Meadow Way/Hawthorn Bank

Flood Risk Assessment & Drainage Strategy

April 2026

Woods Hardwick

Architecture | Engineering | Planning | Surveying

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Report Reference

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Introduction

Introduction

The following paragraphs state the purpose of this document. A summary of existing and future site details; together with relevant pre-planning correspondence is also provided.

1.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Woods Hardwick Ltd on behalf of Broadgate Homes in relation to a Full Planning Application for 230 residential dwellings with associated access, drainage, internal roads, landscaping and associated works for their site known as 'Meadow Way/Hawthorn Bank', Spalding. A copy of the Site Location Plan is provided in **Appendix A**.

1.2 The application site covers an area of approximately 4.82 ha and currently comprises grassland with a factory warehouse located within the north west quadrant. It is the one of the final parcels of the wider Broadgate Homes development located north of The Raceground and west of Hills Drain, with the remainder of the scheme largely completed or under construction.

1.3 In terms of flood risk, the application site is situated in Flood Zone 3, land which has a 1 in 100 or greater annual probability of river or sea flooding.

1.4 This document has been written in accordance with the guidance contained within the Flood Risk and Coastal Change section of the Government's Planning Practice Guidance (FRCC, PPG).

1.5 The Lead Local Flood Authority (LLFA) for the area is Lincolnshire County Council (LCC) and the site lies within the Welland and Deepings Internal Drainage Board district.

1.6 This FRA concludes that the proposed development will not lead to the impedance of flood flows and will not increase the risk of flooding on the site itself, adjacent properties or to third parties situated either upstream or downstream of the site.

1.7 This document includes a Surface Water Drainage Strategy that identifies a suitable sustainable strategy for the disposal of surface water from the proposed development site that conforms with the guidance contained within the following documents:

- CIRIA C753 SuDS Manual (2015)
- National standards for sustainable drainage systems (SuDS)
- Lincolnshire County Council Development Roads and Sustainable Drainage Design Approach (2021)

1.8 The proposed Drainage Strategy is based on a maximum allowance of 40% climate change allowance in line with the Climate change allowances for peak rainfall in England mapping service.

1.9 A suitable foul water outfall to Anglian Water assets to the south and west of the development has also been identified for the proposed development.

1.10 **From the findings of this report, the development proposals are considered appropriate for the site location; therefore, should be fully supported through the Planning process in terms of Flood Risk, Foul and Surface Water Drainage.**

Existing Site and Proposed Development

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Existing Site and Proposed Development

The following paragraphs provide detail on the existing and proposed future residential development site; in relation to location, land uses and topography.

2.1 The application site covers an area of approximately 4.82 ha and is situated in the south west of Spalding, a town located 22km south west of Boston an 24km north east of Peterborough.

2.2 By road, the site is currently accessible from the B1173 and Hawthorn Bank or from Bourne Road, Broadway and Meadow Way.

2.3 The Topographical Survey of the site was carried out by Daniel Charles Surveys in March 2024 (Drawing number 24–6-01 to 24–26–04). During the survey, information was recorded on the location and type of land features observed, including type of surface finishes, land boundaries, access routes, existing building outlines and vegetation. All surveyed elevations were recorded at heights in metres above Ordnance Datum (mAOD). Ground levels and spot levels are also indicated on the drawing where they were recorded onsite. In August 2025, Woods Hardwick Surveying completed a Utility Trace Survey in accordance with PAS 128:2022. Both surveys are provided within **Appendix B**.

2.4 The nearest watercourses to the site, is the Hills Drain which is located to the east of the site, running parallel to the railway line. An unnamed ditch is located to the west of the site, adjacent to the development of 150 dwellings (Holland Park Northern Neighbourhood Phase 2 ref: H16-0116-222) currently under construction. In addition, the River Welland is located approximately 500m to the east of the site.

2.5 In terms of existing drainage utilities, the Anglian Water sewer records identify an existing foul rising main which runs through the site. Anglian Water records also show the presence of surface water sewers and foul sewers located within the roads of residential areas to the north, west and south of the site.

2.6 The Utility Trace Survey confirmed the levels of the Anglian Water foul rising main within the site where possible and identified further surface water sewers and manholes which serve the existing Factory Warehouse.

2.7 The proposals are for a Full Planning Application for 230 dwellings with associated access, drainage, internal roads, landscaping and associated works. A copy of the Illustrative Masterplan is provided in **Appendix C**.

