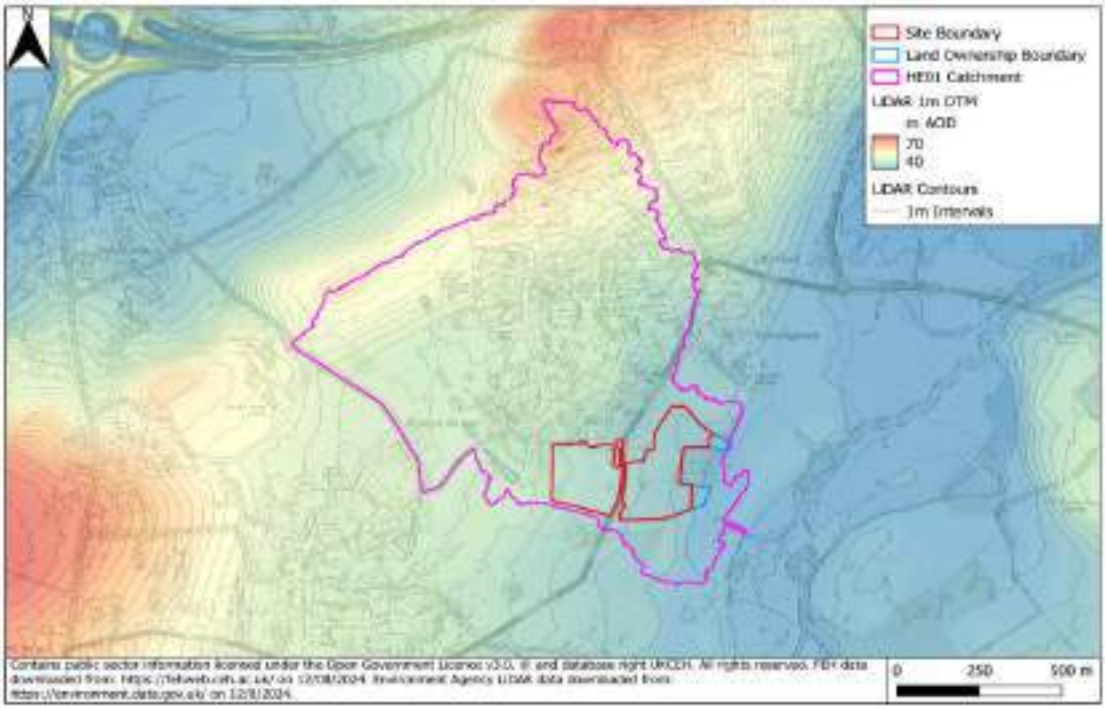
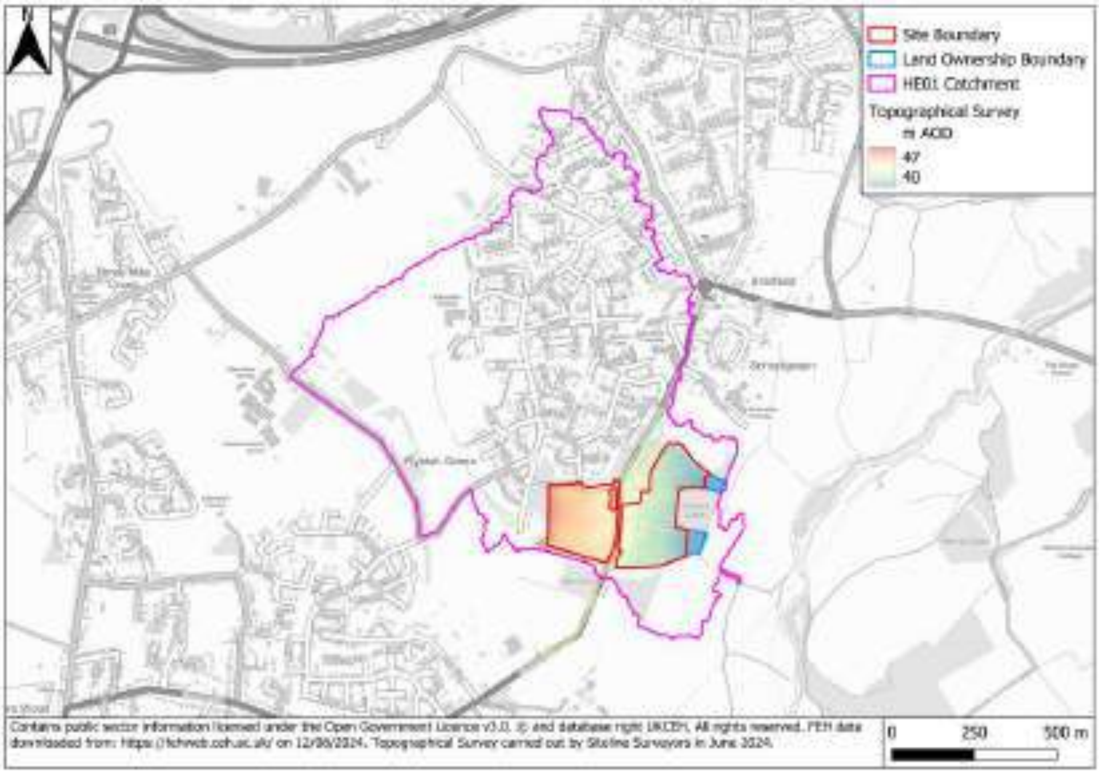
Figure 9 – EA LiDAR Coverage



Ground Model Data

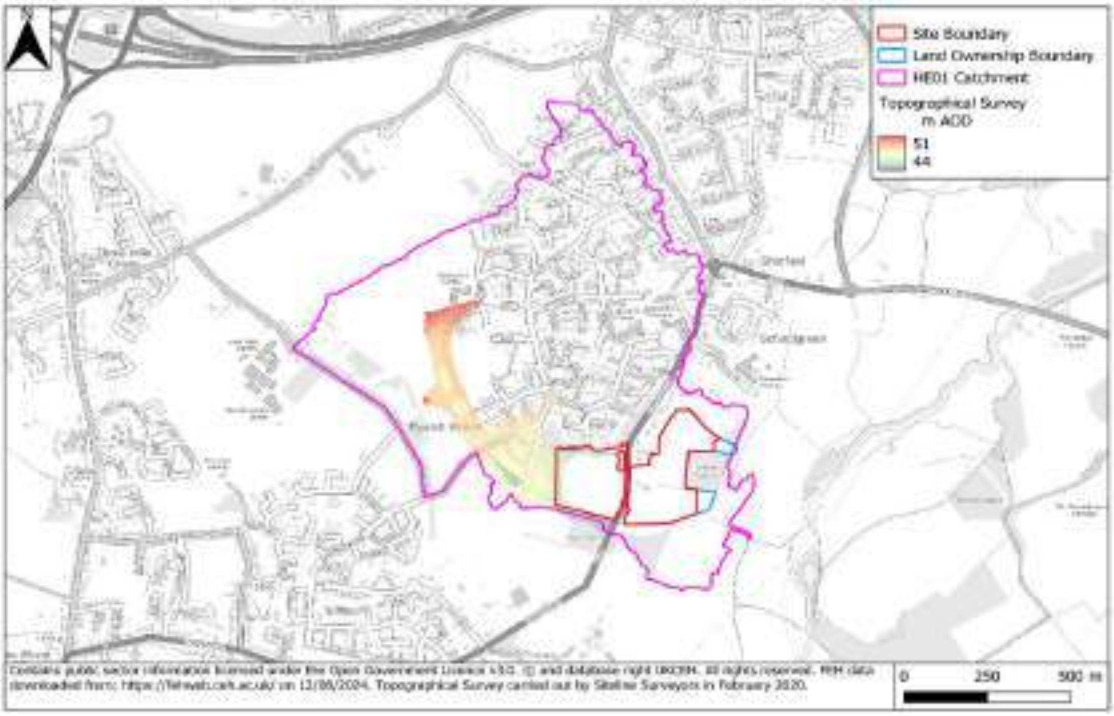
3.12. A topographic survey of the site was carried out by Siteline Geospatial surveyors in June 2024. The extent of the topographic survey is shown in **Figure 10**. A copy of the full topographic survey in appended in **Appendix 3**.

Figure 10 – Topographical Survey of the Site



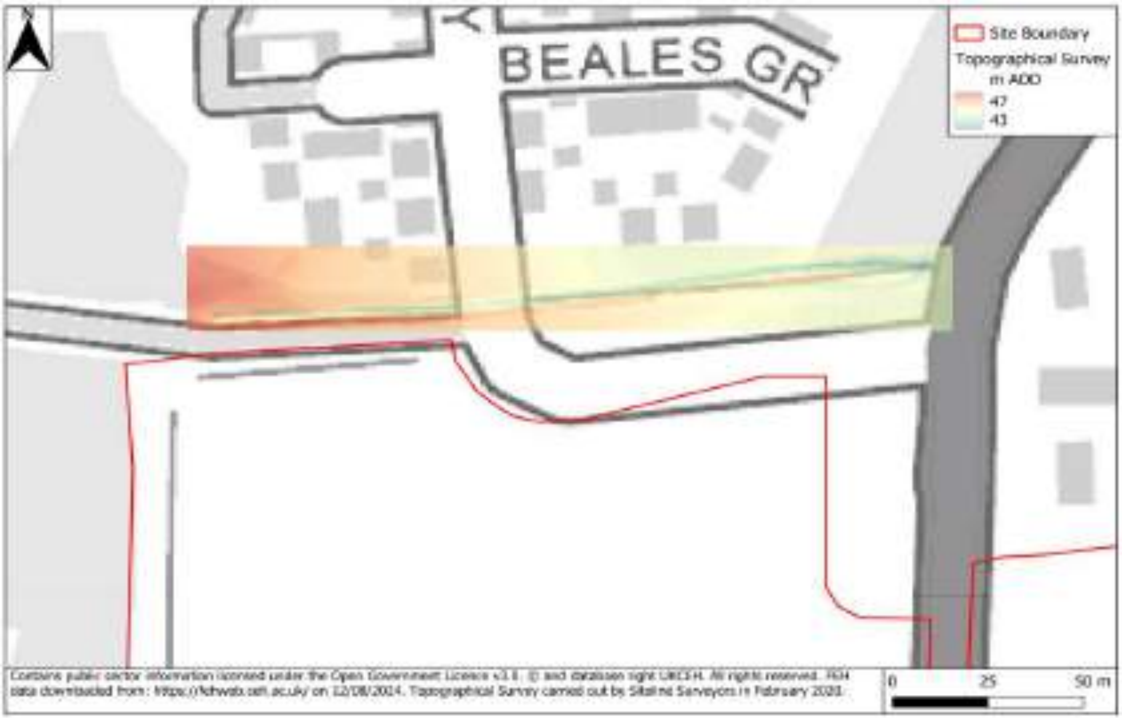
3.13. A topographical survey was carried of the adjacent site by Siteline Surveyors in February 2020. The extent of the topographic survey is shown in **Figure 11**. A copy of the full topographic survey in appended in **Appendix 3**.

Figure 11 – Topographical Survey of the Adjacent Site



3.14. A topographical survey which included the Appleton Way watercourse was carried out in May 2015. An extract of the topographical survey that was included in the model is shown in **Figure 12**.

Figure 12 – Topographical Survey of Appleton Way Watercourse

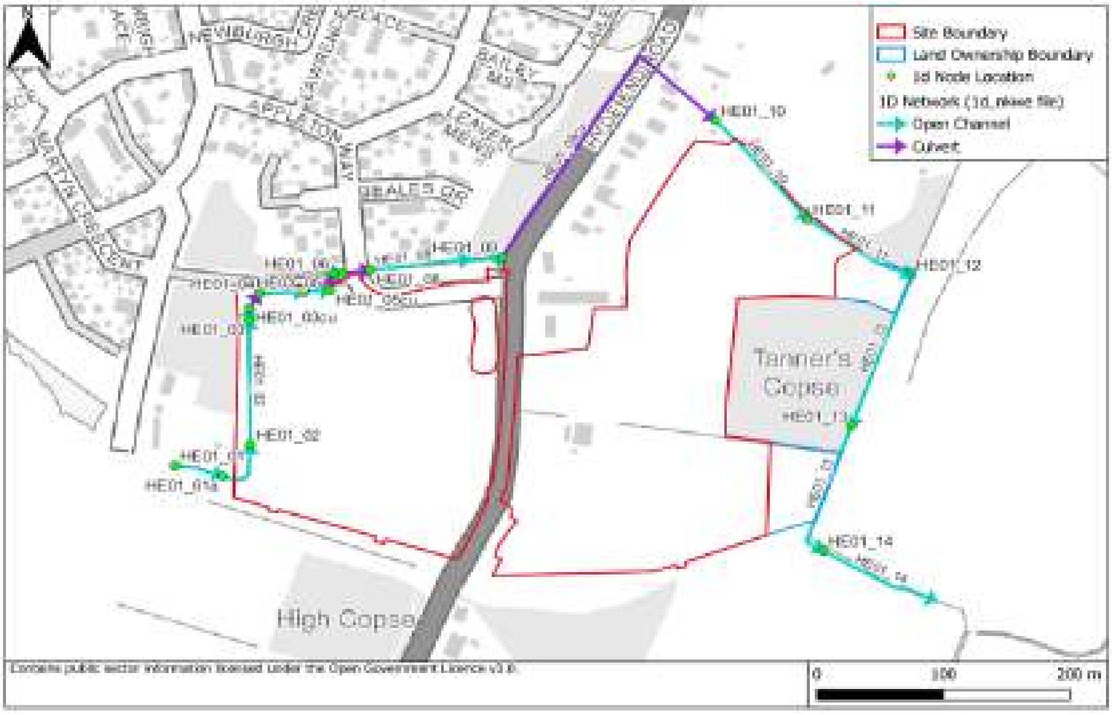


1D Model Domain

3.15. The channel sections in the 1D model domain were 'cut' from the topographical surveys and LiDAR data. There are 14 open channel sections and 4 culverts in the model.

3.16. **Figure 13** shows the location of the 1D channel sections.

Figure 13 – 1D Channel Section Location

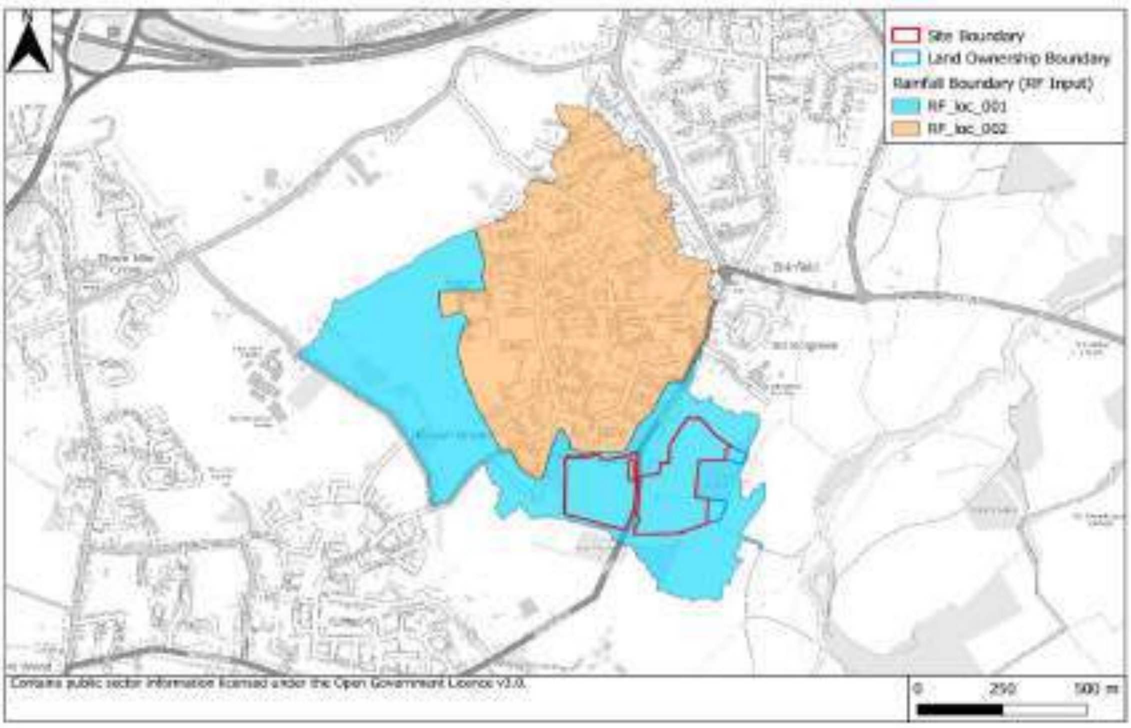


Inflow Boundaries

3.17. The net rainfall was added to the model using a 2d_RF boundary across the HE01 catchment. The RF represents the net rainfall.

3.18. **Figure 14** shows the extent of the rainfall input.

Figure 14 – Rainfall Input Location



3.19. The catchment was split into two rainfall polygons, RF_loc_001 and RF_loc_002. RF_loc_001 represents the rural part of the catchment where 100% of the rainfall becomes surface water runoff. RF_loc_002 represents the urban part of the catchment where 35% of the rainfall which lands within the area becomes surface water runoff. The remaining 65% is accounted for within the development's surface water drainage strategy.

3.20. The adjacent sites have already been developed and incorporate surface water drainage strategies which attenuate runoff and discharge at a controlled rate into the watercourses within the catchment. The development in the northeastern part of the catchment has 65% of the rainfall which lands on it accommodated by the surface water drainage strategy. The development to the west of the site discharges, at a restricted rate, into the western watercourse.

3.21. The flow rates into these watercourses are unknown. As a conservative approach the full pipe flow of the culverts outfalling into the watercourses has been considered.

3.22. **Figure 15** shows the location of these three inflow pipes. **Table 2** shows the calculated full pipe flow.

Figure 15 – Pipe Inflow Locations

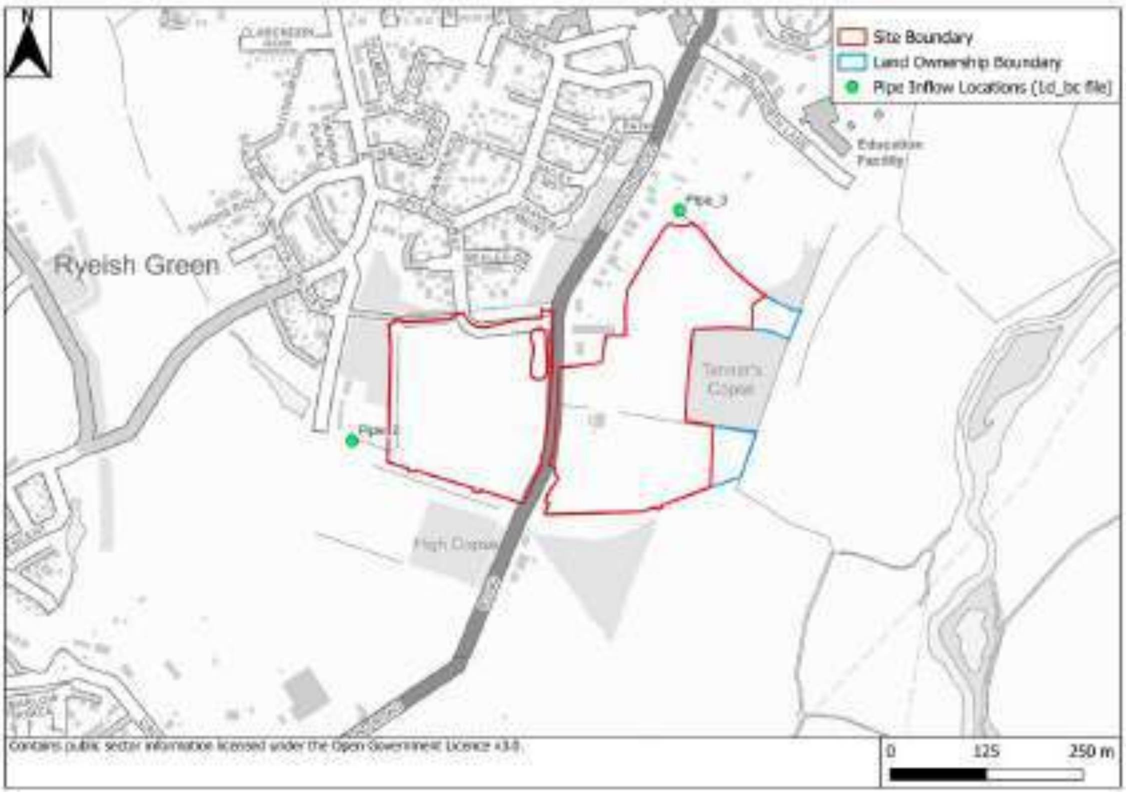


Table 2 – Pipe Inflow Flows

Pipe Name	Pipe Full Flow, m^3/s
Pipe_2	0.31
Pipe_3	0.19

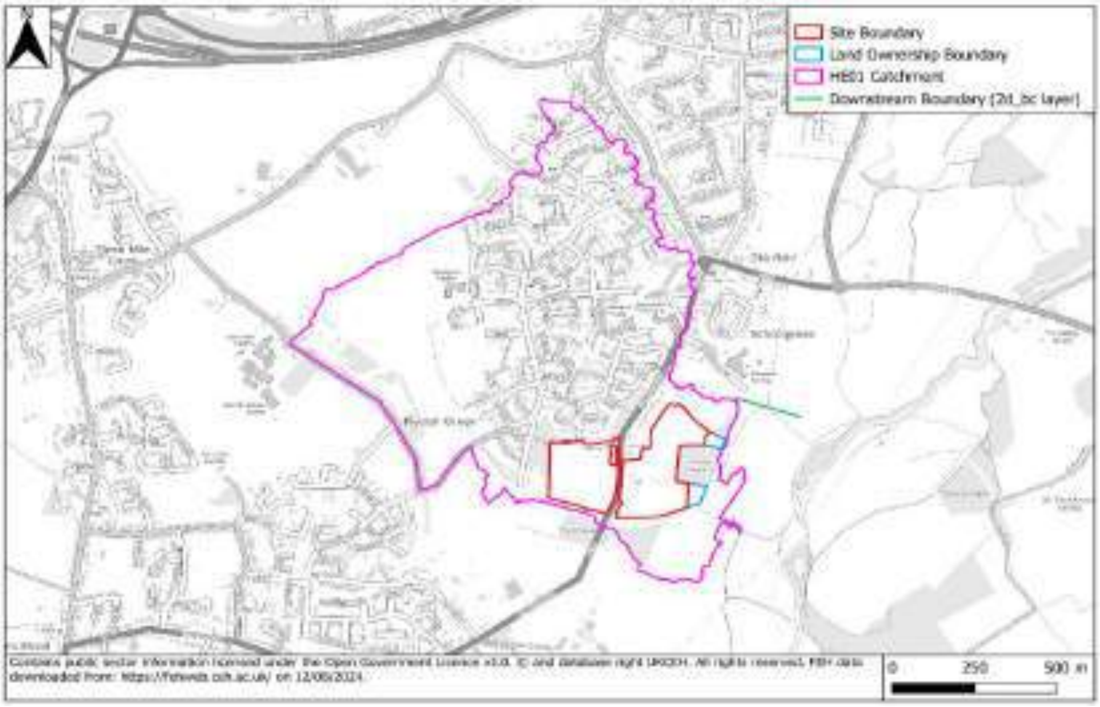
Downstream Boundary

3.23. The downstream boundary of the model has been set approximately 140m to the east of the site. A 2d_bc boundary was used to allow flow to exit the downstream boundary of the model domain and prevent any glass walling along the boundary.

