1 Introduction

This report deals with the long-term intermediate and permanent peripheral drainage collection and conveyance systems for the proposed ESC single dome landform revised in 2015 to accommodate a smaller number of vaults (up to Vault 11) together with an attenuation and control system to restrict the outfall to “natural” values.

It does not consider:

- Control or disposal of groundwater (apart from the collection of water discharged from the capping layer drainage blanket).
- Design of the cap under-drainage system.
- Design of temporary or permanent surface water runoff collection systems on the capping layer other than the main peripheral ditches.
- Collection and discharge of leachate, i.e. water that is collected from within the vaults and trenches and is pumped out to sea.

The control of pollution from any temporary operations such as the use of bentonite, grouting, etc. and the design of the Drigg Stream is the subject of a separate submission.

Where necessary, this document has cross referenced to the relevant paragraphs presented in the ES.

2 Description of the Site

2.1 Changes to the Landform

As far as may be ascertained, the original profile of the overall site was relatively flat with a general fall from Northwest to Southeast. Old mapping suggests that much of the area was poorly drained and marshy and this is backed up by a property being named Mireside. Nevertheless, there was another property in the Northwest, at the location of the trenches, known as Brown Knoll and this suggests that there was always a rounded hill of sorts in that vicinity. It is difficult to be precise about the actual shape or slope of this hill due to the lack of contour detail on the old maps.

Ordnance Survey 1:25,000 mapping shows a low rise above the 20 m contour but it is not clear how that relates to the apparent outlines of Vault 8.

2.2 Watercourses

As well as several relatively minor artificial surface and subsurface watercourses located within the site boundary, there are two significant watercourses that appear to have a natural origin. These are known locally as the Drigg Stream and the East-West Stream.

From comparison of the old mapping to the current situation, it appears that Drigg Stream downstream of its confluence with the East-West Stream and the also the East-West Stream still more or less follow their original courses, albeit with some straightening and possibly re-profiling in places. The old maps suggest that Drigg Stream above its confluence with the East-West Stream followed a rather irregular course that came from Stubble Green and crossed the railway cutting on a zigzag line. The modern mapping suggests that this watercourse still exists. The inference is that the straight length of the Drigg Stream that runs parallel to the seaward boundary of the site is wholly artificial and that any historic watercourses in that vicinity would probably have been limited to field boundary ditches.

2.3 Greenfield and Brownfield Runoff

Although the development of the site is arguably a brownfield situation, it would be very difficult to determine the discharge regime for the site prior to the commencement of the current LLWR activities in order to determine a brownfield runoff pattern.

Therefore, it is proposed that the runoff from the development should be controlled and managed to more or less reflect the natural (i.e. greenfield) runoff that could have been expected had there been no historic development of the site.

The local catchment descriptors taken from the FEH CD-ROM for the Drigg Stream catchment above the confluence with the East-West Stream give a BFI_{HOST} value of 0.63.

3 Modelling Surface Water Runoff

3.1 Simulation of the Natural, Greenfield Runoff Regime

There is insufficient information available to allow any attempt to refine the BFI_{HOST} value within the scope of this study and the FEH CD-ROM value has been used for the calculation of the natural greenfield runoff and also for deriving the runoff from the revised single dome profile.

The natural greenfield runoff was simulated using a simple ditch model in WinDes. The local catchment descriptors were taken from the FEH CD-ROM and used to generate a unit hydrograph in accordance with the Revitalised Flood Hydrograph (ReFH) method.

The area factor ascertained was 120 hectares which also contains the catchments that Drigg Stream drains upstream of the proposed landform. It is proposed to re-profile Drigg Stream so that it follows the perimeter ditch surrounding the proposed landform; more information detailing the re-profiling of Drigg Steam is contained later in this report.

In circumstances such as this, i.e. where there is no downstream development that could be deemed to be at risk of flooding, it is generally appropriate to allow the discharge from the developed site to match the greenfield values with the application of a suitable growth curve rather than restricting the discharge to a low value (e.g. QBAR) which is often about equivalent to the 1 in 2 year peak rate.

In order to generate a reasonably extreme rate of natural runoff, a storm return period of 1 in 200 years (i.e. in the order of 1 in 100 years with an allowance for climate change) was simulated with different durations. It was found that the critical duration for the peak rate of runoff was around 360 minutes using the winter profile and corresponding volumetric runoff coefficient.

Under these circumstances, the peak rate of runoff downstream of the proposed landform was determined to be 1170 l/s and this value was used as the notional limit for the next phase of modelling and simulation.

Full details of the simple “natural catchment” runoff model and results are given in the Annexes.

3.2 Simulation of Runoff from Revised Single Dome Mound

A much more detailed WinDes model was created to simulate the runoff from the revised single dome final landform.

The model comprises a ditch that starts at the northernmost corner of the site and then runs in two branches in both clockwise and anti-clockwise directions around the base of the landform to a confluence just to the west of Drigg Stream, at the southern edge of the landform.

It has been shown in the model that smaller ditches can be utilised at the upstream end of runs, where the amount of flow being conveyed is lower. All side slopes have been kept consistent al 1 in 1.5, but the most efficient ditch sizes and gradients are to be specified in detailed design.

In the model Branch 1 runs in the anticlockwise direction. The flow from Drigg Stream is inputted in this first ditch which starts at an invert level of 19.5m. This leg runs in a South Westerly direction towards the sea and then turns to run down the Westerly side of the land form, in a South Easterly direction before changing to a North Easterly direction, following the base of the landform to the lowest known point in the site. The ditch follows the ground profile as close-as possible to minimise the amount of excavation required. Where the ground is flat a nominal gradient of 1:1000 has been applied.

Branch 2 takes the clockwise route along the Easterly side of the landform, adjacent to the railway again at a gradient matching the ground profile as close as possible. It may be advisable to use a series of steps in detailed design where the ground profile drops steeply to ensure ditches follow the ground profile without having steep gradients which would increase the velocity of the system and potentially cause scour. This branch joins the outfall from Branch 1 at the low point of the site; from here it is proposed to outfall into the existing Drigg Stream channel to the South East of the Landform, through an attenuation lagoon which can be used to limit the flow discharging from the proposed Land form, to the existing rate.

The ditches were modelled in discrete sections with a notional maximum length of approximately 100 m along the straight runs with shorter lengths around curves. Nodes were also positioned at changes in gradient.

Using careful analysis of the contours and slopes of the revised single dome landform, the areas that would contribute runoff to each length of the three branches were identified on an AutoCAD plan. Branch 1 has 15 contributing areas and Branch 2 has 11, making 26 in total, with an average area of approximately 1.42 ha.

The total area that contributes to each of the two branches is illustrated in Figure 1. The green shaded area contributes flow into branch 1 and the red area contributes into branch 2 of the model.

The modelled invert levels towards the downstream end of branch 1 have been kept low enough to enable the small stream that enters the site from the west to be incorporated into the proposed drainage system.

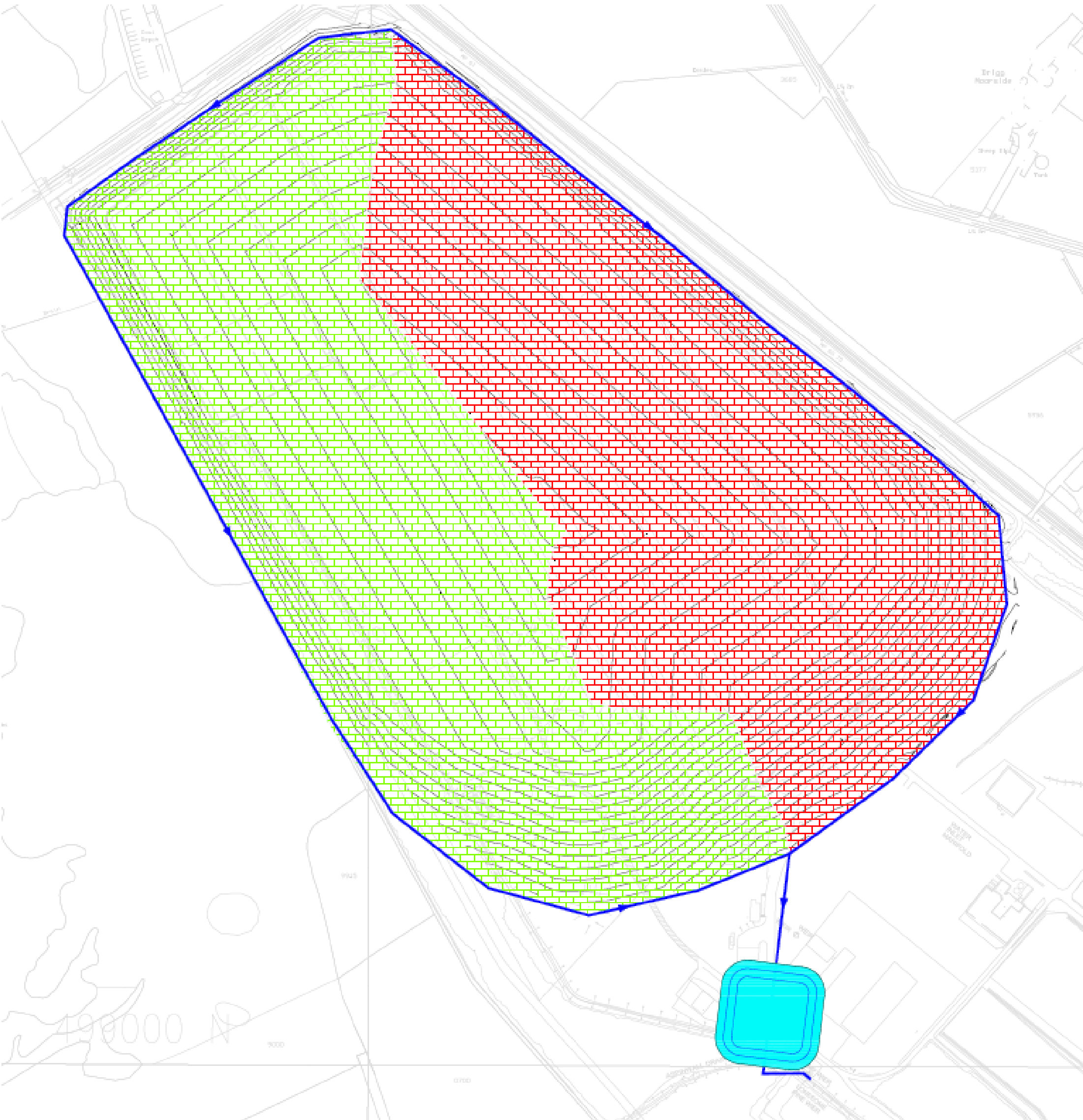


Figure 1: Indicative Catchment Areas and Pond Location

Using the AutoCAD plan, each area was measured as well as the corresponding mean drainage path length (DPLBAR) of each sub-catchment. The difference in elevation in each sub-catchment was calculated and combined with the associated down-slope length to give an average gradient (DPSBAR) for each sub-catchment. DPSBAR is expressed as metres / 1,000 metres.

The ReFH unit hydrograph input calculation facility in WinDes was used to generate runoff from each of the 26 sub-catchments. The relevant abstracted and calculated values for AREA, DPLBAR and DPSBAR were inputted and the winter rainfall profile was selected. As previously mentioned, it was considered that there is insufficient information available to justify any change to the BFIHOST value derived from the FEH CD-ROM and the use of that uniform value could be further justified by the intention to create the capping to the dome from the reworked material excavated locally.

When the WinDes model of the proposed perimeter ditch system was simulated with the same rainfall event, i.e. 1 in 200 years return period, 360 minutes duration, winter profile, the peak rate of runoff was found to be approximately 1,530 l/s.

As well as the rainfall input, the total area modelled and the soil type were the same as for the baseline greenfield simulation and the increase in the peak rate of run off can be attributed to the shorter and steeper flow paths that were modelled.

3.3 Attenuation and Control

Previous study and reporting identified the possibility of creating an online water body to the south east of the mound that could be used for attenuation and pollution control.

It would be feasible to have a permanent open pond at this location after the construction of the final part of the single landform; the modelling has therefore been based on the assumption that all of the runoff from the landform would be channelled through the pond.

