



PRIORS FARM

DIRECT RAINFALL MODELLING REPORT

LIGHTWOOD STRATEGIC LTD

22 September 2025





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Date:	22 September 2025
Document Reference:	A218- R045

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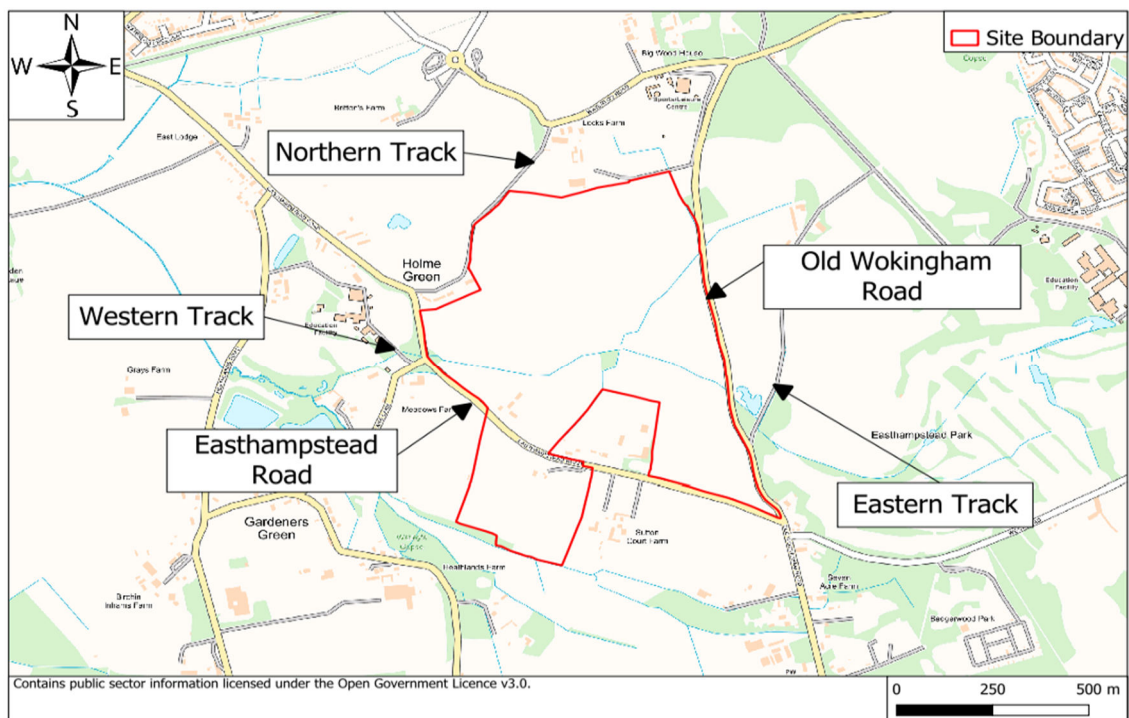
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1 Introduction

1.1 Background

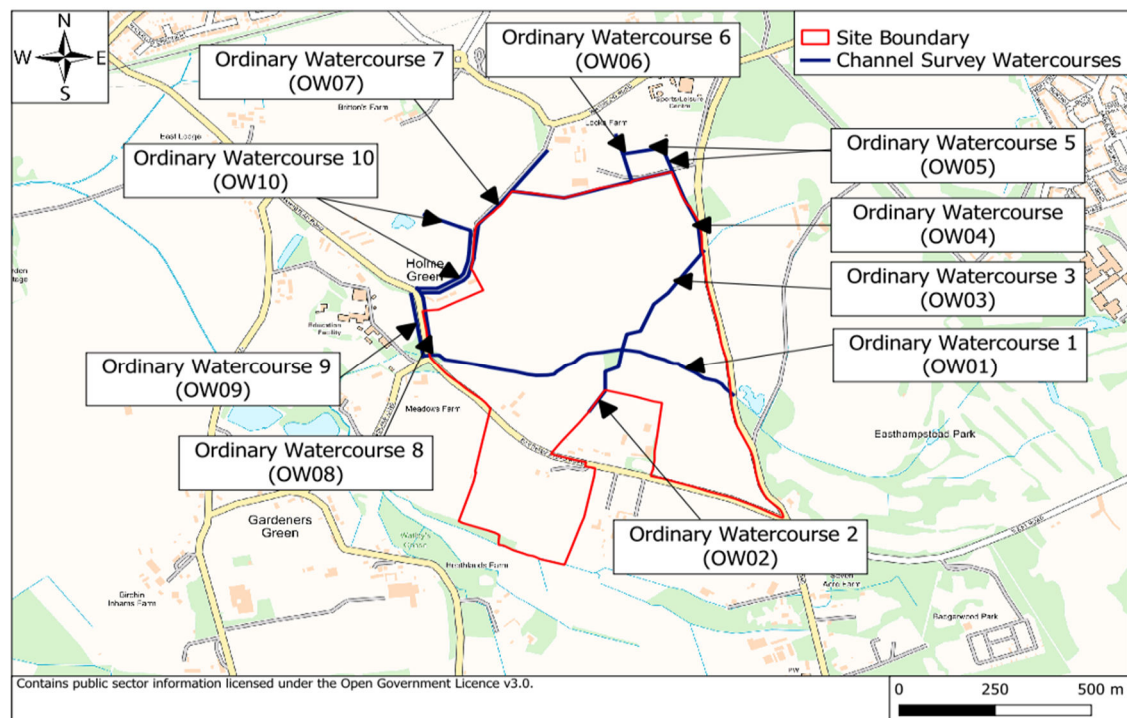
- 1.1.1 This direct rainfall modelling report has been prepared by Abley Letchford, on behalf of Lightwood Strategic Ltd for Priors Farm, South Wokingham.
- 1.1.2 This direct rainfall modelling report sets out the data and methods used to create a site-specific baseline model to represent the site-specific conditions. This report also sets out the baseline model results to define the surface water flood extents.
- 1.1.3 **Figure 1** shows the location of the site and catchment.

Figure 1: Site Location Plan



- 1.1.4 **Figure 2** shows the channel survey watercourses, labelled from Ordinary Watercourse 1 (OW01) through to Ordinary Watercourse 10 (OW10). There is survey data for Ordinary Watercourses 12 to 15 included in the channel survey provided by the surveyors. These watercourses have not been included within this study as they were located outside of the catchment boundary and did not influence the flood risk within the catchment as flowed in a north westerly direction.

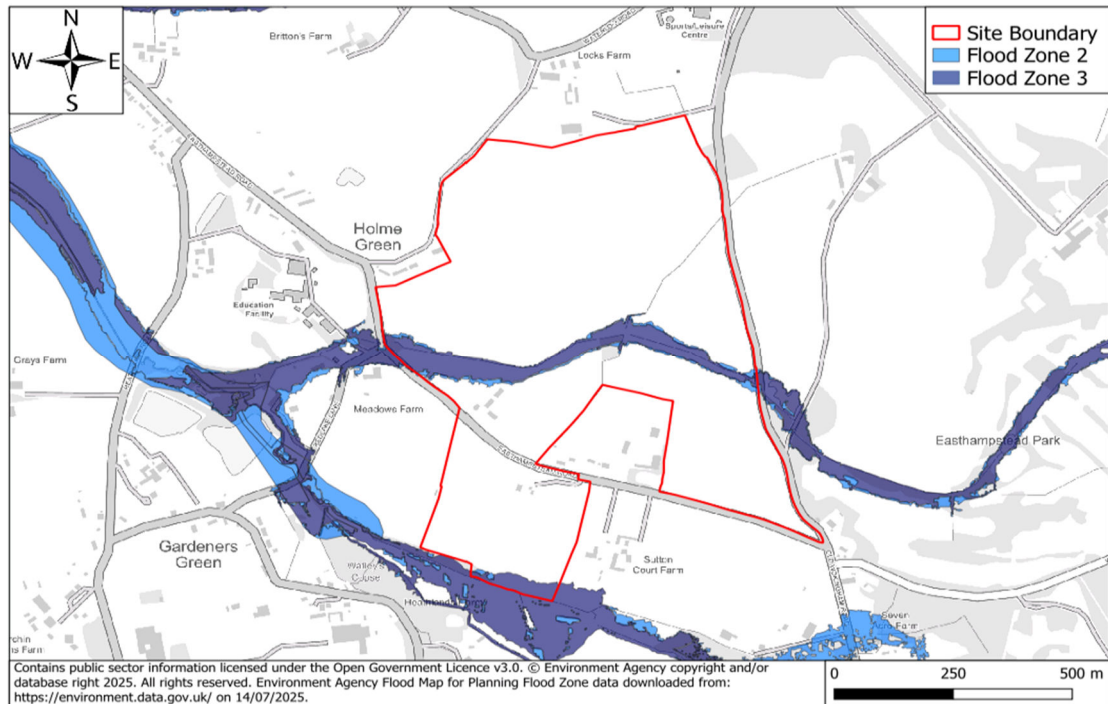
Figure 2: Channel Survey Watercourses



1.2 Environment Agency Flood Risk Mapping

1.2.1 **Figure 3** shows the Environment Agency (EA) Flood Map for Planning.

Figure 3: EA Flood Map for Planning

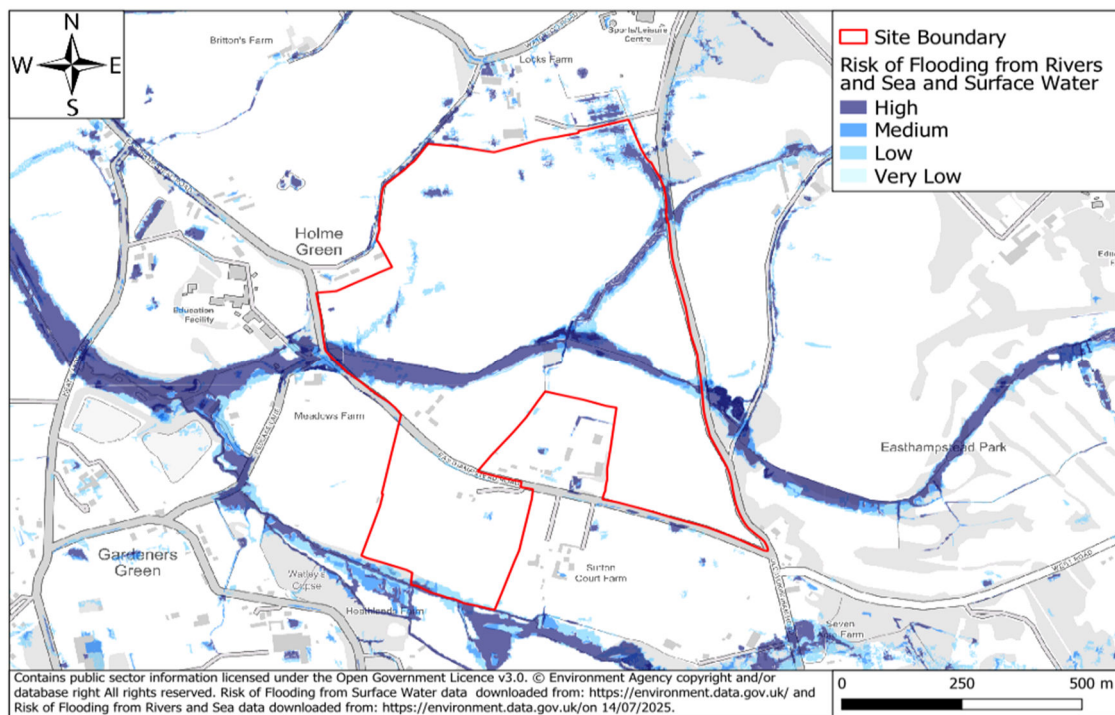


- 1.2.2 The EA Flood Map for Planning, as shown in **Figure 3**, shows that the majority of the site is located within Flood Zone 1 and therefore is at a very low risk of flooding from rivers and sea. The land immediately surrounding Ordinary Watercourse (OW01) is located within Flood Zones 2 and 3.
- 1.2.3 There is also an area in the south of the site, on the southern boundary that is located in Flood Zones 2 and 3. This is associated with Emm Brook.
- 1.2.4 Both of these areas of potential risk of flooding from rivers and seas are aligned with the location of the existing watercourses through the site. Downstream of the site there are some unusual flood extents features that do not correlate to the information in the LiDAR data or site observations.
- 1.2.5 There are clear gaps in the Flood Zone 3 data to the east and west of Heathlands Road. The location of Flood Zone 2 flooding around Redlake Lane does not correspond with the location of Flood Zone 3 flooding in that area. It appears that Flood Zone 3 has been defined by strategic scale JFLOW modelling, whilst Flood Zone 2 may have been defined by a historic flood outline.
- 1.2.6 The topographical survey and observations from the site walkover identified a number of watercourses within the site which are not included in the Flood Zone mapping. This is due to them being Ordinary Watercourses as opposed to Main Rivers which is the primary focus of the EA flood zone mapping.

1.2.7 Based on site observations and data, the EA's flood zone mapping does not appear to be a true reflection of the site's conditions or representative of specific local structures and their impacts on flooding extents.

1.2.8 **Figure 4** shows the NaFRA Risk of Flooding from Surface Water and Rivers and Sea.

Figure 4: NaFRA Risk of Flooding from Surface Water and Rivers and Sea



1.2.9 The NaFRA study includes two datasets: Risk of Flooding from Rivers and Sea (RoFRS) and Risk of Flooding from Surface Water (RoFSW). In this area the RoFRS only covers OW01. RoFSW covers the remainder of the site including the smaller watercourses; as such it is not truly limited to surface water flooding. It is therefore most sensible to consider the two datasets together to get a full understanding of the risk of flooding from fluvial and surface water sources across the site, and thus inform the development strategy for the site.

1.2.10 **Figure 4** shows there are key areas of flooding from surface water and rivers and sea across the site.

1.2.11 Similarly to **Figure 3**, there is flooding shown along the extent of OW01 and along the immediate area of the watercourse. This flood extent is categorised as high flood risk for the majority of the watercourse extent with an area of lesser flood extent at the upstream and eastern site boundary where it is categorised as high in the channel and low surrounding the channel.

1.2.12 The surface water mapping shows a surface water flow route that extends from the northeastern boundary to the centre of the site. Here there are areas of high, medium and low flood risk from surface water. This surface water flow route follows the channel and wider corridor of OW03. Central to the channel the flooding is categorised as high and the surrounding land of the channel, is categorised as low risk from surface water.

1.2.13 In the north-eastern corner of the site a surface water flow route is shown, both within the site and the land immediately to the north of the site. The EA surface water modelling is a strategic dataset



therefore does not pick up the localised drainage features. Based on site observations and survey data, we would expect the surface water coming from the north of the site to be intercepted, conveyed and stored with the ditch system along the northern and then eastern boundaries of the site.

- 1.2.14 Another area of surface water flooding is within the west of the site. This area does not have an associated watercourse, channel or ditch. The flow route flows in a southerly direction into OW01. The catchment for this flow route is entirely within the site boundary.
- 1.2.15 There is an area of low and medium risk of surface water flooding along the site's southern parcel's southern boundary, associated with Emm Brook which flows to the south of the site.
- 1.2.16 There are a few isolated areas across the site which have a low risk of surface water flooding. These areas are associated with localised areas of low ground where surface water may pond.
- 1.2.17 The EA mapping, due to its national-scale strategic nature, does not necessarily consider any site-specific local information, land drainage or include local features, structures or additional watercourses. The mapping therefore provides a guide to vulnerable areas based on the topography of the area and not a detailed assessment of surface water flooding for a specific site. Abley Letchford's assessment will consider site specific features to more accurately define the baseline surface water flood extents across the site suitable to inform a site specific FRA.

1.3 Scope

- 1.3.1 The scope of works includes the following:
 - Undertake a hydrological assessment to estimate the catchment to the site and generate rainfall hyetograph for the relevant return periods.
 - Build a new direct rainfall model with defined channels for the catchment using the best available data to refine the baseline surface water flood extents.
 - Run the model for the following return periods; 1 in 30, 1 in 100, 1 in 1,000 annual probability scenarios.
 - To assess the impact of climate change, the 1 in 100 annual probability scenario has been modelled with the most recent climate change allowances for the Loddon and Tributaries Management Catchment. A +40% climate change allowance has been applied for the 1 in 100 annual probability scenario which represents the Upper End peak rainfall allowance for the Loddon and Tributaries Management Catchment.
 - The key aim of this modelling study is to better define the surface water flood extents using site specific topographical data which considers the local features within the site and catchment in conjunction with local knowledge and site observations. The baseline model will then be used to inform the understanding of the flooding regime within the site and inform the development strategy.



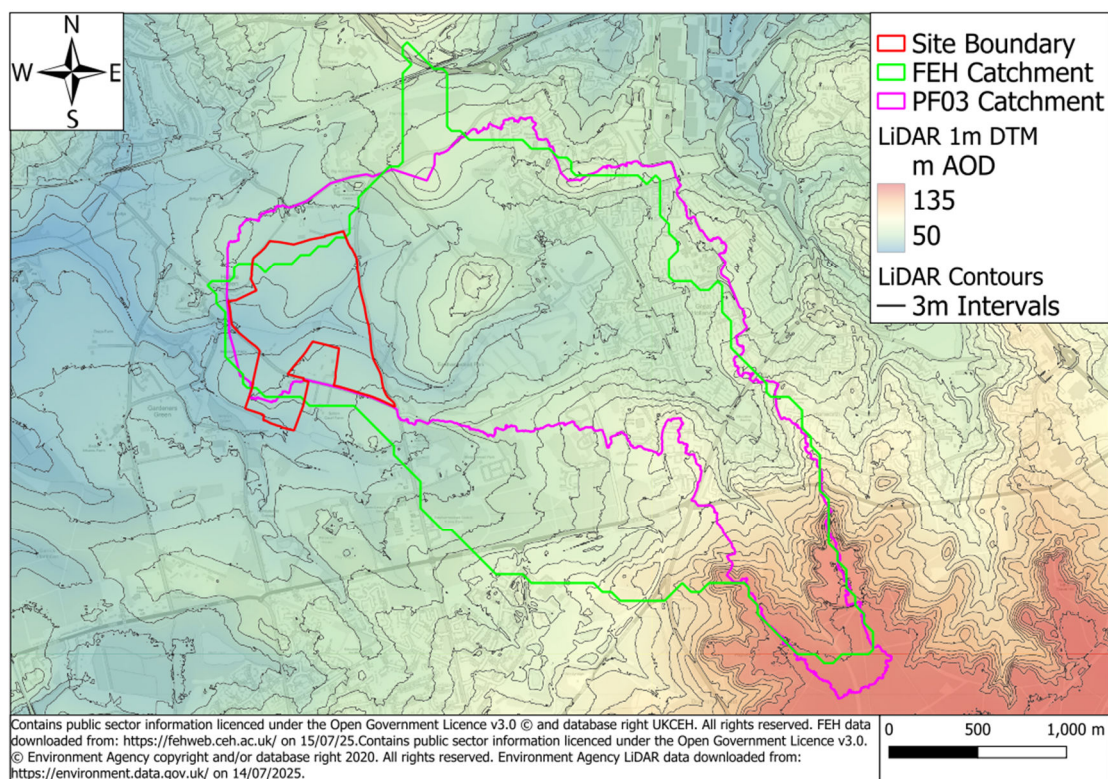
2 Hydrological Assessment

- 2.1.1 Full details for the hydrological assessment methodology and application can be found in the Abley Letchford Hydrological Assessment in **Appendix A**. A summary of the hydrological assessment is included within this chapter.
- 2.1.2 The hydrological study derived hyetograph estimates at the downstream extent of the site. The catchment was obtained from the Flood Estimation Handbook (FEH) webservice and updated where appropriate.
- 2.1.3 The study derived hyetographs for the following return periods; 1 in 30, 1 in 100 and 1 in 1,000 annual probability. To assess the impact of climate change, the 1 in 100 annual probability scenario was modelled with the most recent climate change allowances for the Loddon and Tributaries Management Catchment which is 40%.
- 2.1.4 The hydrological analysis was completed using ReFH2 version 2.3.

2.2 Hydrological Inflow Boundaries

- 2.2.1 The catchment was downloaded from the FEH Webservice.
- 2.2.2 The FEH catchment was adjusted using OS mapping, LiDAR data, EA indicative watershed dataset and site observations to derive the catchment draining through Priors Farm (PF03 catchment). The PF03 catchment deemed to be representative of the actual catchment through the area of interest. The FEH catchment area was 5.9km². The PF03 catchment has an area of 4.8km².
- 2.2.3 **Figure 4** shows the extent of the FEH catchment and PF03 catchment.

Figure 5: FEH Catchment and PF03 Catchment Extents



2.3 Catchment Descriptors

- 2.3.1 A review of the FEH Webservice catchment descriptors was carried out. A summary of key catchment descriptors and updates and summarised in **Table 1**. Red text in the table denotes catchment descriptors which have been updated from the FEH catchment descriptors. Further details of the checks and updates made to the catchment descriptors are provided below the table.



Table 1: Catchment Descriptors

Catchment Descriptor	FEH Catchment Descriptor	PF03 Catchment Descriptor
AREA	5.9km ²	4.8km ²
BFIHOST	0.445	0.445
BFIHOST19	0.468	0.468
DPLBAR	2.65	2.36
DPSBAR	23.80	23.80
FARL	1	1
FPEXT	0.12	0.12
LDP	5.7	5.7
PROPWET	0.29	0.29
SAAR	664	664
SPRHOST	37.68	37.68
URBEXT1990	0.097	0.180
URBEXT2000	0.114	0.180

2.4 Area

- 2.4.1 The FEH catchment area was adjusted for the PF03 catchment using OS mapping, LiDAR data and the EA watershed dataset. The FEH catchment area was 5.9km². The PF03 catchment area is 4.8km². The PF03 catchment area decreased from 5.9 km² to 4.8km², a decrease of 1.1 km². The difference in the catchment area between the FEH catchment and PF03 catchment is in the southern part of the FEH catchment. The FEH catchment appears to include an area which would drain to the Emm Brook catchment, to the south of the site therefore it was excluded from the PF03 catchment.

2.5 BFIHOST and BFIHOST19

- 2.5.1 BFIHOST base flow index is a measure of catchment responsiveness based on the Hydrology of Soil Types (HOST) classification. It indicates the relationship between soil types and the runoff response. Permeable soils and geology tend to yield a higher baseflow.
- 2.5.2 BFIHOST19 is an updated method of classifying BFIHOST which improves on the classification of rarer soil types.
- 2.5.3 The BFIHOST values were reviewed using the Cranfield Soils online viewer. The FEH values were deemed to be reasonable and were accepted. The FEH BFIHOST value were accepted as the soil characteristics are deemed to be representative.



2.6 SPRHOST

- 2.6.1 SPRHOST is the standard percentage runoff associated with each HOST soil class.
- 2.6.2 The FEH SPRHOST values were reviewed using the Cranfield Soils online viewer. The FEH values were deemed to be reasonable and were accepted.

2.7 PROPWET

- 2.7.1 PROPWET is a measure of the proportion of the time that the catchment soils are defined as wet. Wetter regions have higher PROPWET values. Drier regions have lower PROPWET values. The PROPWET value for the FEH catchment is 0.29. The value is considered to be representative of the region that the PF03 catchment is in.

2.8 FARL

- 2.8.1 FARL is a measure of the degree of flood attenuation provided by reservoirs and lakes within a catchment. A value of 1 represents the absence of lakes or reservoirs within the catchment. There are no lakes or reservoirs within the FEH catchment or the PF03 catchment. The FARL value of 1 is therefore considered to be representative for the PF03 catchment.

2.9 URBEXT and URBEXT2000

- 2.9.1 URBEXT and URBEXT2000 is an index of the concentration of urban and suburban areas in 1990 and 2000 respectively expressed as a fraction.
- 2.9.2 OS mapping and aerial photography was reviewed for the PF03 catchment and the URBEXT2000 value adjusted to reflect the suburban areas within the PF03 catchment. The URBEXT2000 value was updated using the FEH Volume 5 Equation 6.2. The urban extents on the FEH Web Service were compared with OS urban extents. FEH does not pick up the urban areas of Jennett's Hill in the northern part of the catchment.
- 2.9.3 The URBEXT2000 value was adjusted from the FEH catchment URBEXT2000 to 0.18 in order to reflect the urbanisation of the PF03 catchment.

2.10 SAAR

- 2.10.1 SAAR is a measure of the average annual rainfall between 1961 and 1990 in millimetres. The FEH catchment is adjacent to the PF03 catchment therefore both catchments will have received similar average rainfall. The SAAR value for the FEH catchment appears reasonable therefore it has been accepted for use for the PF03 catchment.

2.11 DPSBAR

- 2.11.1 DPSBAR is an index for the overall catchment steepness. A value of greater than 300 represents mountainous regions. A value of less than 25 represents flatter regions. The DPSBAR value for the FEH catchment is 23.8. The FEH catchment and PF03 catchment are both relatively flat therefore the DPSBAR for the sites is considered representative.



2.12 ReFH2 Method

- 2.12.1 The ReFH2 method was used to derive hyetographs for the PF03 catchment. The ReFH2 method uses the FEH Webservice catchment descriptors to generate the design hyetographs for the return periods.

2.13 Storm Duration

- 2.13.1 The default ReFH2 rainfall parameters were applied. This approach is an industry standard approach. Rainfall parameters are not typically adjusted unless there is a specific reason to do so. These gave a storm duration of 7.5 hours and a timestep of 0.5 hours. Abley Letchford carried out two sensitivity runs as part of the direct rainfall modelling with storm durations of 5.5 hours and 9.5 hours.
- 2.13.2 The ReFH2 Seasonal Correction Factor (SCF) of 0.69 was used. This was the ReFH2 default value. This approach is industry standard. Parameters are not typically adjusted unless there is a specific reason to do so.
- 2.13.3 The ReFH2 Areas Reduction Factor (ARF) of 0.97 was used. This was the ReFH2 default value. This approach is industry standard. Parameters are not typically adjusted unless there is a specific reason to do so.

2.14 Rainfall Estimates

- 2.14.1 The winter seasonality was selected. This is the appropriate storm profile for rural catchments in England, according to the ReFH2 guidance.
- 2.14.2 The site is located in the Loddon and Tributaries Management Catchment. The relevant climate change allowance is +40% which is the Upper End allowance.

3 Model Approach and Input Data

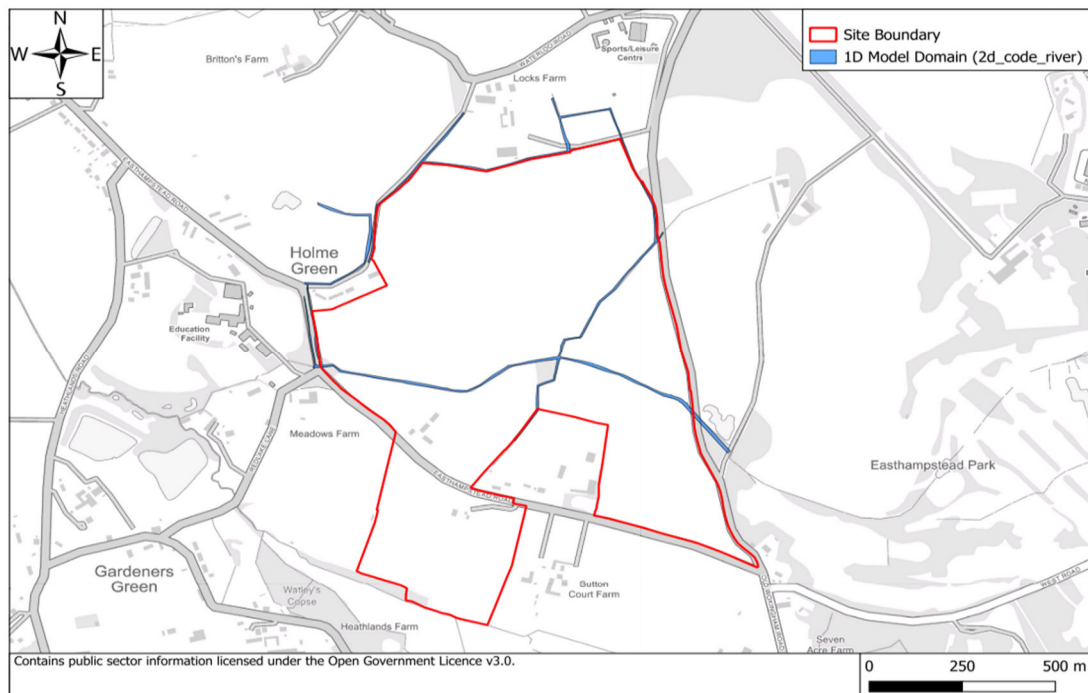
3.1 Model Approach

- 3.1.1 A direct rainfall model with defined channels was constructed using TUFLOW (2025.2.0-iSP-w64). This is the most up-to-date version of TUFLOW at the time of building and running the model.
- 3.1.2 Single precision TUFLOW was used, as is recommended in the TUFLOW manual for direct rainfall models run using HPC GPU.
- 3.1.3 The model log is included in **Appendix B**.

3.2 Model Domains

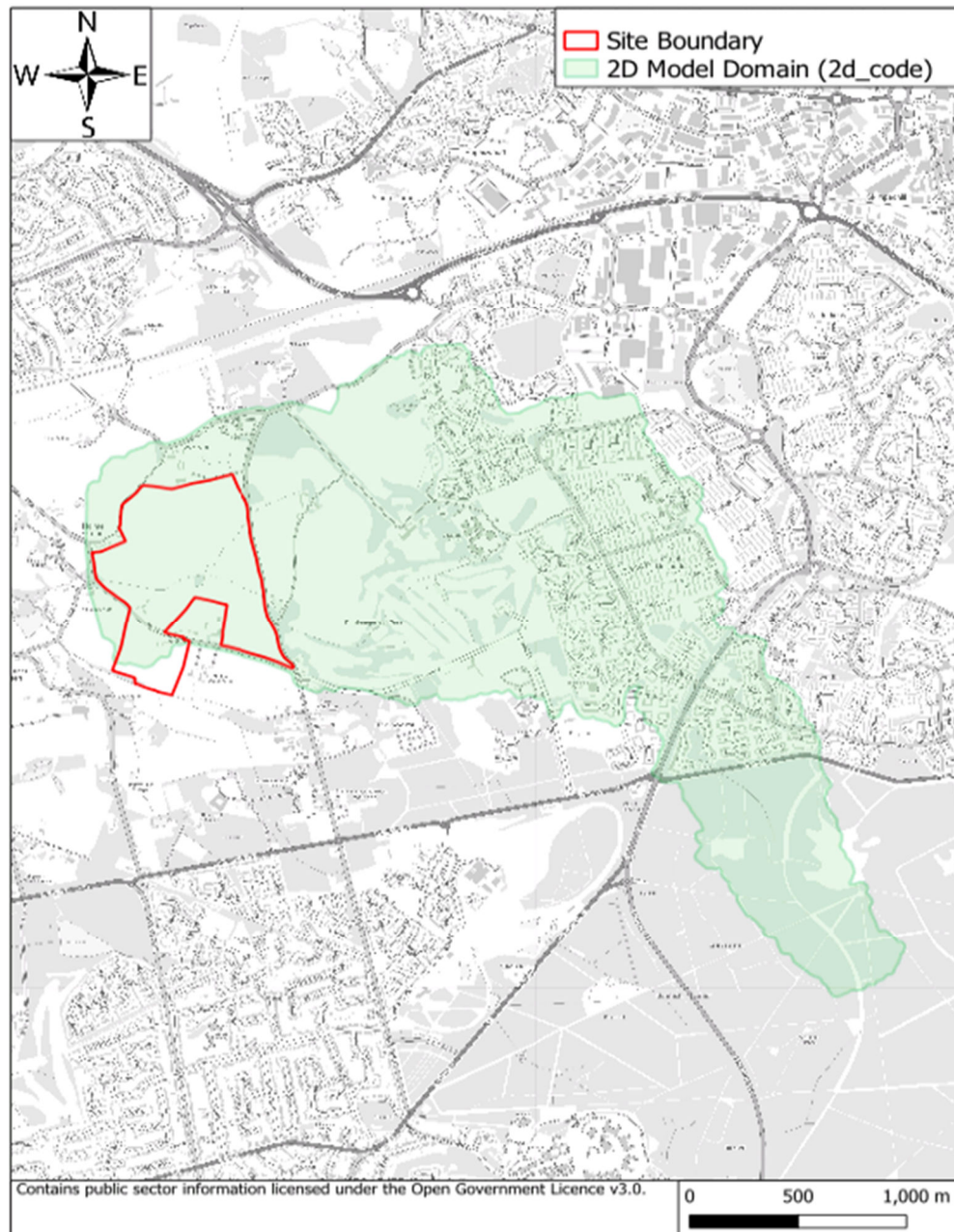
- 3.2.1 **Figure 6** shows the extent of the 1D model domain.

Figure 6: 1D Model Domain



3.2.2 **Figure 7** shows the 2D model extent.

Figure 7: 2D Model Extent





3.2.3 **Figure 7** shows the 2D model extent. There is one 2D model domain.

3.2.4 The 2D model area is 1.2km².

3.2.5 The model domain was set slightly larger than the catchment to ensure that there was no 'glass walling' of flow along the edges of the model.

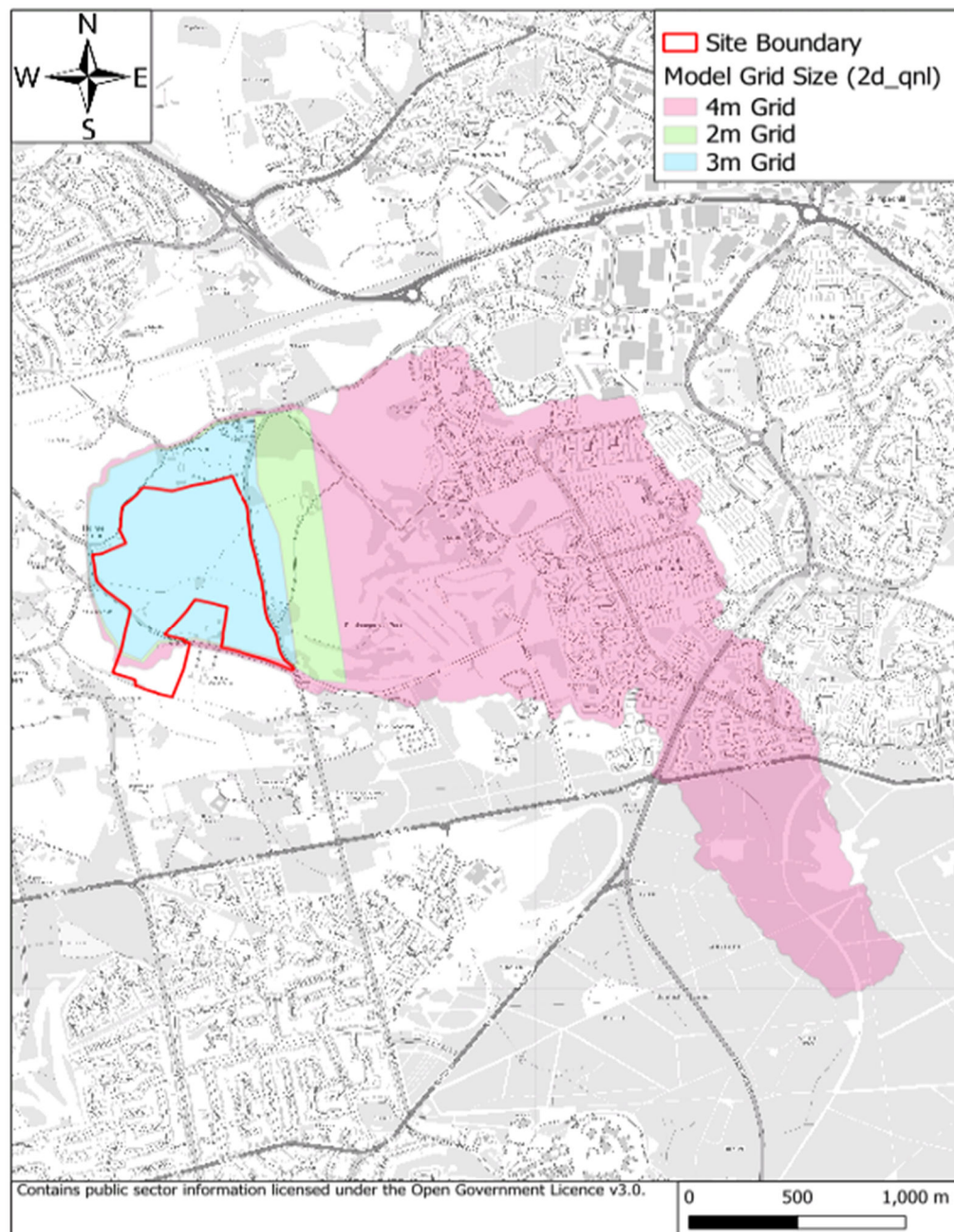
3.3 **Quadtree Model**

3.3.1 A detailed model grid was needed across the site to pick up the detail of the watercourses. However, this led to long model run times when a 1m grid was applied across the whole model. A quadtree layer was used to define the resolution of the model grid across the model.

3.3.2 **Figure 8** shows the location of the 4m grid in the upper parts of the catchment, 2m grid upstream of the site and 1m grid across the site, and area of interest.

3.3.3 The 4m, 2m and 1m grids were used within the baseline model runs and the sensitivity runs.

Figure 8: Quadtree Domain





3.4 Input Data

- 3.4.1 The latest available software and data has been used in the hydraulic model. The data is summarised below.