3.24. A second downstream boundary was used in the northeastern corner of the model to allow flow to exit the model. The downstream part of the model is dominated by the River Loddon flooding. The downstream flood level is dictated by the River Loddon flood level.

3.25. **Figure 16** shows the location of the downstream boundary within the model.

Figure 16 – Downstream Boundary of the Model Domain



Roughness

3.26. The hydraulic roughness can impact the conveyance of flood within the floodplain.

3.27. Polygons were downloaded from eMapSite to inform the land use types. eMapSite uses OS mapping to classify the land use types.

3.28. Manning's 'n' roughness values were assigned to the land use types within the model domain using Chow 1959 industry standard guidance, satellite imagery of the site, photographs from a site walkover and professional judgement.

3.29. Roughness values were applied using 2d_mt files within the .tmf file. **Figure 17** shows the location of each material layers.

Figure 17 – Materials Layers

3.30. **Table 3** summarises the land use types, and roughness values selected.

Table 3 – Summary of Manning's 'n' Roughness Values

ID	Description	Manning's 'n' Roughness Value
1	General Surface/ Grass	0.06
2	Roads and Pavements	0.022
3	Buildings	1
4	Waterbodies	0.03
5	Natural Environment	0.10

3.31. A high Manning's 'n' value of 1 was used to represent the building locations within the model and direct flow around the buildings.

Topographical Changes

3.32. LiDAR and topographical survey data was used to inform the topography of the model, as discussed in paragraphs 3.10 to 3.13.

Western Basins

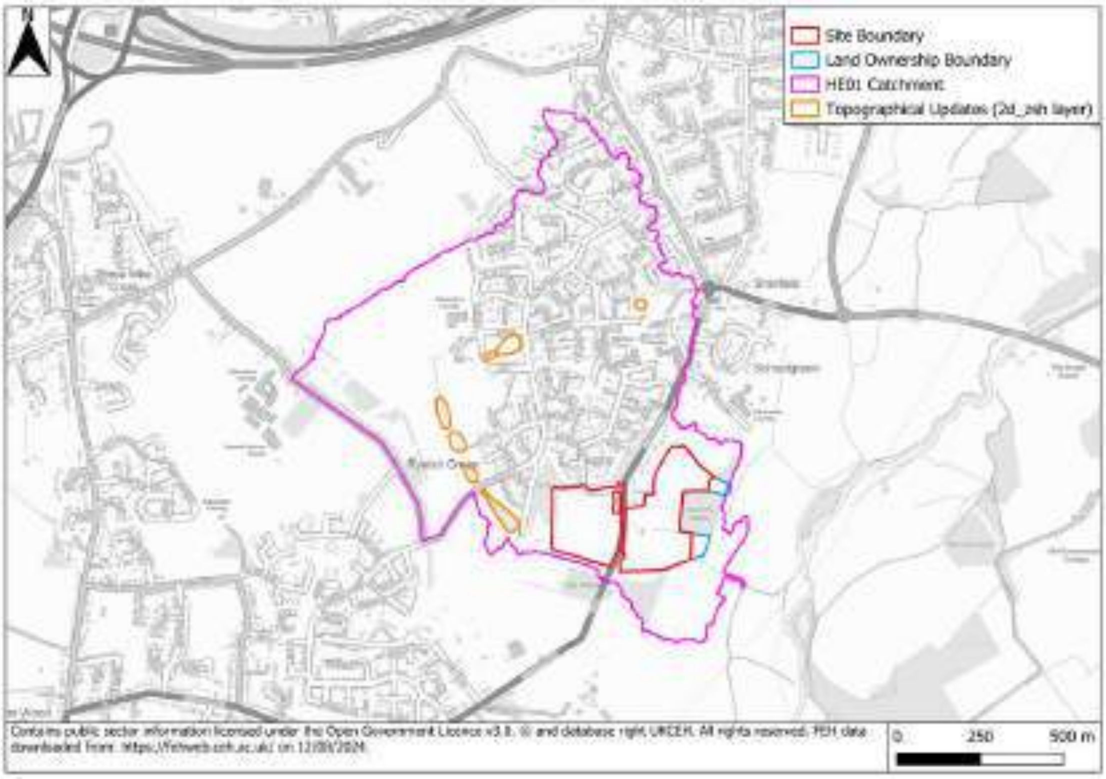
3.33. The western basins were removed from the topographical survey using a zsh polygon. As a conservative approach, it has been assumed that the drainage basins will be completely full in the event of a flood event. The western basins were smoothed over to prevent surface water from ponding within them.

3.34. **Figure 18** shows the location of these areas.

3.35. There were a couple of areas of inconsistent ground elevations within the LiDAR. These areas were reviewed using OS mapping and satellite imagery. Where necessary, these areas were smoothed using a zsh polygon.

3.36. **Figure 18** shows the location of these areas.

Figure 18 – Topographical Updates

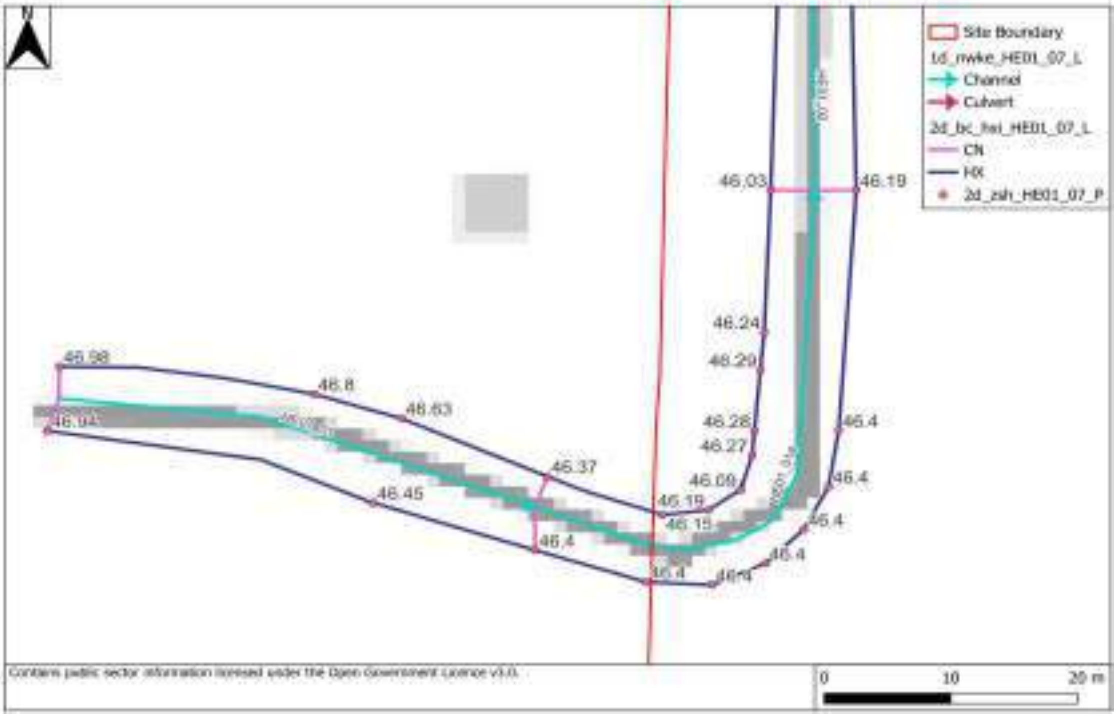


Western Ditch

3.37. Bank levels along the western corner of the ditch were updated to 46.4m AOD, tying in with the upstream bank levels. The bed level of the ditch in this corner was raised during construction causing water to spill out. Works will be undertaken to correct the bed levels in this ditch to prevent any flooding.

3.38. **Figure 19** shows the location and bank levels along this reach.

Figure 19 – Updated Bank Levels



Structures in the 2D Domain

3.39. No structures have been included within the 2D domain.

1D/ 2D Domain Links

3.40. The 1D in-channel and 2D floodplain components of the model are connected along the tops of the banks using HX lines.

1D/ 2D Bank Level Representation

3.41. Topographical survey data was used to inform the bank level representation.

Model Layers

3.42. **Table 4** summarises the layers used within the model domain.

Table 4 – 2D Model Layers

Layer	Purpose
1d_nwke_HE01	Defines the location of the 1d channel and structures.
1d_xs_HE01	Defines the 1d channel geometry.
1d_bc_HE01_inflows	Defines the 1d model inflows.
1d_WLL_HE01	WLL interpolate the 1d water levels across the 1d domain.
2d_code_HE01	Defines the 2d model extent.
2d_code_river_HE01	Defines the 1d model extent.
2d_bc_HE01	Defines the floodplain boundary.
2d_bc_hxi_HE01	Defines the link between the 1d and 2d model domains.
2d_rf_HE01	Applies a rainfall hyetograph to the defined polygon.
2d_zsh_HE01_P	Points defining levels along the zsh line which informs the bank levels.
2d_zsh_HE01_L	Line informing the bank location. The levels are taking from the zsh points layer.
2d_zsh_HE01_R	Polygon to interpolate ground levels.
2d_loc_HE01	Defines the model orientation.
2d_mat_HE01_buildings	Defines the 2d roughness area for buildings.
2d_mat_HE01_general_surface	Defines the 2d roughness area for the general surface (grass).
2d_mat_HE01_natural environment	Defines the 2d roughness area for the natural environment (woodlands).
2d_mat_HE01_roads	Defines the 2d roughness area for roads and paths.
2d_mat_HE01_waterbody	Defines the 2d roughness area for waterbodies.

Model Runs

3.43. The model was run for 15 hours with a fixed 1D timestep of 0.2 seconds and a fixed 2D timestep of 0.4 seconds.

3.44. The model was run for the following return periods:

- 1 in 30 annual probability;
- 1 in 100 annual probability;
- 1 in 1,000 annual probability; and
- 1 in 100 annual probability +40% climate change allowance.

3.45. The site is located within the Loddon and Tributaries Management Catchment. The relevant climate change allowance is the Upper End allowance which is +40% for this management catchment.

4.0 Sensitivity Testing

4.1. Sensitivity testing has been undertaken to assess the impact of uncertainty within the model and assumptions made.

Manning's 'n' Roughness

4.2. A 20% increase and decrease in the Manning's 'n' roughness estimations was modelled.

4.3. **Figure 20** and **Figure 21** shows the difference in the maximum flood extents for a ±20% increase and decrease in the Manning's 'n' roughness values.

Figure 20 – 1 in 100 Annual Probability Manning's Roughness Sensitivity 20% Increase

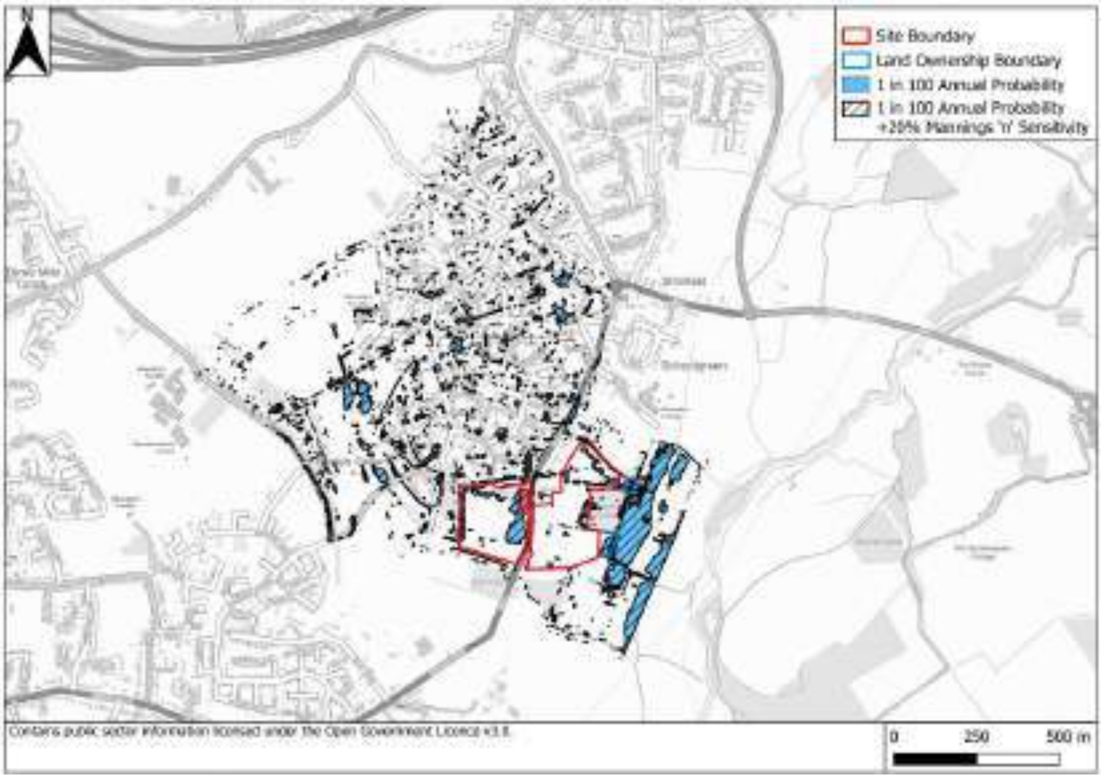
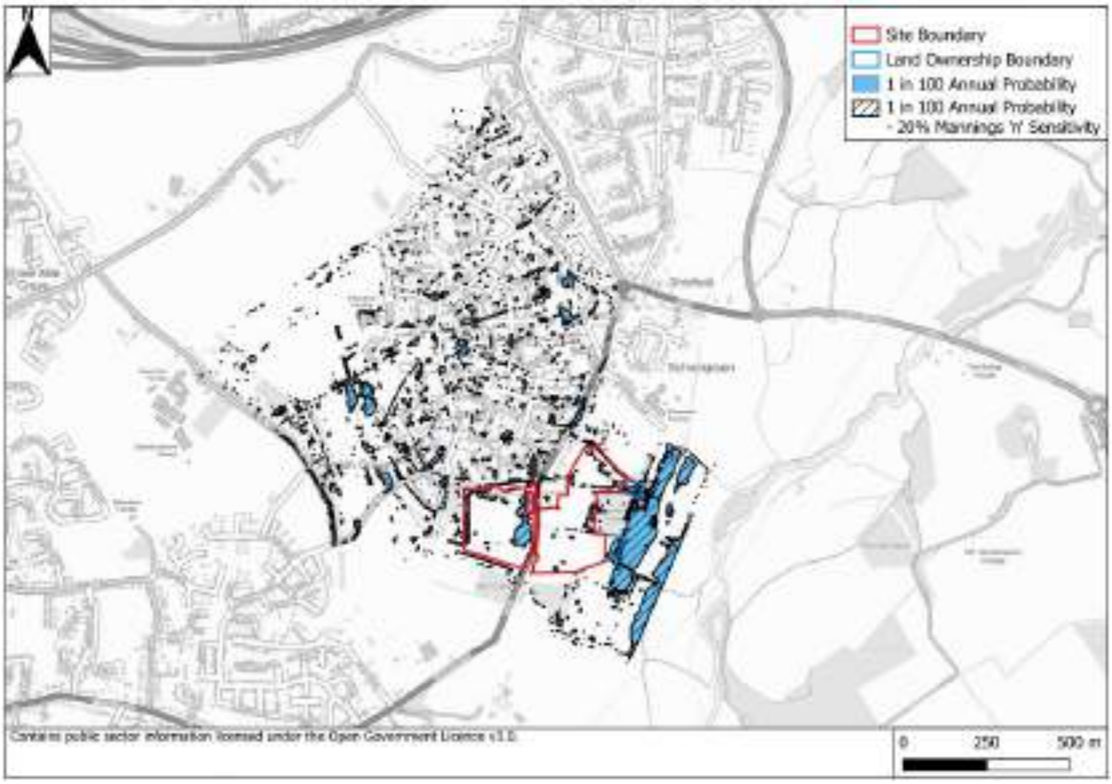


Figure 21 – 1 in 100 Annual Probability Manning's Roughness Sensitivity 20% Decrease



4.4. **Figure 20** shows that there is a slight increase in the modelled flood extents for the scenario with a 20% increase in the Manning's 'n' roughness. This is as expected. However, the model is deemed to be insensitive to a 20% increase in the Manning's 'n' roughness values.

4.5. **Figure 21** shows that there is a slight decrease in the modelled flood extents for the scenario with a 20% decrease in the Manning's 'n' roughness. This is as expected. However, the model is deemed to be insensitive to a 20% decrease in the Manning's 'n' roughness values.

Rainfall

4.6. A 20% increase and decrease in rainfall was applied to the model.

4.7. **Figures 22** and **23** shows the difference in the maximum flood extents for a ±20% increase and decrease in the Manning's 'n' roughness values.

Figure 22 – 1 in 100 Annual Probability 20% Increase in Rainfall

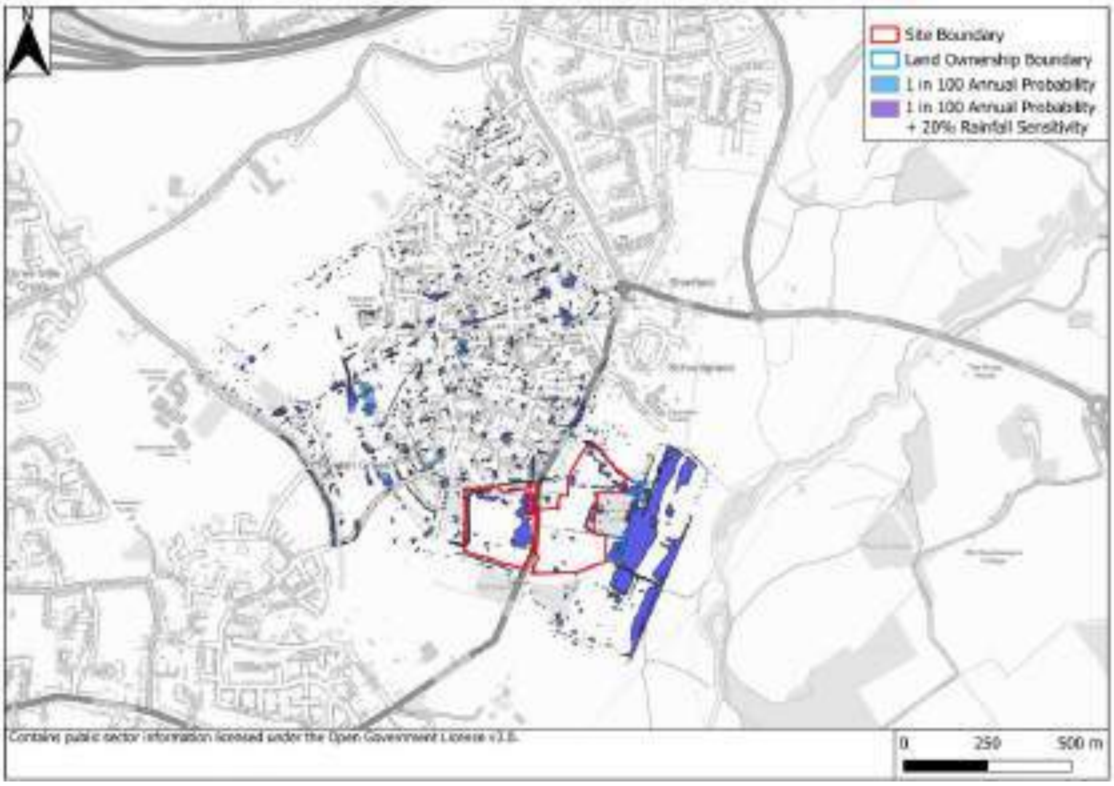
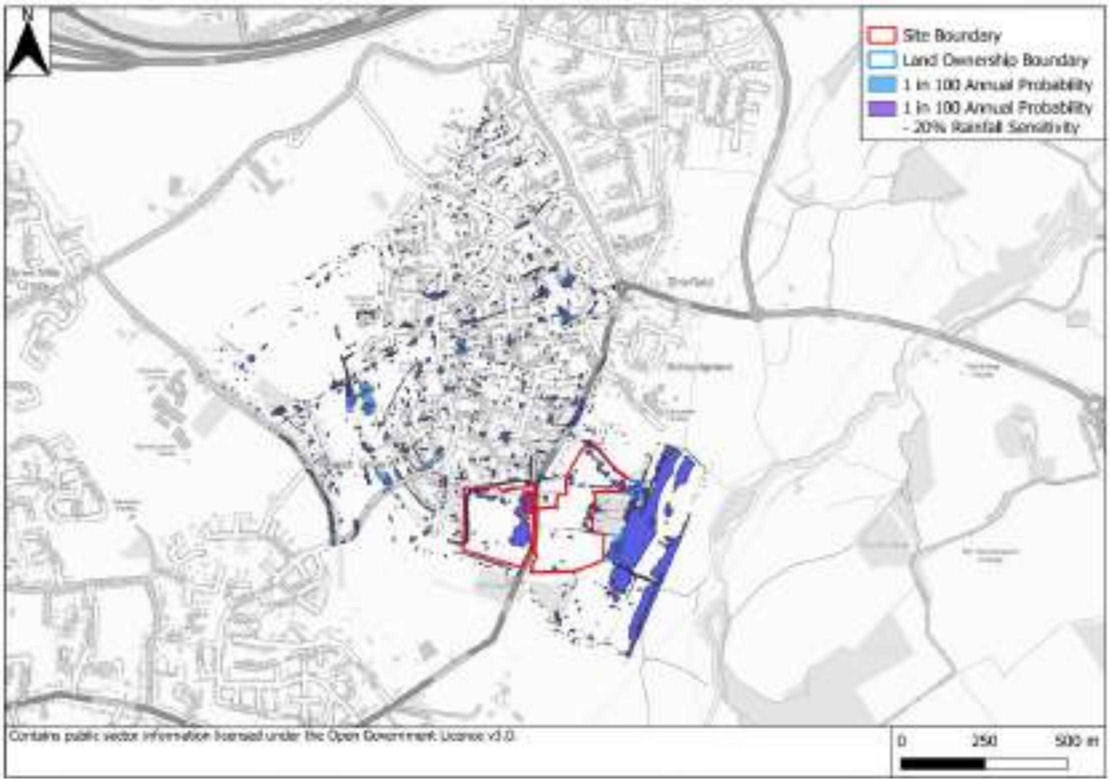


Figure 23 – 1 in 100 Annual Probability 20% Decrease in Rainfall



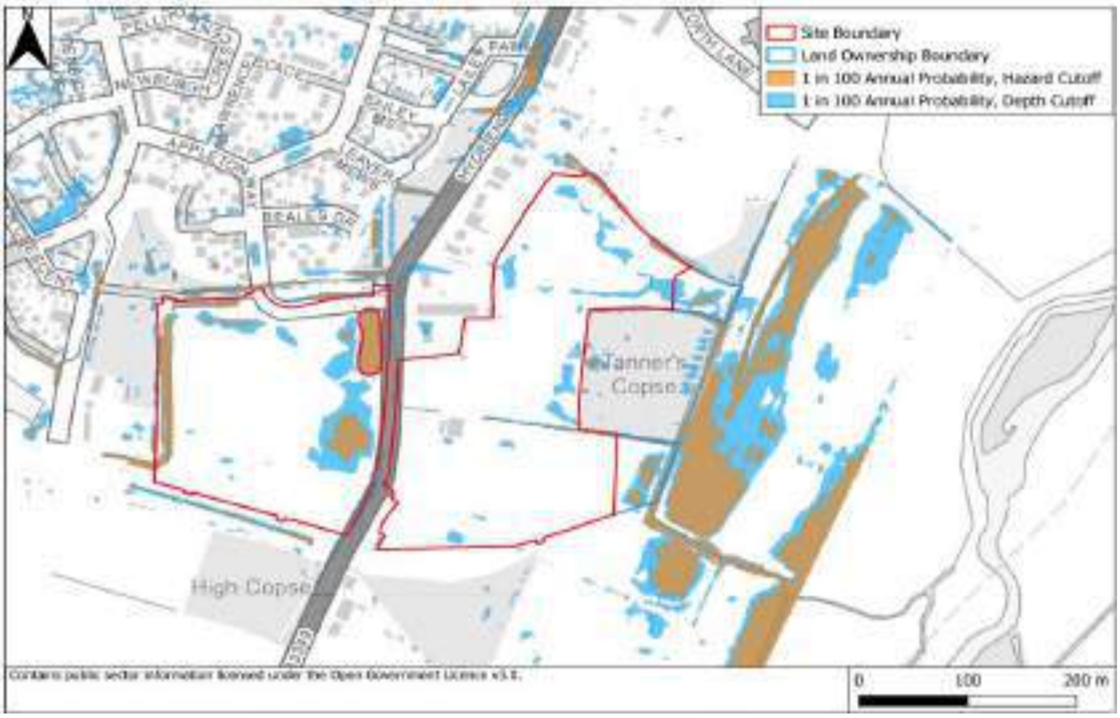
4.8. **Figure 22** shows that there is a slight increase in the modelled flood extents with a 20% increase in rainfall. This is as expected. However, the model is not deemed to be highly sensitive to flow.