A notional pond with 1 in 4 side slopes was drawn within the area identified and the plan areas thus created between 9.7 m and 11.2 m AOD were measured and used to create an attenuation basin in the model. The rate of discharge from the pond to the existing Drigg Stream channel was controlled by means of circular pipe from the pond to the existing stream channel with a diameter of 840 mm.

The model of the proposed ditch system was then simulated with the same input parameters as the baseline model described in Section 3.1, i.e. a 1 in 200 years return period, winter profile storm event with durations between 1 hour and 24 hours, together with the attenuation lagoon and control system. Under these conditions, a maximum of approximately 5,750 m³ of runoff would be stored in the pond, with a depth of approximately 1,300 mm. The peak rate of discharge to Drigg Stream would be about 1165 l/s. For attenuation volume, the critical storm duration was found to be 720 minutes. This is based on the standard durations, the actual critical duration could be slightly different but there would be no significant difference to the results.

The attenuation lagoon used in the model is illustrated in Figure 1. The illustration of this pond should be viewed as purely indicative and it only serves to demonstrate that there is sufficient land available at that location for the construction of a pond of the requisite dimensions. Factors that will need to be considered at a more advanced stage are discussed later on in this report.

The figure showing the notional pond was primarily created to ensure that sufficient area and depth would be available. The WinDes network is not shown connected to the pond but the pond is attached as an off-line volume at Node 18 in the model, but in practice the pond almost certainly would be designed as an on-line feature. On-line ponds are not quite so simple to represent in WinDes, but the performance will be effectively the same whether the pond is constructed as an online or an offline feature. The precise size, shape, layout and location are all matters for the detailed design stage but some issues are discussed below.

The full network details for the proposed ditch system and a summary of the results and outfall flow to the Drigg Stream for the 1 in 200 year return period, 720 minutes (12 hours) duration, winter profile storm event are in the Annexes.

3.4 Comparison of the Natural and Proposed Runoff Regimes

The runoff rates from the 1 in 200 year, 6 hours duration “natural” model and the proposed model for the 1 in 200 year, 12 hour winter storm have been plotted and the result is included in the Annexes.

The following points should be noted:

- The unexpected drop off in the flows on the trailing limbs of the hydrographs (see Annexes L3-1 and L3-2) is a peculiarity of the Micro Drainage software. However, the calculation of the peak flow and peak storage requirement is always represented properly and the conclusions arising from the computer simulations remain valid.
- An indicative continuation of the base flow that would occur in reality has been added to the graph.
- A similar effect is probably happening with the output from the proposed system but as the decay limb of the plot is much smoother, it seems that the effect is masked by the large number of unit hydrographs that are included in the model and that are contributing flow with different times of concentration.

- Although the peak rate of final discharge to Drigg Stream from the proposed system downstream of the proposed landform would be more or less the same as the original system, the total volume of runoff would be greater. This is to be expected because the steeper gradients within the contributing areas (not along the ditches) will mean that the runoff will be more flashy and less water may be expected to be lost in the longer term through evapotranspiration.

4 Geometry

4.1 Collection Ditch Layout

The layout of the modelled ditches and pipes for the proposed system, including the numbering of the conduits is shown in the Annexes.

4.2 Long Sections

Long sections showing the full sets of levels that have been assumed for the model for Branch 1 (North and West sides) and Branch 2 (East and South sides) are given in the Annexes.

4.3 Cross Sections

As described above, the model of the proposed system of collection ditches around the perimeter has been sized accordingly to limit the cost of excavation whilst efficiently conveying flows.

Three differently sized ditches have been used; these are detailed below in ascending order from smallest to largest.

1. A base 375mm wide, a total depth of around 620mm and side slopes of 1 in 1.5. This is used at the upstream end of branch 2; it could not be used at the upstream end of branch 1 because the existing flow from Drigg Stream was inputted into the first ditch in this branch. To work out this flow the FEH data used to create the existing site's hydrograph was again used, with the catchment area reduced by 27 hectares to take account of the area that is modelled separately.

2. A base 600mm wide, a total depth of around 1000mm and side slopes of 1 in 1.5. This is used widely across the site

3. A base 800mm wide, a total depth of around 1320mm and side slopes of 1 in 1.5. This is used from the point at which branch 2 meets branch 1 until the throttle pipe at the outflow of the pond.

The final ditch sizes and locations are a matter for detailed design and which will require very careful consideration along the eastern boundary adjacent to the railway line.

5 Phasing

5.1 Integration with the Existing Drainage Systems

As the high point of the proposed system will be at the northern most corner of the site and as this will be where the first part of the final landform is constructed, it may be possible to create the perimeter ditch as the development of the cap progresses. In other words, any finished sections of the perimeter ditch will be higher than the interim ground levels downstream and, although it may not be possible to construct the whole of the ditch and attenuation lagoon system to be operational from the outset, there will always be an outfall in the form of either the existing upper reaches of Drigg Stream or else the existing collection channel and downstream pipe work that drains the Eastern boundary. Certain lengths of temporary ditches or pipe lines may be required to create outfalls for the permanent ditches as they are gradually constructed.

5.2 Internal Site Drainage

Detailed consideration of the temporary drainage systems that will be required to collect flow during interim phases of the formation of the revised single dome and the means by which such flow will be conveyed to the peripheral collection system described in this report is shown on Drawings 47070159/SWM/01 to 06 included in the Engineering Design report which forms Appendix C to the ES.

6 Detailed design Requirements

6.1 General

Although this report and modelling has been prepared based on the best information currently available and to a commensurate level of detail, due to the very long period over which the development will take place there will inevitably be advances in design techniques, control requirements, etc. Nevertheless, this study has demonstrated that it may be possible to collect all of the runoff from the surface of the landform, the drainage blanket and the re-located Drigg Stream, and convey it southward to an attenuation and control feature before discharging it to an existing, untouched section of Drigg Stream in the South East of the site at a rate that would not exceed the runoff that would have happened if none of the site had been developed.

6.2 Ditch Sections

Efforts have been made to utilise ditch sections that minimise the requirement for excavation whilst efficiently conveying the flow to the outfall, however the final dimension of these ditch sections is a matter to be finalised in detailed design. Flow velocities should be considered, if these are too high then there may be long term maintenance issues, such as the possibility of dealing with excessive amounts of siltation. The use of steps is a possible alternative to having steep gradients in sections and it may be appropriate to construct the largest ditch section possible within the constraints of the slope of the mound, access track, etc.

6.3 Attenuation lagoon

The modelling has demonstrated that there is sufficient land available to the south of the vaults and adjacent to Drigg Stream at the appropriate elevation for the construction of an attenuation and pollution control pond. Current documentation, such as CIRIA Report C697 – The SuDS Manual, provides guidance on the construction of such features. Issues to be addressed will be side slopes, transit length, silt traps, access for maintenance, inlet and outlet structures and habitat creation.

A silt lagoon will need to be implemented until the vegetation over the great majority of the landform has become sufficiently established to carry out this function; the silt lagoon would also have an attenuation function.

6.4 Control Device

The model for the proposed system has a final discharge control in the form of a length of 840mm diameter pipe between the pond and Drigg Stream. If it is determined that it would be preferable to have the majority of the outfall as an open watercourse, then it would be possible to install an alternative control device such as a simple orifice, a v-notch weir or a more complex device such as a Hydro-Brake.

Such devices will have slightly different head/discharge characteristics, but it may still be possible to determine a suitable size to limit the discharge to a value below the “natural” rate.

6.5 Pollution Control

The attenuation lagoon should be designed with isolation valves to prevent any discharge in the event of a contaminant entering the lagoon.

The system will be designed to prevent discharges of both solids and the associated coagulant, preventing any environmental damage to the receiving watercourse downstream. During detailed design, measures such as staged discharge or overflow weirs to encourage full settlement will be incorporated, along with isolation valves. Any solids that may be contaminated will be removed from the settlement lagoon and taken to a suitable, licensed, treatment facility for appropriate disposal. It is anticipated that such a design will be agreed with the EA and the local authority in advance of construction works commencing.

6.6 Range of Return Periods and Durations

A range of storm durations, from 15 minutes to 24 hours, with a selection of return periods including the 1 in 100 plus 20% allowance for climate change and 1 in 200 year have been simulated. The ditch profile coped with all of these events without flooding.

The 720 minutes (12 hours) duration, 1 in 100 year (+20%) return period event would only produce a final discharge of 1164 l/s with approximately 5,750 m^3 being stored in the pond at a maximum depth of 1.30 m. Obviously, as the detailed design is progressed and more data becomes available, it would be advisable to check a range of events in this manner and react accordingly.

6.7 Outfall Design and Scour Protection

The proposed rate of discharge, in the order of 1170l/s through a 840 mm diameter pipe would have considerable energy and the consequent potential to damage or scour the existing stream channel. Therefore, careful attention will be required to ensure that energy is dissipated efficiently to manage such risks.

6.8 Surcharged Outfall

The model for the proposed system assumes that the outfall to Drigg Stream will not be surcharged and, on the basis that the designed discharge will be more or less the same as the current situation; this would be a reasonable starting point. However, during the detailed design of the pond, control and outfall system, the possible effect of the water level in Drigg Stream from other sources such as the East-West Stream should be checked and the design of the pond and control adjusted accordingly.

7 Conclusions

The modelling and simulation described in this report demonstrates that it may be feasible to construct a system of perimeter ditches around the revised single dome landform as its creation progresses with sufficient capacity to convey both surface and sub-surface runoff to a point to the south of the mound, whilst also conveying the flows from the re-directed Drigg Stream to outflow to an existing, untouched point of Drigg Stream.

There is likely to be sufficient space available to the south of the vaults and to the Southwest of Drigg Stream to construct an attenuation lagoon that could also be designed as a silt trap and pollution control feature with a hydraulic control to limit the rate of discharge into Drigg Stream to a value equivalent to the “natural” runoff from the undeveloped site.

As there will be a permanent flow attenuation and control facility that will be left in place after the final phase of dome construction, runoff generated by significant storm events should not be greater than would have been the case had the landform not been constructed. However, should the rates of flow be larger than the range that could be expected in Drigg Stream now, they would not put any downstream property at increased risk of flooding.

Annex L3-1: Natural runoff

Notional natural network details

Notional natural network summary of results

Notional natural network outfall results

Existing Network Details for SW.txt

- 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)	n	HYD SECT	DIA (mm)
1.000	990.000#	9.000	110.0	0.000	5.00	0.0	0.035	\/	35
1.001	10.000	0.091	109.9	0.000	0.00	0.0	0.035	\/	35

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	18.591	0.000	0.0	1.70	3495.9
1.001	9.591	0.000	0.0	1.71	3497.7

PIPELINE SCHEDULES for SW.txt

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)
1.000	\/	35	33	20.000	18.591	0.809	Junction	
1.001	\/	35	34	12.010	9.591	1.819	Junction	

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)
1.000	990.000#	110.0	34	12.010	9.591	1.819	Junction	
1.001	10.000	109.9	Drigg Strea	12.000	9.500	1.900	Open Manhole	0

Summary Wizard of 360 minute 200 year Winter I+0% for SW.txt

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
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	1	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Site Location	GB 305650 498750 SD 05650 98750
C (1km)	-0.021
D1 (1km)	0.372
D2 (1km)	0.374
D3 (1km)	0.366
E (1km)	0.265
F (1km)	2.414
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880
Return Period(s) (years)	200
Climate Change (%)	0

PN	US/MH Name	Rank	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	33	1	19.190	-0.392	0.000	0.33	0.0	1170.2	OK
1.001	34	1	10.188	-0.394	0.000	0.36	0.0	1170.2	OK

Input Hydrograph Manhole 33, DS/PN 1.000 (SW.txt)
360 minute 200 year Winter I+0%
Input Hydrograph Type: ReFH Dynamic

Input Variables

Site Location	GB 305650 498750 SD 05650 98750
C	-0.02199
D1	0.37424
D2	0.37419
D3	0.36824
E	0.26783
F	2.40523
Area (Ha)	120.000
SAAR (mm)	1040
Urban (1990)	0.0000
BFIHOST	0.875
DPSBAR	29.300
DPLBAR	1.830
PROPWET	0.710
Season	Winter
LAG (hrs)	0.000
Base Flow (l/s)	(Calculated)
Areal Reduction Factor	1.000