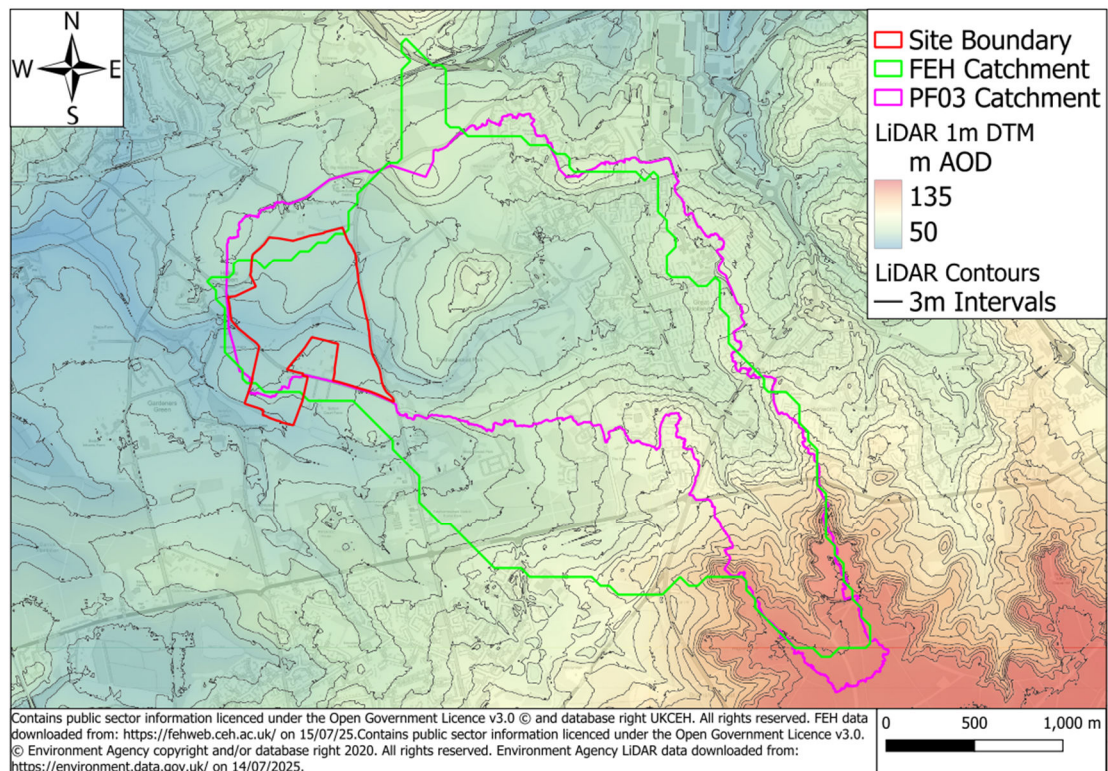
3.5 Hydraulic Software and Data

- 3.5.1 TUFLOW version 2025.2.0-iSP-w64 were used. This is the latest versions of the software at the time of building the model.
- 3.5.2 The hydrological inflows were updated using ReFH2 version 2.3. This is the latest versions of the software.

3.6 LiDAR Data

- 3.6.1 1m DTM LiDAR flown in 2020 was used. This is the best available data at the finest available resolution. The LiDAR data was downloaded from the Defra open-source data service platform on 14th July 2025. **Figure 9** shows the extent of the LiDAR available for the site.

Figure 9: EA LiDAR Coverage

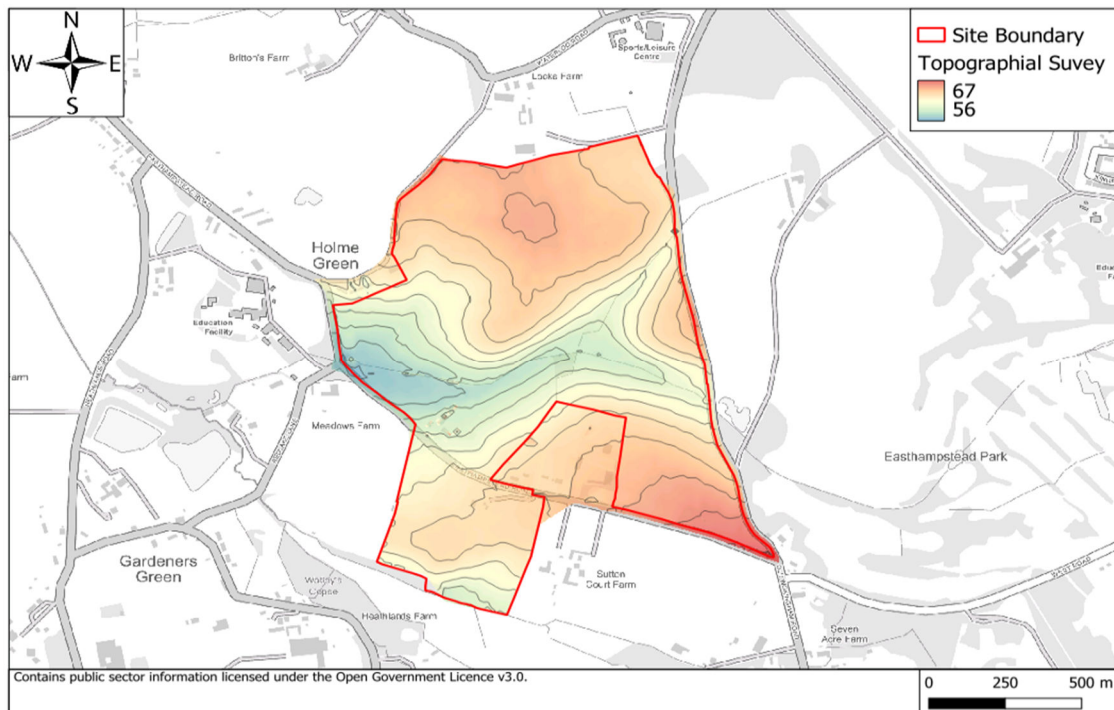


3.7 Ground Model Data

3.7.1 A topographical survey was carried out in June 2022 by Usk Land Survey. A copy of this survey is included in **Appendix C**.

3.7.2 **Figure 10** shows the extent of the topographical survey of the site.

Figure 10: Topographical Survey



3.7.3 The topographical survey has not been used as the ground model for the site. It has just been used to inform bank levels along the 1D channels. The topographical survey was not used as a ground model in the model as there were difference in the ground levels of the LiDAR and topographical survey which can cause unrepresentative flooding along the boundary of the LiDAR and topographical survey. There were also a number of areas where the topographical survey elevations were deemed to be unrepresentative and picked up features such as the rooves around Priors Farm buildings.

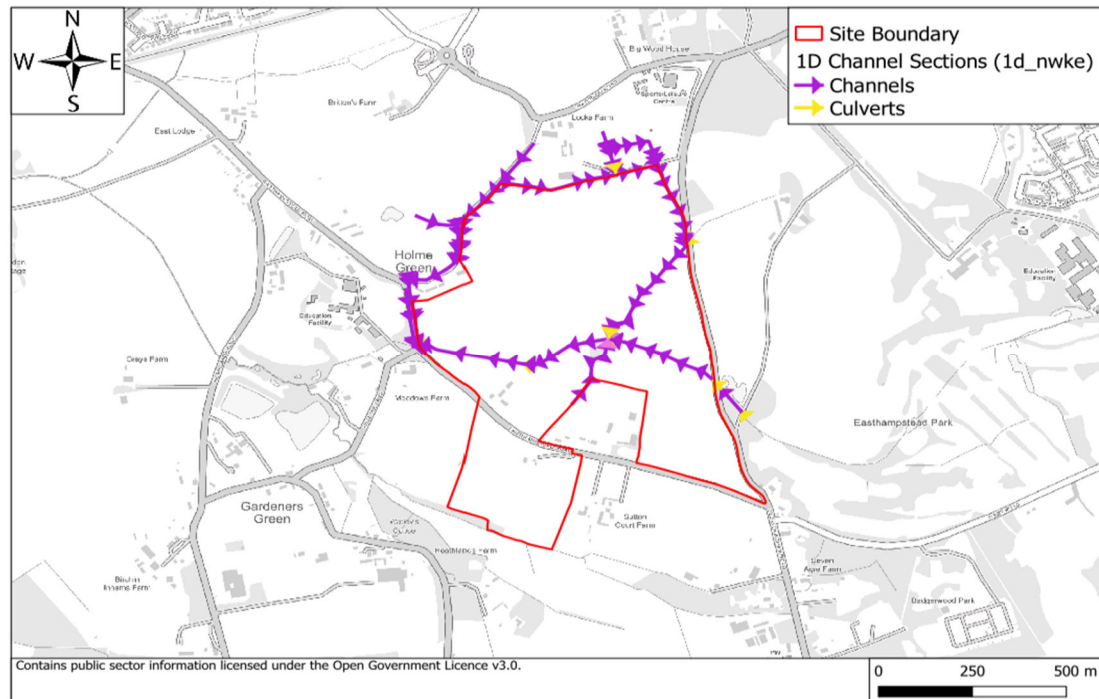
3.8 1D Network

3.8.1 ESTRY was used to define the 1D channel. There are 92 open channel sections and 8 culverts in the model, across the Ordinary Watercourses.

3.8.2 MK Surveys carried out a channel survey of the watercourses through the site in July 2025.

3.8.3 **Figure 11** shows the location of the 1D channel sections.

Figure 11: 1D Channel Section Location

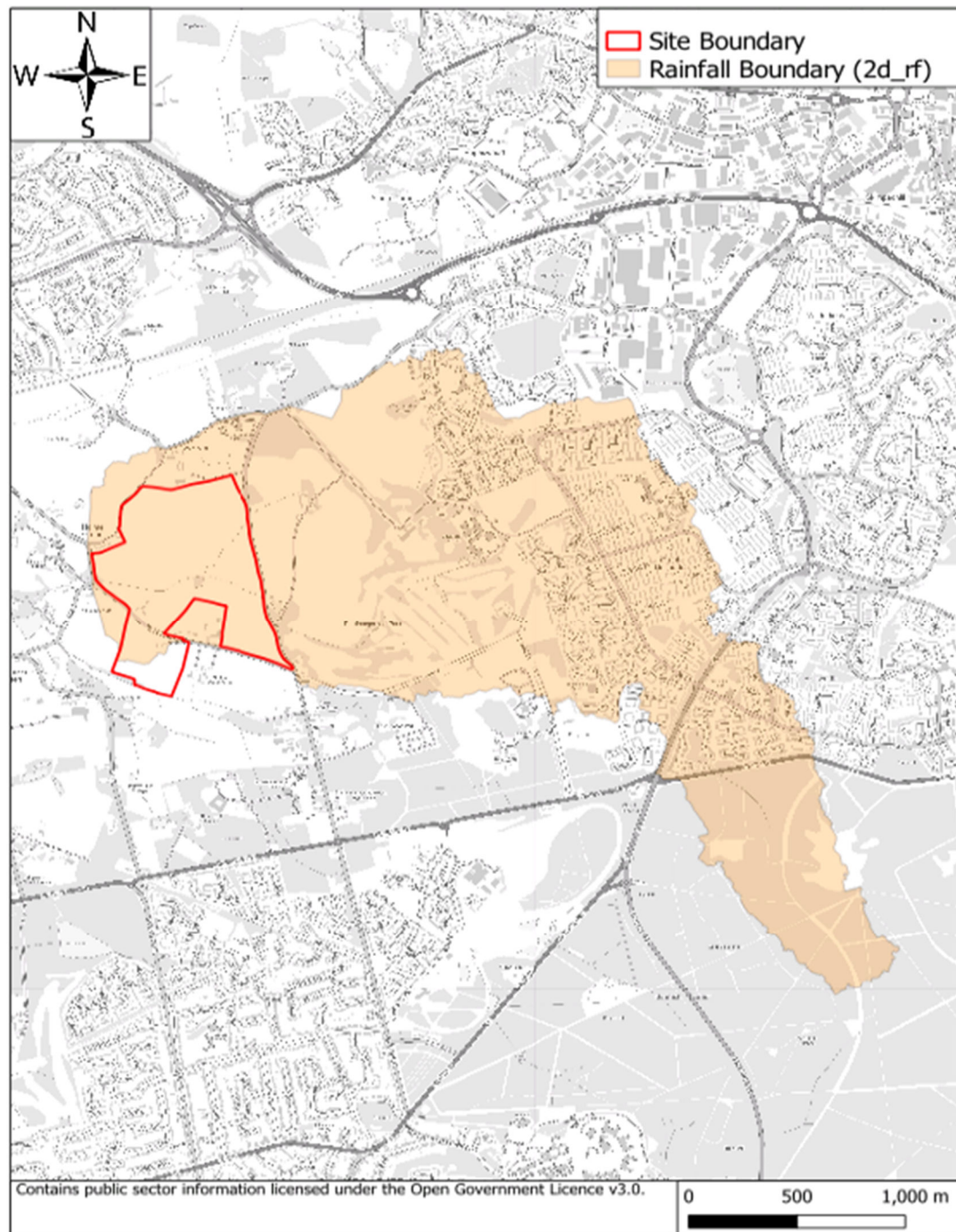


3.9 Inflow Boundaries

3.9.1 The net rainfall was applied uniformly to the model using a 2d_rf boundary across the PF03 catchment. The RF represents the net rainfall.

3.9.2 **Figure 12** shows the extent of the rainfall input.

Figure 12: Rainfall Input Location



3.9.3 The catchment's rainfall boundary is the 2D code layer with a 20m buffer applied.

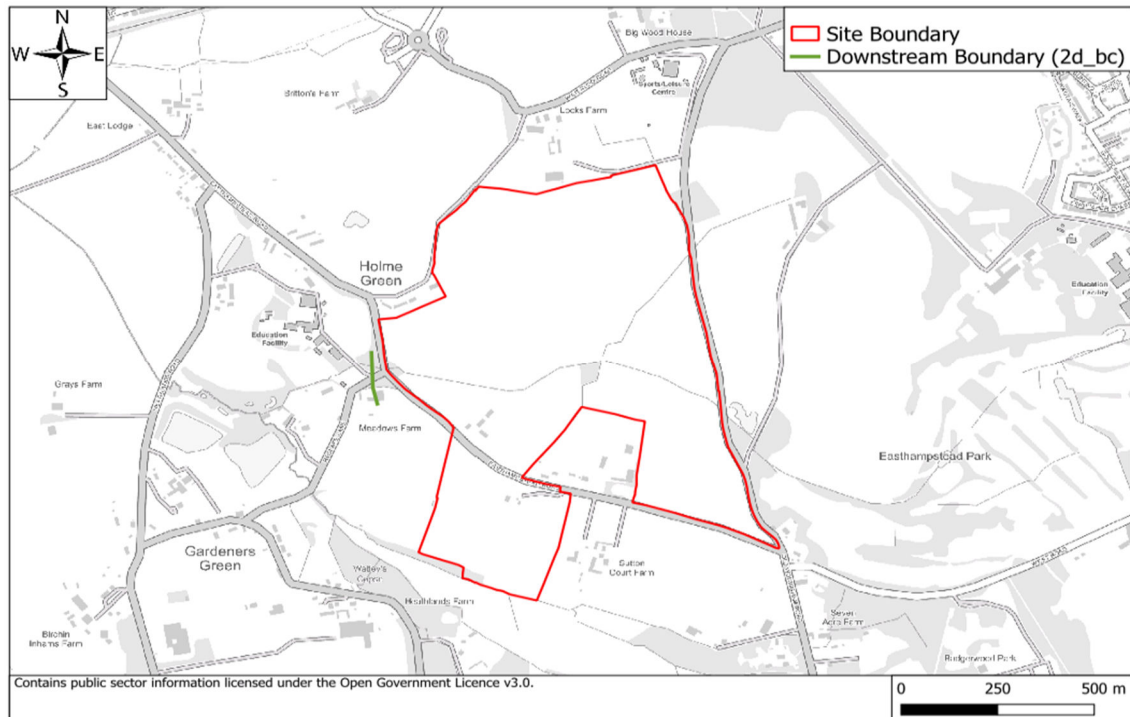
3.10 Downstream Boundary

3.10.1 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.



- 3.10.2 The best practice would be to use modelled data from the Emm Brook which is 350m downstream of the site. A model data request was submitted to the EA. The EA response confirmed that there is no modelled data of the Emm Brook in this area. The nearest downstream model is the River Loddon which was not suitable.
- 3.10.3 The next option would be to use recorded flood level data such as gauged data for OW01. However, this is also not available for this site due to the lack of gauges a suitable distance of the site.
- 3.10.4 Abley Letchford therefore used the slope of the downstream catchment to set the downstream boundary. LiDAR and site observations showed that the slope of the downstream part of the catchment is reasonably uniform therefore this is as reasonable approach to take in the absence of downstream modelled or recorded flood level data.
- 3.10.5 The downstream boundary of the model has been set approximately 40m to the west of the site's western boundary. This downstream boundary is accepted to be sufficiently placed for this modelling study.
- 3.10.6 The downstream boundary's slope was calculated by using the LiDAR ground elevations of the vertical and horizontal measurements of the downstream point of OW01. Sensitivity model runs were also carried out in which a $\pm 20\%$ increase and decrease of the downstream boundary slope was applied.
- 3.10.7 **Figure 13** shows the location of the downstream boundary within the model.

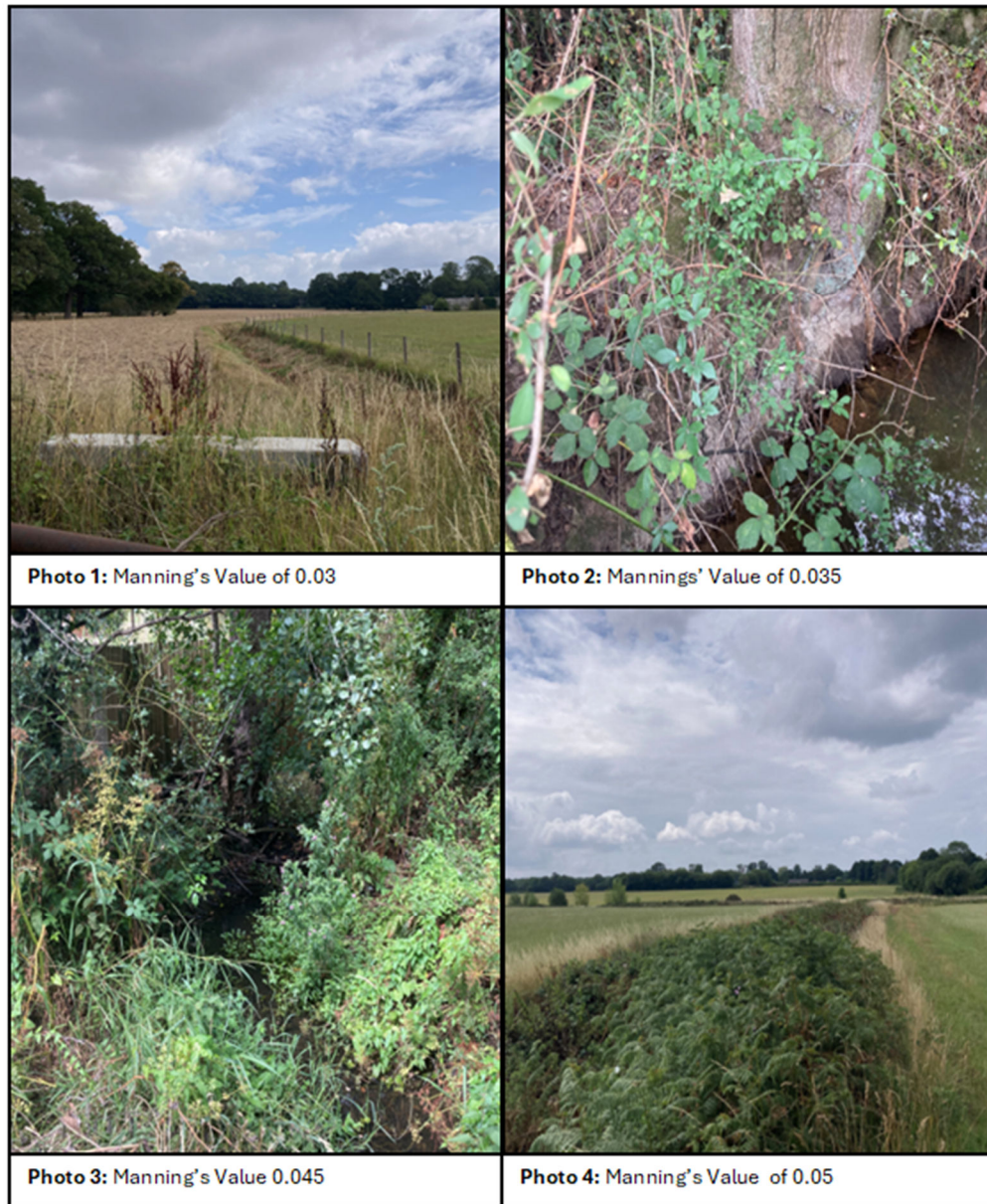
Figure 13: Downstream Boundary of the Model Domain



3.11 Roughness

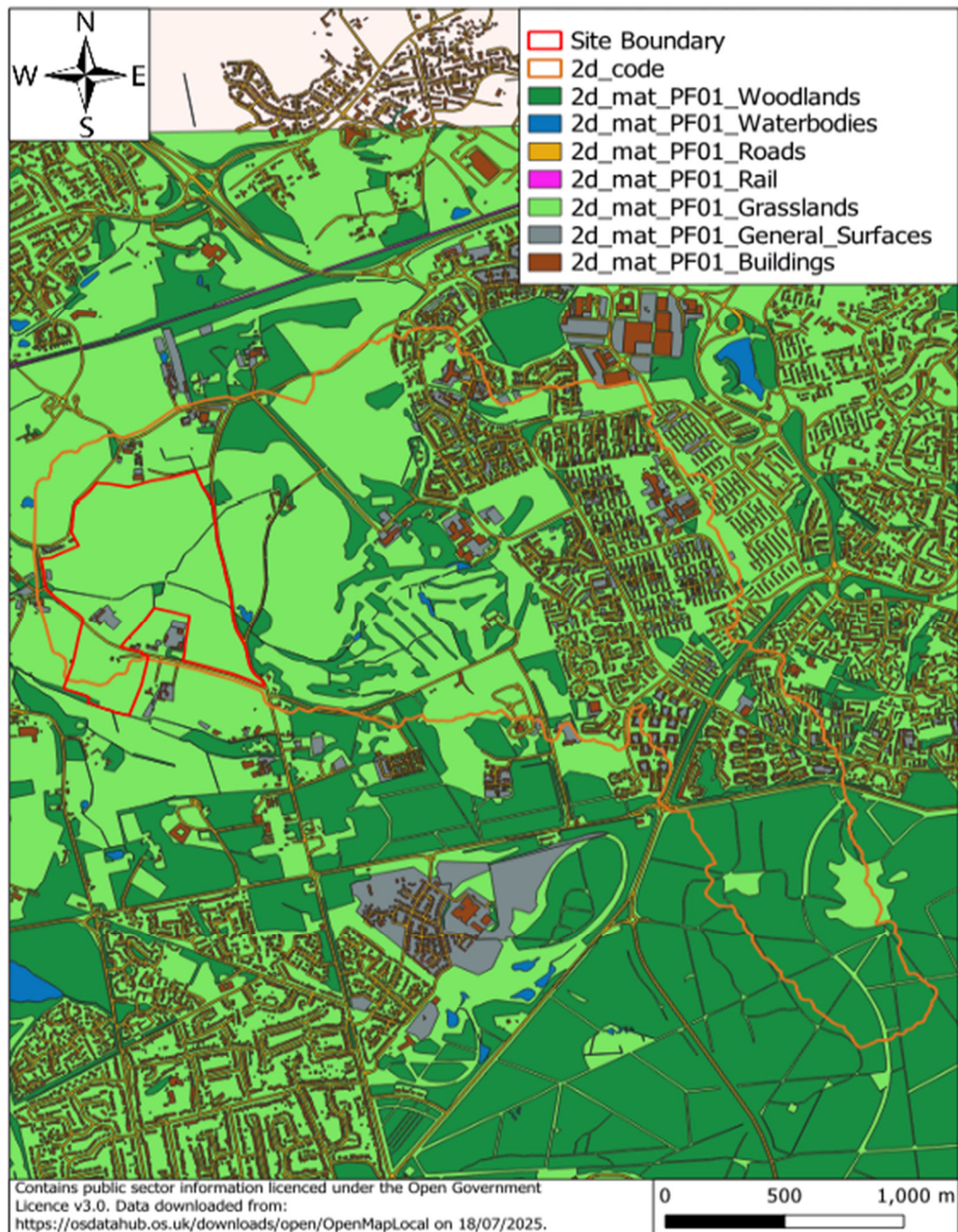
- 3.11.1 The hydraulic roughness can impact the conveyance of flood within the floodplain.
- 3.11.2 Mapping was downloaded from OS OpenMap to inform the land use types.
- 3.11.3 Manning's 'n' roughness values were assigned to the land use types within the model domain using Chow 's1959 industry standard guidance, satellite imagery of the site, photographs from a site walkover and professional judgement.
- 3.11.4 Photographs of the rationale for assigning the Manning's values in channel are shown in **Figure 14.**

Figure 14: Photographs and their Associated Manning's Values for In Channel Roughness



3.11.5 Roughness values were applied using 2d_mat vector files to define the location and the .tmf file to define the roughness.

Figure 15: Materials Layers





3.11.6 **Table 2** summarises the land use types, and roughness values selected for the 2D model domain.

Table 2: Summary of Manning's 'n' Roughness Values

ID	Description	Manning's 'n' Roughness Value
1	Grasslands	0.022
2	Roads and Pavements	0.022
3	Buildings	1
4	Waterbodies	0.03
5	Woodlands	0.10
6	General Surfaces	0.022
7	Rail	0.05

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

3.12 1D/ 2D Domain Links

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

3.13 1D/ 2D Bank Level Representation

3.13.1 1D bank levels were defined using channel survey data. LiDAR data was used in areas where survey data was not available.

3.14 Model Layers

3.14.1 **Table 3** summarises the layers used within the model domain.



Table 3: 2D Model Layers

Layer	Purpose
1d_nwke_PF01	Defines the location of the 1D channel and structures.
1d_xs_PF01	Defines the 1D channel geometry.
1d_WLL_PF01	WLL interpolate the 1D water levels across the 1d domain.
2d_code_PF01	Defines the 2D model extent.
2d_code_river_PF01	Defines the 1D model extent.
2d_bc_PF01	Defines the floodplain boundary.
2d_bc_hxi_PF01	Defines the link between the 1D and 2D model domains.
2d_rf_PF01	Applies a rainfall hyetograph to the defined polygon.
2d_zsh_PF01_P	Points defining levels along the zsh line which informs the bank levels.
2d_zsh_PF01_L	Line informing the bank location. The levels are taking from the zsh points layer.
2d_loc_PF01	Defines the model orientation.
2d_mat_PF01_Buildings	Defines the 2D roughness area for buildings.
2d_mat_PF01_General_Surfaces	Defines the 2D roughness area for the general surface (grass).
2d_mat_PF01_Woodlands	Defines the 2D roughness area for the natural environment (woodlands).
2d_mat_PF01_Grasslands	Defines the 2D roughness area for the natural environment (woodlands).
2d_mat_PF01_Roads	Defines the 2D roughness area for roads and paths.
2d_mat_PF01_Waterbodies	Defines the 2D roughness area for waterbodies.
2d_mat_PF01_Rail	Defines the 2D roughness area for rail networks.



3.15 Model Runs

3.15.1 The model was run for 12 hours with a fixed 1D timestep of 0.25 seconds and a fixed 2D timestep of 0.5 seconds.

3.15.2 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.

3.15.3 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 Sensitivity Testing

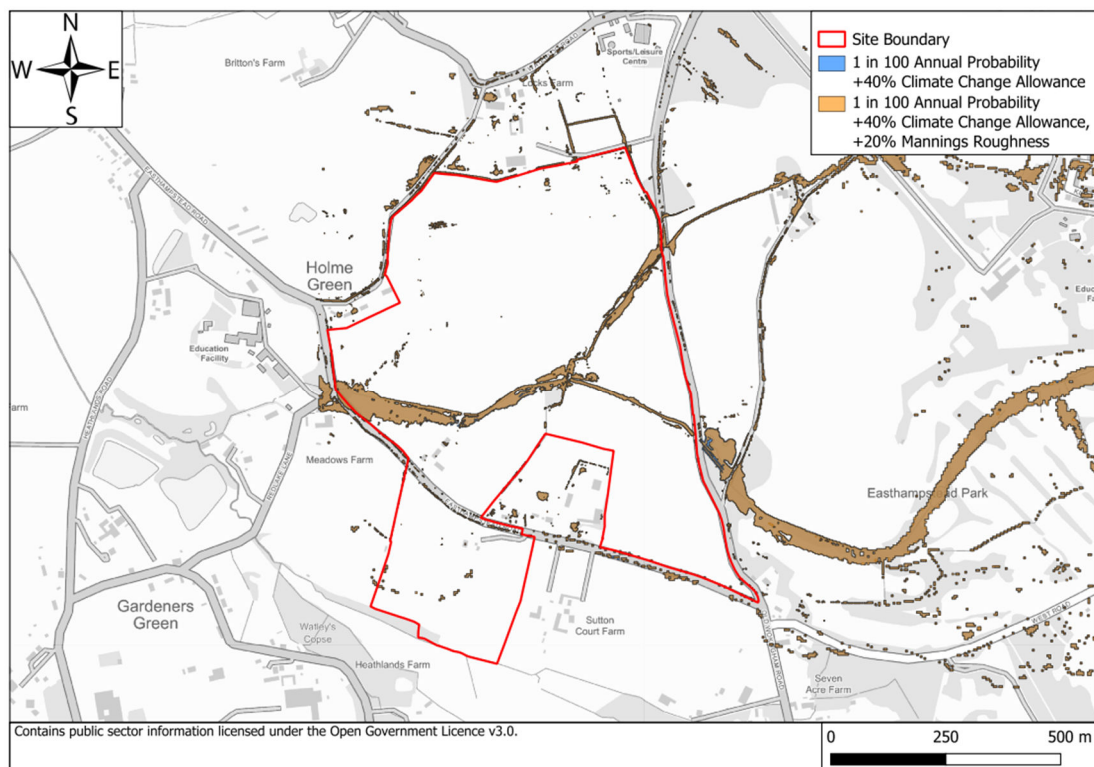
4.1.1 Sensitivity testing has been undertaken to assess the impact of uncertainty within the model and assumptions made.

4.2 Manning's 'n' Roughness

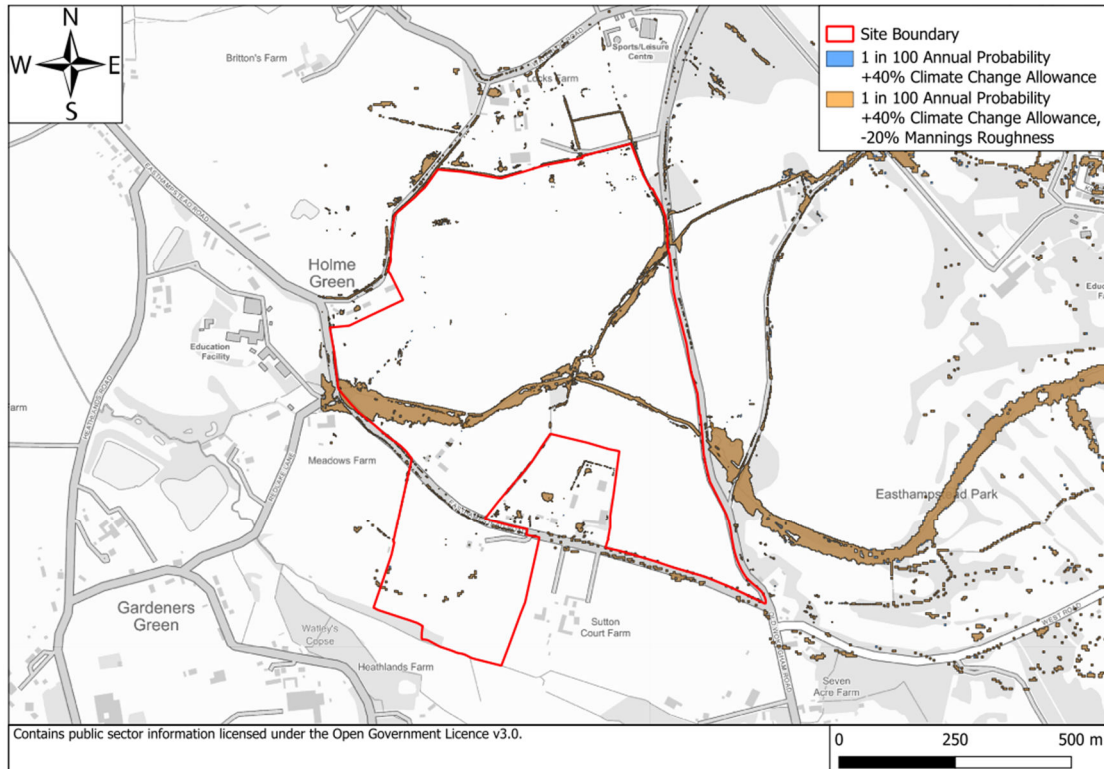
4.2.1 A 20% increase and decrease in the Manning's 'n' roughness estimations was modelled across the 2D model domain.

4.2.2 **Figure 16** and **Figure 17** shows the difference in the maximum flood extents for a $\pm 20\%$ increase and decrease in the Manning's 'n' roughness values.

Figure 16: 1 in 100 Annual Probability +40% Climate Change Allowance Manning's Roughness Sensitivity 20% Increase



**Figure 17: 1 in 100 Annual Probability + 40% Climate Change Allowance Manning's
Roughness Sensitivity 20% Decrease**



- 4.2.3 **Figures 16 and 17** show a $\pm 20\%$ increase and decrease in the Manning's 'n' roughness values.
- 4.2.4 There is generally a slight increase in the modelled flood extents for a 20% increase in the Manning's roughness and a slight decrease in the modelled flood extents for a 20% decrease.
- 4.2.5 An area where the flood extent is more sensitive to the Manning's value selected is at the intersection between OW01, OW02 and OW03. This was noted on site as a localised flat area.
- 4.2.6 The model is therefore considered to be insensitive to this an increase and decrease in Manning's value and the assumptions made in assigning the Manning's roughness values are appropriate.

4.3 Culvert Blockage

- 4.3.1 A 50% culvert blockage and 90% culvert blockage was modelled to represent scenarios where the culverts within the model are partially blocked, due to vegetation or debris.
- 4.3.2 **Figure 18** and **Figure 19** shows the difference in the maximum flood extents for the blockage scenarios compared with the baseline 1 in 100 annual probability +40% climate change allowance scenario.

