majority of the adoptable highway shown on the proposed drainage arrangement drawings included within Appendix C. Drawing 22421/05 is included within Appendix D and shows the typical filter drain construction.

In accordance with planning policy there are to be social and affordable housing provided within the proposed development. From an economic point, the density of this housing must be greater. The majority of this housing is provided in the approximate area of Plots 20-86 to the Southern site boundary. Due to the housing density required it is not viable to utilise filter drains to collect highway water in this area. Therefore, a gully and pipe system will be used. Treatment will still be provided via the gully pots and online attenuation basins and swale downstream.

The proposed roof areas indicated on the drawings, will be drained via rainwater pipes and underground network local to each plot prior to discharging to the perforated pipe within the filter drains or pipe under the carriageway as applicable.

The proposed driveways are to be constructed of a permeable block paving. As infiltration is not feasible the sub-base construction will be lined, and the surface water will be collected from the sub-base via either perforated pipes or fin drains. A typical construction detail is indicated on drawing 22421/05. This construction

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provides suitable source control to ensure water quality, prior to discharging to the filter drains or pipe under the carriageway.

Due to the size of the site, the proposed site levels and the proposed phasing to the construction programme, two detention basins are to be located within the public open spaces to provide storage for flows in excess of 7.1 litres per second. Either one or both of the basins are ‘online’ for the whole drainage system and they provide additional source control through the proposed planting to the basin bed and the marshy areas. The planting is to be in accordance with the CIRIA SuDS Manual 2015, with the vegetation at a suitable level for the 1:1 year event to provide pollutant removal of the surface water run-off. Typical basin cross sections are shown on drawing 22421/05. The larger basin, central within the site, has been designed to have a perimeter channel 5m wide and 300mm deep. This is to convey and store surface water runoff for the 1:1 / 1:2 year storms to prevent the main basin bed becoming saturated on a regular basis. Storm events over 1:2 will require greater than 300mm storage depth and will therefore begin to flood the whole basin area.

Also due to the size of the site, an additional flow control chamber is proposed at the downstream end of Basin 1. This enables a higher water level to be achieved within this basin, as its banks are at a higher level, as it is located in the central part of the site.

There is an existing riparian watercourse to a section of the Northern boundary, approximately 240m in length, which is wholly within the site’s boundary. It is proposed to improve this watercourse to act as a swale for surface water conveyance, additional treatment, and storage, as shown on drawing 22421/05. Utilising this existing feature to convey surface water enables a gravity outfall for the site to be achieved. Further surveying of the existing ditch will be carried out at the detailed design stage.

The HydroBrake chamber restricting flow off site is to discharge into a new Anglian Water sewer within Seagate Road. The existing system within Seagate Road is generally in poor condition and the level at the site boundary does not allow a gravity

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outfall to be made. The exact arrangements for the proposed Anglian Water system in this area and its connection to the SHIDB system are to be agreed.

The system has been modelled utilising MicroDrainage and the calculation inputs and outputs are included within our calculation package 22421-MD-01A, contained with Appendix G. These calculations demonstrate that the run-off will be safely conveyed and attenuated during storms up to and including the 1 in 100 year event plus climate change allowance. The system has no surface flooding within events up to and including the 1:100 year when using both FSR and FEH rainfall data.

4.4 Overland Exceedance Route

With regard to exceedance routing, drawings 22421/01-04 within Appendix C shows the overland flood flow route of the system. The proposed exceedance routing follows the general topography of the site, falling from the Eastern boundary to Basin 1. There is a small section which will fall from the West in an Easterly direction to basin 1, this is in accordance with the proposed construction phasing. Then the most Western part of the site falls to the North-West where attenuation basin 3 is situated.

The proposed carriageway has a longitudinal gradient of 1:500 (minimum) where filter drains are used, to direct flows as described above. Where surface water is collected via gullies from the carriageway the general profile remains at 1:500 however there is a saw tooth nature to achieve 1:150 gradient to suit LCC requirements. This will incur a small amount of ponding local to the gullies in an exceedance event, but the water will be stored only on the Highway owned land.

The attenuation basins have a minimum 400mm freeboard so offer in excess of 2,600 cubic metres of storage above the worst case modelled storm.

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5. FOUL WATER

5.1 Existing Foul Water

There are multiple Anglian Water assets local to and on the proposed site. An existing Foul Water sewer is present within Seagate Road to the West. There is also a foul water sewer within Wisbech Road to the East which enters the sites boundary in the North-east corner. This then travels West adjacent to the watercourse on site before heading off site along the Northern boundary.

Immediately to the North of the site is an existing Foul Water pumping station. Consequentially all sewers have a reasonable amount of depth which will aid the sites connection.

The existing Anglian Water assets onsite will have an easement in place which will need to be maintained.

Anglian Water asset maps are contained within Appendix F.

5.2 Foul Water Proposals

The proposed dwellings will have a buried pipe foul water network around the footprint of the property which will be maintained by individual dwelling. These will then discharge to the proposed foul water network within the adoptable highway area, this drainage network will be offered for Anglian Water's adoption.

Due to the size of the site, there are three proposed connection points to the existing Anglian Water system. The design proposals are illustrated on our drawings 22421/01-04, included within Appendix C.

Connection has previously been agreed for the site to the Anglian Water foul network, albeit with a pumped discharge.

To aid future maintenance requirements it is proposed to divert the existing Anglian Water assets adjacent to the existing watercourse, under the proposed road which runs parallel. This is subject to a future Section 185 agreement to be pursued at the detailed design stage.

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6. MAINTENANCE STRATEGY

The proposed surface water and foul water drainage systems are to be maintained and owned by several different parties. An adoption/maintenance plan has been prepared to illustrate who is responsible for each element of the surface water drainage system. This is shown on drawing 22421/06 and is included within Appendix E.

This drawing notes four parties who are responsible for different elements of the drainage system. The assets are all required to be in reasonable working order for the systems to function as a whole and operate as anticipated in design models. Each parties' responsibilities are listed below:

1. Anglian Water:
    - Filter drains (below surface)
    - Perforated pipes and chambers
    - Detention basins
    - Swale to Northern boundary
    - HydroBrake flow control devices
    - Underground pipe network and chambers for FW & SW
    - Headwalls

These features will be adopted by Anglian Water Services Ltd under an agreement pursuant to Section 104 of the Water Industry Act.

2. LCC Highways:
    - Carriageway
    - Footpaths
    - Vehicular crossovers
    - Filter drains and filter strips (above surface)
    - Gullies and laterals

These features will be adopted by Lincolnshire County Council Highways under a Section 38 agreement.

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3. Management Company:
    - Areas of POS not used for attenuation
    - Easement strip adjacent to swale
    - Shared driveways including integral SW drainage system
4. Private Plot Owners:
    - Permeable driveway construction
    - Fin Drains / perforated collector pipes
    - Buried pipe networks and chambers local to plot for FW and SW
    - Gutters, downpipes and other building rainwater goods

It should be noted that the surface water design calculations do not include a storage allowance for the open graded stone under the private permeable driveways. This is because there designed approach can not be guaranteed for the lifespan of the development, should the private owners make changes to the construction.

The scope/nature of inspection and maintenance is such that various facilities and structures are inspected and maintained at yearly intervals, as well as after or during use and/or heavy storms, in order that they continue to perform effectively.

The maintenance schedule for the foul water system, should as a minimum consist of annual inspections and 5 yearly rodding/jetting should no issue be encountered.

The maintenance schedule for the surface water system will comprise the following activities in accordance with the CIRIA publication C753 (The SuDS Manual)

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Activity	Frequency	Typical Tasks
Routine/regular maintenance (including inspections and monitoring)	Monthly	• Litter/debris removal • Grass cutting (in season) • Inspection and clearance of gullies and drainage channels • Inspection of pumping station
Occasional maintenance	Annually	• Silt removal from catchpits/gullies • Pipe drainage every 3-5 years: suction sweeping (to Water Jetting Association standards) and CCTV where necessary
Remedial maintenance	As required (tasks to repair problems due to damage or vandalism	• Silt removal • Inlet/outlet repair • Erosion repairs • System rehabilitation following a pollution event • Pump failure

On completion of the above, ensure the drainage system is running freely and cleanly. If not, repeat maintenance activities. Written records should be kept of all maintenance work carried out.

7. CONCLUSIONS

As illustrated by our design proposals on drawings 22421 / 01 - 06, surface water calculations and the information outlined within this report, it is demonstrable that a viable and robust foul and surface water scheme that complies with the requirements of National Planning Guidance can be provided for the proposed residential development.

For and on behalf of **SIDEBOTTOM RICHARDSON CHENG LTD**

M PETT **2nd February 2022**

Approved By: J.A. RICHARDSON I Eng. AMIStructE

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APPENDIX A – Site Layout Plan

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Fenholme

SWALE

B 1359

6.3m

The Common

Track

PLOT NUMBER	PLOT NAME	HOUSE TYPE	CHARACTER TYPE	MARKET/ SOCIAL	MATERIAL MIX	MINIMUM FINISH FLOOR LEVEL (m AOD)
70	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.100
71	THE ASPEN	21	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.100
72	THE ASPEN	21	DETACHED DOUBLE	MARKET	Red Elm, Red Brick	3.980
73	THE ALDER	28	DETACHED DOUBLE	MARKET	Dark Elm, Buff Brick	3.980
74	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.100
75	THE TULIP	22	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.160
76	THE CEDAR	5A	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.100
77	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.220
78	THE CHERRY	7	ATTACHED SINGLE	MARKET	Red Elm, Red Brick	4.220
79	THE ASH	37	N/A	MARKET	Red Elm, Red Brick	4.100
80	THE ALDER	28	N/A	MARKET	Red Elm, Red Brick	4.100
81	THE ALDER	28	N/A	MARKET	Red Elm, Red Brick	4.100
82	THE ALDER	28	N/A	MARKET	Dark Elm, Red Brick	4.100
83	THE ALDER	28	N/A	MARKET	Dark Elm, Red Brick	4.100
84	THE ALDER	28	N/A	MARKET	Dark Elm, Red Brick	4.100
85	THE ASPEN	21	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.100
86	THE CHERRY	10	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.200
87	THE CHERRY	10	ATTACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.200
88	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
89	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
90	THE LIME	29	ATTACHED SINGLE	SOCIAL	Red Elm, Red Brick	4.200
91	THE LIME	29	N/A	SOCIAL	Dark Elm, Red Brick	4.200
92	THE LIME	29	N/A	SOCIAL	Dark Elm, Red Brick	4.200
93	THE LIME	29	N/A	SOCIAL	Dark Elm, Red Brick	4.200
94	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.150
95	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.150
96	THE CHERRY	10	ATTACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.190
97	THE CHERRY	10	ATTACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.190
98	THE TITCH	23	ATTACHED SINGLE	MARKET	Red Elm, Red Brick	4.160
99	THE TITCH	24	ATTACHED SINGLE	MARKET	Red Elm, Red Brick	4.160
100	THE ASPEN	21	N/A	MARKET	Red Elm, Red Brick	4.160
101	THE ASPEN	21	N/A	MARKET	Red Elm, Red Brick	4.160
102	THE CEDAR	5	DETACHED DOUBLE	MARKET	Dark & Red Elm, Red Brick	4.060
103	THE CHERRY	7	ATTACHED SINGLE	MARKET	Dark & Red Elm, Red Brick	4.190
104	THE CHERRY	7	ATTACHED SINGLE	MARKET	Dark & Red Elm, Red Brick	4.190
105	THE CHERRY	10	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.150
106	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.180
107	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.180
108	THE POPLAR	30	N/A	SOCIAL	Red Elm, Red Brick	4.150
109	THE POPLAR	30	N/A	SOCIAL	Red Elm, Red Brick	4.150
110	THE POPLAR	30	N/A	SOCIAL	Red Elm, Red Brick	4.150
111	THE POPLAR	30	N/A	SOCIAL	Red Elm, Red Brick	4.150
112	THE LIME	29	N/A	SOCIAL	Dark & Red Elm, Red Brick	4.150
113	THE ASH	37	N/A	SOCIAL	Dark & Red Elm, Red Brick	4.150
114	THE ASH	37	N/A	SOCIAL	Dark Elm, Red Brick	4.150
115	THE ASH	37	N/A	SOCIAL	Dark Elm, Red Brick	4.150
116	THE LIME	29	N/A	SOCIAL	Dark Elm, Red Brick	4.150
117	THE LIME	29	N/A	SOCIAL	Dark Elm, Red Brick	4.150
118	THE ASH	37	N/A	SOCIAL	Dark Elm, Red Brick	4.150
119	THE ASH	37	N/A	SOCIAL	Dark Elm, Red Brick	4.150
120	THE ALDER	28	N/A	MARKET	Red Elm, Red Brick	4.150
121	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
122	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
123	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
124	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
125	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.100
126	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
127	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
128	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
129	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
130	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.200
131	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
132	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
133	THE LIME	29	N/A	SOCIAL	Red Elm, Red Brick	4.150
134	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
135	THE ASH	37	N/A	SOCIAL	Red Elm, Red Brick	4.150
136	THE ELDER	12	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.080
137	THE ELDER	12	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.080
138	THE ELDER	12	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.080
139	THE ELDER	12	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.080
140	THE BLACKTHORN	3B	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.000
141	THE NAZEL	26	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.080
142	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.080
143	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.080
144	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.100
145	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.100
146	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.100
147	THE BLACKTHORN	3B	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.000
148	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.100
149	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.100
150	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.100
151	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark & Red Elm, Buff Brick	4.200
152	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	3.950
153	THE CHERRY	7	ATTACHED SINGLE	MARKET	Red Elm, Red Brick	3.950
154	THE CHERRY	8	ATTACHED SINGLE	MARKET	Dark & Red Elm, Red Brick	3.990
155	THE CEDAR	5A	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	3.850
156	THE CEDAR	5B	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	3.850
157	THE TITCH	24	ATTACHED SINGLE	MARKET	Dark Elm, Red Brick	3.850
158	THE TITCH	24	ATTACHED SINGLE	MARKET	Red Elm, Red Brick	3.880
159	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	3.950
160	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	3.950
161	THE JUNIPER	36	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	3.950
162	THE JUNIPER	36	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.060
163	THE NAZEL	26A	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.060
164	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.176
165	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.176
166	THE HAZEL	34	DETACHED DOUBLE	MARKET	Red Elm, Buff Brick	3.950
167	THE CHERRY	7	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	3.950
168	THE CHERRY	7	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	3.950
169	THE TITCH	25	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	3.950
170	THE TITCH	25	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	3.950
171	THE ASPEN	21	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.180
172	THE MAGNOLIA	32	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.400
173	THE MAGNOLIA	32A	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.400
174	THE WILLOW	33	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.790
175	THE WILLOW	33	DETACHED DOUBLE	MARKET	Red & Dark Elm, Red Brick	4.790
176	THE CEDAR	5	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.440
177	THE CEDAR	5A	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.440
178	THE TULIP	22	ATTACHED DOUBLE	MARKET	Red Elm, Red Brick	4.440
179	THE CEDAR	5	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.440
180	THE CEDAR	5	DETACHED DOUBLE	MARKET	Dark Elm, Red Brick	4.440
181	THE TITCH	24	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	4.440
182	THE TITCH	25	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	4.440
183	THE CHERRY	7	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	4.440
184	THE TULIP	22B	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.230
185	THE TULIP	22	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.230
186	THE CHERRY	7	ATTACHED SINGLE	MARKET	Dark Elm, Buff Brick	4.230
187	THE TITCH	25	ATTACHED SINGLE	MARKET	Dark Elm, Buff Brick	4.230
188	THE TITCH	25	ATTACHED SINGLE	MARKET	Dark Elm, Buff Brick	4.295
189	THE TITCH	25	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	4.295
190	THE TITCH	25	ATTACHED SINGLE	MARKET	Red Elm, Buff Brick	4.295
191	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.270
192	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Buff Brick	4.270
193	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Buff Brick	4.270
194	THE BLACKTHORN	3B	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Buff Brick	4.295
195	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Buff Brick	4.530
196	THE BLACKTHORN	3	ATTACHED DOUBLE	MARKET	Red & Dark Elm, Buff Brick	4.530
197	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.440
198	THE NAZEL	27	ATTACHED DOUBLE	MARKET	Red Elm, Buff Brick	4.440
199	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.790
200	THE BLACKTHORN	3A	ATTACHED DOUBLE	MARKET	Dark Elm, Buff Brick	4.790

KEY:

- THE MULBERRY (4 BED)
- THE HAWTHORN (4 BED - ATT. Garage)
- THE ELM (4 BED)
- THE FOXTAIL (5 BED)
- THE WILLOW (4 BED - ATT. Garage)
- THE TULIP (4 BED - ATT. Garage)
- THE BLACKTHORN (3 BED - ATT. Garage) (bungalow)
- THE YEW (3 BED - ATT. Garage)
- THE CHERRY (3 BED - Single Garage)
- THE CHERRY (3 BED - Double Garage)
- THE ASPEN (4 BED)
- THE ELDER (3 BED - ATT. Garage) (bungalow)
- THE HAZEL (3 BED - ATT. Garage) (bungalow)
- THE CEDAR (4 BED)
- THE CEDAR - handed (4 BED)
- THE ALDER (2 BED)
- THE POPLAR (1 BED)
- THE ASH (2 BED)
- THE LIME (3 BED)
- THE CHESTNUT (2 BED) (bungalow)

Rev.B Revised to Engineers Comments 17/01/22

Rev.A Revised to Engineers Info. 04/01/22

DRAWING ISSUES AND REVISIONS

Unit 6 Stephenson Court | 15 Victoria Lane | Lincoln | LN2 5RP | 01522 511155 | admin@lincolndesigncompany.co.uk

ldc

PROJECT	Residential Development, Seagate Road, Long Sutton, Lincolnshire
DATE	July 2021
TITLE	Proposed
SCALE	As Shown
ORIGINAL SIZE	A0 (Landscape)
DRAWING NUMBER	LDC-3699-PL-02B

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SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street,
Spalding,
Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

APPENDIX B – Ground Investigation (Extracts)

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Geo-environmental ground investigation report

Land off Seagate Road, Long Sutton

Produced for D. Brown Building Contractors Ltd

March 2021

Humberside Materials Laboratory Ltd
Atherton Way, Brigg
North Lincolnshire DN20 8AR
Tel 01652 652753

www.humbersidematerialslab.co.uk

Document control

Title:	Geo-environmental ground investigation report Land off Seagate Road, Long Sutton
Client:	D. Brown Building Contractors Ltd
Report number:	1197/5350/P/P2

Revision	*Purpose*	*Originated*	*Checked*	*Date*
0.0	Issue report	R Lester *Geo-Environmental Engr*	M Driver *Director*	March 2021

Ground investigation report

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Appendix A - Site plans, drawings and photographs

Appendix B - Exploratory hole logs

Appendix C - Test results

Appendix D - Historical maps

Appendix E - Envirocheck™ Report

EXECUTIVE SUMMARY

Proposed works	Large scale residential development (low rise dwellings with estate roads and other associated infrastructure)
Site history	Some former small possible farm buildings in limited areas of the site were removed during the 20th century There is a historic former sea bank crossing the east part of the site There is a former pond along the south boundary and a former drainage ditch in the southwest area A former gas works and Gas Holder were located about 20m north of the site, but these had been removed by the early 1980s.
Published geology	*Drift:* Tidal Flat Deposits (locally previously known as Terrington Beds - sandy silt, loose sand and soft clay) *Solid:* Oxford Clay Formation
Topography	Relatively flat and low-lying; c. 3m or 4m above Ordnance Datum A slight slope means east portion of the site is marginally higher
Hydrology	Drainage ditches along the north and south site boundaries The River Nene is 4km east and The Wash is about 7km northeast The site is in a Flood Zone 3 area
Site works	19 windowless-sampler boreholes (WS1-WS19) with SPTs to depths of 3.45 to 5.25m depth. DCP probing to 7.0m adjacent to WS10 2 shell and auger boreholes (BH1 and BH2) to depths of c.20m 24 trial pits (TP13 to TP37) to depths of 1.0m to 1.7m depth Soakaway testing in 6 trial pits, at depths of between 1.5m & 1.7m
Revealed ground conditions	• Topsoil: (across the site) loamy soil with rootlets (to a maximum depth of 0.50m) • Tidal Flat Deposits (TFD): Locally, shallow firm clay present to a depth of about 1m bgl Common very loose to loose granular silts and fine sands - but sometimes locally clayey – to depths of about 4m bgl A band of (very) soft (slightly organic) clays and silts is present in much of the east area of the site (at depths of up to 4m bgl) Loose to medium dense sands present (below 4m bgl) TFD sands become increasingly gravelly (e.g. >11m bgl) The base of the TFD soils is 14.8m (BH2) to 16.8m (BH1) bgl • Glacial till: Stiff boulder clay (shown to extend deeper than 21.5m bgl) Local BGS records indicate the glacial till is comprised of boulder clay and reaches depths of at least 45m bgl

Groundwater	Recorded standing groundwater levels: 0.61m to 2.95m bgl
Foundation design	Strip footings and raft foundation are not considered generally feasible due to poor strength and stiffness of revealed ground conditions. Such foundations are probably only possible in small isolated areas (if at all), subject to further investigation works Piled foundations will need to be deep to reach suitable bearing stratum (e.g. c.17m depth to reach stiff boulder clay)
Shrinkable soil	Heave may occur if existing high water demand trees are present The *in situ* shallow cohesive soils are of l*ow volume change potential*
Buried concrete	ACEC Class AC2 required for concrete (shallow or deep)
Gas protection	Assessed NHBC classification of Green and CIRIA classification of CS1 No gas protection measures should be required
Road pavement design	Recorded CBR values are very low: e.g. 0.2% to 2%. Therefore, an onerous road design will be required to meet adoption criteria
Soakaway design	Surface water soakaways not feasible due to low infiltration of ground conditions and high water table
Contamination conceptual site model	The conceptual site model identified four main potential sources of contamination: 1. Possible made ground associated with previous buildings (metals, PAHs, asbestos) 2. Past land use – agricultural buildings (metals, PAHs, pesticides) 3. Highly organic subsoils (ground gases) 4. Nearby former gas holder and gas works (metals, PAHs, cyanides, thiocyanate, ammonia)
Contamination risk assessment	No unacceptable risks were identified. No visual or olfactory evidence of potential contamination was found in the 45 exploratory holes at the site Any unforeseen contamination (for example, hydrocarbon odours or staining) encountered during the development of the site must be monitored and reported to the local authority

1 Introduction

Humberside Materials Laboratory Limited (HML) has undertaken a geo-environmental ground investigation for a proposed development on land between Seagate Road and Wisbech Road, Long Sutton, Lincolnshire, as requested by the client, D. Brown Building Contractors Ltd. The land will be hereinafter referred to as *the site*.

1.1 Aims

The aim is to investigate and assess the geo-environmental (i.e. geotechnical and environmental) ground conditions to facilitate engineering design and contamination assessment of the proposed development.

1.2 Scope

The scope of the investigation includes:

- Review of desk study information (including previous site investigation reports)
- Intrusive investigation works
- Geotechnical and geochemical laboratory testing
- Assessment of geotechnical engineering issues
- Development of a conceptual site model of potential contamination linkages
- Assessment of contamination risk using a source-pathway-receptor approach
- Recommendations for further works, where appropriate

1.3 Conditions and Limitations

This report is produced solely for the client and should only be copied in full. When transmitted electronically, the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

This report is prepared on the assumption that all facts have been disclosed.

The comments given in this report and the opinions expressed assume that conditions do not vary beyond the range revealed by this study and the information provided in the production of this report is complete and reliable.

5 Ground Conditions & Soil Properties

5.1 Sequence of sub-strata

The sub-strata as revealed during the site works (in BHs 1 to 2 and WSs 101 to 110) are summarised below (in Table 17 and 18). Copies of the borehole logs are presented later (in Appendix B). Cross sections of the revealed sub-strata are also presented later (in Appendix A).

Table 17: Ground conditions in boreholes (WSs 1 to 19 and BHs 1 to 2)

Strata:	*Topsoil*	*Tidal Flat Deposits*							*Glacial till*
		(SOFT/ FIRM) cohesive clayey SILT	*(VERY LOOSE TO LOOSE) granular (SILT / fine SAND*	*(VERY) SOFT cohesive clayey SILT*	*(VERY) SOFT cohesive (SILT/ CLAY)*	*(VERY) LOOSE becoming LOOSE to MEDIUM DENSE granular (SILT / fine SAND)*	*Cohesive (SILT/ CLAY*	Medium dense granular SAND/ GRAVEL	(Stiff) boulder CLAY
Hole	*Depth to base of stratum (m bgl)*								
WS1	0.40					3.45+			
WS2	0.40		1.10	1.50		3.50+			
WS3	0.42					3.45+			
WS4	0.38	0.73				3.45+			
WS5	0.45		0.60	0.90		3.45+			
WS6	0.45		1.30	1.80		3.45+			
WS7	0.40		0.80	1.70		3.45			
WS8	0.34		2.10		3.50	4.45+			
WS9	0.50	1.00	1.71	2.00	2.70	4.45+			
WS10	0.32					5.25+			
WS11	0.35		1.85	2.25	3.20	4.45+			
WS12	0.47		1.24	1.68		3.45+			
WS13	0.36			1.02	1.49	3.45+			
WS14	0.42		0.72	2.28	2.79	3.45+			
WS15	0.42					3.45+			
WS16	0.45					3.45+			
WS17	0.43		1.05	2.60	2.60	3.45+			
WS18	0.41		0.61	1.75		3.45+			
WS19	0.35	0.72				3.45+			
BH1	0.40			2.50		16.00		16.80	21.50+
BH2	0.30	0.60				10.80		14.80	18.50+

The windowless sampler boreholes generally show that the shallow Tidal Flat Deposits (TFD) soils consist mainly of both granular silts (and sand) with some cohesive silts (and clays). This is normal for the expected local tidal flats geology as these deposits were laid progressively over time by a tidal action which could (at different times) have deposited either coarse silts and fine sands or clays and finer silts. The results are similar to those

reported in BGS boreholes slightly to the west of the site, as discussed earlier (in Section 2).

The trial pits (TP13 to TP37) were used to obtain CBR samples and perform soakaway tests. Nevertheless, they also show much detail about the shallow ground conditions, as shown below (in Table 18). The trial pit logs show there was much granular sands and silts at shallow depth, but there was equally as much shallow sandy silt that was either clayey or locally clayey.

Table 18: Ground conditions in trial pits (TP13 to TP37)

Strata:	*Topsoil*	*Tidal Flat Deposits*						
		Granular SILT/ SAND	*(FIRM) cohesive sandy SILT/ CLAY*	*Granular SILT/ SAND*	*Locally clayey sandy SILT*	*Cohesive sandy clayey SILT*	Granular SILT/ SAND	Cohesive SILT/CLAY
Hole	*Depth to base of stratum (m bgl)*							
TP13	0.31	0.41	0.51			1.00+		
TP14	0.31					1.00+		
TP15	0.17				1.00+			
TP16	0.25				0.80		1.00+	
TP17	0.31	0.58	0.95				1.00+	
TP18	0.18	0.55		1.05		1.70+		
TP19	0.31				0.90	1.00+		
TP20	0.35	0.50				1.00+		
TP21	0.30	0.65				1.00+		
TP22	0.22	0.50	0.65		1.50+			
TP23	0.40	0.55				1.00+		
TP24	0.30				1.00+			
TP25	0.28	0.62				1.00	1.10+	
TP26	0.31	0.65			1.10+			
TP27	0.32	0.52		0.66	1.00+			
TP28	0.33			1.30			1.50+	
TP29	0.34	0.90					1.00+	
TP30	0.28	0.85					1.00+	
TP31	0.30			1.00+				
TP32	0.36				0.90		1.00+	
TP33	0.31			1.35			1.65+	
TP34	0.30				1.00+			
TP35	0.33					0.70	1.00+	
TP36	0.35				0.77		1.40	1.65+
TP37	0.35	1.00+						

5.2 Topsoil

Topsoil was found across the site in all exploratory holes. It was logged to depths of between 0.17m (TP15) and 0.50m (WS9).

The topsoil was logged as a dark brown sandy, silty and clayey soil with occasional rootlets. Locally, some stone gravel was logged.

Only in WS6 (in the south part of the site) were any fine gravel of brick fragments logged within the topsoil. Otherwise, no anthropogenic material was recorded.