4.9. **Figure 23** shows that there is a slight decrease in the modelled flood extents with a 20% decrease in rainfall. This is as expected. However, the model is not deemed to be highly sensitive to flow.

Results Filtering

4.10. **Figure 24** shows the 1 in 100 annual probability modelled extents using a 0.05m cutoff depth, and a 0.575 hazard rating cutoff.

Figure 24 – 1 in 100 Annual Probability Comparison Between Depth and Hazard Cutoffs



4.11. The filtering of results was carried out due to the nature of direct rainfall models. The entire 2D model domain is shown to be wet in the raw model results (as rain falls across the whole model domain). The raw model results are filtered which removes all cells with flood depths below a certain depth to show areas of flooding and remove areas that are wet due to the direct rainfall modelling method. In direct rainfall modelling, the threshold depth is generally accepted as 0.05m. This approach leads to some isolated areas of ponding.

5.0 Model Results

Flood Extents

Overview

5.1. The model was run and the results were extracted for the following events:

- 1 in 30 annual probability;
- 1 in 100 annual probability;
- 1 in 1,000 annual probability; and
- 1 in 100 annual probability plus 40% climate change allowance.

Summary of the Model Outputs

5.2. The model is a direct rainfall model. Due to the nature of direct rainfall models, the entire 2D model domain is shown to be wet in the raw model results (as rain falls across the whole model domain). The raw model results are filtered which removes all cells with flood depths below a certain depth to show areas of flooding and remove areas that are wet due to the direct rainfall modelling method. In direct rainfall modelling, the threshold depth is generally accepted as 0.05m. This approach leads to some isolated areas of ponding.

Flood Extents and Depths

5.3. The maximum modelled flood extents for all modelled return periods are included in **Figure 25** and **Figure 26**.

5.4. The EA raw model results are filtered using the hazard rating.

5.5. The hazard rating is defined in the TUFLOW manual as:

$$\text{Hazard} = \text{Depth}\,(\text{Velocity} + 0.5) + \text{Debris Factor}$$

5.6. The EA use a hazard rating of 0.575 as the cutoff for mapping purposes (not the depth of 0.05m which is generally applied in direct rainfall modelling) as defined in the 'What is the Risk of Flooding from Surface Water' map guidance (dated April 2019). Therefore, to allow a direct comparison, **Figure 25** to **Figure 26** show the Abley Letchford results filtered using a hazard rating of 0.575.

Figure 25 – Abley Letchford Baseline Flood Extents

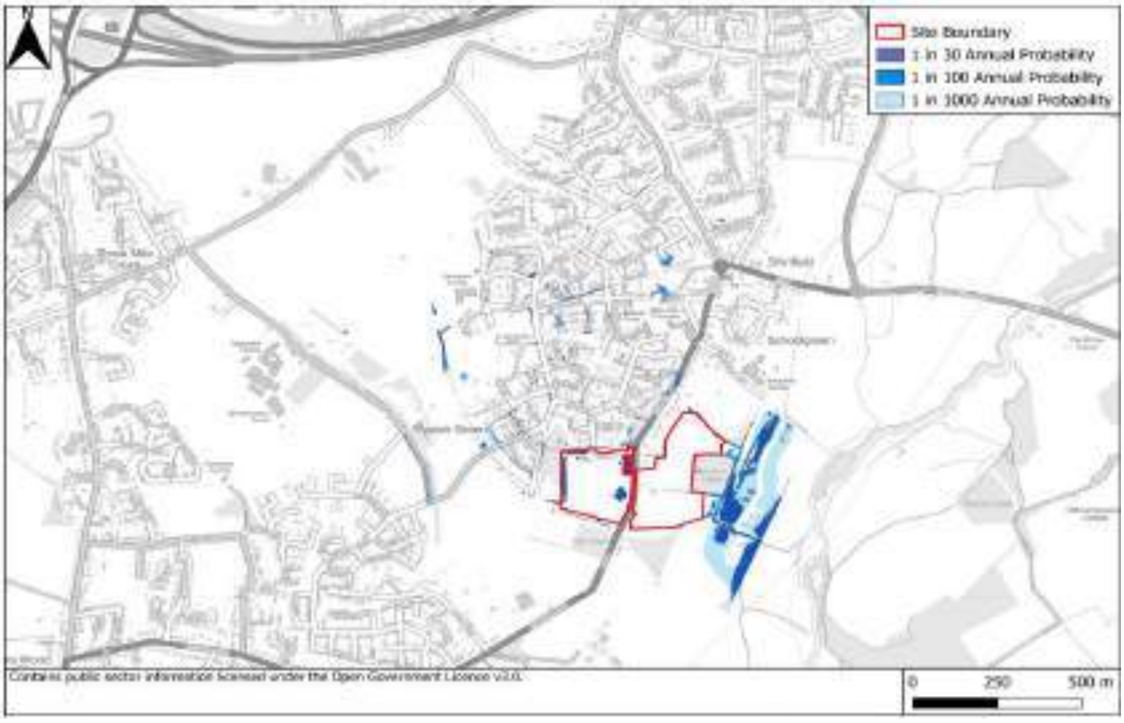
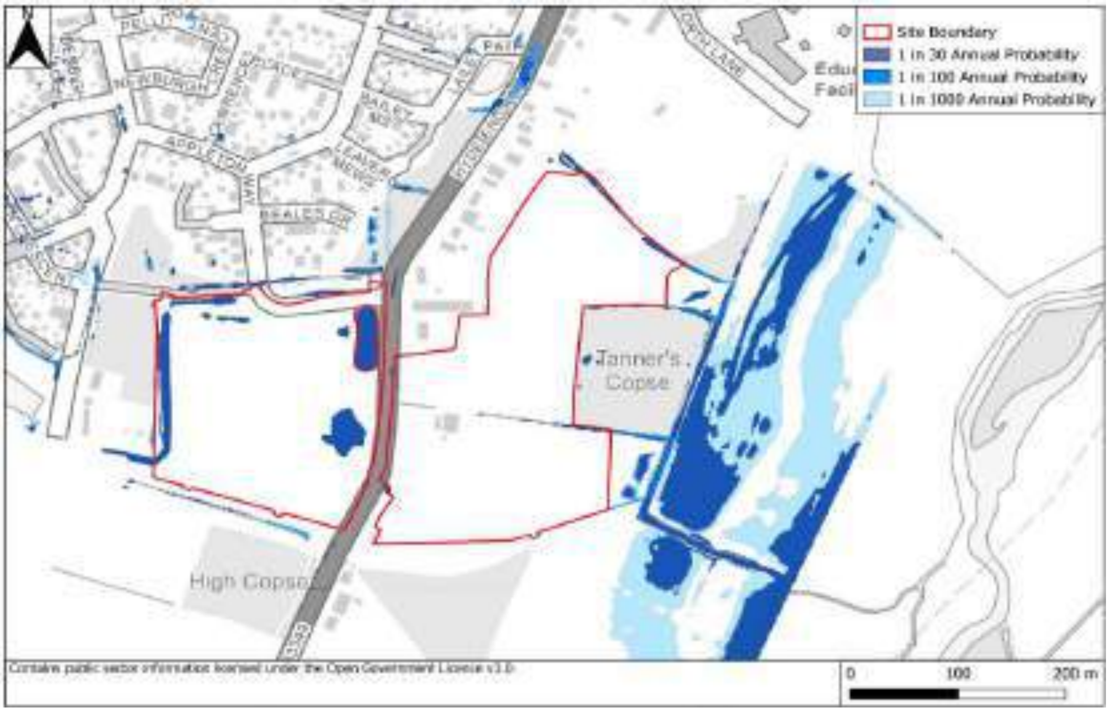


Figure 26 – Abley Letchford Baseline Flood Extents, Site



5.7. The model results show that the surface water flow route shown on the EA and NaFRA Risk of Flooding from Surface Water mapping along the northern boundary of the site is not representative of actual site conditions. This is likely due to the surface water drainage system in place in the adjacent development and the impact of including the associated watercourses in detail.

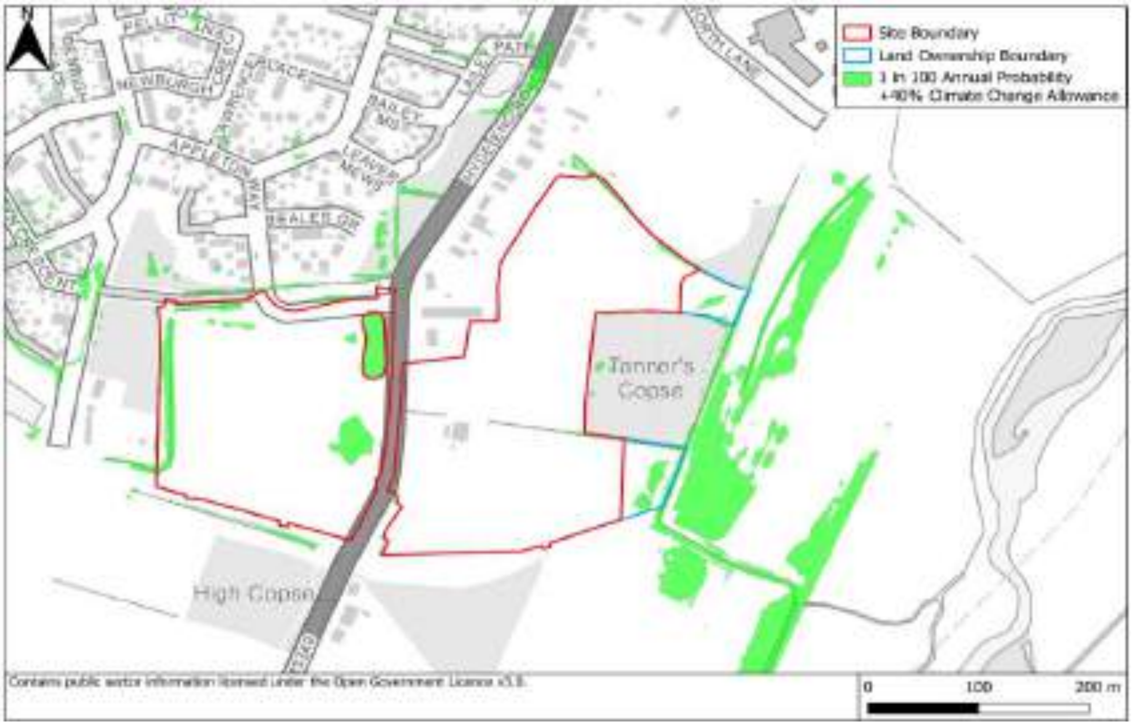
5.8. There is a more significant area of flooding in the eastern part of the western parcel. This is associated with a low point within the site, and a pond. Surface water flows unimpeded across the site in an easterly direction to this area. However, the footpath and carriageway at Hyde End Road are higher than the site and therefore prevent overland flow to the east away from the western parcel.

5.9. A review of the topographical survey of the central watercourse indicates that it is poorly picked up in this location, likely due to the heavy vegetation.

5.10. The River Loddon dominates the downstream conditions of the model. The model uses the River Loddon levels are the downstream boundary. As expected, the flood extents downstream of the site closely match the River Loddon modelled flood extent.

5.11. **Figure 27** shows the modelled flood extents for the 1 in 100 annual probability +40% climate change allowance scenario.

Figure 27 – Abley Letchford Climate Change Flood Extents



5.12. The 1 in 100 annual probability +40% climate change allowance scenario shows a similar pattern of flooding to the baseline model scenarios.

Message Layers

5.13. No negative depth layers are present for all model runs. The model is therefore considered to be healthy and stable.

5.14. Model warning and check files were reviewed. All messaged were checked and are as expected.

1D Model Run Performance

5.15. The 1D and 2D mass balance errors for all of the modelled events are summarised in **Table 5**.

Table 5 – 1D and 2D Mass Balance Error Summary

Return Period	1D Mass Balance
1 in 30 Annual Probability	-0.5%
1 in 100 Annual Probability	-0.5%
1 in 1000 Annual Probability	-0.5%

5.16. The 1D mass balance is within the acceptable range of ±1%. It was noted that after the first hour of the model simulation, the 1D mass balance decreased to within ±0.1%.

5.17. Warnings and checks prior and during the simulation are saved within the TUFLOW '.tlf'. These messages were reviewed for each model run. The locations of the model warning and check files were reviewed, and they were considered to be insignificant.

TUFLOW Model Run Performance

5.18. The model is set up to run for the full range of events required. **Table 6** provides a summary of the 2D domain performance parameters.

Table 6 – Model Run Parameters

Model Parameter	Value
Start time (hours)	0
End time (hours)	15
Model run time (hours)	13
Volume error	~9%
Mass balance error	~9%

5.19. **Table 6** shows that the mass error for the 1 in 100 annual probability for the 2D domain. This is above the ±2% error which is generally considered to be the acceptable limit. The reason for the higher mass and volume errors was investigated and is attributed to the high downstream boundary, set at the River Loddon peak level. A higher mass and volume error would be expected in this instance as water backs up at the downstream boundary.

5.20. All of the modelled simulations were run for the full 15 hours. The model runs were run beyond the peak of the event. Therefore, the maximum flood extents from the model are representative of the peaks for each modelled scenario.

Limitations and Assumptions

5.21. Key limitations and assumptions of the study are listed below:

- The FEH catchment descriptors are representative of the catchment.
- The LiDAR data is representative of the elevations across the catchment (for this study a sense check was undertaken but not a detailed review).
- The topographical survey of the elevations across the site are representative (for this study a sense check was undertaken but not a detailed review).
- The materials data is representative of the roughness of the catchment (for this study a sense check was undertaken but not a detailed review).
- A 2m grid size was used to represent the floodplain. This grid size is considered to be appropriate for the rural location and proposed development. The grid size provides a reasonable balance between the model resolution and the model run time.
- As with all hydraulic modelling, there remains some residual uncertainty within the model results. However, we have tried to mitigate this through the sensitivity testing.

6.0 Conclusions

6.1. This modelling report has been prepared by Abley Letchford, on behalf of Bloor Homes (Southern) and the University of Reading to refine the surface water extents for the land to the east and west of Hyde End Road in Shinfield, Berkshire.

6.2. The model was run for the following return periods: 1 in 30, 1 in 100, and 1 in 1000 annual probability. The maximum flood levels and extents were extracted for all of the modelled return periods. The results are presented in **Appendix 3**.

6.3. The site is located within the Loddon and Tributaries Management Catchment. The latest (July 2021) climate change allowances for the catchment is +40% for the Upper End allowance which is to be used to inform FRA studies. The maximum flood levels and extents were extracted for all the modelled climate change scenario. The results are presented in **Appendix 3**.

6.4. A hydrological assessment was undertaken to provide net rainfall inflows for the site. The FEH catchment descriptors were reviewed and refined using a desk-based assessment. ReFH2 software was used for the hydrological assessment.

6.5. Sensitivity testing was carried out to determine the impact of uncertainty and assumptions made within the modelling. Sensitivity tests were carried out for Manning's 'n' roughness values, and flow. Sensitivity results showed that the model was not sensitive to a ±20% increase or decrease in the Manning's 'n' roughness values. The sensitivity results showed that there was a slight increase in the modelled flood extents for the 20% increase in rainfall, and a slight decrease in the modelled flood extents for the 20% decrease in rainfall. This was as expected and shows that the model is not overly sensitive to rainfall, and the assumptions made within the hydrological study.

Appendices

Appendix 1 - Hydrological Report

HD068-R007 Abley Letchford Hydrological Report

HYDE END ROAD, SHINFIELD

FLOOD ESTIMATION REPORT

BLOOR HOMES LIMITED

08 MAY 2025

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Date:	08 May 2025
Document Reference:	HD068 – R004

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2.0 **Method** 2
3.0 **Revitalised Flood Hydrograph 2 (ReFH2)** 7
4.0 **Discussion and Summary of Results** 8

Appendices

Appendix 1 – ReFH2 Summary

1.0 Summary of Assessment

Summary

1.1. This Flood Estimation Report has been prepared by Abley Letchford Partnership (ALP), on behalf of Bloor Homes Limited to provide hyetographs for a direct rainfall model at Hyde End Road, Shinfield in Berkshire using the latest data, software and methods proportionate to the scope of work.

1.2. The study is considered to be routine based on the scope of work.

1.3. The catchment is predominantly approximately 50% urban and 50% rural. The northeastern and central parts of the catchment is newly built residential development. The west and southern parts of the catchment are open fields.

1.4. The catchment is not influenced by reservoirs. The catchment is not pumped. The catchment does not have extensive floodplain storage.

1.5. The catchment is not groundwater driven. They key mechanism of flooding is therefore surface water flows and flows exceeding the channel capacity.

1.6. The catchment is ungauged and therefore a limitation of the study is the lack of locally available information.

1.7. The final choice of method was ReFH2.

Flood Frequencies

1.8. The frequency of a flood event can be expressed in either annual exceedance probability (AEP) or as a return period. A return periods is defined as the average time between years with a larger flood event. An AEP is defined as the probability of a certain size event occurring over a given period.

1.9. **Table 1** provides a conversion between return periods and AEP.

Table 1 – Annual Exceedance Probability (AEP) and Related Return Period

Annual Exceedance Probability (%)	50	20	10	5	3.33	2	1.33	1	0.5	0.1
Annual Exceedance Probability	0.5	0.2	0.1	0.05	0.033	0.02	0.0133	0.01	0.005	0.001
Return Period (years)	2	5	10	20	30	50	75	100	200	1,000

2.0 Method

Requirement for Flood Estimates

Overview

2.1. This study provides hyetographs for a direct rainfall model of the Hyde End Road catchment. The latest data, methodologies and software have been used, proportionate to the scope of works.

2.2. As part of the study, hyetographs will be calculated for the following return periods:

- 1 in 2
- 1 in 5
- 1 in 10
- 1 in 20
- 1 in 30
- 1 in 50
- 1 in 75
- 1 in 100
- 1 in 200
- 1 in 1000

2.3. Climate change will be considered for the 1 in 100 annual probability scenario. This will be discussed separately.

Project Scope

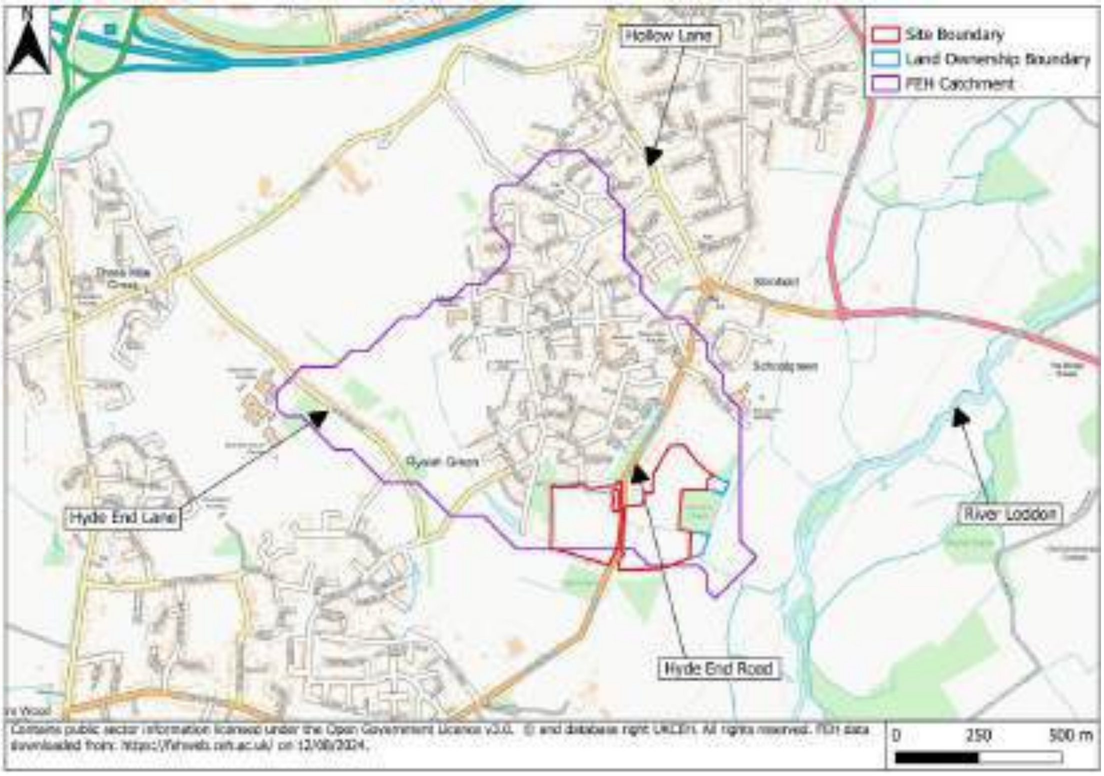
2.4. This study is considered to be routine according to the EA guidance.

2.5. The hyetographs will be used in a direct rainfall model and assist in establishing the baseline flood risk to the site.

Catchment

2.6. The catchment area was downloaded from the FEH Web Service as part of the catchment descriptors. The catchment area, watercourses and site location are shown in **Figure 1**.

Figure 1 – Catchment Overview



2.7. There are a number of watercourse within the catchment. The watercourses general flow along the field boundaries and convey water in an easterly direction towards the River Loddon. The River Loddon is located approximately 300m to the east of the site.

2.8. The catchment area is 0.98km^2.

2.9. The area of interest is in the downstream part of the catchment, as shown in **Figure 1**.

2.10. The catchment is approximately 50% rural and 50% suburban. The urban area is located in the northeast and central parts of the catchment.