Figure 18: 1 in 100 Annual Probability +40% Climate Change Allowance and 50% Culvert Blockage

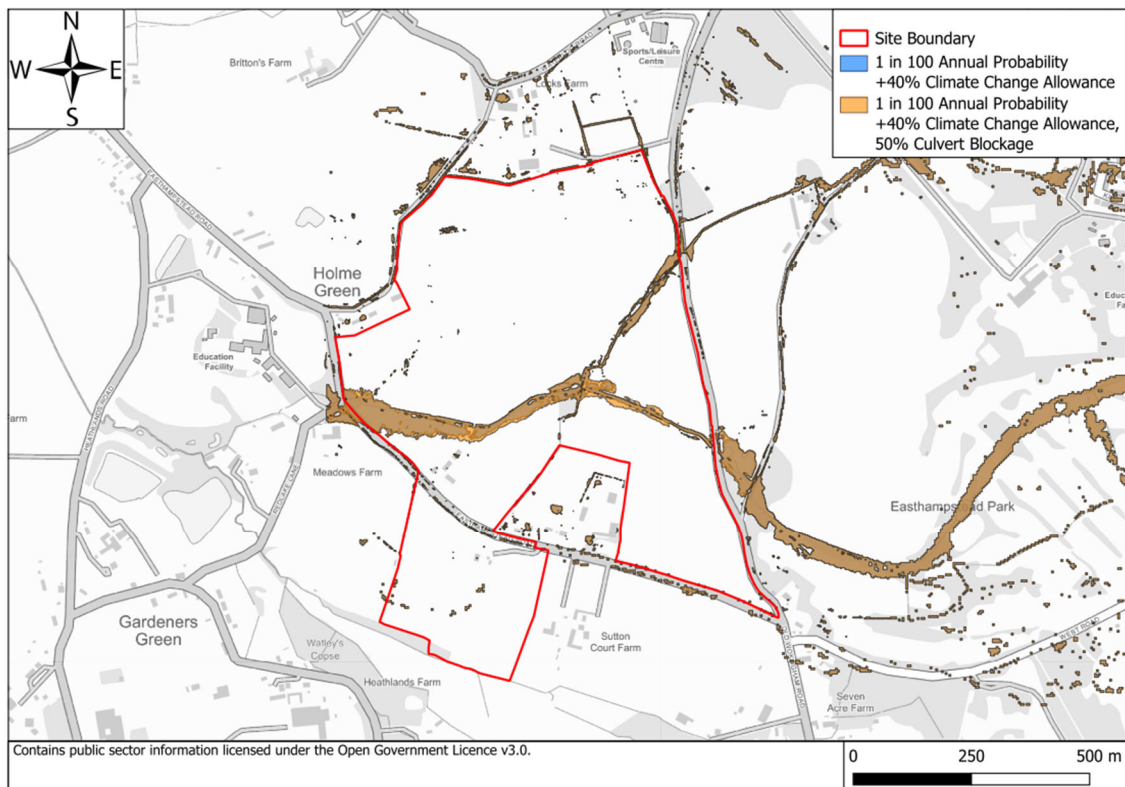
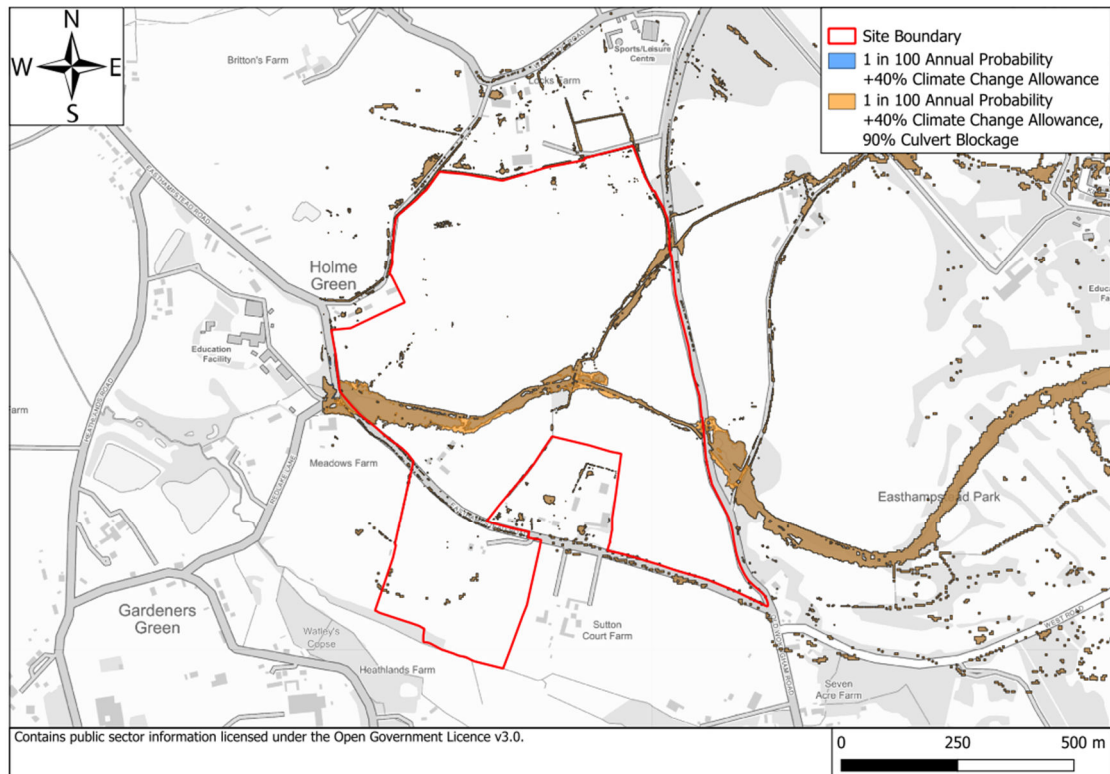


Figure 19: 1 in 100 Annual Probability +40% Climate Change Allowance and 90% Culvert Blockage



- 4.3.3 **Figures 18 and 19** show that the 50% and 90% culvert blockages slightly increase the extent of flooding immediately upstream of the culverts, most notably around OW01 and structures of PF03_0013C and PF01_0544C, and at the confluence of OW02 and OW03 with OW01. As expected, the extent of flooding is greater with 90% culvert blockage compared to the 50% blockage.
- 4.3.4 The culvert blockages do not significantly impact the extent of flooding across the rest of the site and the overall modelled flood extent is not sensitive to culvert blockages.

4.4 Downstream Boundary

4.4.1 Figures 20 and 21 show a 20% increase and 20% decrease to the downstream boundary slope.

Figure 20: 1 in 100 Annual Probability + 40% Climate Change Allowance and a Downstream Boundary 20% Increase

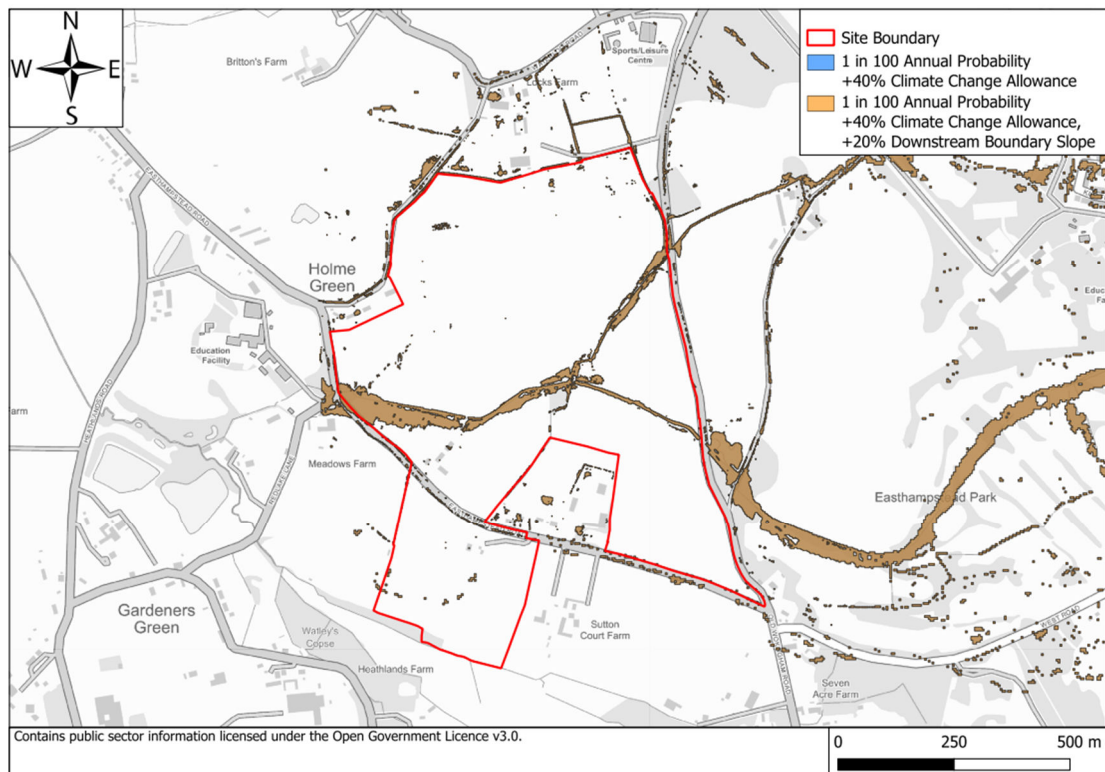
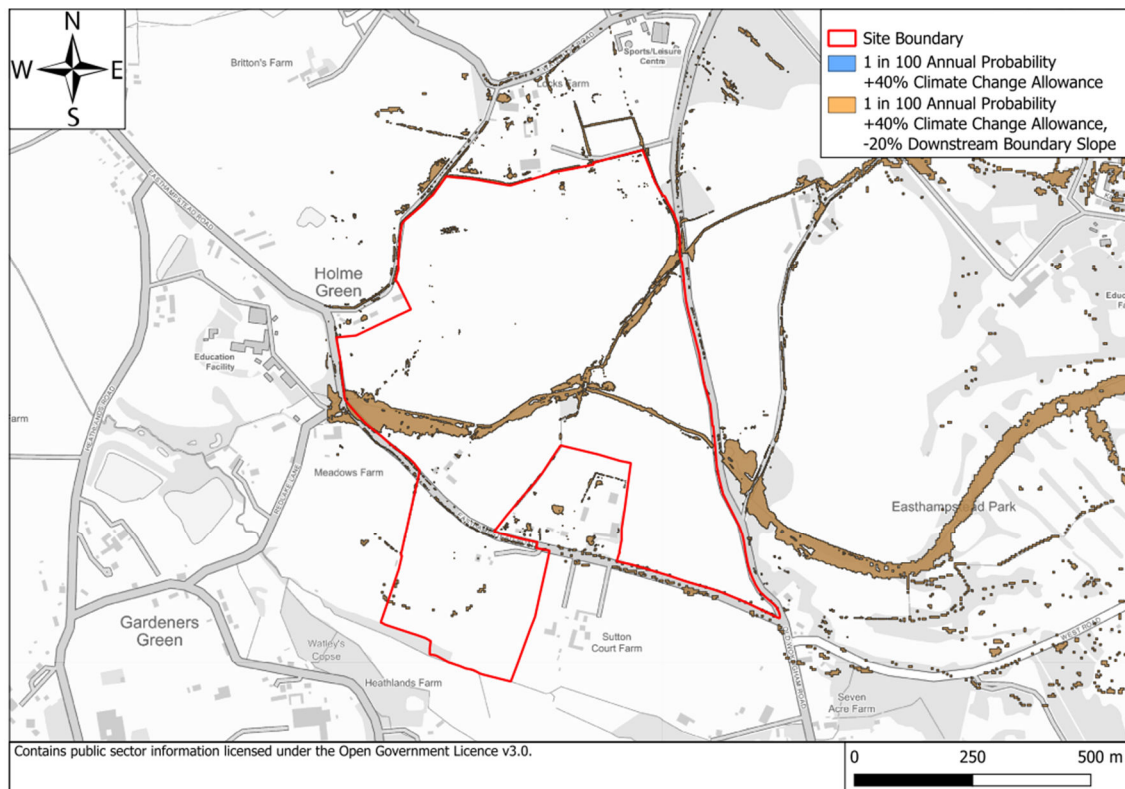


Figure 21: 1 in 100 Annual Probability +40% Climate Change Allowance and a Downstream Boundary 20% Decrease



- 4.4.2 As shown in **Figures 20 and 21**, the increase and decrease in the downstream boundary slope makes an insignificant impact on the modelled flood extents.
- 4.4.3 The model is therefore insensitive to the assumptions made for the downstream boundary slope.

4.5 Storm Duration

4.5.1 **Figures 22 and 23** show results of a 5.5hr and 9.5hr storm duration respectively compared to the baseline model of 7.5hrs.

Figure 22: 1 in 100 Annual Probability +40% Climate Change allowance and a 5.5hour Storm Duration

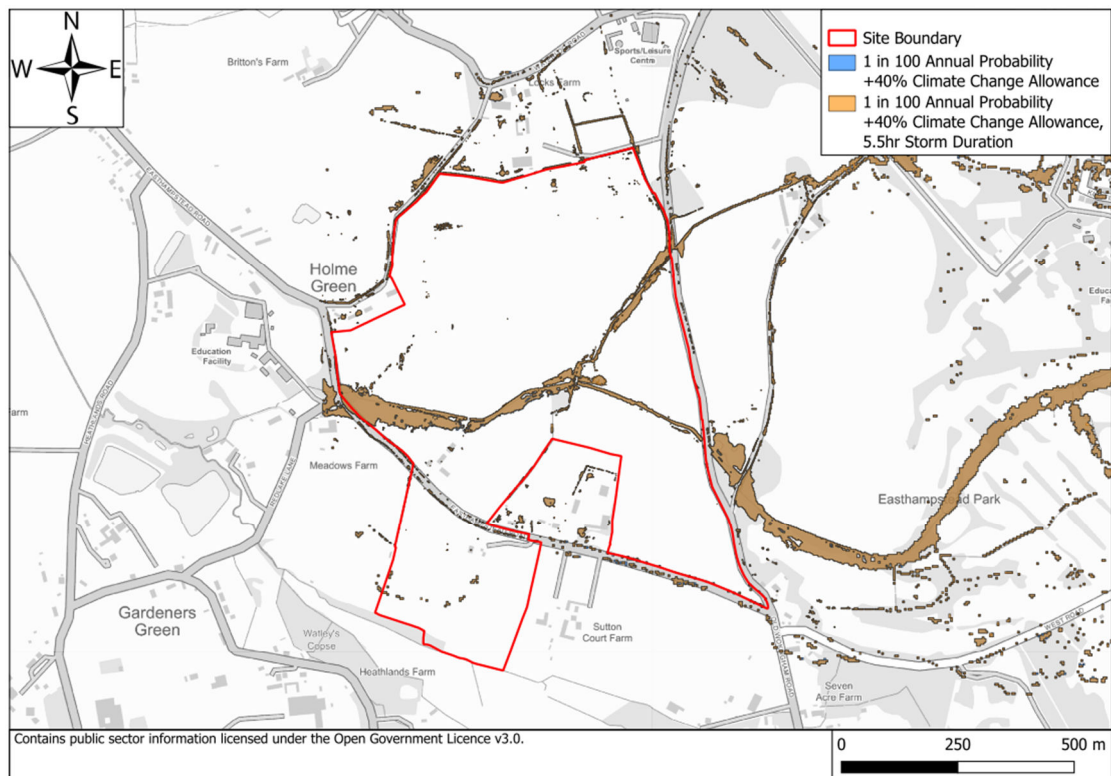
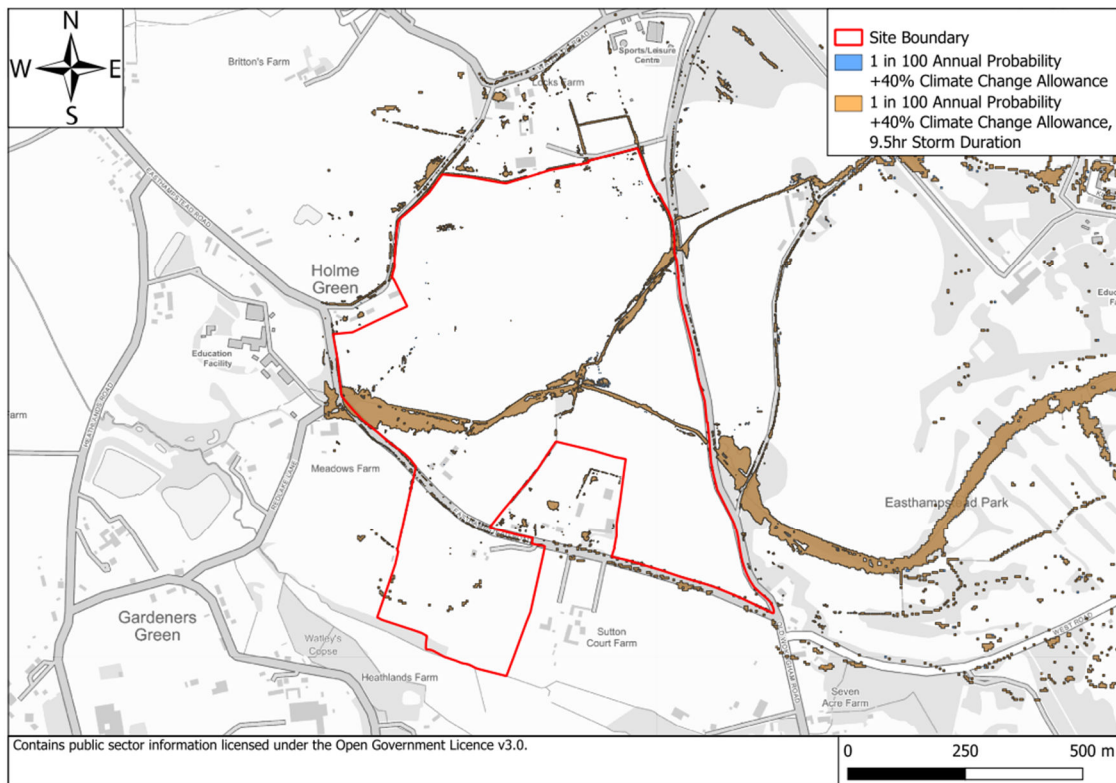


Figure 23: 1 in 100 Annual Probability +40% Climate Change Allowance and a 9.5hour Storm Duration

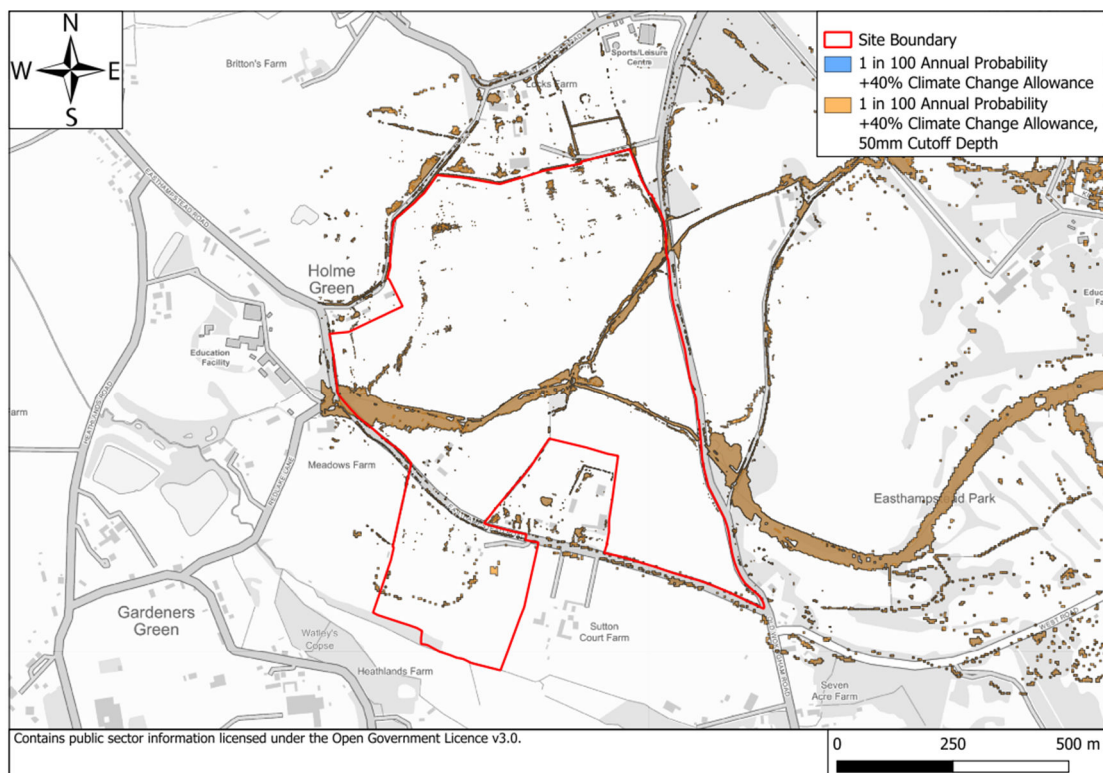


- 4.5.2 There is an insignificant impact in the modelled flood extents across the majority of the site for the 5.5hr and 9.5hr storm durations compared with the baseline 7.5hr storm duration. There is a slight difference at the confluence of OW02 and OW03 with OW01. The 9.5hr storm duration has a slight increase in flood extent and the 5.5hr has a slight decrease in the flood extent. The difference is localised in this location.
- 4.5.3 Overall, both an increase and decrease of storm duration does not change the extent of flooding significantly in comparison to the baseline result and accepting the ReFH2 default critical storm duration of 7.5hr storm duration is acceptable.

4.6 Cut-off Depth

- 4.6.1 **Figure 24** shows the baseline flood extent with a 0.05m cut-off depth applied compared with a 0.075m cutoff depth which has been applied to the baseline flood extents. The 0.05m cutoff depth was run as a sensitivity to see the impact of a lower cut-off depth and if it could significantly impact the modelled flood extents across the site.

Figure 24: 1 in 100 Annual Probability +40% Climate Change Allowance and a 0.05m Cut-off Depth

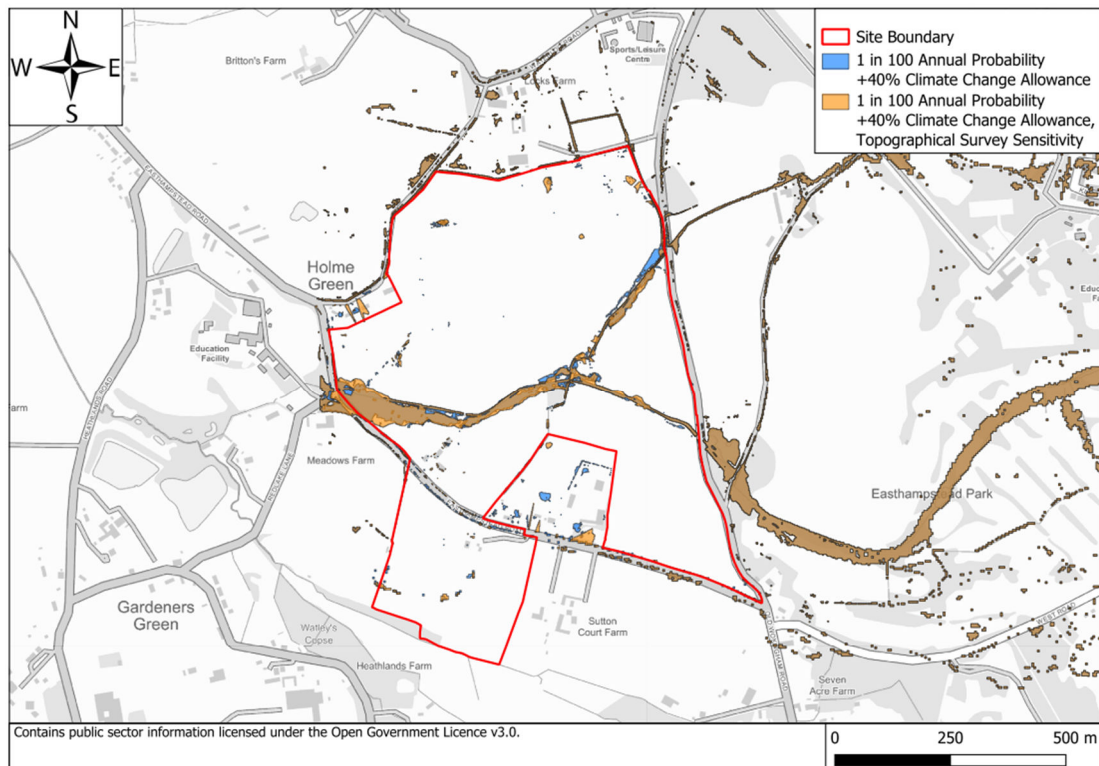


- 4.6.2 As expected, there is greater areas of flooding when a 0.05m cutoff depth is applied. Areas where there is an increase of flooding is in the southern area of the site (south of Easthampstead Road), the area northwest of OW01 and also in the northeastern corner of the site. In these areas there is an increase in localised areas of ponding associated with low points in the localised topography. There are no new flow routes.
- 4.6.3 The 0.075m is an appropriate cutoff depth for the site and the purpose of the model.

4.7 Inclusion of the Topographical Survey

4.7.1 **Figure 25** shows the baseline 1 in 100 annual probability +40% Climate Change Allowance, with the inclusion of the topographical survey.

Figure 25: 1 in 100 Annual Probability +40% Climate Change Allowance Scenario with Inclusion of the Topographical Survey Ground Model



4.7.2 **Figure 25** shows that the overall pattern of the flooding extent is similar between the 1 in 100 annual probability +40% climate change allowance scenario baseline model using LiDAR data compared to the topographical survey.

4.7.3 The area where there is the greatest difference is at the downstream area of OW01 where there is an increase in flooding extent. There is a slight increase in flooding on the southern bank of OW03, and a slight decrease in flooding on the northern bank of OW03. The northeastern corner of the site has a number of localised areas of ponding not shown in the baseline model. There are a number of localised areas of ponding in the land north of Sutton Court Farm and Easthampstead Road.

4.7.4 We have not used the topographical survey for the baseline model runs as detailed in **Section 3.7**.

4.7.5 A review of the topographical survey scenario against the baseline model runs shows that there is no significant difference in the modelled flood extents.



5 Model Results

5.1 Flood Extents

5.1.1 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 +40% climate change allowance.

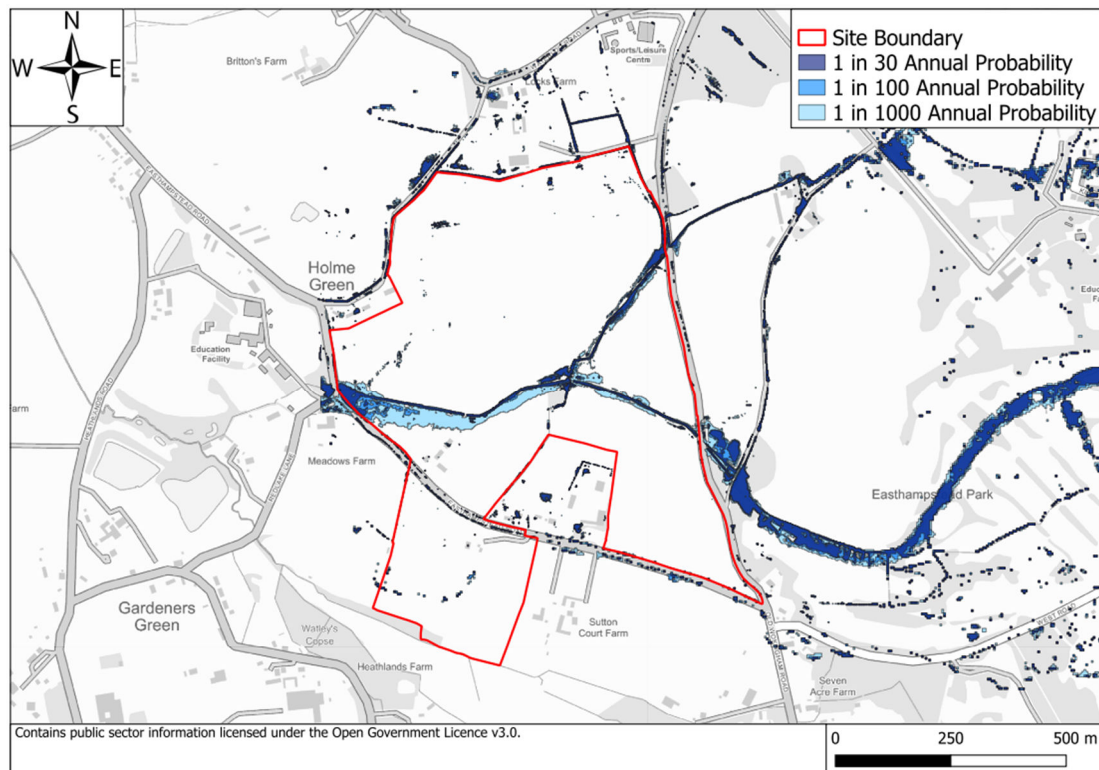
5.2 Summary of the Model Outputs

5.2.1 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. A 0.075m cutoff depth has been used in this direct rainfall modelling study. This is the same depth as the EA use in the NaFRA Risk of Flooding from Surface Water mapping.

5.3 Flood Extents

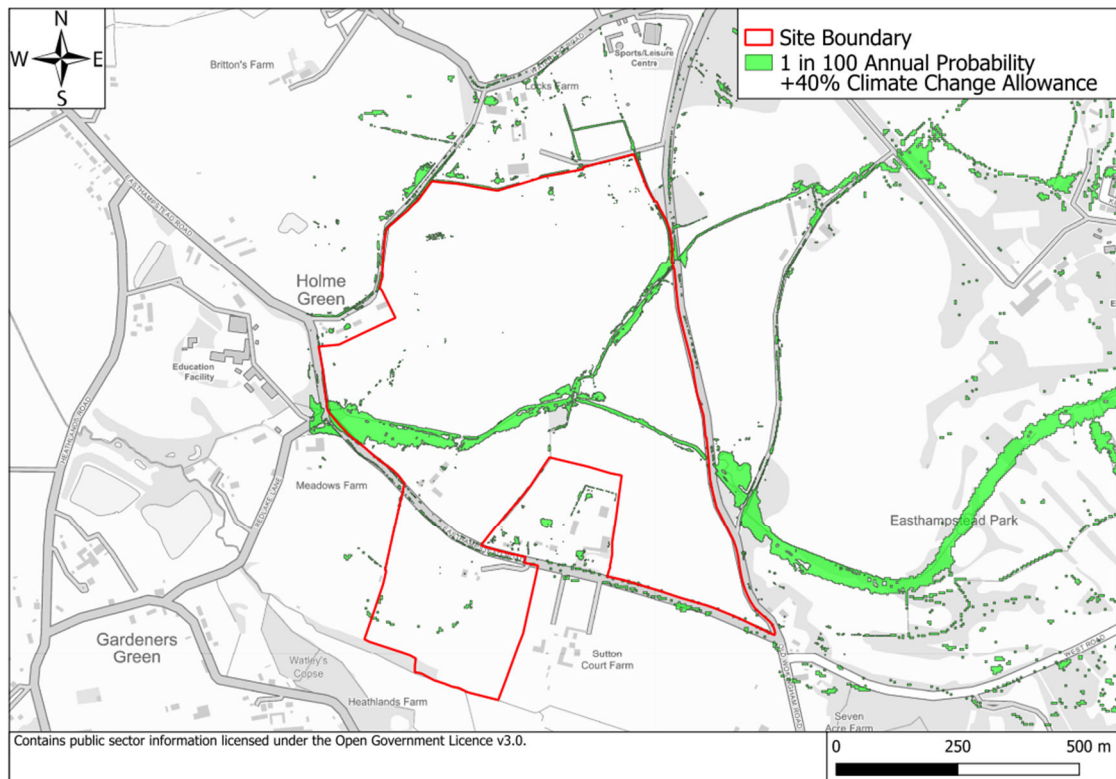
5.3.1 The maximum modelled flood extents for all modelled return periods are included in **Figure 26**.

Figure 26: Abley Letchford Baseline Flood Extents



- 5.3.2 **Figure 26** shows the 1 in 30 annual probability, 1 in 100 annual probability and 1 in 1,000 annual probability maximum flood extents. The flooding extent clearly follows the location of the watercourses and watercourse corridors. Most notably at OW01 flowing east to west through the centre of the site. Here the flooding extent for the 1 in 30 annual probability largely stays in channel. There are, however, a few areas where water appears to come out of channel, including at the downstream of OW01 and at the intersection of OW01, OW02 and OW03. These extents increase in the 1 in 100 and 1 in 1,000 annual probability scenarios. In the 1 in 1,000 annual probability scenario there is a flow route to the south of the OW01 watercourse, along the low point in the topography.
- 5.3.3 In the northeastern area of the site, where there has been the inclusion of the OW04 and OW05 channels, there is water in channel which appears to stay in channel. South of these channels there are small, localised areas of ponding associated with localised low points in the topography.
- 5.3.4 **Figure 27** shows the baseline flood extent for the 1 in 100 annual probability +40% climate change allowance scenario.

Figure 27: Abley Letchford Climate Change Flood Extents

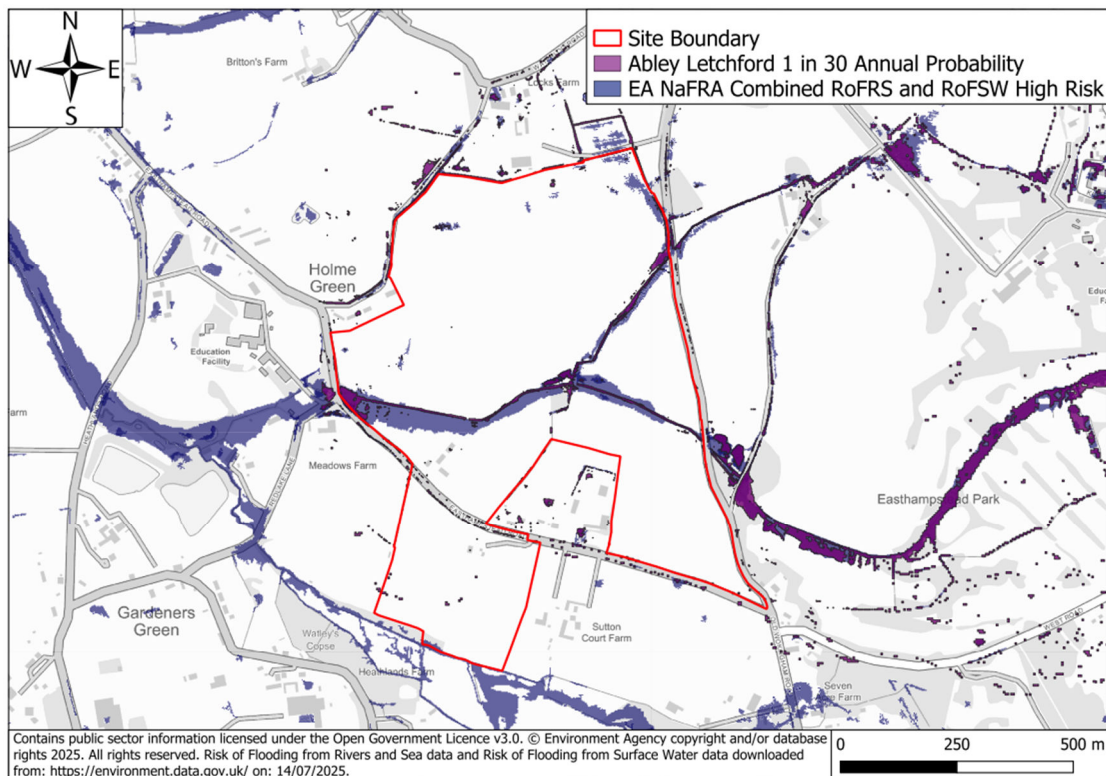


- 5.3.5 **Figure 27** shows the 1 in 100 annual probability +40% climate change allowance scenario. It shows a similar extent to the 1 in 1,000 annual probability from Abley Letchford's baseline results, as shown in **Figure 26**.
- 5.3.6 Flow largely remains in bank of these channels with some areas appearing to come out of bank at the downstream section of OW01. Similarly to the flood extent shown in **Figure 26**, downstream of OW01 and at the intersection of OW01, OW02 and OW03, there is water that comes out of bank.

5.4 Comparison of EA and Abley Letchford Flooding Extents

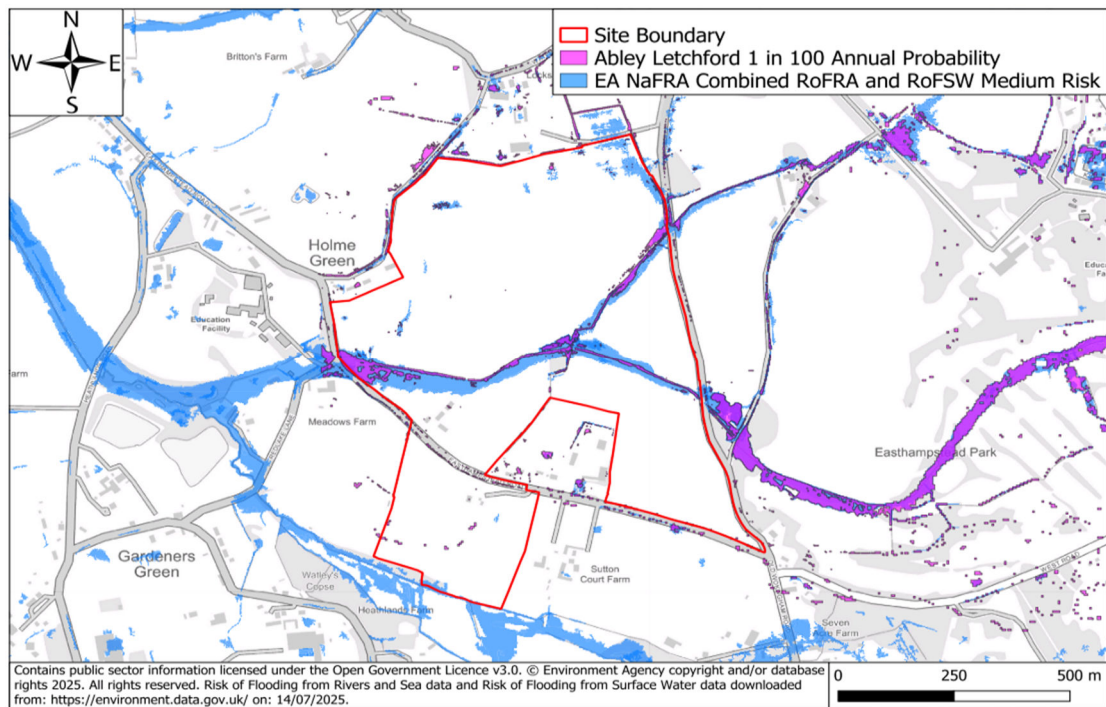
- 5.4.1 **Figures 28 – 30** show a comparison between the high, medium and low EA NaFRA surface water and rivers and sea flooding and Abley Letchford's, 1 in 30, 1 in 100 and 1 in 1,000 annual probability surface water extent.