5.3 Tidal Flat Deposits (TFD)

Thick tidal flat deposits (TFD) were revealed across the site. They were logged in all exploratory holes at shallow depth and were found to reach depths of between 14.8m (in BH2) and 16.8m (in BH2) bgl.

The shallower TFD soils were found to be an assortment of granular (silt or sand) and cohesive (silt or clay) soils. Generally, the granular soils were found to be more common but cohesive soils were often present in distinct bands or found locally (e.g. as thin bands, lenses or partings) within granular strata.

The engineering properties of the revealed TFD shallow soils were found to generally be poor, as shown by the results of SPTs below (in Figure 2). The average N value is about 3 or 4 at start depths of 1m and 2m, with several readings of zero. These values would equate to a very loose or loose granular soil. The lower 10th percentile (a cautious, conservative evaluation) of the N value is between 0 and 1 (from 1.0m to 3.45m depth).

There was little evidence of anywhere on site where the ground conditions were consistently better or worse. The N values were modest and sporadically very poor across the site, as shown later, in an SPT plan (in Appendix A).

5.5 Groundwater observations

Groundwater was encountered during site works within all 21 boreholes (WSs 1 to 19 and BHs 1 and 2) but only in one trial pit (TP18), as shown below (in Table 26). The recorded resting groundwater levels ranged between 0.61m and about 2.95m.

The recorded groundwater levels in boreholes that were mainly drilled in free-draining granular soils are likely to more closely represent the groundwater level. Therefore, the groundwater level at the site could be about 0.6m to 2.0m bgl.

Of course, groundwater levels can fluctuate with climactic and seasonal variations. The recorded groundwater levels were measured in winter after a relatively wet autumn. It is possible, the groundwater table could be lower in late summer months.

Table 26: Summary of groundwater observations

Location	*Date*	*Prevailing shallow ground conditions*	*Water level after drilling (m bgl)*	*Comments*
BH1	27th Jan 2021	Sandy clay	2.5	Resting groundwater level
BH2	27th Jan 2021	Sandy silt	2.0	Resting groundwater level
TPs 13 to 17	10th Dec 2020	-	-	No groundwater observed
TP18	11th Dec 2020	Clayey silt	1.4	Very slight seepage
TPs 19 to 36	11th Dec 2020	-	-	No groundwater observed
WS1	9th Dec 2020	Silty sand	1.77	Resting groundwater level
WS2	9th Dec 2020	Silty sand	1.65	Resting groundwater level
WS3	9th Dec 2020	Silty sand	1.63	Resting groundwater level
WS4	9th Dec 2020	Sandy silt	1.60	Resting groundwater level
WS5	9th Dec 2020	Sandy silt	1.88	Resting groundwater level
WS6	9th Dec 2020	Silty sand	2.06	Resting groundwater level
WS7	9th Dec 2020	Clayey silt	1.66	Resting groundwater level
WS8	9th Dec 2020	Sandy clay	2.95	Resting groundwater level
WS9	9th Dec 2020	Sandy silt	1.45	Resting groundwater level
WS10	11th Dec 2020	Sandy silt	1.85	Resting groundwater level
WS11	11th Dec 2020	Silty clay	2.60	Resting groundwater level
WS12	11th Dec 2020	Sandy silt	2.45	Resting groundwater level
WS13	11th Dec 2020	Sandy silt	1.60	Resting groundwater level
WS14	11th Dec 2020	Clayey silt	1.62	Resting groundwater level
WS15	21st Jan 2021	Sandy silt	0.88	Resting groundwater level
WS16	21st Jan 2021	Sandy silt	1.01	Resting groundwater level
WS17	21st Jan 2021	Sandy silt	0.61	Resting groundwater level
WS18	21st Jan 2021	Clayey silt	1.05	Resting groundwater level

5.6 CBR test results

The results of 24 CBR laboratory tests (on remoulded samples at a natural moisture content) are presented below (in Table 27). The complete results are in Appendix C.

Table 27: Summary of CBR test results						
Location	*Specimen condition*	*Soil type*	*CBR (%)*		*Moisture content*	
			Top	*Bottom*	*Top*	*Bottom*
TP13	n	Sandy silt/clay	0.6	0.4	24	24
TP14	N	Sandy silt/clay	0.2	0.3	24	24
TP15	N	Sandy silt/clay	0.5	0.4	23	22
TP16	N	Sandy silt/clay	0.2	0.1	27	27
TP17	N	Firm sandy clay	-	6.8	25	26
TP18	N	V. soft sandy clay	1.0	1.1	21	21
TP19	N	Soft sandy silt/clay	0.4	0.3	26	28
TP20	N	Soft sandy silt/clay	0.5	0.5	25	25
TP21	N	Firm sandy clay	2.9	2.5	25	25
TP22	N	V. soft clayey sand	0.4	0.3	29	28
TP23	N	V. soft clayey sand	0.4	0.3	26	25
TP24	N	Soft sandy clay	0.9	1.4	25	25
TP25	N	Firm sandy clay	25	26	23	22
TP26	N	V. soft silty sand	1.1	1.1	21	21
TP27	N	V. soft clayey sand	1.0	1.1	21	21
TP28	N	V. soft sandy clay	0.4	0.2	22	24
TP29	N	V. soft clayey sand	0.7	0.8	22	21
TP30	N	V. soft clayey sand	3.5	3.7	20	19
TP31	N	Soft sandy clay	2.1	2.6	21	21
TP32	N	Soft sandy clay	1.0	1.4	22	22
TP33	N	Firm sandy clay	37	34	19	19
TP34	N	Soft sandy clay	0.4	0.4	28	25
TP35	N	V. soft clayey sand	0.5	0.7	23	23
TP36	N	V. Soft clayey sand	1.3	1.2	18	17
TP37	N	Soft sandy clay	0.6	0.6	18	17

By and large, the measured CBR values are relatively low and often less than 1%. This suggests the *in situ* soils have poor strength and compactability. This is not surprising, as soils comprising silts, clays and fine sands often react poorly to compaction.

Some locations saw reasonably high CBR values (e.g. greater than 2%). However, no area on site has been identified where CBR values are consistently reasonably high.

Two locations (TP25 and TP33) saw very high CBR values of 25% to 37%. It is possible these are anomalous results. There is no indication from the ground conditions to explain such locally high CBR values.

5.7 Soakaway test results

As discussed, soakaway testing was carried out in six trial pits (TPs 15, 18, 22, 28, 33 and 36). Water was poured into the pits and the water level was monitored, as detailed below (in Table 28).

Negligible infiltration was observed over several hours. Therefore, the testing was terminated.

Table 28: Selected soakaway / infiltration test results			
Location	*1st fill*		*Comments*
	Time (mins)	*Water level (m bgl)*	
TP15	0	1.34	Testing terminated due to lack of infiltration
	6	1.34	
	206	1.31	
TP18	0	1.36	Testing terminated due to lack of infiltration
	152	1.35	
TP22	0	1.25	Testing terminated due to lack of infiltration
	51	1.25	
	140	1.24	
TP28	0	1.16	Testing terminated due to lack of infiltration
	91	1.17	
	159	1.17	
TP33	0	1.32	Testing terminated due to lack of infiltration
	62	1.32	
	136	1.32	

8 SUMMARY & CONCLUSIONS

8.1 Ground conditions

The findings of the investigation indicate the following sub-strata at the site.

- Topsoil: (across the site) loamy soil with rootlets (to a maximum depth of 0.50m)
- Tidal Flat Deposits (TFD):
  - Locally, some shallow firm clay present to a depth of about 1m bgl
  - Common very loose to loose granular silts and fine sands - but sometimes locally clayey – to depths of about 4m bgl
  - A band of (very) soft (slightly organic) clays and silts is present in much of the east area of the site (at depths of up to 4m bgl)
  - Loose to medium dense sands present (at depths greater than about 4m bgl)
  - TFD sands become increasingly gravelly at significant depth (>11m)
  - The base of the TFD soils was revealed at 14.8m (BH2) to 16.8m (BH1) bgl
- Glacial till:
  - Stiff boulder clay (revealed to reach greater than 21.5m bgl)
  - Local BGS records indicate the glacial till is comprised of boulder clay and reaches depths of at least 45m bgl

8.2 Geotechnical properties

The geotechnical properties as determined from measurements, estimations and evaluations are presented below (in Table 33).

Table 33: Geotechnical properties

Soil	*Depth (m bgl)*	*Geotechnical property*	*Value*
TFD: shallow granular silts/sands	0.5-1.80	Gravel content	0%-1%
		Sand content	34%-52%
		Fines content	45%-66%
	1.0-3.5	Characteristic SPT N value	1
		Average SPT N value	5
		Angle of friction, ϕ	27°
TFD: shallow cohesive silts/clays	0.7-3.5	Plasticity index	13%-20%
		Volume change potential	Low
	<1.0	Characteristic undrained shear strength, $c_{u,k}$	53
	1.3		10
	>2.0		<10
TFD: deeper sands	16.0-16.5	Gravel content	38%
		Sand content	61%
		Fines content	1%
	4.0 – 7.0	Characteristic SPT N value	4
	>7.0		8
Glacial till (boulder clay)	17.0	Characteristic undrained shear strength, $c_{u,k}$	150kPa

8.3 Engineering issues

8.3.1 Foundations

8.3.1.1 Strip footings

Shallow strip footings do not seem feasible at the site due to the poor strength and stiffness of the shallow subsoils. There may some areas of the site where locally better ground conditions mean that shallow strip footings are feasible, but no such areas have been identified.

8.3.1.2 Shallow raft foundations

The ground conditions also appear to be generally unsuitable for raft foundations. Settlements of the underlying very loose and loose sands, especially when added to the consolidation settlement of clayey bands could be adversely large.

It is possible there may be some plots around the site where the ground conditions are suitable for shallow raft foundations. However, the ground conditions vary unpredictably (possibly because of the site's former seaside location).

8.3.1.3 Further investigation works

Further ground investigation works might be able to identify some plots where shallow foundations (strip footings or rafts) could be suitable. However, significant additional investigation works will be needed and may only be able to identify small isolated areas (if any) as suitable for shallow foundations.

8.3.1.4 The influence of trees

The tidal flat deposits (TFD) clays have been found to be of low volume change potential. Therefore, strip footings would need to be reach at least 0.75m bgl, but this depth could increase near to trees.

It is possible heave protection measures may be required for foundations located close to existing high water demand trees.

8.3.1.5 Piled foundations

The deeper boulder clay has good strength and stiffness properties and should be able to provide a suitable bearing stratum for deep piled foundations. 'Floating piles' in the deeper denser tidal flat deposits might also be able to provide sufficient bearing resistance. There should be substantial frictional resistance available to long piles (e.g. about 12m to 15m long) in the revealed underlying sands.

Preliminary estimations suggest that a 12m-long 300mm-diameter pile in the TFD sands might provide a working load of about 47kN. Similarly, an 18m-long 300mm-diameter pile in the boulder clay might be able to provide a working load around 141kN, as shown above (in Table 37).

8.3.1.6 Alternative foundation solutions

It possible a ground improvement method (e.g. deep compaction) or alternative deep foundation solutions (e.g. stone columns) might be potentially feasible at the site. These solutions are considered unlikely to be cost effective. However, specialist contractors may be able to offer further advice.

8.3.2 Slab design

Heave could potentially be an issue for slab design near any existing high water demand trees. A tree survey could confirm this.

8.3.3 Excavations and groundwater control

Shallow excavations in the soft clays and loose sands might quickly become unstable at depths approaching 2m (or shallower).

The groundwater table at the site could be between about 1.0m and 2.0m depth. Localised groundwater levels as shallow as 0.61m bgl have been measured. Accordingly, some form of groundwater control will be needed for modestly deep excavations.

8.3.4 Buried concrete

The results of sulphate (SO_4) and pH tests indicate, a DS-2 Design Sulfate and an AC-2 ACEC classification should be suitable for the in situ soils at the site (based on BRE Special Digest 1, 2005).

8.3.5 Road pavement design

Lab tests indicate CBR values typically ranging between 0.2% and 2%. No significant zones have been identified on site where CBR values are better or worse. To meet local authority adoption criteria, a relatively thick road design will be needed.

8.3.6 Soakaway design

Surface water soakaways are not expected to be feasible at the site as groundwater levels are very shallow and the ground conditions are of negligible infiltration rate, as evidenced by percolation testing.

8.4 Contamination Assessment

8.4.1 Initial conceptual site model

The conceptual site model presented herein identified four main potential sources of contamination:

Source 1	Possible made ground associated with previous buildings (metals, PAHs, asbestos)
Source 2	Past land use – agricultural buildings (metals, PAHs, pesticides)
Source 3	Highly organic subsoils (ground gases)
Source 4	Nearby former gas holder and gas works (metals, PAHs, cyanides, thiocyanate, ammonia)

8.4.2 Preliminary risk assessment

Unacceptable risk was only found for one potential contamination linkage. This linkage concerned ground gas from highly organic subsoils (source) and the effect on future site users (receptor) through migration and inhalation or combustion (pathway).

The possible made ground was not considered to pose a significant risk as no made ground could be found on site. A close inspection of the site revealed only natural soils within the exposed bare earth. Moreover, the site has been used as farm fields for many years so any contaminants are likely to have been attenuated and degraded.

Similarly, past land use was not considered a viable source. Previous buildings evident from historical maps are too small, isolated and aged to have any significant impact on the site.

The nearby former gas holder is unlikely to have affected the site. The underlying subsoils are of (very) low permeability. There is a drainage ditch and trees between the site and the gas holder.

8.4.3 Revised risk assessment

Following the results of site works, no unacceptable contamination risks are considered to be present for the proposed site development. No potentially significant contamination linkages have been identified.

The extensive boreholes drilled on site have not revealed any significant organic material that could offer a plausible source of hazardous ground gas. No peat has been found and the predominant soils are granular silts and sands. A thin band of slightly organic clay was revealed in the east of the site, but this has a negligible gas generating

potential. Accordingly, the underlying subsoils are no longer considered as a viable source of hazardous ground gas.

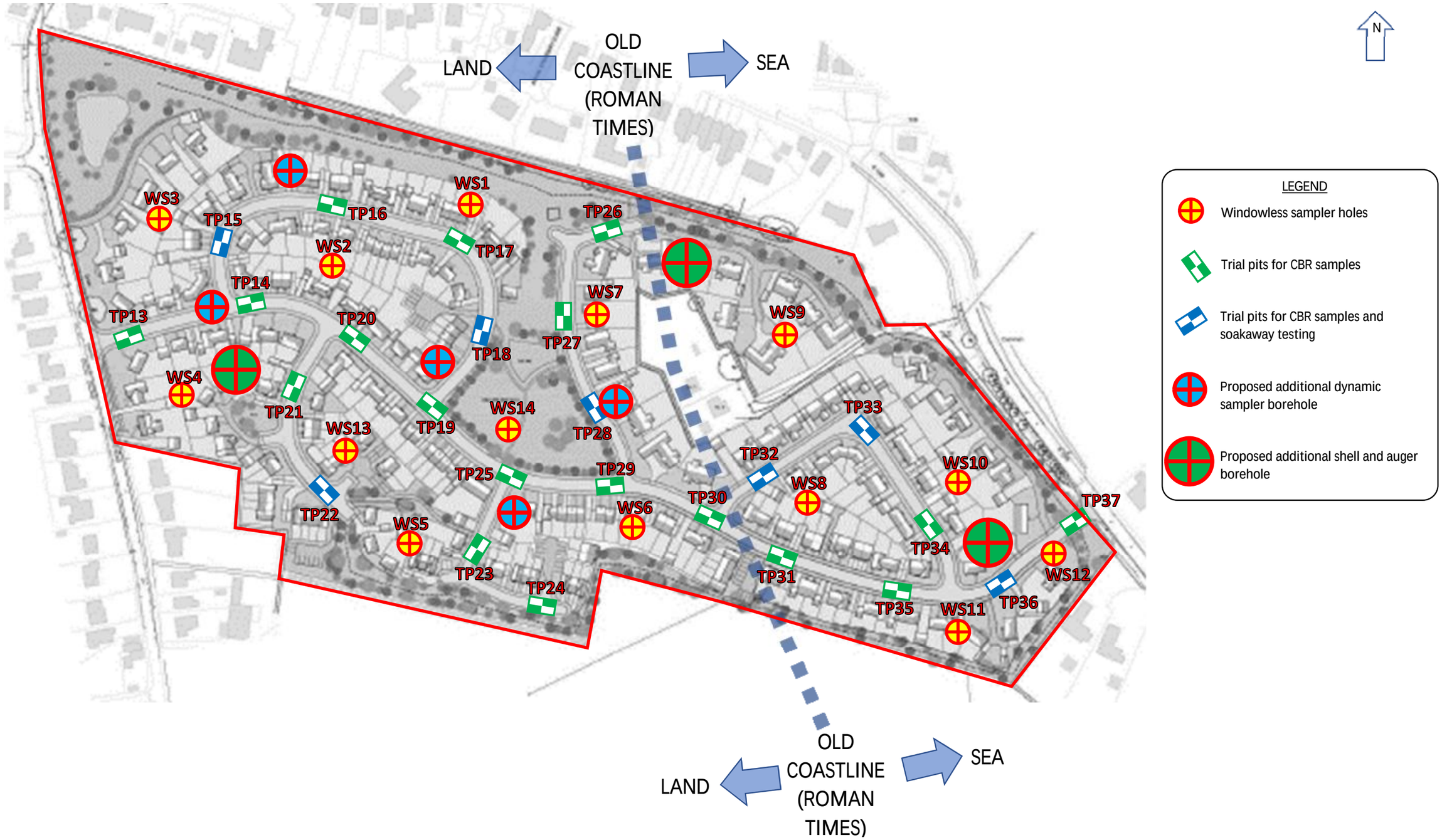
No evidence has been found of contamination on site. No made ground or substantial anthropogenic material has been recorded. Therefore, it should be possible to re-use clean, natural, site-won soils around the site.

Nevertheless, any unforeseen contamination (for example, hydrocarbon odours or staining) encountered during the development of the site must be monitored and reported to the local authority. Work must be halted in any area of the revealed potential contamination and the contamination investigated and assessed to the satisfaction of the local planning authority.

8.4.4 Ground gas risk assessment

No viable source of hazardous ground gas has been found at the site. Accordingly, a CIRIA CS-1 classification (or NHBC green traffic light classification) should be suitable for the site. No ground gas protection measures should be required.

- End of Report -



Notes:
1. Do not scale
2. Locations of all features are approximate only
3. Background image taken from Templeman Design drawing number 3359-TD-XX-DRG-AR-0002-PO, dated November 2017

HUMBERSIDE MATERIALS LABORATORY LIMITED
Atherton Way
Brigg
North Lincolnshire
DN20 8AR
Telephone & Fax 01652 652753
www.humbersidematerialslab.co.uk

Drawing Title: Exploratory hole location plan
Drawing No.: TBC *Revision:* 0
Site: Land between Seagate Rd and B1359
Client: D Brown Building Contractors Ltd
Project No.: 1197/TBC/P
Date: 01/12/2020

SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street,
Spalding,
Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

APPENDIX C – Proposed Drainage Arrangement Drawings

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Key:

- Existing Foul Sewer – AWS
- Redundant Foul Sewer – AWS
- Proposed Foul Water – S104 Adoptable
- Proposed Foul Water Chamber – S104 Adoptable
- Existing Surface Water – SHIDB
- Existing Surface Water – 'Unadopted'
- Proposed Surface Water – S104 Adoptable
- Proposed Surface Water Chamber – S104 Adoptable
- Proposed Filter Drain – S38 & S104 Adoptable
- Proposed SW Gully & Lateral – LCC Highways
- Proposed Surface Water – Private
- Existing Anglian Water Easement
- Proposed Anglian Water Easement
- 3.67 Existing Site Level
- 4.400 Proposed Site Level
- Total Impermeable Area Attributed To Surface Water Drainage System = 5.085ha Includes: Dwelling Roofs, Driveways, Roods & Footpaths, Filter Drains, Attenuation Basins & Watercourse/Swale
- Proposed Driveways Are To Be Permeable Block Paved Construction. Type C System With Lined Sub-Base, Water Collected From Sub-Base & Dischorged Into Adoptable System.
- Denotes Proposed Overland Flood Exceedance Route

FOR ENLARGED LAYOUTS PLEASE REFER TO SRC DRAWINGS 22421 / 02, 03 & 04

Rev	Date	Remarks
D	02.02.22	Drawing Generally Developed.
C	22.12.21	Drawing Generally Developed.
B	29.10.21	Minor Updates.
A	23.09.21	Drawing Generally Developed.

Status: FOR PLANNING

SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: Residential Development Land East of Seagate Road, Long Sutton, Lincolnshire For D Brown Builders

Title: Proposed Drainage Strategy Layout

Date	Jun. '21	Scale	1:1000 @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	22421-01

DRG No. 22421/01 Rev D

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- Proposed Surface Water – Private
- Existing Anglian Water Easement
- Proposed Anglian Water Easement
- Existing Site Level
- Proposed Site Level
- Total Impermeable Area Attributed To Surface Water Drainage System = 5.085ha
  Includes: Dwelling Roofs, Driveways, Roads & Footpaths, Filter Drains, Attenuation Basins & Watercourse/Swale
- Proposed Driveways Are To Be Permeable Block Paved Construction. Type C System With Lined Sub-Base, Water Collected From Sub-Base & Discharged Into Adoptable System.
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LANCASTER DRIVE · Seagate Terrace · THE CHERRIES · TENNANTS CLOSE · Fenholme

Existing Surface Water Chamber, Ref: 3 CL 2.370 IL 1.290
Existing Surface Water Chamber, Ref: 1
Existing Surface Water Chamber, Ref: 5 CL 2.655 IL 1.545
Existing Surface Water Chamber, Ref: 6 CL 3.345 IL 1.855
Chamber To Be Fitted With HydroBrake To Restrict Flows To 7.1 l/s (5.085ha x 1.41/s/ha)
New S123 CL 2.300 IL 1.325
New S122 CL 3.500 IL 1.600
New S121 CL 3.350 IL 1.650
New S120 CL 3.360 IL 1.750
New HW101 IL 1.775
New HW100 IL 1.775
New HW223 IL 1.800
New HW224 IL 1.775
Existing Anglian Water Foul Water MH Ref: 4503 CL 2.690 IL -0.030 TBC
Existing Anglian Water Foul Water MH Ref: 4401 CL 3.460 IL 0.120 TBC
Existing Anglian Water Foul Water MH Ref: 4402 CL 3.240 IL 0.447 TBC
Existing Anglian Water Foul Water MH Ref: 4301 CL 3.040 IL 0.600 TBC
Existing Anglian Water Foul Water MH Ref: 5201 CL 3.120 IL 1.040 TBC
Existing Anglian Water Foul Water MH Ref: 6402 Unsurveyed Postition CL 3.514 TBC IL -0.296 TBC
Assumed Pipe IL ≈2.000
Existing 250ø SI Pipe · Existing 300ø SI Pipe · Existing 150ø SI Pipe · Existing 225ø SI Pipe · Existing 375ø SI Pipe · Existing 450ø SW · Existing 300ø SW · Existing 150ø SW · Existing 225ø SW · Existing 600ø SQUARE

Yellow Shaded Area Denotes Proposed Minimum Easement

Attenuation Basin 3:
Top of Bank: 3.400 = 1,555m²
Bed Level: 1.775 = 885m²
1:3 Side Slope
Total Basin Volume: 1,980m³
FSR Max. Water Level: 2.514 757m³ (1:100+CC)
FEH Max. Water Level: 2.742 1,034m³ (1:100+CC)

Proposed Marshy Area / Permanent Pool, To Be Planted Accordingly To Suit Semi Permanent Wet Conditions In Accordance With Landscape Architects Details
New Chamber Built On End Of Existing Run For Future Maintenance Purposes
Possible Requirement For A Retaining Structure To The North Of The Existing Watercourse, Subject To Detailed Survey Of This Area
Existing Improved Watercourse/Swale: Top of Bank: Min. 2.900 FSR Max. Water Level: 2.516 FEH Max. Water Level: 2.740
Line Of Proposed Garden Boundaries
Proposed Surface Water From First Section Of Entrance Road (50m Approx.) To Discharge Into Roadside Riparian Watercourse Via A Highway Filter Drain
Proposed Foul Water Connection 'A' To Existing Anglian Water System, Subject To relevant Agreements
Proposed French Drain To Collect Surface Water Exceedance Flows From Existing Dwellings
French Drain To Discharge Into Existing Watercourse

PLOT 1 · PLOT 2 · PLOT 3 · PLOT 4 · PLOT 5 · PLOT 6 · PLOT 7 · PLOT 8 · PLOT 9

New F106 CL 3.380 IL 1.865 · New F107 CL 3.550 IL 1.330 · New F108 CL 2.950 IL 0.910 · New F109 CL 2.930 IL 0.825 TBC · New F105 CL 3.700 IL 1.505 · New F104 CL 3.775 IL 1.615 · New F103 CL 3.850 IL 1.730 · New F202 CL 3.825 IL 1.115 · New F200 CL 3.820 IL 1.045 · New F201 CL 3.775 IL 0.885 · New F102 CL 3.925 IL 1.965 · New F101 CL 3.960 IL 2.085 · New F100 CL 3.925 IL 2.215 · New Fxx CL 3.950 IL 2.035 · New F300 CL 4.090 IL 1.950 · New F301 CL 3.885 IL 1.640
New S109 CL 3.305 IL 1.805 · New S108 CL 3.415 IL 1.910 · New S107 CL 3.445 IL 1.925 · New S106 CL 3.505 IL 1.985 · New S105 CL 3.730 IL 2.035 · New S104 CL 3.750 IL 2.060 · New S103 CL 3.800 IL 2.115 · New S102 CL 3.840 IL 2.160 · New S101 CL 3.885 IL 2.185 · New S100 CL 3.970 IL 2.265 · New S201 CL 3.665 IL 2.390 · New S200 CL 3.665 IL 2.410 · New S220 CL 3.795 IL 2.380 · New S202 CL 3.680 IL 2.355 · New S323 CL 3.820 IL 2.295 · New S221 CL 3.665 IL 2.265 · New S222 CL 3.625 IL 2.225 · New S320 CL 4.030 IL 2.540

Rev	Date	Remarks
D	02.02.22	Drawing Generally Developed.
C	22.12.21	Drawing Generally Developed.
B	29.10.21	Minor Updates.
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Status: FOR PLANNING

SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660 Fax: 01775 712635 Email: src@srcltd.com

Project: Residential Development Land East of Seagate Road, Long Sutton, Lincolnshire For D Brown Builders

Title: Proposed Enlarged Drainage Strategy Layout - West

Date	Jun. '21	Scale	1:500 @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	22421-02

DRG No. 22421/02 Rev D

Sumic Sunrise

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- Proposed SW Gully & Lateral – LCC Highways
- Proposed Surface Water – Private
- Existing Anglian Water Easement
- Proposed Anglian Water Easement
- Existing Site Level
- Proposed Site Level
- Total Impermeable Area Attributed To Surface Water Drainage System = 5.085ha
  Includes: Dwelling Roofs, Driveways, Roads & Footpaths, Filter Drains, Attenuation Basins & Watercourse/Swale
- Proposed Driveways Are To Be Permeable Block Paved Construction. Type C System With Lined Sub-Base, Water Collected From Sub-Base & Discharged Into Adoptable System.
- Denotes Proposed Overland Flood Exceedance Route

Possible Requirement For A Retaining Structure To The North Of The Existing Watercourse, Subject To Detailed Survey Of This Area

Existing Improved Watercourse/Swale:
Top of Bank: Min. 2.900
FSR Max. Water Level: 2.516
FEH Max. Water Level: 2.740

Existing Anglian Water Foul Water MH Ref: 6402 Unsurveyed Position CL 3.514 TBC IL -0.296 TBC

Existing Anglian Water Foul Water MH Ref: 7405 CL 3.306 IL 0.094 TBC

Existing Anglian Water Foul Water MH Ref: 7301 Unsurveyed Position CL 2.041 TBC IL 0.274 TBC

Attenuation Basin 2:
Top of Bank: 3.500
Bed Level: 2.100 = 630m³
1:3 Side Slope
FSR Max. Water Level: 2.518
FEH Max. Water Level: 2.745

Attenuation Basin 2a:
Top of Bank: 3.500
Bed Level: 2.250 = 70m²
1:3 Side Slope
FSR Max. Water Level: 2.518
FEH Max. Water Level: 2.745

Attenuation Basin 1:
Top of Bank: 3.600 = 5,870m²
Central Bed Level: 2.475
Perimeter Channel Level: 2.175–2.125
1:3 Side Slope
Total Basin Volume: 6,605m³
FSR Max. Water Level: 2.886 2,671m³ (1:100+CC)
FEH Max. Water Level: 3.179 4,220m³ (1:100+CC)

Proposed Anglian Water Foul Water Diversion Works Are Subject To A Section 185 Agreement At The Detailed Design Stage

Existing Anglian Water Foul Water Drainage Layout Within This Area To Be Confirmed, Varies From Records

Proposed Foul Water Connection 'B' To Existing Anglian Water System, Subject To Relevant Agreements

Chamber To Be Fitted With HydroBrake To Restrict Flows To 7.5 l/s

Proposed Marshy Area / Permanent Pool, To Be Planted Accordingly To Suit Semi Permanent Wet Conditions In Accordance With Landscape Architects Details

5m Wide Perimeter Channel To Basin, Min. 300mm Deep. Designed To Convey & Store Water Up To 1:1 / 1:2 Year Storm Events To Prevent Water Logging Of The Basin Bed (2.475)

Line Of Proposed Garden Boundaries

Rev	Date	Remarks
D	02.02.22	Drawing Generally Developed.
C	22.12.21	Drawing Generally Developed.
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A	23.09.21	Drawing Generally Developed.