Gauging Stations

2.11. There are no available gauging stations within the catchment.

Rating Equations

2.12. A rating review was not within the scope of the study therefore it was not completed.

Other Data Sources

2.13. **Table 2** summarises other sources of data used within the study

Table 2 – Summary of Other Sources of Data

Data	Relevance	Availability	Source	Details
Check flow gauging	Yes	No	NA	NA
Historic flood data	Yes	Yes	DEFRA data portal	EA historic flood outlines dataset
Flow or river level data for events	Yes	No	NA	NA
Rainfall data for events	Yes	No	NA	NA
Potential evaporation data	No	NA	NA	NA
Results from previous studies	Yes	No	NA	NA
Other data	NA	NA	NA	NA

Hydrological Understanding of the Catchment

Conceptual Model

2.14. The site location and catchment area are shown in **Figure 1**. The likely cause of flooding at the site is overland surface water flow and flood flows exceeding the channel capacity.

Unusual Catchment features

2.15. The northeast and central parts of the catchment are urbanised.

2.16. There are no reservoirs within the catchment.

2.17. The catchment is not pumped.

2.18. The catchment is not considered to be highly permeable.

2.19. The catchment has not been previously mined.

Initial Choice of Approach

Is FEH Appropriate

2.20. FEH methods are considered to be appropriate.

2.21. TheReFH2 (version 2.3) method was carried out.

2.22. The catchment will not be divided up into sub catchments.

Software

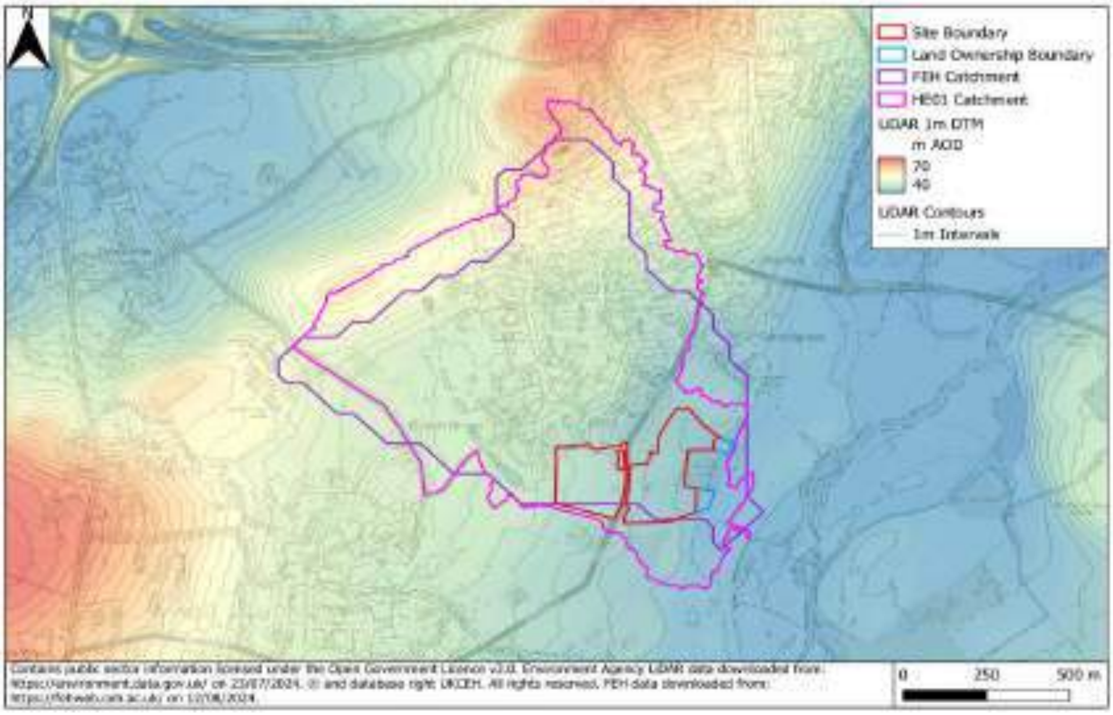
2.23. The following software was used in this study.

- FEH Web Service; and
- ReFH2.3

Flood Estimates

2.24. **Figure 2** shows the located of the FEH catchment, adjusted catchment and site location.

Figure 2 – Comparison of the FEH Catchment and Adjusted Catchment Areas



2.25. **Table 3** summarises the subject sites.

Table 3 – Summary of the Subject Site

Site Code	Type of Estimate L – lumped catchment C – sub catchment	Watercourse	Site Name	Easting	Northing	FEH Area (km²)	Revised Area (km²)
HE01	L	HE01	HE01	473450	167000	0.98	1.1

Imported Catchment Descriptors

2.26. The catchment descriptors were extracted from the FEH Web Service.

2.27. The red text in **Table 4** has been used to identify the catchment descriptors that have been updated from the FEH downloaded values.

Table 4 – Summary of the Updated FEH Catchment Descriptors

Site Code	FARL	PROWET	BFIHOST	BFIHOST19	DLPBAR (km)	DPSBAR (m/km)	SAAR (mm)	URBEXT1990	URBXT2000	FPEXT
HE01	1	0.29	0.477	0.542	1.05	11.3	625	0.268	0.268	0.223

Checking Catchment Descriptors

Catchment Boundary

2.28. The FEH Online Service catchment boundary was checked using LiDAR data, EA watershed data and Ordnance Survey data.

2.29. The catchment boundary was adjusted to consider the slope of the catchment are the road drainage network.

2.30. The catchment area increased from 0.98km^2 to 1.1km^2, an increase of 0.12km^2.

BFIHOST and SPRHOST

2.31. BFIHOST, BFIHOST19 and SPRHOST values for the catchment were checked using the Soilscapes online viewer.

2.32. The descriptor values were reviewed and were considered to be representative of the catchment.

FARL

2.33. The FARL value was checked against OS mapping and the FEH Web Service information on reservoir and lake storage areas.

2.34. The FARL value is considered to be appropriate.

URBEXT

2.35. The urban extents on the FEH Web Service were compared with OS urban extents. The urban area is located in the north and eastern parts of the catchment.

2.36. FEH Volume 5 Equation 6.2 was used to calculate the URBEXT value. Equation 4.5 in 'URBEXT2000- a new catchment descriptor' was used to calculate the URBEXT2000 value.

3.0 Revitalised Flood Hydrograph 2 (ReFH2)

Application of the ReFH2 Method

3.1. The purpose of carrying out the ReFH2 method is to calculate hyetographs for the catchment.

Catchment Sub-Divisions in the ReFH2 Model

3.2. The catchment was not further subdivided. The rural results were extracted where applicable and as indicated below.

Parameters for ReFH2 Model

3.3. **Table 5** provides a summary of ReFH2 method.

Table 5 – Summary of ReFH2 Parameters

Site code	Method	Tp_{rural} (hours)	Tp_{urban} (hours)	C_{max} (mm) Maximum storage capacity	PR_{imp}	BL (hours) Baseflow lag	BR Baseflow recharge
HE01	CD	3.74	-	471.9	40%	38.06	2.37
OPT: Optimisation, BR: Baseflow recession fitting, CD: Catchment descriptors, DT: Data transfer							

Design Events for ReFH2 Method

3.4. **Table 6** provides a summary of the ReFH2 design event parameters.

Table 6 – Summary of Design Parameters

Site code	Urban or rural	Season of design event	Storm duration (hours)	Storm area for ARF
HE01	Rural	Winter	6.5	0.98

Flood Estimates from the ReFH2 Method

3.5. **Table 7** provides a summary of the ReFH2 method peak net rural rainfall.

Table 7 – Summary of ReFH2 Method Peak Net Rural Rainfall

Site code	Peak Net Rural Rainfall (mm) for the following return periods (in years)									
	2	5	10	20	30	50	75	100	200	1000
HE01	0.40	0.57	0.69	0.81	0.89	0.98	1.07	1.15	1.35	2.04

4.0 Discussion and Summary of Results

Assumptions, Limitations and Uncertainty

Assumptions

4.1. The following assumptions were made in this study:

- The catchment descriptors are representative of the catchment;
- The catchment areas are representative of the areas being drained;
- The QMED values calculated are representative; and
- The ReFH2 hydrograph shapes are representative of the catchment response.

Limitations

4.2. A limitation of this study is that gauge data is not available.

Uncertainty

4.3. Uncertainty is not currently assessed within ReFH2, the final method selected.

Suitability for Future Studies

4.4. The hyetograph estimates as part of this study are specific to the model extent. If future studies are located within the model extent, the results should be reviewed at a minimum. If future studies are located outside of the model boundary, an update to the hydrology may be required.

Checks

4.5. **Table 12** provides a summary of the checks carried out.

Table 12 – Summary of Checks

Are the results consistent, for example at confluences?	NA – a single point estimate is being considered.
What do the results imply regarding the return periods of floods during the period of record?	NA – no gauge data of historic flood records available for comparison.
What is the 100-year growth factor? Is this realistic? (The guidance suggests a typical range of 2.1 to 4.0)	2.63 This is within the typical range.
If 1000-year flows have been derived, what is the range of ratios for 1000-year flow over 100-year flow?	1.70
How do the results compare with those of other studies? Explain any differences and conclude which results should be preferred.	NA – no other studies available for the catchment.
Are the results compatible with the longer-term flood history?	Data from historic flood was not available at this site.
Describe any other checks on the results	NA

Final Results

4.6. The final accepted peak net rural rainfall values for this study are summarised in **Table 13**.

Table 13 – Summary of the Final Accepted Peak Net Rural Rainfall

Site code	Peak net rural rainfall (mm) for the following return periods (in years)									
	2	5	10	20	30	50	75	100	200	1000
HE01	0.40	0.57	0.69	0.81	0.89	0.98	1.07	1.15	1.35	2.04

Appendices

Appendix 1 – ReFH2 Summary

UK Design Flood Estimation

Generated on 18 March 2025 10:27:37 by Hydro
Printed from the ReFH2 Flood Modelling software package, version 3.3.8355.27598

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: D879-0978

Site name: HE01

Easting: 473450

Northing: 167000

Country: England, Wales or Northern Ireland

Catchment Area (km^2): 1.1

Using plot scale calculations: No

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH 2013 model (mm):	62.56	Total runoff (ML):	15.22
Total Rainfall (mm):	41.69	Total flow (ML):	38.47
Peak Rainfall (mm):	8.13	Peak flow (m^3/s):	0.71

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	06:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.68	No
ARF (Areal reduction factor)	0.98	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	93.66	No
Cmax (mm)	471.09	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	3.74	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0.02	No
BL (hr)	38.06	No
BR	2.37	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0.46	No
Urbext 2000	0.27	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m³/s)	Net Rain (mm)	Runoff (m³/s)	Baseflow (m³/s)	Total Flow (m³/s)
00:00:00	0.742	0.000	0.213	0.000	0.017	0.017
00:30:00	1.149	0.000	0.339	0.001	0.016	0.018
01:00:00	1.773	0.000	0.529	0.005	0.016	0.021
01:30:00	2.723	0.000	0.824	0.014	0.016	0.030
02:00:00	4.153	0.000	1.283	0.029	0.016	0.045
02:30:00	6.241	0.000	1.988	0.056	0.017	0.072
03:00:00	8.128	0.000	2.699	0.099	0.017	0.116
03:30:00	6.241	0.000	2.156	0.164	0.019	0.183
04:00:00	4.153	0.000	1.475	0.250	0.021	0.271
04:30:00	2.723	0.000	0.985	0.347	0.025	0.373
05:00:00	1.773	0.000	0.649	0.446	0.031	0.477
05:30:00	1.149	0.000	0.423	0.536	0.037	0.573
06:00:00	0.742	0.000	0.275	0.605	0.046	0.651
06:30:00	0.000	0.000	0.000	0.643	0.055	0.698
07:00:00	0.000	0.000	0.000	0.649	0.065	0.714
07:30:00	0.000	0.000	0.000	0.627	0.076	0.703
08:00:00	0.000	0.000	0.000	0.585	0.087	0.671
08:30:00	0.000	0.000	0.000	0.532	0.097	0.628
09:00:00	0.000	0.000	0.000	0.474	0.106	0.580
09:30:00	0.000	0.000	0.000	0.417	0.115	0.531
10:00:00	0.000	0.000	0.000	0.362	0.122	0.484
10:30:00	0.000	0.000	0.000	0.311	0.128	0.439
11:00:00	0.000	0.000	0.000	0.265	0.133	0.398
11:30:00	0.000	0.000	0.000	0.223	0.138	0.361
12:00:00	0.000	0.000	0.000	0.185	0.141	0.327
12:30:00	0.000	0.000	0.000	0.151	0.144	0.295
13:00:00	0.000	0.000	0.000	0.121	0.146	0.267
13:30:00	0.000	0.000	0.000	0.095	0.148	0.243
14:00:00	0.000	0.000	0.000	0.075	0.149	0.224
14:30:00	0.000	0.000	0.000	0.058	0.150	0.208
15:00:00	0.000	0.000	0.000	0.044	0.150	0.194
15:30:00	0.000	0.000	0.000	0.032	0.150	0.182
16:00:00	0.000	0.000	0.000	0.022	0.149	0.172
16:30:00	0.000	0.000	0.000	0.015	0.148	0.163
17:00:00	0.000	0.000	0.000	0.009	0.147	0.156

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.000	0.000	0.000	0.005	0.145	0.150
18:00:00	0.000	0.000	0.000	0.003	0.144	0.146
18:30:00	0.000	0.000	0.000	0.001	0.142	0.143
19:00:00	0.000	0.000	0.000	0.000	0.140	0.140
19:30:00	0.000	0.000	0.000	0.000	0.138	0.138
20:00:00	0.000	0.000	0.000	0.000	0.136	0.136
20:30:00	0.000	0.000	0.000	0.000	0.135	0.135
21:00:00	0.000	0.000	0.000	0.000	0.133	0.133
21:30:00	0.000	0.000	0.000	0.000	0.131	0.131
22:00:00	0.000	0.000	0.000	0.000	0.129	0.129
22:30:00	0.000	0.000	0.000	0.000	0.128	0.128
23:00:00	0.000	0.000	0.000	0.000	0.126	0.126
23:30:00	0.000	0.000	0.000	0.000	0.124	0.124
24:00:00	0.000	0.000	0.000	0.000	0.123	0.123
24:30:00	0.000	0.000	0.000	0.000	0.121	0.121
25:00:00	0.000	0.000	0.000	0.000	0.120	0.120
25:30:00	0.000	0.000	0.000	0.000	0.118	0.118
26:00:00	0.000	0.000	0.000	0.000	0.116	0.116
26:30:00	0.000	0.000	0.000	0.000	0.115	0.115
27:00:00	0.000	0.000	0.000	0.000	0.113	0.113
27:30:00	0.000	0.000	0.000	0.000	0.112	0.112
28:00:00	0.000	0.000	0.000	0.000	0.110	0.110
28:30:00	0.000	0.000	0.000	0.000	0.109	0.109
29:00:00	0.000	0.000	0.000	0.000	0.108	0.108
29:30:00	0.000	0.000	0.000	0.000	0.106	0.106
30:00:00	0.000	0.000	0.000	0.000	0.105	0.105
30:30:00	0.000	0.000	0.000	0.000	0.103	0.103
31:00:00	0.000	0.000	0.000	0.000	0.102	0.102
31:30:00	0.000	0.000	0.000	0.000	0.101	0.101
32:00:00	0.000	0.000	0.000	0.000	0.099	0.099
32:30:00	0.000	0.000	0.000	0.000	0.098	0.098
33:00:00	0.000	0.000	0.000	0.000	0.097	0.097
33:30:00	0.000	0.000	0.000	0.000	0.096	0.096
34:00:00	0.000	0.000	0.000	0.000	0.094	0.094
34:30:00	0.000	0.000	0.000	0.000	0.093	0.093
35:00:00	0.000	0.000	0.000	0.000	0.092	0.092

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.000	0.000	0.000	0.000	0.091	0.091
36:00:00	0.000	0.000	0.000	0.000	0.090	0.090
36:30:00	0.000	0.000	0.000	0.000	0.088	0.088
37:00:00	0.000	0.000	0.000	0.000	0.087	0.087
37:30:00	0.000	0.000	0.000	0.000	0.086	0.086
38:00:00	0.000	0.000	0.000	0.000	0.085	0.085
38:30:00	0.000	0.000	0.000	0.000	0.084	0.084
39:00:00	0.000	0.000	0.000	0.000	0.083	0.083
39:30:00	0.000	0.000	0.000	0.000	0.082	0.082
40:00:00	0.000	0.000	0.000	0.000	0.081	0.081
40:30:00	0.000	0.000	0.000	0.000	0.080	0.080
41:00:00	0.000	0.000	0.000	0.000	0.078	0.078
41:30:00	0.000	0.000	0.000	0.000	0.077	0.077
42:00:00	0.000	0.000	0.000	0.000	0.076	0.076
42:30:00	0.000	0.000	0.000	0.000	0.075	0.075
43:00:00	0.000	0.000	0.000	0.000	0.074	0.074
43:30:00	0.000	0.000	0.000	0.000	0.074	0.074
44:00:00	0.000	0.000	0.000	0.000	0.073	0.073
44:30:00	0.000	0.000	0.000	0.000	0.072	0.072
45:00:00	0.000	0.000	0.000	0.000	0.071	0.071
45:30:00	0.000	0.000	0.000	0.000	0.070	0.070
46:00:00	0.000	0.000	0.000	0.000	0.069	0.069
46:30:00	0.000	0.000	0.000	0.000	0.068	0.068
47:00:00	0.000	0.000	0.000	0.000	0.067	0.067
47:30:00	0.000	0.000	0.000	0.000	0.066	0.066
48:00:00	0.000	0.000	0.000	0.000	0.065	0.065
48:30:00	0.000	0.000	0.000	0.000	0.064	0.064
49:00:00	0.000	0.000	0.000	0.000	0.064	0.064
49:30:00	0.000	0.000	0.000	0.000	0.063	0.063
50:00:00	0.000	0.000	0.000	0.000	0.062	0.062
50:30:00	0.000	0.000	0.000	0.000	0.061	0.061
51:00:00	0.000	0.000	0.000	0.000	0.060	0.060
51:30:00	0.000	0.000	0.000	0.000	0.060	0.060
52:00:00	0.000	0.000	0.000	0.000	0.059	0.059
52:30:00	0.000	0.000	0.000	0.000	0.058	0.058
53:00:00	0.000	0.000	0.000	0.000	0.057	0.057

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:30:00	0.000	0.000	0.000	0.000	0.057	0.057
54:00:00	0.000	0.000	0.000	0.000	0.056	0.056
54:30:00	0.000	0.000	0.000	0.000	0.055	0.055
55:00:00	0.000	0.000	0.000	0.000	0.054	0.054
55:30:00	0.000	0.000	0.000	0.000	0.054	0.054
56:00:00	0.000	0.000	0.000	0.000	0.053	0.053
56:30:00	0.000	0.000	0.000	0.000	0.052	0.052
57:00:00	0.000	0.000	0.000	0.000	0.052	0.052
57:30:00	0.000	0.000	0.000	0.000	0.051	0.051
58:00:00	0.000	0.000	0.000	0.000	0.050	0.050
58:30:00	0.000	0.000	0.000	0.000	0.050	0.050
59:00:00	0.000	0.000	0.000	0.000	0.049	0.049
59:30:00	0.000	0.000	0.000	0.000	0.048	0.048
60:00:00	0.000	0.000	0.000	0.000	0.048	0.048
60:30:00	0.000	0.000	0.000	0.000	0.047	0.047
61:00:00	0.000	0.000	0.000	0.000	0.046	0.046
61:30:00	0.000	0.000	0.000	0.000	0.046	0.046
62:00:00	0.000	0.000	0.000	0.000	0.045	0.045
62:30:00	0.000	0.000	0.000	0.000	0.045	0.045
63:00:00	0.000	0.000	0.000	0.000	0.044	0.044
63:30:00	0.000	0.000	0.000	0.000	0.043	0.043
64:00:00	0.000	0.000	0.000	0.000	0.043	0.043
64:30:00	0.000	0.000	0.000	0.000	0.042	0.042
65:00:00	0.000	0.000	0.000	0.000	0.042	0.042
65:30:00	0.000	0.000	0.000	0.000	0.041	0.041
66:00:00	0.000	0.000	0.000	0.000	0.041	0.041
66:30:00	0.000	0.000	0.000	0.000	0.040	0.040
67:00:00	0.000	0.000	0.000	0.000	0.040	0.040
67:30:00	0.000	0.000	0.000	0.000	0.039	0.039
68:00:00	0.000	0.000	0.000	0.000	0.039	0.039
68:30:00	0.000	0.000	0.000	0.000	0.038	0.038
69:00:00	0.000	0.000	0.000	0.000	0.038	0.038
69:30:00	0.000	0.000	0.000	0.000	0.037	0.037
70:00:00	0.000	0.000	0.000	0.000	0.037	0.037
70:30:00	0.000	0.000	0.000	0.000	0.036	0.036
71:00:00	0.000	0.000	0.000	0.000	0.036	0.036

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
71:30:00	0.000	0.000	0.000	0.000	0.035	0.035
72:00:00	0.000	0.000	0.000	0.000	0.035	0.035
72:30:00	0.000	0.000	0.000	0.000	0.034	0.034
73:00:00	0.000	0.000	0.000	0.000	0.034	0.034
73:30:00	0.000	0.000	0.000	0.000	0.033	0.033
74:00:00	0.000	0.000	0.000	0.000	0.033	0.033
74:30:00	0.000	0.000	0.000	0.000	0.033	0.033
75:00:00	0.000	0.000	0.000	0.000	0.032	0.032
75:30:00	0.000	0.000	0.000	0.000	0.032	0.032
76:00:00	0.000	0.000	0.000	0.000	0.031	0.031
76:30:00	0.000	0.000	0.000	0.000	0.031	0.031
77:00:00	0.000	0.000	0.000	0.000	0.030	0.030
77:30:00	0.000	0.000	0.000	0.000	0.030	0.030
78:00:00	0.000	0.000	0.000	0.000	0.030	0.030
78:30:00	0.000	0.000	0.000	0.000	0.029	0.029
79:00:00	0.000	0.000	0.000	0.000	0.029	0.029
79:30:00	0.000	0.000	0.000	0.000	0.029	0.029
80:00:00	0.000	0.000	0.000	0.000	0.028	0.028
80:30:00	0.000	0.000	0.000	0.000	0.028	0.028
81:00:00	0.000	0.000	0.000	0.000	0.027	0.027
81:30:00	0.000	0.000	0.000	0.000	0.027	0.027
82:00:00	0.000	0.000	0.000	0.000	0.027	0.027
82:30:00	0.000	0.000	0.000	0.000	0.026	0.026
83:00:00	0.000	0.000	0.000	0.000	0.026	0.026
83:30:00	0.000	0.000	0.000	0.000	0.026	0.026
84:00:00	0.000	0.000	0.000	0.000	0.025	0.025
84:30:00	0.000	0.000	0.000	0.000	0.025	0.025
85:00:00	0.000	0.000	0.000	0.000	0.025	0.025
85:30:00	0.000	0.000	0.000	0.000	0.024	0.024
86:00:00	0.000	0.000	0.000	0.000	0.024	0.024
86:30:00	0.000	0.000	0.000	0.000	0.024	0.024
87:00:00	0.000	0.000	0.000	0.000	0.023	0.023
87:30:00	0.000	0.000	0.000	0.000	0.023	0.023
88:00:00	0.000	0.000	0.000	0.000	0.023	0.023
88:30:00	0.000	0.000	0.000	0.000	0.023	0.023
89:00:00	0.000	0.000	0.000	0.000	0.022	0.022