Figure 28: Comparison of NaFRA 1 in 30 Annual Probability Flood Risk from Surface Water and Rivers and Sea and Abley Letchford 1 in 30 Annual Probability



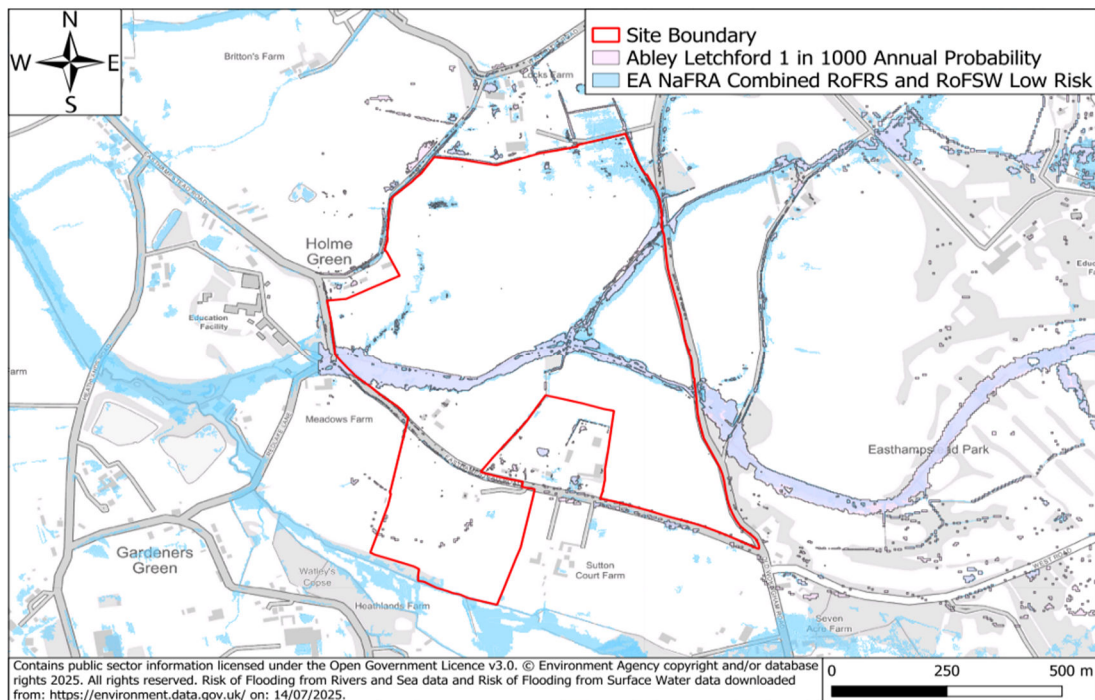
- 5.4.2 Abley Letchford's 1 in 30 annual probability model results in comparison to the EA NaFRA Surface Water and Rivers and Sea modelling are presented in **Figure 28**. Overall, Abley Letchford's model results show that flooding extent is less extensive.
- 5.4.3 Key areas where there is less extensive flooding include at the downstream of OW01 and the northeastern corner of the site. Downstream of OW01 and the land to the south of OW01, Abley Letchford's results compared to the EA mapping, show a lesser extent of flooding. There are still areas of high, medium, low and very low flooding, however there is a lot less than the EA mapping.
- 5.4.4 In the northeastern corner of the site, the EA mapping shows there to be high, medium, low and very low flooding in this area. Abley Letchford's modelled results show no flooding in the centre of the OW04, OW05 and OW06 and less flooding to the south of OW04 and within the site boundary. This is most likely as the channels have been included in Abley Letchford's model which were not included within the strategic EA NaFRA modelling and thus water is being conveyed and stored within them, meaning the water has a place to go instead of ponding and flowing onto the site.

Figure 29: Comparison of NaFRA 1 in 100 Annual Probability Flood Risk from Surface Water and Rivers and Sea and Abley Letchford 1 in 100 Annual Probability



- 5.4.5 Abley Letchford's 1 in 100 annual probability model results in comparison to the EA Surface Water and Rivers and Sea modelling are presented in **Figure 29**. Overall, Abley Letchford's model results show that is overall less extensive.
- 5.4.6 Similarly to the 1 in 30 annual probability, the key areas where there is less extensive flooding include at the downstream of OW01 and the northeastern corner of the site. Downstream and the land to the south of OW01, Abley Letchford's results compared to the EA mapping, show a lesser extent of flooding. There are still areas of high, medium, low and very low flooding, however there is a lot less than the EA mapping.
- 5.4.7 In the northeastern corner of the site, the EA mapping shows there to be high, medium, low and very low flooding in this area and significant flooding. In comparison Abley Letchford's results show minimal flooding in this area, instead minimal spotting and ponding, which is slightly more than in the 1 in 30 annual probability scenario. The inclusion of the channels means water can be captured, conveyed and stored within them.
- 5.4.8 Another area of interest and difference between the EA and Abley Letchford's mapping is in the western area of the site. Here, the EA mapping is shown to have areas of ponding and a potential flow route. This occurs in the EA and Abley Letchford's mapping, however to a lesser extent in Abley Letchford's.

Figure 30: Comparison of NaFRA 1 in 1,000 Annual Probability Flood Risk from Surface Water and Rivers and Sea and Abley Letchford 1 in 1,000 Annual Probability



- 5.4.10 Abley Letchford's 1 in 1,000 annual probability model results in comparison to the EA Surface Water and Rivers and Sea modelling are presented in **Figure 30**. Overall, Abley Letchford's model results show that is overall less extensive.
- 5.4.11 Similarly to the 1 in 30 and 1 in 100 annual probability scenarios, Abley Letchford's baseline mapping has a lesser extent that the EA NaFRA surface water and rivers and sea mapping.
- 5.4.12 Along the extent of OW01, the flooding extent modelled by Abley Letchford is only marginally lesser than the EA mapping. Both results show water within channel, to the south of the channel and flooding occurring at the downstream boundary of the site.
- 5.4.13 In the northeastern corner of the site, the EA Flood extent has more flooding in the 1 in 1,000 annual probability scenario compared to Abley Letchford's modelled results. This difference is key in demonstrating how the inclusion of the channels impacts the flood risk of the site.
- 5.4.14 An area where there is more flooding in the Abley Letchford's results compared to the EA mapping is in the area beyond the site boundary, south of the OW01, OW02 and OW03 intersection and north of Easthampstead Road. In this area there is a clear area of ponding. This correlates with lower ground elevation and a natural low spot. This area does not appear to be a flow route and therefore is likely not to flow into or impact the site.
- 5.4.15 Overall, **Figures 28 – 30** all show that Abley Letchford's baseline flood mapping has a lesser extent that the EA NaFRA surface water and rivers and sea mapping.



5.5 Message Layers

- 5.5.1 No negative depth layers are present for all model runs. The model is therefore considered to be healthy and stable.
- 5.5.2 There were 19 warning messages. 12 of these are associated with 'ghost features'. 'Ghost features' are GIS features that have no associated geometries. These 'ghost features' do not impact the model and therefore Abley Letchford are satisfied for them to remain. 7 of the messages are associated with the crest/invert level of structures being below the bed level. Abley Letchford have reviewed these messages and the associated structures. Comparing the structure location to the survey information and site observations, this shows that the structures have been digitised accordingly are representative of what is on site. Abley Letchford are therefore satisfied that those warning messages will not impact the model results.

5.6 TUFLOW Model Run Performance

- 5.6.1 The model is set up to run for the full range of events required. **Table 4** provides a summary of the 2D domain performance parameters.

Table 4: Model Run Parameters

Model Parameter	Value
Start time (hours)	0
End time (hours)	12
Model run time (hours)	1
Volume error	< 0%
Mass balance error	< ±0%

- 5.6.2 **Table 4** shows that the mass error for the 1 in 100 annual probability for the 2D domain. This is within the ±1% error. The model can therefore be considered to be stable and free of any major stability issues, according to TUFLOW guidance.
- 5.6.3 All of the modelled simulations were run for the full 12 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 flood extents for each modelled scenario.



5.7 Limitations and Assumptions

5.7.1 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).
- For this model we used Quadtree, which means the grid cells could be refined and ultimately allowed for cells to be split into four smaller square cells. The grid cells of 4m, 2m and 1m was used to represent the floodplain. This grid size configuration 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.

5.7.2 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 Conclusions

- 6.1.1 This modelling report has been prepared by Abley Letchford, on behalf of the Lightwood Ltd to refine the surface water extents for Priors Farm, in South Wokingham.
- 6.1.2 A hydrological assessment was undertaken to provide hyetographs for the catchment. The FEH catchment descriptors were reviewed and refined using a desk-based assessment. ReFH2 software was used for the hydrological assessment.
- 6.1.3 The model was run for the following return periods: 1 in 30, 1 in 100, and 1 in 1,000 annual probability. The maximum flood levels and extents were extracted for all of the modelled return periods.
- 6.1.4 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.
- 6.1.5 The model results show that the majority of the site is located outside of the surface water return periods of 1 in 30, 1 in 100 and 1 in 1,000. There are key areas where there are surface water flows, along the OW01 and OW03 and water comes out of channel in some sections of these watercourses. A particularly sensitive area is the intersection in the centre of the site. Here there is flooding out of channel, despite the inclusion of culvert structures.
- 6.1.6 Sensitivity testing was carried out to determine the impact of uncertainty and assumptions made within the modelling. Sensitivity tests were carried out for $\pm 20\%$ Manning's 'n' roughness values, 50% and 90% culvert blockages, 5.5hr and 9.5hr storm durations, 50% and 90% culvert blockage, a decrease in cut-off depth and a $\pm 20\%$ increase and decrease of the downstream boundary slope.
- 6.1.7 The assumptions made within the model are deemed to be reasonable and the model is generally not considered to be sensitive to any of the assumptions made. There were a few areas where the model is deemed to be a little more sensitive therefore space should be allowed in the masterplan in these areas to reflect this. This includes the confluence of OW01, OW02 and OW03. This particularly areas and the downstream and upstream areas are shown to be the most sensitive within all of the sensitivity runs.
- 6.1.8 Sensitivity results showed that overall the model was not sensitive to these sensitivity runs. The sensitivity tests results show that the assumptions made do not make a significant impact on the modelled 1 in 100 annual probability +40% climate change allowance baseline results.



Appendices



Appendix A - Hydrological Report



PRIORS FARM, SOUTH WOKINGHAM SDL

FLOOD ESTIMATION REPORT

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18 DECEMBER 2025





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Document Reference:	A218-R043

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Appendix A - ReFH2 Summary



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1 Summary of Assessment

1.1 Summary

- 1.1.1 This Flood Estimation Report has been prepared by Abley Letchford on behalf of Lightwood Strategic Ltd to provide hyetographs for a direct rainfall model at Priors Farm in South Wokingham using the latest data, software and methods proportionate to the scope of work.
- 1.1.2 The study is considered to be moderate based on the EA hydrology complexity guidance scope of work.
- 1.1.3 The western and central part of the catchment comprises of greenfield agricultural land. The eastern part of the catchment is primarily residential development. The southeastern part of the site is woodland.
- 1.1.4 The catchment is not influenced by reservoirs. The catchment is not pumped. The catchment does not have extensive floodplain storage.
- 1.1.5 The catchment is not groundwater driven. The key mechanism of flooding is therefore flood flows exceeding the channel capacity.
- 1.1.6 The catchment is ungauged and therefore a limitation of the study is the lack of locally available information.
- 1.1.7 The ReFH2 method was completed to derive hyetographs for the catchment.

1.2 Flood Frequencies

- 1.2.1 The frequency of a flood event can be expressed in either annual exceedance probability (AEP) or as a return period. A return period 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.
- 1.2.2 **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 Method

2.1 Requirement for Flood Estimates

Overview

- 2.1.1 This study provides hyetographs for a direct rainfall model with defined channels for the Priors Farm catchment, South Wokingham in Berkshire. The latest data, methodologies and software have been used, proportionate to the scope of works.
- 2.1.2 The study derives hyetographs estimates for the catchment. The hyetographs will be applied to the direct rainfall model using 2d_rf polygons, which will apply uniform rainfall across the catchment.
- 2.1.3 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
- 2.1.4 Climate change will be considered for the 1 in 100 annual probability scenario. This will be discussed separately.

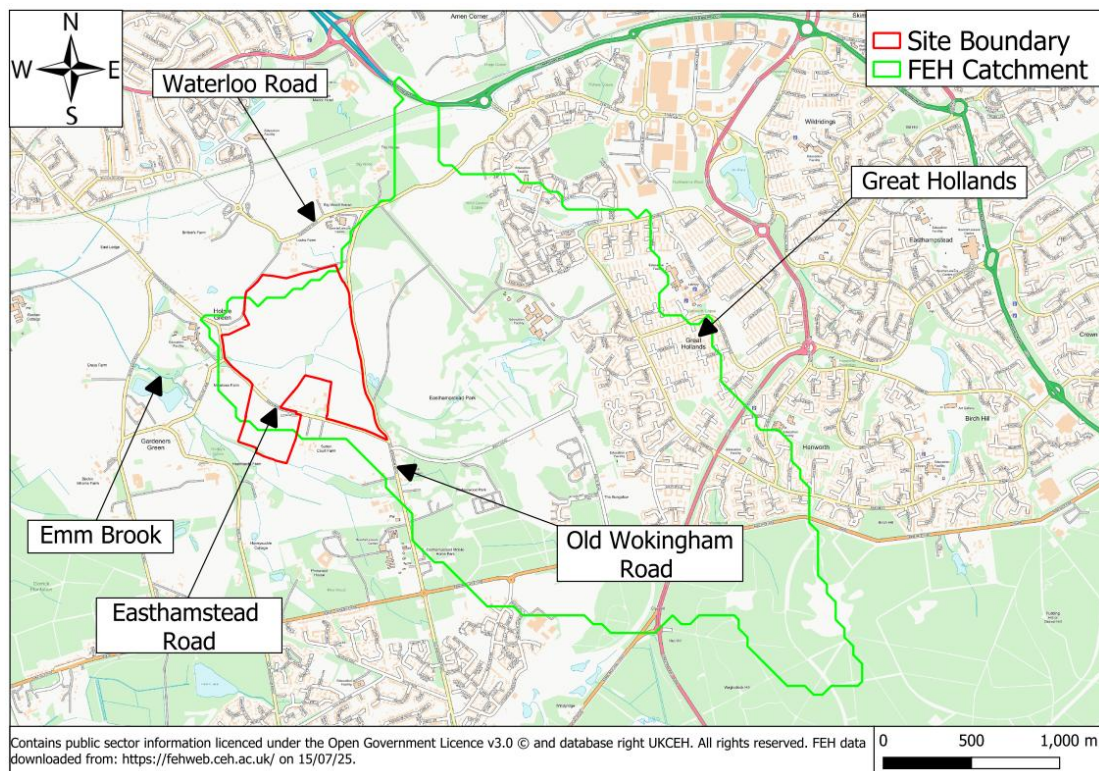
2.2 Project Scope

- 2.2.1 This study is considered to be moderate by the EA hydrology complexity guidance.

2.3 Catchment

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

Figure 1 – Catchment Overview



- 2.3.2 The FEH catchment area is 5.9km².
- 2.3.3 The area of interest is in the western part of the catchment, as shown in **Figure 1**.
- 2.3.4 The eastern part of the catchment is predominately the sub-urban area of Great Hollands. The western and central parts of the catchment are predominately rural agricultural fields. There is an area of woodland in the southeastern corner of the site.

2.4 Gauging Stations

- 2.4.1 There are no available gauging stations within the catchment.



2.5 Other Data Sources

2.5.1 **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	N/A	N/A
Historic flood data	Yes	Yes	EA Historic Flood Outline	Historic outlines obtained from the DeFRA data portal
Flow or river level data for events	Yes	No	N/A	N/A
Rainfall data for events	Yes	No	N/A	N/A
Potential evaporation data	Yes	No	N/A	N/A
Results from previous studies	Yes	No	N/A	N/A

2.6 Hydrological Understanding of the Catchment

Conceptual Model

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

Unusual Catchment Features

2.6.2 The catchment is not heavily urbanised.

2.6.3 There are no reservoirs within the catchment.

2.6.4 The catchment is not pumped.

2.6.5 The catchment is not highly permeable.

2.1.2 The catchment has not been previously mined.



2.7 Initial Choice of Approach

Is FEH Appropriate

- 2.7.1 FEH methods are considered to be appropriate.
- 2.7.2 The ReFH2 (version 2.3) method will be carried out.
- 2.7.3 The catchment will be lumped and rainfall applied uniformly across the catchment using a 2d_rf polygon in the model.

Software

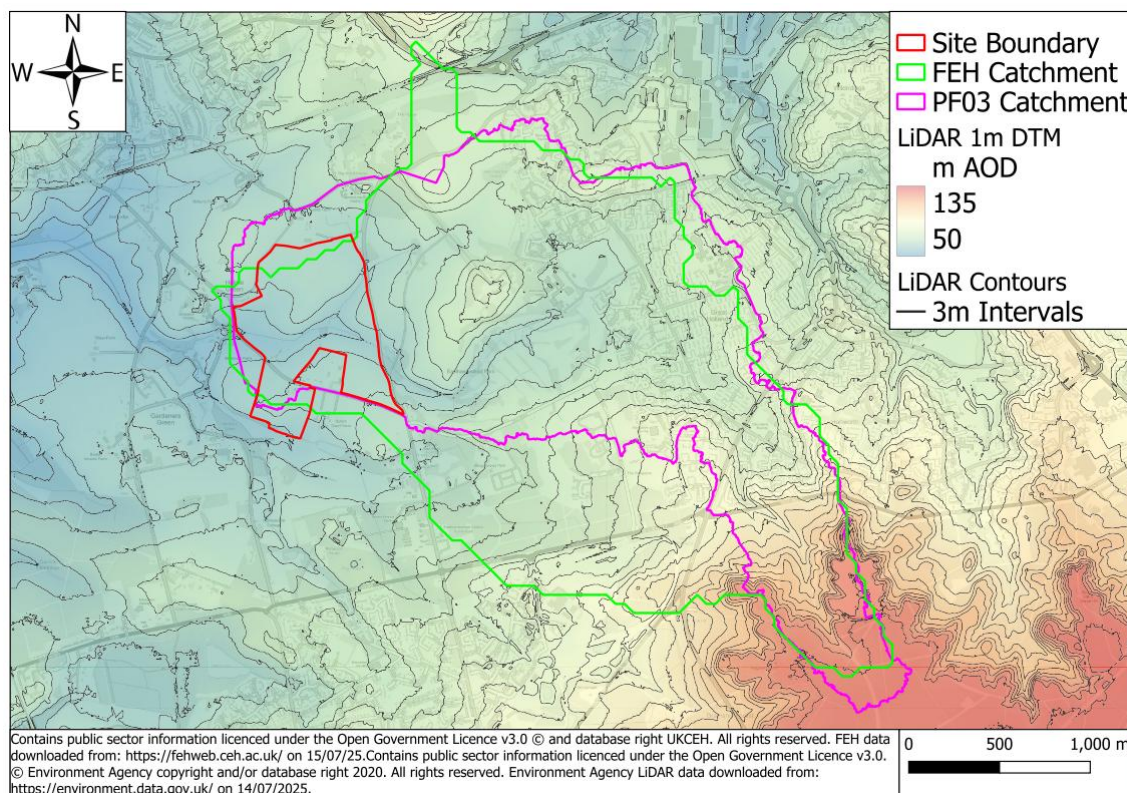
- 2.7.4 The following software was used in this study:

- FEH Web Service; and
- ReFH2.3.

3 Flood Estimates

3.1.1 **Figure 2** shows the located of the FEH catchment, adjusted catchment (PF03) and site location.

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



3.2 Imported Catchment Descriptors

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

3.2.2 The red text in **Table 3** has been used to identify the catchment descriptors that have been updated from the FEH downloaded values.

Table 3 – Summary of the Updated FEH Catchment Descriptors

Site Code	FARL	PROWET	BFIHOST	BFIHOST19	DLPBAR (km)	DPSBAR (m/km)	SAAR (mm)	URBEXT1990	URBEXT2000	FPEXT
PF03	1	0.29	0.445	0.468	2.36	23.8	664	0.18	0.18	0.12



3.3 Checking Catchment Descriptors

Catchment Boundary

- 3.3.1 The FEH Online Service catchment boundary was checked using LiDAR data, EA watershed dataset, Ordnance Survey data, and google satellite imagery. A site walkover was also completed on 23rd July 2025 to observe the catchment characteristics.
- 3.3.2 The catchment boundary was adjusted to consider the slope of the catchment and the road drainage network.
- 3.3.3 The PF03 catchment area decreased from 5.9 km² to 4.8km², a decrease of 1.1 km². The difference in the catchment area between the FEH catchment and PF03 catchment is in the southern part of the FEH catchment. The FEH catchment appears to include an area which would drain to the Emm Brook catchment, to the south of the site therefore it was excluded from the PF03 catchment.

BFIHOST and SPRHOST

- 3.3.4 BFIHOST, BFIHOST19 and SPRHOST values for the catchment were checked using the Soilscales online viewer.
- 3.3.5 The percentage areas of each of the catchment in each of the soil class areas was compared. A summary is included in **Table 4**.

Table 4 - Soil Type Review

Soil ID	Soilscape Description	FEH Percentage	PF03 Percentage
1	Naturally wet very acid sandy and loamy soils	45%	26%
2	Slowly Permeable seasonally wet slightly acid but base-rich loamy and clayey soils	48%	64%
3	Loamy Soils	0.049%	0.015%
4	Freely draining slightly acid loamy soil	6%	8%

- 3.3.6 Soil ID 1 has a 19% decrease between FEH and PF03. Soil ID 2 has had a 16% increase between FEH and PF03. Whilst the percentages in each of these soil classes are different in the PF03 catchment, Soilscales lists both soil types as slowly permeable or naturally wet. A greater proportion of the FEH catchment was within soil ID 1 which was naturally wet which would likely cause greater runoff due to being less permeable. This in turn greater flooding therefore is a conservative approach.
- 3.3.7 The FEH and F03 areas of soil ID 3 and 4 are approximately similar.
- 3.3.8 The FEH BFIHOST and SPRHOST values were accepted as the soil characteristics are deemed to be representative.



FARL

- 3.3.9 The FARL value was checked against OS mapping and the FEH Web Service information on reservoir and lake storage areas.
- 3.3.10 The FARL value for the catchment is 1. There are no notable lakes or reservoirs within the FEH catchment or the PF03 catchment therefore the FARL value of 1 is considered to be appropriate and the FEH FARL value was accepted.

URBEXT

- 3.3.11 The urban extents on the FEH Web Service were compared with OS urban extents. FEH does not pick up the urban areas of Jennett's Hill in the northern part of the catchment.
- 3.3.12 FEH Volume 5 Equation 6.2 was therefore used to calculate the URBEXT value. Equation 4.5 in 'URBEXT2000- a new catchment descriptor' was used to calculate the URBEXT2000 value.



4 Revitalised Flood Hydrograph 2 (ReFH2)

4.1 Application of the ReFH2 Method

4.1.1 The purpose of carrying out the ReFH2 method is to estimate hyetographs for the catchment.

4.2 Parameters for ReFH2 Model

4.2.1 **Table 4** provides a summary of the ReFH2 parameters.

Table 4 – Summary of ReFH2 Parameters

Site code	Method	Tprural (hours)	Cmax (mm) Maximum storage capacity	PRimp	BL (hours) Baseflow lag	BR Baseflow recharge
PF03	CD	4.69	388.71	0.70	41.54	1.94

4.3 Flood Estimates from the ReFH2 Method

4.3.1 **Table 5** provides a summary of the ReFH2 method peak net rainfall values.

Table 5 – Summary of ReFH2 Method Peak Net Rainfall

Site code	Peak net rainfall (mm) for the following return periods (in years)									
	2	5	10	20	30	50	75	100	200	1000
PF03	1.0	1.4	1.7	2.1	2.3	2.5	2.7	2.9	3.4	5.0



5 Discussion and Summary of Results

5.1 Assumptions, Limitations and Uncertainty

Assumptions

5.1.1 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; and
- The ReFH2 hyetograph shapes are representative of the catchment response.

Limitations

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

Uncertainty

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

Suitability for Future Studies

5.1.4 The hyetographs calculated 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.



5.2 Checks

5.2.1 **Table 6** provides a summary of the checks carried out.

Table 6 – Summary of Checks

Are the results consistent, for example at confluences?	The results have consistent hyetographs, looking at the proportionate areas.
What do the results imply regarding the return periods of floods during the period of record?	No gauge data of historic flood records is available for comparison.
How do the results compare with those of other studies? Explain any differences and conclude which results should be preferred.	No other studies available for the catchment.
Are the results compatible with the longer-term flood history?	No data available.
Describe any other checks on the results	NA

5.3 50Final Results

5.3.1 The final accepted peak net rainfall for this study is summarised in **Table 7**.

Table 7 – Summary of the Final Accepted Peak Net Rainfall

Site code	Peak net rainfall (mm) for the following return periods (in years)									
	2	5	10	20	30	50	75	100	200	1000
PF03	1.0	1.4	1.7	2.1	2.3	2.5	2.7	2.9	3.4	5.0



Appendices



Appendix A - ReFH2 Summary

UK Design Flood Estimation

Generated on 05 August 2025 12:43:49 by Hydro
Printed from the ReFH2 Flood Modelling software package, version 4.1.8879.22310

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

Site details

Checksum: 282F-201E

Site name: PF03

Easting: 482950

Northing: 167100

Country: England, Wales or Northern Ireland

Catchment Area (km²): 4.8

Using plot scale calculations: No

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	74.90	Total runoff (ML):	94.05
Total Rainfall (mm):	50.01	Total flow (ML):	239.99
Peak Rainfall (mm):	8.53	Peak flow (m ³ /s):	3.54

Parameters

Where the user has overridden 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 - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	07:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.69	No
ARF (Areal reduction factor)	0.97	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	107.29	No
Cmax (mm)	388.71	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	4.69	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m ³ /s)	0.14	No
BL (hr)	41.54	No
BR	1.94	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m ³ /s)	0	No
Exporting drained area (km ²)	0	No
Urban area (km ²)	1.34	No
Effective URBEXT2000	0.18	n/a
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

Time series data

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)
00:00:00	0.748	0.000	0.245	0.000	0.120	0.120
00:30:00	1.093	0.000	0.367	0.003	0.119	0.122
01:00:00	1.593	0.000	0.540	0.014	0.117	0.132
01:30:00	2.315	0.000	0.795	0.037	0.116	0.153
02:00:00	3.350	0.000	1.173	0.077	0.116	0.192
02:30:00	4.815	0.000	1.733	0.142	0.116	0.258
03:00:00	6.827	0.000	2.551	0.244	0.117	0.362
03:30:00	8.533	0.000	3.344	0.402	0.120	0.522
04:00:00	6.827	0.000	2.800	0.631	0.126	0.757
04:30:00	4.815	0.000	2.041	0.933	0.135	1.068
05:00:00	3.350	0.000	1.452	1.284	0.149	1.434
05:30:00	2.315	0.000	1.019	1.661	0.169	1.830
06:00:00	1.593	0.000	0.709	2.040	0.194	2.234
06:30:00	1.093	0.000	0.490	2.398	0.225	2.623
07:00:00	0.748	0.000	0.337	2.711	0.261	2.973
07:30:00	0.000	0.000	0.000	2.950	0.303	3.253
08:00:00	0.000	0.000	0.000	3.096	0.349	3.444
08:30:00	0.000	0.000	0.000	3.142	0.397	3.539
09:00:00	0.000	0.000	0.000	3.094	0.447	3.541
09:30:00	0.000	0.000	0.000	2.972	0.496	3.468
10:00:00	0.000	0.000	0.000	2.800	0.544	3.344
10:30:00	0.000	0.000	0.000	2.599	0.588	3.187
11:00:00	0.000	0.000	0.000	2.384	0.629	3.013
11:30:00	0.000	0.000	0.000	2.167	0.667	2.833
12:00:00	0.000	0.000	0.000	1.955	0.700	2.655
12:30:00	0.000	0.000	0.000	1.751	0.729	2.480
13:00:00	0.000	0.000	0.000	1.561	0.754	2.315
13:30:00	0.000	0.000	0.000	1.388	0.776	2.164
14:00:00	0.000	0.000	0.000	1.230	0.795	2.025
14:30:00	0.000	0.000	0.000	1.086	0.811	1.897
15:00:00	0.000	0.000	0.000	0.953	0.824	1.776
15:30:00	0.000	0.000	0.000	0.828	0.835	1.663
16:00:00	0.000	0.000	0.000	0.714	0.844	1.557
16:30:00	0.000	0.000	0.000	0.611	0.850	1.461

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)
17:00:00	0.000	0.000	0.000	0.520	0.855	1.376
17:30:00	0.000	0.000	0.000	0.440	0.858	1.298
18:00:00	0.000	0.000	0.000	0.366	0.859	1.225
18:30:00	0.000	0.000	0.000	0.299	0.858	1.157
19:00:00	0.000	0.000	0.000	0.237	0.856	1.093
19:30:00	0.000	0.000	0.000	0.181	0.852	1.032
20:00:00	0.000	0.000	0.000	0.131	0.846	0.977
20:30:00	0.000	0.000	0.000	0.089	0.839	0.929
21:00:00	0.000	0.000	0.000	0.058	0.832	0.889
21:30:00	0.000	0.000	0.000	0.036	0.823	0.858
22:00:00	0.000	0.000	0.000	0.021	0.814	0.835
22:30:00	0.000	0.000	0.000	0.011	0.805	0.816
23:00:00	0.000	0.000	0.000	0.005	0.795	0.800
23:30:00	0.000	0.000	0.000	0.002	0.786	0.788
24:00:00	0.000	0.000	0.000	0.000	0.776	0.777
24:30:00	0.000	0.000	0.000	0.000	0.767	0.767
25:00:00	0.000	0.000	0.000	0.000	0.758	0.758
25:30:00	0.000	0.000	0.000	0.000	0.749	0.749
26:00:00	0.000	0.000	0.000	0.000	0.740	0.740
26:30:00	0.000	0.000	0.000	0.000	0.731	0.731
27:00:00	0.000	0.000	0.000	0.000	0.722	0.722
27:30:00	0.000	0.000	0.000	0.000	0.714	0.714
28:00:00	0.000	0.000	0.000	0.000	0.705	0.705
28:30:00	0.000	0.000	0.000	0.000	0.697	0.697
29:00:00	0.000	0.000	0.000	0.000	0.688	0.688
29:30:00	0.000	0.000	0.000	0.000	0.680	0.680
30:00:00	0.000	0.000	0.000	0.000	0.672	0.672
30:30:00	0.000	0.000	0.000	0.000	0.664	0.664
31:00:00	0.000	0.000	0.000	0.000	0.656	0.656
31:30:00	0.000	0.000	0.000	0.000	0.648	0.648
32:00:00	0.000	0.000	0.000	0.000	0.640	0.640
32:30:00	0.000	0.000	0.000	0.000	0.633	0.633
33:00:00	0.000	0.000	0.000	0.000	0.625	0.625
33:30:00	0.000	0.000	0.000	0.000	0.618	0.618
34:00:00	0.000	0.000	0.000	0.000	0.610	0.610

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)
34:30:00	0.000	0.000	0.000	0.000	0.603	0.603
35:00:00	0.000	0.000	0.000	0.000	0.596	0.596
35:30:00	0.000	0.000	0.000	0.000	0.589	0.589
36:00:00	0.000	0.000	0.000	0.000	0.582	0.582
36:30:00	0.000	0.000	0.000	0.000	0.575	0.575
37:00:00	0.000	0.000	0.000	0.000	0.568	0.568
37:30:00	0.000	0.000	0.000	0.000	0.561	0.561
38:00:00	0.000	0.000	0.000	0.000	0.554	0.554
38:30:00	0.000	0.000	0.000	0.000	0.548	0.548
39:00:00	0.000	0.000	0.000	0.000	0.541	0.541
39:30:00	0.000	0.000	0.000	0.000	0.535	0.535
40:00:00	0.000	0.000	0.000	0.000	0.528	0.528
40:30:00	0.000	0.000	0.000	0.000	0.522	0.522
41:00:00	0.000	0.000	0.000	0.000	0.516	0.516
41:30:00	0.000	0.000	0.000	0.000	0.510	0.510
42:00:00	0.000	0.000	0.000	0.000	0.503	0.503
42:30:00	0.000	0.000	0.000	0.000	0.497	0.497
43:00:00	0.000	0.000	0.000	0.000	0.491	0.491
43:30:00	0.000	0.000	0.000	0.000	0.486	0.486
44:00:00	0.000	0.000	0.000	0.000	0.480	0.480
44:30:00	0.000	0.000	0.000	0.000	0.474	0.474
45:00:00	0.000	0.000	0.000	0.000	0.468	0.468
45:30:00	0.000	0.000	0.000	0.000	0.463	0.463
46:00:00	0.000	0.000	0.000	0.000	0.457	0.457
46:30:00	0.000	0.000	0.000	0.000	0.452	0.452
47:00:00	0.000	0.000	0.000	0.000	0.446	0.446
47:30:00	0.000	0.000	0.000	0.000	0.441	0.441
48:00:00	0.000	0.000	0.000	0.000	0.436	0.436
48:30:00	0.000	0.000	0.000	0.000	0.431	0.431
49:00:00	0.000	0.000	0.000	0.000	0.425	0.425
49:30:00	0.000	0.000	0.000	0.000	0.420	0.420
50:00:00	0.000	0.000	0.000	0.000	0.415	0.415
50:30:00	0.000	0.000	0.000	0.000	0.410	0.410
51:00:00	0.000	0.000	0.000	0.000	0.405	0.405
51:30:00	0.000	0.000	0.000	0.000	0.401	0.401

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)
52:00:00	0.000	0.000	0.000	0.000	0.396	0.396
52:30:00	0.000	0.000	0.000	0.000	0.391	0.391
53:00:00	0.000	0.000	0.000	0.000	0.386	0.386
53:30:00	0.000	0.000	0.000	0.000	0.382	0.382
54:00:00	0.000	0.000	0.000	0.000	0.377	0.377
54:30:00	0.000	0.000	0.000	0.000	0.373	0.373
55:00:00	0.000	0.000	0.000	0.000	0.368	0.368
55:30:00	0.000	0.000	0.000	0.000	0.364	0.364
56:00:00	0.000	0.000	0.000	0.000	0.359	0.359
56:30:00	0.000	0.000	0.000	0.000	0.355	0.355
57:00:00	0.000	0.000	0.000	0.000	0.351	0.351
57:30:00	0.000	0.000	0.000	0.000	0.347	0.347
58:00:00	0.000	0.000	0.000	0.000	0.343	0.343
58:30:00	0.000	0.000	0.000	0.000	0.338	0.338
59:00:00	0.000	0.000	0.000	0.000	0.334	0.334
59:30:00	0.000	0.000	0.000	0.000	0.330	0.330
60:00:00	0.000	0.000	0.000	0.000	0.326	0.326
60:30:00	0.000	0.000	0.000	0.000	0.323	0.323
61:00:00	0.000	0.000	0.000	0.000	0.319	0.319
61:30:00	0.000	0.000	0.000	0.000	0.315	0.315
62:00:00	0.000	0.000	0.000	0.000	0.311	0.311
62:30:00	0.000	0.000	0.000	0.000	0.307	0.307
63:00:00	0.000	0.000	0.000	0.000	0.304	0.304
63:30:00	0.000	0.000	0.000	0.000	0.300	0.300
64:00:00	0.000	0.000	0.000	0.000	0.296	0.296
64:30:00	0.000	0.000	0.000	0.000	0.293	0.293
65:00:00	0.000	0.000	0.000	0.000	0.289	0.289
65:30:00	0.000	0.000	0.000	0.000	0.286	0.286
66:00:00	0.000	0.000	0.000	0.000	0.283	0.283
66:30:00	0.000	0.000	0.000	0.000	0.279	0.279
67:00:00	0.000	0.000	0.000	0.000	0.276	0.276
67:30:00	0.000	0.000	0.000	0.000	0.273	0.273
68:00:00	0.000	0.000	0.000	0.000	0.269	0.269
68:30:00	0.000	0.000	0.000	0.000	0.266	0.266
69:00:00	0.000	0.000	0.000	0.000	0.263	0.263

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)
69:30:00	0.000	0.000	0.000	0.000	0.260	0.260
70:00:00	0.000	0.000	0.000	0.000	0.257	0.257
70:30:00	0.000	0.000	0.000	0.000	0.254	0.254
71:00:00	0.000	0.000	0.000	0.000	0.250	0.250
71:30:00	0.000	0.000	0.000	0.000	0.247	0.247
72:00:00	0.000	0.000	0.000	0.000	0.245	0.245
72:30:00	0.000	0.000	0.000	0.000	0.242	0.242
73:00:00	0.000	0.000	0.000	0.000	0.239	0.239
73:30:00	0.000	0.000	0.000	0.000	0.236	0.236
74:00:00	0.000	0.000	0.000	0.000	0.233	0.233
74:30:00	0.000	0.000	0.000	0.000	0.230	0.230
75:00:00	0.000	0.000	0.000	0.000	0.228	0.228
75:30:00	0.000	0.000	0.000	0.000	0.225	0.225
76:00:00	0.000	0.000	0.000	0.000	0.222	0.222
76:30:00	0.000	0.000	0.000	0.000	0.219	0.219
77:00:00	0.000	0.000	0.000	0.000	0.217	0.217
77:30:00	0.000	0.000	0.000	0.000	0.214	0.214
78:00:00	0.000	0.000	0.000	0.000	0.212	0.212
78:30:00	0.000	0.000	0.000	0.000	0.209	0.209
79:00:00	0.000	0.000	0.000	0.000	0.207	0.207
79:30:00	0.000	0.000	0.000	0.000	0.204	0.204
80:00:00	0.000	0.000	0.000	0.000	0.202	0.202
80:30:00	0.000	0.000	0.000	0.000	0.199	0.199
81:00:00	0.000	0.000	0.000	0.000	0.197	0.197
81:30:00	0.000	0.000	0.000	0.000	0.195	0.195
82:00:00	0.000	0.000	0.000	0.000	0.192	0.192
82:30:00	0.000	0.000	0.000	0.000	0.190	0.190
83:00:00	0.000	0.000	0.000	0.000	0.188	0.188
83:30:00	0.000	0.000	0.000	0.000	0.185	0.185
84:00:00	0.000	0.000	0.000	0.000	0.183	0.183
84:30:00	0.000	0.000	0.000	0.000	0.181	0.181
85:00:00	0.000	0.000	0.000	0.000	0.179	0.179
85:30:00	0.000	0.000	0.000	0.000	0.177	0.177
86:00:00	0.000	0.000	0.000	0.000	0.175	0.175
86:30:00	0.000	0.000	0.000	0.000	0.172	0.172

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)
87:00:00	0.000	0.000	0.000	0.000	0.170	0.170
87:30:00	0.000	0.000	0.000	0.000	0.168	0.168
88:00:00	0.000	0.000	0.000	0.000	0.166	0.166
88:30:00	0.000	0.000	0.000	0.000	0.164	0.164
89:00:00	0.000	0.000	0.000	0.000	0.162	0.162
89:30:00	0.000	0.000	0.000	0.000	0.160	0.160
90:00:00	0.000	0.000	0.000	0.000	0.159	0.159
90:30:00	0.000	0.000	0.000	0.000	0.157	0.157
91:00:00	0.000	0.000	0.000	0.000	0.155	0.155
91:30:00	0.000	0.000	0.000	0.000	0.153	0.153
92:00:00	0.000	0.000	0.000	0.000	0.151	0.151
92:30:00	0.000	0.000	0.000	0.000	0.149	0.149
93:00:00	0.000	0.000	0.000	0.000	0.148	0.148
93:30:00	0.000	0.000	0.000	0.000	0.146	0.146
94:00:00	0.000	0.000	0.000	0.000	0.144	0.144
94:30:00	0.000	0.000	0.000	0.000	0.142	0.142
95:00:00	0.000	0.000	0.000	0.000	0.141	0.141
95:30:00	0.000	0.000	0.000	0.000	0.139	0.139
96:00:00	0.000	0.000	0.000	0.000	0.137	0.137
96:30:00	0.000	0.000	0.000	0.000	0.136	0.136
97:00:00	0.000	0.000	0.000	0.000	0.134	0.134
97:30:00	0.000	0.000	0.000	0.000	0.132	0.132
98:00:00	0.000	0.000	0.000	0.000	0.131	0.131
98:30:00	0.000	0.000	0.000	0.000	0.129	0.129
99:00:00	0.000	0.000	0.000	0.000	0.128	0.128
99:30:00	0.000	0.000	0.000	0.000	0.126	0.126
100:00:00	0.000	0.000	0.000	0.000	0.125	0.125
100:30:00	0.000	0.000	0.000	0.000	0.123	0.123
101:00:00	0.000	0.000	0.000	0.000	0.122	0.122

Appendix

Catchment descriptors

Name	Value	User-defined value used?
Area (km ²)	4.8	No
ALTBAR	78	No
ASPBAR	295	No
ASPVAR	0.45	No
BFIHOST	0.45	No
BFIHOST19	0.47	No
DPLBAR (km)	2.36	No
DPSBAR (mkm ⁻¹)	23.8	No
FARL	1	No
LDP	5.7	No
PROPWET	0.29	No
RMED1H	12.5	No
RMED1D	32	No
RMED2D	41	No
SAAR (mm)	664	No
SAAR4170 (mm)	673	No
SPRHOST	37.68	No
URBEXT2000	0.18	No
URBEXT1990	0.18	No
URBCONC	0.86	No
URBLOC	1.27	No
DDF parameter C	-0.03	No
DDF parameter D1	0.26	No
DDF parameter D2	0.27	No
DDF parameter D3	0.32	No
DDF parameter E	0.3	No
DDF parameter F	2.72	No
DDF parameter C (1km grid value)	-0.03	No
DDF parameter D1 (1km grid value)	0.27	No
DDF parameter D2 (1km grid value)	0.29	No
DDF parameter D3 (1km grid value)	0.32	No
DDF parameter E (1km grid value)	0.3	No
DDF parameter F (1km grid value)	2.7	No



Appendix B - Model Log

A218 Priors Farm Direct Rainfall Model Log

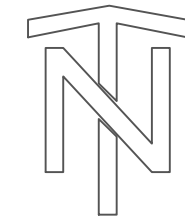
.TCF	.ECF	.TGC	.TBC	.TMF	Run
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PF01_2m_100yr_005	PF01_2m_100yr_005	PF01_2m_005	PF01_2m_005	Materials	100%
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PF01_2m_100yrCC40_005a	PF01_2m_100yrCC40_005a	PF01_2m_005	PF01_2m_005	Materials	100%
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PF01_2m_100yrCC40_90PC_Block_005	PF01_2m_100yrCC40_90PC_Block_005	PF01_2m_005	PF01_2m_005	Materials	100%
PF01_2m_100yrCC40_5.5hr_Storm_Duration_005	PF01_2m_100yrCC40_5.5hr_Storm_Duration_005	PF01_2m_005	PF01_2m_005	Materials	100%
PF01_2m_100yrCC40_9.5hr_Storm_Duration_005	PF01_2m_100yrCC40_9.5hr_Storm_Duration_005	PF01_2m_005	PF01_2m_005	Materials	100%
PF01_2m_100yrCC40_DSB_+20PC_005	PF01_2m_100yrCC40_DSB_+20PC_005	PF01_2m_DSB_+20PC_005	PF01_2m_005	Materials	100%
PF01_2m_100yrCC40_DSB_-20PC_005	PF01_2m_100yrCC40_DSB_-20PC_005	PF01_2m_DSB_-20PC_005	PF01_2m_005	Materials	100%
PF01_2m_100yrCC40_006	PF01_2m_100yrCC40_006	PF01_2m_006	PF01_2m_006	Materials	100%
PF01_2m_100yrCC40_DSB_west_005	PF01_2m_100yrCC40_DSB_west_005	PF01_2m_DSB_west_005	PF01_2m_005	Materials	100%



Appendix C - Topographical Survey

Topographical Survey

Channel Survey



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2. Due to unavoidable inaccuracies during the reproduction process these drawings should be checked. Where discrepancies are critical Usk Land Survey should be requested to confirm dimensions based on survey information. Scales appearing at the base of this plan are only indicative.
3. This plan has been prepared in accordance with B.S. 1192, Part 1 in relation to scale and dimension. Tolerances permitted within the British Standard should be observed.
4. All dimensions and particulars should be checked on site. Any discrepancies should be reported to Usk Land Survey before any work commences.