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15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
E-mail: src@srcltd.com

Project: Residential Development
Land East of Seagate Road, Long Sutton, Lincolnshire
For D Brown Builders

Title: Proposed Enlarged Drainage Strategy Layout - Central

Date	Jun. '21	Scale	1:500 @A1
Drawn	MP	Checked	SRC
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N

B 1359

ion Basin 2a:
Bank: 3.500
et: 2.250 = 70m²
e Slope
x. Water Level: 2.518
x. Water Level: 2.745

Proposed Anglian Water Foul Water Diversion
Works Are Subject To A Section 185 Agreement
At The Detailed Design Stage

New HW520
IL 2.240

New S523
CL 3.500
IL 2.260

Existing Anglian Water Foul Water Drainage Layout Within This Area To Be Confirmed, Levels From Records

Existing Anglian Water
Foul Water MH
Ref: 8301 TBC
CL 2.730
IL 0.622 TBC

New S522
CL 3.610
IL 2.370

New F205
CL 3.725
IL 0.591

New S521
CL 3.800
IL 2.410

Existing Anglian Water
Foul Water MH
Ref: 9301
CL 3.630
IL 0.866 TBC

Existing Anglian Water
Foul Water MH
Ref: 9302
CL 4.200
IL TBC

Existing 300ø @ 1:157 CO Pipe

Existing 300ø CO Pipe

Proposed Foul Water Connection 'C'
To Existing Anglian Water System,
Subject To relevant Agreements

The Common

New F500
CL 3.500
IL 0.591

New S520
CL 3.900
IL 2.470

New F404
CL 4.550
IL 1.250

New F403
CL 4.400
IL 1.425

Existing Anglian Water
Foul Water MH
Ref: 9201
CL 5.950
IL 1.234 TBC

New F423
CL 4.200
IL 1.625

New S412
CL 3.380
IL 2.530

New S410
CL 4.010
IL 2.575

New S409
CL 4.045
IL 2.600

New F421
CL 4.100
IL 1.750

New S411
CL 3.980
IL 2.550

New S413
CL 3.880
IL 2.430

New F420
CL 4.000
IL 2.120

New S407
CL 3.860
IL 2.430

New S403
CL 4.170
IL 2.710

New S408
CL 4.170
IL 2.690

New F422
CL 4.200
IL 2.130

New S404
CL 4.075
IL 2.660

New F402
CL 4.350
IL 2.025

New S400
CL 4.225
IL 2.795

New F441
CL 4.050
IL 2.225

New F440
CL 4.150
IL 2.555

New S405
CL 4.075
IL 2.645

New F400
CL 4.210
IL 2.765

New S402
CL 4.115
IL 2.685

New S401
CL 4.150
IL 2.720

New F401
CL 4.250
IL 2.375

Brunswick Mill
(Ruin)

Rev	Date	Remarks
D	02.02.22	Drawing Generally Developed.
C	22.12.21	Drawing Generally Developed.
B	29.10.21	Minor Updates.
A	23.09.21	Drawing Generally Developed.

Status: FOR PLANNING

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CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: Residential Development
Land East of Seagate Road, Long Sutton, Lincolnshire
For D Brown Builders

Title: Proposed Enlarged Drainage Strategy Layout - East

Date	Jun. '21	Scale	1:500 @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	22421-04

DRG No. 22421/04 Rev D

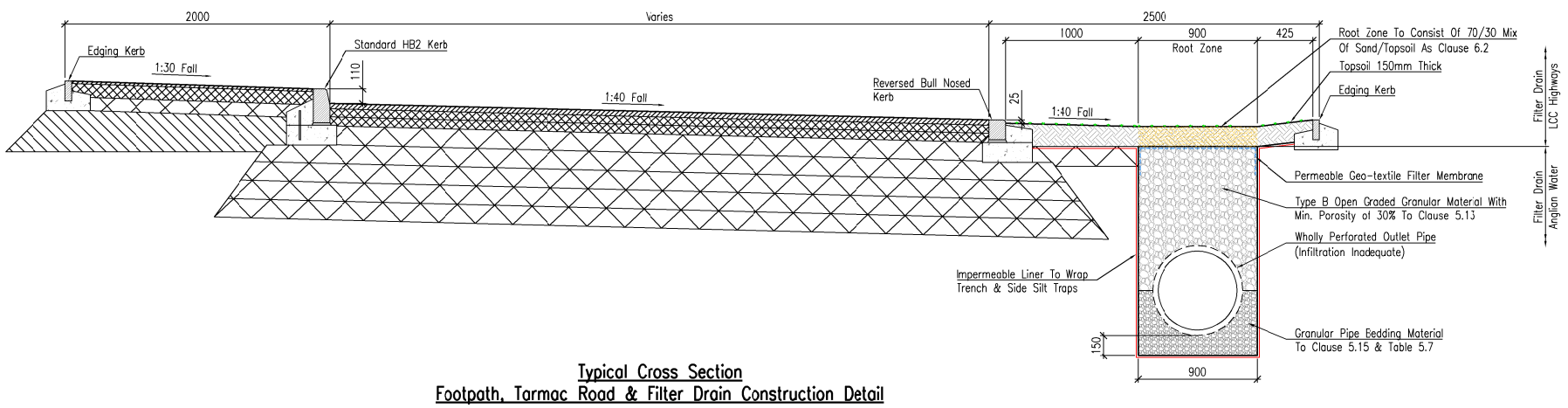
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Spalding,
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Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

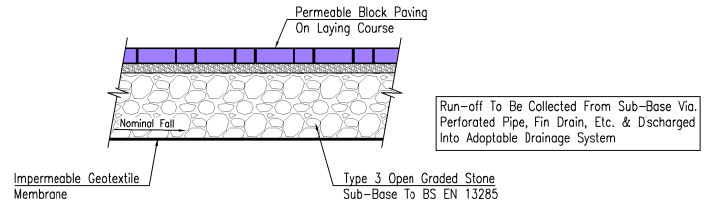
APPENDIX D – Typical Sections & Construction Details

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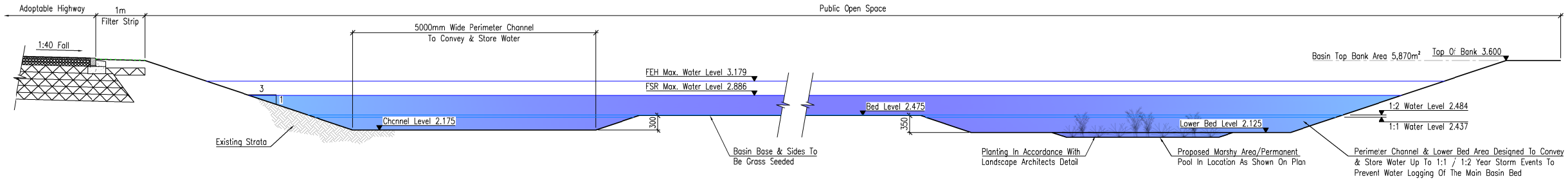
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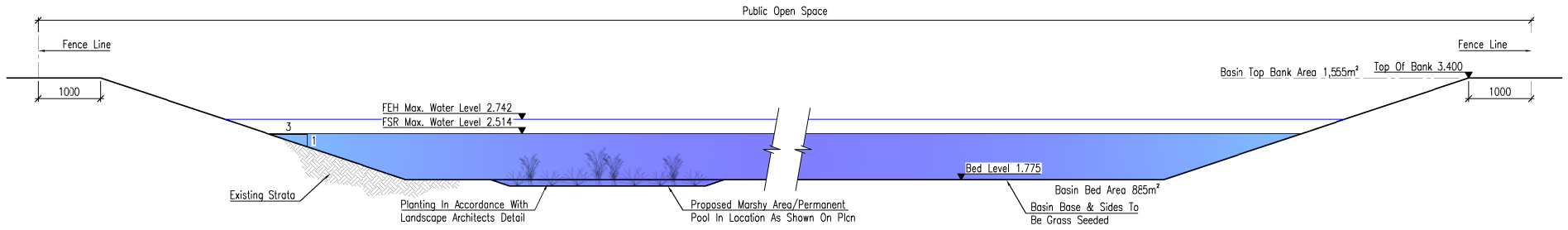
Typical Cross Section
Footpath, Tarmac Road & Filter Drain Construction Detail
Scale 1:25



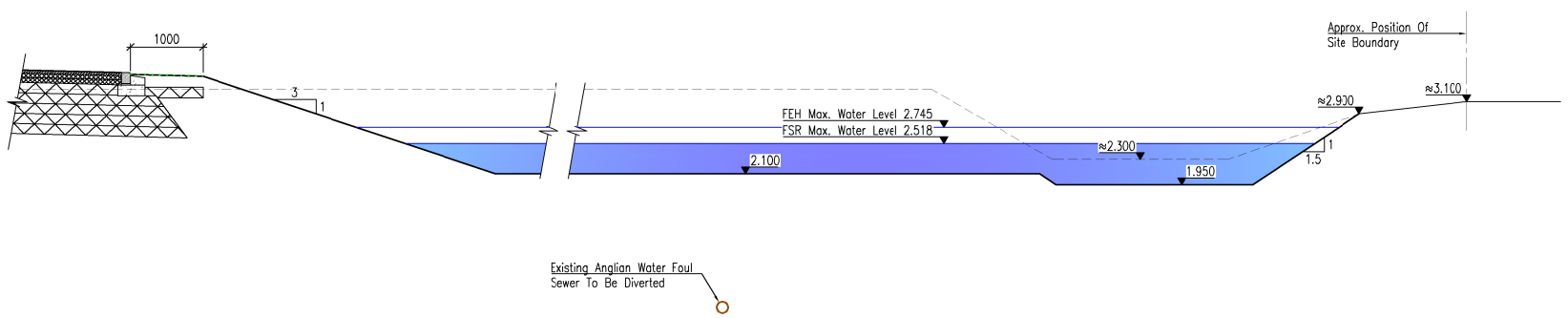
Typical Type C Driveway Construction Detail
Scale 1:20



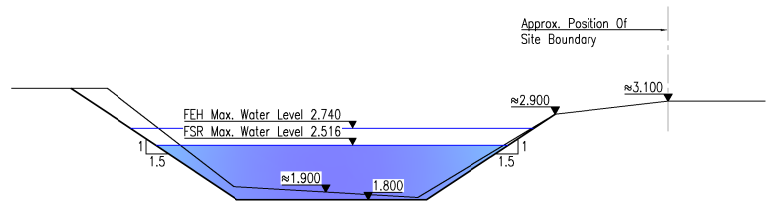
Typical Section Through Attenuation Basin 1
Scale 1:50



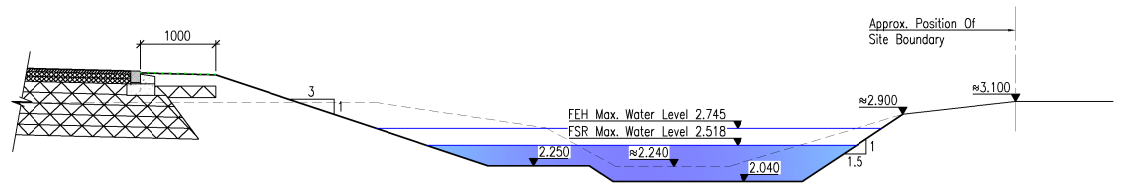
Typical Section Through Attenuation Basin 3
Scale 1:50



Typical Section Through Improved Watercourse/Swale Local To Basin 2
Scale 1:50



Typical Section Through Improved Watercourse/Swale
Scale 1:50



Typical Section Through Improved Watercourse/Swale Local To Basin 2a
Scale 1:50

Rev	Date	Remarks
A	02.02.22	Drawing Generally Developed.

Status: FOR PLANNING

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15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: Residential Development Land East of Seagate Road, Long Sutton, Lincolnshire For D Brown Builders

Title: Typical Sections / Construction Details

Date	Dec. '21	Scale	As Shown @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	22421-05

DRG No. 22421/05 — Rev A

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15 High Street,
Spalding,
Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

APPENDIX E – Adoption / Maintenance Plan

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Maintenance / Adoption Key:

- Proposed Foul Water – Anglian Water
- Proposed Surface Water – Anglian Water
- Proposed Surface Water – LCC Highways
- Anglian Water
- Lincolnshire County Council Highways
- Management Company
- Private Plot Owner

Management Company To Maintain Shared Drives Including Integral Surface Water Drainage System

Anglian Water To Maintain Underground Drainage System, Filter Drains & Detention Basin Under A Section 104 Agreement

Private Plot Owners To Maintain Permeable Block Paved Driveway Construction & Underground Drainage System

LCC Highways To Maintain Top Surface Of Filter Drains

Rev	Date	Remarks
A	02.02.22	Drawing Generally Developed.

Status: FOR PLANNING

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15 High Street, Spalding, Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: Residential Development Land East of Seagate Road, Long Sutton, Lincolnshire For D Brown Builders

Title: Proposed Adoption / Maintenance Plan

Date	Dec. '21	Scale	1:1000 @A1
Drawn	MP	Checked	SRC
Design	SRC	File Name	22421-06

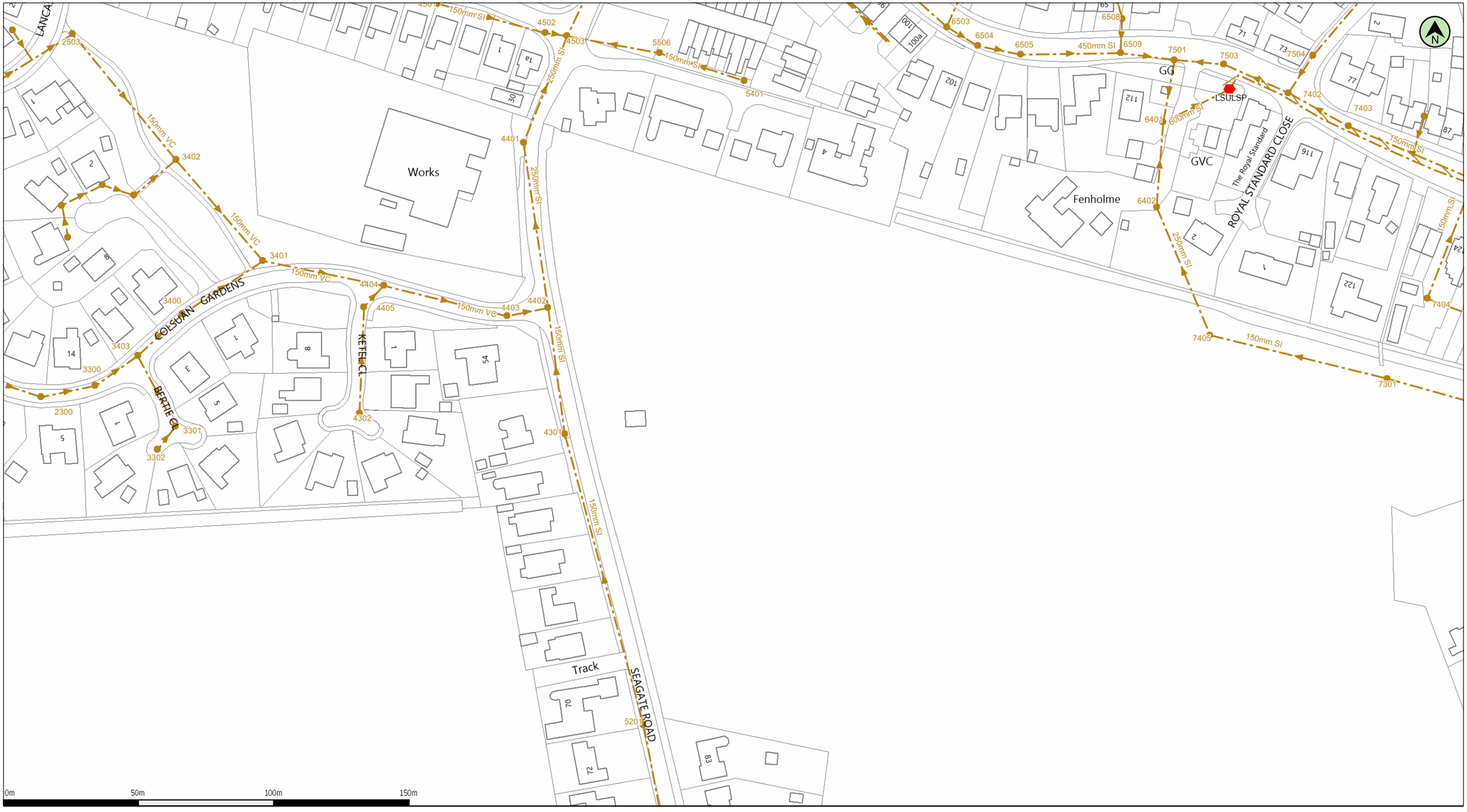
DRG No. 22421/06 Rev A

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CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street,
Spalding,
Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

APPENDIX F – Anglian Water Asset Maps

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

- Foul Sewer
- Surface Sewer
- Combined Sewer
- Final Effluent
- Rising Main*
- Private Sewer*
- Decommissioned Sewer*
- Outfall*
- Inlet*
- Manhole*
- Sewage Treatment Works
- Public Pumping Station
- Decommissioned Pumping Station

*(Colour denotes effluent type)

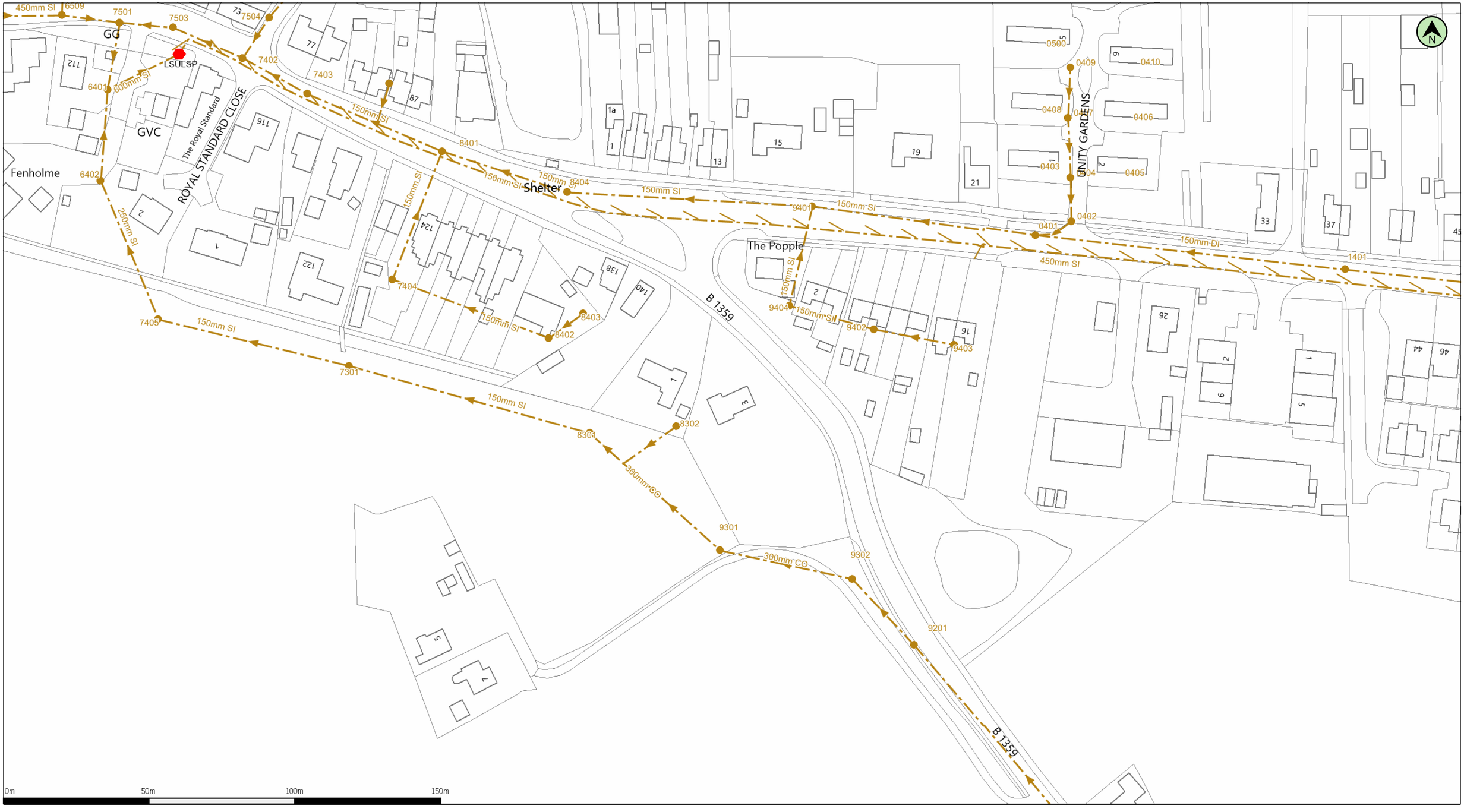
jamie.earls@lincolnshire.gov.uk

love every drop anglianwater

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
2300	F	3.039	1.214	1.825
2503	F	3.218	1.262	1.956
3300	F	3.034	1.124	1.91
3301	F	3.188	1.533	1.655
3302	F	3.172	1.668	1.504
3400	F	2.997	0.957	2.04
3401	F	3.158	0.824	2.334
3402	F	3.037	1.007	2.03
3403	F	3.093	1.033	2.06
4301	F	3.06	0.6	2.46
4302	F	3.243	1.849	1.394
4401	F	3.43	0.12	3.31
4402	F	3.2	0.447	2.753
4403	F	3.219	0.505	2.714
4404	F	3.066	0.665	2.401
4405	F	3.058	0.798	2.26
4501	F	2.72	-	-
4502	F	2.8	0.05	2.75
4503	F	2.64	-0.03	2.67
5201	F	3.11	1.04	2.07
5401	F	3.09	1.91	1.18
5506	F	2.85	1.64	1.21
6401	F	3.575	-0.427	4.002
6402	F	3.514	-0.296	3.81
6503	F	3.44	-0.99	4.43
6504	F	3.55	-1.04	4.59
6505	F	3.59	-1.08	4.67
6508	F	3.33	1.72	1.61
6509	F	3.49	-1.2	4.69
7301	F	2.941	0.274	2.667
7402	F	4.029	-0.299	4.328
7403	F	4.23	-0.21	4.44
7404	F	2.93	2.17	0.76
7405	F	3.228	0.094	3.134
7501	F	3.484	-1.42	4.904
7503	F	3.52	-0.543	4.063
7504	F	3.865	-0.241	4.106

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert



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- Foul Sewer
- Surface Sewer
- Combined Sewer
- Final Effluent
- Rising Main*
- Private Sewer*
- Decommissioned Sewer*
- Outfall*
- Inlet*
- Manhole*
- Sewage Treatment Works
- Public Pumping Station
- Decommissioned Pumping Station

*(Colour denotes effluent type)

julie@brownbuilders.co.uk

Wisbech Rd

love every drop anglianwater

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0401	F	4.2	0.82	3.38
0402	F	-	-	-
0404	F	-	-	-
0407	F	-	-	-
0409	F	-	-	-
1401	F	4.4	1.25	3.15
6401	F	3.575	-0.427	4.002
6402	F	3.514	-0.296	3.81
6509	F	3.49	-1.2	4.69
7301	F	2.941	0.274	2.667
7402	F	4.029	-0.299	4.328
7403	F	4.23	-0.21	4.44
7404	F	2.93	2.17	0.76
7405	F	3.228	0.094	3.134
7501	F	3.484	-1.42	4.904
7503	F	3.52	-0.543	4.063
7504	F	3.865	-0.241	4.106
8301	F	2.765	0.622	2.143
8302	F	-	-	-
8401	F	3.95	-0.03	3.98
8402	F	3.18	2.56	0.62
8403	F	3.47	2.69	0.78
8404	F	3.85	0.18	3.67
9201	F	5.904	1.234	4.67
9301	F	2.966	0.866	2.1
9302	F	-	-	-
9401	F	4.11	0.51	3.6
9402	F	4.03	2.29	1.74
9403	F	3.4	2.47	0.93
9404	F	3.89	2.04	1.85

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

SIDEBOTTOM RICHARDSON CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS
15 High Street,
Spalding,
Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

APPENDIX G – MicroDrainage Calculations

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15 High Street,
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Lincs. PE11 1TW
Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: **Proposed Residential Development off Seagate Road, Long Sutton**

Title:	**Surface Water Design Calculations**
Project:	**Proposed Residential Development off**
Location:	**Seagate Road, Long Sutton**
Project Ref:	**22421**
Prepared By:	**M.Pett**
Date:	**December 2021**
Revision:	**A – February 2022**
Doc Ref:	**22421-MD-01A**

Revisions:
A – 02.02.22 – Calculations updated to suit updated site layout.

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Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project: **Proposed Residential Development off Seagate Road, Long Sutton**

Calculation Summary:

The following calculations demonstrate the design of the full surface water drainage system serving the adoptable Highway and footpath and private dwelling roof water and driveways. The design proposals are shown on SRC drawings 22421/01-04.

The system has been designed for storms up to and including the 1:100yr +40% climate change event.

The surface water from driveways is proposed to be collected via a lined permeable block paved surface, i.e. a Type C system. The following calculations have considered a traditional drainage system with no sub-base storage and no reduction in run-off time, therefore a worse-case scenario.

The surface water from the dwellings roofs is to be collected by a private drainage network local to each plot. However, this network has not been modelled, and the catchment area applied to the main drainage network.

A large part of the drainage network consists of filter drains, at this stage these structures have not been modelled with storage.

A storage ponds (i.e. detention basin) have been modelled on PN1.004, 2.009, 1.005, 1.008, please refer to the following calculations for details.

Two proposed flow control devices have been incorporated to limit discharge to a maximum of 7.1 litres / second off site and an intermediate device to limited discharge from basin 1 to 7.5 litres / second.

The system outfalls to the head of South Holland IDB's system.

An allowance for urban creep has been made of 10%.

Results for both FSR and FEH rainfall data are included. No flooding occurs in any of the modelled events, including the 1:100 year plus 40% climate change.

The purpose of these calculation is to support the planning application and therefore they should not be used solely, for the detailed design/construction.