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (m^3/s)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
89:30:00	0.000	0.000	0.000	0.000	0.022	0.022
90:00:00	0.000	0.000	0.000	0.000	0.022	0.022
90:30:00	0.000	0.000	0.000	0.000	0.021	0.021
91:00:00	0.000	0.000	0.000	0.000	0.021	0.021
91:30:00	0.000	0.000	0.000	0.000	0.021	0.021
92:00:00	0.000	0.000	0.000	0.000	0.021	0.021
92:30:00	0.000	0.000	0.000	0.000	0.020	0.020
93:00:00	0.000	0.000	0.000	0.000	0.020	0.020
93:30:00	0.000	0.000	0.000	0.000	0.020	0.020
94:00:00	0.000	0.000	0.000	0.000	0.019	0.019
94:30:00	0.000	0.000	0.000	0.000	0.019	0.019
95:00:00	0.000	0.000	0.000	0.000	0.019	0.019
95:30:00	0.000	0.000	0.000	0.000	0.019	0.019
96:00:00	0.000	0.000	0.000	0.000	0.019	0.019
96:30:00	0.000	0.000	0.000	0.000	0.018	0.018
97:00:00	0.000	0.000	0.000	0.000	0.018	0.018
97:30:00	0.000	0.000	0.000	0.000	0.018	0.018
98:00:00	0.000	0.000	0.000	0.000	0.018	0.018
98:30:00	0.000	0.000	0.000	0.000	0.017	0.017
99:00:00	0.000	0.000	0.000	0.000	0.017	0.017
99:30:00	0.000	0.000	0.000	0.000	0.017	0.017

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km^2)	1.1	No
ALTBAR	48	No
ASPBAR	134	No
ASPVAR	0.78	No
BFIHOST	0.48	No
BFIHOST19	0.54	No
DPLBAR (km)	1.05	No
DPSBAR (mkm^{-1})	11.3	No
FARL	1	No
LDP	1.69	No
PROPWET	0.29	No
RMED1H	11.4	No
RMED1D	29	No
RMED2D	36.8	No
SAAR (mm)	640	No
SAAR4170 (mm)	643	No
SPRHOST	34.74	No
Urbext2000	0.27	No
Urbext1990	0.02	No
URBCONC	0.57	No
URBLOC	1.07	No
DDF parameter C	-0.03	No
DDF parameter D1	0.27	No
DDF parameter D2	0.28	No
DDF parameter D3	0.32	No
DDF parameter E	0.31	No
DDF parameter F	2.59	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.26	No
DDF parameter D2 (1km grid value)	0.28	No
DDF parameter D3 (1km grid value)	0.32	No
DDF parameter E (1km grid value)	0.31	No
DDF parameter F (1km grid value)	2.59	No

Appendix 2 - Model Log

.TCF	.ECF	bc_dbase	.TGC	.TBC	.TMF	Run
HE01_2m_30yr_007.tcf	HE01_2m_30yr_007.ecf	bc_dbase_HE01_30yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_100yr_007.tcf	HE01_2m_100yr_007.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_1000yr_007.tcf	HE01_2m_1000yr_007.ecf	bc_dbase_HE01_1000yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_30yr_007a.tcf	HE01_2m_30yr_007a.ecf	bc_dbase_HE01_30yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_100yr_007a.tcf	HE01_2m_100yr_007a.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_1000yr_007a.tcf	HE01_2m_1000yr_007a.ecf	bc_dbase_HE01_1000yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_30yrCC45_007.tcf	HE01_2m_30yrCC45_007.ecf	bc_dbase_HE01_30yrCC35_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_100yrCC40_007.tcf	HE01_2m_100yrCC40_007.ecf	bc_dbase_HE01_100yrCC40_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_100yr_Mannings_20pc_inc_007.tcf	HE01_2m_100yr_Mannings_20pc_inc_007.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials_20pc_inc.csv	100%
HE01_2m_100yr_Mannings_20pc_dec_007.tcf	HE01_2m_100yr_Mannings_20pc_dec_007.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials_20pc_dec.csv	100%
HE01_2m_100yr_Q_20pc_inc_007.tcf	HE01_2m_100yr_Q_20pc_inc_007.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%
HE01_2m_100yr_Q_20pc_dec_007.tcf	HE01_2m_100yr_Q_20pc_dec_007.ecf	bc_dbase_HE01_100yr_007.csv	HE01_2m_007.tgc	HE01_2m_007.tbc	Materials.csv	100%

Appendix 3 - Topographical Survey

TREES

A	Ash
AL	Alder
AP	Apple
B	Beech
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
E	Elm
EL	Elder
EU	Eucalyptus
F	Fir
FM	Field Maple
FR	Fruit
HZ	Hazel
HC	Horse Chestnut
HO	Holm Oak
HW	Hawthorn
HY	Holly
JM	Japanese Maple
LB	Laburnum
LM	Lime
LO	Locust Tree
LR	Laurel
M	Maple
MG	Magnolia
OK	Oak
P	Pine
PA	Palm
PL	Plane
PM	Plum
PO	Poplar
PP	Pissardii Plum
PR	Pear
R	Redwood
RD	Red Oak
RH	Rhododendron
RO	Rowan
SB	Silver Birch
SC	Sweet Chestnut
SP	Scots Pine
SU	Spruce
SY	Sycamore
U	Unidentified
W	Willow
WN	Walnut
Y	Yew

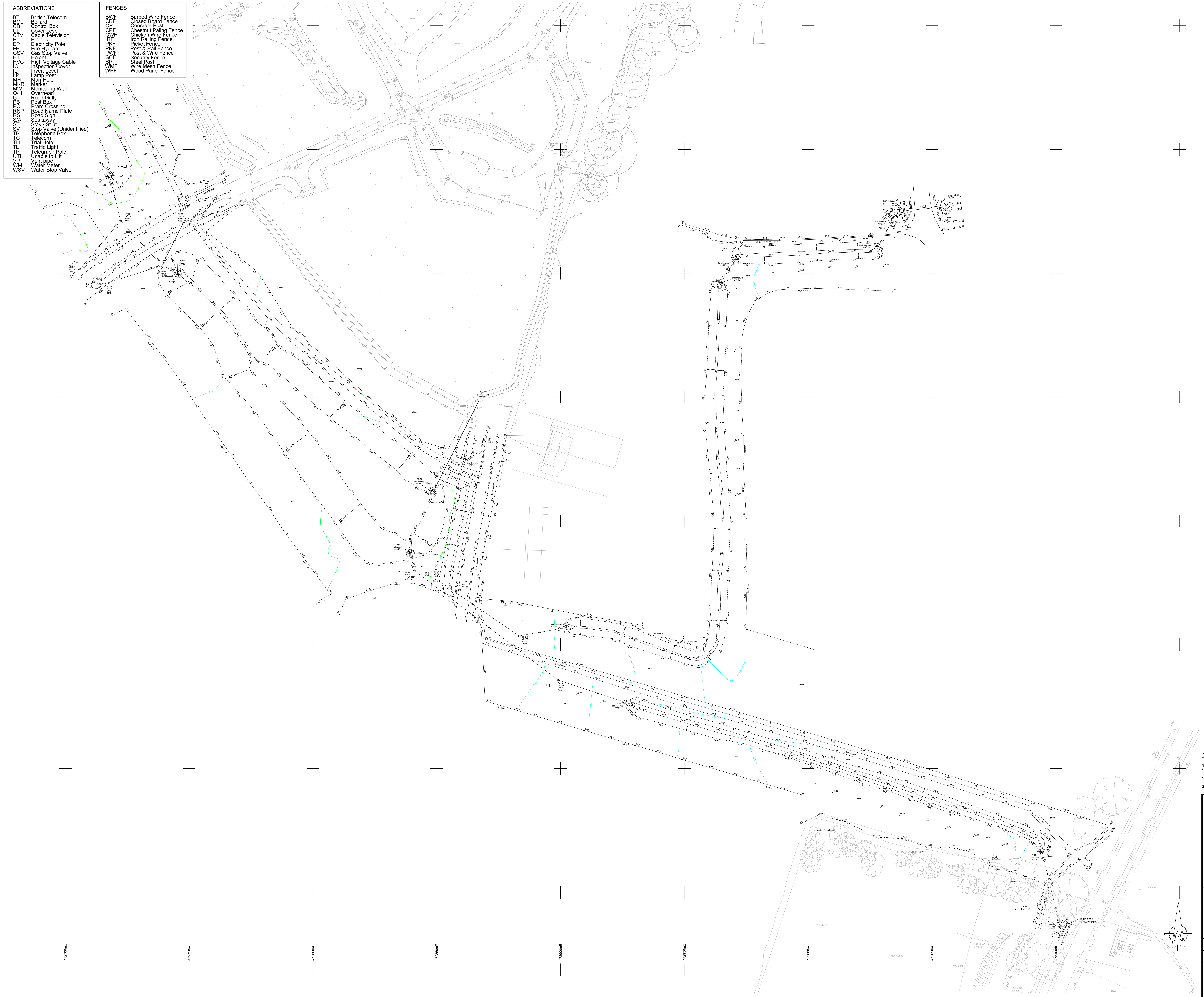
Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

ABBREVIATIONS

BT	British Telecom
BOL	Bollard
CB	Control Box
CL	Cover Level
CTV	Cable Television
EL	Electric
EP	Electricity Pole
FH	Fire Hydrant
GSV	Gas Stop Valve
HT	Height
HVC	High Voltage Cable
IC	Inspection Cover
IL	Invert Level
LP	Lamp Post
MH	Man-Hole
MKR	Marker
MW	Monitoring Well
O/H	Overhead
G	Road Gully
PB	Post Box
PC	Pram Crossing
RNP	Road Name Plate
RS	Road Sign
S/A	Soakaway
ST	Stay / Strut
SV	Stop Valve (Unidentified)
TB	Telephone Box
TC	Telecom
TH	Trial Hole
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable to Lift
VP	Vent pipe
WM	Water Meter
WSV	Water Stop Valve

FENCES

BWF	Barbed Wire Fence
CBF	Closed Board Fence
CP	Concrete Post
CPF	Chestnut Paling Fence
CWF	Chicken Wire Fence
IRF	Iron Railing Fence
PKF	Picket Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence



Revision B - July 2020
Amendments in specific areas as instructed by client.

Revision A - January 2020
Survey extended to include outfall of the University drainage run.

NOTES

Survey grid & level relate to control provided by Buxted Construction Ltd.

Geomatic Surveyors

siteline

Unit E, Woodside
34 Parham Drive
Eastleigh
SO50 4NU

t: 023 8081 1081
w: siteline.co.uk

BLOOR HOMES LINDEN HOMES BOVIS HOMES	Client
SUDS AREA SHINFIELD MEADOWS SHINFIELD READING	Contract
SITE SURVEY	Title
01SD02B (SHEET 1 OF 2)	Drawing Number
JANUARY 2020	Date
1:500 (at A0)	Scale
JB/HB	Surveyor(s)

TREES

A	Ash
AL	Alder
AP	Apple
B	Beech
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
E	Elm
EL	Elder
EU	Eucalyptus
F	Fir
FM	Field Maple
FR	Fruit
HZ	Hazel
HC	Horse Chestnut
HO	Holm Oak
HW	Hawthorn
HY	Holly
JM	Japanese Maple
LB	Laburnum
LM	Lime
LO	Locust Tree
LR	Laurel
M	Maple
MG	Magnolia
OK	Oak
P	Pine
PA	Palm
PL	Plane
PM	Plum
PO	Poplar
PP	Pissardii Plum
PR	Pear
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RD	Red Oak
RH	Rhododendron
RO	Rowan
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SC	Sweet Chestnut
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Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

ABBREVIATIONS

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MH	Man-Hole
MKR	Marker
MW	Monitoring Well
O/H	Overhead
G	Road Gully
PB	Post Box
PC	Pram Crossing
RNP	Road Name Plate
RS	Road Sign
S/A	Soakaway
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CP	Concrete Post
CPF	Chestnut Paling Fence
CWF	Chicken Wire Fence
IRF	Iron Railing Fence
PKF	Picket Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence

Revision B - July 2020
Amendments in specific areas as instructed by client.

Revision A - January 2020
Survey extended to include outfall of the University drainage run.

NOTES

Survey grid & level relate to control provided by Buxted Construction Ltd.

Geomatic Surveyors	siteline Unit E, Woodside 34 Parham Drive Eastleigh SO50 4NU t: 023 8081 1081 w: siteline.co.uk
BLOOR HOMES LINDEN HOMES BOVIS HOMES	Client
SUDS AREA SHINFIELD MEADOWS SHINFIELD READING	Contract
SITE SURVEY	Title
01SD02B	Drawing Number
JANUARY 2020	Date
1:500 (at A0)	Scale
JB/HB	Surveyor(s)

Storm Water Drainage Table						
MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
SDOUTA	47.95		47.95	-	375	PCC
SD9	49.30		48.00	1:184	375	PCC
SD7	50.00		48.41	1:156	375	PCC
SD6	50.03		48.48	1:76	375	PCC
SD5	52.07		50.61	1:35	375	PCC
SB91	52.36		50.95	1:23	375	PCC
SD3	52.66		51.26	1:72	375	PCC
SD2	52.93		51.45	1:94	375	PCC
SD1	52.92		51.68	1:63	375	PCC
SEXIS	46.37	43.71	43.69	-	450	PCC
SE21	45.98		43.94	1:123	450	PCC
S12	46.05	44.11	44.01	1:129	300	PCC
S9	46.22		44.22	1:107	300	PCC
S8	46.53		44.39	1:165	300	PCC
S7	46.47		44.46	1:231	300	PCC
S6	46.58	44.68	44.64	1:144	300	PCC
S5	47.31		44.92	1:173	225	PCC
S3	47.37		45.05	1:105	225	PCC
S2		Not Found		-	225	PCC
S1	47.34		45.38	-	225	PCC
S5	47.31		44.92	1:173	225	PCC
S4	47.37		44.99	1:181	225	PCC
S21	45.93		43.89	1:123	450	PCC
S20	45.79	43.98	43.94	1:270	300	PCC
S17	45.97		44.39	1:116	300	PCC
S16	46.42		44.57	1:152	300	PCC
S15	46.40		44.77	1:172	300	PCC
S14	46.67		44.83	1:250	300	PCC
S13	47.28		44.97	1:196	225	VC
SB237	48.46		45.61	1:149	750	PCC
SB235	48.36		45.66	1:156	750	PCC
SB266	48.00		45.70	1:695	750	PCC
SB224	47.83		45.78	1:353	750	PCC
SB223	48.03		45.88	1:280	750	PCC
SB222	48.37		45.99	1:263	750	PCC
SB214	48.44		46.05	1:173	675	PCC
SB213	49.34	46.42	46.39	1:103	600	PCC
SB146	49.49		47.15	1:19	450	PCC
SB144	49.98		47.26	1:394	300	PCC
SB118	50.04		47.28	1:265	300	PCC
SB116	50.08		47.44	1:43	300	PCC
SB114	50.62		48.30	1:26	300	PCC
SB94	51.05		48.82	1:30	300	PCC
SD4	52.28		50.26	1:27	300	PCC
SB89	52.39	50.49	50.45	1:36	300	PCC
SB87	52.60		50.71	1:98	300	PCC
SB84	53.07		50.92	1:104	225	VC
SB82	53.95		51.08	1:125	225	VC
SB80	54.31		51.19	1:120	225	VC
SB79	54.27		51.42	1:54	150	VC
SB224	47.83	45.93	45.78	1:353	750	PCC
SB255	48.00		46.35	1:17	100	VC
SB223	48.03	46.15	45.88	1:280	750	PCC
SJ10	48.25		46.46	1:23	100	VC
SB222	48.37		45.99	1:263	750	PCC
SB22A		Not Found		-		
SB114	50.62	48.48	48.30	1:26	300	PCC
SB112	51.07		48.98	1:55	225	VC
SB213	49.31		46.36	1:103	600	PCC
SB201	49.48		47.16	1:8	225	VC
SB235	48.36	46.02	45.66	-	750	PCC
SB233	48.32		46.17	1:59	375	PCC
SB235	48.36	46.04	45.66	1:156	750	PCC
SB235A	48.38		46.97	1:10	100	VC
SB213	49.31	46.61	46.36	1:103	600	
SB203	49.52		46.75	1:71	300	PCC
SB212	49.33		46.83	1:123	225	VC
SB211	48.72		46.99	1:213	225	VC
SB203	49.52		46.75	1:71	300	PCC
SB202	46.84		46.84	1:100	300	PCC
SB144	49.98	47.35	47.28	1:394	450	PCC
SB142	49.92		47.49	1:73	300	PCC
SB140	49.75		47.59	1:294	300	PCC
SB142	49.97	47.69	47.55	1:73	300	PCC
SB141	50.05		48.77	1:11	100	VC
SB116	50.08	47.60	47.44	1:43	300	PCC
SB115	50.29		48.86	1:6	100	VC
SB114	50.62	48.47	48.30	1:26	300	PCC
SB98	50.74		48.68	1:38	225	VC
SB97	50.51		48.81	1:92	150	VC
SB94	51.05	48.96	48.82	1:30	300	PCC
SB92	51.33		49.91	1:9	100	VC
SB94	51.05	48.96	48.82	1:30	300	PCC
SB93	51.16		49.19	1:30	100	VC
SB87	52.60	50.83	50.71	1:98	300	PCC
SB87A	52.77		50.89	1:123	100	VC
SB87	52.60	50.83	50.71	1:98	300	PCC
S51.60	52.83	51.77		1:16	100	VC
SB84	53.07	51.02	50.92	1:104	225	VC
SB84A	53.17		51.83	1:11	100	VC
SB82	53.95	51.90	51.08	1:125	225	VC
SB81	54.04		52.70	1:8	100	VC
SB222	48.37	46.22	45.99	1:263	750	PCC
SB222B	48.46		46.34	1:52	375	PCC
SB222A	48.52		46.39	1:162	375	PCC
SB221	49.03	46.79	46.75	1:123	375	PCC
SB219	48.94		46.97	1:89	300	PCC
SB218	48.74	47.13	47.10	1:269	300	PCC
SB216	49.06		47.46	1:139	225	VC
SB215	49.26		48.12	1:47	150	VC
SB221	49.03	46.88	46.75	1:123	300	PCC
SJ19	48.93		47.02	1:53	100	VC
SB218	48.74	47.16	47.10	1:269	300	PCC
SJ3	48.85		47.19	1:97	100	VC
SB216	49.06		47.46	1:139	225	VC
SB216A	48.99		47.65	1:88	150	VC
SA46	49.95		47.28	1:130	750	PCC
SA44	49.83		47.26	1:-720	750	PCC
SA43	49.75		47.31	1:636	750	PCC
SA41	49.94		47.49	1:141	750	PCC
SE60	50.11		47.95	1:40	525	PCC
SE57	50.33		48.09	1:130	525	PCC
SE54	50.72		48.46	1:75	450	PCC
SE49	51.19		49.05	1:28	375	PCC
SE27	51.22		49.22	1:97	375	PCC
SE24	51.09	49.42	49.34	1:111	375	PCC
SE19	51.31		49.65	1:67	300	PCC
SE17	51.58		50.02	1:27	300	PCC
SA46	49.94	47.44	47.30	1:130	750	PCC
SA45	49.65		48.05	1:16	100	VC
SA43	49.70	47.70	47.24	1:636	750	PCC
SA42	49.72		48.27	1:24	100	VC
SE54	50.72	48.66	48.46	1:75	450	PCC
SE53	50.38		48.83	1:129	225	VC
SE49	51.19	49.11	49.05	1:28	375	PCC
SE47	51.27		49.66	1:42	300	PCC
SE24	51.09		49.34	1:111	375	PCC
SE21	51.25		49.64	1:61	225	VC
SE161	50.52		48.98	-	300	PCC
SB158	51.52	49.87	49.84	1:47	300	PCC
SB153	51.71		50.17	1:55	225	VC
SB150	51.98	50.48	50.43	1:110	225	VC
SB148	52.18		50.58	1:57	100	VC
SB158	51.52	49.87	49.84	1:47	300	PCC
SB157	51.45	50.00	49.95	1:126	225	VC
SB155	51.74		50.19	1:38	100	VC
SB158	51.52	49.92	49.84	1:47	300	PCC
SB154	51.84		50.34	1:25	100	VC
SB153	51.71	50.16	50.17	1:55	225	VC
SB152	51.83		50.28	1:58	100	VC
SB150	51.98	50.48	50.43	1:110	225	VC
SB147	52.30		50.65	1:95	100	VC