SURVEY LEGEND

AB	AIR BRICK	LP	LAMP POST
AV	B	MB	MOORING BOLLARD
B	BOLLARD	MF	MOCELLANEOUS FENCING
BL	BELTLINE BEACON	MN	MANHOLE
BO	BOUNDARY	MKR	MARKER
BR	BROWN	MR	MOORING PILE
BY	BEL BEL	MF	METAL RAILING FENCE
BK	BLOCK	MS	MILE STATION
BS	BUS STOP	NC	NOTICE BOARD
BSK	BUS STOP	NB	NATURAL PIPE, BRASS AUTHORITY
BW	BRICK WALL	OH	OVERHEAD CABLE
BWF	BARBED WIRE FENCE	OS	ORANGE SURVEY
BWV	BUS STOP, BARBED FENCE	OP	OPEN STREET RAILINGS
C	CORRUGATED IRON FENCE	P	PILE
CF	COVER	PR	PILLAR BOX
CLF	CHAIN LINK FENCE	PM	PARKING MARKER
CONC	CONCRETE	PT	POST
CP	CONCRETE POST	PRF	POST & RAIL FENCE
CR	CORNER	PS	POST SIGN, TELEPHONE
CRV	CYCLE RACK	PWF	POST & WIRE FENCE
CU	CULVERT, MANHOLE	RB	RIGHT BANK
CUV	CULVERT	RCD	ROUNDING C/D
DK	DOWN KERO	RS	ROAD SIGN
DK	DOWN KERO	RW	RETAINING WALL
DP	DOWNPUR	RSP	RAINNATER PIPE
DPC	DOWN PROOF FLOOR	RO	ROAD C/OOK
DR	DR	SD	STAND PIPE
DWB	DRAIN WASTE BIN	SK	SKIDWAY
EA	ENVIRONMENT AGENCY	SL	SOFTT LEVEL
ED	ELECTRICITY BOX	SMH	SMALL WATER MANHOLE
EDP	ELECTRICITY CABLE FENCE	SN	SIGN
ECB	ELECTRICITY CABLE PIT	SP	SIGN POST
EMH	ELECTRICITY MANHOLE	ST	STATION
EL	ELECTRICITY POLE	SV	SWITCH VALVE
ETL	ELECTRICITY TRANSMISSION LINE	SW	SWEEP WIRE FENCE
FA	FOOTBRIDGE	SWV	SWEEP WIRE MARK
FR	FOOTBRIDGE	TCP/TP	TELEPHONE CALL BOX/POST
FH	FIRE HYDRANT	T	TELECOM CABINET
FHM	FIRE HYDRANT MARKER	TM	TELECOM MANHOLE
FL	FLOOR LEVEL	TL	THRESHOLD LEVEL
FLM	FLOOR LEVEL MARK	TRF	TRAFFIC LIGHT
FWM	FOUL WATER MANHOLE	T/LB	TRAFFIC LIGHT BOX
GL	GROUND LEVEL	TR	TELEGRAPH POLE
GL	GROUND LEVEL	TRS	TRIUMBER RUBBING STRIP
GM	GRASS	TRU	TRUSS
Q	GRASS	TUB	TUBULAR STEEL RAILINGS
QV	GRASS MARKER	V	VENT PIPE
Q	GRASS MARKER	W	WASTE BIN
QV	GRASS MARKER	WL	WATER LEVEL/WATER LINE
IC	INSULATION CHAMBER	WM	WATER METER
IR	IRON RAILING FENCE	WMF	WIRE MESH FENCE
IRF	IRON RAILING FENCE	WPD	WATER POST
JB	JUNCTION BOX	WPR	WATER POST & RAIL FENCE
JL	JUNCTION BOX, CULVERT	Y	YARD
LB	LEFT BANK		
LF	LEFTBANK		

(Abbreviations apply to survey data only)

STN	CO-ORDINATES	LEVEL	STN	CO-ORDINATES	LEVEL
NATIONAL GRID.			CONTROL USED:		
			TYPE		REFERENCE
			VALUE(M)		
ALL LEVELS RELATE TO ORDNANCE DATUM NEWLYN.					

 **Usk Land Survey**
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EMAIL jonbarton@usklandsurvey.co.uk

Site Easthampstead Road
Wokingham
RG40 3BQ

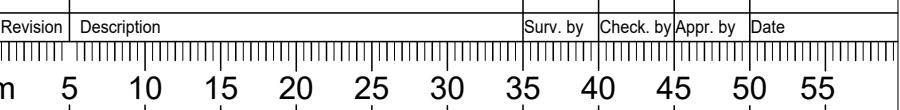
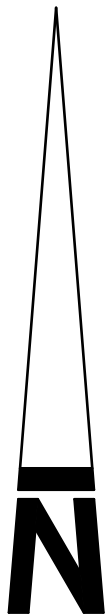
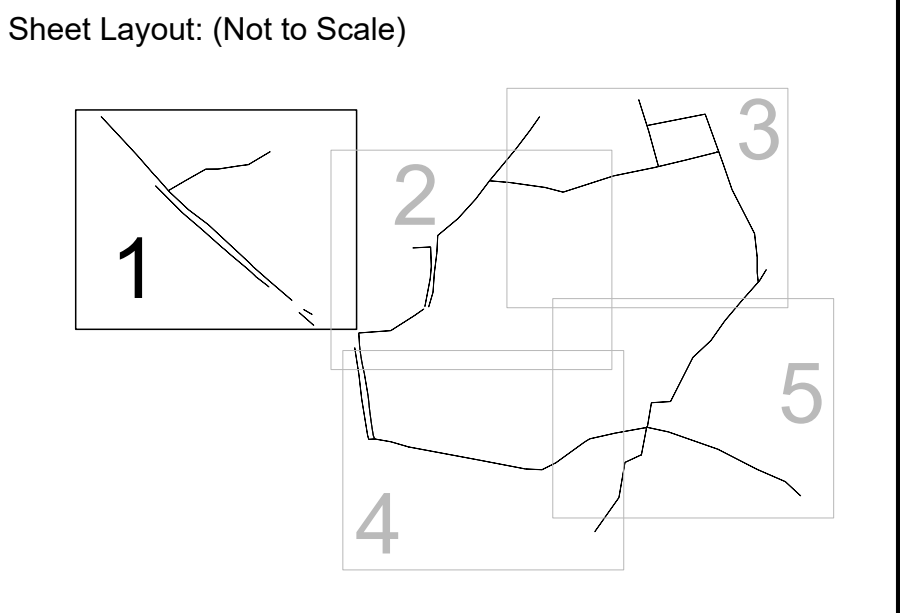
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2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Location Plan

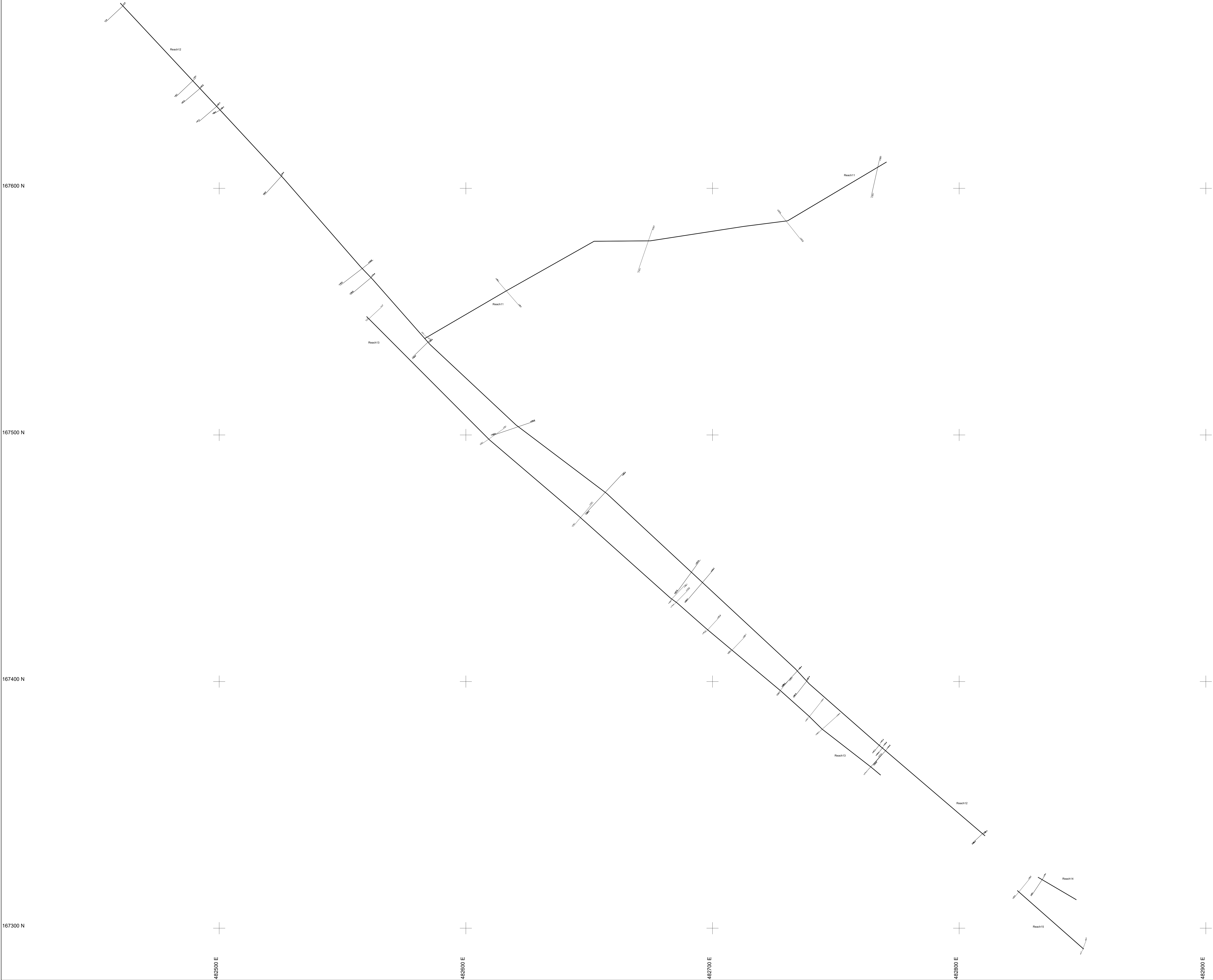
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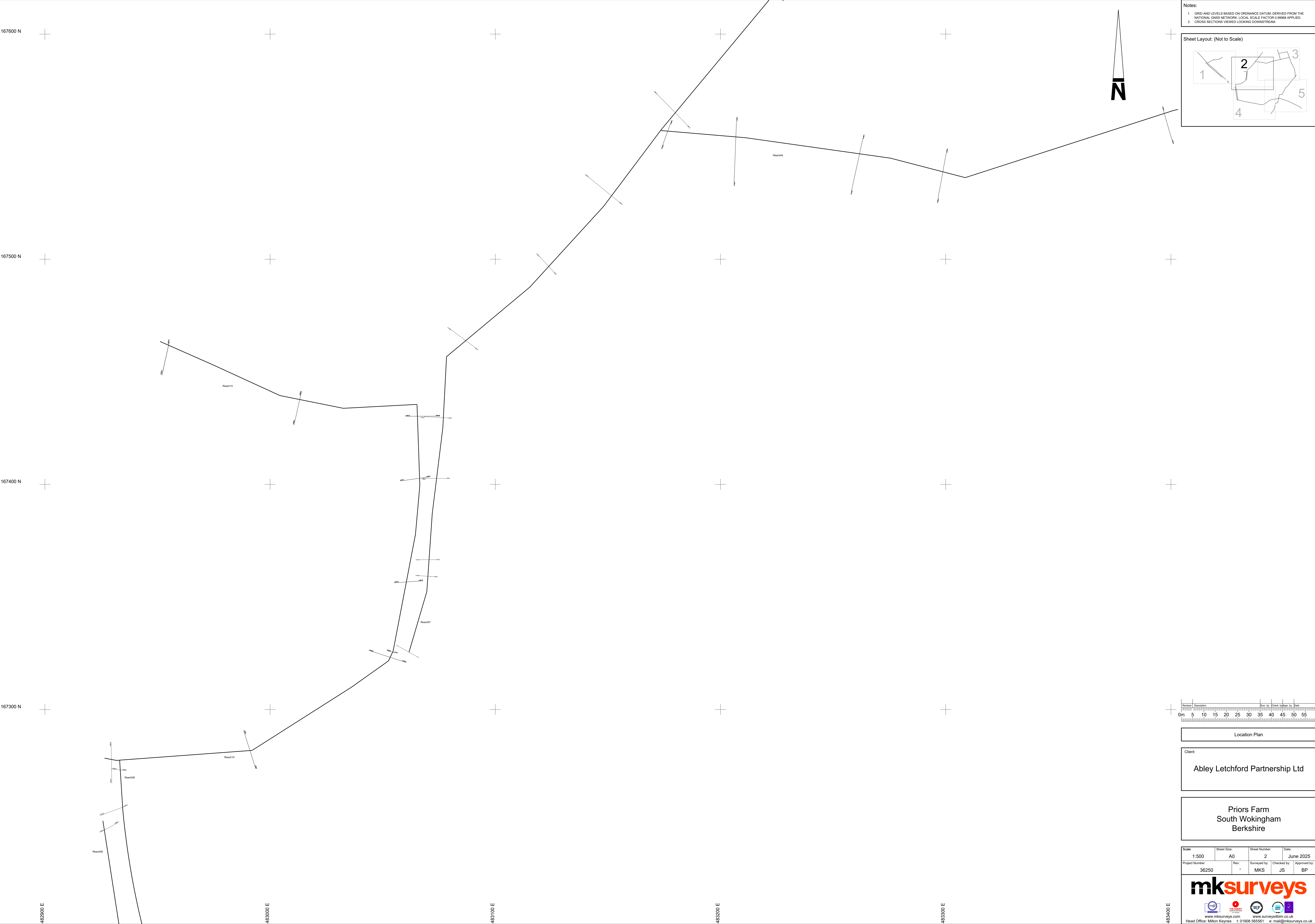
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South Wokingham
Berkshire

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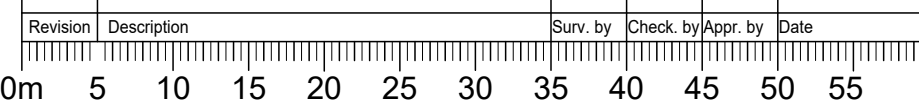
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Sheet Layout: (Not to Scale)



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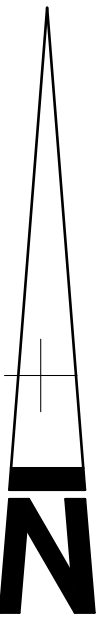
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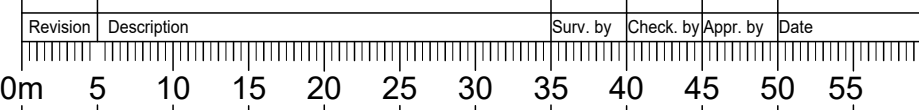
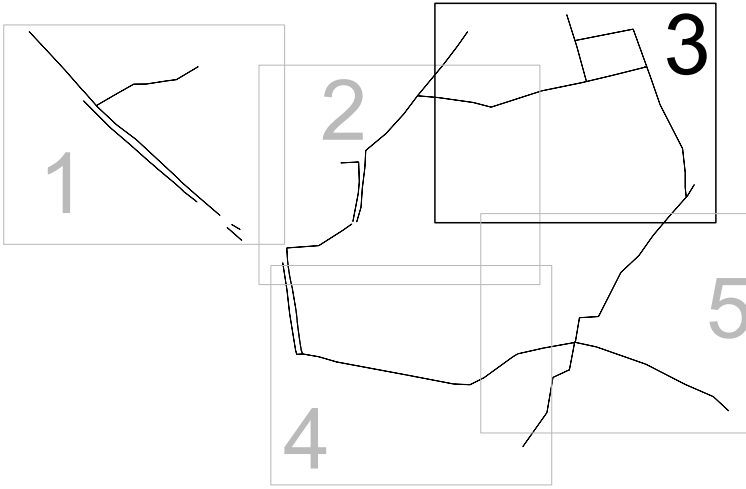
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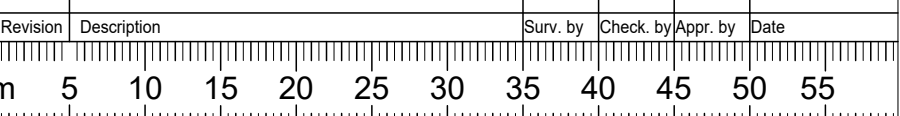
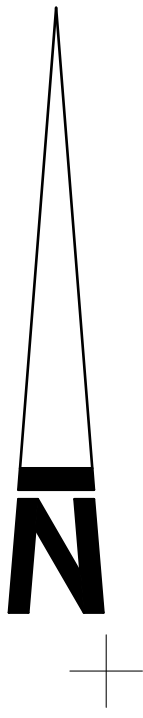
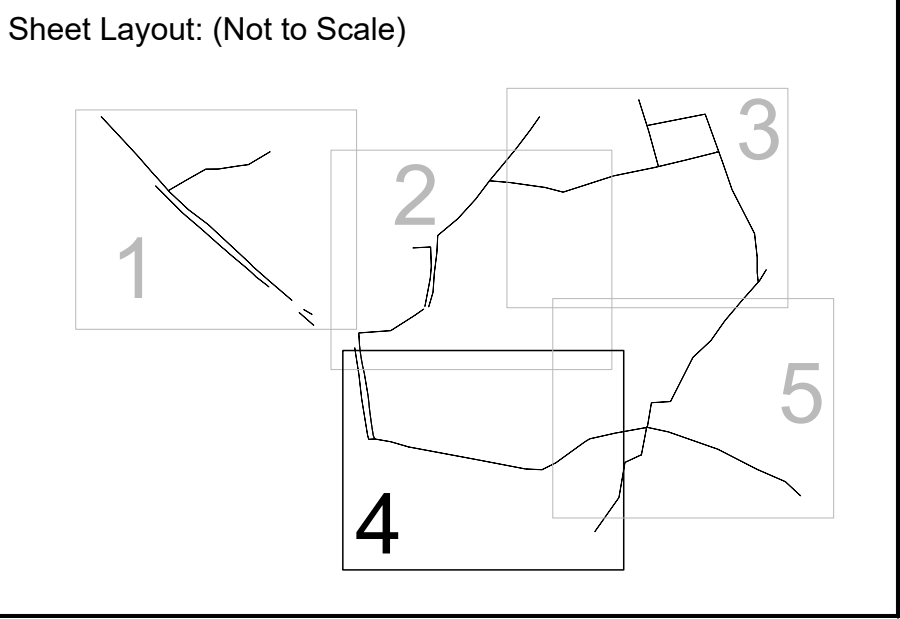
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South Wokingham
Berkshire

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36250	-	MKS	JS
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Berkshire**

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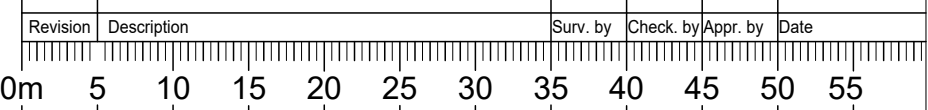
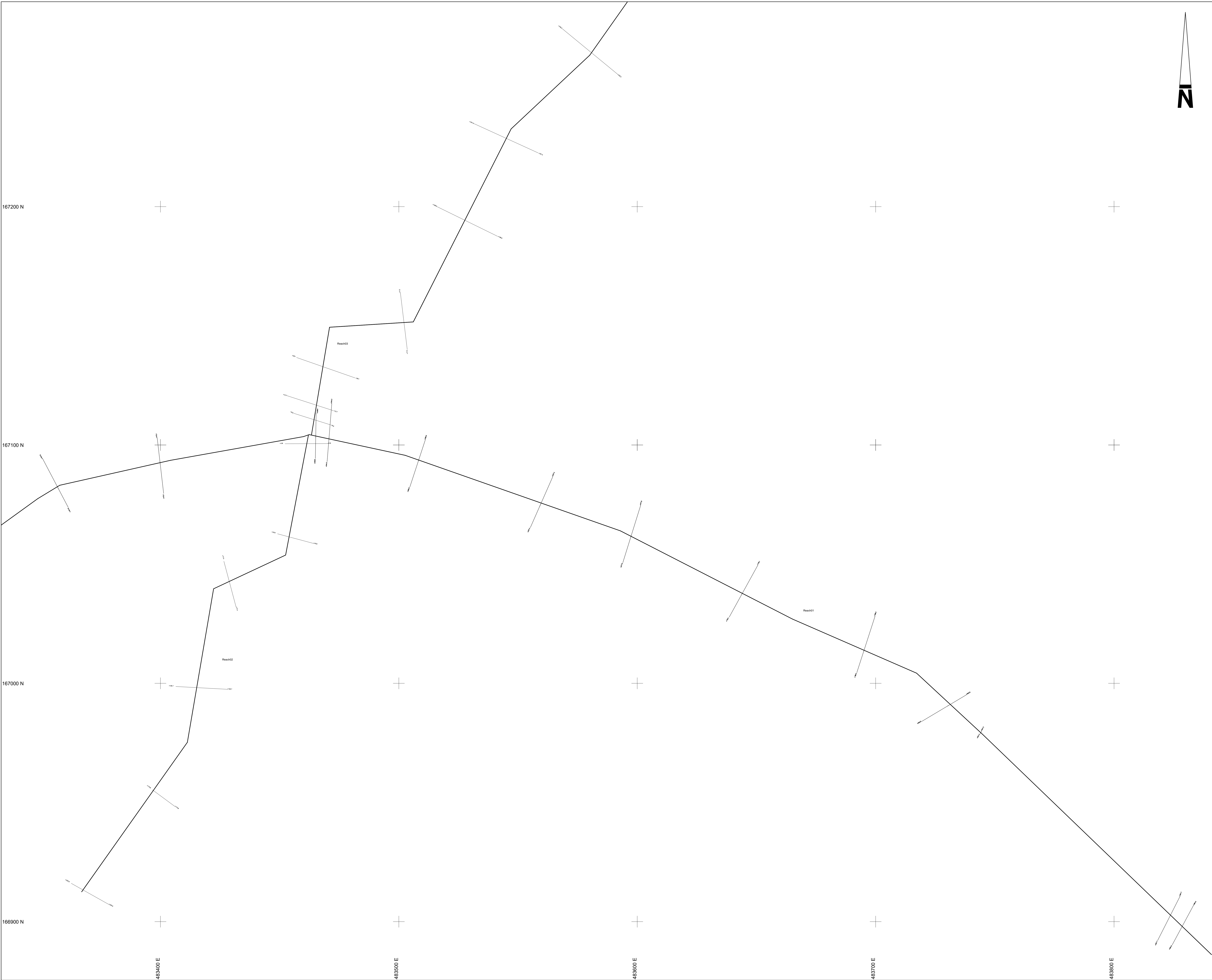
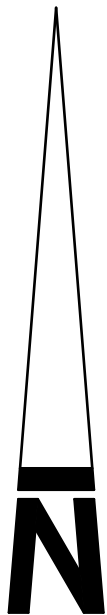
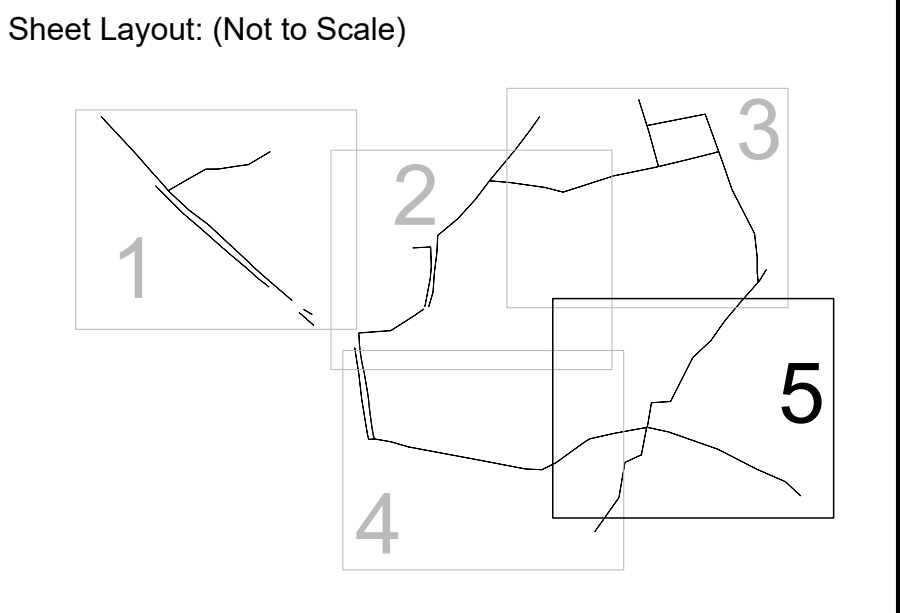
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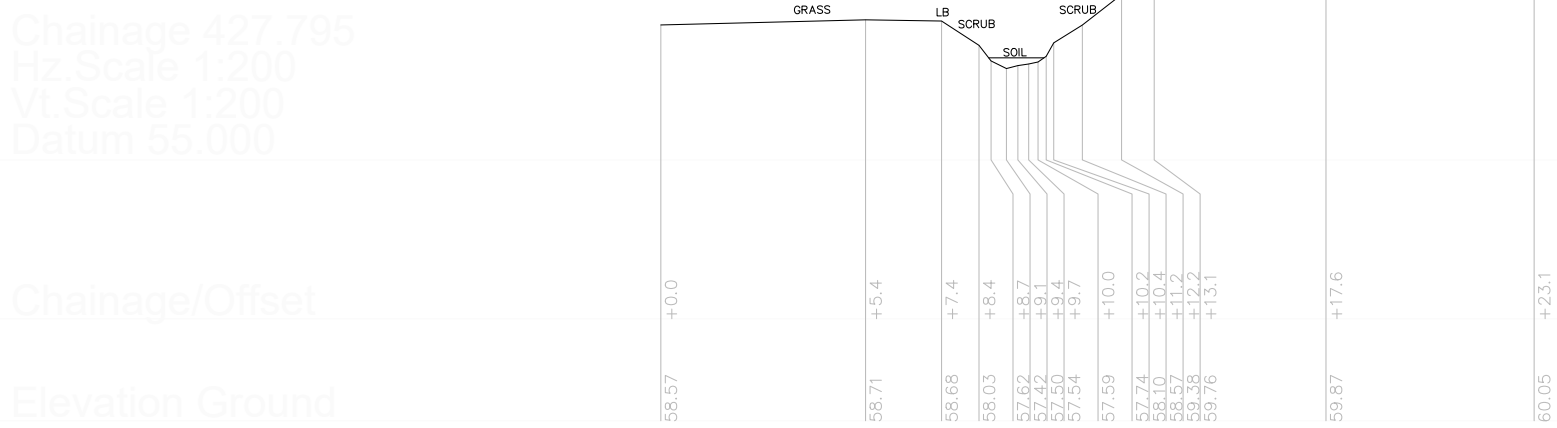
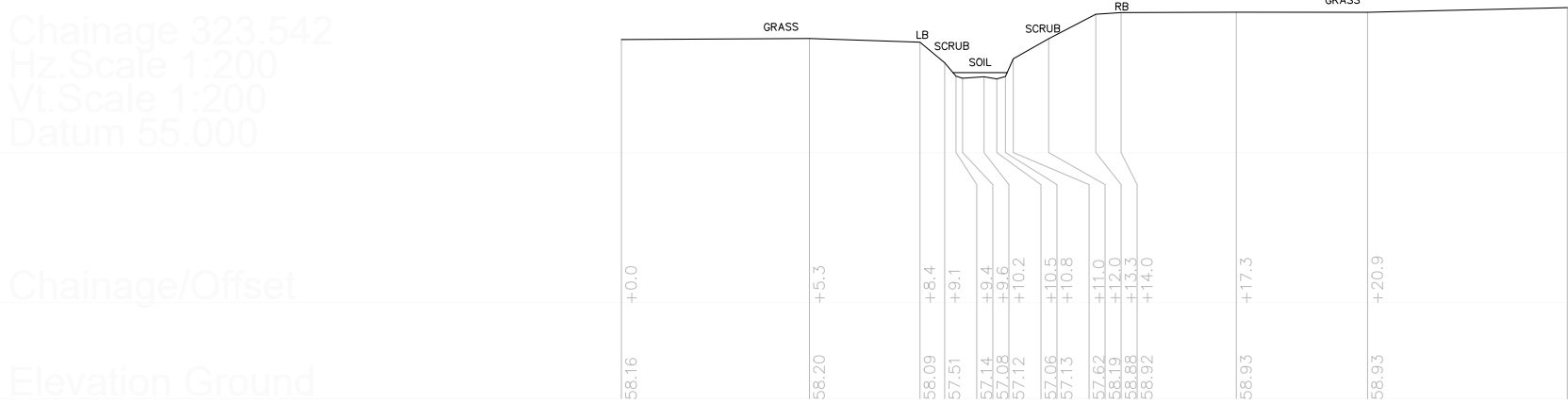
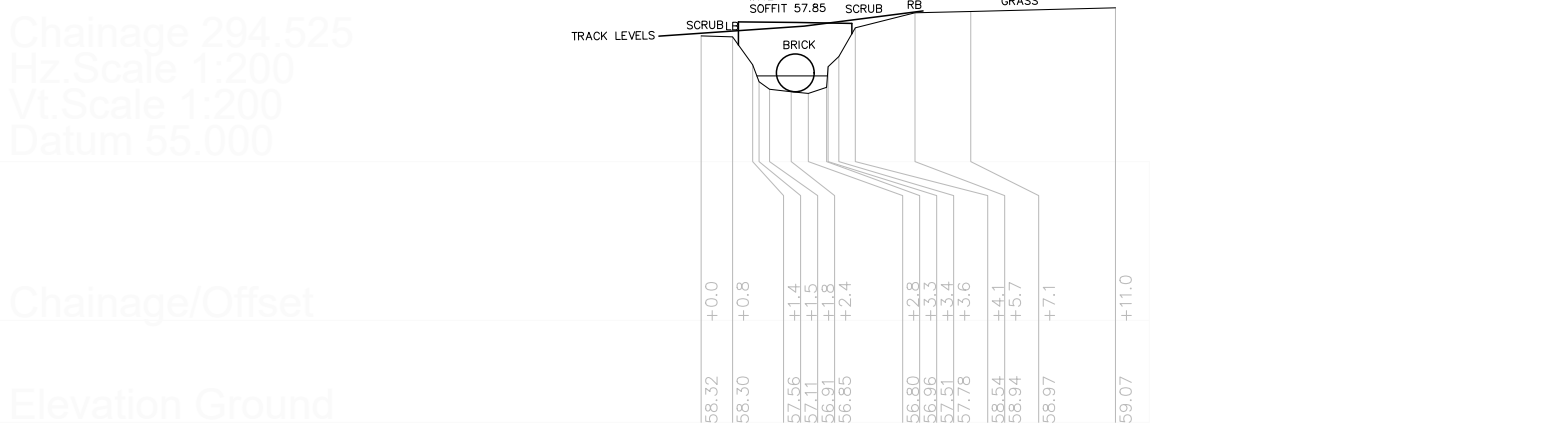
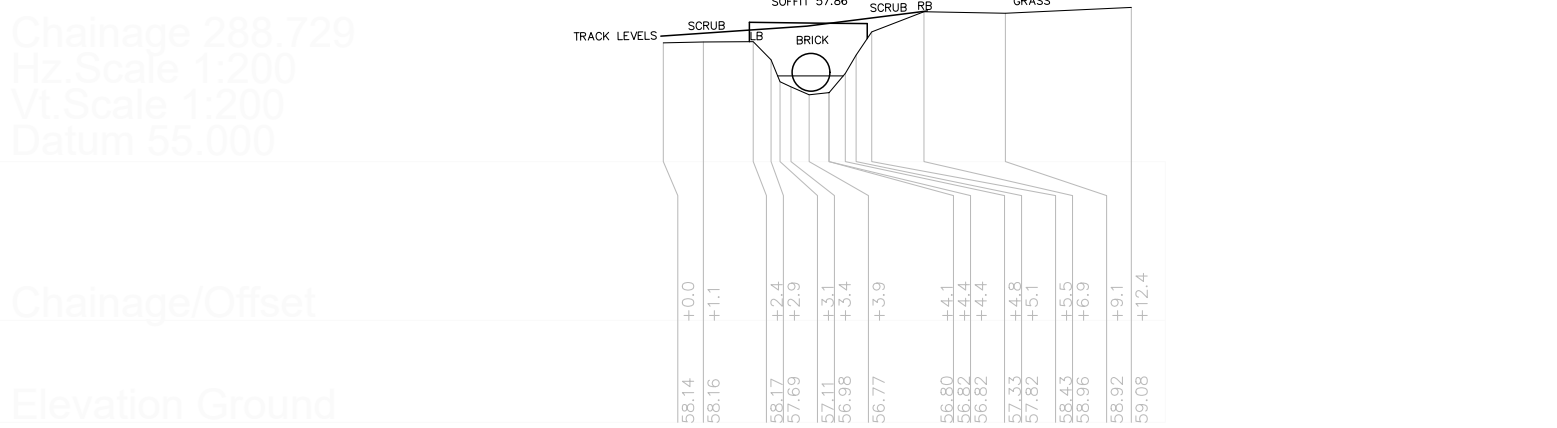
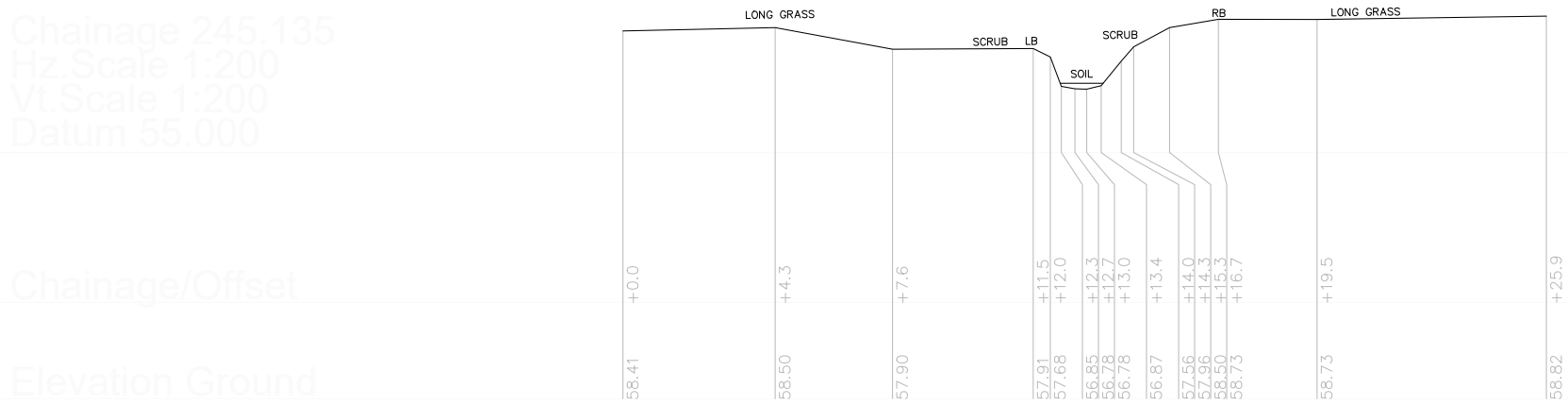
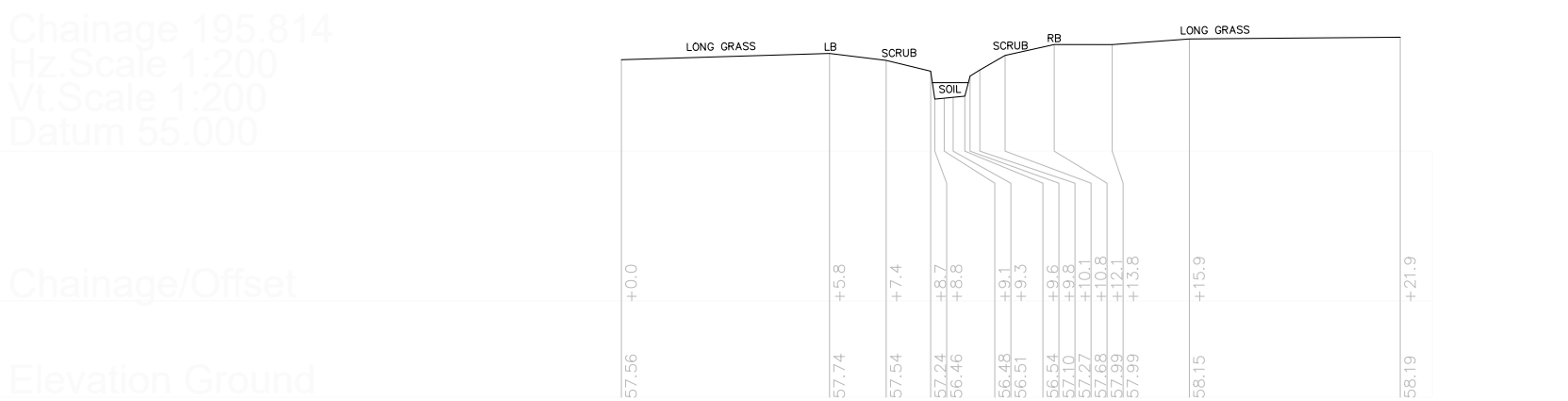
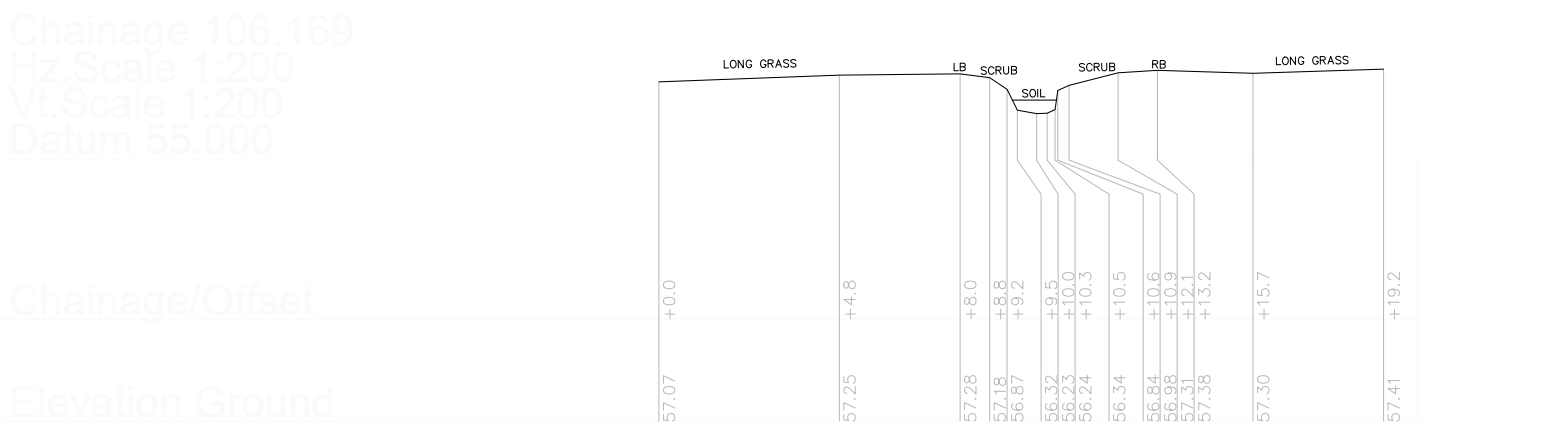
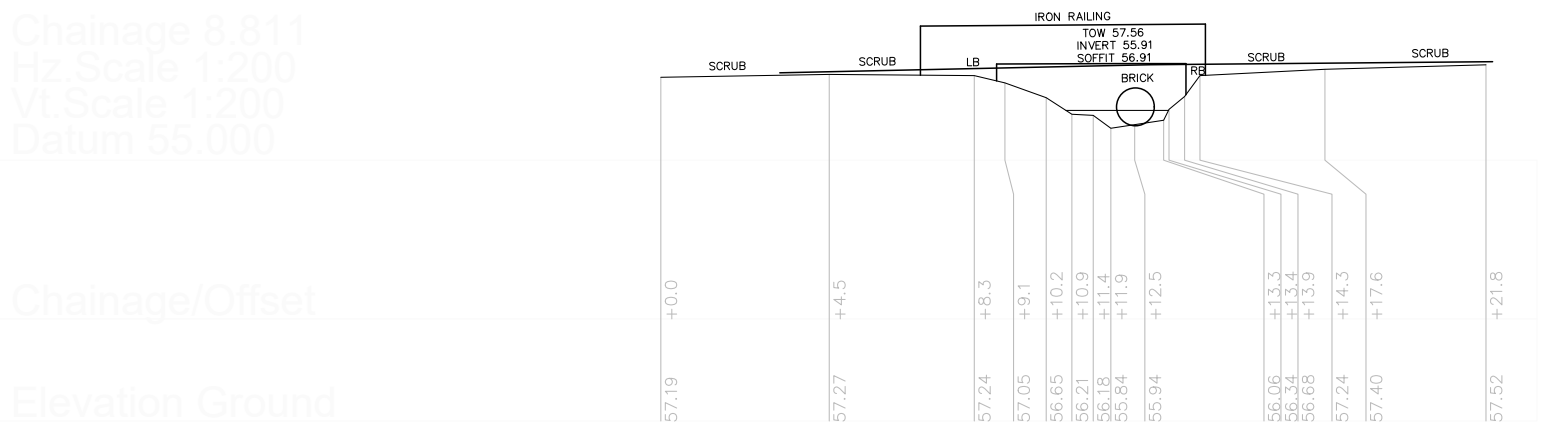
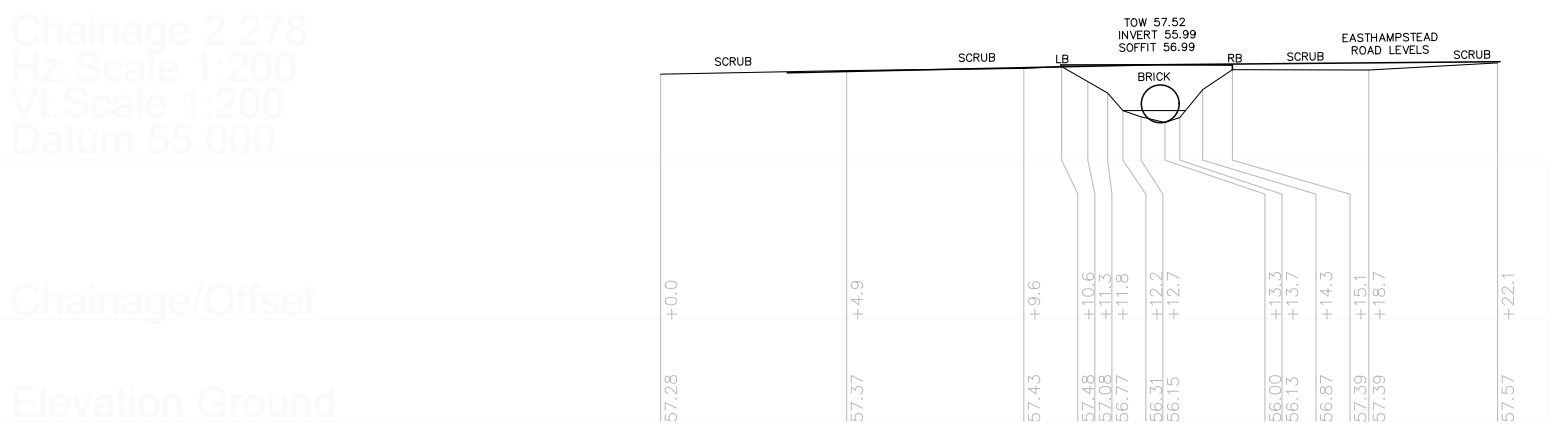
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Berkshire**