Output Variables

TP(0) (mins)	76	Initial C	84.084
T (mins)	8	Maximum C	570.639
TBt (mins)	234	Initial PR (%)	11.725
TB (mins)	273	Maximum PR (%)	21.792
Uc	0.337	Initial BF (l/s)	41.0
Seasonal Correction Factor	0.792	Maximum BF (l/s)	306.1
Alpha	0.794		

Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)
1	41.0	15	41.8	29	45.4	43	52.8	57	64.2	71	79.8
2	41.0	16	42.0	30	45.8	44	53.4	58	65.1	72	81.1
3	41.0	17	42.2	31	46.3	45	54.1	59	66.1	73	82.4
4	41.0	18	42.3	32	46.7	46	54.9	60	67.0	74	83.7
5	41.0	19	42.5	33	47.2	47	55.6	61	68.1	75	85.0
6	41.1	20	42.7	34	47.6	48	56.4	62	69.2	76	86.3
7	41.1	21	42.9	35	48.1	49	57.2	63	70.3	77	87.8
8	41.2	22	43.2	36	48.5	50	58.0	64	71.4	78	89.5
9	41.2	23	43.5	37	49.1	51	58.8	65	72.6	79	91.3
10	41.3	24	43.8	38	49.7	52	59.5	66	73.7	80	93.0
11	41.4	25	44.1	39	50.3	53	60.4	67	74.8	81	94.8
12	41.4	26	44.4	40	50.9	54	61.3	68	75.9	82	96.5
13	41.5	27	44.7	41	51.5	55	62.3	69	77.2	83	98.3
14	41.7	28	45.0	42	52.1	56	63.2	70	78.5	84	100.0

Input Hydrograph Manhole 33, DS/PN 1.000 (SW.txt)
360 minute 200 year Winter I+0%
Input Hydrograph Type: ReFH Dynamic

Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)
85	101.9	132	202.8	179	428.4	226	865.5	273	1171.4	320	1079.4
86	104.0	133	205.6	180	435.5	227	875.4	274	1173.2	321	1075.2
87	106.1	134	208.6	181	443.1	228	885.3	275	1175.0	322	1071.1
88	108.2	135	211.6	182	451.2	229	894.9	276	1176.8	323	1066.9
89	110.3	136	214.6	183	459.2	230	904.2	277	1177.8	324	1062.7
90	112.4	137	217.6	184	467.3	231	913.5	278	1178.0	325	1058.4
91	114.5	138	220.6	185	475.4	232	922.8	279	1178.2	326	1054.0
92	116.6	139	223.6	186	483.4	233	932.2	280	1178.4	327	1049.7
93	118.7	140	226.6	187	491.5	234	941.5	281	1178.6	328	1045.3
94	120.7	141	229.9	188	499.6	235	950.8	282	1178.8	329	1041.0
95	122.7	142	233.5	189	508.1	236	960.1	283	1178.9	330	1036.6
96	124.7	143	237.2	190	517.0	237	969.0	284	1179.1	331	1032.3
97	126.7	144	240.8	191	525.9	238	977.4	285	1178.6	332	1027.9
98	128.7	145	244.4	192	534.8	239	985.8	286	1177.4	333	1023.6
99	130.7	146	248.0	193	543.7	240	994.3	287	1176.2	334	1019.2
100	132.7	147	251.6	194	552.6	241	1002.7	288	1175.1	335	1014.9
101	134.6	148	255.2	195	561.5	242	1011.1	289	1173.9	336	1010.6
102	136.6	149	259.1	196	570.4	243	1019.6	290	1172.7	337	1006.2
103	138.6	150	263.5	197	579.6	244	1028.0	291	1171.5	338	1001.9
104	140.6	151	267.8	198	589.1	245	1035.8	292	1170.3	339	997.6
105	142.5	152	272.2	199	598.7	246	1043.0	293	1168.5	340	993.2
106	144.5	153	276.5	200	608.2	247	1050.2	294	1166.1	341	989.0
107	146.5	154	280.8	201	617.7	248	1057.4	295	1163.7	342	984.7
108	148.5	155	285.2	202	627.3	249	1064.6	296	1161.3	343	980.5
109	150.5	156	289.5	203	636.8	250	1071.8	297	1158.9	344	976.3
110	152.5	157	294.3	204	646.3	251	1079.0	298	1156.5	345	972.1
111	154.6	158	299.5	205	656.0	252	1086.2	299	1154.1	346	967.9
112	156.6	159	304.7	206	666.0	253	1092.7	300	1151.7	347	963.6
113	158.7	160	309.8	207	675.9	254	1098.3	301	1148.9	348	959.4
114	160.7	161	315.0	208	685.9	255	1103.9	302	1145.7	349	955.2
115	162.7	162	320.2	209	695.8	256	1109.5	303	1142.5	350	951.1
116	164.8	163	325.4	210	705.7	257	1115.2	304	1139.2	351	947.0
117	166.9	164	330.6	211	715.7	258	1120.8	305	1136.0	352	942.9
118	169.2	165	336.2	212	725.6	259	1126.4	306	1132.8	353	938.7
119	171.4	166	342.4	213	735.6	260	1132.1	307	1129.6	354	934.6
120	173.6	167	348.5	214	745.7	261	1136.7	308	1126.4	355	930.5
121	175.8	168	354.6	215	755.7	262	1140.2	309	1122.8	356	926.3
122	178.1	169	360.7	216	765.8	263	1143.8	310	1119.0	357	922.2
123	180.3	170	366.9	217	775.8	264	1147.4	311	1115.2	358	918.1
124	182.5	171	373.0	218	785.9	265	1150.9	312	1111.3	359	914.0
125	184.9	172	379.1	219	795.9	266	1154.5	313	1107.5	360	910.0
126	187.5	173	385.7	220	806.0	267	1158.1	314	1103.7	361	905.9
127	190.0	174	392.8	221	816.0	268	1161.6	315	1099.8	362	901.8
128	192.6	175	399.9	222	825.9	269	1164.3	316	1096.0	363	897.7
129	195.1	176	407.1	223	835.8	270	1166.1	317	1092.0	364	893.6
130	197.7	177	414.2	224	845.7	271	1167.9	318	1087.8	365	889.5
131	200.2	178	421.3	225	855.6	272	1169.7	319	1083.6	366	885.5

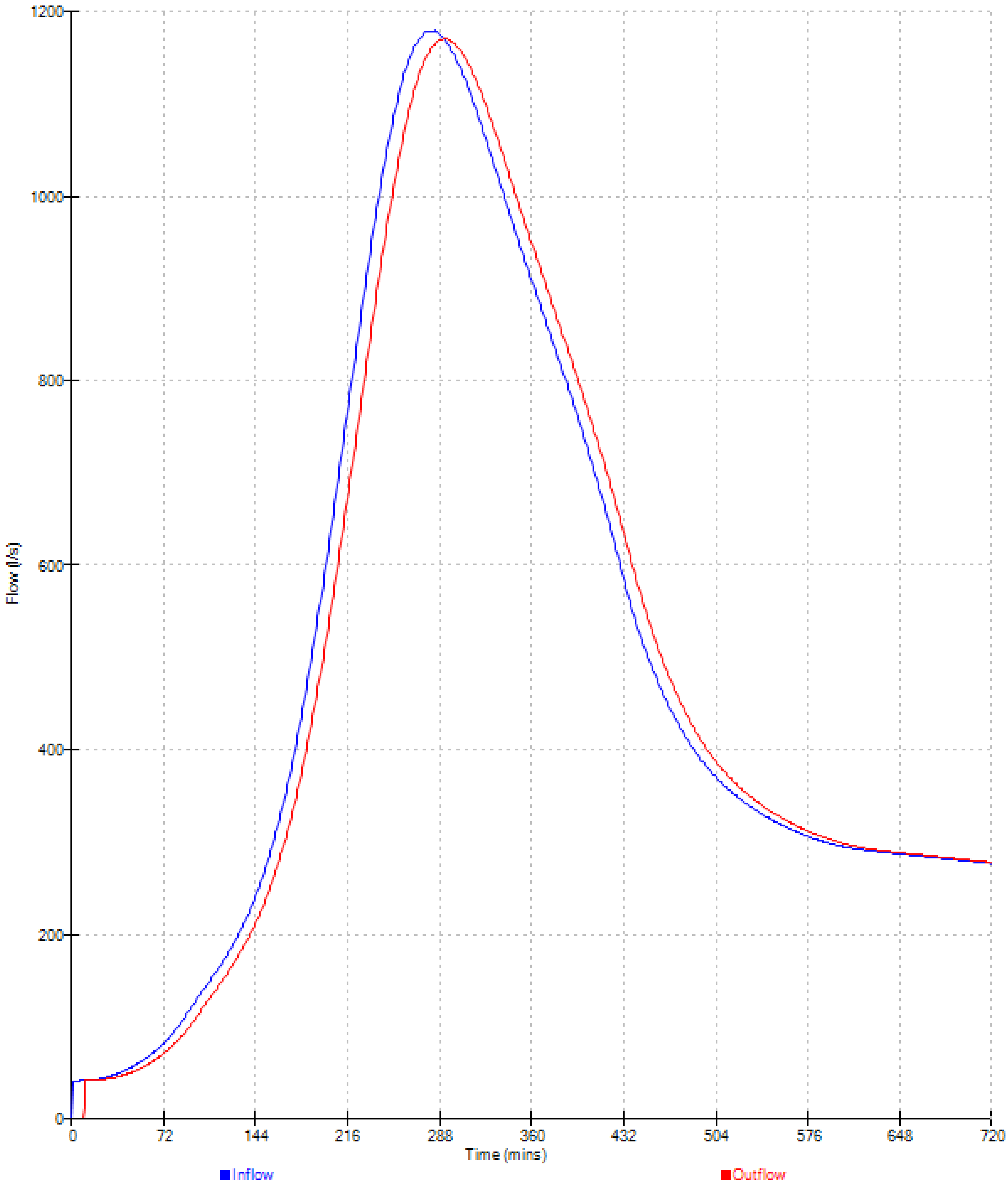
Input Hydrograph Manhole 33, DS/PN 1.000 (SW.txt)
360 minute 200 year Winter I+0%
Input Hydrograph Type: ReFH Dynamic

Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)
367	881.4	414	678.9	461	466.4	508	364.6	555	318.7	602	295.3
368	877.3	415	674.0	462	463.4	509	363.2	556	318.0	603	295.0
369	873.3	416	669.0	463	460.4	510	362.0	557	317.3	604	294.7
370	869.2	417	664.1	464	457.4	511	360.7	558	316.6	605	294.4
371	865.1	418	659.1	465	454.4	512	359.5	559	316.0	606	294.2
372	861.1	419	654.2	466	451.4	513	358.2	560	315.3	607	294.0
373	857.0	420	649.2	467	448.4	514	356.9	561	314.7	608	293.7
374	852.9	421	644.2	468	445.4	515	355.7	562	314.0	609	293.5
375	848.8	422	639.0	469	442.5	516	354.4	563	313.4	610	293.2
376	844.8	423	633.8	470	439.9	517	353.2	564	312.7	611	293.0
377	840.7	424	628.6	471	437.3	518	352.1	565	312.1	612	292.7
378	836.6	425	623.4	472	434.6	519	351.0	566	311.6	613	292.5
379	832.6	426	618.2	473	432.0	520	349.9	567	311.0	614	292.3
380	828.5	427	613.0	474	429.4	521	348.8	568	310.4	615	292.1
381	824.4	428	607.8	475	426.7	522	347.6	569	309.8	616	291.9
382	820.3	429	602.6	476	424.1	523	346.5	570	309.2	617	291.7
383	816.1	430	597.2	477	421.6	524	345.4	571	308.6	618	291.5
384	812.0	431	591.8	478	419.3	525	344.3	572	308.1	619	291.4
385	807.9	432	586.4	479	417.1	526	343.4	573	307.5	620	291.2
386	803.8	433	581.0	480	414.8	527	342.4	574	307.0	621	291.0
387	799.6	434	575.7	481	412.5	528	341.4	575	306.5	622	290.8
388	795.5	435	570.3	482	410.2	529	340.4	576	306.0	623	290.7
389	791.3	436	564.9	483	407.9	530	339.4	577	305.5	624	290.5
390	787.0	437	559.9	484	405.6	531	338.4	578	304.9	625	290.3
391	782.8	438	555.2	485	403.5	532	337.4	579	304.4	626	290.2
392	778.5	439	550.6	486	401.6	533	336.5	580	303.9	627	290.0
393	774.3	440	545.9	487	399.6	534	335.6	581	303.4	628	289.9
394	770.0	441	541.3	488	397.6	535	334.7	582	303.0	629	289.7
395	765.8	442	536.6	489	395.7	536	333.8	583	302.5	630	289.6
396	761.5	443	532.0	490	393.7	537	332.9	584	302.1	631	289.4
397	757.2	444	527.3	491	391.8	538	332.0	585	301.6	632	289.3
398	752.7	445	523.1	492	389.8	539	331.1	586	301.2	633	289.1
399	748.3	446	519.4	493	388.0	540	330.2	587	300.7	634	289.0
400	743.8	447	515.6	494	386.3	541	329.4	588	300.3	635	288.8
401	739.4	448	511.8	495	384.6	542	328.6	589	299.9	636	288.7
402	735.0	449	508.1	496	383.0	543	327.8	590	299.5	637	288.5
403	730.5	450	504.3	497	381.3	544	327.0	591	299.1	638	288.4
404	726.1	451	500.6	498	379.6	545	326.2	592	298.8	639	288.2
405	721.5	452	496.8	499	377.9	546	325.4	593	298.4	640	288.1
406	716.8	453	493.3	500	376.3	547	324.6	594	298.0	641	287.9
407	712.1	454	489.9	501	374.7	548	323.8	595	297.6	642	287.8
408	707.4	455	486.5	502	373.3	549	323.0	596	297.2	643	287.6
409	702.8	456	483.1	503	371.8	550	322.3	597	296.9	644	287.5
410	698.1	457	479.7	504	370.4	551	321.6	598	296.6	645	287.4
411	693.4	458	476.4	505	368.9	552	320.9	599	296.3	646	287.2
412	688.7	459	473.0	506	367.5	553	320.1	600	296.0	647	287.1
413	683.9	460	469.6	507	366.0	554	319.4	601	295.7	648	286.9

Input Hydrograph Manhole 33, DS/PN 1.000 (SW.txt)
360 minute 200 year Winter I+0%
Input Hydrograph Type: ReFH Dynamic

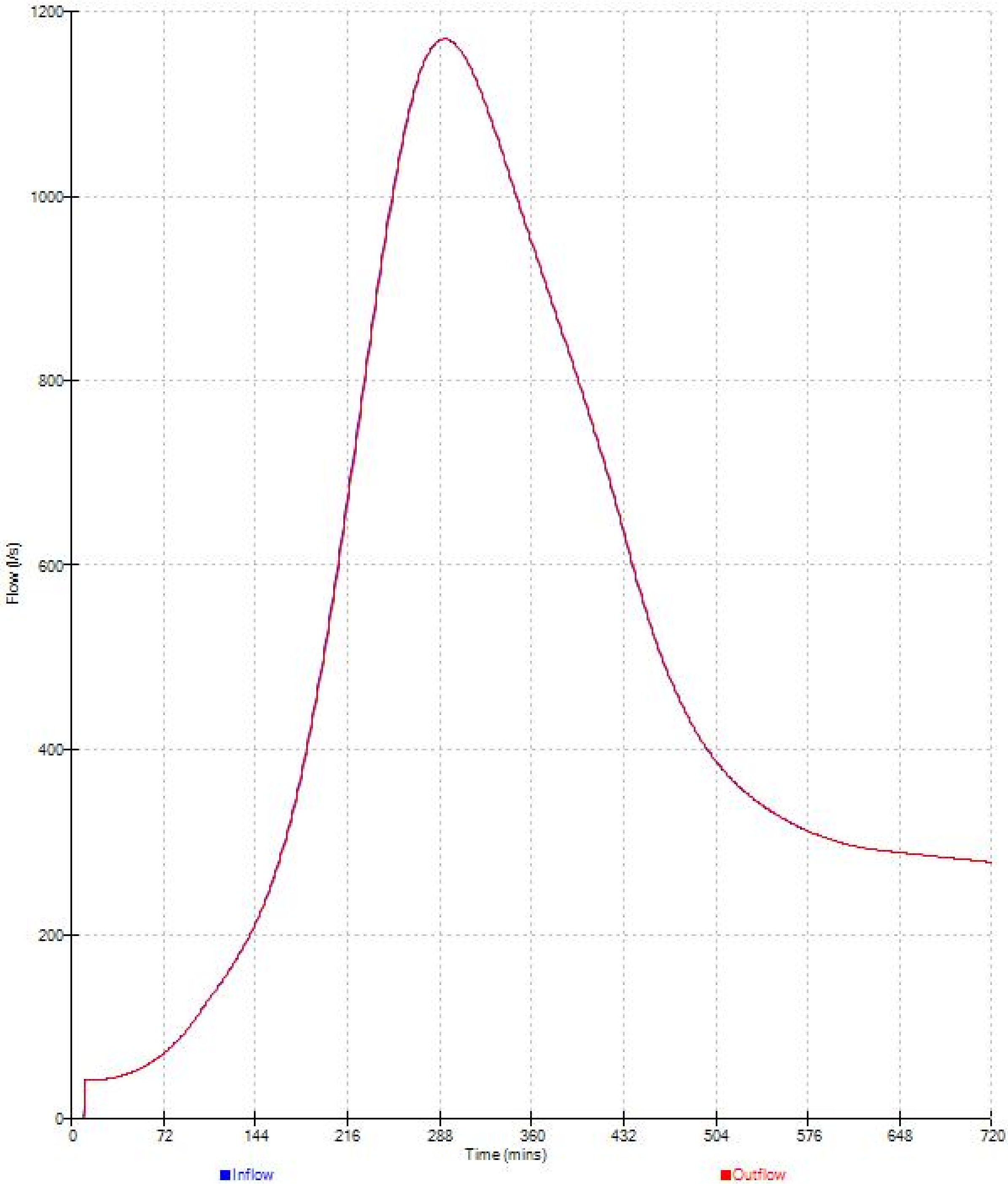
Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)	Time (mins)	Flow (l/s)
649	286.8	661	285.0	673	283.3	685	281.5	697	279.8	709	278.1
650	286.6	662	284.9	674	283.1	686	281.4	698	279.7	710	278.0
651	286.5	663	284.7	675	283.0	687	281.2	699	279.5	711	277.8
652	286.3	664	284.6	676	282.8	688	281.1	700	279.4	712	277.7
653	286.2	665	284.4	677	282.7	689	281.0	701	279.2	713	277.5
654	286.0	666	284.3	678	282.5	690	280.8	702	279.1	714	277.4
655	285.9	667	284.1	679	282.4	691	280.7	703	278.9	715	277.2
656	285.7	668	284.0	680	282.3	692	280.5	704	278.8	716	277.1
657	285.6	669	283.8	681	282.1	693	280.4	705	278.7	717	277.0
658	285.4	670	283.7	682	282.0	694	280.2	706	278.5	718	276.8
659	285.3	671	283.6	683	281.8	695	280.1	707	278.4	719	276.7
660	285.2	672	283.4	684	281.7	696	279.9	708	278.2	720	276.5

Graphs for Pipe 1.000 US/MH 33 (SW.txt)
360 minute 200 year Winter I+0%
Status: OK



AECOM Ltd		Page 8
Aecom House 63-77 Victoria Street St Albans Herts AL1 3ER	LLWR Notional "natural" drainage Outfall graphs	
Date 19 March 2013 File ORIGINAL SW 360MIN	Designed by R J Marshall Checked by	
XP Solutions	Network 2014.1.1	

Graphs for Pipe 1.001 US/MH 34 (SW.txt)
360 minute 200 year Winter I+0%
Status: OK



Annex L3-2: Proposed runoff

Proposed network details

Proposed network summary of results

Proposed network outfall results

Existing Network Details for SW.txt

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)
1.000	63.777	0.350	182.2	0.000	5.00	0.0		0.035	\/	35
1.001	98.096	0.550	178.4	0.000	0.00	0.0		0.035	\/	35
1.002	88.581	0.530	167.1	0.000	0.00	0.0		0.035	\/	35
1.003	75.674	0.440	172.0	0.000	0.00	0.0		0.035	\/	35
1.004	25.426	0.470	54.1	0.000	0.00	0.0		0.035	\/	35
1.005	74.455	0.074	1006.1	0.000	0.00	0.0		0.035	\/	36
1.006	107.681	0.108	997.0	0.000	0.00	0.0		0.035	\/	36
1.007	97.272	0.097	1002.8	0.000	0.00	0.0		0.035	\/	36
1.008	101.695	0.102	997.0	0.000	0.00	0.0		0.035	\/	36
1.009	97.585	0.098	995.8	0.000	0.00	0.0		0.035	\/	36
1.010	98.522	0.099	995.2	0.000	0.00	0.0		0.035	\/	35
1.011	105.035	0.802	131.0	0.000	0.00	0.0		0.035	\/	35
1.012	90.503	0.300	301.7	0.000	0.00	0.0		0.035	\/	35
1.013	96.895	1.600	60.6	0.000	0.00	0.0		0.035	\/	35
1.014	85.836	2.100	40.9	0.000	0.00	0.0		0.035	\/	35
2.000	100.402	0.500	200.8	0.000	5.00	0.0		0.035	\/	33
2.001	101.174	0.560	180.7	0.000	0.00	0.0		0.035	\/	33
2.002	100.340	0.520	193.0	0.000	0.00	0.0		0.035	\/	33
2.003	101.796	0.700	145.4	0.000	0.00	0.0		0.035	\/	33
2.004	99.438	0.500	198.9	0.000	0.00	0.0		0.035	\/	35
2.005	100.108	0.400	250.3	0.000	0.00	0.0		0.035	\/	35
2.006	71.872	0.400	179.7	0.000	0.00	0.0		0.035	\/	35
2.007	77.142	2.400	32.1	0.000	0.00	0.0		0.035	\/	35
2.008	88.293	1.900	46.5	0.000	0.00	0.0		0.035	\/	35
2.009	98.721	0.400	246.8	0.000	0.00	0.0		0.035	\/	35

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
1.000	19.520	0.000	0.0	1.32	2716.2
1.001	19.170	0.000	0.0	1.34	2745.5
1.002	18.620	0.000	0.0	1.38	2836.1
1.003	18.090	0.000	0.0	1.36	2795.8
1.004	17.650	0.000	0.0	2.43	4985.1
1.005	17.180	0.000	0.0	0.68	2487.0
1.006	17.106	0.000	0.0	0.69	2498.3
1.007	16.998	0.000	0.0	0.68	2491.1
1.008	16.901	0.000	0.0	0.69	2498.4
1.009	16.799	0.000	0.0	0.69	2499.9
1.010	16.701	0.000	0.0	0.57	1162.3
1.011	16.602	0.000	0.0	1.56	3203.9
1.012	15.800	0.000	0.0	1.03	2111.0
1.013	15.500	0.000	0.0	2.30	4711.6
1.014	13.900	0.000	0.0	2.80	5735.0
2.000	20.480	0.000	0.0	0.92	737.2
2.001	19.980	0.000	0.0	0.97	777.2
2.002	19.420	0.000	0.0	0.94	752.1
2.003	18.900	0.000	0.0	1.08	866.3
2.004	18.200	0.000	0.0	1.27	2600.0
2.005	17.700	0.000	0.0	1.13	2317.7
2.006	17.300	0.000	0.0	1.33	2735.3
2.007	16.900	0.000	0.0	3.15	6467.3
2.008	14.500	0.000	0.0	2.62	5378.7
2.009	12.600	0.000	0.0	1.14	2333.9

Existing Network Details for SW.txt

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)
2.010	109.682	0.400	274.2	0.000	0.00	0.0		0.035	\/	35
1.015	96.114	0.300	320.4	0.000	0.00	0.0		0.035	\/	36
1.016	96.114	1.462	65.7	0.000	0.00	0.0		0.035	\/	36
1.017	35.224	0.176	200.1	0.000	0.00	0.0	0.600		o	840
1.018	8.028	0.040	200.7	0.000	0.00	0.0	0.600		o	840

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
2.010	12.200	0.000	0.0	1.08	2214.2
1.015	11.480	0.000	0.0	1.21	4407.3
1.016	11.180	0.000	0.0	2.67	9729.4
1.017	9.718	0.000	0.0	2.12	1174.1
1.018	9.542	0.000	0.0	2.12	1172.5

Conduit Sections for SW.txt

NOTE: Diameters less than 66 refer to section numbers of hydraulic conduits. These conduits are marked by the symbols:- [] box culvert, \/ open channel, oo dual pipe, ooo triple pipe, O egg.