Foul Water Drainage Table						
MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
FB5B	46.67		44.09	-	150	VC
F5A	46.81		44.16	1:153	150	VC
F5	46.59		44.23	1:144	150	VC
F3	46.38		44.41	1:85	150	VC
F2	46.43		44.63	1:158	150	VC
F1	45.93		44.81	1:150	150	VC
FB147	46.78		43.13	1:105	225	VC
FB146	46.87		43.88	1:17	150	VC
FB145	47.04		44.06	1:76	150	VC
FB144	48.13		44.35	1:156	150	VC
FB143	48.40		44.54	1:136	150	VC
FB138	48.29		44.62	1:121	150	VC
FB134	48.00		44.79	1:151	150	VC
FB133	47.78		44.96	1:151	150	VC
FB132	48.00		45.16	1:146	150	VC
FB131	48.33		45.37	1:130	150	VC
FB127	48.41		45.43	1:115	150	VC
FB126	49.29		45.81	1:90	150	VC
FB95	49.49		46.49	1:30	150	VC
FB94	49.93		46.73	1:148	150	VC
FB82	49.99		46.95	1:40	150	VC
FB81	50.16		47.22	1:29	150	VC
FB80	50.69		48.05	1:31	150	VC
FB70	51.08		48.46	1:35	150	VC
FB69	52.12		49.52	1:31	150	VC
FB68	52.41		49.75	1:37	150	VC
FB67	52.67		49.98	1:88	150	VC
FB66	53.10		50.40	1:54	150	VC
FB65	53.93		50.68	1:74	150	VC
FB64	54.26		50.81	1:75	150	VC
FB63	54.22		51.02	1:53	150	VC
F5A	46.81		44.16	1:153	150	VC
F4	47.21		45.45	1:13	150	VC
FB143	48.44		44.58	1:136	150	VC
FB142	48.33		45.09	1:25	150	VC
FB138	48.30	44.74	44.64	1:121	150	VC
FB137	48.36		44.84	1:105	150	VC
FB134	47.98	44.88	44.76	1:146	150	VC
F47.40	48.17		46.19	1:8	100	VC
FB132	48.00	45.29	45.16	1:146	150	VC
F6	48.21		45.45	1:49	150	VC
FB131	48.33		45.37	1:130	150	VC
FB131A		Not Found		-		VC
FB126	49.29	45.92	45.81	45.81	150	VC
FB118	49.46		46.17	1:32	100	VC
FB81	50.16	47.33	47.22	1:29	150	VC
FB81A	50.26		47.40	1:117	100	VC
FB80	50.69	48.16	48.05	1:31	150	VC
FB79	50.76		48.24	1:90	150	VC
FB78	50.47		48.37	1:123	150	VC
FB80	50.69	48.15	48.05	1:31	150	VC
FB77	51.08		48.73	1:46	150	VC
FB70	51.08	48.58	48.46	1:35	150	VC
FB70A	51.48		48.79	1:36	100	VC
FB70	51.08	48.53	48.46	1:35	150	VC
FB70B	51.26		48.68	1:40	100	VC
						VC
FB69	52.12	49.62	49.52	1:31	150	VC
FB69A	52.27		51.47	1:3	100	VC
FB67	52.67	50.09	49.98	1:88	150	VC
FB67A	52.80		50.22	1:48	100	VC
FB67	52.67	50.09	49.98	1:88	150	VC
FB67B	52.82		50.32	1:29	100	VC
						VC
FB66	53.10	50.53	50.40	1:54	150	VC
FB66A	53.19		50.94	1:14	100	VC
FB65	53.93	50.53	50.40	1:74	150	VC
FB65B	54.17		50.94	1:14	100	VC
FB94	49.93	46.88	46.73	1:148	150	VC
FB93	49.95		46.98	1:122	150	VC
FB92	49.78		47.13	1:153	150	VC
FB93	49.95		46.98	1:122	150	VC
FB93A	50.03		48.68	1:7	100	VC
FB131	48.33	45.46	45.37	1:130	150	VC
FB131B	48.50		45.55	1:129	150	VC
FB130	49.05		45.95	1:130	150	VC
FB129	48.90		46.11	1:91	150	VC
FB128	48.71		46.46	1:104	150	VC
FJ1	48.98		46.98	1:13	150	VC
FB130	49.05		45.95	1:130	150	VC
FJ14	48.90		46.04	1:96	150	VC
FA64	49.73		46.79	1:225	225	VC
FA62	49.94		46.94	1:164	225	VC
FA47	50.36		47.50	1:64	150	VC
FA46	50.69		48.17	1:38	150	VC
FA44	51.15		48.55	1:43	150	VC
FA41	51.16		48.91	1:56	150	VC
FA40	51.08		48.98	1:133	150	VC
FA39	51.30		49.28	1:33	150	VC
FE5	51.64		49.39	1:100	150	VC
FA64	49.73		46.78	1:225	150	VC
FA94	49.73		48.48	1:9	100	VC
FA64	49.73		46.78	1:225	225	VC
FA63	48.95		47.41	1:64	150	VC
FA64	49.73		46.78	1:225	225	VC
FA94	49.73		48.12	1:17	100	VC
FA46	50.69		48.17	1:38	150	VC
FA45	50.26		48.40	1:103	150	VC
FA44	51.15		48.55	1:43	150	VC
FA43	51.33		48.91	1:77	150	VC
FA40	51.08		48.83	1:133	150	VC
FA38	51.23		49.13	1:49	150	VC
FA40	51.08		48.83	1:133	150	VC
FA40B	51.32		49.03	1:48	100	VC
FB100A	50.61		48.51	-	150	VC
FB99	51.35		49.31	1:36	150	VC
FB98	51.58		49.54	1:30	150	VC
FB97	51.73		49.67	1:117	150	VC
FB96	51.97		50.02	1:75	150	VC
FB96B	52.23		50.16	1:89	100	VC
FB98	51.58		49.54	1:30	150	VC
FB98B	51.88		49.85	1:39	100	VC
FB97	51.73		49.67	1:117	150	VC
FB97A	51.89		49.71	1:127	100	VC
FB97	51.73		49.67	1:117	150	VC
FB97C	52.08		50.03	1:24	100	VC
FB96	51.97		50.02	1:75	150	VC
FB96B	52.23		50.16	1:91	100	VC
FB96	51.97		50.02	1:75	150	VC
FB96C	52.25		50.32	1:31	100	VC

Provisional Section 102 As-Built

REVISION B - MARCH 2020
Drawing notes adjusted on lateral manholes.

REVISION A - FEBRUARY 2020
Levels added to SUDS ponds.

NOTES

Survey grid and level relate to control provided by Buxted Construction Ltd.

Geomatic Surveyors

siteline

Unit E, Woodside
34 Parham Drive
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SO50 4NU

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BLOOR HOMES	Client
SHINFIELD MEADOWS SHINFIELD READING	Contract
AS-BUILT SURVEY	Title
01SD100B Sheet 1 of 4	Drawing Number
FEBRUARY 2020	Date
1:500 (at A0)	Scale
RS JB	Surveyor(s)

Storm Water Drainage Table

MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
SCOUT	44.62		43.30	-	300	PCC
SC35	44.62		43.62	1:74	300	PCC
SC30	44.94		43.68	1:528	600	PCC
SC29	45.28		43.73	1:590	600	PCC
SC28	45.46		43.76	1:600	600	PCC
SC27	45.87	43.82	43.80	1:518	600	PCC
SC26	46.04	UTL		-	600	PCC
SC25	46.13		43.97	-	600	PCC
SC15	46.87	44.25	44.06	1:511	600	PCC
SC13	46.66		44.40	1:177	450	PCC
SC12	46.50		44.49	1:172	450	PCC
SC11	46.53	44.56	44.53	1:405	450	PCC
SC10	46.84		44.64	1:383	375	PCC
SC9	46.96		44.69	1:316	375	PCC
SC8	47.27	44.89	44.79	1:278	375	PCC
SC1	47.39	45.04	44.99	1:152	225	VC
SC1A	47.45		46.34	1:6	100	VC
				-		
SC35	44.62		43.62	1:74	300	PCC
SC31	43.91		43.91	1:47	225	VC
				-		
SC26	46.04	UTL		-	600	PCC
S44.33	46.20		44.47	-	100	VC
				-		
SC25	46.13	44.33	43.97	-	600	PCC
SC24	46.37		44.67	1:91	225	VC
				-		
SC25	46.13	44.33	43.97	-	600	PCC
S44.45	46.28		44.57	1:30	100	VC
				-		
SC13	46.66	44.66	44.40	1:177	450	PCC
SC13A	46.78		45.83	1:4	100	VC
				-		
SC13	46.66	44.66	44.40	1:177	450	PCC
S44.6	46.78		44.79	1:49	100	VC
				-		
SC12	46.50	44.76	44.49	1:172	450	PCC
S44.67	46.60		45.34	1:11	100	VC
				-		
SC11	46.53	44.73	44.53	1:405	450	PCC
S44.63	46.63		45.25	1:12	100	VC
				-		
SC10	46.83	44.84	44.71	1:383	375	PCC
SC10A	46.98	UTL		-		-
SC10	46.83	44.83	44.71	1:383	375	PCC
S45.10	46.93		44.96	1:112	100	VC
SC9	46.95	44.90	44.68	1:316	375	PCC
SC9A	47.04		45.49	1:11	100	VC
SC8	47.27	44.93	44.79	1:278	375	PCC
SC2	-	Not Found		-		
SC8	47.27	44.82	44.79	1:278	300	PCC
SC7	47.33		44.85	1:287	300	PCC
SC25	46.13	44.35	43.97	-	600	PCC
SC19	46.08	44.52	44.49	1:44	225	VC
S44.72	46.26		44.57	1:64	100	VC
SC19	46.08	44.53	44.49	1:44	225	VC
S44.72A	46.51		44.81	1:26	100	VC
SC15	46.87	44.25	44.06	1:511	600	PCC
SC17	47.39		44.85	1:30	300	PCC
SC16	47.63		45.28	1:48	300	PCC
SC14	47.81		45.46	1:114	225	VC
SC17	47.39	45.04	44.85	1:30	300	PCC
S45.10A	47.41		46.01	1:9	100	VC
SC17	47.39	45.04	44.85	1:30	300	PCC
S45.05	47.56		45.89	1:7	100	VC
SC16	47.63		45.28	1:48	300	PCC
S45.46	47.71		45.53	1:38	100	VC
SC14	47.81	45.59	45.46	1:114	225	VC
S61	48.03		45.94	1:25	100	VC
SB40A	-		42.59	-	450	PCC
SB40	44.57		42.62	1:350	450	PCC
SB38	44.47		42.68	1:130	450	PCC
SB36	44.43		42.80	1:215	450	PCC
SB28	44.90		42.95	1:81	375	PCC
SB26	44.73		43.04	1:357	375	PCC
SB24	44.81	43.28	43.16	1:259	375	PCC
SB23A	45.10		43.65	1:30	225	VC
SB23	45.68		44.31	1:27	225	VC
SB20		Not Found		-	225	VC
SB19	46.56		46.12	-	225	VC
SB40	44.57		42.62	1:350	450	PCC
SB40B	44.89		43.55	1:15	100	VC
SB38	44.47	42.94	42.68	1:130	450	PCC
SB37	44.57	UTL		-		
SB36	44.43		42.80	1:215	450	PCC
SB35	44.62	Filled			-	VC
SB28	44.91	43.19	42.97	1:81	375	PCC
SB27	45.04		44.02	1:7	100	VC
SB26	44.72	43.27	43.03	1:357	375	PCC
SB25	44.63		43.48	1:26	100	VC
SB24	44.81		43.16	1:259	375	PCC
SB17	44.77		43.23	1:90	225	VC
SB20		Not Found		-	225	VC
SB18	46.42		45.77	-	100	VC
SBOUTA	42.50		42.50	-	450	PCC
SB70	43.92	42.52		1:85	450	PCC
SB270A	42.59		42.59	1:117	450	PCC
SB46A	42.88		42.88	-	225	VC
SB46	44.43		43.01	1:107	225	VC
SB45	44.95		43.13	1:153	225	VC
				-		
SB78A	-		42.60	-	375	PCC
SB78	44.62		42.66	1:158	375	PCC
SB77	44.42		42.68	1:230	375	PCC
SB73	44.53		42.83	1:154	375	PCC
SB71	44.50		42.94	1:210	375	PCC
SB69	44.56		43.07	1:132	375	PCC
SB68	44.75		43.28	1:60	300	PCC
SB67	45.15		43.50	1:105	300	PCC
SB56	45.38		43.74	1:95	225	VC
SB53	45.47		43.80	1:203	225	VC
SB51	45.65		44.31	1:31	225	VC
SB49	46.16		44.66	1:62	225	VC
SB49B	46.27		45.06	1:19	100	VC
SB77	44.42		42.67	-	375	PCC
SB75	44.59		43.03	1:59	225	VC
SB75A	44.71	UTL		-		
SB77	44.42	42.87	42.67	1:230	375	PCC
SB77A	44.60		43.15	1:25	100	VC
SB73	44.53	42.99	42.83	1:154	375	PCC
SB73A	44.67		43.11	1:33	100	VC
SB71	44.50	43.09	42.94	1:210	375	PCC
SB71A	44.82		43.26	1:51	100	VC
SB67	45.15	43.64	43.50	1:105	300	PCC
SB67B	45.23		44.03	1:16	100	VC
SB56	45.38	43.79	43.74	1:95	225	VC
SB56A	45.48		44.12	1:21	100	VC
SB56	45.38	43.79	43.74	1:95	225	VC
SB56B	45.40		43.85	1:98	100	VC
SB53	45.47	43.87	43.80	1:203	225	VC
SB53A	45.54		44.34	1:17	100	VC
SB266A	-		44.33	-	875	PCC
SB266	45.88		44.48	1:40	875	PCC
SB265	47.13		44.56	1:568	875	PCC
SB258	46.99		44.60	1:328	875	PCC
SB250	46.86		44.67	1:210	875	PCC
SB247	46.74		44.78	1:255	750	PCC
SB249	46.90		44.91	1:120	750	PCC
SB241	47.08	45.38	45.33	1:39	750	PCC
SB239	48.10		45.44	1:717	750	PCC
SB237	48.46		45.61	1:149	750	PCC
SB258	46.99	45.24	44.61	1:328	875	PCC
SB258A	46.98		45.30	1:97	225	PCC
SB258	46.99	45.04	44.61	1:328	875	PCC
SB258B	46.98		45.21	1:34	100	VC
SB250	46.86		44.67	1:210	875	PCC
SB250A	46.98	UTL		-		
SB250	46.86		44.67	1:210	875	PCC
SB250B	46.98	UTL		-		
SB247	46.74		44.78	1:255	750	PCC
SB247B	46.91	UTL		-		
SB241	47.08	45.38	45.33	1:39	750	PCC
SB241A	47.49		45.64	1:45	100	VC
				-		
SB239	48.10	45.69	45.43	1:717	750	PCC
SB239A	48.30		47.27	1:5	100	VC
SB265	47.13	45.18	44.63	1:568	875	PCC
SB264	47.22		45.32	1:32	225	VC
SB261	47.45		45.55	1:105	225	VC
SB264	47.22	45.40	45.32	1:32	225	VC
S45.95	47.38		45.48	1:107	100	VC
SB67	45.15	43.55	43.50	1:105	300	PCC
SB64	45.62		43.79	1:139	225	VC
SB62	45.30		43.90	1:204	225	VC
SB61	45.81		44.06	1:201	225	VC
SB58	46.12	44.70	44.68	1:24	225	VC
SB58A	46.12		44.88	1:22	100	VC
SB64	45.62	43.88	43.79	1:139	225	VC
SB64A	45.63		44.03	1:23	100	VC
SB61	45.81	44.16	44.06	1:201	225	VC
SB61A	46.08	UTL			100	VC

Foul Water Drainage Table

MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
FCOUT	44.48		42.98	-	200	VC
FC8	44.57		43.03	1:162	225	VC
FC7	44.91		43.15	1:271	375	PCC
FC6	45.53		43.30	1:338	375	PCC
FC5	45.82		43.40	1:176	375	PCC
FC4	45.96		43.57	1:71	225	VC
FC3	46.04		43.81	1:75	225	VC
FC1		Not Found		-	225	VC
FC3	46.04	43.85	43.81	1:75	225	VC
F44.05	46.18		44.05	1:43	100	VC
FBOUT	44.80	UTL		-	225	VC
FB45A	44.59	40.19	40.10	-	225	VC
FB45	44.54		40.29	1:69	150	VC
FB44	44.45		40.38	1:133	2400	PCC
FB43	44.51		40.57	1:157	150	VC
FB42	44.41		40.70	1:152	150	VC
FB41	44.61		40.92	1:117	150	VC
FB40	44.51		40.96	1:155	150	VC
FB39	44.42		41.07	1:65	150	VC
FB38	44.57		41.28	1:125	150	VC
FB37	44.49		41.39	1:152	150	VC
FB36	44.48		41.63	1:104	150	VC
FB35	44.53		41.69	1:107	150	VC
FB31	44.92		41.77	1:139	150	VC
FB30	44.74		41.96	1:160	150	VC
FB29	44.57		42.14	1:108	150	VC
FB28	44.85	42.26	42.24	1:119	150	VC
FB27	45.58		42.44	1:149	150	VC
FB26	46.45		42.68	1:115	150	VC
FB25	46.64		42.77	1:161	150	VC
FB24	46.55		42.89	1:108	150	VC
FB23	46.56		43.10	1:151	150	VC
FB22	46.93		43.28	1:130	150	VC
FB21	47.30		44.20	1:15	150	VC
FB20	47.66		44.67	1:65	150	VC
FB19	47.94		45.06	1:43	150	VC
FB43	44.51		40.56	1:157	150	VC
FB43A	44.64		41.71	1:7	100	VC
FB41	44.61	41.01	40.93	1:117	150	VC
FB41A	44.66		43.64	1:2	100	VC
FB40	44.51		40.96	1:155	150	VC
FB40A	44.55		43.53	1:2	100	VC
FB39	44.42		41.07	1:65	150	VC
FB40A	44.63		41.28	1:28	100	VC
FB38	44.57	41.31	41.29	1:125	150	VC
FB38A	44.81		43.00	1:7	150	VC
FB37	44.49	41.45	41.39	1:152	150	VC
FB37A	44.53		43.39	1:3	100	VC
FB35	44.53	41.73	41.69	1:107	150	VC
FB34	44.61		42.57	1:7	150	VC
FB31	44.92		41.78	1:139	150	VC
FB31A	45.05		43.15	1:4	100	VC
FB29	44.57	42.17	42.14	1:108	150	VC
FB29A	44.69		43.80	1:3	100	VC
FB28	44.85		42.24	1:119	150	VC
FB10	44.88		42.36	1:58	150	VC
FB27	45.58	42.48	42.44	1:149	150	VC
FB27A	45.68		44.33	1:3	100	VC
FB27	45.58	42.48	42.44	1:149	150	VC
FB27A	45.68		44.33	1:3	100	VC
FB25	46.75	43.00	42.87	1:161	150	VC
F45.10	46.83		43.04	1:133	150	VC
FB24	46.55	42.97	42.90	1:108	150	VC
FB24B	46.66		43.44	1:15	100	VC
FB23	46.56	43.21	43.10	1:151	150	VC
FB23B	46.85		45.90	1:3	100	VC
FB18	46.48	43.63	43.51	1:108	150	VC
F43.53	46.57		43.74	1:61	150	VC
FB21	44.30	41.35	41.20	1:15	150	VC
F44.23	47.38		44.36	1:1	150	VC
FB21	47.30	44.33	44.20	1:15		VC
F44.30	47.56		44.51	1:52	100	VC
FB20	47.66	44.81	44.67	1:65	150	VC
F45.05	47.62		44.99	1:74	150	VC
						VC
FB19	47.94		45.06	1:43	150	VC
FFC2-64	48.02		45.09	1:133	100	VC
FB19	47.94		45.06	1:43	150	VC
F59	47.95		45.55	1:14	100	VC
FB22	46.93	43.30		1:130		VC
FB18	46.48		43.51	1:108	150	VC
FB17	46.08		43.66	1:192	150	VC
FB17A	46.02		43.76	1:81	150	VC
						VC
FB18	46.48	43.63	43.51	1:108	150	VC
F43.50	46.78		43.73	1:54	150	VC
FB17	46.08		43.66	1:192	150	VC
F43.78	46.13		43.88	1:40	100	VC
FB17	46.08	43.79	43.66	1:130	150	VC
F43.70	46.17		43.97	1:25	100	VC
FB45A	44.59		40.10	-		VC
FB157	44.71		40.57	1:18	225	VC
FB156	45.12		42.32	1:14	225	VC
FB151	45.39		42.53	1:122	225	VC
FB150	45.55		42.65	1:105	225	VC
FB149	45.71		42.76	1:141	225	VC
FB148	45.99		42.85	1:153	225	VC
FB147	46.78		43.13	1:105	225	VC
FB146	46.87		43.88	1:17	150	VC
FB145	47.05		44.08	1:68	150	VC
FB144	48.13		44.35	1:167	150	VC
FB156	45.12	42.43	42.32	1:14	225	VC
FB156B	45.22		43.68	1:7	100	VC
FB151	45.39		42.53	1:122	225	VC
FB151E	45.50		43.04	1:15	150	VC
FB151	45.39	42.63	42.53	1:122	225	VC
FB151D	45.39		42.77	1:46	150	VC
FB148	45.97	42.91	42.82	1:153	225	VC
FB148A	46.04		43.79	1:6	100	VC
FB148	45.97	42.91	42.82	1:153	225	VC
FB148B	46.20		43.14	1:33	100	VC
FB144	48.12	44.36	44.33	1:167	150	VC
FB144A	48.35		44.71	1:25	150	VC
FB147	46.78		43.13	1:105	225	VC
FB62	46.75		43.25	1:156	150	VC
FB61	46.99		43.43	1:165	150	VC
FB56	47.19		43.53	1:148	150	VC
FB55	47.36		43.65	1:143	150	VC
FB54	47.40		43.77	1:145	150	VC
FB53	47.33		43.97	1:99	150	VC
FB46	46.99		44.15	1:152	150	VC
FB46A	47.13		45.53	1:4	100	VC
FB62	46.73		43.22	1:156	150	VC
FB62A	46.80		44.79	1:7	100	VC
FB62	46.73		43.22	1:156	150	VC
FB62B	46.86		43.26	1:113	150	VC
FB61	46.98	43.43	43.42	1:165	150	VC
FB58	47.20		45.15	1:5	100	VC
FB61	46.98	43.46	43.42	1:165	150	VC
FB60	47.10		43.87	1:12	150	VC
FB56	47.19		43.53	1:148	150	VC
F43.75	47.38		43.66	1:78	150	VC
FB55	47.36		43.65	1:143	150	VC
FB54A	47.37		46.13	1:3	100	VC
						VC
FB55	47.36		43.65	1:143	150	VC
F45.85	47.56		46.76	1:2	100	VC
FB53	47.33	43.97	43.97	1:99	150	VC
FB5	47.43		44.08	1:138	150	VC
FB156	45.12	42.43	42.32	1:14	225	VC
FB155	45.50		42.63	1:135	225	VC
FB154	45.26		42.75	1:238	225	VC
FB153	45.79		42.93	1:177	225	VC
FB152	45.93		43.23	1:28	150	VC
FB152A	46.41		43.41	1:95	150	VC
FB155	45.50	42.72	42.63	1:135	225	VC
FB155A	45.53		43.28	1:4	150	VC
FB153	45.79		43.09	1:177	150	VC
FB153A	45.91		44.07	1:7	150	VC

Provisional Section 102 As-Built

REVISION B - MARCH 2020
Drawing notes adjusted on lateral manholes.

REVISION A - FEBRUARY 2020
Levels added to SUDS ponds.

NOTES

Survey grid and level relate to control provided by Buxted Construction Ltd.