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Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP

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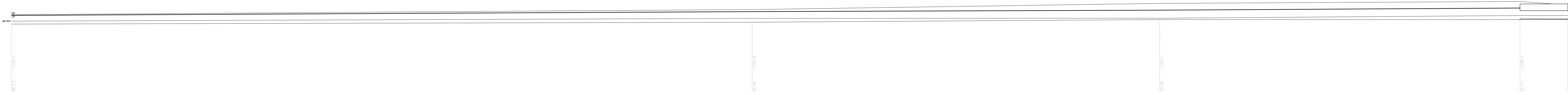
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Datum 55.000

Chainage/Offset

Elevation Ground



Chainage 294.5-472.1
Hx Scale 1:200
Vx Scale 1:200
Datum 55.000

Chainage/Offset

Elevation Ground



Chainage 472.1-637.4
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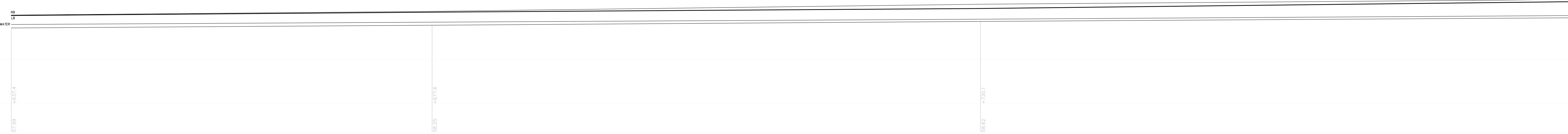
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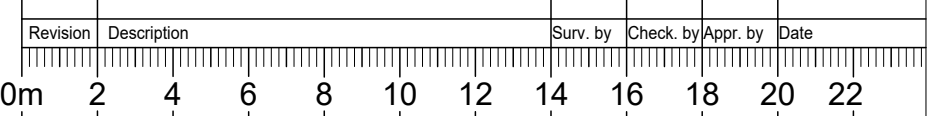
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Elevation Ground



Long Section - Reach01

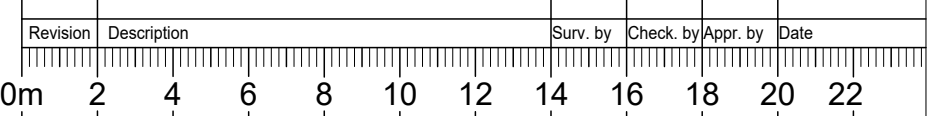
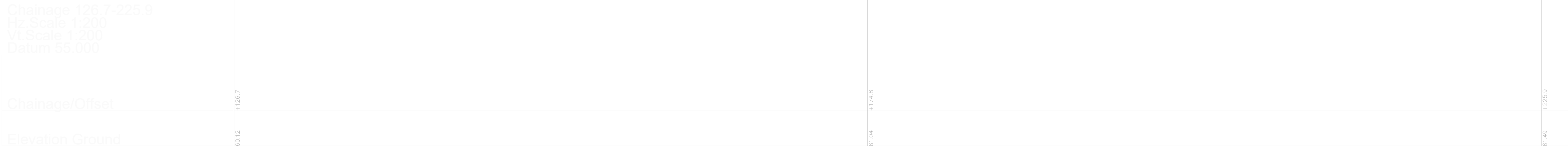
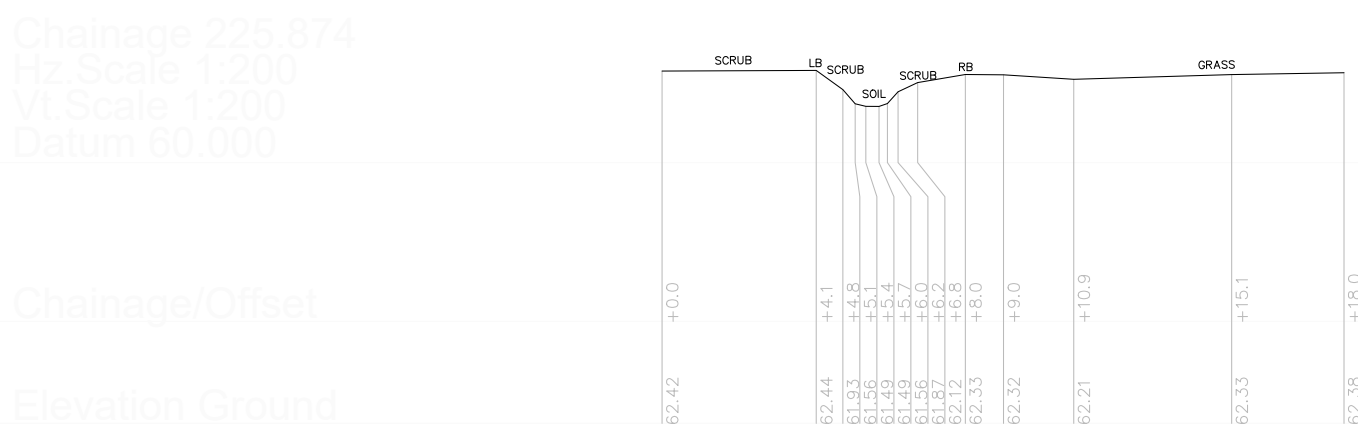
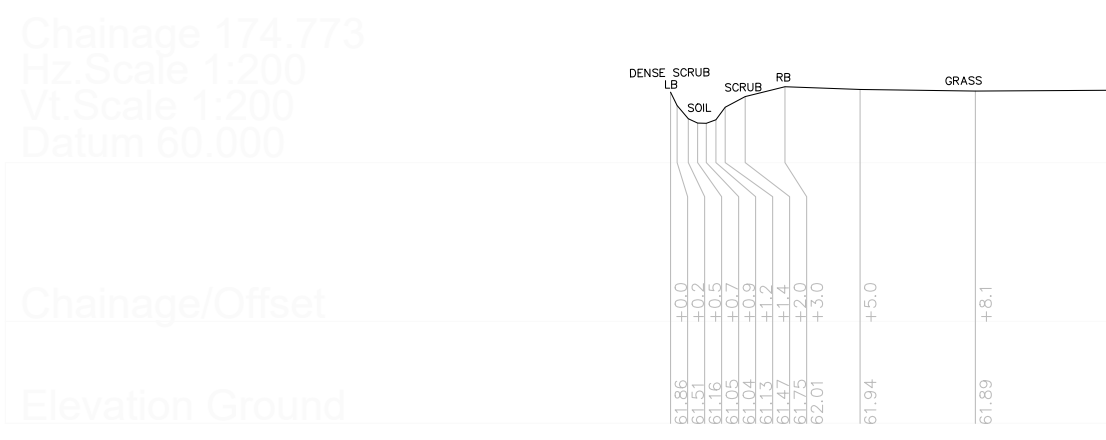
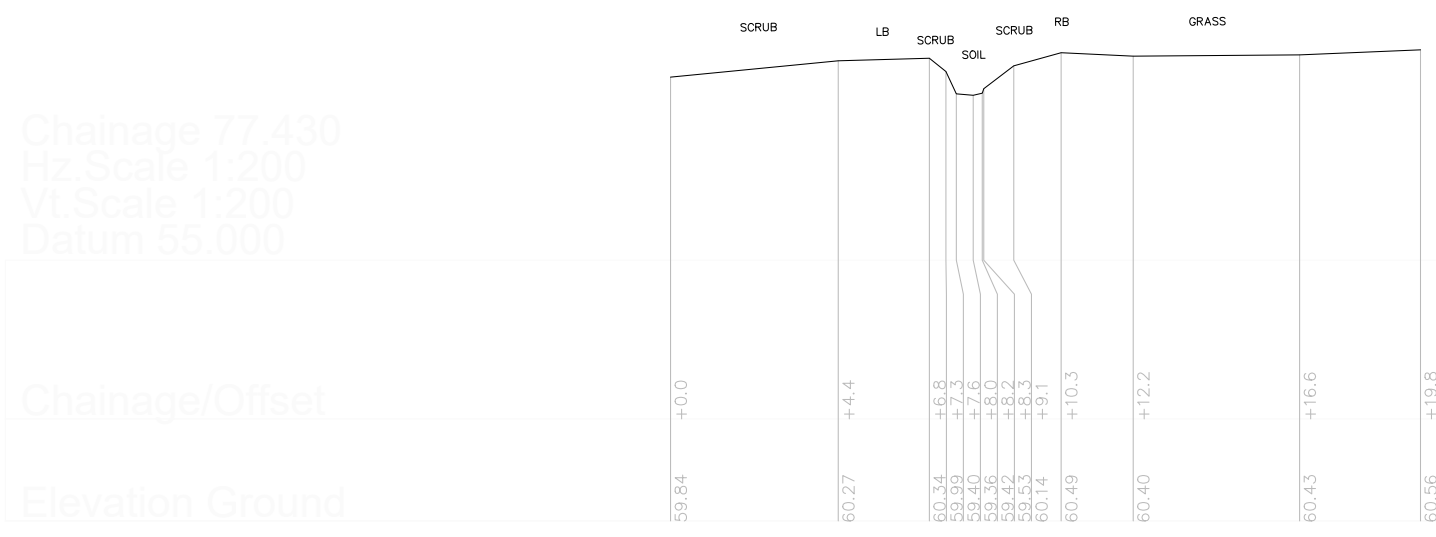
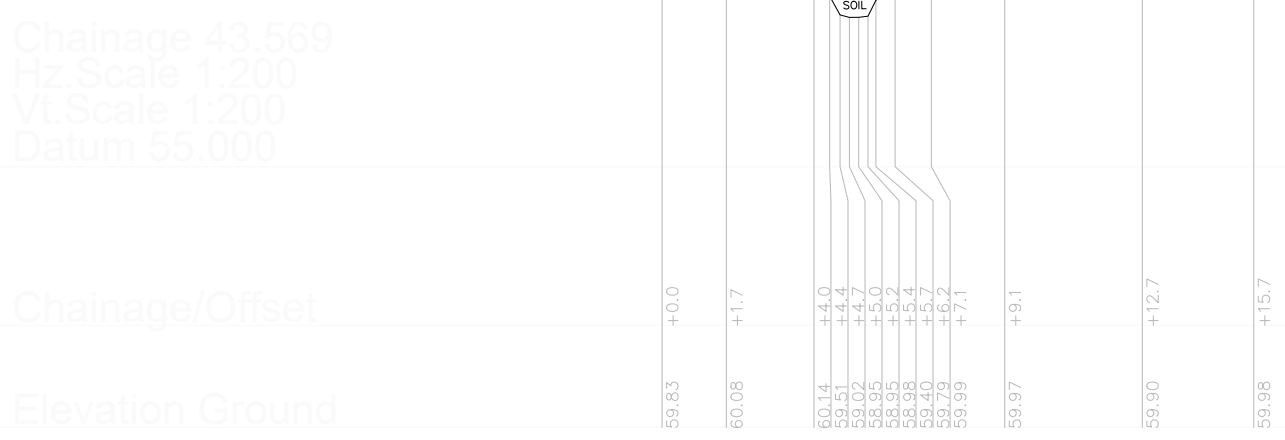
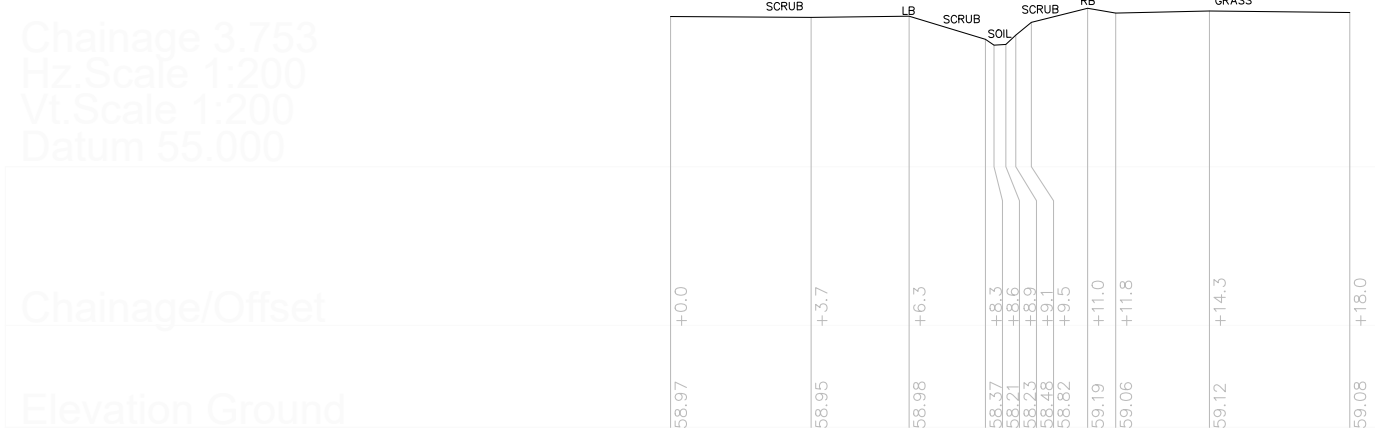
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Priors Farm
South Wokingham
Berkshire

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			Approved by: BP

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Cross Sections & Long Section - Reach02

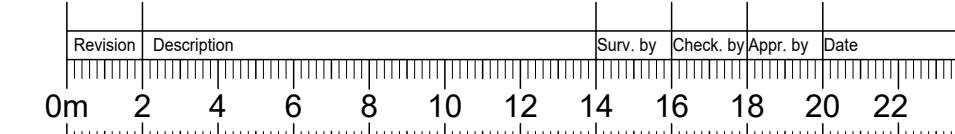
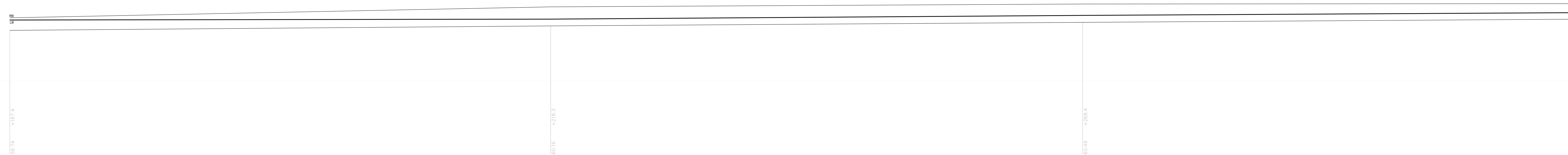
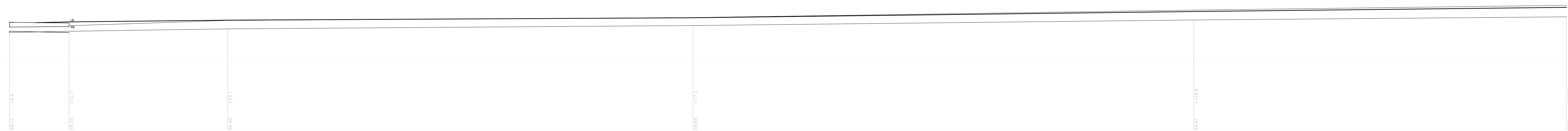
Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	8	June 2025
Project Number:	Rev:	Surveyed by:	Checked by:
36250	-	MKS	JS
			BP

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Client:

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 10	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP

mk surveys

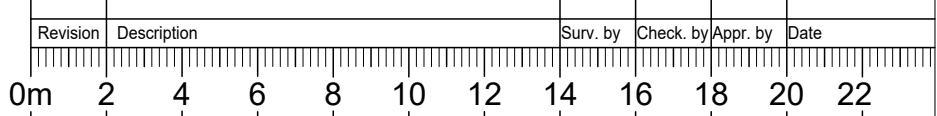
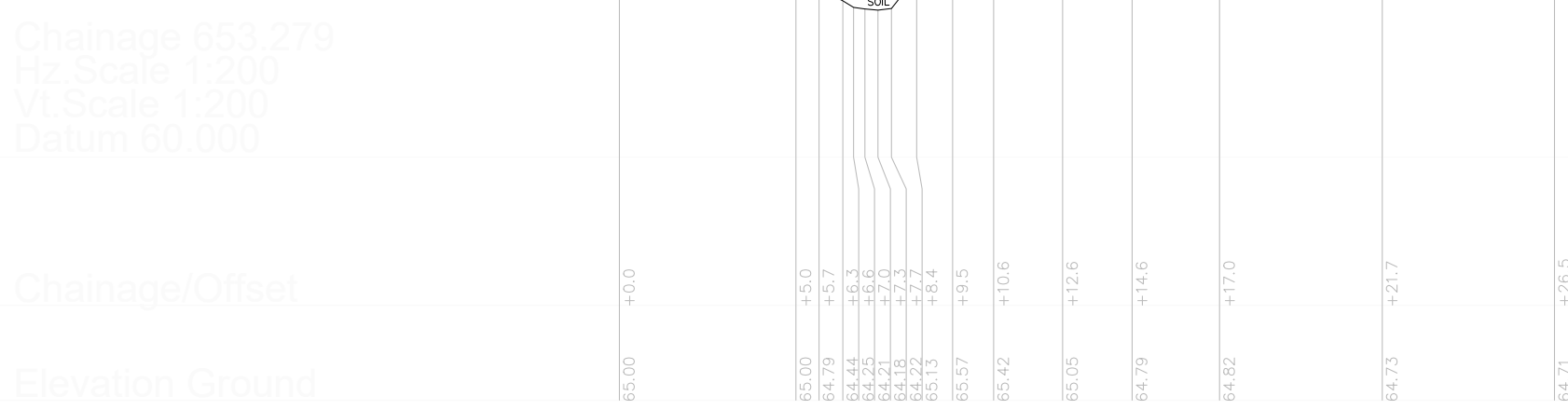
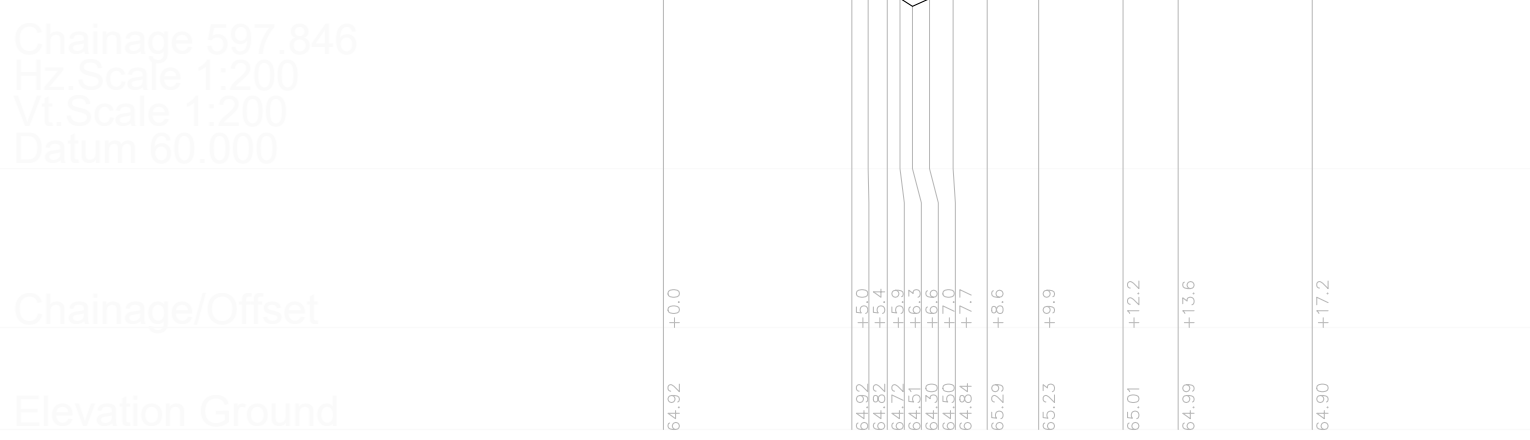
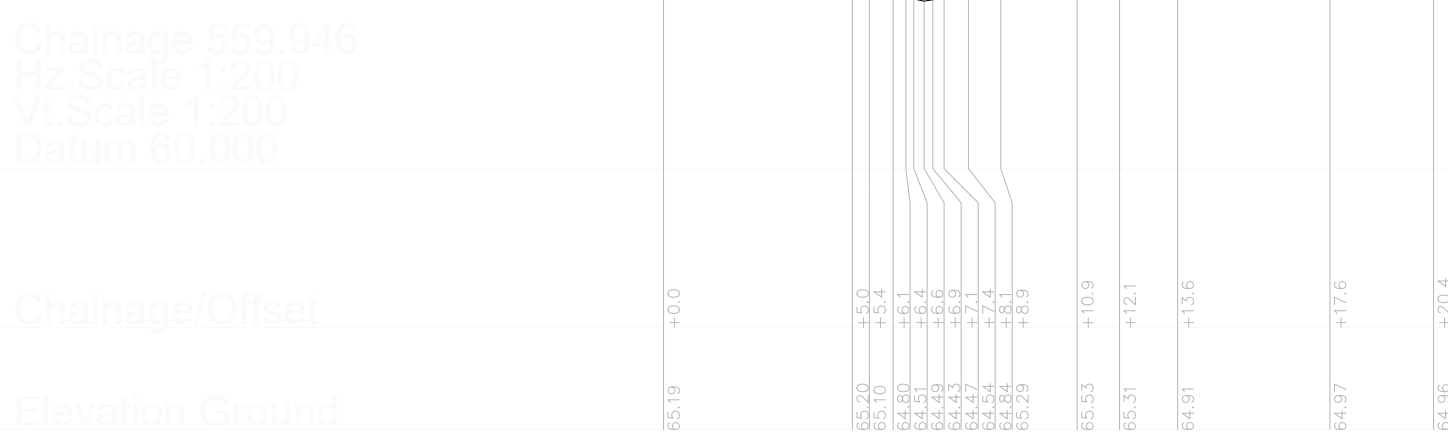
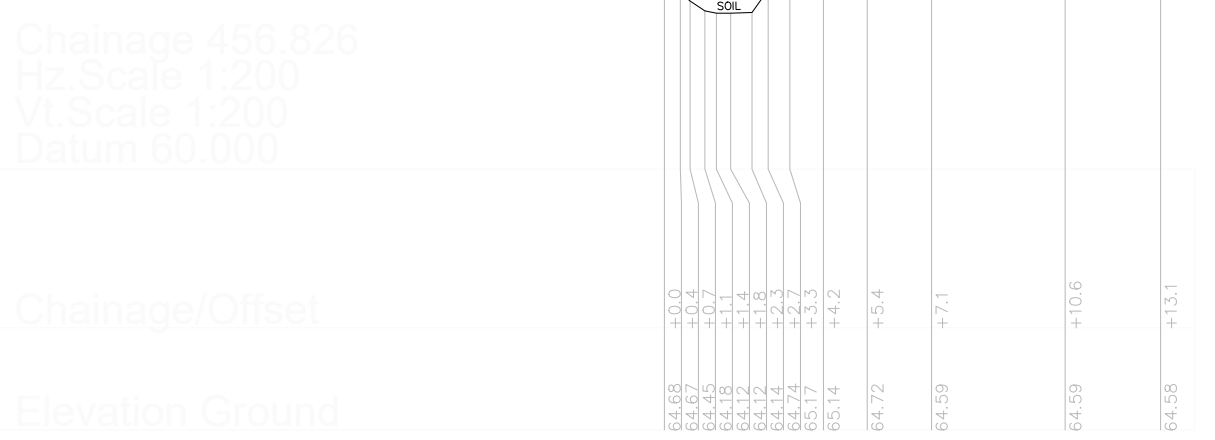
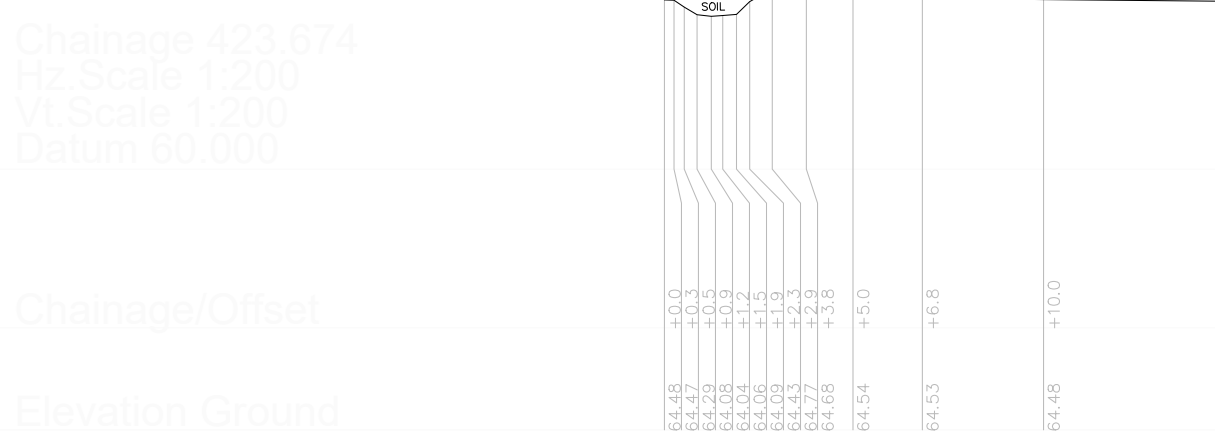
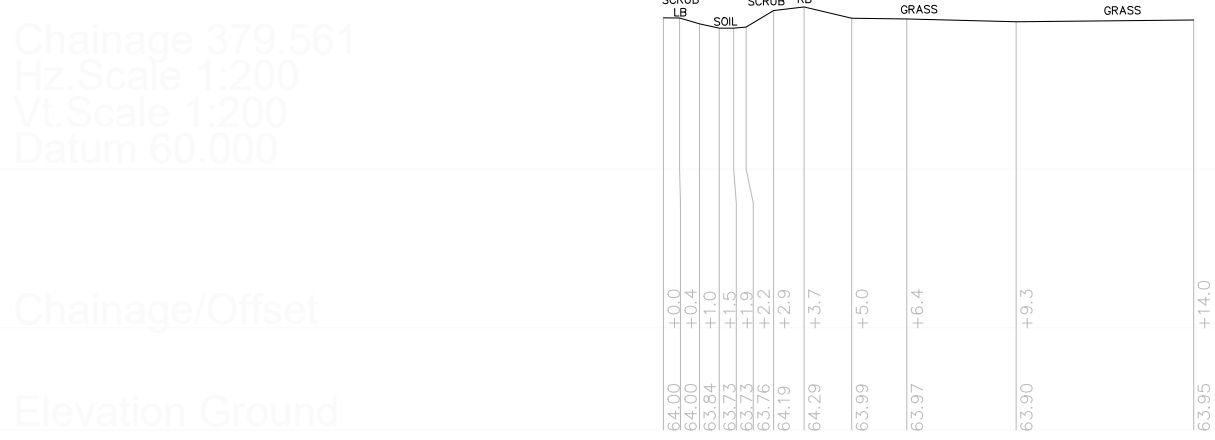
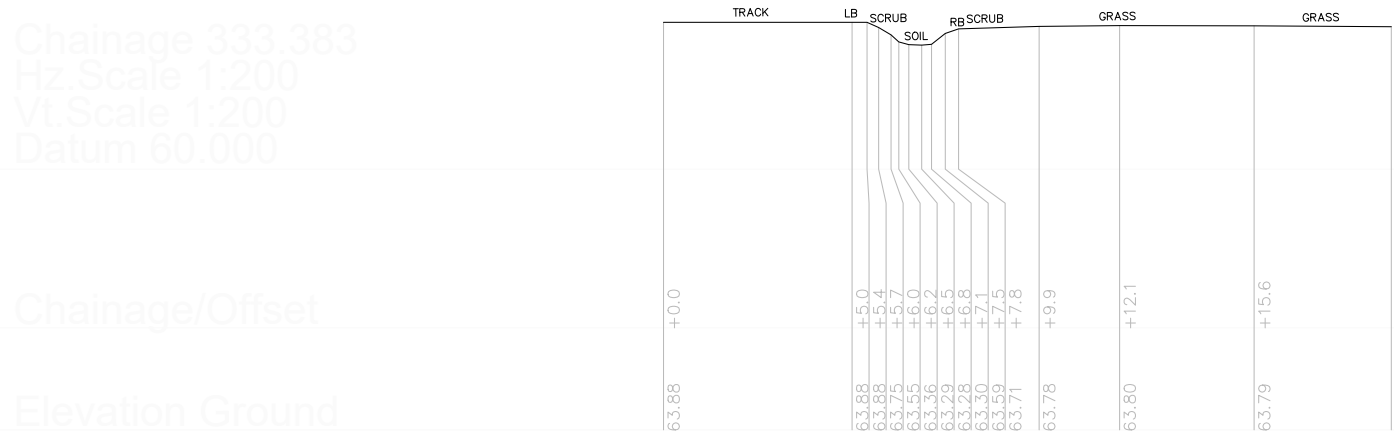
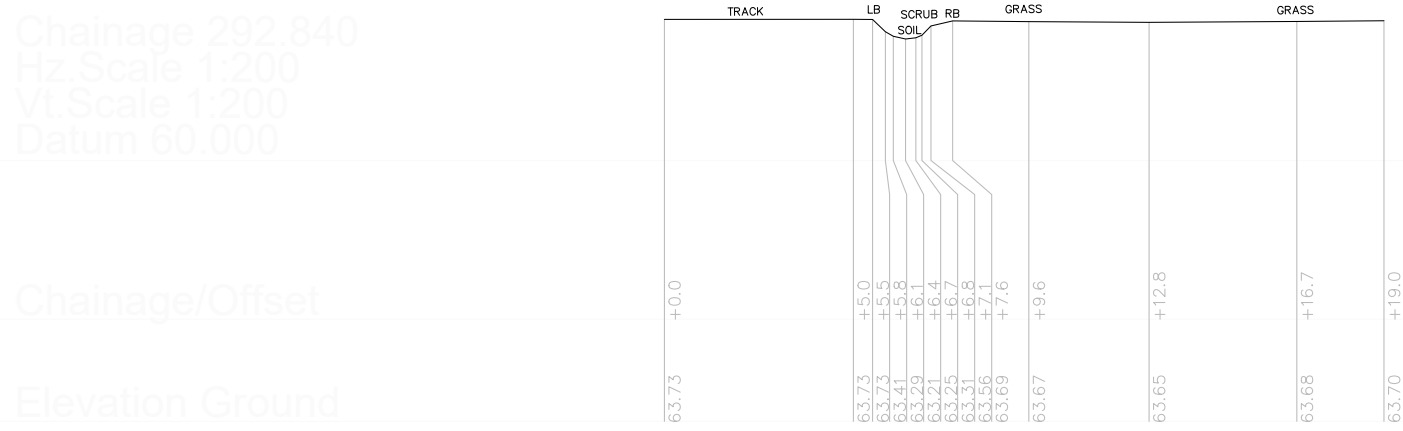
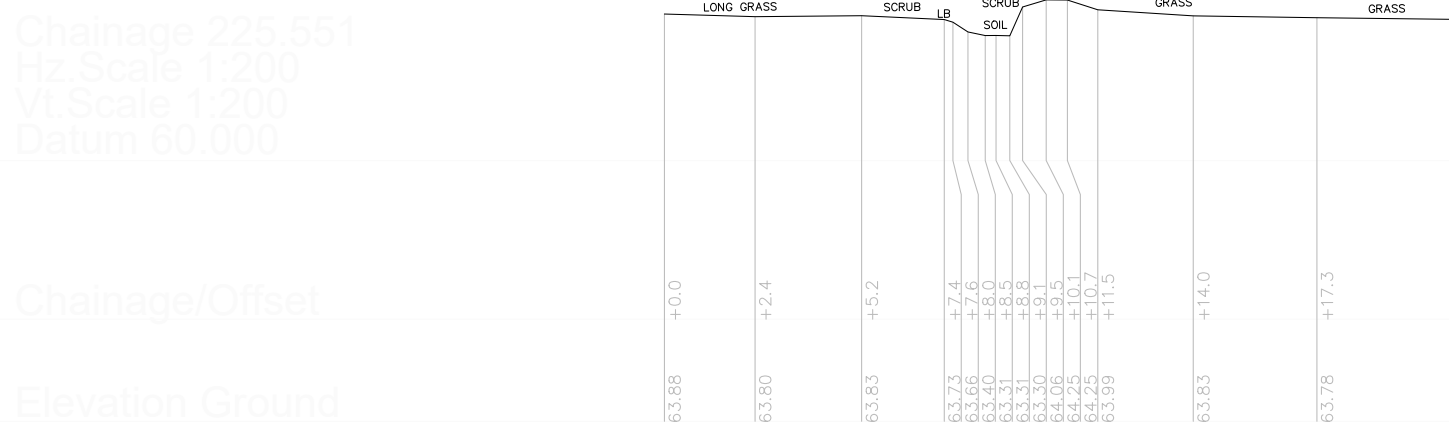
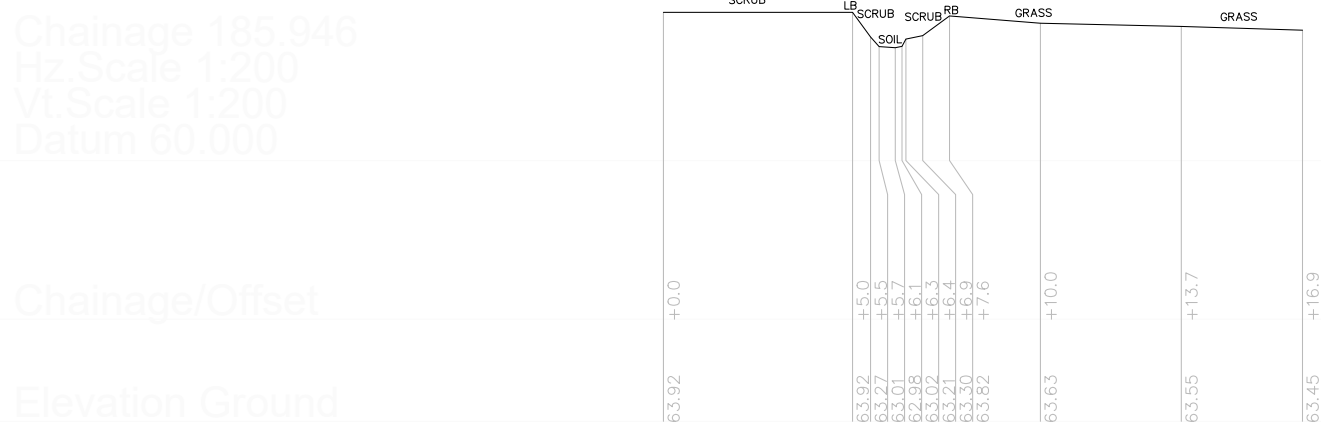
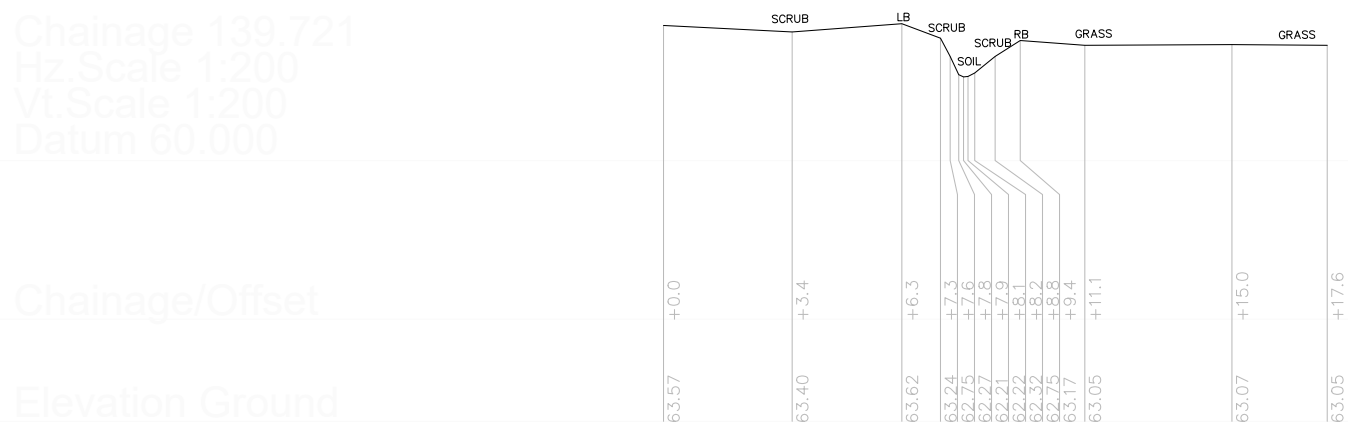
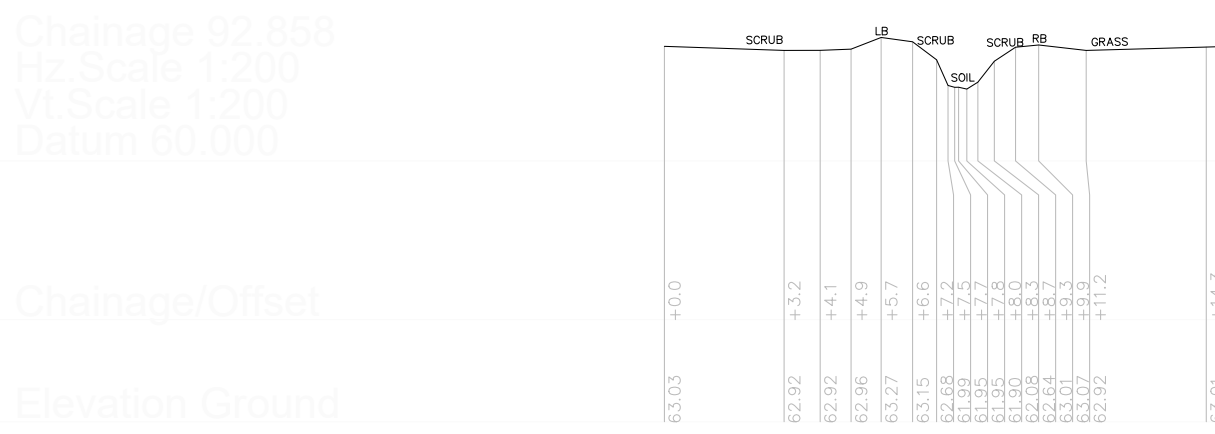
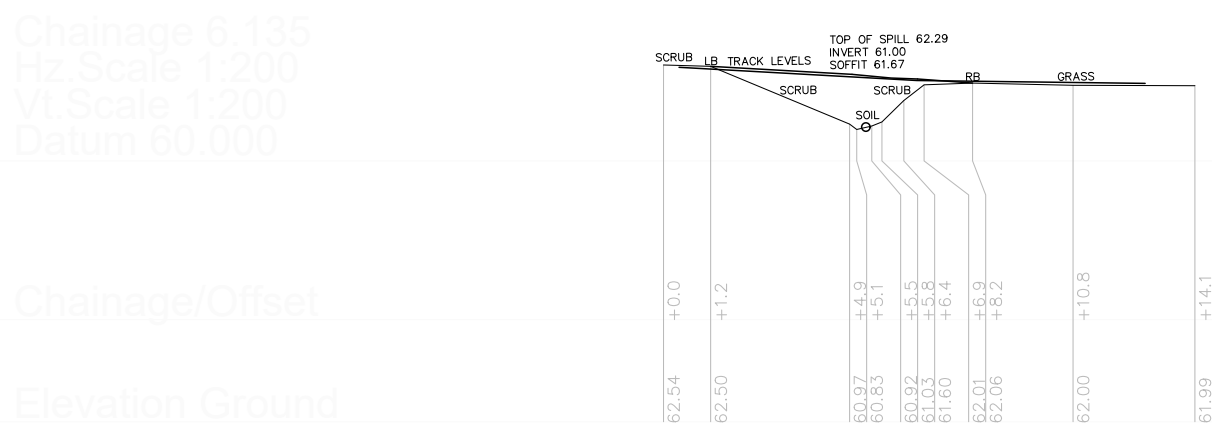






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Cross Sections - Reach04

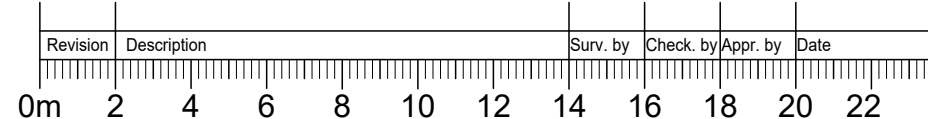
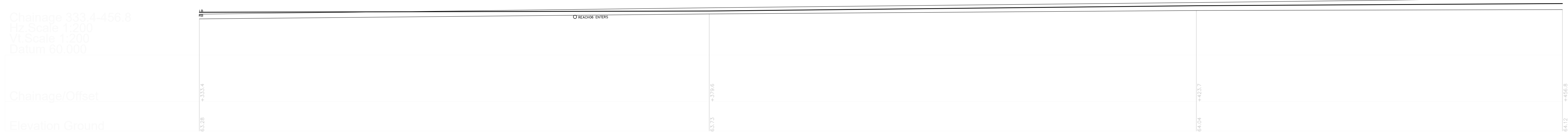
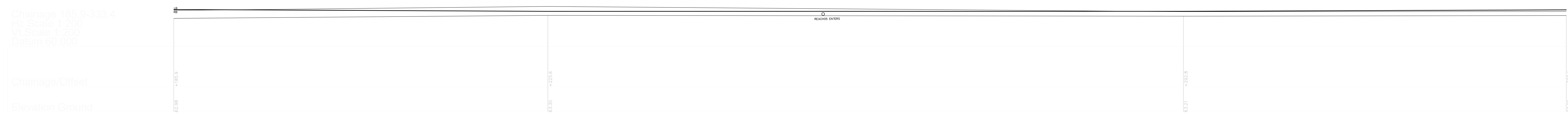
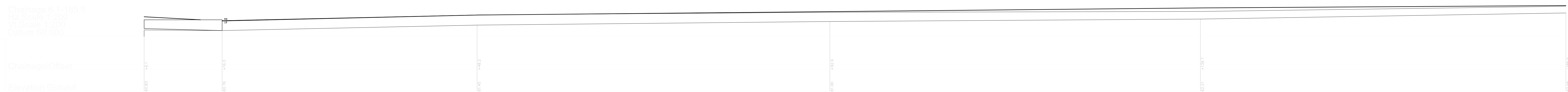
Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 11	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS
		Approved by: BP	

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



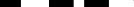
Long Section - Reach04

Client:

Abley Letchford Partnership Ltd

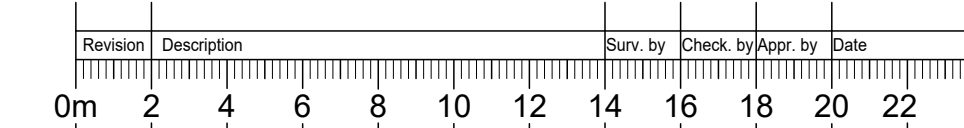
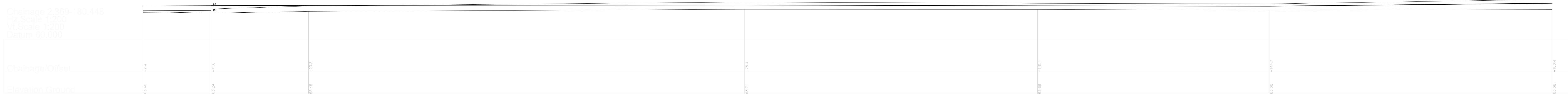
Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 12	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP



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Head Office: Milton Keynes t: 01908 565561 e: mail@mksurveys.co.uk

- Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
 2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



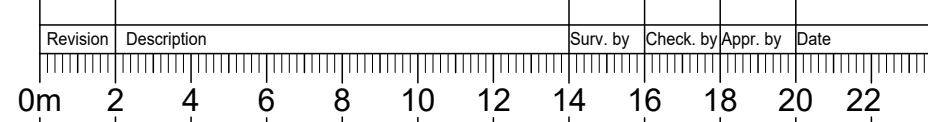
Cross Sections & Long Section - Reach05

Client: Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 13	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP

- Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
 2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Sections - Reach07

Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 15	Date: June 2025		
Project Number: 36250		Rev: -	Surveyed by: MKS	Checked by: JS	Approved by: BP

Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.

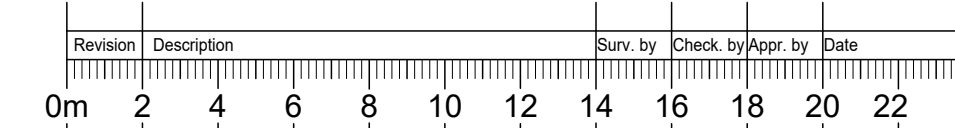
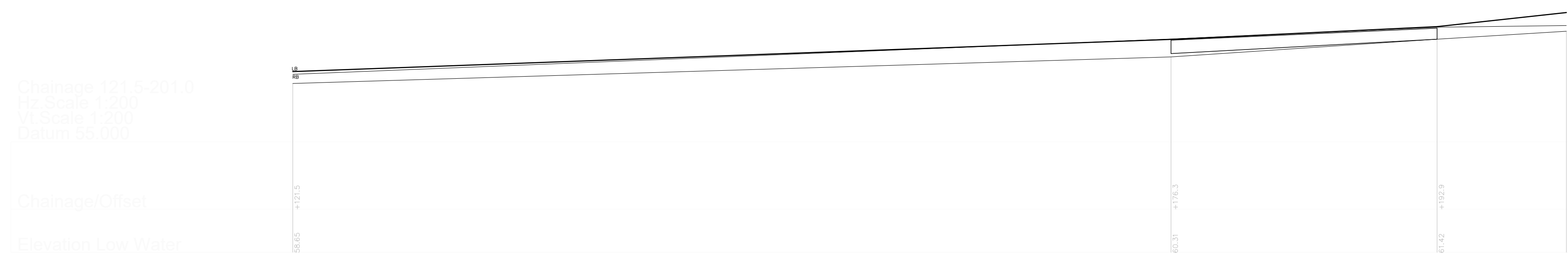
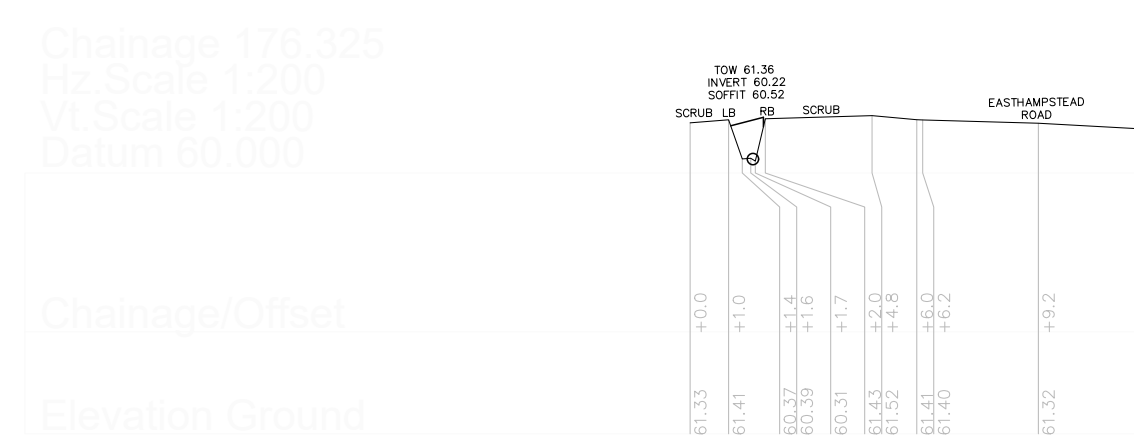
Chainage 1.1-143.8
Hx Scale 1:200
Vx Scale 1:200
Datum 60.000

Chainage/Offset

Elevation Ground



- Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
 2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Sections & Long Section - Reach08

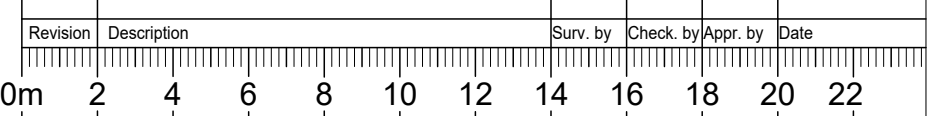
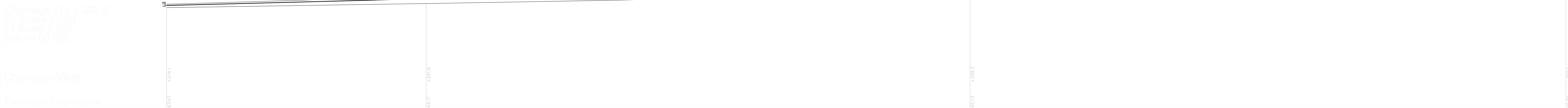
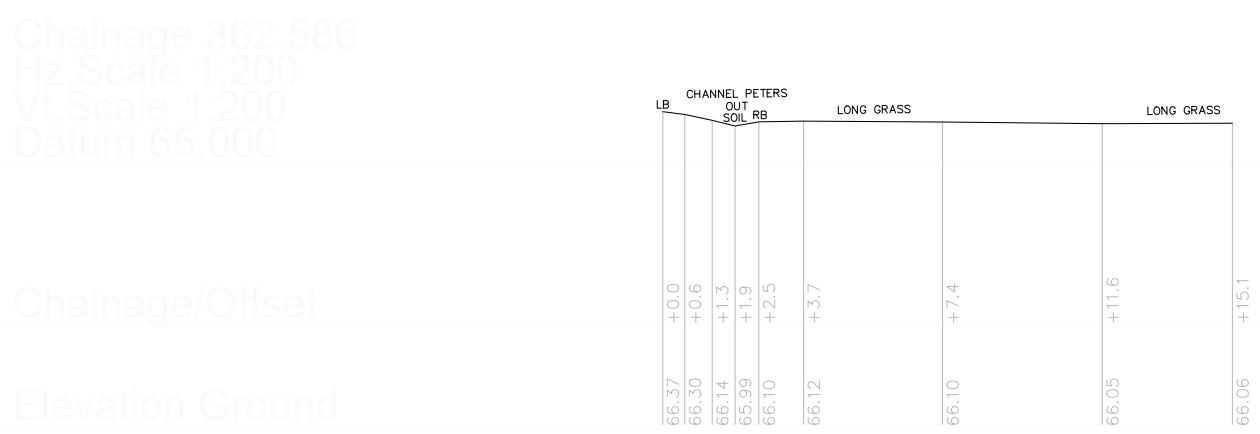
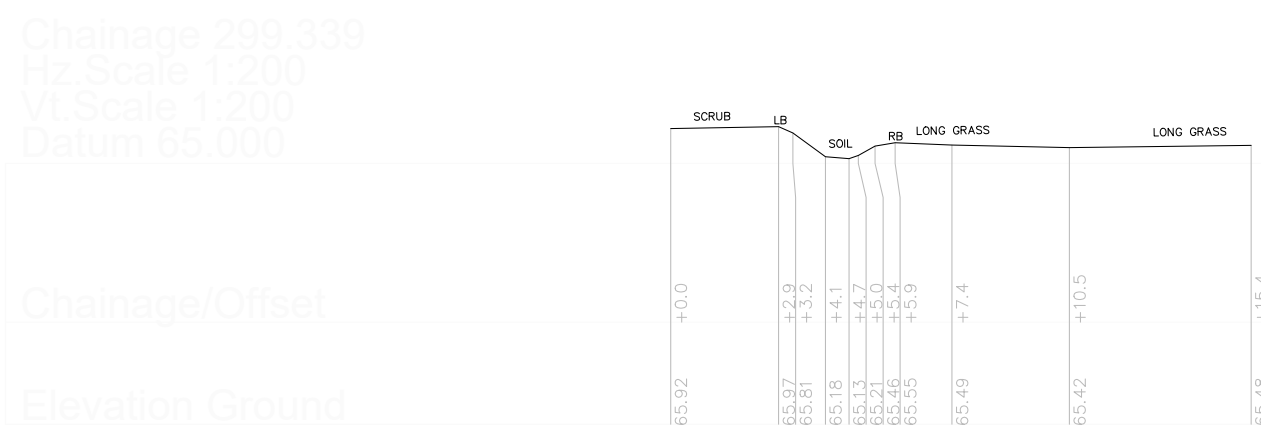
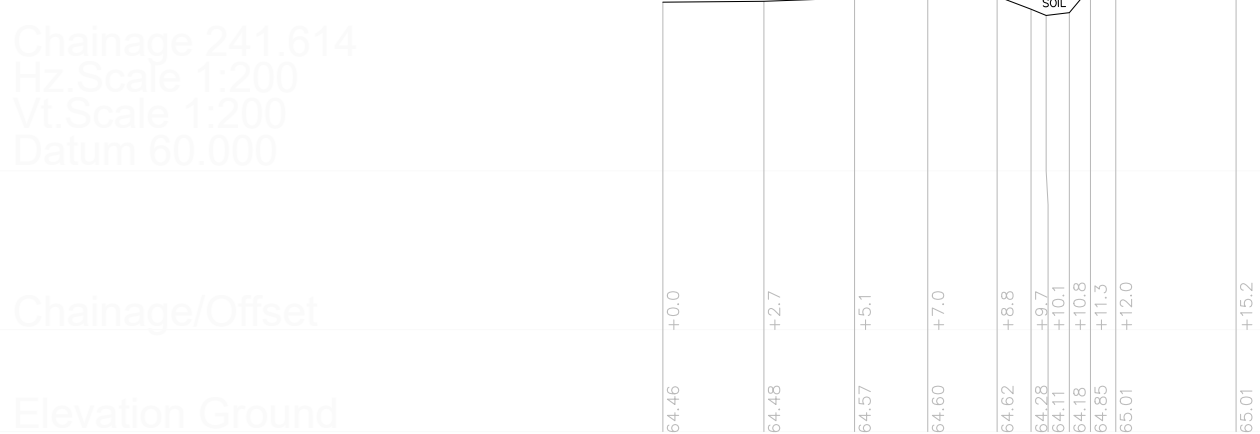
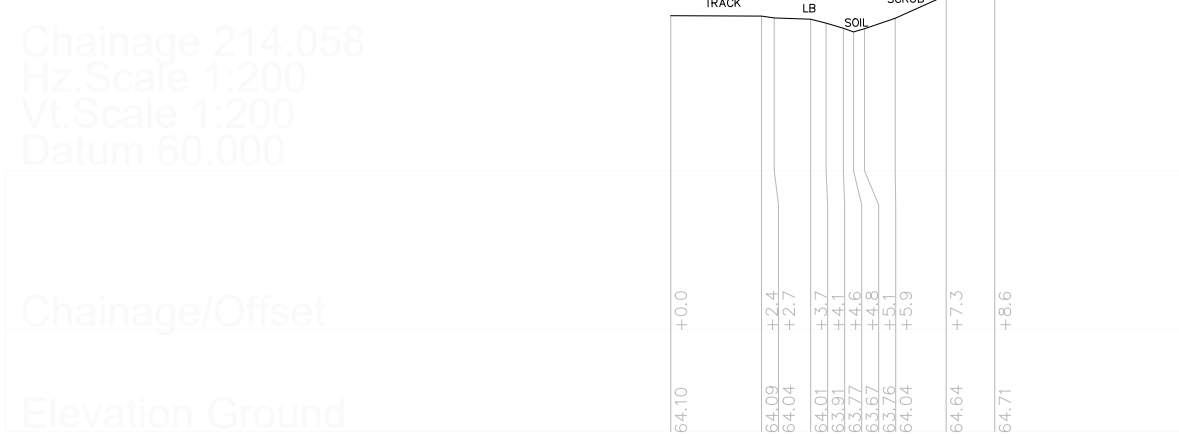
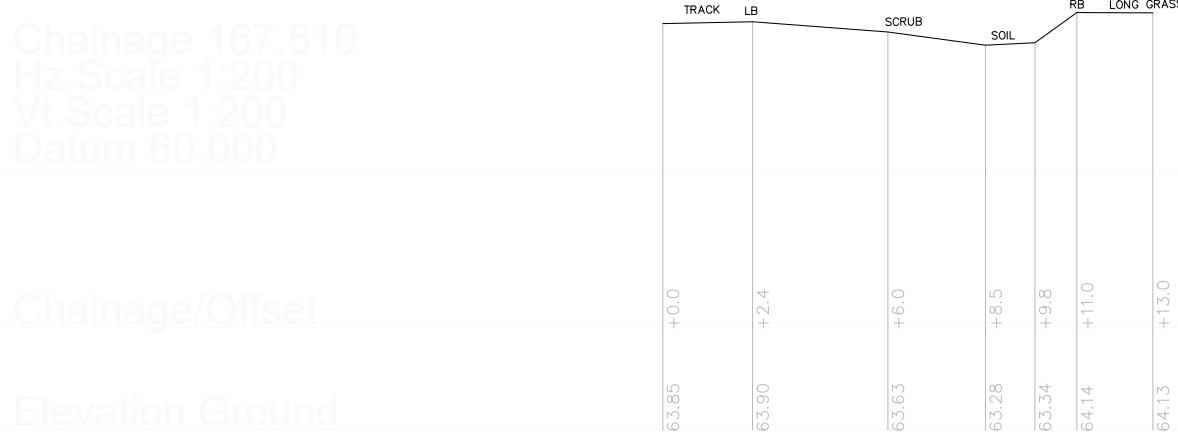
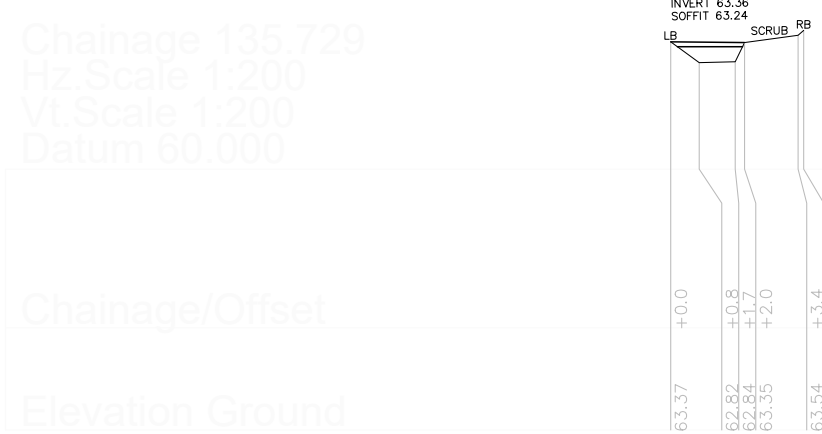
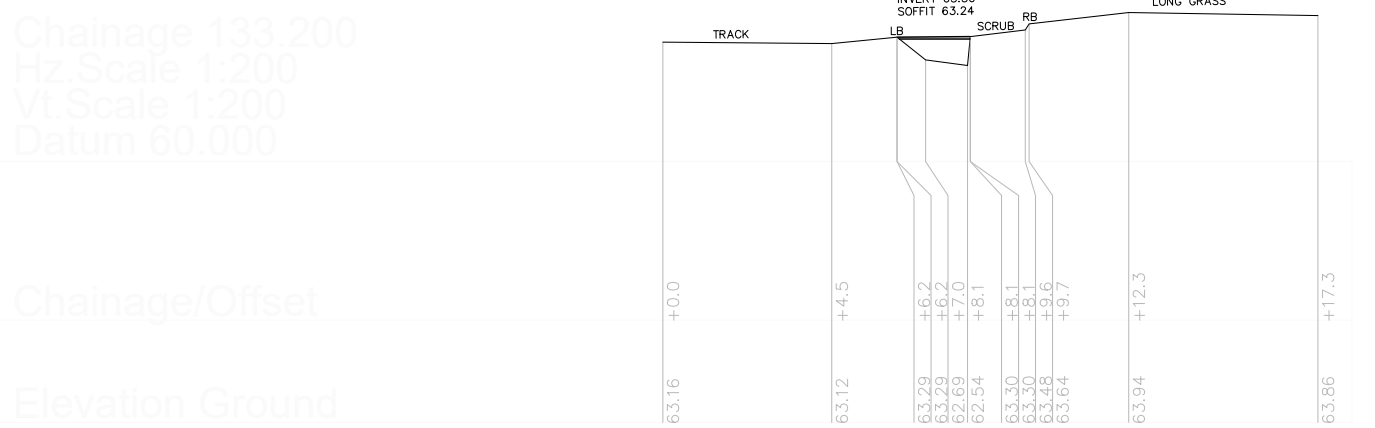
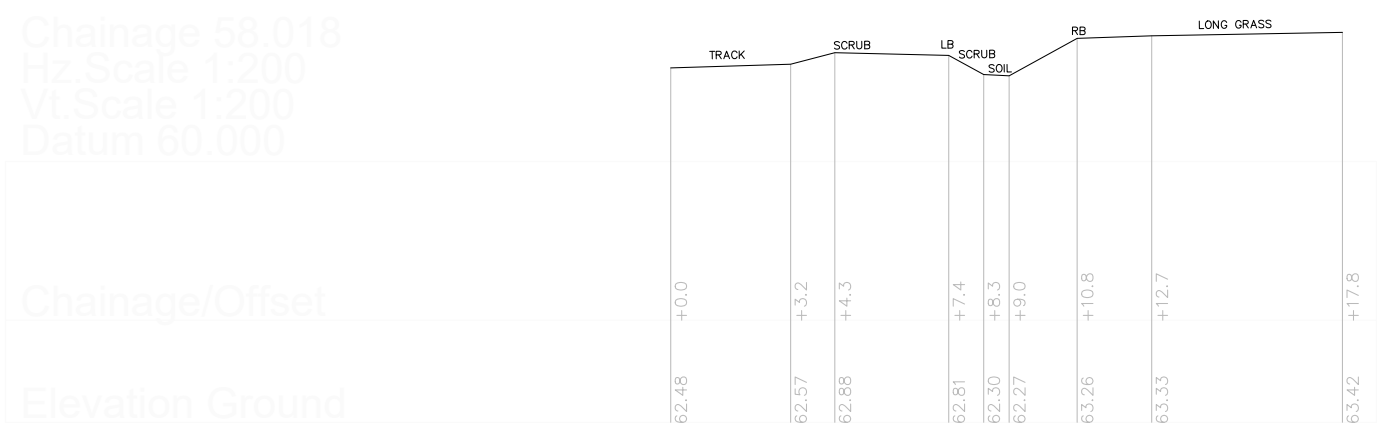
Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 17	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP

Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Sections & Long Section - Reach10

Client:
Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 19	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS
			Approved by: BP

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Abley Letchford Partnership Ltd