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15 High Street,
Spalding,
Lincs. PE11 1TW

Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

Project No. 22421	
Sheet No. 3	Rev. A
Date 02.02.22	
Designer MP	

Project: **Proposed Residential Development off Seagate Road, Long Sutton**

Input Data

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Existing Network Details for Existing

- Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
PN1.000	30.000	0.060	500.0	0.069	5.00	0.0	0.600	o	600	Pipe/Conduit
PN1.001	19.658	0.040	491.5	0.064	0.00	0.0	0.600	o	600	Pipe/Conduit
PN1.002	55.000	0.110	500.0	0.105	0.00	0.0	0.600	o	600	Pipe/Conduit
PN1.003	7.904	0.020	395.2	0.018	0.00	0.0	0.600	o	600	Pipe/Conduit
PN1.004	86.614	0.090	962.4	0.097	5.00	0.0	0.600	1.5 _/	2500	1:1.5 Ditch
PN2.000	37.780	0.075	503.7	0.338	5.00	0.0	0.600	o	600	Pipe/Conduit
PN2.001	16.363	0.035	467.5	0.061	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.002	20.769	0.040	519.2	0.023	0.00	0.0	0.600	o	600	Pipe/Conduit
PN3.000	25.404	0.050	508.1	0.045	5.00	0.0	0.600	o	600	Pipe/Conduit
PN3.001	6.597	0.015	439.8	0.005	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.003	61.691	0.125	493.5	0.190	0.00	0.0	0.600	o	750	Pipe/Conduit
PN2.004	43.350	0.090	481.7	0.138	0.00	0.0	0.600	o	750	Pipe/Conduit
PN2.005	19.986	0.040	499.7	0.049	0.00	0.0	0.600	o	750	Pipe/Conduit
PN4.000	45.967	0.090	510.7	0.128	5.00	0.0	0.600	o	600	Pipe/Conduit
PN4.001	12.014	0.025	480.6	0.025	0.00	0.0	0.600	o	600	Pipe/Conduit
PN4.002	12.025	0.025	481.0	0.077	0.00	0.0	0.600	o	600	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
PN1.000	2.470	0.069	0.0	1.08	306.0
PN1.001	2.410	0.133	0.0	1.09	308.7
PN1.002	2.370	0.238	0.0	1.08	306.0
PN1.003	2.260	0.256	0.0	1.22	344.6
PN1.004	2.040	0.353	0.0	1.80	5861.0
PN2.000	2.795	0.338	0.0	1.08	304.8
PN2.001	2.720	0.399	0.0	1.12	316.6
PN2.002	2.685	0.422	0.0	1.06	300.2
PN3.000	2.710	0.045	0.0	1.07	303.5
PN3.001	2.660	0.050	0.0	1.15	326.5
PN2.003	2.495	0.662	0.0	1.25	553.5
PN2.004	2.370	0.800	0.0	1.27	560.3
PN2.005	2.280	0.849	0.0	1.25	550.1
PN4.000	2.690	0.128	0.0	1.07	302.7
PN4.001	2.600	0.153	0.0	1.10	312.2
PN4.002	2.575	0.230	0.0	1.10	312.0

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Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
PN4.003	9.107	0.020	455.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN4.004	50.682	0.100	506.8	0.138	0.00	0.0	0.600	o	600	Pipe/Conduit
PN4.005	12.552	0.025	502.1	0.021	0.00	0.0	0.600	o	600	Pipe/Conduit
PN4.006	6.257	0.015	417.1	0.004	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.006	30.099	0.050	602.0	0.054	0.00	0.0	0.600	o	750	Pipe/Conduit
PN2.007	6.078	0.015	405.2	0.077	0.00	0.0	0.600	o	750	Pipe/Conduit
PN2.008	2.000#	0.050	40.0	0.000	5.00	0.0	0.600	o	750	Pipe/Conduit
PN5.000	58.115	0.115	505.3	0.153	5.00	0.0	0.600	o	600	Pipe/Conduit
PN6.000	35.000	0.070	500.0	0.098	5.00	0.0	0.600	o	600	Pipe/Conduit
PN7.000	27.500	0.055	500.0	0.030	5.00	0.0	0.600	o	600	Pipe/Conduit
PN6.001	87.000	0.175	497.1	0.173	0.00	0.0	0.600	o	600	Pipe/Conduit
PN6.002	14.272	0.030	475.7	0.041	0.00	0.0	0.600	o	600	Pipe/Conduit
PN5.001	20.211	0.040	505.3	0.019	0.00	0.0	0.600	o	600	Pipe/Conduit
PN5.002	17.336	0.035	495.3	0.035	0.00	0.0	0.600	o	600	Pipe/Conduit
PN5.003	6.112	0.015	407.5	0.096	0.00	0.0	0.600	o	600	Pipe/Conduit
PN5.004	2.000#	0.050	40.0	0.000	5.00	0.0	0.600	o	600	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
PN4.003	2.550	0.230	0.0	1.13	320.8
PN4.004	2.530	0.368	0.0	1.07	303.9
PN4.005	2.430	0.389	0.0	1.08	305.3
PN4.006	2.405	0.394	0.0	1.19	335.3
PN2.006	2.240	1.297	0.0	1.13	500.6
PN2.007	2.190	1.374	0.0	1.38	611.4
PN2.008	2.175	1.374	0.0	4.43	1958.3
PN5.000	2.380	0.153	0.0	1.08	304.3
PN6.000	2.540	0.098	0.0	1.08	306.0
PN7.000	2.525	0.030	0.0	1.08	306.0
PN6.001	2.470	0.302	0.0	1.09	306.9
PN6.002	2.295	0.343	0.0	1.11	313.8
PN5.001	2.265	0.514	0.0	1.08	304.4
PN5.002	2.225	0.549	0.0	1.09	307.4
PN5.003	2.190	0.645	0.0	1.20	339.3
PN5.004	2.175	0.645	0.0	3.86	1090.9

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Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
PN8.000	50.000	0.100	500.0	0.118	5.00	0.0	0.600	o	600	Pipe/Conduit
PN8.001	13.779	0.030	459.3	0.033	0.00	0.0	0.600	o	600	Pipe/Conduit
PN8.002	10.016	0.020	500.8	0.049	0.00	0.0	0.600	o	600	Pipe/Conduit
PN8.003	51.000	0.100	510.0	0.071	0.00	0.0	0.600	o	600	Pipe/Conduit
PN8.004	8.862	0.025	354.5	0.084	0.00	0.0	0.600	o	600	Pipe/Conduit
PN8.005	2.000#	0.050	40.0	0.000	5.00	0.0	0.600	o	600	Pipe/Conduit
PN9.000	30.000	0.060	500.0	0.020	5.00	0.0	0.600	o	600	Pipe/Conduit
PN9.001	25.000	0.050	500.0	0.017	0.00	0.0	0.600	o	600	Pipe/Conduit
PN9.002	9.861	0.020	493.1	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN9.003	16.367	0.000	0.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.009	9.955	0.015	663.7	0.573	5.00	0.0	0.600	o	600	Pipe/Conduit
PN10.000	9.086	0.020	454.3	0.054	5.00	0.0	0.600	o	600	Pipe/Conduit
PN10.001	83.566	0.165	506.5	0.276	0.00	0.0	0.600	o	600	Pipe/Conduit
PN11.000	56.303	0.115	489.6	0.085	5.00	0.0	0.600	o	600	Pipe/Conduit
PN11.001	6.259	0.015	417.3	0.058	0.00	0.0	0.600	o	600	Pipe/Conduit
PN10.002	14.061	0.030	468.7	0.044	0.00	0.0	0.600	o	600	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
PN8.000	2.450	0.118	0.0	1.08	306.0
PN8.001	2.350	0.151	0.0	1.13	319.4
PN8.002	2.320	0.200	0.0	1.08	305.7
PN8.003	2.300	0.271	0.0	1.07	302.9
PN8.004	2.200	0.355	0.0	1.29	364.1
PN8.005	2.175	0.355	0.0	3.86	1090.9
PN9.000	2.255	0.020	0.0	1.08	306.0
PN9.001	2.195	0.038	0.0	1.08	306.0
PN9.002	2.145	0.038	0.0	1.09	308.2
PN9.003	2.125	0.038	0.0	0.00	0.0
PN2.009	2.125	2.985	0.0	0.94	265.1
PN10.000	2.410	0.054	0.0	1.14	321.2
PN10.001	2.390	0.329	0.0	1.08	304.0
PN11.000	2.355	0.085	0.0	1.09	309.3
PN11.001	2.240	0.144	0.0	1.19	335.3
PN10.002	2.225	0.517	0.0	1.12	316.2

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Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
PN10.003	13.580	0.025	543.2	0.052	0.00	0.0	0.600	o	600	Pipe/Conduit
PN10.004	31.517	0.060	525.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.010	6.447	0.010	644.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN2.011	2.000#	0.150	13.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN1.005	149.885	0.150	999.2	0.250	0.00	0.0	0.600	1.5 _/	2500	1:1.5 Ditch
PN1.006	19.407	0.025	776.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN1.007	2.000#	0.000	0.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.000	39.071	0.080	488.4	0.067	5.00	0.0	0.600	o	600	Pipe/Conduit
PN12.001	10.823	0.025	432.9	0.055	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.002	20.575	0.045	457.2	0.111	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.003	27.849	0.055	506.3	0.028	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.004	11.104	0.025	444.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.005	23.681	0.050	473.6	0.048	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.006	28.746	0.060	479.1	0.073	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.007	5.857	0.015	390.5	0.101	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.008	52.000	0.105	495.2	0.114	0.00	0.0	0.600	o	600	Pipe/Conduit
PN12.009	15.588	0.030	519.6	0.058	5.00	0.0	0.600	o	600	Pipe/Conduit
PN12.010	2.000#	0.000	0.0	0.117	0.00	0.0	0.600	o	600	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
PN10.003	2.195	0.569	0.0	1.04	293.4
PN10.004	2.170	0.569	0.0	1.06	298.4
PN2.010	2.110	3.554	0.0	0.95	269.1
PN2.011	2.100	3.554	0.0	6.69	1892.2
PN1.005	1.950	4.157	0.0	1.85	6899.9
PN1.006	1.800	4.157	0.0	0.87	244.9
PN1.007	1.775	4.157	0.0	0.00	0.0
PN12.000	2.265	0.067	0.0	1.10	309.6
PN12.001	2.185	0.122	0.0	1.16	329.1
PN12.002	2.160	0.233	0.0	1.13	320.1
PN12.003	2.115	0.261	0.0	1.08	304.0
PN12.004	2.060	0.261	0.0	1.15	324.9
PN12.005	2.035	0.309	0.0	1.11	314.5
PN12.006	1.985	0.382	0.0	1.11	312.7
PN12.007	1.925	0.482	0.0	1.23	346.7
PN12.008	1.910	0.597	0.0	1.09	307.5
PN12.009	1.805	0.654	0.0	1.06	300.1
PN12.010	1.775	0.771	0.0	0.00	0.0

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Existing Network Details for Existing

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
PN1.008	10.040	0.025	401.6	0.157	0.00	0.0	0.600	o	750	Pipe/Conduit
PN1.009	75.000	0.100	750.0	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit
PN1.010	11.623	0.050	232.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
PN1.011	68.595	0.275	249.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
PN1.012	9.231	0.045	205.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
PN1.008	1.775	5.085	0.0	1.39	614.2
PN1.009	1.750	5.085	0.0	1.01	448.0
PN1.010	1.650	5.085	0.0	1.03	72.6
PN1.011	1.600	5.085	0.0	0.99	70.0
PN1.012	1.325	5.085	0.0	1.09	77.3

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Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)
S520	3.900	1.430	Open Manhole	1200	PN1.000	2.470	600			
S521	3.800	1.390	Open Manhole	1200	PN1.001	2.410	600	PN1.000	2.410	600
S522	3.610	1.240	Open Manhole	1200	PN1.002	2.370	600	PN1.001	2.370	600
S523	3.500	1.240	Open Manhole	1200	PN1.003	2.260	600	PN1.002	2.260	600
S-HW520-Ditch1	2.900	0.860	Open Manhole	1200	PN1.004	2.040	2500	PN1.003	2.240	600
S400	4.225	1.430	Open Manhole	1200	PN2.000	2.795	600			
S401	4.150	1.430	Open Manhole	1200	PN2.001	2.720	600	PN2.000	2.720	600
S402	4.115	1.430	Open Manhole	1200	PN2.002	2.685	600	PN2.001	2.685	600
S403	4.170	1.460	Open Manhole	1200	PN3.000	2.710	600			
S404	4.075	1.415	Open Manhole	1200	PN3.001	2.660	600	PN3.000	2.660	600
S405	4.075	1.580	Open Manhole	1200	PN2.003	2.495	750	PN2.002	2.645	600
								PN3.001	2.645	600
S406	3.950	1.580	Open Manhole	1200	PN2.004	2.370	750	PN2.003	2.370	750
S407	3.860	1.580	Open Manhole	1200	PN2.005	2.280	750	PN2.004	2.280	750
S408	4.170	1.480	Open Manhole	1200	PN4.000	2.690	600			
S409	4.045	1.445	Open Manhole	1200	PN4.001	2.600	600	PN4.000	2.600	600
S410	4.010	1.435	Open Manhole	1200	PN4.002	2.575	600	PN4.001	2.575	600
S411	3.980	1.430	Open Manhole	1200	PN4.003	2.550	600	PN4.002	2.550	600
S412	3.980	1.450	Open Manhole	1200	PN4.004	2.530	600	PN4.003	2.530	600
S413	3.880	1.450	Open Manhole	1200	PN4.005	2.430	600	PN4.004	2.430	600
S414	3.820	1.415	Open Manhole	1200	PN4.006	2.405	600	PN4.005	2.405	600
S415	3.820	1.580	Open Manhole	1200	PN2.006	2.240	750	PN2.005	2.240	750
								PN4.006	2.390	600
S416	3.750	1.560	Open Manhole	1200	PN2.007	2.190	750	PN2.006	2.190	750
S-HW400	3.870	1.695	Open Manhole	1200	PN2.008	2.175	750	PN2.007	2.175	750
S220	3.795	1.415	Open Manhole	1200	PN5.000	2.380	600			
S320	4.030	1.490	Open Manhole	1200	PN6.000	2.540	600			
S321	4.060	1.535	Open Manhole	1200	PN7.000	2.525	600			
S322	3.885	1.415	Open Manhole	1200	PN6.001	2.470	600	PN6.000	2.470	600
								PN7.000	2.470	600
S323	3.820	1.525	Open Manhole	1200	PN6.002	2.295	600	PN6.001	2.295	600
S221	3.665	1.400	Open Manhole	1200	PN5.001	2.265	600	PN5.000	2.265	600
								PN6.002	2.265	600
S222	3.625	1.400	Open Manhole	1200	PN5.002	2.225	600	PN5.001	2.225	600
S223	3.590	1.400	Open Manhole	1200	PN5.003	2.190	600	PN5.002	2.190	600
S-HW220	3.590	1.415	Open Manhole	1200	PN5.004	2.175	600	PN5.003	2.175	600
S300	4.015	1.565	Open Manhole	1200	PN8.000	2.450	600			
S301	3.885	1.535	Open Manhole	1200	PN8.001	2.350	600	PN8.000	2.350	600

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Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diamet (mm)
S302	3.800	1.480	Open Manhole	1200	PN8.002	2.320	600	PN8.001	2.320	6
S303	3.840	1.540	Open Manhole	1200	PN8.003	2.300	600	PN8.002	2.300	6
S304	3.800	1.600	Open Manhole	1200	PN8.004	2.200	600	PN8.003	2.200	6
S-HW300	3.700	1.525	Open Manhole	1200	PN8.005	2.175	600	PN8.004	2.175	6
S500	3.610	1.355	Open Manhole	1200	PN9.000	2.255	600			
S501	3.550	1.355	Open Manhole	1200	PN9.001	2.195	600	PN9.000	2.195	6
S502	3.500	1.355	Open Manhole	1200	PN9.002	2.145	600	PN9.001	2.145	6
S-HW500	3.500	1.375	Open Manhole	1200	PN9.003	2.125	600	PN9.002	2.125	6
S-HW221-Basin1	3.600	1.475	Open Manhole	1200	PN2.009	2.125	600	PN2.008	2.125	7
								PN5.004	2.125	6
								PN8.005	2.125	6
								PN9.003	2.125	6
S200	3.665	1.255	Open Manhole	1200	PN10.000	2.410	600			
S201	3.665	1.275	Open Manhole	1200	PN10.001	2.390	600	PN10.000	2.390	6
S202	3.680	1.325	Open Manhole	1200	PN11.000	2.355	600			
S203	3.500	1.260	Open Manhole	1200	PN11.001	2.240	600	PN11.000	2.240	6
S204	3.500	1.275	Open Manhole	1200	PN10.002	2.225	600	PN10.001	2.225	6
								PN11.001	2.225	6
S205	3.460	1.265	Open Manhole	1200	PN10.003	2.195	600	PN10.002	2.195	6
S206	3.410	1.240	Open Manhole	1200	PN10.004	2.170	600	PN10.003	2.170	6
S250-FCC1	3.500	1.390	Open Manhole	1200	PN2.010	2.110	600	PN2.009	2.110	6
								PN10.004	2.110	6
S-HW222	3.500	1.400	Open Manhole	1325	PN2.011	2.100	600	PN2.010	2.100	6
SDitch2/Basin2	2.900	0.950	Open Manhole	1200	PN1.005	1.950	2500	PN1.004	1.950	25
								PN2.011	1.950	6
S-HW223-Ditch3	2.900	1.100	Open Manhole	1200	PN1.006	1.800	600	PN1.005	1.800	25
S-HW224	3.400	1.625	Open Manhole	1200	PN1.007	1.775	600	PN1.006	1.775	6
S100	3.970	1.705	Open Manhole	1200	PN12.000	2.265	600			
S101	3.885	1.700	Open Manhole	1200	PN12.001	2.185	600	PN12.000	2.185	6
S102	3.840	1.680	Open Manhole	1200	PN12.002	2.160	600	PN12.001	2.160	6
S103	3.800	1.685	Open Manhole	1200	PN12.003	2.115	600	PN12.002	2.115	6
S104	3.750	1.690	Open Manhole	1200	PN12.004	2.060	600	PN12.003	2.060	6
S105	3.730	1.695	Open Manhole	1200	PN12.005	2.035	600	PN12.004	2.035	6
S106	3.505	1.520	Open Manhole	1200	PN12.006	1.985	600	PN12.005	1.985	6
S107	3.445	1.520	Open Manhole	1200	PN12.007	1.925	600	PN12.006	1.925	6
S108	3.415	1.505	Open Manhole	1200	PN12.008	1.910	600	PN12.007	1.910	6
S109	3.305	1.500	Open Manhole	1200	PN12.009	1.805	600	PN12.008	1.805	6
S-HW100	3.400	1.625	Open Manhole	1200	PN12.010	1.775	600	PN12.009	1.775	6

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Manhole Schedules for Existing

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)
S-HW101-Basin3	3.400	1.625	Open Manhole	1200	PN1.008	1.775	750	PN1.007	1.775	600
								PN12.010	1.775	600
S120	3.350	1.600	Open Manhole	1200	PN1.009	1.750	750	PN1.008	1.750	750
S121-FCC2	3.350	1.700	Open Manhole	1200	PN1.010	1.650	300	PN1.009	1.650	750
S122	3.500	1.900	Open Manhole	1200	PN1.011	1.600	300	PN1.010	1.600	300
S123	2.300	0.975	Open Manhole	1200	PN1.012	1.325	300	PN1.011	1.325	300
S	2.300	1.020	Open Manhole	0		OUTFALL		PN1.012	1.280	300

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S520	543858.801	322326.100	543858.801	322326.100	Required	
S521	543879.251	322348.050	543879.251	322348.050	Required	
S522	543888.252	322365.526	543888.252	322365.526	Required	
S523	543835.315	322380.446	543835.315	322380.446	Required	
S-HW520-Ditch1	543831.470	322387.352	543831.470	322387.352	Required	
S400	544005.635	322222.880	544005.635	322222.880	Required	
S401	543976.094	322199.330	543976.094	322199.330	Required	
S402	543961.469	322192.372	543961.469	322192.372	Required	
S403	543936.797	322220.025	543936.797	322220.025	Required	
S404	543945.416	322196.523	543945.416	322196.523	Required	

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Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S405	543940.705	322191.904	543940.705	322191.904	Required	
S406	543880.766	322205.942	543880.766	322205.942	Required	
S407	543840.910	322222.768	543840.910	322222.768	Required	
S408	543932.928	322225.820	543932.928	322225.820	Required	
S409	543907.407	322264.051	543907.407	322264.051	Required	
S410	543897.764	322270.722	543897.764	322270.722	Required	
S411	543886.169	322268.983	543886.169	322268.983	Required	
S412	543878.300	322273.567	543878.300	322273.567	Required	
S413	543836.496	322244.912	543836.496	322244.912	Required	
S414	543829.661	322234.385	543829.661	322234.385	Required	
S415	543823.613	322232.781	543823.613	322232.781	Required	
S416	543796.851	322246.473	543796.851	322246.473	Required	
S-HW400	543795.660	322252.433	543795.660	322252.433	Required	
S220	543635.145	322330.949	543635.145	322330.949	Required	
S320	543614.663	322222.287	543614.663	322222.287	Required	

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Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S321	543675.787	322209.243	543675.787	322209.243	Required	
S322	543648.892	322214.982	543648.892	322214.982	Required	
S323	543671.882	322298.890	543671.882	322298.890	Required	
S221	543685.659	322302.619	543685.659	322302.619	Required	
S222	543704.798	322296.128	543704.798	322296.128	Required	
S223	543721.058	322290.115	543721.058	322290.115	Required	
S-HW220	543726.326	322293.214	543726.326	322293.214	Required	
S300	543683.720	322207.550	543683.720	322207.550	Required	
S301	543732.619	322197.114	543732.619	322197.114	Required	
S302	543745.636	322201.633	543745.636	322201.633	Required	
S303	543752.066	322209.312	543752.066	322209.312	Required	
S304	543762.967	322259.134	543762.967	322259.134	Required	
S-HW300	543764.861	322267.791	543764.861	322267.791	Required	
S500	543828.424	322379.193	543828.424	322379.193	Required	
S501	543799.549	322387.332	543799.549	322387.332	Required	

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Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S502	543774.556	322386.745	543774.556	322386.745	Required	
S-HW500	543773.113	322376.990	543773.113	322376.990	Required	
S-HW221-Basin1	543756.907	322374.700	543756.907	322374.700	Required	
S200	543620.253	322387.724	543620.253	322387.724	Required	
S201	543628.439	322391.666	543628.439	322391.666	Required	
S202	543691.408	322305.292	543691.408	322305.292	Required	
S203	543710.031	322358.426	543710.031	322358.426	Required	
S204	543707.316	322364.066	543707.316	322364.066	Required	
S205	543716.013	322375.115	543716.013	322375.115	Required	
S206	543724.839	322385.163	543724.839	322385.163	Required	
S250-FCC1	543756.352	322384.639	543756.352	322384.639	Required	
S-HW222	543755.988	322391.076	543755.988	322391.076	Required	
SDitch2/Basin2	543748.043	322410.631	543748.043	322410.631	Required	
S-HW223-Ditch3	543603.696	322450.998	543603.696	322450.998	Required	
S-HW224	543587.424	322440.423	543587.424	322440.423	Required	

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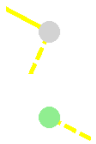
Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S100	543600.330	322237.804	543600.330	322237.804	Required	
S101	543602.837	322276.795	543602.837	322276.795	Required	
S102	543598.459	322286.694	543598.459	322286.694	Required	
S103	543603.907	322306.361	543603.907	322306.361	Required	
S104	543617.569	322330.628	543617.569	322330.628	Required	
S105	543626.311	322337.475	543626.311	322337.475	Required	
S106	543604.859	322347.015	543604.859	322347.015	Required	
S107	543576.235	322346.665	543576.235	322346.665	Required	
S108	543571.353	322349.900	543571.353	322349.900	Required	
S109	543557.869	322400.122	543557.869	322400.122	Required	
S-HW100	543559.562	322415.617	543559.562	322415.617	Required	
S-HW101-Basin3	543556.007	322449.290	543556.007	322449.290	Required	
S120	543549.837	322457.211	543549.837	322457.211	Required	
S121-FCC2	543478.062	322478.968	543478.062	322478.968	Required	
S122	543467.580	322483.988	543467.580	322483.988	Required	

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Manhole Schedules for Existing

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S123	543495.882	322546.471	543495.882	322546.471	Required	
S	543487.709	322550.763			No Entry	



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PIPELINE SCHEDULES for Existing

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN1.000	o	600	S520	3.900	2.470	0.830	Open Manhole	1200
PN1.001	o	600	S521	3.800	2.410	0.790	Open Manhole	1200
PN1.002	o	600	S522	3.610	2.370	0.640	Open Manhole	1200
PN1.003	o	600	S523	3.500	2.260	0.640	Open Manhole	1200
PN1.004	1.5 _/	2500	S-HW520-Ditch1	2.900	2.040	0.560	Open Manhole	1200
PN2.000	o	600	S400	4.225	2.795	0.830	Open Manhole	1200
PN2.001	o	600	S401	4.150	2.720	0.830	Open Manhole	1200
PN2.002	o	600	S402	4.115	2.685	0.830	Open Manhole	1200
PN3.000	o	600	S403	4.170	2.710	0.860	Open Manhole	1200
PN3.001	o	600	S404	4.075	2.660	0.815	Open Manhole	1200
PN2.003	o	750	S405	4.075	2.495	0.830	Open Manhole	1200
PN2.004	o	750	S406	3.950	2.370	0.830	Open Manhole	1200
PN2.005	o	750	S407	3.860	2.280	0.830	Open Manhole	1200
PN4.000	o	600	S408	4.170	2.690	0.880	Open Manhole	1200
PN4.001	o	600	S409	4.045	2.600	0.845	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN1.000	30.000	500.0	S521	3.800	2.410	0.790	Open Manhole	1200
PN1.001	19.658	491.5	S522	3.610	2.370	0.640	Open Manhole	1200
PN1.002	55.000	500.0	S523	3.500	2.260	0.640	Open Manhole	1200
PN1.003	7.904	395.2	S-HW520-Ditch1	2.900	2.240	0.060	Open Manhole	1200
PN1.004	86.614	962.4	SDitch2/Basin2	2.900	1.950	0.650	Open Manhole	1200
PN2.000	37.780	503.7	S401	4.150	2.720	0.830	Open Manhole	1200
PN2.001	16.363	467.5	S402	4.115	2.685	0.830	Open Manhole	1200
PN2.002	20.769	519.2	S405	4.075	2.645	0.830	Open Manhole	1200
PN3.000	25.404	508.1	S404	4.075	2.660	0.815	Open Manhole	1200
PN3.001	6.597	439.8	S405	4.075	2.645	0.830	Open Manhole	1200
PN2.003	61.691	493.5	S406	3.950	2.370	0.830	Open Manhole	1200
PN2.004	43.350	481.7	S407	3.860	2.280	0.830	Open Manhole	1200
PN2.005	19.986	499.7	S415	3.820	2.240	0.830	Open Manhole	1200
PN4.000	45.967	510.7	S409	4.045	2.600	0.845	Open Manhole	1200
PN4.001	12.014	480.6	S410	4.010	2.575	0.835	Open Manhole	1200

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PIPELINE SCHEDULES for Existing

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN4.002	o	600	S410	4.010	2.575	0.835	Open Manhole	1200
PN4.003	o	600	S411	3.980	2.550	0.830	Open Manhole	1200
PN4.004	o	600	S412	3.980	2.530	0.850	Open Manhole	1200
PN4.005	o	600	S413	3.880	2.430	0.850	Open Manhole	1200
PN4.006	o	600	S414	3.820	2.405	0.815	Open Manhole	1200
PN2.006	o	750	S415	3.820	2.240	0.830	Open Manhole	1200
PN2.007	o	750	S416	3.750	2.190	0.810	Open Manhole	1200
PN2.008	o	750	S-HW400	3.870	2.175	0.945	Open Manhole	1200
PN5.000	o	600	S220	3.795	2.380	0.815	Open Manhole	1200
PN6.000	o	600	S320	4.030	2.540	0.890	Open Manhole	1200
PN7.000	o	600	S321	4.060	2.525	0.935	Open Manhole	1200
PN6.001	o	600	S322	3.885	2.470	0.815	Open Manhole	1200
PN6.002	o	600	S323	3.820	2.295	0.925	Open Manhole	1200
PN5.001	o	600	S221	3.665	2.265	0.800	Open Manhole	1200
PN5.002	o	600	S222	3.625	2.225	0.800	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN4.002	12.025	481.0	S411	3.980	2.550	0.830	Open Manhole	1200
PN4.003	9.107	455.4	S412	3.980	2.530	0.850	Open Manhole	1200
PN4.004	50.682	506.8	S413	3.880	2.430	0.850	Open Manhole	1200
PN4.005	12.552	502.1	S414	3.820	2.405	0.815	Open Manhole	1200
PN4.006	6.257	417.1	S415	3.820	2.390	0.830	Open Manhole	1200
PN2.006	30.099	602.0	S416	3.750	2.190	0.810	Open Manhole	1200
PN2.007	6.078	405.2	S-HW400	3.870	2.175	0.945	Open Manhole	1200
PN2.008	2.000#	40.0	S-HW221-Basin1	3.600	2.125	0.725	Open Manhole	1200
PN5.000	58.115	505.3	S221	3.665	2.265	0.800	Open Manhole	1200
PN6.000	35.000	500.0	S322	3.885	2.470	0.815	Open Manhole	1200
PN7.000	27.500	500.0	S322	3.885	2.470	0.815	Open Manhole	1200
PN6.001	87.000	497.1	S323	3.820	2.295	0.925	Open Manhole	1200
PN6.002	14.272	475.7	S221	3.665	2.265	0.800	Open Manhole	1200
PN5.001	20.211	505.3	S222	3.625	2.225	0.800	Open Manhole	1200
PN5.002	17.336	495.3	S223	3.590	2.190	0.800	Open Manhole	1200