Section numbers < 0 are taken from user conduit table

Section Number	Conduit Type	Major Dimn. (mm)	Minor Dimn. (mm)	Side Slope (Deg)	Corner Splay (mm)	4*Hyd Radius (m)	XSect Area (m²)
33	\/	375	619	34.0		1.236	0.800
35	\/	600	991	34.0		1.980	2.051
36	\/	800	1321	34.0		2.638	3.644

Manhole Schedules for SW.txt

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)	Backdrop (mm)
1	21.000	1.480	Junction		1.000	19.520	35				
2	20.900	1.730	Junction		1.001	19.170	35	1.000	19.170	35	
3	20.300	1.680	Junction		1.002	18.620	35	1.001	18.620	35	
4	19.600	1.510	Junction		1.003	18.090	35	1.002	18.090	35	
5	19.000	1.350	Junction		1.004	17.650	35	1.003	17.650	35	
6	18.500	1.320	Junction		1.005	17.180	36	1.004	17.180	35	
7	18.500	1.394	Junction		1.006	17.106	36	1.005	17.106	36	
8	18.500	1.502	Junction		1.007	16.998	36	1.006	16.998	36	
9	18.500	1.599	Junction		1.008	16.901	36	1.007	16.901	36	
10	18.500	1.701	Junction		1.009	16.799	36	1.008	16.799	36	
11	18.500	1.799	Junction		1.010	16.701	35	1.009	16.701	36	
12	18.500	1.898	Junction		1.011	16.602	35	1.010	16.602	35	
13	16.800	1.000	Junction		1.012	15.800	35	1.011	15.800	35	
14	16.500	1.000	Junction		1.013	15.500	35	1.012	15.500	35	
15	14.900	1.000	Junction		1.014	13.900	35	1.013	13.900	35	
20	21.100	0.620	Junction		2.000	20.480	33				
21	20.600	0.620	Junction		2.001	19.980	33	2.000	19.980	33	
22	20.100	0.680	Junction		2.002	19.420	33	2.001	19.420	33	
23	20.000	1.100	Junction		2.003	18.900	33	2.002	18.900	33	
24	19.200	1.000	Junction		2.004	18.200	35	2.003	18.200	33	
25	18.700	1.000	Junction		2.005	17.700	35	2.004	17.700	35	
26	18.300	1.000	Junction		2.006	17.300	35	2.005	17.300	35	
27	17.900	1.000	Junction		2.007	16.900	35	2.006	16.900	35	
28	15.500	1.000	Junction		2.008	14.500	35	2.007	14.500	35	
29	13.600	1.000	Junction		2.009	12.600	35	2.008	12.600	35	
30	13.500	1.300	Junction		2.010	12.200	35	2.009	12.200	35	
16	12.800	1.320	Junction		1.015	11.480	36	1.014	11.800	35	320
								2.010	11.800	35	320
17	12.500	1.320	Junction		1.016	11.180	36	1.015	11.180	36	
18	12.200	2.482	Junction		1.017	9.718	840	1.016	9.718	36	
19	12.100	2.558	Junction	0	1.018	9.542	840	1.017	9.542	840	
Drigg Strea	12.000	2.498	Open Manhole	0		OUTFALL		1.018	9.502	840	

PIPELINE SCHEDULES for SW.txt

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)
1.000	\/	35	1	21.000	19.520	0.880	Junction	
1.001	\/	35	2	20.900	19.170	1.130	Junction	
1.002	\/	35	3	20.300	18.620	1.080	Junction	
1.003	\/	35	4	19.600	18.090	0.910	Junction	
1.004	\/	35	5	19.000	17.650	0.750	Junction	
1.005	\/	36	6	18.500	17.180	0.720	Junction	
1.006	\/	36	7	18.500	17.106	0.794	Junction	
1.007	\/	36	8	18.500	16.998	0.902	Junction	
1.008	\/	36	9	18.500	16.901	0.999	Junction	
1.009	\/	36	10	18.500	16.799	1.101	Junction	
1.010	\/	35	11	18.500	16.701	1.199	Junction	
1.011	\/	35	12	18.500	16.602	1.298	Junction	
1.012	\/	35	13	16.800	15.800	0.400	Junction	
1.013	\/	35	14	16.500	15.500	0.400	Junction	
1.014	\/	35	15	14.900	13.900	0.400	Junction	
2.000	\/	33	20	21.100	20.480	0.020	Junction	
2.001	\/	33	21	20.600	19.980	0.020	Junction	
2.002	\/	33	22	20.100	19.420	0.080	Junction	
2.003	\/	33	23	20.000	18.900	0.500	Junction	
2.004	\/	35	24	19.200	18.200	0.400	Junction	
2.005	\/	35	25	18.700	17.700	0.400	Junction	
2.006	\/	35	26	18.300	17.300	0.400	Junction	
2.007	\/	35	27	17.900	16.900	0.400	Junction	
2.008	\/	35	28	15.500	14.500	0.400	Junction	

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)
1.000	63.777	182.2	2	20.900	19.170	1.130	Junction	
1.001	98.096	178.4	3	20.300	18.620	1.080	Junction	
1.002	88.581	167.1	4	19.600	18.090	0.910	Junction	
1.003	75.674	172.0	5	19.000	17.650	0.750	Junction	
1.004	25.426	54.1	6	18.500	17.180	0.720	Junction	
1.005	74.455	1006.1	7	18.500	17.106	0.794	Junction	
1.006	107.681	997.0	8	18.500	16.998	0.902	Junction	
1.007	97.272	1002.8	9	18.500	16.901	0.999	Junction	
1.008	101.695	997.0	10	18.500	16.799	1.101	Junction	
1.009	97.585	995.8	11	18.500	16.701	1.199	Junction	
1.010	98.522	995.2	12	18.500	16.602	1.298	Junction	
1.011	105.035	131.0	13	16.800	15.800	0.400	Junction	
1.012	90.503	301.7	14	16.500	15.500	0.400	Junction	
1.013	96.895	60.6	15	14.900	13.900	0.400	Junction	
1.014	85.836	40.9	16	12.800	11.800	0.400	Junction	
2.000	100.402	200.8	21	20.600	19.980	0.020	Junction	
2.001	101.174	180.7	22	20.100	19.420	0.080	Junction	
2.002	100.340	193.0	23	20.000	18.900	0.500	Junction	
2.003	101.796	145.4	24	19.200	18.200	0.400	Junction	
2.004	99.438	198.9	25	18.700	17.700	0.400	Junction	
2.005	100.108	250.3	26	18.300	17.300	0.400	Junction	
2.006	71.872	179.7	27	17.900	16.900	0.400	Junction	
2.007	77.142	32.1	28	15.500	14.500	0.400	Junction	
2.008	88.293	46.5	29	13.600	12.600	0.400	Junction	

PIPELINE SCHEDULES for SW.txt

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)
2.009	\/	35	29	13.600	12.600	0.400	Junction	
2.010	\/	35	30	13.500	12.200	0.700	Junction	
1.015	\/	36	16	12.800	11.480	0.720	Junction	
1.016	\/	36	17	12.500	11.180	0.720	Junction	
1.017	o	840	18	12.200	9.718	1.642	Junction	
1.018	o	840	19	12.100	9.542	1.718	Junction	

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)
2.009	98.721	246.8	30	13.500	12.200	0.700	Junction	
2.010	109.682	274.2	16	12.800	11.800	0.400	Junction	
1.015	96.114	320.4	17	12.500	11.180	0.720	Junction	
1.016	96.114	65.7	18	12.200	9.718	1.882	Junction	
1.017	35.224	200.1	19	12.100	9.542	1.718	Junction	
1.018	8.028	200.7	Drigg Strea	12.000	9.502	1.658	Open Manhole	0

Storage Structures for SW.txt

Tank or Pond Manhole: 18, DS/PN: 1.017

Invert Level (m) 9.718

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	6130.9	0.368	6593.4	0.768	7123.4	1.168	7673.8	1.469	0.0
0.068	6209.4	0.468	6724.0	0.868	7259.0	1.268	7814.6		
0.168	6336.2	0.568	6855.8	0.968	7396.0	1.368	7956.6		
0.268	6464.2	0.668	6989.0	1.068	7534.2	1.468	8100.0		

Summary Wizard of 720 minute 200 year Winter I+0% for SW.txt

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
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 28 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH D3 (1km) 0.366
Site Location GB 305650 498750 SD 05650 98750 E (1km) 0.265
C (1km) -0.021 F (1km) 2.414
D1 (1km) 0.372 Cv (Summer) 0.750
D2 (1km) 0.374 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 100, 200
Climate Change (%) 20, 0

PN	US/MH Name	Rank	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	17	20.082	-0.429	0.000	0.29	0.0	800.1	OK
1.001	2	16	19.736	-0.425	0.000	0.30	0.0	821.8	OK
1.002	3	15	19.184	-0.427	0.000	0.30	0.0	841.8	OK
1.003	4	15	18.660	-0.421	0.000	0.30	0.0	847.7	OK
1.004	5	14	18.193	-0.448	0.000	0.17	0.0	848.2	OK
1.005	6	14	18.152	-0.349	0.000	0.34	0.0	857.4	OK
1.006	7	14	18.073	-0.354	0.000	0.35	0.0	886.2	OK
1.007	8	13	17.973	-0.346	0.000	0.37	0.0	917.8	OK
1.008	9	13	17.872	-0.350	0.000	0.38	0.0	953.9	OK
1.009	10	13	17.759	-0.361	0.000	0.40	0.0	989.8	OK
1.010	11	13	17.632	-0.060	0.000	0.87	0.0	1010.7	OK
1.011	12	12	17.188	-0.405	0.000	0.32	0.0	1032.6	OK
1.012	13	12	16.521	-0.270	0.000	0.50	0.0	1046.9	FLOOD RISK*
1.013	14	12	16.000	-0.491	0.000	0.22	0.0	1060.0	OK
1.014	15	12	14.349	-0.542	0.000	0.18	0.0	1060.0	OK
2.000	20	20	20.569	-0.530	0.000	0.02	0.0	16.9	OK
2.001	21	20	20.155	-0.444	0.000	0.07	0.0	56.4	OK
2.002	22	20	19.656	-0.383	0.000	0.13	0.0	99.9	OK
2.003	23	20	19.170	-0.349	0.000	0.17	0.0	149.4	OK
2.004	24	20	18.485	-0.706	0.000	0.07	0.0	191.7	OK
2.005	25	20	18.020	-0.671	0.000	0.09	0.0	215.8	OK
2.006	26	20	17.604	-0.687	0.000	0.08	0.0	225.6	OK
2.007	27	20	17.086	-0.805	0.000	0.04	0.0	239.9	OK
2.008	28	20	14.718	-0.773	0.000	0.05	0.0	260.4	OK
2.009	29	20	12.970	-0.621	0.000	0.13	0.0	297.2	OK
2.010	30	20	12.625	-0.566	0.000	0.17	0.0	370.0	OK
1.015	16	17	12.245	-0.556	0.000	0.31	0.0	1359.7	OK

Summary Wizard of 720 minute 200 year Winter I+0% for SW.txt

PN	US/MH Name	Rank	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m^3)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.016	17	17	11.696	-0.805	0.000	0.14	0.0	1359.6	OK
1.017	18	9	10.905	0.347	0.000	1.31	0.0	1080.5	SURCHARGED*
1.018	19	7	10.382	0.000	0.000	1.34	0.0	1080.5	SURCHARGED*

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

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
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 28 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 0 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.366
Site Location	GB 305650 498750 SD 05650 98750	E (1km)	0.265
C (1km)	-0.021	F (1km)	2.414
D1 (1km)	0.372	Cv (Summer)	0.750
D2 (1km)	0.374	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100, 200
Climate Change (%)	20, 0