Geomatic Surveyors

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Unit E, Woodside
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BLOOR HOMES	Client
SHINFIELD MEADOWS SHINFIELD READING	Contract
AS-BUILT SURVEY	Title
01SD100B Sheet 2 of 4	Drawing Number
FEBRUARY 2020	Date
1:500 (at A0)	Scale
RS JB	Surveyor(s)

Storm Water Drainage Table

MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
SA166	48.83		46.17	1:455	600	PCC
SA164	49.28		46.23	1:663	600	PCC
SA55	49.40		46.26	1:490	600	PCC
SA152	49.23		46.43	1:243	525	PCC
SA148	49.08		46.72	1:48	450	PCC
SA143	49.00		47.06	1:127	375	PCC
SA139	48.99		47.29	1:197	300	PCC
SA136	49.46		47.57	1:126	225	VC
SA166	48.83	46.53	46.17	1:455	600	PCC
SA165	48.68		46.67	1:73	225	VC
SA136	49.46		47.57	1:126	225	VC
SA136A	49.77		48.26	1:26	100	VC
SA164	49.28	46.45	46.23	1:663	600	PCC
SA162	49.35		46.48	1:257	375	PCC
SA153	49.26		46.86	1:43	300	PCC
SK112	49.12		46.94	1:229	300	PCC
SA162	49.35	46.68	46.48	1:257	375	PCC
S47.60	49.07		47.19	1:7	225	VC
SA164	49.28	46.58	46.23	1:663	600	PCC
SK103	49.14		46.69	1:102	225	VC
SA152	49.23	46.55	46.43	1:243	525	PCC
SA149	49.41		46.65	1:124	375	PCC
SK100	49.16		46.85	1:65	375	PCC
SA143	49.00	47.10	47.06	1:127	375	PCC
SA142	49.11		47.22	1:118	300	PCC
SA139	48.99	47.34	47.29	1:197	300	PCC
SA138	49.20		47.51	1:95	225	VC
SA82A	-		46.86	-	900	PCC
SA82	49.08	46.90	46.88	1:813	900	PCC
SA81	48.82		46.96	1:357	900	PCC
SA79	48.65		47.02	1:750	900	PCC
SA77	49.17		46.97	1:-444	900	PCC
SA74	49.31		47.01	1:265	900	PCC
SA69		Not Found		-	825	PCC
SA66	49.71		46.99	-	825	PCC
SA64	49.61		47.05	1:283	825	PCC
SA62	49.48		47.04	1:-1220	825	PCC
SA58	49.54		47.17	1:195	750	PCC
SA55	49.81		47.21	1:710	750	PCC
SA52	49.67		47.18	1:-947	750	PCC
SA51	49.67		47.24	1:100	750	PCC
SA48	49.84		47.19	1:-254	750	PCC
SA46	49.95		47.28	1:130	750	PCC
SA44	49.83		47.26	1:-720	750	PCC
SA43	49.75		47.31	1:636	750	PCC
SA41	49.94		47.49	1:141	750	PCC
SA41	49.94	48.02	47.49	1:141	750	PCC
SE78	50.11		48.25	1:120	300	PCC
SE76	50.37		48.44	1:138	300	PCC
SE65	50.50		48.58	1:92	225	VC
SE63	50.68		48.88	1:66	225	VC
SA74	49.31	47.58	47.01	1:265	900	PCC
SA72	49.12		47.82	1:103	225	VC
SA100	-		48.15	-	375	PCC
SA99	50.05		48.29	1:226	375	PCC
SA98		Not Found		-		
SA97	50.56		48.63	-	300	PCC
SA90	50.75		48.86	1:51	300	PCC
SA89	51.86		49.94	1:55	300	PCC
SA90	50.75		48.86	1:51	300	PCC
SE102	55.13	UTL		-		
SA97	50.56	48.71	48.63	-	300	PCC
SA96	50.37		48.76	1:156	225	VC
SA95	50.52		48.96	1:119	225	VC
SA96	50.37		48.76	1:156	225	VC
SA93	50.29		48.88	1:74	225	VC
SA106B	-		47.57		450	PCC
SA106A	47.64		47.64	1:121	450	PCC
				-		
SA107B	-		47.32	-	450	PCC
SA107	48.79		47.36	1:375	150	PCC
SA107A	-		47.40	1:240	450	PCC
SA116	49.06		46.95	1:160	300	PCC
SA115	49.21		47.09	1:144	225	VC
S15	48.81		47.33	1:135	150	VC
SA116	49.06		46.95	1:160	300	PCC
S19	49.14		47.08	1:125	225	VC

Foul Water Drainage Table

MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
FA81	48.77		45.46	1:175	225	VC
FA80		Not Found		-	225	VC
FA78	49.26		45.67	-	225	VC
FA75	49.38		45.74	1:214	225	VC
FA74	49.25		45.91	1:244	225	VC
FA73	49.11		45.98	1:200	225	VC
FA71	48.99		46.16	1:239	225	VC
FA70	49.00		46.36	1:240	225	VC
FA65	49.92		46.67	1:206	225	VC
FA85	47.94		45.12	1:132	225	VC
FA85A	48.09		46.06	1:16	150	VC
						VC
FA84	48.26		45.25	1:235	225	VC
FK141	48.45		45.87	1:11	100	VC
						VC
FA80		Not Found		-	225	VC
FA79	48.72		45.98	-	150	VC
						VC
FA78	49.26		45.67	-	225	VC
FA77	49.14		45.85	1:54	100	VC
FA78	49.26		45.67	-	225	VC
FFC2-57	49.03		46.68	1:10	100	VC
FA75	49.38	45.77	45.73	1:214	225	VC
FK136		UTL		-	150	VC
FK135	49.17		46.13	-	150	VC
FA73	49.11		45.97	1:200	225	VC
FK126	49.18		46.22	1:56	150	VC
FA71	48.99		46.16	1:239	150	VC
FK99	49.12		47.02	1:13	100	VC
FA70	48.99		46.34	1:240	225	VC
FA70A	49.00		46.62	1:41	100	VC
FA70	48.99	46.44	46.34	1:240	225	VC
FA69A	49.25		46.58	1:139	150	VC
FA69	49.31		46.64	1:85	150	VC
FA68	49.60		46.75	1:145	150	VC
FA67	49.66		46.81	1:125	150	VC
FA65	49.92	46.76	46.67	1:206	225	VC
FK94	49.64		48.12	1:17	100	VC
FA62	49.94		46.94	1:164	225	VC
FE21	50.10		47.15	1:132	150	VC
FE20	50.36		47.32	1:155	150	VC
FA61	50.46		47.42	1:124	150	VC
FE17	50.64		47.57	1:130	150	VC
FA60	50.53		47.69	1:165	150	VC
FA59	50.40		47.84	1:165	150	VC
FA58	50.74		47.99	1:111	150	VC
FA57	51.79		48.40	1:21	150	VC
FA58	50.74		47.99	1:111	150	VC
FA58A	51.09		48.09	1:87	100	VC
FA58	50.74		47.99	1:111	150	VC
FA58B	50.69		48.21	1:75	150	VC
FA15	49.22		46.01	1:211	225	VC
FK71	49.12		46.12	1:227	225	VC
FA14	49.22		46.22	1:260	225	VC
FA13	49.33	46.37	46.28	1:152	225	VC
FA8	49.57		46.59	1:165	150	VC
FA7	49.63		46.65	1:167	150	VC
FA6	49.49		46.82	1:166	150	VC
FA5	49.52		47.04	1:120	150	VC
FA3	49.67		47.12	1:158	150	VC
FK7	49.82		47.27	1:155	150	VC
FA15	49.22		46.01	1:211	225	VC
F1	48.89		46.46	1:58	150	VC

Provisional Section 102 As-Built

REVISION B - MARCH 2020
Drawing notes adjusted on lateral manholes.

REVISION A - FEBRUARY 2020
Levels added to SUDS ponds.

NOTES

Survey grid and level relate to control provided by Buxted Construction Ltd.

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BLOOR HOMES	Client
SHINFIELD MEADOWS SHINFIELD READING	Contract
AS-BUILT SURVEY	Title
01SD100B Sheet 3 of 4	Drawing Number
FEBRUARY 2020	Date
1:500 (at A0)	Scale
RS JB	Surveyor(s)

Foul Water Drainage Table						
MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
EXTFM				-	225	VC
FA87	47.67		44.92	-	225	VC
FA86	47.84		45.00	1:265	225	VC
FK147	47.92		45.07	1:127	225	VC
FA85	47.94		45.12	1:132	225	VC
FA84	48.26		45.25	1:235	225	VC
FA82	48.57		45.37	1:246	225	VC
FZ2	48.72		45.40	1:517	225	VC
FA81	48.77		45.46	1:175	225	VC
FA87	47.67	44.95	44.92	-	225	VC
FA30	47.64		45.06	1:231	225	VC
FK86	47.41		45.13	1:233	225	VC
FK85	47.92		45.19	1:223	225	VC
FA29	47.97		45.23	1:223	225	VC
FA28	47.74	45.41	45.35	1:242	225	VC
FA26	47.75		45.45	1:215	225	VC
FA25	48.06		45.57	1:250	225	VC
FA24	48.35		45.68	1:264	225	VC
FA23	48.44		45.73	1:150	225	VC
FK79	48.52		45.76	1:170	225	VC
FA19	48.61		45.79	1:157	225	VC
FA17	49.12		45.92	1:198	225	VC
FA30	47.64		45.07	1:231	225	VC
FK92	47.54		45.52	1:71	150	VC
FK91	47.50		46.24	1:56	150	VC
FA28	47.74	45.44	45.35	1:242	225	VC
FK82	47.90		45.63	1:82	150	VC
FA27	48.24		46.63	1:35	150	VC
FA25	48.06	45.64	45.55	1:250	225	VC
F38	48.02		46.02	1:16	100	VC
FA17	49.12	45.98	45.92	1:198	225	VC
F14	49.15		46.13	1:69	150	VC
FA24	48.35		45.68	1:264	225	VC
FK5	48.45		45.82	1:271	225	VC
FA2	48.37		46.02	1:166	225	VC
FA1	48.51		46.12	1:235	225	VC
FA17	49.12	46.00	45.92	1:198	150	VC
F12	48.60		UTL	-	100	VC
FA28	47.74	45.42	45.35	1:242	225	VC
FK84	47.62		45.60	1:82	150	VC
FK83	47.72		45.89	1:84	150	VC
FA84	47.62		45.60	1:82	150	VC
FK38	47.68		46.26	1:13	100	VC
FA84	47.62		45.60	1:82	150	VC
FK84B	47.60		46.00	1:22	100	VC

Storm Water Drainage Table						
MANHOLE	CL	IL IN	IL OUT	GRADIENT	PIPE SIZE	PIPE MATERIAL
SA110	-		45.70	-	900	PCC
SWMH	48.99		46.71	1:18	900	PCC
SA109	48.75		46.77	1:167	900	PCC
SA109A	46.82		46.82	1:90	900	PCC
SA134	45.76		45.76	-	375	PCC
SK73	48.29		46.42	1:66	375	PCC
SA133	48.39		46.47	1:348	375	PCC
SA131	48.42		46.54	1:149	375	PCC
SA129	48.34		46.64	1:379	375	PCC
SA127	48.46		46.70	1:190	375	PCC
SA120	48.48		46.77	1:19	375	PCC
SA118	48.55		46.80	1:230	300	PCC
SA117	48.88		46.89	1:177	300	PCC
SA118	48.55	46.95	46.80	1:230	300	PCC
S48.05	48.51		47.12	1:41	100	VC
SA189A	-		45.57		900	PCC
SA189	48.28		45.76	1:34	750	PCC
SA135	48.20		45.83	1:343	750	PCC
SA135A	45.89		45.89	1:297	750	PCC
SA135	48.20	46.46	45.83	1:343	750	PCC
SWCPA	48.46		47.56	1:23	300	PCC
SA189	48.28	46.25	45.76	1:34	900	PCC
SWCPB	48.49		47.54	1:19	300	PCC
SA189	48.28		45.76	1:34	750	PCC
SA188	48.18		45.84	1:262	750	PCC
SA187	48.32		46.00	1:288	750	PCC
SK128	48.07		46.04	1:623	750	PCC
SA184	47.81		46.10	1:410	750	PCC
SA176	47.86		46.20	1:545	675	PCC
SZ3	47.97		46.15	1:-242	675	PCC
SA173	48.30		46.21	1:400	675	PCC
SA170	48.64		46.10	1:-337	675	PCC
SA198	48.77		46.15	1:294	600	PCC
SA166	48.83		46.18	1:303	600	PCC
SA184	47.81	46.48	46.10	1:410	750	PCC
SA182	47.82		46.60	1:103	225	VC
SA180	48.10		46.73	1:208	225	VC
S45	48.00	UTL			100	VC
SA176	47.86	46.60	46.18	1:545	675	PCC
SA175	47.65		46.67	1:121	100	VC
SZ3	47.98		46.18	1:-242	675	PCC
SK122	48.10		46.56	1:22	225	VC
SK121	48.13		46.70	1:99	225	VC
SA173	48.30	46.67	46.20	1:400	675	PCC
SA171	48.53		46.73	1:158	150	VC
SA198	48.77		46.15	1:294	600	PCC
SA167	48.92	UTL				
SA184	47.81	46.51	46.10	1:410	750	VC
SA177	47.67		46.55	1:218	225	VC
SK124	48.02		46.66	1:180	150	VC
SA177	47.67		46.55	1:218	225	VC
SK125	47.79		46.76	1:26	100	VC
LD-S7A	-		47.17	-	450	PCC
LD-S7	48.00		47.26	1:178	450	PCC
LD-S6	47.99		47.31	1:276	300	PCC
LD-S5	48.00	UTL		-		PCC
LD-S4		Not Found		-		PCC
LD-S3	48.10		47.43	-	300	PCC
LD-S2		Not Found		-		PCC
LD-S1	48.16		45.46	-	300	PCC
SA191	-		45.63	-	300	PCC
SA190	47.24		45.66	1:1337	300	PCC
SK138	47.47		45.89	1:30	225	PCC
SK137	47.45		46.12	1:172	225	PCC
SK135	47.65		46.37	1:147	225	PCC
SK130	47.74	UTL		-	225	PCC
SK138	47.47		45.89	1:30	225	VC
SK138A	47.41		45.99	1:117	150	VC
SK135	47.65		46.37	-	225	VC
SK133	47.76		46.50	1:121	225	VC
SA195	-		45.14	-	450	PCC
SA194	47.19		45.14	1:0	450	PCC
SA192	47.34	45.24	45.89	1:96	450	PCC
SA192A	45.28		45.28	1:175	450	PCC
SAOUT	-		44.11	-	450	PCC
SA199	44.39		44.39	1:109	450	PCC
LD-S13A	46.00		46.00	-	300	PCC
LD-S13	47.59		46.03	1:633	300	PCC
LD-S11	47.70		46.23	1:193	300	PCC
LD-S11A	46.38		46.38	1:333	300	PCC
				-		
INV2	-		45.12	-	300	PCC
INV1	-		45.15	1:380	300	PCC
				-		
INV4	-		44.92	-	300	PCC
INV3	-		45.07	1:93	300	PCC
				-		
INV6	-		44.77	-	375	PCC
INV5	-		44.85	1:238	375	PCC

Provisional Section 102 As-Built

REVISION B - MARCH 2020
Drawing notes adjusted on lateral manholes.

REVISION A - FEBRUARY 2020
Levels added to SUDS ponds.

NOTES

Survey grid and level relate to control provided by Buxted Construction Ltd.

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BLOOR HOMES	Client
SHINFIELD MEADOWS SHINFIELD READING	Contract
AS-BUILT SURVEY	Title
01SD100B Sheet 4 of 4	Drawing Number
FEBRUARY 2020	Date
1:500 (at A0)	Scale
RS JB	Surveyor(s)

GENERAL NOTES:
1. Do not scale.
2. Refer to all other Project Drawings and supporting notes.
3. The Contractor is to check and verify all buildings and site dimensions and levels, including sewer invert levels, before works start on site. The contractor is to comply in all aspects with the current building legislation, British Standards, building regulations etc.
4. Positions of existing services/statutory undertakers apparatus adjacent to or crossing proposed excavations are to be checked by the contractor prior to starting work.
5. Any anomaly or contradiction between any of the above is to be reported to the Engineer.
6. This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
7. The Contractor shall contact all utilities companies prior to commencing and excavation. It is the Contractor's responsibility to locate the exact position of all underground and overhead services, cables, pipes etc prior to the excavations and to take all necessary protective measures.

CONSTRUCTION NOTES:
1. All sewers to comply with the requirements of the water authorities publication "Sewers for Adoption, 7th Edition" together with Thames Waters Addendum.
2. All public sewers are to be the subject of a Section 104 agreement of the Water Industry Act 1991.
3. Invert levels of existing manholes and sewers are to be checked on site before construction commences and results reported to engineers.
4. All manhole ironworks to comply with BS EN124, and be stamped with BSI Kitemark. Covers to suit loading as below;
   - Carriageways and Roads - D400
   - Driveways and Verges - C250
   - Footways and Pedestrian Areas - B125
   - Gardens/Landscaping - A15
5. All sewer pipes, up to, and including 225mm are to be vitrified clay to BS EN295. All sewer pipes 300mm diameter and above to concrete pipes to BS EN1916.
6. All drainage shall be installed and tested strictly in accordance with the Manufacturers' printed instructions, BS EN 752, BS EN 1601, Local Water Authority requirements and the Building Regulations.
7. All bedding shall be Class S unless noted otherwise.
8. All trenches under existing and proposed public highways are to be backfilled with thoroughly compacted Type 1 granular sub-base material.
9. Drainage laid beneath roads and areas of vehicular access (car parking etc) with less than 1200mm of cover shall be encased in concrete bed and surround with associated movement joints. Drainage laid beneath paths, footways and pedestrian areas with less than 900mm of cover shall be similarly treated.
10. Chambers with outgoing pipes greater than 600mm diameter shall be fitted with guard bars, safety chains or other approved safety devices.
11. The use of precast concrete products made with sulphate resisting cement is mandatory, unless a laboratory report proves such precautions are not necessary.
12. All gully connections to use a minimum diameter pipe of 150mm and to be surrounded by a minimum of 150mm of grade C8/C10 concrete over its full length (which should not exceed 15m) and its connection to the carrier system.

LEGEND

(G)92.67 Proposed Structural Slab/Garage Level

FOUL STORM
Existing adopted sewer
Proposed adoptable sewer & MH
Highway gully and 150mmØ connection

Rev	Date	Description	Drawn	Checked
P7	08.15	Updated to reflect latest site layout and WSP and EA drainage comments.	BA	SL
P6	07.15	Updated to reflect latest RPS S278 layout.	BA	SL
P5	07.15	Updated to reflect WBC comments.	BA	LPA
P4	06.15	BW boundary updated.	BA	LPA
P3	06.15	Amended to suit BW SuDS basin location.	BA	SL
P2	05.15	Amended to suit latest site layout.	BA	SL
P1	05.15	Amended to suit latest site layout.	BA	SL

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Client
UNIVERSITY OF READING

Project
SHINFIELD WEST

Title
PHASE 1A RM APPLICATION DRAINAGE LAYOUT

Status
FOR APPROVAL

Scale	Date	Drawn	Checked
1:500 @ A1	MAY 15	BA	LPA

Drawing No	Revision
A061-A-500	P7

Major Development Full Application (and/or discharge of conditions or reserved matters)

Full planning applications for Major Development and/or discharge of conditions or reserved matters must include the following information and details on the proposed drainage strategy and system(s).

Ref.	Documentation required	Requirement met/included
	In addition to documentation required for outline applications, the applicant shall also submit:	
	■ Confirmation of the destination of discharge(s) (in accordance with Building Regulation Part H hierarchy) with appropriate justification for the(ir) selection;	7.10 - 7.11
	■ Details of any offsite works required, together with any necessary consents;	N/A
	■ Where necessary, a full planting schedule with accompanying plan;	N/A
	■ Where proposing to discharge to ground the results of site specific ground investigation (accounting for the variability in ground conditions), including geo-environmental characterisation and infiltration test results shall be provided. These investigations shall account for: • Evidence of infiltration tests, providing representative results, at the location and depth of any intended infiltration device; • Records of recorded groundwater levels over a number of visits to establish confidence in seasonal variability on groundwater levels.	N/A
	■ Exceedence routes – confirmation that exceedence routes will remain clear of development in perpetuity;	Appendix D
	■ Confirmation of the arrangements for the adoption, management / operation and maintenance of the drainage system, including but not necessarily limited to: • Details of which body will be responsible for operating and maintenance for the drainage proposals including their written confirmation; • A management statement to outline the management goals for the site and required maintenance; • Description of maintenance schedule and materials and tools needed; • A maintenance schedule; • Legal agreements to ensure the continued operation and maintenance of the drainage system for the lifetime of the development; • Health and safety plan, if appropriate, considering all potential health and safety risks posed by the proposed drainage system including but not limited to areas of open water, confined spaces, and steep slopes; • Access arrangements for maintenance of all aspects of the proposed drainage systems; and • Operational characteristics of any mechanical features including maintenance and energy requirements.	Appendix E
	Plans & Drawings Required	

	In addition to plan and drawing required for outline applications, the applicant shall also submit: ▪ Detail drawings of connections (including flow control devices) to water bodies, sewers, public surface water sewers, highway drains and SuDS; ▪ Phasing plans for implementation of the drainage system(s); ▪ Details of source control measures including location, type levels and detail drawing; ▪ Details of site control measures including location, type levels and detail drawing; ▪ Where appropriate, details of regional control measures including location, type levels and detail drawing; ▪ Details of all other drainage features including levels, detail location and detail drawings; ▪ Details of those components of the drainage system(s) comprising the 'management train' for the site; ▪ Conveyance and exceedance routes; ▪ The destination of runoff with clearly defined outfall locations; and ▪ Any surface water/groundwater flow routes entering the development from adjacent land.	All within drawings in Appendix D
	Calculations Required	
	In addition to calculations required for outline applications, the applicant shall also submit: ▪ Full design calculations and design parameters to demonstrate conformity with best practice standards. This shall include a calculation pack for the following storm events: • 1:1 year; • 1:30 year; • 1:100 year; and, • 1:100 year with climate change. The calculations shall be able to be referenced to appropriate drawings of the drainage system with pipe and manhole references and clearly labelled storage and conveyance features (basins, swales, tanks etc.); and, ▪ Confirmation of attenuation volumes provided in each storage feature along with details of freeboard allowance for each feature.	Appendix D Within Drawings in Appendix A

Additional requirements for a large site or multi-plot development.