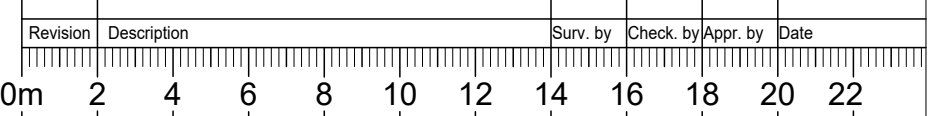
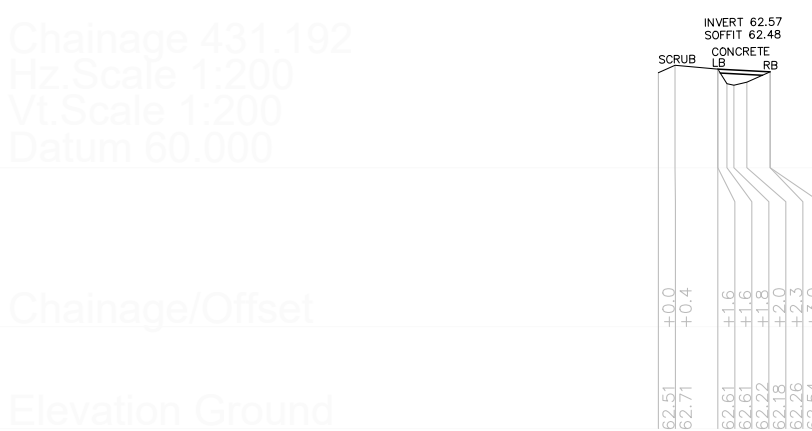
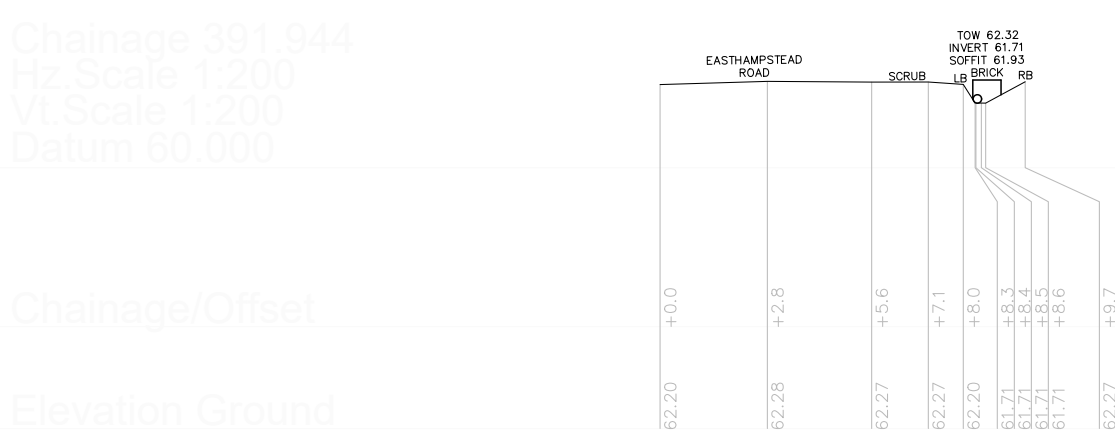
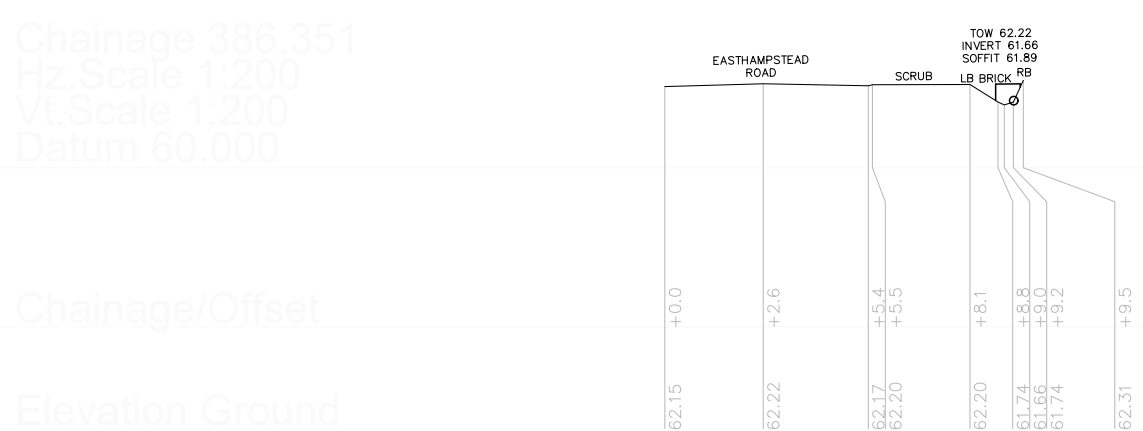
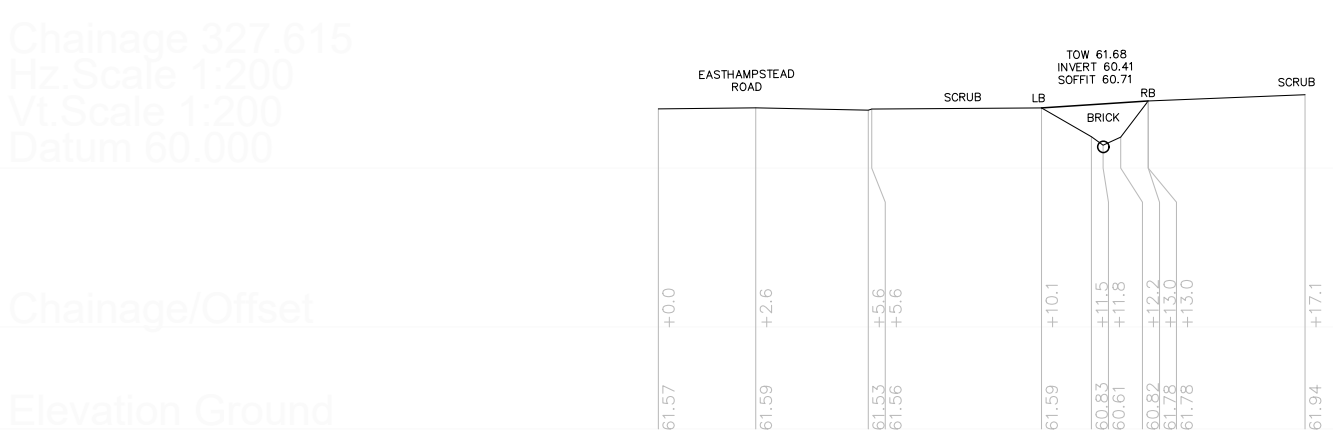
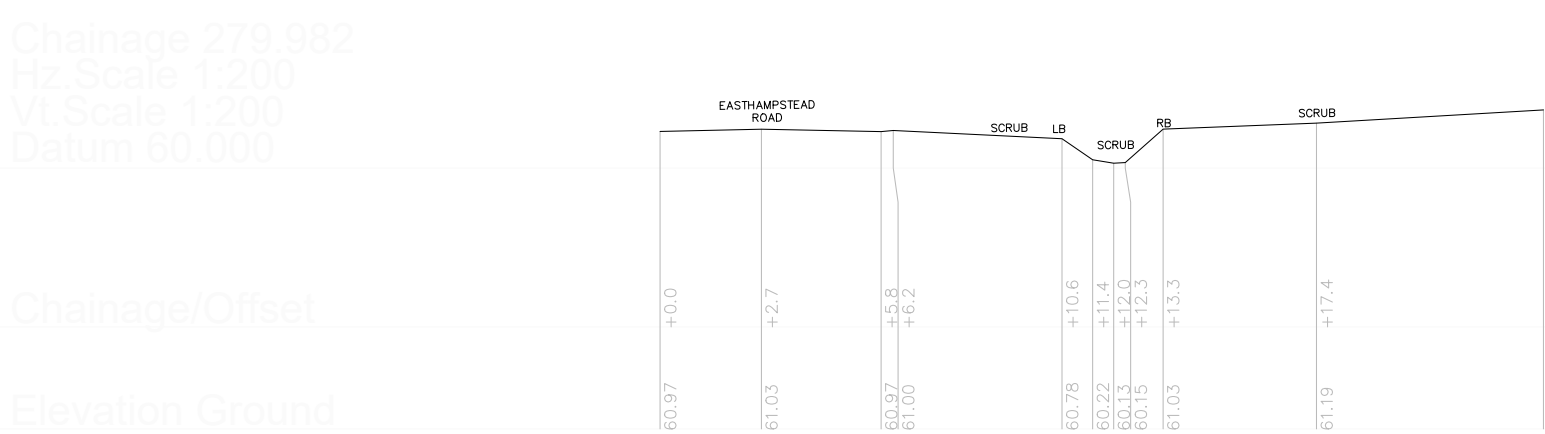
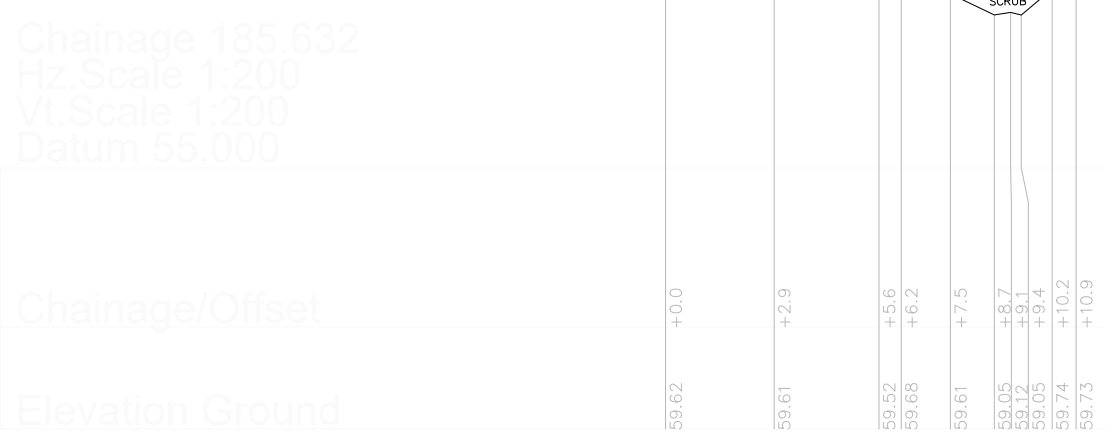
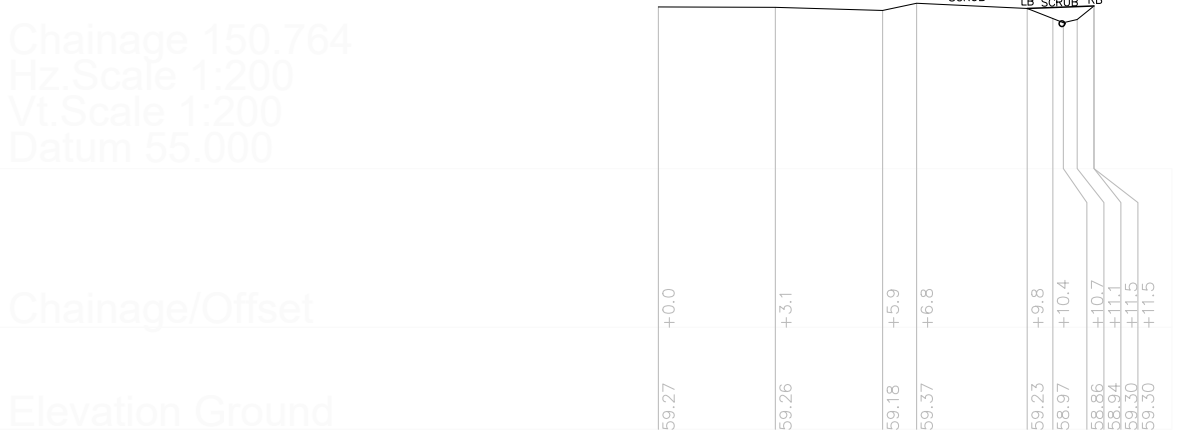
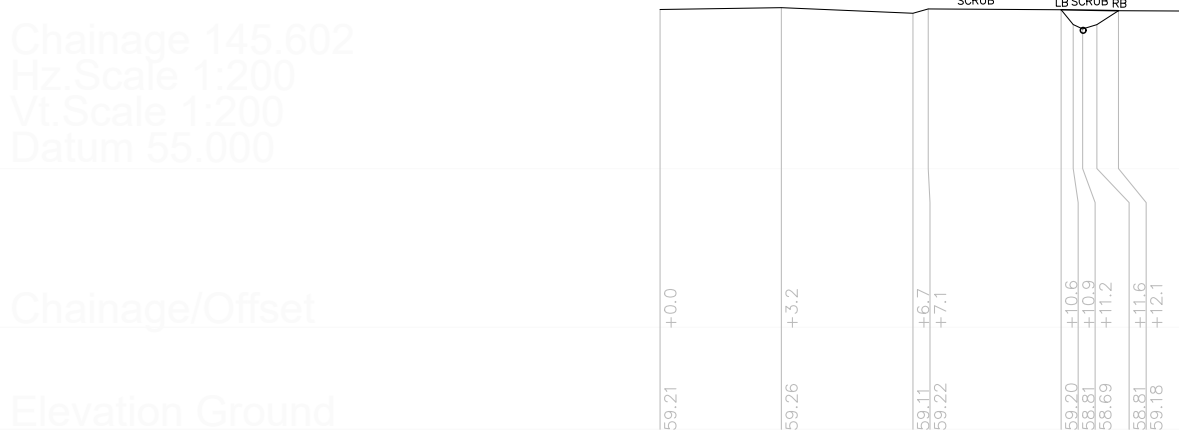
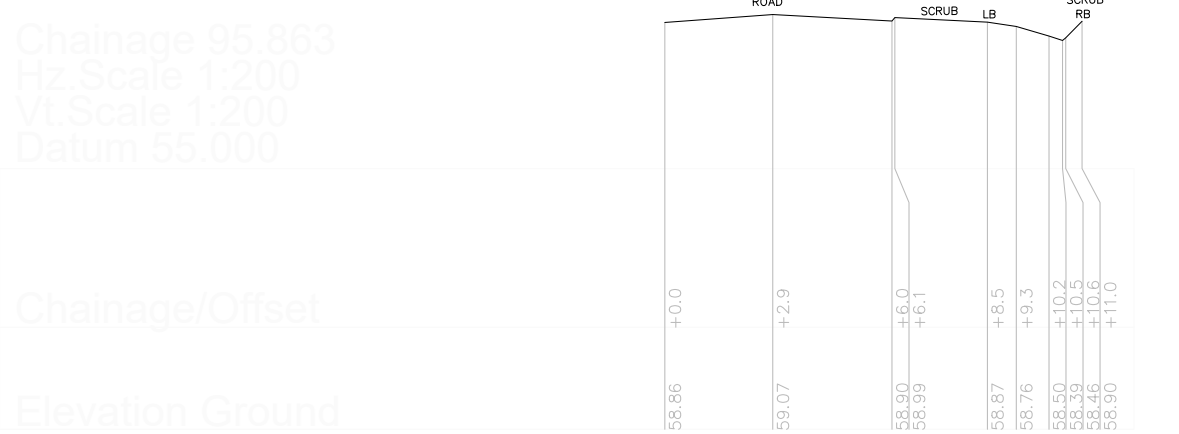
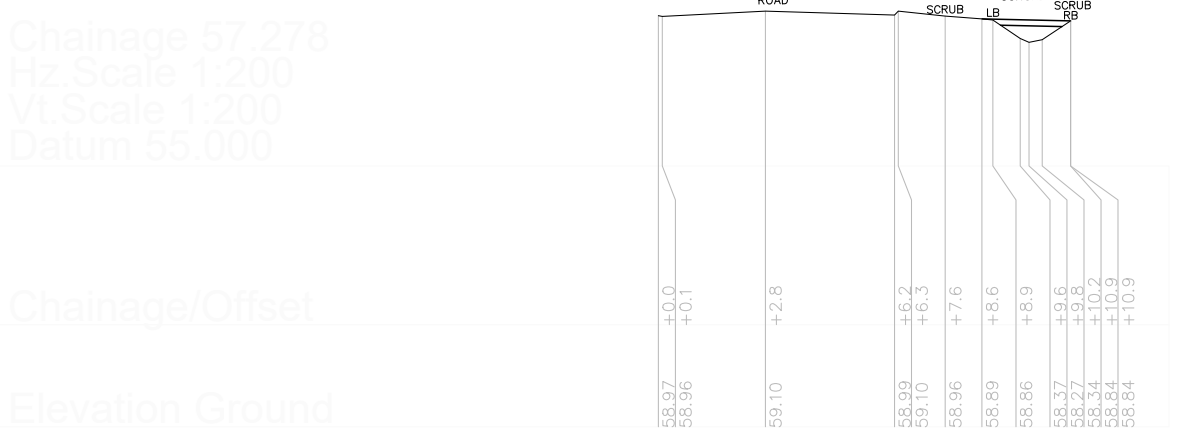
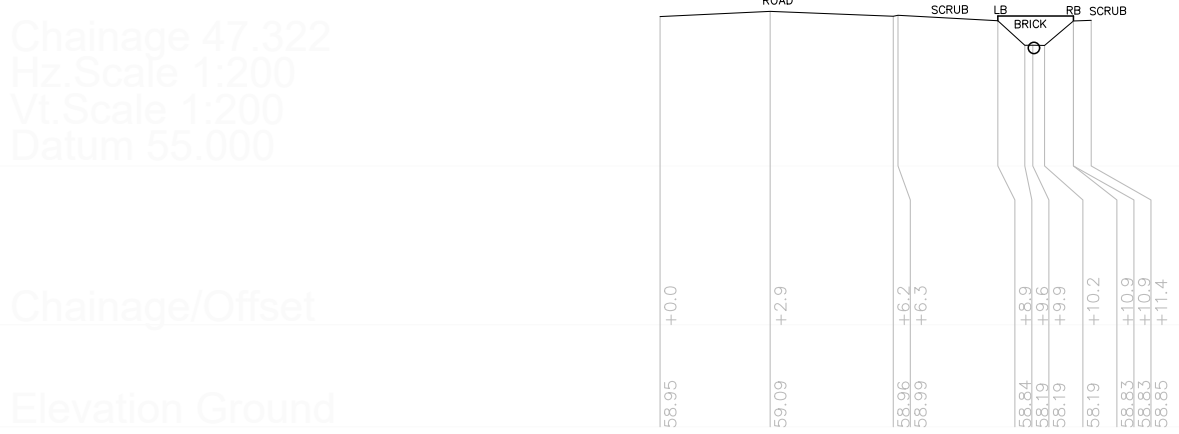
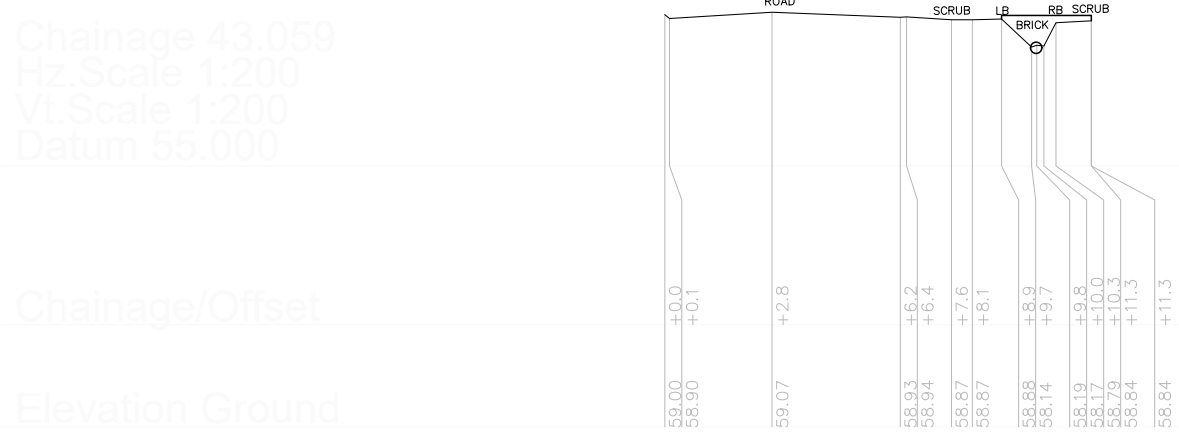
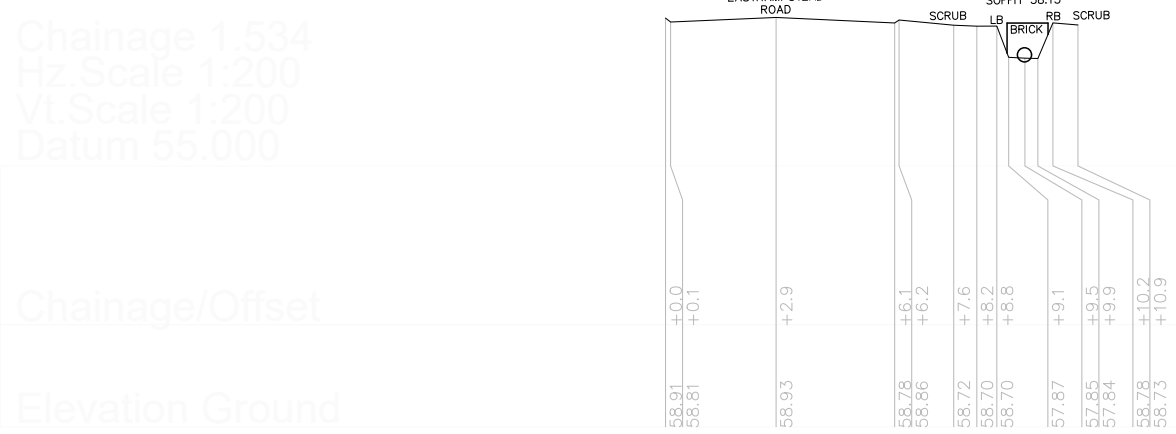
Priors Farm
South Wokingham
Berkshire

1:200	A0	20	June 2025		
Project Number: 36250		Rev: -	Surveyed by: MKS	Checked by: JS	Approved BP

mk surveys



Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Sections - Reach12

Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

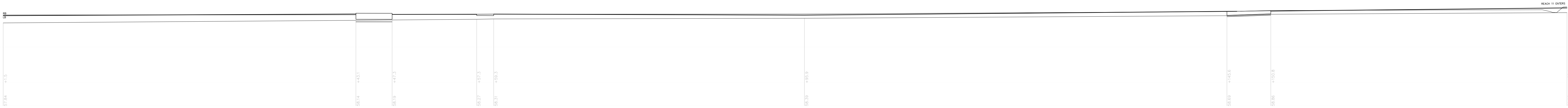
Scale: 1:200	Sheet Size: A0	Sheet Number: 21	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS
		Approved by: BP	

Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.

Chainage 1 to 165.0
Hx Scale 1:200
Vx Scale 1:200
Datum 55.000

Chainage/Offset

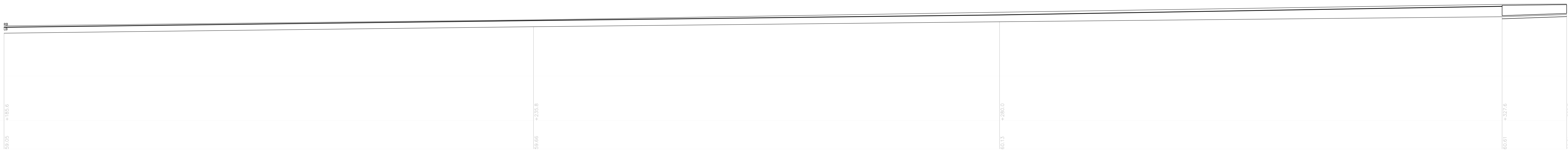
Elevation Low Water



Chainage 165.0-333.7
Hx Scale 1:200
Vx Scale 1:200
Datum 55.000

Chainage/Offset

Elevation Low Water



Chainage 327.0-485.3
Hx Scale 1:200
Vx Scale 1:200
Datum 55.000

Chainage/Offset

Elevation Low Water



Revision	Description	Surv. by	Check by	Appr. by	Date						
0m	2	4	6	8	10	12	14	16	18	20	22

Long Section - Reach12

Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	22	June 2025
Project Number:	Rev:	Surveyed by:	Checked by:
36250	-	MKS	JS
			BP

mksurveys

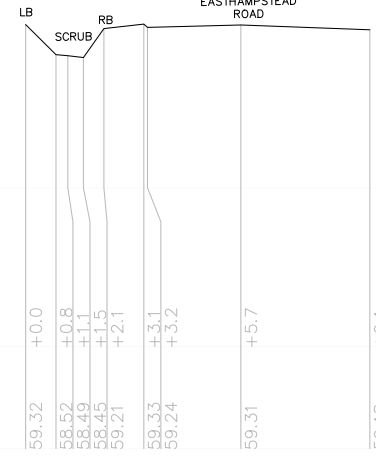
www.mksurveys.com
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www.surveys4bim.co.uk

- Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
 2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.

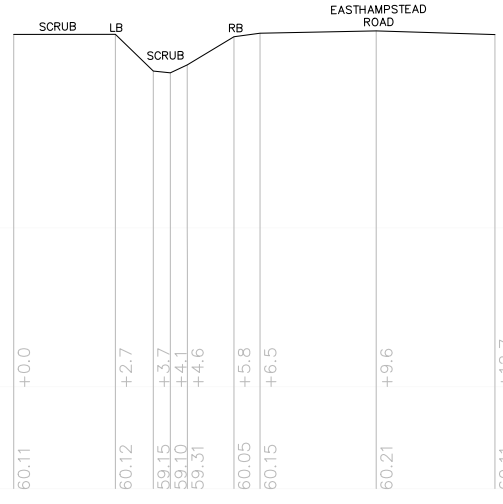
Chainage 1283
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



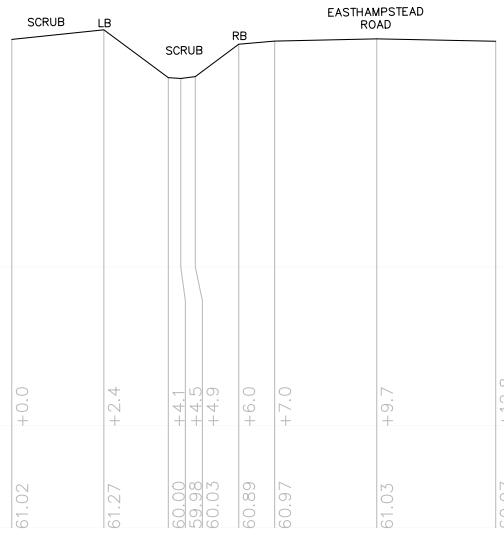
Chainage 70.147
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



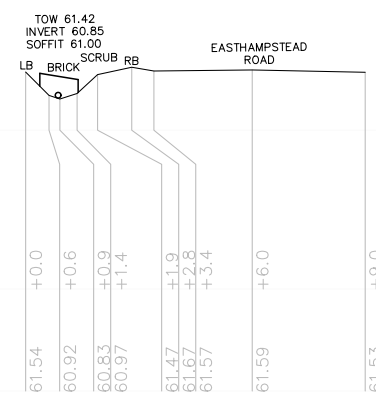
Chainage 119.134
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



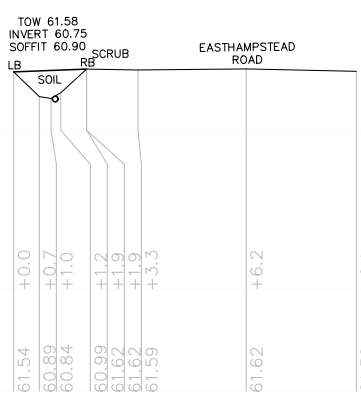
Chainage 166.665
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



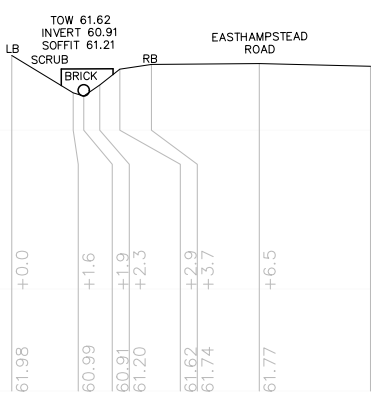
Chainage 170.927
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



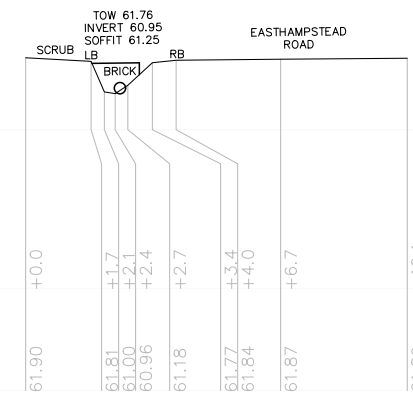
Chainage 187.901
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



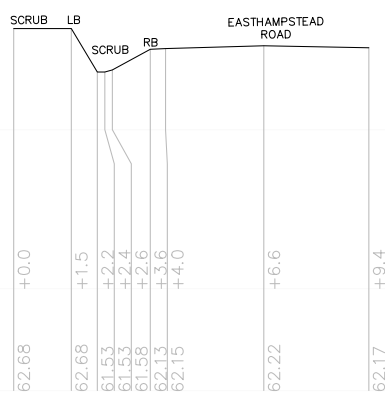
Chainage 200.790
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



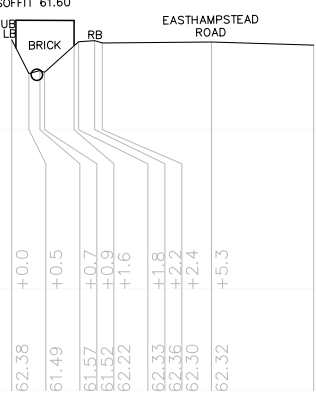
Chainage 226.231
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



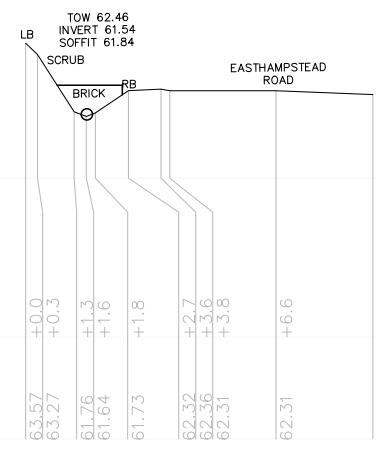
Chainage 242.102
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



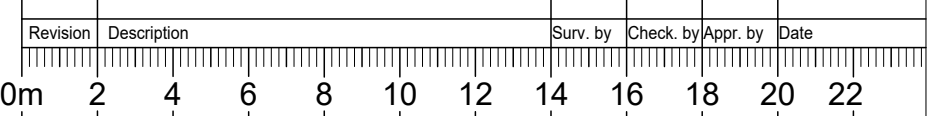
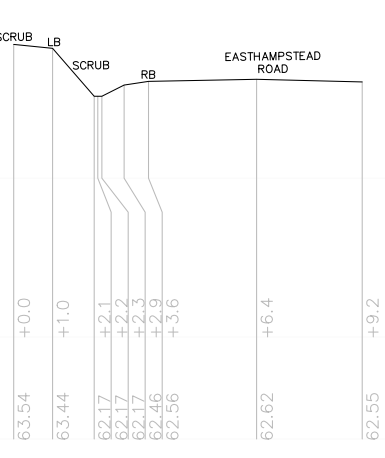
Chainage 249.408
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



Chainage 274.303
Hz Scale 1:200
Vt Scale 1:200
Datum 60.000

Chainage/Offset
Elevation Ground



Cross Sections - Reach13

Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale:	Sheet Size:	Sheet Number:	Date:
1:200	A0	23	June 2025
Project Number:	Rev:	Surveyed by:	Checked by:
36250	-	MKS	JS
			BP

Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.

Chainage 1.3-170.9
Hx Scale 1:200
Vx Scale 1:200
Datum 58.000

Chainage/Offset

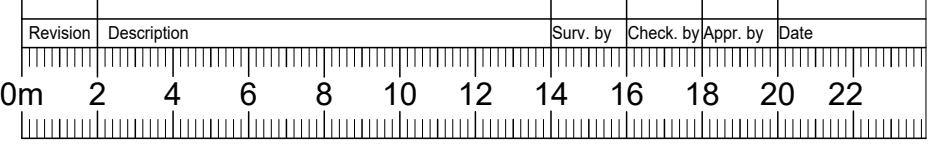
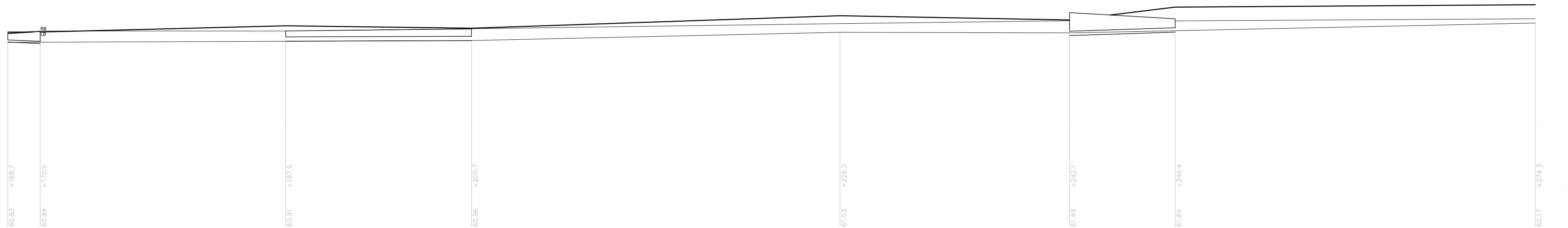
Elevation Low Water



Chainage 188.7-274.3
Hx Scale 1:200
Vx Scale 1:200
Datum 58.000

Chainage/Offset

Elevation Low Water



Long Section - Reach13

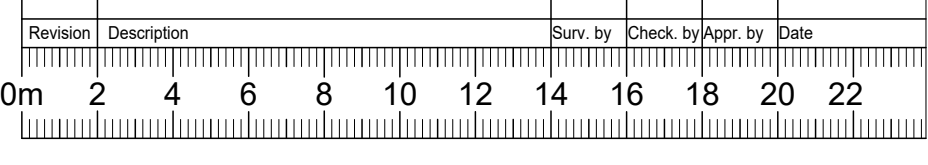
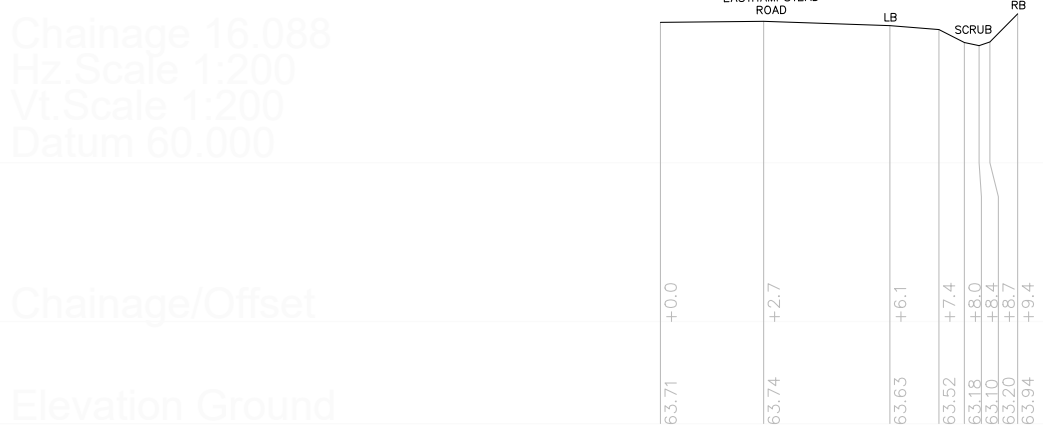
Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 24	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS
		Approved by: BP	

Notes:
1. GRID AND LEVELS BASED ON ORDNANCE DATUM. DERIVED FROM THE NATIONAL GRID NETWORK. LOCAL SCALE FACTOR 0.99960 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Section - Reach14

Client:

Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 25	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS
		Approved by: BP	

mksurveys

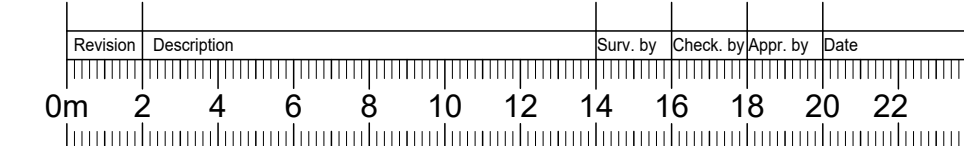
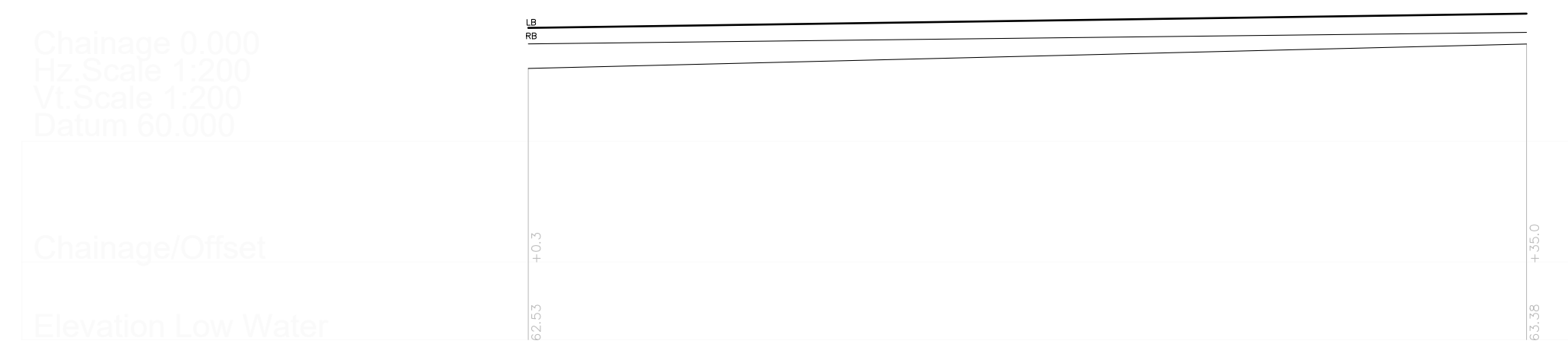
www.mksurveys.com

www.surveys4bim.co.uk

Head Office: Milton Keynes t: 01908 565561 e: mail@mksurveys.co.uk

Notes:

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GNSS NETWORK. LOCAL SCALE FACTOR 0.99968 APPLIED.
2. CROSS SECTIONS VIEWED LOOKING DOWNSTREAM.



Cross Section & Long Section- Reach15

Client: Abley Letchford Partnership Ltd

Priors Farm
South Wokingham
Berkshire

Scale: 1:200	Sheet Size: A0	Sheet Number: 26	Date: June 2025
Project Number: 36250	Rev: -	Surveyed by: MKS	Checked by: JS Approved by: BP

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