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PIPELINE SCHEDULES for Existing

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN5.003	o	600	S223	3.590	2.190	0.800	Open Manhole	1200
PN5.004	o	600	S-HW220	3.590	2.175	0.815	Open Manhole	1200
PN8.000	o	600	S300	4.015	2.450	0.965	Open Manhole	1200
PN8.001	o	600	S301	3.885	2.350	0.935	Open Manhole	1200
PN8.002	o	600	S302	3.800	2.320	0.880	Open Manhole	1200
PN8.003	o	600	S303	3.840	2.300	0.940	Open Manhole	1200
PN8.004	o	600	S304	3.800	2.200	1.000	Open Manhole	1200
PN8.005	o	600	S-HW300	3.700	2.175	0.925	Open Manhole	1200
PN9.000	o	600	S500	3.610	2.255	0.755	Open Manhole	1200
PN9.001	o	600	S501	3.550	2.195	0.755	Open Manhole	1200
PN9.002	o	600	S502	3.500	2.145	0.755	Open Manhole	1200
PN9.003	o	600	S-HW500	3.500	2.125	0.775	Open Manhole	1200
PN2.009	o	600	S-HW221-Basin1	3.600	2.125	0.875	Open Manhole	1200
PN10.000	o	600	S200	3.665	2.410	0.655	Open Manhole	1200
PN10.001	o	600	S201	3.665	2.390	0.675	Open Manhole	1200
PN11.000	o	600	S202	3.680	2.355	0.725	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN5.003	6.112	407.5	S-HW220	3.590	2.175	0.815	Open Manhole	1200
PN5.004	2.000#	40.0	S-HW221-Basin1	3.600	2.125	0.875	Open Manhole	1200
PN8.000	50.000	500.0	S301	3.885	2.350	0.935	Open Manhole	1200
PN8.001	13.779	459.3	S302	3.800	2.320	0.880	Open Manhole	1200
PN8.002	10.016	500.8	S303	3.840	2.300	0.940	Open Manhole	1200
PN8.003	51.000	510.0	S304	3.800	2.200	1.000	Open Manhole	1200
PN8.004	8.862	354.5	S-HW300	3.700	2.175	0.925	Open Manhole	1200
PN8.005	2.000#	40.0	S-HW221-Basin1	3.600	2.125	0.875	Open Manhole	1200
PN9.000	30.000	500.0	S501	3.550	2.195	0.755	Open Manhole	1200
PN9.001	25.000	500.0	S502	3.500	2.145	0.755	Open Manhole	1200
PN9.002	9.861	493.1	S-HW500	3.500	2.125	0.775	Open Manhole	1200
PN9.003	16.367	0.0	S-HW221-Basin1	3.600	2.125	0.875	Open Manhole	1200
PN2.009	9.955	663.7	S250-FCC1	3.500	2.110	0.790	Open Manhole	1200
PN10.000	9.086	454.3	S201	3.665	2.390	0.675	Open Manhole	1200
PN10.001	83.566	506.5	S204	3.500	2.225	0.675	Open Manhole	1200
PN11.000	56.303	489.6	S203	3.500	2.240	0.660	Open Manhole	1200

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PIPELINE SCHEDULES for Existing

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN11.001	o	600	S203	3.500	2.240	0.660	Open Manhole	1200
PN10.002	o	600	S204	3.500	2.225	0.675	Open Manhole	1200
PN10.003	o	600	S205	3.460	2.195	0.665	Open Manhole	1200
PN10.004	o	600	S206	3.410	2.170	0.640	Open Manhole	1200
PN2.010	o	600	S250-FCC1	3.500	2.110	0.790	Open Manhole	1200
PN2.011	o	600	S-HW222	3.500	2.100	0.800	Open Manhole	1325
PN1.005	1.5 _/	2500	SDitch2/Basin2	2.900	1.950	0.650	Open Manhole	1200
PN1.006	o	600	S-HW223-Ditch3	2.900	1.800	0.500	Open Manhole	1200
PN1.007	o	600	S-HW224	3.400	1.775	1.025	Open Manhole	1200
PN12.000	o	600	S100	3.970	2.265	1.105	Open Manhole	1200
PN12.001	o	600	S101	3.885	2.185	1.100	Open Manhole	1200
PN12.002	o	600	S102	3.840	2.160	1.080	Open Manhole	1200
PN12.003	o	600	S103	3.800	2.115	1.085	Open Manhole	1200
PN12.004	o	600	S104	3.750	2.060	1.090	Open Manhole	1200
PN12.005	o	600	S105	3.730	2.035	1.095	Open Manhole	1200
PN12.006	o	600	S106	3.505	1.985	0.920	Open Manhole	1200
PN12.007	o	600	S107	3.445	1.925	0.920	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN11.001	6.259	417.3	S204	3.500	2.225	0.675	Open Manhole	1200
PN10.002	14.061	468.7	S205	3.460	2.195	0.665	Open Manhole	1200
PN10.003	13.580	543.2	S206	3.410	2.170	0.640	Open Manhole	1200
PN10.004	31.517	525.3	S250-FCC1	3.500	2.110	0.790	Open Manhole	1200
PN2.010	6.447	644.7	S-HW222	3.500	2.100	0.800	Open Manhole	1325
PN2.011	2.000#	13.3	SDitch2/Basin2	2.900	1.950	0.350	Open Manhole	1200
PN1.005	149.885	999.2	S-HW223-Ditch3	2.900	1.800	0.800	Open Manhole	1200
PN1.006	19.407	776.3	S-HW224	3.400	1.775	1.025	Open Manhole	1200
PN1.007	2.000#	0.0	S-HW101-Basin3	3.400	1.775	1.025	Open Manhole	1200
PN12.000	39.071	488.4	S101	3.885	2.185	1.100	Open Manhole	1200
PN12.001	10.823	432.9	S102	3.840	2.160	1.080	Open Manhole	1200
PN12.002	20.575	457.2	S103	3.800	2.115	1.085	Open Manhole	1200
PN12.003	27.849	506.3	S104	3.750	2.060	1.090	Open Manhole	1200
PN12.004	11.104	444.2	S105	3.730	2.035	1.095	Open Manhole	1200
PN12.005	23.681	473.6	S106	3.505	1.985	0.920	Open Manhole	1200
PN12.006	28.746	479.1	S107	3.445	1.925	0.920	Open Manhole	1200
PN12.007	5.857	390.5	S108	3.415	1.910	0.905	Open Manhole	1200

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PIPELINE SCHEDULES for Existing

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN12.008	o	600	S108	3.415	1.910	0.905	Open Manhole	1200
PN12.009	o	600	S109	3.305	1.805	0.900	Open Manhole	1200
PN12.010	o	600	S-HW100	3.400	1.775	1.025	Open Manhole	1200
PN1.008	o	750	S-HW101-Basin3	3.400	1.775	0.875	Open Manhole	1200
PN1.009	o	750	S120	3.350	1.750	0.850	Open Manhole	1200
PN1.010	o	300	S121-FCC2	3.350	1.650	1.400	Open Manhole	1200
PN1.011	o	300	S122	3.500	1.600	1.600	Open Manhole	1200
PN1.012	o	300	S123	2.300	1.325	0.675	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
PN12.008	52.000	495.2	S109	3.305	1.805	0.900	Open Manhole	1200
PN12.009	15.588	519.6	S-HW100	3.400	1.775	1.025	Open Manhole	1200
PN12.010	2.000#	0.0	S-HW101-Basin3	3.400	1.775	1.025	Open Manhole	1200
PN1.008	10.040	401.6	S120	3.350	1.750	0.850	Open Manhole	1200
PN1.009	75.000	750.0	S121-FCC2	3.350	1.650	0.950	Open Manhole	1200
PN1.010	11.623	232.5	S122	3.500	1.600	1.600	Open Manhole	1200
PN1.011	68.595	249.4	S123	2.300	1.325	0.675	Open Manhole	1200
PN1.012	9.231	205.1	S	2.300	1.280	0.720	Open Manhole	0

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.020	0.020	0.020
	User	-	100	0.048	0.048	0.069
1.001	User	-	100	0.016	0.016	0.016
	User	-	100	0.023	0.023	0.039
	User	-	100	0.025	0.025	0.064
1.002	User	-	100	0.064	0.064	0.064
	User	-	100	0.024	0.024	0.088
	User	-	100	0.017	0.017	0.105
1.003	User	-	100	0.009	0.009	0.009
	User	-	100	0.009	0.009	0.018
1.004	User	-	100	0.043	0.043	0.043
	User	-	100	0.054	0.054	0.097
2.000	User	-	100	0.064	0.064	0.064
	User	-	100	0.016	0.016	0.081
	User	-	100	0.009	0.009	0.090
	User	-	100	0.008	0.008	0.097
	User	-	100	0.057	0.057	0.155
	User	-	100	0.030	0.030	0.185
	User	-	100	0.014	0.014	0.199
	User	-	100	0.012	0.012	0.211
	User	-	100	0.030	0.030	0.241
	User	-	100	0.022	0.022	0.263
	User	-	100	0.031	0.031	0.293
	User	-	100	0.014	0.014	0.308
	User	-	100	0.008	0.008	0.316
	User	-	100	0.022	0.022	0.338
2.001	User	-	100	0.019	0.019	0.019
	User	-	100	0.012	0.012	0.031
	User	-	100	0.007	0.007	0.039
	User	-	100	0.022	0.022	0.061
2.002	User	-	100	0.023	0.023	0.023
3.000	User	-	100	0.028	0.028	0.028
	User	-	100	0.008	0.008	0.036
	User	-	100	0.009	0.009	0.045
3.001	User	-	100	0.005	0.005	0.005
2.003	User	-	100	0.084	0.084	0.084
	User	-	100	0.017	0.017	0.100
	User	-	100	0.008	0.008	0.108
	User	-	100	0.012	0.012	0.120
	User	-	100	0.024	0.024	0.144
	User	-	100	0.022	0.022	0.166
	User	-	100	0.023	0.023	0.190
2.004	User	-	100	0.046	0.046	0.046
	User	-	100	0.024	0.024	0.069
	User	-	100	0.022	0.022	0.091
	User	-	100	0.024	0.024	0.115
	User	-	100	0.023	0.023	0.138
2.005	User	-	100	0.010	0.010	0.010
	User	-	100	0.016	0.016	0.026
	User	-	100	0.023	0.023	0.049
4.000	User	-	100	0.047	0.047	0.047

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.009	0.009	0.056
	User	-	100	0.009	0.009	0.066
	User	-	100	0.009	0.009	0.075
	User	-	100	0.009	0.009	0.085
	User	-	100	0.009	0.009	0.094
	User	-	100	0.008	0.008	0.101
	User	-	100	0.017	0.017	0.118
	User	-	100	0.010	0.010	0.128
4.001	User	-	100	0.015	0.015	0.015
	User	-	100	0.010	0.010	0.025
4.002	User	-	100	0.015	0.015	0.015
	User	-	100	0.016	0.016	0.032
	User	-	100	0.031	0.031	0.062
	User	-	100	0.014	0.014	0.077
4.003	-	-	100	0.000	0.000	0.000
4.004	User	-	100	0.050	0.050	0.050
	User	-	100	0.011	0.011	0.061
	User	-	100	0.011	0.011	0.073
	User	-	100	0.024	0.024	0.097
	User	-	100	0.012	0.012	0.109
	User	-	100	0.008	0.008	0.116
	User	-	100	0.022	0.022	0.138
4.005	User	-	100	0.011	0.011	0.011
	User	-	100	0.010	0.010	0.021
4.006	User	-	100	0.004	0.004	0.004
2.006	User	-	100	0.019	0.019	0.019
	User	-	100	0.012	0.012	0.031
	User	-	100	0.023	0.023	0.054
2.007	User	-	100	0.010	0.010	0.010
	User	-	100	0.031	0.031	0.041
	User	-	100	0.011	0.011	0.053
	User	-	100	0.024	0.024	0.077
2.008	-	-	100	0.000	0.000	0.000
5.000	User	-	100	0.023	0.023	0.023
	User	-	100	0.060	0.060	0.083
	User	-	100	0.024	0.024	0.107
	User	-	100	0.018	0.018	0.125
	User	-	100	0.012	0.012	0.136
	User	-	100	0.009	0.009	0.145
	User	-	100	0.007	0.007	0.153
6.000	User	-	100	0.019	0.019	0.019
	User	-	100	0.029	0.029	0.048
	User	-	100	0.013	0.013	0.061
	User	-	100	0.013	0.013	0.074
	User	-	100	0.011	0.011	0.085
	User	-	100	0.013	0.013	0.098
7.000	User	-	100	0.011	0.011	0.011
	User	-	100	0.013	0.013	0.024
	User	-	100	0.006	0.006	0.030
6.001	User	-	100	0.039	0.039	0.039
	User	-	100	0.029	0.029	0.067

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.011	0.011	0.078
	User	-	100	0.012	0.012	0.091
	User	-	100	0.006	0.006	0.097
	User	-	100	0.013	0.013	0.110
	User	-	100	0.013	0.013	0.123
	User	-	100	0.017	0.017	0.140
	User	-	100	0.017	0.017	0.157
	User	-	100	0.016	0.016	0.173
6.002	User	-	100	0.025	0.025	0.025
	User	-	100	0.016	0.016	0.041
5.001	User	-	100	0.019	0.019	0.019
5.002	User	-	100	0.019	0.019	0.019
	User	-	100	0.017	0.017	0.035
5.003	User	-	100	0.020	0.020	0.020
	User	-	100	0.017	0.017	0.036
	User	-	100	0.030	0.030	0.066
	User	-	100	0.014	0.014	0.080
	User	-	100	0.017	0.017	0.096
5.004	-	-	100	0.000	0.000	0.000
8.000	User	-	100	0.030	0.030	0.030
	User	-	100	0.016	0.016	0.046
	User	-	100	0.016	0.016	0.062
	User	-	100	0.011	0.011	0.073
	User	-	100	0.014	0.014	0.087
	User	-	100	0.017	0.017	0.104
	User	-	100	0.014	0.014	0.118
8.001	User	-	100	0.011	0.011	0.011
	User	-	100	0.006	0.006	0.017
	User	-	100	0.016	0.016	0.033
8.002	User	-	100	0.030	0.030	0.030
	User	-	100	0.009	0.009	0.039
	User	-	100	0.010	0.010	0.049
8.003	User	-	100	0.029	0.029	0.029
	User	-	100	0.005	0.005	0.034
	User	-	100	0.012	0.012	0.047
	User	-	100	0.012	0.012	0.058
	User	-	100	0.013	0.013	0.071
8.004	User	-	100	0.033	0.033	0.033
	User	-	100	0.016	0.016	0.049
	User	-	100	0.023	0.023	0.072
	User	-	100	0.011	0.011	0.084
8.005	-	-	100	0.000	0.000	0.000
9.000	User	-	100	0.010	0.010	0.010
	User	-	100	0.010	0.010	0.020
9.001	User	-	100	0.017	0.017	0.017
9.002	-	-	100	0.000	0.000	0.000
9.003	-	-	100	0.000	0.000	0.000
2.009	User	-	100	0.573	0.573	0.573
10.000	User	-	100	0.030	0.030	0.030
	User	-	100	0.024	0.024	0.054
10.001	User	-	100	0.079	0.079	0.079

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.025	0.025	0.103
	User	-	100	0.025	0.025	0.128
	User	-	100	0.024	0.024	0.152
	User	-	100	0.026	0.026	0.177
	User	-	100	0.024	0.024	0.201
	User	-	100	0.024	0.024	0.225
	User	-	100	0.024	0.024	0.249
	User	-	100	0.027	0.027	0.276
11.000	User	-	100	0.023	0.023	0.023
	User	-	100	0.012	0.012	0.035
	User	-	100	0.022	0.022	0.057
	User	-	100	0.012	0.012	0.069
	User	-	100	0.009	0.009	0.078
	User	-	100	0.007	0.007	0.085
11.001	User	-	100	0.058	0.058	0.058
10.002	User	-	100	0.020	0.020	0.020
	User	-	100	0.024	0.024	0.044
10.003	User	-	100	0.012	0.012	0.012
	User	-	100	0.007	0.007	0.020
	User	-	100	0.023	0.023	0.043
	User	-	100	0.009	0.009	0.052
10.004	-	-	100	0.000	0.000	0.000
2.010	-	-	100	0.000	0.000	0.000
2.011	-	-	100	0.000	0.000	0.000
1.005	User	-	100	0.033	0.033	0.033
	User	-	100	0.125	0.125	0.158
	User	-	100	0.092	0.092	0.250
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
12.000	User	-	100	0.021	0.021	0.021
	User	-	100	0.016	0.016	0.037
	User	-	100	0.016	0.016	0.053
	User	-	100	0.014	0.014	0.067
12.001	User	-	100	0.022	0.022	0.022
	User	-	100	0.016	0.016	0.038
	User	-	100	0.008	0.008	0.046
	User	-	100	0.009	0.009	0.055
12.002	User	-	100	0.019	0.019	0.019
	User	-	100	0.017	0.017	0.036
	User	-	100	0.012	0.012	0.048
	User	-	100	0.014	0.014	0.062
	User	-	100	0.020	0.020	0.082
	User	-	100	0.012	0.012	0.094
	User	-	100	0.017	0.017	0.111
12.003	User	-	100	0.028	0.028	0.028
12.004	-	-	100	0.000	0.000	0.000
12.005	User	-	100	0.032	0.032	0.032
	User	-	100	0.016	0.016	0.048
12.006	User	-	100	0.028	0.028	0.028
	User	-	100	0.010	0.010	0.038
	User	-	100	0.010	0.010	0.048

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Area Summary for Existing

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
	User	-	100	0.014	0.014	0.062
	User	-	100	0.011	0.011	0.073
12.007	User	-	100	0.033	0.033	0.033
	User	-	100	0.012	0.012	0.045
	User	-	100	0.011	0.011	0.056
	User	-	100	0.011	0.011	0.067
	User	-	100	0.012	0.012	0.079
	User	-	100	0.022	0.022	0.101
12.008	User	-	100	0.052	0.052	0.052
	User	-	100	0.010	0.010	0.062
	User	-	100	0.010	0.010	0.072
	User	-	100	0.021	0.021	0.093
	User	-	100	0.021	0.021	0.114
12.009	User	-	100	0.021	0.021	0.021
	User	-	100	0.021	0.021	0.042
	User	-	100	0.016	0.016	0.058
12.010	User	-	100	0.023	0.023	0.023
	User	-	100	0.021	0.021	0.044
	User	-	100	0.072	0.072	0.117
1.008	User	-	100	0.157	0.157	0.157
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
1.011	-	-	100	0.000	0.000	0.000
1.012	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				5.085	5.085	5.085

Free Flowing Outfall Details for Existing

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
PN1.012	S	2.300	1.280	0.000	0	0

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Online Controls for Existing

Hydro-Brake® Optimum Manhole: S250-FCC1, DS/PN: PN2.010, Volume (m³): 12.6

Unit Reference	MD-SHE-0122-7500-1390-7500
Design Head (m)	1.390
Design Flow (l/s)	7.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	122
Invert Level (m)	2.110
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.390	7.5
Flush-Flo™	0.409	7.5
Kick-Flo®	0.863	6.0
Mean Flow over Head Range	-	6.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.3	1.200	7.0	3.000	10.8	7.000	16.1
0.200	6.9	1.400	7.5	3.500	11.6	7.500	16.7
0.300	7.4	1.600	8.0	4.000	12.3	8.000	17.2
0.400	7.5	1.800	8.5	4.500	13.1	8.500	17.7
0.500	7.4	2.000	8.9	5.000	13.7	9.000	18.2
0.600	7.3	2.200	9.3	5.500	14.4	9.500	18.7
0.800	6.5	2.400	9.7	6.000	15.0		
1.000	6.4	2.600	10.1	6.500	15.6		

Hydro-Brake® Optimum Manhole: S121-FCC2, DS/PN: PN1.010, Volume (m³): 34.5

Unit Reference	MD-SHE-0114-7100-1700-7100
Design Head (m)	1.700
Design Flow (l/s)	7.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	114
Invert Level (m)	1.650
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: S121-FCC2, DS/PN: PN1.010, Volume (m³): 34.5

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	7.1
Flush-Flo™	0.500	7.0
Kick-Flo®	1.022	5.6
Mean Flow over Head Range	-	6.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.0	1.200	6.0	3.000	9.3	7.000	13.9
0.200	6.2	1.400	6.5	3.500	10.0	7.500	14.3
0.300	6.7	1.600	6.9	4.000	10.6	8.000	14.8
0.400	7.0	1.800	7.3	4.500	11.2	8.500	15.2
0.500	7.0	2.000	7.7	5.000	11.8	9.000	15.6
0.600	7.0	2.200	8.0	5.500	12.4	9.500	16.0
0.800	6.7	2.400	8.3	6.000	12.9		
1.000	5.8	2.600	8.7	6.500	13.4		

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Storage Structures for Existing

Filter Drain Manhole: S522, DS/PN: PN1.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.370	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	55.0		

Tank or Pond Manhole: S-HW520-Ditch1, DS/PN: PN1.004

Invert Level (m) 2.250

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	70.0	0.650	180.0

Filter Drain Manhole: S400, DS/PN: PN2.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.795	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	37.8		

Filter Drain Manhole: S401, DS/PN: PN2.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.720	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	16.4		

Filter Drain Manhole: S403, DS/PN: PN3.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.710	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	25.4		

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Filter Drain Manhole: S404, DS/PN: PN3.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.660	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	6.6		

Filter Drain Manhole: S405, DS/PN: PN2.003

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.495	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	61.4		

Filter Drain Manhole: S406, DS/PN: PN2.004

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.370	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	43.4		

Filter Drain Manhole: S408, DS/PN: PN4.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.690	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	46.0		

Filter Drain Manhole: S409, DS/PN: PN4.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.600	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	12.0		

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Filter Drain Manhole: S410, DS/PN: PN4.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.575	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	12.0		

Filter Drain Manhole: S412, DS/PN: PN4.004

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.530	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	50.6		

Filter Drain Manhole: S413, DS/PN: PN4.005

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.430	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	12.5		

Filter Drain Manhole: S414, DS/PN: PN4.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.405	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	6.3		

Filter Drain Manhole: S415, DS/PN: PN2.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.750
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	600.0
Invert Level (m)	2.240	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	30.0		

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Filter Drain Manhole: S220, DS/PN: PN5.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.380	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	58.1		

Filter Drain Manhole: S222, DS/PN: PN5.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.225	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	17.3		

Tank or Pond Manhole: S-HW221-Basin1, DS/PN: PN2.009

Invert Level (m) 2.175

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1865.0	0.299	2360.0	0.300	4740.0	1.425	5870.0

Filter Drain Manhole: S200, DS/PN: PN10.000

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.410	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	9.1		

Filter Drain Manhole: S201, DS/PN: PN10.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.390	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	83.6		

Filter Drain Manhole: S202, DS/PN: PN11.000

Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.00000	Invert Level (m)	2.355
Safety Factor	2.0	Trench Width (m)	0.9

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Filter Drain Manhole: S202, DS/PN: PN11.000

Trench Length (m)	56.3	Slope (1:X)	500.0
Pipe Diameter (m)	0.600	Cap Volume Depth (m)	0.000
Pipe Depth above Invert (m)	0.000	Cap Infiltration Depth (m)	0.000
Number of Pipes	1		

Filter Drain Manhole: S203, DS/PN: PN11.001

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.240	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	6.3		

Filter Drain Manhole: S205, DS/PN: PN10.003

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.195	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	13.6		

Tank or Pond Manhole: SDitch2/Basin2, DS/PN: PN1.005

Invert Level (m) 2.100

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	550.0	0.800	810.0

Filter Drain Manhole: S102, DS/PN: PN12.002

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.160	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	20.6		

Filter Drain Manhole: S103, DS/PN: PN12.003

Infiltration Coefficient Base (m/hr)	0.00000	Trench Length (m)	27.8
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Diameter (m)	0.600
Safety Factor	2.0	Pipe Depth above Invert (m)	0.000
Porosity	0.30	Number of Pipes	1
Invert Level (m)	2.115	Slope (1:X)	500.0
Trench Width (m)	0.9	Cap Volume Depth (m)	0.000

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Filter Drain Manhole: S103, DS/PN: PN12.003

Cap Infiltration Depth (m) 0.000

Filter Drain Manhole: S105, DS/PN: PN12.005

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	2.035	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	23.7		

Filter Drain Manhole: S106, DS/PN: PN12.006

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	1.985	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	28.7		

Filter Drain Manhole: S107, DS/PN: PN12.007

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	1.925	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	5.8		

Filter Drain Manhole: S108, DS/PN: PN12.008

Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.600
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	500.0
Invert Level (m)	1.910	Cap Volume Depth (m)	0.000
Trench Width (m)	0.9	Cap Infiltration Depth (m)	0.000
Trench Length (m)	52.0		

Tank or Pond Manhole: S-HW101-Basin3, DS/PN: PN1.008

Invert Level (m) 1.775

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	885.0	1.625	1555.0

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RICHARDSON
CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

15 High Street,
Spalding,
Lincs. PE11 1TW

Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

FSR Results

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.000	S520	15 Winter	1	+0%				
PN1.001	S521	15 Winter	1	+0%				
PN1.002	S522	15 Winter	1	+0%				
PN1.003	S523	15 Winter	1	+0%				
PN1.004	S-HW520-Ditch1	15 Winter	1	+0%				
PN2.000	S400	15 Winter	1	+0%				
PN2.001	S401	15 Winter	1	+0%				
PN2.002	S402	15 Winter	1	+0%				
PN3.000	S403	15 Winter	1	+0%				
PN3.001	S404	15 Winter	1	+0%				
PN2.003	S405	15 Winter	1	+0%				
PN2.004	S406	15 Winter	1	+0%				
PN2.005	S407	30 Winter	1	+0%				
PN4.000	S408	15 Winter	1	+0%				
PN4.001	S409	15 Winter	1	+0%				
PN4.002	S410	15 Winter	1	+0%				
PN4.003	S411	15 Winter	1	+0%				
PN4.004	S412	15 Winter	1	+0%				
PN4.005	S413	15 Winter	1	+0%				