Ref.	Detail required	Requirement met/included
	Plans demonstrating the phasing of drainage infrastructure (in keeping with wider development phasing proposals, demonstrating how flood risks and drainage will be managed throughout and on completion of the development.	Phasing order to be confirmed

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	1.000	Drain Down Time (mins)	1440	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Detailed	Additional Storage (m^3/ha)	0.0	Check Discharge Volume	x
Summer CV	1.000	Skip Steady State	✓	Starting Level (m)			

Storm Durations

60	120	180	240	360	480	600	720	960	1440	2160	2880	4320	5760	7200	8640	10080

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

Node S4-Outlet Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m^2)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to All storms

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.780	225	0.780	450	0.780	675	0.780	900	0.780	1125	0.780	1350	0.780	1575	0.780	1800	0.780
15	0.780	240	0.780	465	0.780	690	0.780	915	0.780	1140	0.780	1365	0.780	1590	0.780	1815	0.780
30	0.780	255	0.780	480	0.780	705	0.780	930	0.780	1155	0.780	1380	0.780	1605	0.780	1830	0.780
45	0.780	270	0.780	495	0.780	720	0.780	945	0.780	1170	0.780	1395	0.780	1620	0.780	1845	0.780
60	0.780	285	0.780	510	0.780	735	0.780	960	0.780	1185	0.780	1410	0.780	1635	0.780	1860	0.780
75	0.780	300	0.780	525	0.780	750	0.780	975	0.780	1200	0.780	1425	0.780	1650	0.780	1875	0.780
90	0.780	315	0.780	540	0.780	765	0.780	990	0.780	1215	0.780	1440	0.780	1665	0.780	1890	0.780
105	0.780	330	0.780	555	0.780	780	0.780	1005	0.780	1230	0.780	1455	0.780	1680	0.780	1905	0.780
120	0.780	345	0.780	570	0.780	795	0.780	1020	0.780	1245	0.780	1470	0.780	1695	0.780	1920	0.780
135	0.780	360	0.780	585	0.780	810	0.780	1035	0.780	1260	0.780	1485	0.780	1710	0.780	1935	0.780
150	0.780	375	0.780	600	0.780	825	0.780	1050	0.780	1275	0.780	1500	0.780	1725	0.780	1950	0.780
165	0.780	390	0.780	615	0.780	840	0.780	1065	0.780	1290	0.780	1515	0.780	1740	0.780	1965	0.780
180	0.780	405	0.780	630	0.780	855	0.780	1080	0.780	1305	0.780	1530	0.780	1755	0.780	1980	0.780
195	0.780	420	0.780	645	0.780	870	0.780	1095	0.780	1320	0.780	1545	0.780	1770	0.780	1995	0.780
210	0.780	435	0.780	660	0.780	885	0.780	1110	0.780	1335	0.780	1560	0.780	1785	0.780	2010	0.780

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
2025	0.780	2535	0.780	3045	0.780	3555	0.780	4065	0.780	4575	0.780	5085	0.780	5595	0.780	6105	0.780
2040	0.780	2550	0.780	3060	0.780	3570	0.780	4080	0.780	4590	0.780	5100	0.780	5610	0.780	6120	0.780
2055	0.780	2565	0.780	3075	0.780	3585	0.780	4095	0.780	4605	0.780	5115	0.780	5625	0.780	6135	0.780
2070	0.780	2580	0.780	3090	0.780	3600	0.780	4110	0.780	4620	0.780	5130	0.780	5640	0.780	6150	0.780
2085	0.780	2595	0.780	3105	0.780	3615	0.780	4125	0.780	4635	0.780	5145	0.780	5655	0.780	6165	0.780
2100	0.780	2610	0.780	3120	0.780	3630	0.780	4140	0.780	4650	0.780	5160	0.780	5670	0.780	6180	0.780
2115	0.780	2625	0.780	3135	0.780	3645	0.780	4155	0.780	4665	0.780	5175	0.780	5685	0.780	6195	0.780
2130	0.780	2640	0.780	3150	0.780	3660	0.780	4170	0.780	4680	0.780	5190	0.780	5700	0.780	6210	0.780
2145	0.780	2655	0.780	3165	0.780	3675	0.780	4185	0.780	4695	0.780	5205	0.780	5715	0.780	6225	0.780
2160	0.780	2670	0.780	3180	0.780	3690	0.780	4200	0.780	4710	0.780	5220	0.780	5730	0.780	6240	0.780
2175	0.780	2685	0.780	3195	0.780	3705	0.780	4215	0.780	4725	0.780	5235	0.780	5745	0.780	6255	0.780
2190	0.780	2700	0.780	3210	0.780	3720	0.780	4230	0.780	4740	0.780	5250	0.780	5760	0.780	6270	0.780
2205	0.780	2715	0.780	3225	0.780	3735	0.780	4245	0.780	4755	0.780	5265	0.780	5775	0.780	6285	0.780
2220	0.780	2730	0.780	3240	0.780	3750	0.780	4260	0.780	4770	0.780	5280	0.780	5790	0.780	6300	0.780
2235	0.780	2745	0.780	3255	0.780	3765	0.780	4275	0.780	4785	0.780	5295	0.780	5805	0.780	6315	0.780
2250	0.780	2760	0.780	3270	0.780	3780	0.780	4290	0.780	4800	0.780	5310	0.780	5820	0.780	6330	0.780
2265	0.780	2775	0.780	3285	0.780	3795	0.780	4305	0.780	4815	0.780	5325	0.780	5835	0.780	6345	0.780
2280	0.780	2790	0.780	3300	0.780	3810	0.780	4320	0.780	4830	0.780	5340	0.780	5850	0.780	6360	0.780
2295	0.780	2805	0.780	3315	0.780	3825	0.780	4335	0.780	4845	0.780	5355	0.780	5865	0.780	6375	0.780
2310	0.780	2820	0.780	3330	0.780	3840	0.780	4350	0.780	4860	0.780	5370	0.780	5880	0.780	6390	0.780
2325	0.780	2835	0.780	3345	0.780	3855	0.780	4365	0.780	4875	0.780	5385	0.780	5895	0.780	6405	0.780
2340	0.780	2850	0.780	3360	0.780	3870	0.780	4380	0.780	4890	0.780	5400	0.780	5910	0.780	6420	0.780
2355	0.780	2865	0.780	3375	0.780	3885	0.780	4395	0.780	4905	0.780	5415	0.780	5925	0.780	6435	0.780
2370	0.780	2880	0.780	3390	0.780	3900	0.780	4410	0.780	4920	0.780	5430	0.780	5940	0.780	6450	0.780
2385	0.780	2895	0.780	3405	0.780	3915	0.780	4425	0.780	4935	0.780	5445	0.780	5955	0.780	6465	0.780
2400	0.780	2910	0.780	3420	0.780	3930	0.780	4440	0.780	4950	0.780	5460	0.780	5970	0.780	6480	0.780
2415	0.780	2925	0.780	3435	0.780	3945	0.780	4455	0.780	4965	0.780	5475	0.780	5985	0.780	6495	0.780
2430	0.780	2940	0.780	3450	0.780	3960	0.780	4470	0.780	4980	0.780	5490	0.780	6000	0.780	6510	0.780
2445	0.780	2955	0.780	3465	0.780	3975	0.780	4485	0.780	4995	0.780	5505	0.780	6015	0.780	6525	0.780
2460	0.780	2970	0.780	3480	0.780	3990	0.780	4500	0.780	5010	0.780	5520	0.780	6030	0.780	6540	0.780
2475	0.780	2985	0.780	3495	0.780	4005	0.780	4515	0.780	5025	0.780	5535	0.780	6045	0.780	6555	0.780
2490	0.780	3000	0.780	3510	0.780	4020	0.780	4530	0.780	5040	0.780	5550	0.780	6060	0.780	6570	0.780
2505	0.780	3015	0.780	3525	0.780	4035	0.780	4545	0.780	5055	0.780	5565	0.780	6075	0.780	6585	0.780
2520	0.780	3030	0.780	3540	0.780	4050	0.780	4560	0.780	5070	0.780	5580	0.780	6090	0.780	6600	0.780

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
6615	0.780	7005	0.780	7395	0.780	7785	0.780	8175	0.780	8565	0.780	8955	0.780	9345	0.780	9735	0.780
6630	0.780	7020	0.780	7410	0.780	7800	0.780	8190	0.780	8580	0.780	8970	0.780	9360	0.780	9750	0.780
6645	0.780	7035	0.780	7425	0.780	7815	0.780	8205	0.780	8595	0.780	8985	0.780	9375	0.780	9765	0.780
6660	0.780	7050	0.780	7440	0.780	7830	0.780	8220	0.780	8610	0.780	9000	0.780	9390	0.780	9780	0.780
6675	0.780	7065	0.780	7455	0.780	7845	0.780	8235	0.780	8625	0.780	9015	0.780	9405	0.780	9795	0.780
6690	0.780	7080	0.780	7470	0.780	7860	0.780	8250	0.780	8640	0.780	9030	0.780	9420	0.780	9810	0.780
6705	0.780	7095	0.780	7485	0.780	7875	0.780	8265	0.780	8655	0.780	9045	0.780	9435	0.780	9825	0.780
6720	0.780	7110	0.780	7500	0.780	7890	0.780	8280	0.780	8670	0.780	9060	0.780	9450	0.780	9840	0.780
6735	0.780	7125	0.780	7515	0.780	7905	0.780	8295	0.780	8685	0.780	9075	0.780	9465	0.780	9855	0.780
6750	0.780	7140	0.780	7530	0.780	7920	0.780	8310	0.780	8700	0.780	9090	0.780	9480	0.780	9870	0.780
6765	0.780	7155	0.780	7545	0.780	7935	0.780	8325	0.780	8715	0.780	9105	0.780	9495	0.780	9885	0.780
6780	0.780	7170	0.780	7560	0.780	7950	0.780	8340	0.780	8730	0.780	9120	0.780	9510	0.780	9900	0.780
6795	0.780	7185	0.780	7575	0.780	7965	0.780	8355	0.780	8745	0.780	9135	0.780	9525	0.780	9915	0.780
6810	0.780	7200	0.780	7590	0.780	7980	0.780	8370	0.780	8760	0.780	9150	0.780	9540	0.780	9930	0.780
6825	0.780	7215	0.780	7605	0.780	7995	0.780	8385	0.780	8775	0.780	9165	0.780	9555	0.780	9945	0.780
6840	0.780	7230	0.780	7620	0.780	8010	0.780	8400	0.780	8790	0.780	9180	0.780	9570	0.780	9960	0.780
6855	0.780	7245	0.780	7635	0.780	8025	0.780	8415	0.780	8805	0.780	9195	0.780	9585	0.780	9975	0.780
6870	0.780	7260	0.780	7650	0.780	8040	0.780	8430	0.780	8820	0.780	9210	0.780	9600	0.780	9990	0.780
6885	0.780	7275	0.780	7665	0.780	8055	0.780	8445	0.780	8835	0.780	9225	0.780	9615	0.780	10005	0.780
6900	0.780	7290	0.780	7680	0.780	8070	0.780	8460	0.780	8850	0.780	9240	0.780	9630	0.780	10020	0.780
6915	0.780	7305	0.780	7695	0.780	8085	0.780	8475	0.780	8865	0.780	9255	0.780	9645	0.780	10035	0.780
6930	0.780	7320	0.780	7710	0.780	8100	0.780	8490	0.780	8880	0.780	9270	0.780	9660	0.780	10050	0.780
6945	0.780	7335	0.780	7725	0.780	8115	0.780	8505	0.780	8895	0.780	9285	0.780	9675	0.780	10065	0.780
6960	0.780	7350	0.780	7740	0.780	8130	0.780	8520	0.780	8910	0.780	9300	0.780	9690	0.780	10080	0.780
6975	0.780	7365	0.780	7755	0.780	8145	0.780	8535	0.780	8925	0.780	9315	0.780	9705	0.780		
6990	0.780	7380	0.780	7770	0.780	8160	0.780	8550	0.780	8940	0.780	9330	0.780	9720	0.780		

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	S4-3	34	42.798	0.670	47.8	0.9581	0.0000	SURCHARGED
60 minute summer	S4-4	34	42.790	0.739	71.0	1.0570	0.0000	SURCHARGED
60 minute summer	S4-5	34	42.774	0.780	116.6	1.1167	0.0000	SURCHARGED
60 minute summer	S4-6	34	42.739	0.791	115.7	1.1322	0.0000	SURCHARGED
60 minute summer	S4-7	35	42.913	0.480	22.1	0.6872	0.0000	SURCHARGED
60 minute summer	S4-8	35	42.889	0.568	36.6	0.8125	0.0000	SURCHARGED
60 minute summer	S4-9	35	42.819	0.559	35.4	0.7993	0.0000	SURCHARGED
60 minute summer	S4-10	34	42.714	0.790	148.5	1.1301	0.0000	SURCHARGED
60 minute summer	S4-11	34	42.651	0.774	216.4	1.1078	0.0000	SURCHARGED
720 minute winter	S4-12	705	42.542	0.703	21.3	1.0059	0.0000	SURCHARGED
720 minute winter	S4-13	705	42.542	0.805	25.3	1.4224	0.0000	SURCHARGED
720 minute winter	S4-14	705	42.542	0.523	0.1	0.7484	0.0000	SURCHARGED
720 minute winter	S4-15	705	42.542	0.893	25.2	1.5779	0.0000	SURCHARGED
720 minute winter	S4-16	705	42.542	0.923	29.0	2.3490	0.0000	SURCHARGED
720 minute winter	Basin 4 - HW1	705	42.542	0.985	39.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	S4-3	1.000	S4-4	45.2	0.540	0.283	4.9477	
60 minute summer	S4-4	1.001	S4-5	69.7	0.504	0.437	3.6618	
60 minute summer	S4-5	1.002	S4-6	115.7	0.730	0.690	2.6809	
60 minute summer	S4-6	1.003	S4-10	114.7	0.724	0.712	1.5123	
60 minute summer	S4-7	2.000	S4-8	20.5	0.741	0.408	0.4785	
60 minute summer	S4-8	2.001	S4-9	35.4	1.008	0.890	0.4110	
60 minute summer	S4-9	2.002	S4-10	36.4	1.028	0.914	0.7486	
60 minute summer	S4-10	1.004	S4-11	147.7	0.932	0.921	2.9875	
60 minute summer	S4-11	1.005	S4-12	215.6	1.361	1.349	2.4335	
720 minute winter	S4-12	1.006	S4-13	21.2	0.537	0.131	1.7026	
720 minute winter	S4-13	1.007	S4-15	25.2	0.417	0.116	9.3454	
720 minute winter	S4-14	3.000	S4-15	-0.1	-0.010	-0.002	0.4422	
720 minute winter	S4-15	1.008	S4-16	25.1	0.401	0.114	3.1288	
720 minute winter	S4-16	1.009	Basin 4 - HW1	28.8	0.502	0.131	1.9752	
720 minute winter	Basin 4 - HW1	Flow through Pond	Basin 4 - HW2	15.2	0.029	0.000	793.5754	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.50%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Basin 4 - HW2	705	42.542	1.055	30.5	0.0000	0.0000	SURCHARGED
720 minute winter	S4-18 Control	705	42.542	1.073	5.8	4.8538	0.0000	SURCHARGED
60 minute summer	S4-Outlet	1	41.750	0.530	5.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	Basin 4 - HW2	4.000	S4-18 Control	5.8	0.301	0.053	0.6409	
720 minute winter	S4-18 Control	4.001	S4-Outlet	5.7	0.052	0.043	6.2236	627.9

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.250
Return Period (years)	2	Maximum Rainfall (mm/hr)	550.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	9.990		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S4-3	0.078	5.00	43.465	1350	473322.833	167393.844	1.337
S4-4	0.043	5.00	43.892	1350	473296.143	167377.633	1.841
S4-5	0.080	5.00	43.843	1350	473283.463	167358.311	1.849
S4-6			43.620	1350	473278.150	167342.247	1.672
S4-7	0.036	5.00	43.908	1350	473269.391	167292.571	1.475
S4-8	0.028	5.00	43.790	1350	473273.442	167303.901	1.469
S4-9			43.688	1350	473275.389	167314.051	1.428
S4-10			43.522	1350	473277.899	167332.705	1.598
S4-11	0.118	5.00	43.680	1350	473296.720	167331.569	1.803
S4-12			43.830	1350	473311.080	167326.120	1.991
S4-13	0.067	5.00	43.787	1500	473321.482	167323.421	2.050
S4-14		5.00	43.316	1350	473364.416	167335.239	1.297
S4-15			43.246	1500	473364.735	167324.125	1.597
S4-16	0.064	5.00	43.065	1800	473379.212	167324.540	1.446
Basin 4 - HW1	0.172		43.000		473385.248	167331.407	1.443
Basin 4 - HW2	0.251	5.00	43.000		473420.898	167328.336	1.513
S4-18 Control			43.100	2400	473425.024	167324.244	1.631
S4-Outlet			41.750		473478.222	167305.434	0.530

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S4-3	S4-4	31.227	0.600	42.128	42.051	0.077	405.6	450	5.52	49.2
1.001	S4-4	S4-5	23.111	0.600	42.051	41.994	0.057	405.5	450	5.90	47.6
1.002	S4-5	S4-6	16.920	0.600	41.994	41.948	0.046	367.8	450	6.17	46.6
1.003	S4-6	S4-10	9.545	0.600	41.948	41.924	0.024	397.7	450	6.33	46.0
2.000	S4-7	S4-8	12.032	0.600	42.433	42.321	0.112	107.4	225	5.16	50.7
2.001	S4-8	S4-9	10.335	0.600	42.321	42.260	0.061	169.4	225	5.33	50.0
2.002	S4-9	S4-10	18.822	0.600	42.260	42.149	0.111	169.6	225	5.64	48.7
1.004	S4-10	S4-11	18.855	0.600	41.924	41.877	0.047	401.2	450	6.64	45.0
1.005	S4-11	S4-12	15.359	0.600	41.877	41.839	0.038	404.2	450	6.89	44.1
1.006	S4-12	S4-13	10.746	0.600	41.839	41.812	0.027	398.0	450	7.07	43.5
1.007	S4-13	S4-15	43.259	0.600	41.737	41.649	0.088	491.6	525	7.79	41.5
3.000	S4-14	S4-15	11.119	0.600	42.019	41.949	0.070	158.8	225	5.18	50.6
1.008	S4-15	S4-16	14.483	0.600	41.649	41.619	0.030	482.8	525	8.03	40.8
1.009	S4-16	Basin 4 - HW1	9.143	0.600	41.619	41.600	0.019	481.2	525	8.18	40.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.003	159.5	10.4	0.887	1.391	0.078	0.0	77	0.573
1.001	1.003	159.6	15.6	1.391	1.399	0.121	0.0	94	0.646
1.002	1.054	167.6	25.4	1.399	1.222	0.201	0.0	117	0.767
1.003	1.013	161.1	25.1	1.222	1.148	0.201	0.0	119	0.743
2.000	1.261	50.1	5.0	1.250	1.244	0.036	0.0	48	0.812
2.001	1.001	39.8	8.7	1.244	1.203	0.064	0.0	71	0.802
2.002	1.001	39.8	8.4	1.203	1.148	0.064	0.0	70	0.796
1.004	1.009	160.4	32.3	1.148	1.353	0.265	0.0	137	0.797
1.005	1.005	159.8	45.9	1.353	1.541	0.384	0.0	165	0.873
1.006	1.013	161.1	45.3	1.541	1.525	0.384	0.0	162	0.873
1.007	1.003	217.2	50.7	1.525	1.072	0.451	0.0	171	0.824
3.000	1.035	41.1	0.0	1.072	1.072	0.000	0.0	0	0.000
1.008	1.012	219.2	49.9	1.072	0.921	0.451	0.0	169	0.826
1.009	1.014	219.5	56.4	0.921	0.875	0.515	0.0	181	0.855

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
4.000	Basin 4 - HW2	S4-18 Control	5.811	0.600	41.487	41.469	0.018	322.8	375	5.10	51.0
4.001	S4-18 Control	S4-Outlet	56.426	0.600	41.469	41.220	0.249	226.6	375	5.88	47.7

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
4.000	1.003	110.7	34.7	1.138	1.256	0.251	0.0	144	0.891
4.001	1.199	132.4	32.5	1.256	0.155	0.251	0.0	126	0.996

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	31.227	405.6	450	ADOPTABLE	43.465	42.128	0.887	43.892	42.051	1.391
1.001	23.111	405.5	450	ADOPTABLE	43.892	42.051	1.391	43.843	41.994	1.399
1.002	16.920	367.8	450	ADOPTABLE	43.843	41.994	1.399	43.620	41.948	1.222
1.003	9.545	397.7	450	ADOPTABLE	43.620	41.948	1.222	43.522	41.924	1.148
2.000	12.032	107.4	225	ADOPTABLE	43.908	42.433	1.250	43.790	42.321	1.244
2.001	10.335	169.4	225	ADOPTABLE	43.790	42.321	1.244	43.688	42.260	1.203
2.002	18.822	169.6	225	ADOPTABLE	43.688	42.260	1.203	43.522	42.149	1.148
1.004	18.855	401.2	450	ADOPTABLE	43.522	41.924	1.148	43.680	41.877	1.353

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S4-3	1350	Manhole	Adoptable	S4-4	1350	Manhole	Adoptable
1.001	S4-4	1350	Manhole	Adoptable	S4-5	1350	Manhole	Adoptable
1.002	S4-5	1350	Manhole	Adoptable	S4-6	1350	Manhole	Adoptable
1.003	S4-6	1350	Manhole	Adoptable	S4-10	1350	Manhole	Adoptable
2.000	S4-7	1350	Manhole	Adoptable	S4-8	1350	Manhole	Adoptable
2.001	S4-8	1350	Manhole	Adoptable	S4-9	1350	Manhole	Adoptable
2.002	S4-9	1350	Manhole	Adoptable	S4-10	1350	Manhole	Adoptable
1.004	S4-10	1350	Manhole	Adoptable	S4-11	1350	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.005	15.359	404.2	450	ADOPTABLE	43.680	41.877	1.353	43.830	41.839	1.541
1.006	10.746	398.0	450	ADOPTABLE	43.830	41.839	1.541	43.787	41.812	1.525
1.007	43.259	491.6	525	ADOPTABLE	43.787	41.737	1.525	43.246	41.649	1.072
3.000	11.119	158.8	225	ADOPTABLE	43.316	42.019	1.072	43.246	41.949	1.072
1.008	14.483	482.8	525	ADOPTABLE	43.246	41.649	1.072	43.065	41.619	0.921
1.009	9.143	481.2	525	ADOPTABLE	43.065	41.619	0.921	43.000	41.600	0.875
4.000	5.811	322.8	375	ADOPTABLE	43.000	41.487	1.138	43.100	41.469	1.256
4.001	56.426	226.6	375	ADOPTABLE	43.100	41.469	1.256	41.750	41.220	0.155

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.005	S4-11	1350	Manhole	Adoptable	S4-12	1350	Manhole	Adoptable
1.006	S4-12	1350	Manhole	Adoptable	S4-13	1500	Manhole	Adoptable
1.007	S4-13	1500	Manhole	Adoptable	S4-15	1500	Manhole	Adoptable
3.000	S4-14	1350	Manhole	Adoptable	S4-15	1500	Manhole	Adoptable
1.008	S4-15	1500	Manhole	Adoptable	S4-16	1800	Manhole	Adoptable
1.009	S4-16	1800	Manhole	Adoptable	Basin 4 - HW1		Junction	
4.000	Basin 4 - HW2		Junction		S4-18 Control	2400	Manhole	Adoptable
4.001	S4-18 Control	2400	Manhole	Adoptable	S4-Outlet		Junction	

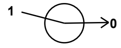
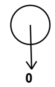
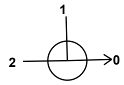
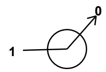
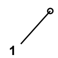
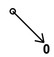
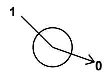
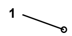
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S4-3	473322.833	167393.844	43.465	1.337	1350	0	1.000	42.128	450
S4-4	473296.143	167377.633	43.892	1.841	1350	1	1.000	42.051	450
						0	1.001	42.051	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S4-5	473283.463	167358.311	43.843	1.849	1350	1	1.001	41.994	450
						0	1.002	41.994	450
S4-6	473278.150	167342.247	43.620	1.672	1350	1	1.002	41.948	450
						0	1.003	41.948	450
S4-7	473269.391	167292.571	43.908	1.475	1350	0	2.000	42.433	225
S4-8	473273.442	167303.901	43.790	1.469	1350	1	2.000	42.321	225
						0	2.001	42.321	225
S4-9	473275.389	167314.051	43.688	1.428	1350	1	2.001	42.260	225
						0	2.002	42.260	225
S4-10	473277.899	167332.705	43.522	1.598	1350	1	2.002	42.149	225
						2	1.003	41.924	450
						0	1.004	41.924	450
S4-11	473296.720	167331.569	43.680	1.803	1350	1	1.004	41.877	450
						0	1.005	41.877	450
S4-12	473311.080	167326.120	43.830	1.991	1350	1	1.005	41.839	450
						0	1.006	41.839	450

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S4-13	473321.482	167323.421	43.787	2.050	1500		1	1.006	41.812	450
							0	1.007	41.737	525
S4-14	473364.416	167335.239	43.316	1.297	1350		0	3.000	42.019	225
S4-15	473364.735	167324.125	43.246	1.597	1500		1	3.000	41.949	225
							2	1.007	41.649	525
							0	1.008	41.649	525
S4-16	473379.212	167324.540	43.065	1.446	1800		1	1.008	41.619	525
							0	1.009	41.619	525
Basin 4 - HW1	473385.248	167331.407	43.000	1.443			1	1.009	41.600	525
Basin 4 - HW2	473420.898	167328.336	43.000	1.513			0	4.000	41.487	375
S4-18 Control	473425.024	167324.244	43.100	1.631	2400		1	4.000	41.469	375
							0	4.001	41.469	375
S4-Outlet	473478.222	167305.434	41.750	0.530			1	4.001	41.220	375