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	360 Winter	100	+20%					
1.001	360 Winter	100	+20%					
1.002	360 Winter	100	+20%					
1.003	360 Winter	100	+20%					
1.004	360 Winter	100	+20%					
1.005	360 Winter	100	+20%					
1.006	360 Winter	100	+20%					
1.007	360 Winter	100	+20%					
1.008	360 Winter	100	+20%					
1.009	360 Winter	100	+20%					
1.010	360 Winter	100	+20%					
1.011	360 Winter	100	+20%					
1.012	360 Winter	100	+20%					
1.013	360 Winter	100	+20%					
1.014	360 Winter	100	+20%					
2.000	15 Winter	100	+20%					
2.001	15 Winter	100	+20%					
2.002	30 Winter	100	+20%					
2.003	30 Winter	100	+20%					
2.004	30 Winter	100	+20%					
2.005	30 Winter	100	+20%					
2.006	30 Winter	100	+20%					
2.007	30 Winter	100	+20%					
2.008	30 Winter	100	+20%					
2.009	30 Winter	100	+20%					
2.010	30 Winter	100	+20%					
1.015	360 Winter	100	+20%					
1.016	360 Winter	100	+20%					

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.017	720 Winter	100	+20%	100/180 Winter				
1.018	960 Winter	100	+20%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	20.139	-0.372	0.000	0.36	0.0	980.1	OK
1.001	2	19.792	-0.369	0.000	0.36	0.0	1001.0	OK
1.002	3	19.238	-0.373	0.000	0.36	0.0	1020.3	OK
1.003	4	18.714	-0.367	0.000	0.37	0.0	1025.8	OK
1.004	5	18.275	-0.366	0.000	0.21	0.0	1025.6	OK
1.005	6	18.227	-0.274	0.000	0.41	0.0	1033.8	FLOOD RISK*
1.006	7	18.144	-0.283	0.000	0.42	0.0	1060.0	OK
1.007	8	18.042	-0.277	0.000	0.44	0.0	1089.0	OK
1.008	9	17.937	-0.285	0.000	0.45	0.0	1122.1	OK
1.009	10	17.821	-0.299	0.000	0.46	0.0	1154.9	OK
1.010	11	17.692	0.000	0.000	1.01	0.0	1174.1	OK
1.011	12	17.231	-0.362	0.000	0.37	0.0	1193.7	OK
1.012	13	16.567	-0.224	0.000	0.57	0.0	1206.4	FLOOD RISK*
1.013	14	16.031	-0.460	0.000	0.26	0.0	1218.1	OK
1.014	15	14.386	-0.505	0.000	0.21	0.0	1218.1	OK
2.000	20	20.673	-0.426	0.000	0.08	0.0	59.3	OK
2.001	21	20.289	-0.310	0.000	0.21	0.0	164.1	OK
2.002	22	19.817	-0.222	0.000	0.37	0.0	280.7	FLOOD RISK*
2.003	23	19.343	-0.176	0.000	0.47	0.0	406.9	OK
2.004	24	18.667	-0.524	0.000	0.20	0.0	508.8	OK
2.005	25	18.216	-0.475	0.000	0.24	0.0	557.3	OK
2.006	26	17.781	-0.510	0.000	0.21	0.0	568.8	OK
2.007	27	17.217	-0.674	0.000	0.09	0.0	588.9	OK
2.008	28	14.853	-0.638	0.000	0.12	0.0	620.4	OK
2.009	29	13.164	-0.427	0.000	0.29	0.0	686.6	OK
2.010	30	12.833	-0.358	0.000	0.38	0.0	831.5	OK
1.015	16	12.290	-0.511	0.000	0.35	0.0	1532.7	OK
1.016	17	11.729	-0.772	0.000	0.16	0.0	1532.7	OK
1.017	18	11.002	0.444	0.000	1.41	0.0	1163.8	SURCHARGED*
1.018	19	10.382	0.000	0.000	1.44	0.0	1159.0	SURCHARGED*

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW.txt

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
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	28	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.366
Site Location	GB 305650 498750 SD 05650 98750	E (1km)	0.265
C (1km)	-0.021	F (1km)	2.414
D1 (1km)	0.372	Cv (Summer)	0.750
D2 (1km)	0.374	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100, 200
Climate Change (%)	20, 0

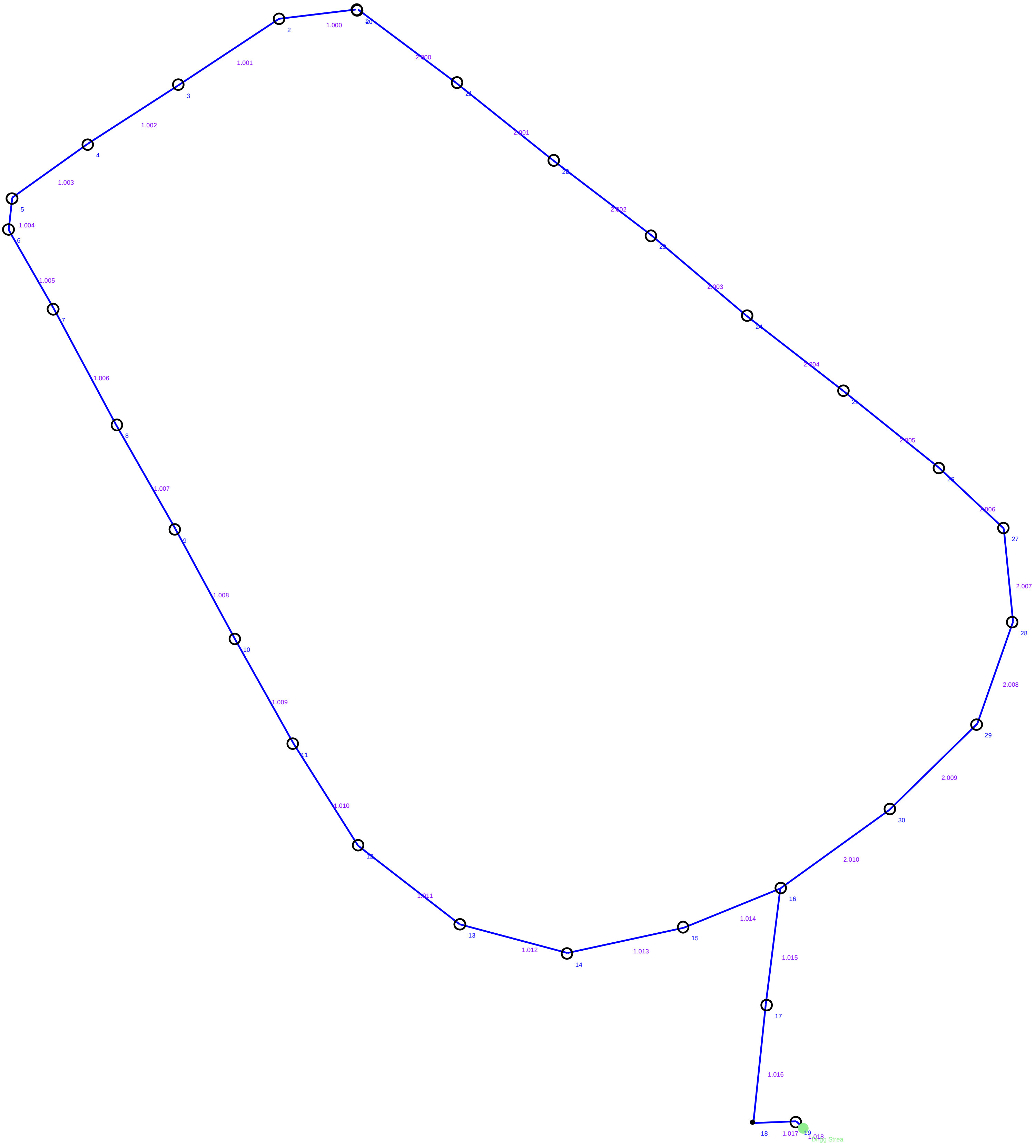
PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	360 Winter	200	0%					
1.001	360 Winter	200	0%					
1.002	360 Winter	200	0%					
1.003	360 Winter	200	0%					
1.004	360 Winter	200	0%					
1.005	360 Winter	200	0%					
1.006	360 Winter	200	0%					
1.007	360 Winter	200	0%					
1.008	360 Winter	200	0%					
1.009	360 Winter	200	0%					
1.010	360 Winter	200	0%					
1.011	360 Winter	200	0%					
1.012	360 Winter	200	0%					
1.013	360 Winter	200	0%					
1.014	360 Winter	200	0%					
2.000	15 Winter	200	0%					
2.001	15 Winter	200	0%					
2.002	15 Winter	200	0%					
2.003	30 Winter	200	0%					
2.004	30 Winter	200	0%					
2.005	30 Winter	200	0%					
2.006	30 Winter	200	0%					
2.007	30 Winter	200	0%					
2.008	30 Winter	200	0%					
2.009	30 Winter	200	0%					
2.010	30 Winter	200	0%					
1.015	120 Winter	200	0%					
1.016	120 Winter	200	0%					

200 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW.txt

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.017	480 Winter	200	0%	100/180 Winter				
1.018	960 Winter	200	0%					

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	20.120	-0.391	0.000	0.34	0.0	919.4	OK
1.001	2	19.773	-0.388	0.000	0.34	0.0	938.9	OK
1.002	3	19.219	-0.392	0.000	0.34	0.0	957.0	OK
1.003	4	18.695	-0.386	0.000	0.34	0.0	962.1	OK
1.004	5	18.242	-0.399	0.000	0.19	0.0	962.1	OK
1.005	6	18.198	-0.303	0.000	0.39	0.0	969.9	OK
1.006	7	18.116	-0.311	0.000	0.40	0.0	994.3	OK
1.007	8	18.014	-0.305	0.000	0.41	0.0	1021.0	OK
1.008	9	17.910	-0.312	0.000	0.42	0.0	1051.6	OK
1.009	10	17.795	-0.325	0.000	0.43	0.0	1081.9	OK
1.010	11	17.667	-0.025	0.000	0.95	0.0	1099.4	OK
1.011	12	17.211	-0.382	0.000	0.35	0.0	1117.7	OK
1.012	13	16.545	-0.246	0.000	0.54	0.0	1129.6	FLOOD RISK*
1.013	14	16.016	-0.475	0.000	0.24	0.0	1140.5	OK
1.014	15	14.368	-0.523	0.000	0.20	0.0	1140.5	OK
2.000	20	20.672	-0.427	0.000	0.08	0.0	58.2	OK
2.001	21	20.286	-0.313	0.000	0.21	0.0	161.2	OK
2.002	22	19.813	-0.226	0.000	0.36	0.0	268.9	FLOOD RISK*
2.003	23	19.338	-0.181	0.000	0.46	0.0	394.8	OK
2.004	24	18.659	-0.532	0.000	0.19	0.0	493.9	OK
2.005	25	18.210	-0.481	0.000	0.23	0.0	541.1	OK
2.006	26	17.773	-0.518	0.000	0.20	0.0	552.1	OK
2.007	27	17.213	-0.678	0.000	0.09	0.0	571.7	OK
2.008	28	14.848	-0.643	0.000	0.11	0.0	602.3	OK
2.009	29	13.157	-0.434	0.000	0.29	0.0	666.7	OK
2.010	30	12.824	-0.367	0.000	0.36	0.0	807.7	OK
1.015	16	12.266	-0.535	0.000	0.33	0.0	1439.5	OK
1.016	17	11.711	-0.790	0.000	0.15	0.0	1439.0	OK
1.017	18	10.908	0.350	0.000	1.31	0.0	1083.0	SURCHARGED*
1.018	19	10.382	0.000	0.000	1.33	0.0	1069.0	SURCHARGED*