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.000	S520	2.571	-0.499	0.000	0.04		9.6	OK	
PN1.001	S521	2.539	-0.471	0.000	0.08		16.3	OK	
PN1.002	S522	2.503	-0.467	0.000	0.09		25.0	OK	
PN1.003	S523	2.413	-0.447	0.000	0.15		25.7	OK	
PN1.004	S-HW520-Ditch1	2.094	-0.806	0.000	0.01		32.4	OK	
PN2.000	S400	2.991	-0.404	0.000	0.17		42.8	OK	
PN2.001	S401	2.929	-0.391	0.000	0.24		46.2	OK	
PN2.002	S402	2.883	-0.402	0.000	0.24		48.5	OK	
PN3.000	S403	2.779	-0.531	0.000	0.02		5.7	OK	
PN3.001	S404	2.729	-0.531	0.000	0.03		6.2	OK	
PN2.003	S405	2.703	-0.542	0.000	0.14		65.7	OK	
PN2.004	S406	2.606	-0.514	0.000	0.14		65.7	OK	
PN2.005	S407	2.553	-0.477	0.000	0.18		63.7	OK	
PN4.000	S408	2.806	-0.484	0.000	0.06		15.1	OK	
PN4.001	S409	2.752	-0.448	0.000	0.09		15.3	OK	
PN4.002	S410	2.735	-0.440	0.000	0.13		21.9	OK	
PN4.003	S411	2.708	-0.442	0.000	0.14		21.7	OK	
PN4.004	S412	2.685	-0.445	0.000	0.12		31.2	OK	
PN4.005	S413	2.610	-0.420	0.000	0.20		31.1	OK	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.006	S414	15 Winter	1	+0%			
PN2.006	S415	30 Winter	1	+0%			
PN2.007	S416	30 Winter	1	+0%			
PN2.008	S-HW400	960 Winter	1	+0%			
PN5.000	S220	15 Winter	1	+0%			
PN6.000	S320	15 Winter	1	+0%			
PN7.000	S321	15 Winter	1	+0%			
PN6.001	S322	15 Winter	1	+0%			
PN6.002	S323	15 Winter	1	+0%			
PN5.001	S221	15 Winter	1	+0%	100/960 Winter		
PN5.002	S222	15 Winter	1	+0%	100/480 Winter		
PN5.003	S223	960 Winter	1	+0%	100/360 Winter		
PN5.004	S-HW220	960 Winter	1	+0%	100/360 Winter		
PN8.000	S300	15 Winter	1	+0%			
PN8.001	S301	15 Winter	1	+0%			
PN8.002	S302	15 Winter	1	+0%			
PN8.003	S303	15 Winter	1	+0%			
PN8.004	S304	960 Winter	1	+0%	100/360 Winter		
PN8.005	S-HW300	960 Winter	1	+0%	100/360 Winter		
PN9.000	S500	960 Winter	1	+0%	100/960 Winter		
PN9.001	S501	960 Winter	1	+0%	100/360 Winter		
PN9.002	S502	960 Winter	1	+0%	100/240 Winter		
PN9.003	S-HW500	960 Winter	1	+0%	100/240 Summer		
PN2.009	S-HW221-Basin1	960 Winter	1	+0%	100/240 Summer		
PN10.000	S200	15 Winter	1	+0%			
PN10.001	S201	15 Winter	1	+0%			
PN11.000	S202	30 Winter	1	+0%			
PN11.001	S203	30 Winter	1	+0%	100/960 Winter		
PN10.002	S204	30 Winter	1	+0%	100/480 Winter		
PN10.003	S205	960 Winter	1	+0%	100/360 Winter		
PN10.004	S206	960 Winter	1	+0%	100/240 Winter		
PN2.010	S250-FCC1	960 Winter	1	+0%	100/120 Winter		
PN2.011	S-HW222	960 Winter	1	+0%			
PN1.005	SDitch2/Basin2	1440 Winter	1	+0%			
PN1.006	S-HW223-Ditch3	1440 Winter	1	+0%	100/480 Winter		
PN1.007	S-HW224	1440 Winter	1	+0%	100/480 Winter		
PN12.000	S100	15 Winter	1	+0%			
PN12.001	S101	15 Winter	1	+0%			
PN12.002	S102	15 Winter	1	+0%			
PN12.003	S103	15 Winter	1	+0%			
PN12.004	S104	15 Winter	1	+0%			
PN12.005	S105	15 Winter	1	+0%			
PN12.006	S106	30 Winter	1	+0%			
PN12.007	S107	30 Winter	1	+0%			
PN12.008	S108	30 Winter	1	+0%	100/1440 Winter		
PN12.009	S109	1440 Winter	1	+0%	100/960 Summer		
PN12.010	S-HW100	1440 Winter	1	+0%	100/480 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	1	+0%			

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN4.006	S414		2.561	-0.444	0.000	0.15		31.3	OK
PN2.006	S415		2.526	-0.464	0.000	0.25		95.2	OK
PN2.007	S416		2.465	-0.475	0.000	0.29		97.8	OK
PN2.008	S-HW400		2.437	-0.488	0.000	0.02		14.4	OK
PN5.000	S220		2.509	-0.471	0.000	0.06		16.7	OK
PN6.000	S320		2.660	-0.480	0.000	0.05		13.8	OK
PN7.000	S321		2.624	-0.501	0.000	0.02		4.1	OK
PN6.001	S322		2.618	-0.452	0.000	0.12		34.1	OK
PN6.002	S323		2.506	-0.389	0.000	0.19		33.6	OK
PN5.001	S221		2.482	-0.383	0.000	0.22		45.7	OK
PN5.002	S222		2.442	-0.383	0.000	0.25		47.5	OK
PN5.003	S223		2.437	-0.353	0.000	0.03		6.6	OK
PN5.004	S-HW220		2.437	-0.338	0.000	0.02		6.6	OK
PN8.000	S300		2.568	-0.482	0.000	0.06		16.3	OK
PN8.001	S301		2.505	-0.445	0.000	0.10		18.3	OK
PN8.002	S302		2.484	-0.436	0.000	0.16		23.3	OK
PN8.003	S303		2.454	-0.446	0.000	0.11		30.2	OK
PN8.004	S304		2.437	-0.363	0.000	0.02		3.5	OK
PN8.005	S-HW300		2.437	-0.338	0.000	0.01		3.5	OK
PN9.000	S500		2.437	-0.418	0.000	0.00		0.2	OK
PN9.001	S501		2.437	-0.358	0.000	0.00		0.3	OK
PN9.002	S502		2.437	-0.308	0.000	0.00		0.2	OK
PN9.003	S-HW500		2.437	-0.288	0.000	0.00		0.2	OK
PN2.009	S-HW221-Basin1		2.437	-0.288	0.000	0.05		6.9	OK
PN10.000	S200		2.545	-0.465	0.000	0.04		6.8	OK
PN10.001	S201		2.542	-0.448	0.000	0.12		33.4	OK
PN11.000	S202		2.461	-0.494	0.000	0.03		7.2	OK
PN11.001	S203		2.455	-0.385	0.000	0.04		8.3	OK
PN10.002	S204		2.454	-0.371	0.000	0.21		36.8	OK
PN10.003	S205		2.436	-0.359	0.000	0.04		5.5	OK
PN10.004	S206		2.436	-0.334	0.000	0.02		5.5	OK
PN2.010	S250-FCC1		2.436	-0.274	0.000	0.04		7.3	OK
PN2.011	S-HW222		2.153	-0.547	0.000	0.02		7.3	OK
PN1.005	SDitch2/Basin2		2.093	-0.807	0.000	0.00		11.5	OK
PN1.006	S-HW223-Ditch3		2.093	-0.307	0.000	0.07		9.3	OK
PN1.007	S-HW224		2.091	-0.284	0.000	0.04		9.2	OK
PN12.000	S100		2.362	-0.503	0.000	0.04		9.4	OK
PN12.001	S101		2.323	-0.462	0.000	0.08		14.5	OK
PN12.002	S102		2.307	-0.453	0.000	0.11		25.7	OK
PN12.003	S103		2.267	-0.448	0.000	0.11		25.9	OK
PN12.004	S104		2.221	-0.439	0.000	0.14		25.1	OK
PN12.005	S105		2.194	-0.441	0.000	0.11		27.6	OK
PN12.006	S106		2.154	-0.431	0.000	0.12		30.5	OK
PN12.007	S107		2.109	-0.416	0.000	0.17		36.4	OK
PN12.008	S108		2.096	-0.414	0.000	0.16		43.0	OK
PN12.009	S109		2.091	-0.314	0.000	0.03		5.0	OK
PN12.010	S-HW100		2.091	-0.284	0.000	0.03		5.9	OK

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.008	S-HW101-Basin3		2.091	-0.434	0.000	0.02		7.3	OK

PN	US/MH Name	Level Exceeded
PN4.006	S414	
PN2.006	S415	
PN2.007	S416	
PN2.008	S-HW400	
PN5.000	S220	
PN6.000	S320	
PN7.000	S321	
PN6.001	S322	
PN6.002	S323	
PN5.001	S221	
PN5.002	S222	
PN5.003	S223	
PN5.004	S-HW220	
PN8.000	S300	
PN8.001	S301	
PN8.002	S302	
PN8.003	S303	
PN8.004	S304	
PN8.005	S-HW300	
PN9.000	S500	
PN9.001	S501	
PN9.002	S502	
PN9.003	S-HW500	
PN2.009	S-HW221-Basin1	
PN10.000	S200	
PN10.001	S201	
PN11.000	S202	
PN11.001	S203	
PN10.002	S204	
PN10.003	S205	
PN10.004	S206	
PN2.010	S250-FCC1	
PN2.011	S-HW222	
PN1.005	SDitch2/Basin2	
PN1.006	S-HW223-Ditch3	
PN1.007	S-HW224	
PN12.000	S100	
PN12.001	S101	
PN12.002	S102	
PN12.003	S103	
PN12.004	S104	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Level Exceeded
PN12.005	S105	
PN12.006	S106	
PN12.007	S107	
PN12.008	S108	
PN12.009	S109	
PN12.010	S-HW100	
PN1.008	S-HW101-Basin3	

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.009	S120	1440 Winter	1	+0%	100/1440 Winter			
PN1.010	S121-FCC2	1440 Winter	1	+0%	1/120 Winter			
PN1.011	S122	1440 Winter	1	+0%				
PN1.012	S123	1440 Winter	1	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.009	S120	2.090	-0.410	0.000	0.02		7.2	OK	
PN1.010	S121-FCC2	2.087	0.137	0.000	0.12		7.0	SURCHARGED	
PN1.011	S122	1.664	-0.236	0.000	0.10		7.0	OK	
PN1.012	S123	1.393	-0.232	0.000	0.12		7.0	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.000	S520	15 Winter	2	+0%				
PN1.001	S521	15 Winter	2	+0%				
PN1.002	S522	15 Winter	2	+0%				
PN1.003	S523	15 Winter	2	+0%				
PN1.004	S-HW520-Ditch1	1440 Winter	2	+0%				
PN2.000	S400	15 Winter	2	+0%				
PN2.001	S401	15 Winter	2	+0%				
PN2.002	S402	15 Winter	2	+0%				
PN3.000	S403	15 Winter	2	+0%				
PN3.001	S404	15 Winter	2	+0%				
PN2.003	S405	15 Winter	2	+0%				
PN2.004	S406	15 Winter	2	+0%				
PN2.005	S407	30 Winter	2	+0%				
PN4.000	S408	15 Winter	2	+0%				
PN4.001	S409	15 Winter	2	+0%				
PN4.002	S410	15 Winter	2	+0%				
PN4.003	S411	15 Winter	2	+0%				
PN4.004	S412	15 Winter	2	+0%				
PN4.005	S413	15 Winter	2	+0%				

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.000	S520	2.588	-0.482	0.000	0.05		12.5	OK	
PN1.001	S521	2.556	-0.454	0.000	0.10		21.1	OK	
PN1.002	S522	2.522	-0.448	0.000	0.12		32.2	OK	
PN1.003	S523	2.436	-0.424	0.000	0.19		33.1	OK	
PN1.004	S-HW520-Ditch1	2.134	-0.766	0.000	0.00		3.4	OK	
PN2.000	S400	3.021	-0.374	0.000	0.22		55.9	OK	
PN2.001	S401	2.960	-0.360	0.000	0.31		59.8	OK	
PN2.002	S402	2.913	-0.372	0.000	0.31		62.5	OK	
PN3.000	S403	2.788	-0.522	0.000	0.03		7.5	OK	
PN3.001	S404	2.743	-0.517	0.000	0.04		8.1	OK	
PN2.003	S405	2.735	-0.510	0.000	0.18		84.8	OK	
PN2.004	S406	2.645	-0.475	0.000	0.18		84.5	OK	
PN2.005	S407	2.596	-0.434	0.000	0.24		82.0	OK	
PN4.000	S408	2.824	-0.466	0.000	0.08		19.7	OK	
PN4.001	S409	2.776	-0.424	0.000	0.12		19.9	OK	
PN4.002	S410	2.760	-0.415	0.000	0.17		28.3	OK	
PN4.003	S411	2.733	-0.417	0.000	0.18		28.2	OK	
PN4.004	S412	2.711	-0.419	0.000	0.15		40.5	OK	
PN4.005	S413	2.636	-0.394	0.000	0.26		40.9	OK	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.006	S414	30 Winter	2	+0%			
PN2.006	S415	30 Winter	2	+0%			
PN2.007	S416	30 Winter	2	+0%			
PN2.008	S-HW400	960 Winter	2	+0%			
PN5.000	S220	15 Winter	2	+0%			
PN6.000	S320	15 Winter	2	+0%			
PN7.000	S321	15 Winter	2	+0%			
PN6.001	S322	15 Winter	2	+0%			
PN6.002	S323	15 Winter	2	+0%			
PN5.001	S221	15 Winter	2	+0%	100/960 Winter		
PN5.002	S222	960 Winter	2	+0%	100/480 Winter		
PN5.003	S223	960 Winter	2	+0%	100/360 Winter		
PN5.004	S-HW220	960 Winter	2	+0%	100/360 Winter		
PN8.000	S300	15 Winter	2	+0%			
PN8.001	S301	15 Winter	2	+0%			
PN8.002	S302	15 Winter	2	+0%			
PN8.003	S303	960 Winter	2	+0%			
PN8.004	S304	960 Winter	2	+0%	100/360 Winter		
PN8.005	S-HW300	960 Winter	2	+0%	100/360 Winter		
PN9.000	S500	960 Winter	2	+0%	100/960 Winter		
PN9.001	S501	960 Winter	2	+0%	100/360 Winter		
PN9.002	S502	960 Winter	2	+0%	100/240 Winter		
PN9.003	S-HW500	960 Winter	2	+0%	100/240 Summer		
PN2.009	S-HW221-Basin1	960 Winter	2	+0%	100/240 Summer		
PN10.000	S200	15 Winter	2	+0%			
PN10.001	S201	15 Winter	2	+0%			
PN11.000	S202	30 Winter	2	+0%			
PN11.001	S203	30 Winter	2	+0%	100/960 Winter		
PN10.002	S204	30 Winter	2	+0%	100/480 Winter		
PN10.003	S205	960 Winter	2	+0%	100/360 Winter		
PN10.004	S206	960 Winter	2	+0%	100/240 Winter		
PN2.010	S250-FCC1	960 Winter	2	+0%	100/120 Winter		
PN2.011	S-HW222	960 Winter	2	+0%			
PN1.005	SDitch2/Basin2	1440 Winter	2	+0%			
PN1.006	S-HW223-Ditch3	1440 Winter	2	+0%	100/480 Winter		
PN1.007	S-HW224	1440 Winter	2	+0%	100/480 Winter		
PN12.000	S100	15 Winter	2	+0%			
PN12.001	S101	15 Winter	2	+0%			
PN12.002	S102	15 Winter	2	+0%			
PN12.003	S103	15 Winter	2	+0%			
PN12.004	S104	15 Winter	2	+0%			
PN12.005	S105	15 Winter	2	+0%			
PN12.006	S106	15 Winter	2	+0%			
PN12.007	S107	30 Winter	2	+0%			
PN12.008	S108	1440 Winter	2	+0%	100/1440 Winter		
PN12.009	S109	1440 Winter	2	+0%	100/960 Summer		
PN12.010	S-HW100	1440 Winter	2	+0%	100/480 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	2	+0%			

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN4.006	S414		2.588	-0.417	0.000	0.19		39.7	OK
PN2.006	S415		2.570	-0.420	0.000	0.32		122.6	OK
PN2.007	S416		2.507	-0.433	0.000	0.38		126.6	OK
PN2.008	S-HW400		2.484	-0.441	0.000	0.03		17.2	OK
PN5.000	S220		2.530	-0.450	0.000	0.08		21.4	OK
PN6.000	S320		2.678	-0.462	0.000	0.07		17.8	OK
PN7.000	S321		2.647	-0.478	0.000	0.02		5.3	OK
PN6.001	S322		2.642	-0.428	0.000	0.16		44.0	OK
PN6.002	S323		2.536	-0.359	0.000	0.24		42.2	OK
PN5.001	S221		2.512	-0.353	0.000	0.28		57.4	OK
PN5.002	S222		2.484	-0.341	0.000	0.03		6.5	OK
PN5.003	S223		2.484	-0.306	0.000	0.04		7.7	OK
PN5.004	S-HW220		2.484	-0.291	0.000	0.02		7.6	OK
PN8.000	S300		2.586	-0.464	0.000	0.08		21.1	OK
PN8.001	S301		2.529	-0.421	0.000	0.13		23.8	OK
PN8.002	S302		2.509	-0.411	0.000	0.20		30.3	OK
PN8.003	S303		2.484	-0.416	0.000	0.01		3.5	OK
PN8.004	S304		2.484	-0.316	0.000	0.02		4.2	OK
PN8.005	S-HW300		2.484	-0.291	0.000	0.01		4.2	OK
PN9.000	S500		2.484	-0.371	0.000	0.00		0.3	OK
PN9.001	S501		2.484	-0.311	0.000	0.00		0.3	OK
PN9.002	S502		2.484	-0.261	0.000	0.00		0.2	OK
PN9.003	S-HW500		2.484	-0.241	0.000	0.00		0.2	OK
PN2.009	S-HW221-Basin1		2.484	-0.241	0.000	0.05		7.2	OK
PN10.000	S200		2.568	-0.442	0.000	0.05		8.7	OK
PN10.001	S201		2.566	-0.424	0.000	0.15		42.5	OK
PN11.000	S202		2.490	-0.465	0.000	0.03		8.4	OK
PN11.001	S203		2.486	-0.354	0.000	0.05		9.9	OK
PN10.002	S204		2.485	-0.340	0.000	0.26		46.2	OK
PN10.003	S205		2.483	-0.312	0.000	0.04		6.3	OK
PN10.004	S206		2.483	-0.287	0.000	0.03		6.1	OK
PN2.010	S250-FCC1		2.483	-0.227	0.000	0.04		7.4	OK
PN2.011	S-HW222		2.154	-0.546	0.000	0.02		7.4	OK
PN1.005	SDitch2/Basin2		2.134	-0.766	0.000	0.00		12.5	OK
PN1.006	S-HW223-Ditch3		2.133	-0.267	0.000	0.08		9.9	OK
PN1.007	S-HW224		2.132	-0.243	0.000	0.04		9.8	OK
PN12.000	S100		2.380	-0.485	0.000	0.05		12.1	OK
PN12.001	S101		2.344	-0.441	0.000	0.11		18.6	OK
PN12.002	S102		2.330	-0.430	0.000	0.14		33.1	OK
PN12.003	S103		2.291	-0.424	0.000	0.14		33.1	OK
PN12.004	S104		2.247	-0.413	0.000	0.19		32.4	OK
PN12.005	S105		2.220	-0.415	0.000	0.15		36.0	OK
PN12.006	S106		2.182	-0.403	0.000	0.16		41.0	OK
PN12.007	S107		2.138	-0.387	0.000	0.22		47.4	OK
PN12.008	S108		2.132	-0.378	0.000	0.02		5.6	OK
PN12.009	S109		2.132	-0.273	0.000	0.04		5.9	OK
PN12.010	S-HW100		2.132	-0.243	0.000	0.03		6.9	OK

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.008	S-HW101-Basin3		2.132	-0.393	0.000	0.02		7.4	OK

PN	US/MH Name	Level Exceeded
PN4.006	S414	
PN2.006	S415	
PN2.007	S416	
PN2.008	S-HW400	
PN5.000	S220	
PN6.000	S320	
PN7.000	S321	
PN6.001	S322	
PN6.002	S323	
PN5.001	S221	
PN5.002	S222	
PN5.003	S223	
PN5.004	S-HW220	
PN8.000	S300	
PN8.001	S301	
PN8.002	S302	
PN8.003	S303	
PN8.004	S304	
PN8.005	S-HW300	
PN9.000	S500	
PN9.001	S501	
PN9.002	S502	
PN9.003	S-HW500	
PN2.009	S-HW221-Basin1	
PN10.000	S200	
PN10.001	S201	
PN11.000	S202	
PN11.001	S203	
PN10.002	S204	
PN10.003	S205	
PN10.004	S206	
PN2.010	S250-FCC1	
PN2.011	S-HW222	
PN1.005	SDitch2/Basin2	
PN1.006	S-HW223-Ditch3	
PN1.007	S-HW224	
PN12.000	S100	
PN12.001	S101	
PN12.002	S102	
PN12.003	S103	
PN12.004	S104	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Level Exceeded
PN12.005	S105	
PN12.006	S106	
PN12.007	S107	
PN12.008	S108	
PN12.009	S109	
PN12.010	S-HW100	
PN1.008	S-HW101-Basin3	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.009	S120	1440 Winter	2	+0%	100/1440 Winter			
PN1.010	S121-FCC2	1440 Winter	2	+0%	1/120 Winter			
PN1.011	S122	1440 Winter	2	+0%				
PN1.012	S123	1440 Winter	2	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.009	S120	2.131	-0.369	0.000	0.02		7.4	OK	
PN1.010	S121-FCC2	2.128	0.178	0.000	0.12		7.0	SURCHARGED	
PN1.011	S122	1.664	-0.236	0.000	0.10		7.0	OK	
PN1.012	S123	1.393	-0.232	0.000	0.12		7.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.000	S520	15 Winter	30	+0%				
PN1.001	S521	15 Winter	30	+0%				
PN1.002	S522	15 Winter	30	+0%				
PN1.003	S523	15 Winter	30	+0%				
PN1.004	S-HW520-Ditch1	1440 Winter	30	+0%				
PN2.000	S400	15 Winter	30	+0%				
PN2.001	S401	15 Winter	30	+0%				
PN2.002	S402	15 Winter	30	+0%				
PN3.000	S403	15 Winter	30	+0%				
PN3.001	S404	15 Winter	30	+0%				
PN2.003	S405	15 Winter	30	+0%				
PN2.004	S406	30 Winter	30	+0%				
PN2.005	S407	30 Winter	30	+0%				
PN4.000	S408	15 Winter	30	+0%				
PN4.001	S409	15 Winter	30	+0%				
PN4.002	S410	15 Winter	30	+0%				
PN4.003	S411	15 Winter	30	+0%				
PN4.004	S412	15 Winter	30	+0%				
PN4.005	S413	30 Winter	30	+0%				

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.000	S520	2.653	-0.417	0.000	0.09		23.6	OK	
PN1.001	S521	2.632	-0.378	0.000	0.21		43.6	OK	
PN1.002	S522	2.601	-0.369	0.000	0.25		67.5	OK	
PN1.003	S523	2.521	-0.339	0.000	0.39		69.0	OK	
PN1.004	S-HW520-Ditch1	2.283	-0.617	0.000	0.00		5.9	OK	
PN2.000	S400	3.131	-0.264	0.000	0.41		106.9	OK	
PN2.001	S401	3.070	-0.250	0.000	0.62		117.7	OK	
PN2.002	S402	3.021	-0.264	0.000	0.59		121.3	OK	
PN3.000	S403	2.852	-0.458	0.000	0.05		11.8	OK	
PN3.001	S404	2.846	-0.414	0.000	0.05		9.8	OK	
PN2.003	S405	2.846	-0.399	0.000	0.32		155.4	OK	
PN2.004	S406	2.780	-0.340	0.000	0.32		149.7	OK	
PN2.005	S407	2.737	-0.293	0.000	0.44		152.4	OK	
PN4.000	S408	2.896	-0.394	0.000	0.14		36.8	OK	
PN4.001	S409	2.861	-0.339	0.000	0.25		40.6	OK	
PN4.002	S410	2.845	-0.330	0.000	0.34		55.1	OK	
PN4.003	S411	2.819	-0.331	0.000	0.35		55.0	OK	
PN4.004	S412	2.797	-0.333	0.000	0.30		80.0	OK	
PN4.005	S413	2.743	-0.287	0.000	0.45		71.1	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.006	S414	30 Winter	30	+0%			
PN2.006	S415	30 Winter	30	+0%			
PN2.007	S416	30 Winter	30	+0%			
PN2.008	S-HW400	1440 Winter	30	+0%			
PN5.000	S220	15 Winter	30	+0%			
PN6.000	S320	15 Winter	30	+0%			
PN7.000	S321	15 Winter	30	+0%			
PN6.001	S322	15 Winter	30	+0%			
PN6.002	S323	15 Winter	30	+0%			
PN5.001	S221	1440 Winter	30	+0%	100/960 Winter		
PN5.002	S222	1440 Winter	30	+0%	100/480 Winter		
PN5.003	S223	1440 Winter	30	+0%	100/360 Winter		
PN5.004	S-HW220	1440 Winter	30	+0%	100/360 Winter		
PN8.000	S300	15 Winter	30	+0%			
PN8.001	S301	1440 Winter	30	+0%			
PN8.002	S302	1440 Winter	30	+0%			
PN8.003	S303	1440 Winter	30	+0%			
PN8.004	S304	1440 Winter	30	+0%	100/360 Winter		
PN8.005	S-HW300	1440 Winter	30	+0%	100/360 Winter		
PN9.000	S500	1440 Winter	30	+0%	100/960 Winter		
PN9.001	S501	1440 Winter	30	+0%	100/360 Winter		
PN9.002	S502	1440 Winter	30	+0%	100/240 Winter		
PN9.003	S-HW500	1440 Winter	30	+0%	100/240 Summer		
PN2.009	S-HW221-Basin1	1440 Winter	30	+0%	100/240 Summer		
PN10.000	S200	15 Winter	30	+0%			
PN10.001	S201	15 Winter	30	+0%			
PN11.000	S202	30 Winter	30	+0%			
PN11.001	S203	1440 Winter	30	+0%	100/960 Winter		
PN10.002	S204	1440 Winter	30	+0%	100/480 Winter		
PN10.003	S205	1440 Winter	30	+0%	100/360 Winter		
PN10.004	S206	1440 Winter	30	+0%	100/240 Winter		
PN2.010	S250-FCC1	1440 Winter	30	+0%	100/120 Winter		
PN2.011	S-HW222	1440 Winter	30	+0%			
PN1.005	SDitch2/Basin2	1440 Winter	30	+0%			
PN1.006	S-HW223-Ditch3	1440 Winter	30	+0%	100/480 Winter		
PN1.007	S-HW224	1440 Winter	30	+0%	100/480 Winter		
PN12.000	S100	15 Winter	30	+0%			
PN12.001	S101	15 Winter	30	+0%			
PN12.002	S102	15 Winter	30	+0%			
PN12.003	S103	15 Winter	30	+0%			
PN12.004	S104	15 Winter	30	+0%			
PN12.005	S105	15 Winter	30	+0%			
PN12.006	S106	15 Winter	30	+0%			
PN12.007	S107	1440 Winter	30	+0%			
PN12.008	S108	1440 Winter	30	+0%	100/1440 Winter		
PN12.009	S109	1440 Winter	30	+0%	100/960 Summer		
PN12.010	S-HW100	1440 Winter	30	+0%	100/480 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	30	+0%			