Annex L3-3: Geometry

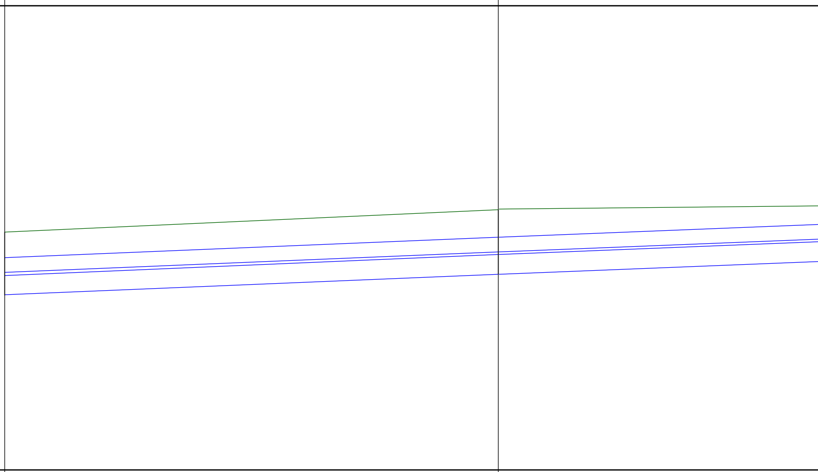

1
10
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
1.000
1.001
1.002
1.003
1.004
1.005
1.006
1.007
1.008
1.009
1.010
1.011
1.012
1.013
1.014
1.015
1.016
1.017
1.018
2.000
2.001
2.002
2.003
2.004
2.005
2.006
2.007
2.008
2.009
2.010

AECOM Ltd		Page 1
Aecom House 63-77 Victoria Street St Albans Herts AL1 3ER	LLWR Proposed Perimeter Ditch Outfall Results	
Date 19 March 2013 File 1M HIGHER SW WITH PIPE	Designed by R J Marshall Checked by	
XP Solutions	Network 2015.1	

Hor Scale 1500

Ver Scale 200

Datum (m)14.000

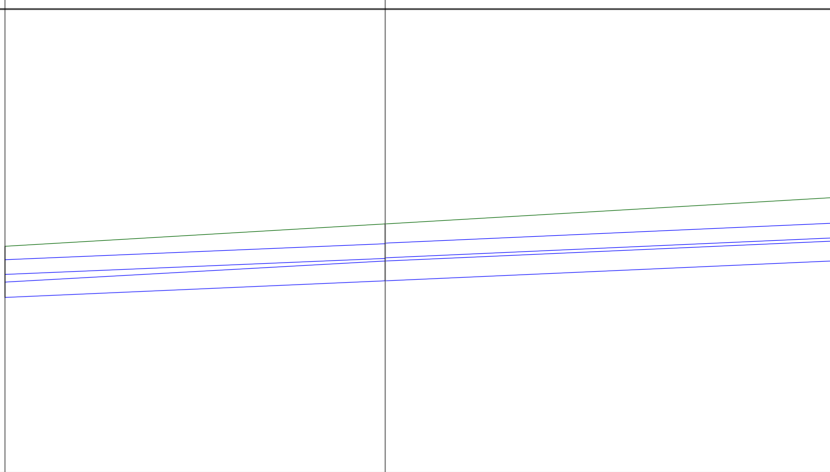


MH Name	3		2		1
PN		1.001		1.000	
Dia (mm)		35		35	
Slope (1:X)		178.4		182.2	
Cover Level (m)	20.300		20.900		21.000
Invert Level (m)	18.620		19.170 19.170		19.520
Length (m)		98.096		63.777	

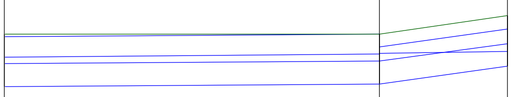
Hor Scale 1500

Ver Scale 200

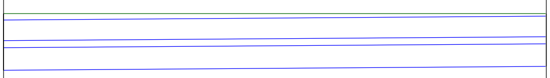
Datum (m)13.000



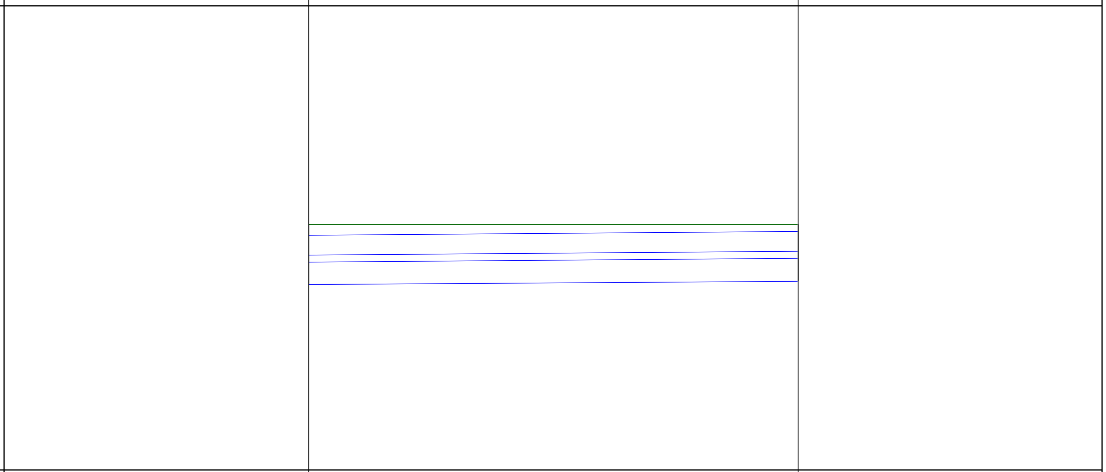
MH Name	5		4		3
PN		1.003		1.002	
Dia (mm)		35		35	
Slope (1:X)		172.0		167.1	
Cover Level (m)	19.000		19.600		20.300
Invert Level (m)	17.650		18.090 18.090		18.620
Length (m)		75.674		88.581	

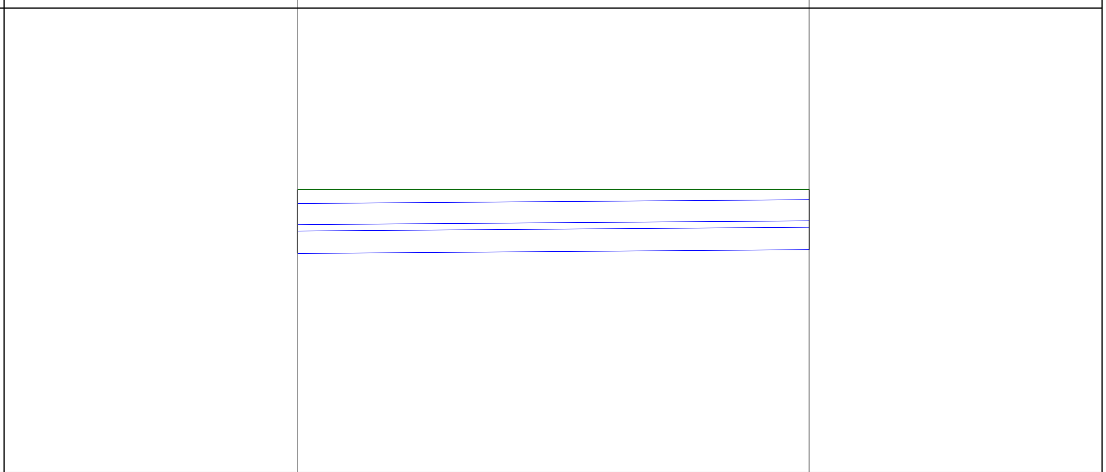


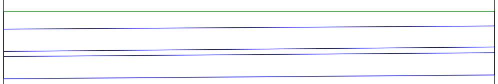
MH Name	7		6		5
Hor Scale 1500 Ver Scale 200 Datum (m)12.000					
PN		1.005		1.004	
Dia (mm)		36		35	
Slope (1:X)		1006.1		54.1	
Cover Level (m)	18.500		18.500		19.000
Invert Level (m)	17.106		17.180 / 17.180		17.650
Length (m)		74.455		25.426	



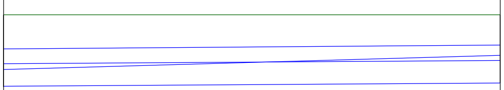
MH Name	8		7
Hor Scale 1500 Ver Scale 200 Datum (m)12.000			
PN		1.006	
Dia (mm)		36	
Slope (1:X)		997.0	
Cover Level (m)	18.500		18.500
Invert Level (m)	16.998		17.106
Length (m)		107.681	

MH Name	9		8
Hor Scale 1500 Ver Scale 200 Datum (m)12.000			
PN		1.007	
Dia (mm)		36	
Slope (1:X)		1002.8	
Cover Level (m)	18.500		18.500
Invert Level (m)	16.901		16.998
Length (m)		97.272	

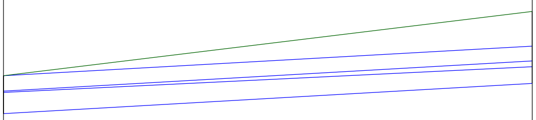
MH Name	10		9
Hor Scale 1500 Ver Scale 200 Datum (m)11.000			
PN		1.008	
Dia (mm)		36	
Slope (1:X)		997.0	
Cover Level (m)	18.500		18.500
Invert Level (m)	16.799		16.901
Length (m)		101.695	



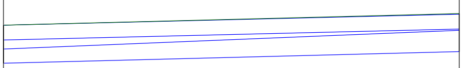
MH Name	11		10
Hor Scale 1500 Ver Scale 200 Datum (m)11.000			
PN		1.009	
Dia (mm)		36	
Slope (1:X)		995.8	
Cover Level (m)	18.500		18.500
Invert Level (m)	16.701		16.799
Length (m)		97.585	



MH Name	12		11
Hor Scale 1500 Ver Scale 200 Datum (m)11.000			
PN		1.010	
Dia (mm)		35	
Slope (1:X)		995.2	
Cover Level (m)	18.500		18.500
Invert Level (m)	16.602		16.701
Length (m)		98.522	



MH Name	13		12
Hor Scale 1500 Ver Scale 200 Datum (m)11.000			
PN		1.011	
Dia (mm)		35	
Slope (1:X)		131.0	
Cover Level (m)	16.800		18.500
Invert Level (m)	15.800		16.602
Length (m)		105.035	



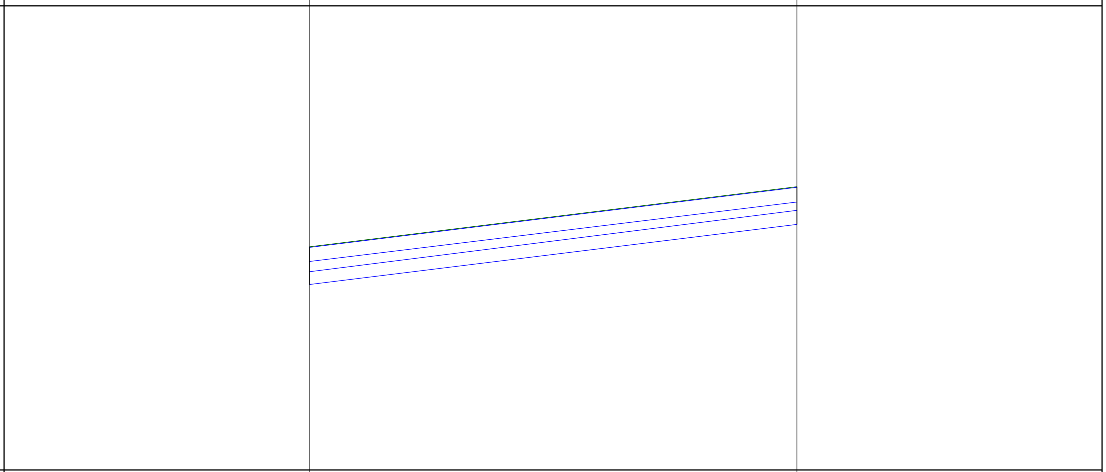
MH Name	14		13
Hor Scale 1500 Ver Scale 200 Datum (m)10.000			
PN		1.012	
Dia (mm)		35	
Slope (1:X)		301.7	
Cover Level (m)	16.500		16.800
Invert Level (m)	15.500		15.800
Length (m)		90.503	

AECOM Ltd		Page 6
Aecom House 63-77 Victoria Street St Albans Herts AL1 3ER	LLWR Proposed Perimeter Ditch Outfall Results	
Date 19 March 2013 File 1M HIGHER SW WITH PIPE	Designed by R J Marshall Checked by	
XP Solutions	Network 2015.1	

Hor Scale 1500

Ver Scale 200

Datum (m)9.000

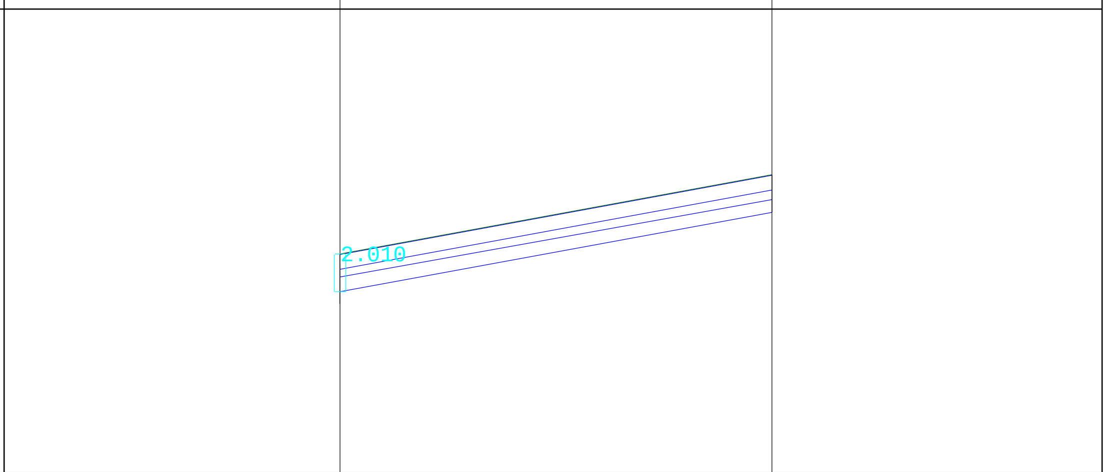


MH Name	15		14
PN		1.013	
Dia (mm)		35	
Slope (1:X)		60.6	
Cover Level (m)	14.900		16.500
Invert Level (m)	13.900		15.500
Length (m)		96.895	

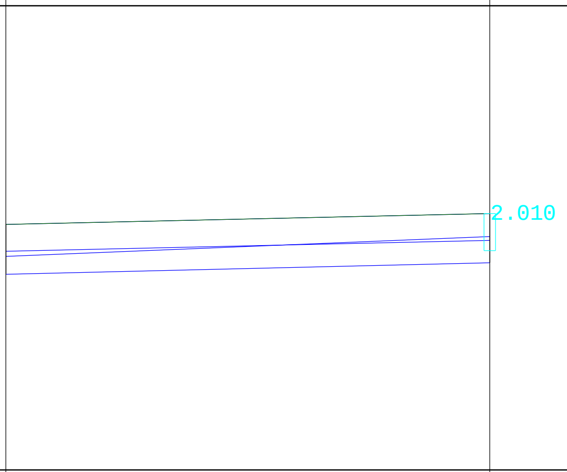
Hor Scale 1500

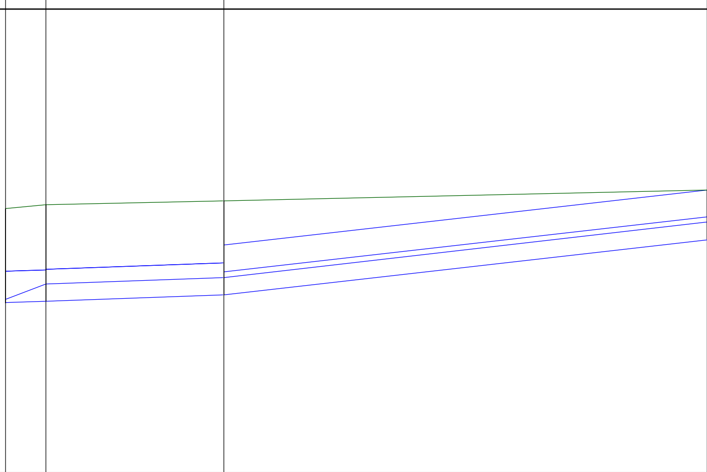
Ver Scale 200

Datum (m)7.000

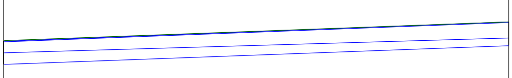


MH Name	16		15
PN		1.014	
Dia (mm)		35	
Slope (1:X)		40.9	
Cover Level (m)	12.800		14.900
Invert Level (m)	11.800		13.900
Length (m)		85.836	

MH Name	17		16
Hor Scale 1500 Ver Scale 200 Datum (m)6.000			
PN		1.015	
Dia (mm)		36	
Slope (1:X)		320.4	
Cover Level (m)	12.500		12.800
Invert Level (m)	11.180		11.480
Length (m)		96.114	

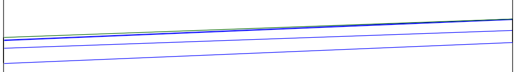
MH Name	Drigg Strea			18		17
Hor Scale 1500 Ver Scale 200 Datum (m)5.000						
PN			1.017		1.016	
Dia (mm)			840		36	
Slope (1:X)			200.1		65.7	
Cover Level (m)	12.000	12.100		12.200		12.500
Invert Level (m)		9.542	9.542	9.718	9.718	11.180
Length (m)			35.224		96.114	

MH Name	21		20
Hor Scale 1500 Ver Scale 200 Datum (m)14.000			

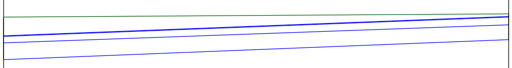


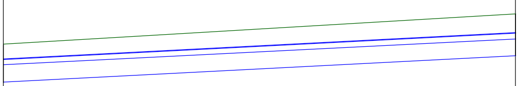
PN		2.000	
Dia (mm)		33	
Slope (1:X)		200.8	
Cover Level (m)	20.600		21.100
Invert Level (m)	19.980		20.480
Length (m)		100.402	

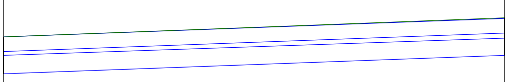
MH Name	22		21
Hor Scale 1500 Ver Scale 200 Datum (m)14.000			

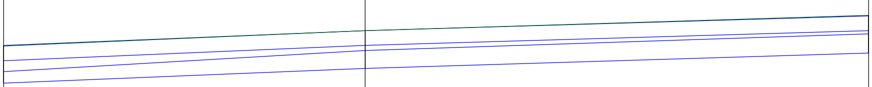


PN		2.001	
Dia (mm)		33	
Slope (1:X)		180.7	
Cover Level (m)	20.100		20.600
Invert Level (m)	19.420		19.980
Length (m)		101.174	

MH Name	23		22	
Hor Scale 1500 Ver Scale 200 Datum (m)13.000				
PN		2.002		
Dia (mm)		33		
Slope (1:X)		193.0		
Cover Level (m)	20.000		20.100	
Invert Level (m)		18.900	19.420	
Length (m)		100.340		

MH Name	24		23	
Hor Scale 1500 Ver Scale 200 Datum (m)13.000				
PN		2.003		
Dia (mm)		33		
Slope (1:X)		145.4		
Cover Level (m)	19.200		20.000	
Invert Level (m)		18.200	18.900	
Length (m)		101.796		

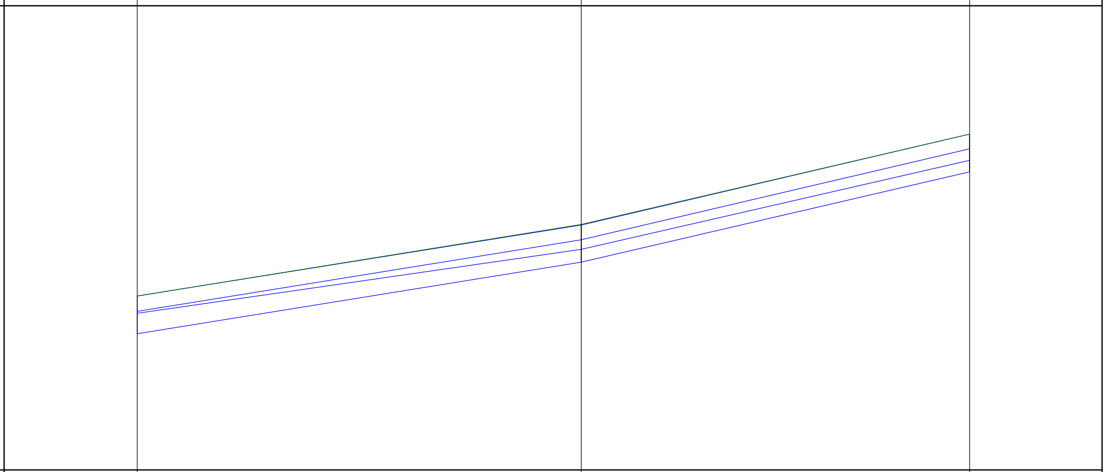
MH Name	25		24
Hor Scale 1500 Ver Scale 200 Datum (m)12.000			
PN		2.004	
Dia (mm)		35	
Slope (1:X)		198.9	
Cover Level (m)	18.700		19.200
Invert Level (m)	17.700		18.200
Length (m)		99.438	

MH Name	27		26		25
Hor Scale 1500 Ver Scale 200 Datum (m)12.000					
PN		2.006		2.005	
Dia (mm)		35		35	
Slope (1:X)		179.7		250.3	
Cover Level (m)	17.900		18.300		18.700
Invert Level (m)	16.900		17.300 / 17.300		17.700
Length (m)		71.872		100.108	

Hor Scale 1500

Ver Scale 200

Datum (m)9.000

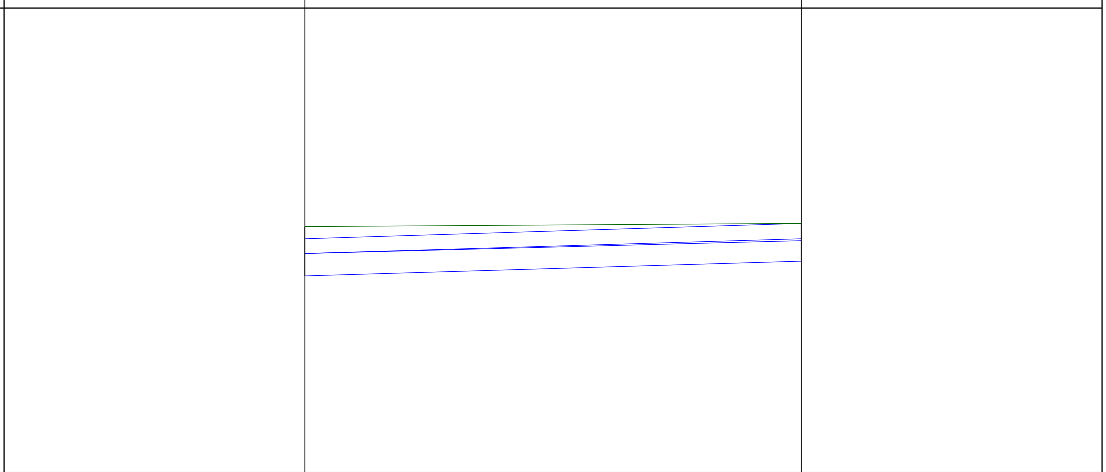


MH Name	29		28		27
PN		2.008		2.007	
Dia (mm)		35		35	
Slope (1:X)		46.5		32.1	
Cover Level (m)	13.600		15.500		17.900
Invert Level (m)	12.600		14.500 / 14.500		16.900
Length (m)		88.293		77.142	

Hor Scale 1500

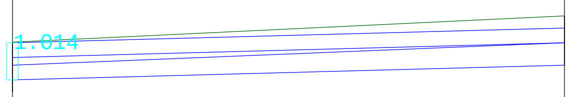
Ver Scale 200

Datum (m)7.000



MH Name	30		29
PN		2.009	
Dia (mm)		35	
Slope (1:X)		246.8	
Cover Level (m)	13.500		13.600
Invert Level (m)	12.200		12.600
Length (m)		98.721	

MH Name	16	30
Hor Scale 1500 Ver Scale 200 Datum (m)6.000		



PN	2.010	
Dia (mm)	35	
Slope (1:X)	274.2	
Cover Level (m)	12.800	13.500
Invert Level (m)	11.800	12.200
Length (m)	109.682	