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN4.006	S414		2.718	-0.287	0.000	0.34		69.3	OK
PN2.006	S415		2.710	-0.280	0.000	0.58		223.9	OK
PN2.007	S416		2.644	-0.296	0.000	0.68		230.5	OK
PN2.008	S-HW400		2.625	-0.300	0.000	0.04		21.6	OK
PN5.000	S220		2.646	-0.334	0.000	0.13		36.6	OK
PN6.000	S320		2.756	-0.384	0.000	0.13		33.7	OK
PN7.000	S321		2.736	-0.389	0.000	0.04		10.2	OK
PN6.001	S322		2.732	-0.338	0.000	0.32		90.3	OK
PN6.002	S323		2.647	-0.248	0.000	0.49		85.0	OK
PN5.001	S221		2.625	-0.240	0.000	0.04		7.6	OK
PN5.002	S222		2.625	-0.200	0.000	0.04		8.0	OK
PN5.003	S223		2.625	-0.165	0.000	0.05		9.5	OK
PN5.004	S-HW220		2.625	-0.150	0.000	0.03		9.5	OK
PN8.000	S300		2.659	-0.391	0.000	0.15		40.0	OK
PN8.001	S301		2.625	-0.325	0.000	0.01		2.3	OK
PN8.002	S302		2.625	-0.295	0.000	0.02		3.1	OK
PN8.003	S303		2.625	-0.275	0.000	0.02		4.2	OK
PN8.004	S304		2.625	-0.175	0.000	0.03		5.4	OK
PN8.005	S-HW300		2.625	-0.150	0.000	0.02		5.3	OK
PN9.000	S500		2.625	-0.230	0.000	0.00		0.3	OK
PN9.001	S501		2.625	-0.170	0.000	0.00		0.5	OK
PN9.002	S502		2.625	-0.120	0.000	0.00		0.4	OK
PN9.003	S-HW500		2.625	-0.100	0.000	0.00		0.3	OK
PN2.009	S-HW221-Basin1		2.625	-0.100	0.000	0.05		7.1	OK
PN10.000	S200		2.668	-0.342	0.000	0.11		17.1	OK
PN10.001	S201		2.666	-0.324	0.000	0.33		91.4	OK
PN11.000	S202		2.626	-0.329	0.000	0.04		11.2	OK
PN11.001	S203		2.624	-0.216	0.000	0.01		1.7	OK
PN10.002	S204		2.624	-0.201	0.000	0.04		7.2	OK
PN10.003	S205		2.624	-0.171	0.000	0.05		7.9	OK
PN10.004	S206		2.624	-0.146	0.000	0.03		7.8	OK
PN2.010	S250-FCC1		2.624	-0.086	0.000	0.04		7.5	OK
PN2.011	S-HW222		2.283	-0.417	0.000	0.02		7.5	OK
PN1.005	SDitch2/Basin2		2.283	-0.617	0.000	0.00		16.0	OK
PN1.006	S-HW223-Ditch3		2.281	-0.119	0.000	0.08		10.8	OK
PN1.007	S-HW224		2.279	-0.096	0.000	0.05		10.6	OK
PN12.000	S100		2.453	-0.412	0.000	0.09		23.0	OK
PN12.001	S101		2.433	-0.352	0.000	0.21		37.8	OK
PN12.002	S102		2.421	-0.339	0.000	0.31		70.5	OK
PN12.003	S103		2.386	-0.329	0.000	0.29		70.0	OK
PN12.004	S104		2.347	-0.313	0.000	0.39		67.6	OK
PN12.005	S105		2.322	-0.313	0.000	0.30		73.5	OK
PN12.006	S106		2.290	-0.295	0.000	0.33		82.3	OK
PN12.007	S107		2.278	-0.247	0.000	0.04		7.5	OK
PN12.008	S108		2.278	-0.232	0.000	0.03		9.0	OK
PN12.009	S109		2.278	-0.127	0.000	0.06		9.6	OK
PN12.010	S-HW100		2.278	-0.097	0.000	0.05		11.5	OK

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.008	S-HW101-Basin3		2.278	-0.247	0.000	0.03		7.9	OK

PN	US/MH Name	Level Exceeded
PN4.006	S414	
PN2.006	S415	
PN2.007	S416	
PN2.008	S-HW400	
PN5.000	S220	
PN6.000	S320	
PN7.000	S321	
PN6.001	S322	
PN6.002	S323	
PN5.001	S221	
PN5.002	S222	
PN5.003	S223	
PN5.004	S-HW220	
PN8.000	S300	
PN8.001	S301	
PN8.002	S302	
PN8.003	S303	
PN8.004	S304	
PN8.005	S-HW300	
PN9.000	S500	
PN9.001	S501	
PN9.002	S502	
PN9.003	S-HW500	
PN2.009	S-HW221-Basin1	
PN10.000	S200	
PN10.001	S201	
PN11.000	S202	
PN11.001	S203	
PN10.002	S204	
PN10.003	S205	
PN10.004	S206	
PN2.010	S250-FCC1	
PN2.011	S-HW222	
PN1.005	SDitch2/Basin2	
PN1.006	S-HW223-Ditch3	
PN1.007	S-HW224	
PN12.000	S100	
PN12.001	S101	
PN12.002	S102	
PN12.003	S103	
PN12.004	S104	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Level Exceeded
PN12.005	S105	
PN12.006	S106	
PN12.007	S107	
PN12.008	S108	
PN12.009	S109	
PN12.010	S-HW100	
PN1.008	S-HW101-Basin3	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.009	S120	1440 Winter	30	+0%	100/1440 Winter			
PN1.010	S121-FCC2	1440 Winter	30	+0%	1/120 Winter			
PN1.011	S122	960 Summer	30	+0%				
PN1.012	S123	480 Summer	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.009	S120	2.278	-0.222	0.000	0.02		7.8	OK	
PN1.010	S121-FCC2	2.272	0.322	0.000	0.12		7.0	SURCHARGED	
PN1.011	S122	1.665	-0.235	0.000	0.10		7.0	OK	
PN1.012	S123	1.393	-0.232	0.000	0.12		7.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.900	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.000	S520	15 Winter	100	+40%				
PN1.001	S521	15 Winter	100	+40%				
PN1.002	S522	15 Winter	100	+40%				
PN1.003	S523	15 Winter	100	+40%				
PN1.004	S-HW520-Ditch1	1440 Winter	100	+40%				
PN2.000	S400	15 Winter	100	+40%				
PN2.001	S401	15 Winter	100	+40%				
PN2.002	S402	30 Winter	100	+40%				
PN3.000	S403	30 Winter	100	+40%				
PN3.001	S404	30 Winter	100	+40%				
PN2.003	S405	30 Winter	100	+40%				
PN2.004	S406	30 Winter	100	+40%				
PN2.005	S407	30 Winter	100	+40%				
PN4.000	S408	30 Winter	100	+40%				
PN4.001	S409	30 Winter	100	+40%				
PN4.002	S410	30 Winter	100	+40%				
PN4.003	S411	30 Winter	100	+40%				
PN4.004	S412	30 Winter	100	+40%				
PN4.005	S413	30 Winter	100	+40%				

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.000	S520	2.757	-0.313	0.000	0.17		42.6	OK
PN1.001	S521	2.732	-0.278	0.000	0.38		78.0	OK
PN1.002	S522	2.704	-0.266	0.000	0.45		120.9	OK
PN1.003	S523	2.636	-0.224	0.000	0.71		124.1	OK
PN1.004	S-HW520-Ditch1	2.518	-0.382	0.000	0.00		10.5	FLOOD RISK
PN2.000	S400	3.395	0.000	0.000	0.71		183.8	OK
PN2.001	S401	3.301	-0.019	0.000	1.00		190.7	OK
PN2.002	S402	3.199	-0.086	0.000	0.93		190.1	OK
PN3.000	S403	3.170	-0.140	0.000	0.07		18.0	OK
PN3.001	S404	3.162	-0.098	0.000	0.16		31.0	OK
PN2.003	S405	3.160	-0.085	0.000	0.50		238.2	OK
PN2.004	S406	3.069	-0.051	0.000	0.52		239.8	OK
PN2.005	S407	2.972	-0.058	0.000	0.68		235.9	OK
PN4.000	S408	3.106	-0.184	0.000	0.20		52.5	OK
PN4.001	S409	3.070	-0.130	0.000	0.32		52.6	OK
PN4.002	S410	3.059	-0.116	0.000	0.51		82.9	OK
PN4.003	S411	3.041	-0.109	0.000	0.50		79.7	OK
PN4.004	S412	3.028	-0.102	0.000	0.46		124.0	OK
PN4.005	S413	2.966	-0.064	0.000	0.67		106.9	OK

PN	US/MH Name	Level Exceeded
PN1.000	S520	
PN1.001	S521	
PN1.002	S522	
PN1.003	S523	
PN1.004	S-HW520-Ditch1	
PN2.000	S400	
PN2.001	S401	
PN2.002	S402	
PN3.000	S403	
PN3.001	S404	
PN2.003	S405	
PN2.004	S406	
PN2.005	S407	
PN4.000	S408	
PN4.001	S409	
PN4.002	S410	
PN4.003	S411	
PN4.004	S412	
PN4.005	S413	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.006	S414	30 Winter	100	+40%			
PN2.006	S415	30 Winter	100	+40%			
PN2.007	S416	1440 Winter	100	+40%			
PN2.008	S-HW400	1440 Winter	100	+40%			
PN5.000	S220	1440 Winter	100	+40%			
PN6.000	S320	15 Winter	100	+40%			
PN7.000	S321	15 Winter	100	+40%			
PN6.001	S322	15 Winter	100	+40%			
PN6.002	S323	1440 Winter	100	+40%			
PN5.001	S221	1440 Winter	100	+40%	100/960 Winter		
PN5.002	S222	1440 Winter	100	+40%	100/480 Winter		
PN5.003	S223	1440 Winter	100	+40%	100/360 Winter		
PN5.004	S-HW220	1440 Winter	100	+40%	100/360 Winter		
PN8.000	S300	1440 Winter	100	+40%			
PN8.001	S301	1440 Winter	100	+40%			
PN8.002	S302	1440 Winter	100	+40%			
PN8.003	S303	1440 Winter	100	+40%			
PN8.004	S304	1440 Winter	100	+40%	100/360 Winter		
PN8.005	S-HW300	1440 Winter	100	+40%	100/360 Winter		
PN9.000	S500	1440 Winter	100	+40%	100/960 Winter		
PN9.001	S501	1440 Winter	100	+40%	100/360 Winter		
PN9.002	S502	1440 Winter	100	+40%	100/240 Winter		
PN9.003	S-HW500	1440 Winter	100	+40%	100/240 Summer		
PN2.009	S-HW221-Basin1	1440 Winter	100	+40%	100/240 Summer		
PN10.000	S200	30 Winter	100	+40%			
PN10.001	S201	30 Winter	100	+40%			
PN11.000	S202	30 Winter	100	+40%			
PN11.001	S203	1440 Winter	100	+40%	100/960 Winter		
PN10.002	S204	1440 Winter	100	+40%	100/480 Winter		
PN10.003	S205	1440 Winter	100	+40%	100/360 Winter		
PN10.004	S206	1440 Winter	100	+40%	100/240 Winter		
PN2.010	S250-FCC1	1440 Winter	100	+40%	100/120 Winter		
PN2.011	S-HW222	1440 Winter	100	+40%			
PN1.005	SDitch2/Basin2	1440 Winter	100	+40%			
PN1.006	S-HW223-Ditch3	1440 Winter	100	+40%	100/480 Winter		
PN1.007	S-HW224	1440 Winter	100	+40%	100/480 Winter		
PN12.000	S100	30 Winter	100	+40%			
PN12.001	S101	15 Winter	100	+40%			
PN12.002	S102	30 Winter	100	+40%			
PN12.003	S103	15 Winter	100	+40%			
PN12.004	S104	15 Winter	100	+40%			
PN12.005	S105	15 Winter	100	+40%			
PN12.006	S106	15 Winter	100	+40%			
PN12.007	S107	15 Winter	100	+40%			
PN12.008	S108	1440 Winter	100	+40%	100/1440 Winter		
PN12.009	S109	1440 Winter	100	+40%	100/960 Summer		
PN12.010	S-HW100	1440 Winter	100	+40%	100/480 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	100	+40%			

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN4.006	S414		2.942	-0.063	0.000	0.49		100.5
PN2.006	S415		2.926	-0.064	0.000	0.85		330.0
PN2.007	S416		2.887	-0.053	0.000	0.11		35.7
PN2.008	S-HW400		2.887	-0.038	0.000	0.06		35.6
PN5.000	S220		2.886	-0.094	0.000	0.01		3.8
PN6.000	S320		2.927	-0.213	0.000	0.24		60.7
PN7.000	S321		2.895	-0.230	0.000	0.07		18.3
PN6.001	S322		2.890	-0.180	0.000	0.56		158.3
PN6.002	S323		2.887	-0.008	0.000	0.05		8.8
PN5.001	S221		2.886	0.021	0.000	0.06		12.4
PN5.002	S222		2.886	0.061	0.000	0.07		13.0
PN5.003	S223		2.887	0.097	0.000	0.08		15.7
PN5.004	S-HW220		2.886	0.111	0.000	0.05		15.7
PN8.000	S300		2.887	-0.163	0.000	0.01		3.5
PN8.001	S301		2.887	-0.063	0.000	0.02		4.0
PN8.002	S302		2.887	-0.033	0.000	0.04		5.3
PN8.003	S303		2.887	-0.013	0.000	0.03		7.4
PN8.004	S304		2.886	0.086	0.000	0.05		9.4
PN8.005	S-HW300		2.886	0.111	0.000	0.03		9.3
PN9.000	S500		2.886	0.031	0.000	0.00		0.6
PN9.001	S501		2.886	0.091	0.000	0.00		0.8
PN9.002	S502		2.886	0.141	0.000	0.00		0.7
PN9.003	S-HW500		2.886	0.161	0.000	0.01		0.7
PN2.009	S-HW221-Basin1		2.886	0.161	0.000	0.07		9.9
PN10.000	S200		2.913	-0.097	0.000	0.15		23.2
PN10.001	S201		2.912	-0.078	0.000	0.45		126.3
PN11.000	S202		2.896	-0.059	0.000	0.06		17.4
PN11.001	S203		2.885	0.045	0.000	0.01		3.0
PN10.002	S204		2.889	0.064	0.000	0.07		11.5
PN10.003	S205		2.908	0.113	0.000	0.08		12.7
PN10.004	S206		2.925	0.155	0.000	0.05		12.6
PN2.010	S250-FCC1		2.921	0.211	0.000	0.04		7.5
PN2.011	S-HW222		2.519	-0.181	0.000	0.02		7.5
PN1.005	SDitch2/Basin2		2.518	-0.382	0.000	0.00		17.3
PN1.006	S-HW223-Ditch3		2.516	0.116	0.000	0.08		10.8
PN1.007	S-HW224		2.514	0.139	0.000	0.05		10.6
PN12.000	S100		2.847	-0.018	0.000	0.13		33.0
PN12.001	S101		2.785	0.000	0.000	0.37		64.9
PN12.002	S102		2.760	0.000	0.000	0.44		100.4
PN12.003	S103		2.715	0.000	0.000	0.47		116.0
PN12.004	S104		2.660	0.000	0.000	0.58		100.2
PN12.005	S105		2.635	0.000	0.000	0.43		106.7
PN12.006	S106		2.585	0.000	0.000	0.43		108.4
PN12.007	S107		2.525	0.000	0.000	0.68		143.2
PN12.008	S108		2.514	0.004	0.000	0.05		14.7
PN12.009	S109		2.514	0.109	0.000	0.10		15.9
PN12.010	S-HW100		2.514	0.139	0.000	0.08		19.2

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN1.008	S-HW101-Basin3		2.514	-0.011	0.000	0.03		8.2

PN	US/MH Name	Status	Level Exceeded
PN4.006	S414	OK	
PN2.006	S415	OK	
PN2.007	S416	OK	
PN2.008	S-HW400	OK	
PN5.000	S220	OK	
PN6.000	S320	OK	
PN7.000	S321	OK	
PN6.001	S322	OK	
PN6.002	S323	OK	
PN5.001	S221	SURCHARGED	
PN5.002	S222	SURCHARGED	
PN5.003	S223	SURCHARGED	
PN5.004	S-HW220	SURCHARGED	
PN8.000	S300	OK	
PN8.001	S301	OK	
PN8.002	S302	OK	
PN8.003	S303	OK	
PN8.004	S304	SURCHARGED	
PN8.005	S-HW300	SURCHARGED	
PN9.000	S500	SURCHARGED	
PN9.001	S501	SURCHARGED	
PN9.002	S502	SURCHARGED	
PN9.003	S-HW500	SURCHARGED	
PN2.009	S-HW221-Basin1	SURCHARGED	
PN10.000	S200	OK	
PN10.001	S201	OK	
PN11.000	S202	OK	
PN11.001	S203	SURCHARGED	
PN10.002	S204	SURCHARGED	
PN10.003	S205	SURCHARGED	
PN10.004	S206	SURCHARGED	
PN2.010	S250-FCC1	SURCHARGED	
PN2.011	S-HW222	OK	
PN1.005	SDitch2/Basin2	FLOOD RISK	
PN1.006	S-HW223-Ditch3	FLOOD RISK	
PN1.007	S-HW224	SURCHARGED	
PN12.000	S100	OK	
PN12.001	S101	OK	
PN12.002	S102	OK	
PN12.003	S103	OK	
PN12.004	S104	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Status	Level Exceeded
PN12.005	S105	OK	
PN12.006	S106	OK	
PN12.007	S107	OK	
PN12.008	S108	SURCHARGED	
PN12.009	S109	SURCHARGED	
PN12.010	S-HW100	SURCHARGED	
PN1.008	S-HW101-Basin3	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
PN1.009	S120	1440 Winter	100	+40%	100/1440 Winter			
PN1.010	S121-FCC2	1440 Winter	100	+40%	1/120 Winter			
PN1.011	S122	1440 Winter	100	+40%				
PN1.012	S123	1440 Winter	100	+40%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
PN1.009	S120	2.506	0.006	0.000	0.02		8.0	SURCHARGED	
PN1.010	S121-FCC2	2.506	0.556	0.000	0.12		7.0	SURCHARGED	
PN1.011	S122	1.665	-0.235	0.000	0.10		7.0	OK	
PN1.012	S123	1.393	-0.232	0.000	0.12		7.0	OK	

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SIDEBOTTOM
RICHARDSON
CHENG LTD
CONSULTING STRUCTURAL AND CIVIL ENGINEERS

15 High Street,
Spalding,
Lincs. PE11 1TW

Tel: 01775 712660
Fax: 01775 712635
Email: src@srcltd.com

FEH Results

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 543724 322312 TF 43724 22312
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN1.000	S520	15 Winter	2	+0%			
PN1.001	S521	15 Winter	2	+0%			
PN1.002	S522	15 Winter	2	+0%			
PN1.003	S523	15 Winter	2	+0%			
PN1.004	S-HW520-Ditch1	1440 Winter	2	+0%			
PN2.000	S400	15 Winter	2	+0%	100/15 Summer		
PN2.001	S401	15 Winter	2	+0%	100/15 Summer		
PN2.002	S402	15 Winter	2	+0%	100/15 Summer		
PN3.000	S403	15 Winter	2	+0%			
PN3.001	S404	15 Winter	2	+0%			
PN2.003	S405	15 Winter	2	+0%	100/30 Summer		
PN2.004	S406	15 Winter	2	+0%	100/15 Summer		
PN2.005	S407	30 Winter	2	+0%	100/15 Summer		
PN4.000	S408	15 Winter	2	+0%			
PN4.001	S409	15 Winter	2	+0%	100/30 Summer		
PN4.002	S410	15 Winter	2	+0%	100/1440 Winter		

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.000	S520		2.584	-0.486	0.000	0.05		11.9	OK
PN1.001	S521		2.552	-0.458	0.000	0.10		20.1	OK
PN1.002	S522		2.518	-0.452	0.000	0.11		30.7	OK
PN1.003	S523		2.431	-0.429	0.000	0.18		31.6	OK
PN1.004	S-HW520-Ditch1		2.150	-0.750	0.000	0.00		3.6	OK
PN2.000	S400		3.015	-0.380	0.000	0.21		53.2	OK
PN2.001	S401		2.954	-0.366	0.000	0.30		57.0	OK
PN2.002	S402		2.906	-0.379	0.000	0.29		59.5	OK
PN3.000	S403		2.787	-0.523	0.000	0.03		7.1	OK
PN3.001	S404		2.739	-0.521	0.000	0.04		7.8	OK
PN2.003	S405		2.729	-0.516	0.000	0.17		80.8	OK
PN2.004	S406		2.637	-0.483	0.000	0.17		80.6	OK
PN2.005	S407		2.586	-0.444	0.000	0.22		77.5	OK
PN4.000	S408		2.821	-0.469	0.000	0.07		18.8	OK
PN4.001	S409		2.771	-0.429	0.000	0.12		19.0	OK
PN4.002	S410		2.755	-0.420	0.000	0.16		26.9	OK

PN	US/MH Name	Level Exceeded
PN1.000	S520	
PN1.001	S521	
PN1.002	S522	
PN1.003	S523	
PN1.004	S-HW520-Ditch1	
PN2.000	S400	
PN2.001	S401	
PN2.002	S402	
PN3.000	S403	
PN3.001	S404	
PN2.003	S405	
PN2.004	S406	
PN2.005	S407	
PN4.000	S408	
PN4.001	S409	
PN4.002	S410	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.003	S411	15 Winter	2	+0%	100/30 Winter		
PN4.004	S412	15 Winter	2	+0%	100/15 Winter		
PN4.005	S413	15 Winter	2	+0%	100/15 Summer		
PN4.006	S414	15 Winter	2	+0%	100/15 Summer		
PN2.006	S415	30 Winter	2	+0%	100/15 Summer		
PN2.007	S416	480 Winter	2	+0%	100/15 Winter		
PN2.008	S-HW400	480 Winter	2	+0%	100/240 Summer		
PN5.000	S220	15 Winter	2	+0%	100/30 Winter		
PN6.000	S320	15 Winter	2	+0%	100/960 Winter		
PN7.000	S321	15 Winter	2	+0%	100/960 Winter		
PN6.001	S322	15 Winter	2	+0%	100/15 Winter		
PN6.002	S323	15 Winter	2	+0%	100/15 Summer		
PN5.001	S221	15 Winter	2	+0%	100/15 Summer		
PN5.002	S222	480 Winter	2	+0%	100/15 Summer		
PN5.003	S223	480 Winter	2	+0%	100/15 Winter		
PN5.004	S-HW220	480 Winter	2	+0%	100/60 Winter		
PN8.000	S300	15 Winter	2	+0%	100/360 Winter		
PN8.001	S301	15 Winter	2	+0%	100/15 Winter		
PN8.002	S302	15 Winter	2	+0%	100/15 Winter		
PN8.003	S303	480 Winter	2	+0%	100/15 Winter		
PN8.004	S304	480 Winter	2	+0%	100/120 Summer		
PN8.005	S-HW300	480 Winter	2	+0%	100/120 Summer		
PN9.000	S500	480 Winter	2	+0%	100/120 Winter		
PN9.001	S501	480 Winter	2	+0%	100/120 Summer		
PN9.002	S502	480 Winter	2	+0%	30/960 Winter		
PN9.003	S-HW500	480 Winter	2	+0%	30/480 Winter		
PN2.009	S-HW221-Basin1	480 Winter	2	+0%	30/480 Winter		
PN10.000	S200	15 Winter	2	+0%	100/15 Winter		
PN10.001	S201	15 Winter	2	+0%	100/15 Winter		
PN11.000	S202	480 Winter	2	+0%	100/15 Summer		
PN11.001	S203	480 Winter	2	+0%	100/15 Summer		
PN10.002	S204	480 Winter	2	+0%	100/15 Summer		
PN10.003	S205	480 Winter	2	+0%	100/15 Summer		
PN10.004	S206	480 Winter	2	+0%	100/15 Summer		
PN2.010	S250-FCC1	480 Winter	2	+0%	30/360 Winter		
PN2.011	S-HW222	1440 Winter	2	+0%	100/960 Winter		
PN1.005	SDitch2/Basin2	1440 Winter	2	+0%			
PN1.006	S-HW223-Ditch3	1440 Winter	2	+0%	100/120 Winter		
PN1.007	S-HW224	1440 Winter	2	+0%	30/1440 Winter		
PN12.000	S100	15 Winter	2	+0%	100/15 Summer		
PN12.001	S101	15 Winter	2	+0%	100/15 Winter		
PN12.002	S102	15 Winter	2	+0%	100/15 Summer		
PN12.003	S103	15 Winter	2	+0%	100/15 Summer		
PN12.004	S104	15 Winter	2	+0%	100/15 Summer		
PN12.005	S105	15 Winter	2	+0%	100/15 Summer		
PN12.006	S106	15 Winter	2	+0%	100/15 Summer		
PN12.007	S107	1440 Winter	2	+0%	100/15 Summer		
PN12.008	S108	1440 Winter	2	+0%	100/15 Summer		

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN4.003	S411		2.728	-0.422	0.000	0.17		26.7	OK
PN4.004	S412		2.706	-0.424	0.000	0.14		38.5	OK
PN4.005	S413		2.631	-0.399	0.000	0.25		39.0	OK
PN4.006	S414		2.582	-0.423	0.000	0.19		39.0	OK
PN2.006	S415		2.560	-0.430	0.000	0.30		116.0	OK
PN2.007	S416		2.503	-0.437	0.000	0.10		32.9	OK
PN2.008	S-HW400		2.503	-0.422	0.000	0.06		32.8	OK
PN5.000	S220		2.526	-0.454	0.000	0.08		20.4	OK
PN6.000	S320		2.674	-0.466	0.000	0.07		17.0	OK
PN7.000	S321		2.642	-0.483	0.000	0.02		5.1	OK
PN6.001	S322		2.637	-0.433	0.000	0.15		41.9	OK
PN6.002	S323		2.530	-0.365	0.000	0.23		40.3	OK
PN5.001	S221		2.506	-0.359	0.000	0.27		54.9	OK
PN5.002	S222		2.503	-0.322	0.000	0.07		12.3	OK
PN5.003	S223		2.503	-0.287	0.000	0.07		14.5	OK
PN5.004	S-HW220		2.503	-0.272	0.000	0.04		14.3	OK
PN8.000	S300		2.582	-0.468	0.000	0.08		20.2	OK
PN8.001	S301		2.525	-0.425	0.000	0.13		22.6	OK
PN8.002	S302		2.504	-0.416	0.000	0.19		28.8	OK
PN8.003	S303		2.503	-0.397	0.000	0.03		6.7	OK
PN8.004	S304		2.503	-0.297	0.000	0.04		8.1	OK
PN8.005	S-HW300		2.503	-0.272	0.000	0.02		7.9	OK
PN9.000	S500		2.503	-0.352	0.000	0.00		0.5	OK
PN9.001	S501		2.503	-0.292	0.000	0.00		0.6	OK
PN9.002	S502		2.503	-0.242	0.000	0.00		0.3	OK
PN9.003	S-HW500		2.503	-0.222	0.000	0.00		0.2	OK
PN2.009	S-HW221-Basin1		2.503	-0.222	0.000	0.05		7.3	OK
PN10.000	S200		2.564	-0.446	0.000	0.05		8.3	OK
PN10.001	S201		2.561	-0.429	0.000	0.15		40.7	OK
PN11.000	S202		2.503	-0.452	0.000	0.01		2.0	OK
PN11.001	S203		2.503	-0.337	0.000	0.01		2.8	OK
PN10.002	S204		2.503	-0.322	0.000	0.06		11.2	OK
PN10.003	S205		2.503	-0.292	0.000	0.08		12.0	OK
PN10.004	S206		2.503	-0.267	0.000	0.05		11.8	OK
PN2.010	S250-FCC1		2.502	-0.208	0.000	0.04		7.4	OK
PN2.011	S-HW222		2.155	-0.545	0.000	0.02		7.4	OK
PN1.005	SDitch2/Basin2		2.150	-0.750	0.000	0.00		12.9	OK
PN1.006	S-HW223-Ditch3		2.148	-0.252	0.000	0.08		10.0	OK
PN1.007	S-HW224		2.147	-0.228	0.000	0.04		9.9	OK
PN12.000	S100		2.377	-0.488	0.000	0.04		11.6	OK
PN12.001	S101		2.340	-0.445	0.000	0.10		17.8	OK
PN12.002	S102		2.325	-0.435	0.000	0.14		31.6	OK
PN12.003	S103		2.286	-0.429	0.000	0.13		31.6	OK
PN12.004	S104		2.242	-0.418	0.000	0.18		30.8	OK
PN12.005	S105		2.215	-0.420	0.000	0.14		34.1	OK
PN12.006	S106		2.176	-0.409	0.000	0.15		38.9	OK
PN12.007	S107		2.147	-0.378	0.000	0.02		4.9	OK

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN12.008	S108		2.147	-0.363	0.000	0.02		5.9	OK

PN	US/MH Name	Level Exceeded
PN4.003	S411	
PN4.004	S412	
PN4.005	S413	
PN4.006	S414	
PN2.006	S415	
PN2.007	S416	
PN2.008	S-HW400	
PN5.000	S220	
PN6.000	S320	
PN7.000	S321	
PN6.001	S322	
PN6.002	S323	
PN5.001	S221	
PN5.002	S222	
PN5.003	S223	
PN5.004	S-HW220	
PN8.000	S300	
PN8.001	S301	
PN8.002	S302	
PN8.003	S303	
PN8.004	S304	
PN8.005	S-HW300	
PN9.000	S500	
PN9.001	S501	
PN9.002	S502	
PN9.003	S-HW500	
PN2.009	S-HW221-Basin1	
PN10.000	S200	
PN10.001	S201	
PN11.000	S202	
PN11.001	S203	
PN10.002	S204	
PN10.003	S205	
PN10.004	S206	
PN2.010	S250-FCC1	
PN2.011	S-HW222	
PN1.005	SDitch2/Basin2	
PN1.006	S-HW223-Ditch3	
PN1.007	S-HW224	
PN12.000	S100	
PN12.001	S101	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Level Exceeded
PN12.002	S102	
PN12.003	S103	
PN12.004	S104	
PN12.005	S105	
PN12.006	S106	
PN12.007	S107	
PN12.008	S108	

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2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN12.009	S109	1440 Winter	2	+0%	100/15 Summer		
PN12.010	S-HW100	1440 Winter	2	+0%	30/1440 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	2	+0%	100/240 Winter		
PN1.009	S120	1440 Winter	2	+0%	100/240 Winter		
PN1.010	S121-FCC2	1440 Winter	2	+0%	2/60 Winter		
PN1.011	S122	1440 Winter	2	+0%			
PN1.012	S123	1440 Winter	2	+0%			

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN12.009	S109		2.147	-0.258	0.000	0.04		6.2
PN12.010	S-HW100		2.147	-0.228	0.000	0.03		7.3
PN1.008	S-HW101-Basin3		2.147	-0.378	0.000	0.02		7.5
PN1.009	S120		2.146	-0.354	0.000	0.02		7.4
PN1.010	S121-FCC2		2.142	0.192	0.000	0.12		7.0
PN1.011	S122		1.665	-0.235	0.000	0.10		7.0
PN1.012	S123		1.393	-0.232	0.000	0.12		7.0

PN	US/MH Name	Status	Level Exceeded
PN12.009	S109	OK	
PN12.010	S-HW100	OK	
PN1.008	S-HW101-Basin3	OK	
PN1.009	S120	OK	
PN1.010	S121-FCC2	SURCHARGED	
PN1.011	S122	OK	
PN1.012	S123	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 543724 322312 TF 43724 22312
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN1.000	S520	15 Winter	30	+0%			
PN1.001	S521	15 Winter	30	+0%			
PN1.002	S522	15 Winter	30	+0%			
PN1.003	S523	15 Winter	30	+0%			
PN1.004	S-HW520-Ditch1	1440 Winter	30	+0%			
PN2.000	S400	15 Winter	30	+0%	100/15 Summer		
PN2.001	S401	15 Winter	30	+0%	100/15 Summer		
PN2.002	S402	15 Winter	30	+0%	100/15 Summer		
PN3.000	S403	30 Winter	30	+0%			
PN3.001	S404	30 Winter	30	+0%			
PN2.003	S405	30 Winter	30	+0%	100/30 Summer		
PN2.004	S406	30 Winter	30	+0%	100/15 Summer		
PN2.005	S407	30 Winter	30	+0%	100/15 Summer		
PN4.000	S408	15 Winter	30	+0%			
PN4.001	S409	15 Winter	30	+0%	100/30 Summer		
PN4.002	S410	15 Winter	30	+0%	100/1440 Winter		

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
PN1.000	S520		2.694	-0.376	0.000	0.12		31.1	OK
PN1.001	S521		2.673	-0.337	0.000	0.28		57.3	OK
PN1.002	S522		2.643	-0.327	0.000	0.33		88.8	OK
PN1.003	S523		2.568	-0.292	0.000	0.52		91.1	OK
PN1.004	S-HW520-Ditch1		2.391	-0.509	0.000	0.00		7.9	OK
PN2.000	S400		3.202	-0.193	0.000	0.55		140.8	OK
PN2.001	S401		3.142	-0.178	0.000	0.82		155.8	OK
PN2.002	S402		3.091	-0.194	0.000	0.79		160.3	OK
PN3.000	S403		2.925	-0.385	0.000	0.04		10.8	OK
PN3.001	S404		2.922	-0.338	0.000	0.07		13.1	OK
PN2.003	S405		2.921	-0.324	0.000	0.38		181.8	OK
PN2.004	S406		2.872	-0.248	0.000	0.42		193.3	OK
PN2.005	S407		2.824	-0.206	0.000	0.56		196.0	OK
PN4.000	S408		2.940	-0.350	0.000	0.18		47.9	OK
PN4.001	S409		2.911	-0.289	0.000	0.32		52.0	OK
PN4.002	S410		2.897	-0.278	0.000	0.45		73.0	OK

PN	US/MH Name	Level Exceeded
PN1.000	S520	
PN1.001	S521	
PN1.002	S522	
PN1.003	S523	
PN1.004	S-HW520-Ditch1	
PN2.000	S400	
PN2.001	S401	
PN2.002	S402	
PN3.000	S403	
PN3.001	S404	
PN2.003	S405	
PN2.004	S406	
PN2.005	S407	
PN4.000	S408	
PN4.001	S409	
PN4.002	S410	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.003	S411	15 Winter	30	+0%	100/30 Winter		
PN4.004	S412	30 Winter	30	+0%	100/15 Winter		
PN4.005	S413	30 Winter	30	+0%	100/15 Summer		
PN4.006	S414	30 Winter	30	+0%	100/15 Summer		
PN2.006	S415	30 Winter	30	+0%	100/15 Summer		
PN2.007	S416	960 Winter	30	+0%	100/15 Winter		
PN2.008	S-HW400	960 Winter	30	+0%	100/240 Summer		
PN5.000	S220	960 Winter	30	+0%	100/30 Winter		
PN6.000	S320	15 Winter	30	+0%	100/960 Winter		
PN7.000	S321	15 Winter	30	+0%	100/960 Winter		
PN6.001	S322	15 Winter	30	+0%	100/15 Winter		
PN6.002	S323	960 Winter	30	+0%	100/15 Summer		
PN5.001	S221	960 Winter	30	+0%	100/15 Summer		
PN5.002	S222	960 Winter	30	+0%	100/15 Summer		
PN5.003	S223	960 Winter	30	+0%	100/15 Winter		
PN5.004	S-HW220	960 Winter	30	+0%	100/60 Winter		
PN8.000	S300	960 Winter	30	+0%	100/360 Winter		
PN8.001	S301	960 Winter	30	+0%	100/15 Winter		
PN8.002	S302	960 Winter	30	+0%	100/15 Winter		
PN8.003	S303	960 Winter	30	+0%	100/15 Winter		
PN8.004	S304	960 Winter	30	+0%	100/120 Summer		
PN8.005	S-HW300	960 Winter	30	+0%	100/120 Summer		
PN9.000	S500	960 Winter	30	+0%	100/120 Winter		
PN9.001	S501	960 Winter	30	+0%	100/120 Summer		
PN9.002	S502	960 Winter	30	+0%	30/960 Winter		
PN9.003	S-HW500	960 Winter	30	+0%	30/480 Winter		
PN2.009	S-HW221-Basin1	960 Winter	30	+0%	30/480 Winter		
PN10.000	S200	960 Winter	30	+0%	100/15 Winter		
PN10.001	S201	960 Winter	30	+0%	100/15 Winter		
PN11.000	S202	960 Winter	30	+0%	100/15 Summer		
PN11.001	S203	960 Winter	30	+0%	100/15 Summer		
PN10.002	S204	960 Winter	30	+0%	100/15 Summer		
PN10.003	S205	960 Winter	30	+0%	100/15 Summer		
PN10.004	S206	960 Winter	30	+0%	100/15 Summer		
PN2.010	S250-FCC1	960 Winter	30	+0%	30/360 Winter		
PN2.011	S-HW222	1440 Winter	30	+0%	100/960 Winter		
PN1.005	SDitch2/Basin2	1440 Winter	30	+0%			
PN1.006	S-HW223-Ditch3	1440 Winter	30	+0%	100/120 Winter		
PN1.007	S-HW224	1440 Winter	30	+0%	30/1440 Winter		
PN12.000	S100	15 Winter	30	+0%	100/15 Summer		
PN12.001	S101	15 Winter	30	+0%	100/15 Winter		
PN12.002	S102	15 Winter	30	+0%	100/15 Summer		
PN12.003	S103	15 Winter	30	+0%	100/15 Summer		
PN12.004	S104	15 Winter	30	+0%	100/15 Summer		
PN12.005	S105	15 Winter	30	+0%	100/15 Summer		
PN12.006	S106	1440 Winter	30	+0%	100/15 Summer		
PN12.007	S107	1440 Winter	30	+0%	100/15 Summer		
PN12.008	S108	1440 Winter	30	+0%	100/15 Summer		

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN4.003	S411		2.871	-0.279	0.000	0.45		71.8
PN4.004	S412		2.862	-0.268	0.000	0.36		96.3
PN4.005	S413		2.823	-0.207	0.000	0.55		87.9
PN4.006	S414		2.805	-0.200	0.000	0.42		85.0
PN2.006	S415		2.798	-0.192	0.000	0.73		284.0
PN2.007	S416		2.747	-0.193	0.000	0.12		39.4
PN2.008	S-HW400		2.747	-0.178	0.000	0.07		39.3
PN5.000	S220		2.747	-0.233	0.000	0.02		4.2
PN6.000	S320		2.812	-0.328	0.000	0.17		44.3
PN7.000	S321		2.792	-0.333	0.000	0.05		13.4
PN6.001	S322		2.784	-0.286	0.000	0.42		117.6
PN6.002	S323		2.747	-0.148	0.000	0.06		9.8
PN5.001	S221		2.747	-0.118	0.000	0.07		13.8
PN5.002	S222		2.747	-0.078	0.000	0.08		14.4
PN5.003	S223		2.747	-0.043	0.000	0.08		17.3
PN5.004	S-HW220		2.747	-0.028	0.000	0.05		17.2
PN8.000	S300		2.747	-0.303	0.000	0.01		3.8
PN8.001	S301		2.747	-0.203	0.000	0.02		4.4
PN8.002	S302		2.747	-0.173	0.000	0.04		5.8
PN8.003	S303		2.747	-0.153	0.000	0.03		8.0
PN8.004	S304		2.747	-0.053	0.000	0.05		10.1
PN8.005	S-HW300		2.747	-0.028	0.000	0.03		10.0
PN9.000	S500		2.747	-0.108	0.000	0.00		0.6
PN9.001	S501		2.747	-0.048	0.000	0.00		0.9
PN9.002	S502		2.747	0.002	0.000	0.00		0.6
PN9.003	S-HW500		2.747	0.022	0.000	0.00		0.5
PN2.009	S-HW221-Basin1		2.747	0.022	0.000	0.05		8.0
PN10.000	S200		2.749	-0.261	0.000	0.01		1.6
PN10.001	S201		2.749	-0.241	0.000	0.03		9.4
PN11.000	S202		2.749	-0.206	0.000	0.01		2.0
PN11.001	S203		2.749	-0.091	0.000	0.01		3.1
PN10.002	S204		2.749	-0.076	0.000	0.07		12.7
PN10.003	S205		2.749	-0.046	0.000	0.09		14.0
PN10.004	S206		2.749	-0.021	0.000	0.06		13.8
PN2.010	S250-FCC1		2.748	0.038	0.000	0.04		7.5
PN2.011	S-HW222		2.391	-0.309	0.000	0.02		7.5
PN1.005	SDitch2/Basin2		2.391	-0.509	0.000	0.00		17.0
PN1.006	S-HW223-Ditch3		2.389	-0.011	0.000	0.08		10.9
PN1.007	S-HW224		2.378	0.003	0.000	0.05		10.7
PN12.000	S100		2.512	-0.353	0.000	0.11		30.1
PN12.001	S101		2.482	-0.303	0.000	0.28		49.2
PN12.002	S102		2.471	-0.289	0.000	0.40		92.4
PN12.003	S103		2.442	-0.273	0.000	0.37		91.1
PN12.004	S104		2.408	-0.252	0.000	0.50		86.6
PN12.005	S105		2.387	-0.248	0.000	0.39		95.0
PN12.006	S106		2.378	-0.207	0.000	0.03		7.7
PN12.007	S107		2.378	-0.147	0.000	0.05		9.7

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN12.008	S108		2.378	-0.132	0.000	0.04		11.7

PN	US/MH Name	Status	Level Exceeded
PN4.003	S411	OK	
PN4.004	S412	OK	
PN4.005	S413	OK	
PN4.006	S414	OK	
PN2.006	S415	OK	
PN2.007	S416	OK	
PN2.008	S-HW400	OK	
PN5.000	S220	OK	
PN6.000	S320	OK	
PN7.000	S321	OK	
PN6.001	S322	OK	
PN6.002	S323	OK	
PN5.001	S221	OK	
PN5.002	S222	OK	
PN5.003	S223	OK	
PN5.004	S-HW220	OK	
PN8.000	S300	OK	
PN8.001	S301	OK	
PN8.002	S302	OK	
PN8.003	S303	OK	
PN8.004	S304	OK	
PN8.005	S-HW300	OK	
PN9.000	S500	OK	
PN9.001	S501	OK	
PN9.002	S502	SURCHARGED	
PN9.003	S-HW500	SURCHARGED	
PN2.009	S-HW221-Basin1	SURCHARGED	
PN10.000	S200	OK	
PN10.001	S201	OK	
PN11.000	S202	OK	
PN11.001	S203	OK	
PN10.002	S204	OK	
PN10.003	S205	OK	
PN10.004	S206	OK	
PN2.010	S250-FCC1	SURCHARGED	
PN2.011	S-HW222	OK	
PN1.005	SDitch2/Basin2	OK	
PN1.006	S-HW223-Ditch3	OK	
PN1.007	S-HW224	SURCHARGED	
PN12.000	S100	OK	
PN12.001	S101	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Status	Level Exceeded
PN12.002	S102	OK	
PN12.003	S103	OK	
PN12.004	S104	OK	
PN12.005	S105	OK	
PN12.006	S106	OK	
PN12.007	S107	OK	
PN12.008	S108	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN12.009	S109	1440 Winter	30	+0%	100/15 Summer		
PN12.010	S-HW100	1440 Winter	30	+0%	30/1440 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	30	+0%	100/240 Winter		
PN1.009	S120	1440 Winter	30	+0%	100/240 Winter		
PN1.010	S121-FCC2	1440 Winter	30	+0%	2/60 Winter		
PN1.011	S122	1440 Winter	30	+0%			
PN1.012	S123	120 Summer	30	+0%			

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN12.009	S109		2.378	-0.027	0.000	0.08		12.6
PN12.010	S-HW100		2.378	0.003	0.000	0.06		15.1
PN1.008	S-HW101-Basin3		2.378	-0.147	0.000	0.03		8.1
PN1.009	S120		2.377	-0.123	0.000	0.02		7.9
PN1.010	S121-FCC2		2.367	0.417	0.000	0.12		7.0
PN1.011	S122		1.665	-0.235	0.000	0.10		7.0
PN1.012	S123		1.393	-0.232	0.000	0.12		7.0

PN	US/MH Name	Status	Level Exceeded
PN12.009	S109	OK	
PN12.010	S-HW100	SURCHARGED	
PN1.008	S-HW101-Basin3	OK	
PN1.009	S120	OK	
PN1.010	S121-FCC2	SURCHARGED	
PN1.011	S122	OK	
PN1.012	S123	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	10.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	31
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 543724 322312 TF 43724 22312
Data Type	Point
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN1.000	S520	15 Winter	100	+40%			
PN1.001	S521	15 Winter	100	+40%			
PN1.002	S522	15 Winter	100	+40%			
PN1.003	S523	1440 Winter	100	+40%			
PN1.004	S-HW520-Ditch1	1440 Winter	100	+40%			
PN2.000	S400	15 Winter	100	+40%	100/15 Summer		
PN2.001	S401	15 Winter	100	+40%	100/15 Summer		
PN2.002	S402	15 Winter	100	+40%	100/15 Summer		
PN3.000	S403	30 Winter	100	+40%			
PN3.001	S404	30 Winter	100	+40%			
PN2.003	S405	30 Summer	100	+40%	100/30 Summer		
PN2.004	S406	1440 Winter	100	+40%	100/15 Summer		
PN2.005	S407	1440 Winter	100	+40%	100/15 Summer		
PN4.000	S408	30 Winter	100	+40%			
PN4.001	S409	30 Summer	100	+40%	100/30 Summer		
PN4.002	S410	1440 Winter	100	+40%	100/1440 Winter		

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN1.000	S520		2.842	-0.228	0.000	0.23		57.7
PN1.001	S521		2.810	-0.200	0.000	0.50		104.6
PN1.002	S522		2.783	-0.187	0.000	0.60		163.1
PN1.003	S523		2.745	-0.115	0.000	0.06		11.0
PN1.004	S-HW520-Ditch1		2.745	-0.155	0.000	0.00		13.4
PN2.000	S400		3.482	0.087	0.000	1.07		274.6
PN2.001	S401		3.376	0.056	0.000	1.66		316.6
PN2.002	S402		3.318	0.033	0.000	1.61		328.5
PN3.000	S403		3.310	0.000	0.000	0.11		26.7
PN3.001	S404		3.260	0.000	0.000	0.25		49.4
PN2.003	S405		3.250	0.005	0.000	0.67		321.4
PN2.004	S406		3.180	0.060	0.000	0.06		28.3
PN2.005	S407		3.180	0.150	0.000	0.09		29.9
PN4.000	S408		3.290	0.000	0.000	0.24		63.4
PN4.001	S409		3.205	0.005	0.000	0.45		74.4
PN4.002	S410		3.180	0.005	0.000	0.05		8.6

PN	US/MH Name	Status	Level Exceeded
PN1.000	S520	OK	
PN1.001	S521	OK	
PN1.002	S522	OK	
PN1.003	S523	OK	
PN1.004	S-HW520-Ditch1	FLOOD RISK	
PN2.000	S400	SURCHARGED	
PN2.001	S401	SURCHARGED	
PN2.002	S402	SURCHARGED	
PN3.000	S403	OK	
PN3.001	S404	OK	
PN2.003	S405	SURCHARGED	
PN2.004	S406	SURCHARGED	
PN2.005	S407	SURCHARGED	
PN4.000	S408	OK	
PN4.001	S409	SURCHARGED	
PN4.002	S410	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN4.003	S411	1440 Winter	100	+40%	100/30 Winter		
PN4.004	S412	1440 Winter	100	+40%	100/15 Winter		
PN4.005	S413	1440 Winter	100	+40%	100/15 Summer		
PN4.006	S414	1440 Winter	100	+40%	100/15 Summer		
PN2.006	S415	1440 Winter	100	+40%	100/15 Summer		
PN2.007	S416	1440 Winter	100	+40%	100/15 Winter		
PN2.008	S-HW400	1440 Winter	100	+40%	100/240 Summer		
PN5.000	S220	1440 Winter	100	+40%	100/30 Winter		
PN6.000	S320	1440 Winter	100	+40%	100/960 Winter		
PN7.000	S321	1440 Winter	100	+40%	100/960 Winter		
PN6.001	S322	1440 Winter	100	+40%	100/15 Winter		
PN6.002	S323	1440 Winter	100	+40%	100/15 Summer		
PN5.001	S221	1440 Winter	100	+40%	100/15 Summer		
PN5.002	S222	1440 Winter	100	+40%	100/15 Summer		
PN5.003	S223	1440 Winter	100	+40%	100/15 Winter		
PN5.004	S-HW220	1440 Winter	100	+40%	100/60 Winter		
PN8.000	S300	1440 Winter	100	+40%	100/360 Winter		
PN8.001	S301	1440 Winter	100	+40%	100/15 Winter		
PN8.002	S302	1440 Winter	100	+40%	100/15 Winter		
PN8.003	S303	1440 Winter	100	+40%	100/15 Winter		
PN8.004	S304	1440 Winter	100	+40%	100/120 Summer		
PN8.005	S-HW300	1440 Winter	100	+40%	100/120 Summer		
PN9.000	S500	1440 Winter	100	+40%	100/120 Winter		
PN9.001	S501	1440 Winter	100	+40%	100/120 Summer		
PN9.002	S502	1440 Winter	100	+40%	30/960 Winter		
PN9.003	S-HW500	1440 Winter	100	+40%	30/480 Winter		
PN2.009	S-HW221-Basin1	1440 Winter	100	+40%	30/480 Winter		
PN10.000	S200	360 Winter	100	+40%	100/15 Winter		
PN10.001	S201	360 Winter	100	+40%	100/15 Winter		
PN11.000	S202	480 Winter	100	+40%	100/15 Summer		
PN11.001	S203	1440 Winter	100	+40%	100/15 Summer		
PN10.002	S204	480 Winter	100	+40%	100/15 Summer		
PN10.003	S205	1440 Winter	100	+40%	100/15 Summer		
PN10.004	S206	480 Winter	100	+40%	100/15 Summer		
PN2.010	S250-FCC1	480 Winter	100	+40%	30/360 Winter		
PN2.011	S-HW222	1440 Winter	100	+40%	100/960 Winter		
PN1.005	SDitch2/Basin2	1440 Winter	100	+40%			
PN1.006	S-HW223-Ditch3	1440 Winter	100	+40%	100/120 Winter		
PN1.007	S-HW224	1440 Winter	100	+40%	30/1440 Winter		
PN12.000	S100	15 Winter	100	+40%	100/15 Summer		
PN12.001	S101	15 Winter	100	+40%	100/15 Winter		
PN12.002	S102	15 Winter	100	+40%	100/15 Summer		
PN12.003	S103	1440 Winter	100	+40%	100/15 Summer		
PN12.004	S104	1440 Winter	100	+40%	100/15 Summer		
PN12.005	S105	1440 Winter	100	+40%	100/15 Summer		
PN12.006	S106	1440 Winter	100	+40%	100/15 Summer		
PN12.007	S107	1440 Winter	100	+40%	100/15 Summer		
PN12.008	S108	1440 Winter	100	+40%	100/15 Summer		

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN4.003	S411		3.180	0.030	0.000	0.05		8.4
PN4.004	S412		3.180	0.050	0.000	0.05		13.2
PN4.005	S413		3.180	0.150	0.000	0.09		13.9
PN4.006	S414		3.180	0.175	0.000	0.07		14.0
PN2.006	S415		3.180	0.190	0.000	0.12		45.9
PN2.007	S416		3.180	0.240	0.000	0.14		48.6
PN2.008	S-HW400		3.179	0.254	0.000	0.08		48.6
PN5.000	S220		3.180	0.200	0.000	0.02		6.7
PN6.000	S320		3.179	0.039	0.000	0.02		4.3
PN7.000	S321		3.179	0.054	0.000	0.01		1.3
PN6.001	S322		3.179	0.109	0.000	0.05		13.3
PN6.002	S323		3.180	0.285	0.000	0.09		15.1
PN5.001	S221		3.180	0.315	0.000	0.11		22.7
PN5.002	S222		3.180	0.355	0.000	0.13		24.2
PN5.003	S223		3.179	0.389	0.000	0.14		28.4
PN5.004	S-HW220		3.179	0.404	0.000	0.08		28.3
PN8.000	S300		3.179	0.129	0.000	0.02		5.2
PN8.001	S301		3.179	0.229	0.000	0.04		6.6
PN8.002	S302		3.179	0.259	0.000	0.06		8.7
PN8.003	S303		3.179	0.279	0.000	0.04		11.8
PN8.004	S304		3.179	0.379	0.000	0.08		15.4
PN8.005	S-HW300		3.179	0.404	0.000	0.04		15.4
PN9.000	S500		3.179	0.324	0.000	0.00		0.9
PN9.001	S501		3.179	0.384	0.000	0.01		1.6
PN9.002	S502		3.179	0.434	0.000	0.01		1.5
PN9.003	S-HW500		3.179	0.454	0.000	0.01		1.4
PN2.009	S-HW221-Basin1		3.179	0.454	0.000	0.07		10.6
PN10.000	S200		3.194	0.184	0.000	0.05		7.6
PN10.001	S201		3.194	0.204	0.000	0.17		46.6
PN11.000	S202		3.200	0.245	0.000	0.05		12.7
PN11.001	S203		3.215	0.375	0.000	0.04		7.2
PN10.002	S204		3.223	0.398	0.000	0.34		58.7
PN10.003	S205		3.223	0.428	0.000	0.17		25.1
PN10.004	S206		3.258	0.488	0.000	0.26		64.7
PN2.010	S250-FCC1		3.239	0.529	0.000	0.04		7.5
PN2.011	S-HW222		2.746	0.046	0.000	0.02		7.5
PN1.005	SDitch2/Basin2		2.745	-0.155	0.000	0.00		17.0
PN1.006	S-HW223-Ditch3		2.740	0.340	0.000	0.13		17.1
PN1.007	S-HW224		2.742	0.367	0.000	0.07		17.0
PN12.000	S100		2.893	0.028	0.000	0.21		54.3
PN12.001	S101		2.879	0.094	0.000	0.55		96.6
PN12.002	S102		2.781	0.021	0.000	0.68		156.6
PN12.003	S103		2.739	0.024	0.000	0.04		10.0
PN12.004	S104		2.740	0.080	0.000	0.06		10.0
PN12.005	S105		2.740	0.105	0.000	0.05		11.8
PN12.006	S106		2.741	0.156	0.000	0.06		14.6
PN12.007	S107		2.741	0.216	0.000	0.09		18.5

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN12.008	S108		2.742	0.232	0.000	0.09		23.1

PN	US/MH Name	Status	Level Exceeded
PN4.003	S411	SURCHARGED	
PN4.004	S412	SURCHARGED	
PN4.005	S413	SURCHARGED	
PN4.006	S414	SURCHARGED	
PN2.006	S415	SURCHARGED	
PN2.007	S416	SURCHARGED	
PN2.008	S-HW400	SURCHARGED	
PN5.000	S220	SURCHARGED	
PN6.000	S320	SURCHARGED	
PN7.000	S321	SURCHARGED	
PN6.001	S322	SURCHARGED	
PN6.002	S323	SURCHARGED	
PN5.001	S221	SURCHARGED	
PN5.002	S222	FLOOD RISK	
PN5.003	S223	FLOOD RISK	
PN5.004	S-HW220	FLOOD RISK	
PN8.000	S300	SURCHARGED	
PN8.001	S301	SURCHARGED	
PN8.002	S302	SURCHARGED	
PN8.003	S303	SURCHARGED	
PN8.004	S304	SURCHARGED	
PN8.005	S-HW300	SURCHARGED	
PN9.000	S500	FLOOD RISK	
PN9.001	S501	FLOOD RISK	
PN9.002	S502	FLOOD RISK	
PN9.003	S-HW500	FLOOD RISK	
PN2.009	S-HW221-Basin1	FLOOD RISK	
PN10.000	S200	SURCHARGED	
PN10.001	S201	SURCHARGED	
PN11.000	S202	SURCHARGED	
PN11.001	S203	FLOOD RISK	
PN10.002	S204	FLOOD RISK	
PN10.003	S205	FLOOD RISK	
PN10.004	S206	FLOOD RISK	
PN2.010	S250-FCC1	FLOOD RISK	
PN2.011	S-HW222	SURCHARGED	
PN1.005	SDitch2/Basin2	FLOOD RISK	
PN1.006	S-HW223-Ditch3	FLOOD RISK	
PN1.007	S-HW224	SURCHARGED	
PN12.000	S100	SURCHARGED	
PN12.001	S101	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Status	Level Exceeded
PN12.002	S102	SURCHARGED	
PN12.003	S103	SURCHARGED	
PN12.004	S104	SURCHARGED	
PN12.005	S105	SURCHARGED	
PN12.006	S106	SURCHARGED	
PN12.007	S107	SURCHARGED	
PN12.008	S108	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Existing

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
PN12.009	S109	1440 Winter	100	+40%	100/15 Summer		
PN12.010	S-HW100	1440 Winter	100	+40%	30/1440 Winter		
PN1.008	S-HW101-Basin3	1440 Winter	100	+40%	100/240 Winter		
PN1.009	S120	1440 Winter	100	+40%	100/240 Winter		
PN1.010	S121-FCC2	1440 Winter	100	+40%	2/60 Winter		
PN1.011	S122	1440 Winter	100	+40%			
PN1.012	S123	1440 Winter	100	+40%			

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
PN12.009	S109		2.742	0.337	0.000	0.15		25.3
PN12.010	S-HW100		2.742	0.367	0.000	0.13		29.9
PN1.008	S-HW101-Basin3		2.742	0.217	0.000	0.15		45.1
PN1.009	S120		3.134	0.634	0.000	0.09		37.7
PN1.010	S121-FCC2		3.215	1.265	0.000	0.12		7.0
PN1.011	S122		1.665	-0.235	0.000	0.10		7.0
PN1.012	S123		1.393	-0.232	0.000	0.12		7.0

PN	US/MH Name	Status	Level Exceeded
PN12.009	S109	SURCHARGED	
PN12.010	S-HW100	SURCHARGED	
PN1.008	S-HW101-Basin3	SURCHARGED	
PN1.009	S120	FLOOD RISK	
PN1.010	S121-FCC2	FLOOD RISK	
PN1.011	S122	OK	
PN1.012	S123	OK	

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