2.8 Vehicular access to the site will be provided from three locations:

- A priority T-junction off Hawthorn Bank which provides access for 56 dwellings.
- An extension of Meadow Way, which will act as the main vehicular access for the majority of dwellings on the site.
- An extension of Steeple View, which provides a connection to existing residential dwellings to the south.

2.9 In addition, there are frontage plots served via private drives off Hawthorn Bank and directly off Keats Grove and Honeysuckle Way.

Flood Risk

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Flood Risk

The following paragraphs will identify whether or not there are any flood risks associated with the future development which may affect the proposal's impact on the surrounding environment.

3.1 This FRA has been prepared in accordance with the National Planning Policy Framework (NPPF) December 2024 version with minor amendments in February 2025 and accompanying Planning Practice Guidance (PPG) Flood Risk and Coastal Change (FRCC) published in March 2014 (last updated September 2025).

3.2 Table 1 of the FRCC, PPG seeks to define Flood Risk Zones. An extract of this table is shown in Figure 3.1 on the following page.

3.3 Annex 3 of the NPPF, defines the 'Flood Risk Vulnerability Classification' for different types of development. Residential dwellings are classified under the 'More Vulnerable' category.

3.4 The Environment Agency (EA) Flood Map demonstrates that the site lies within Flood Zone 3 and is therefore classified as having a 1 in 100 or greater annual probability of flooding from rivers or seas. A copy of the EA Flood Map covering the immediate surrounding area for the proposed development is shown in **Appendix D**.

3.5 Based on Table 2: Flood risk vulnerability and flood zone 'incompatibility' – reproduced on the next page, for development within Flood Zone 3a, an exception test is required.

3.6 As can be seen in the Flood Map for Planning, the majority of Spalding and a large extent of South East Lincolnshire is in Flood Zone 3. Therefore, it is not possible to guide development entirely to Flood Zone 1 and 2. Instead the suitability of the proposed development has been assessed with refence to the refined flood risk information (Hazard and Depth maps) from the South East Lincolnshire Strategic Flood Risk Assessment (SFRA), March 2017.

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Figure 3.1: Table 1: Flood Zone Definitions – Planning Practice Guidance Extract

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✔	✔	✔	✔	✔
Zone 2	✔	Exception Test required	✔	✔	✔
Zone 3a †	Exception Test required †	X	Exception Test required	✔	✔
Zone 3b *	Exception Test required *	X	X	X	✔ *

Figure 3.2: Table 2: Flood Risk vulnerability – Planning Practice Guidance Extract

Risk of Flooding to the Development from Known Sources

3.7 Notwithstanding the above, presented below is a summary and analysis of the potential for the site to flood from known sources.

Flooding from Rivers and/ or Watercourses

3.8 As previously mentioned, there are existing watercourses in the vicinity of the site, the nearest watercourse is an unnamed drain to the east of the railway line. The Hills Drain, an unnamed ditch to the west and the River Welland are also in the vicinity.

3.9 The EA rivers and sea flood mapping (included in **Appendix E**) shows that the site has a medium chance of yearly flooding (between 1% and 3.3% chance each year). This mapping takes into account the effect of any flood defences in the area if present.

3.10 The South East Lincolnshire SFRA (March 2017) contains hazard mapping which shows modelled flooding consequences in the event of overtopping and breaching of flood defences. It also shows the likely flood depths, velocities and overall hazard to a proposed site. Two scenarios were modelled, the 1 in 200 (0.5%) and 1 in 1,000 (0.1%). This was undertaken for the 'present' day (2006 baseline) and 2115 (the year to which the final Defra sea level allowances related and allows for a lifetime of development).

3.11 The hazard mapping for Spalding (included in **Appendix F**) shows that in the worst modelled scenario (2115), the site and surrounding area are not expected to experience flooding.

Flooding from the Sea

3.12 The nearest sea to the site is the North Sea, which is located over 23km to the north east.

3.13 As confirmed by the SFRA Hazard mapping, the site and immediate surrounding areas are not at risk of flooding from this source.

Flooding from Land

3.14 The potential for overland flows needs to be considered to ensure that neither the development nor adjacent land and/ or property, including that which may be under the responsibility of a third party, is placed at an unacceptable risk of flooding.

3.15 The EA Surface Water Flood map for the site (enclosed in **Appendix G)**, shows that areas of the site area affected by low to high chance of surface water flood risk, with the majority of this being low chance.

3.16 It is also noted that there are no significant surface water flow routes present within the site, and as such, any surface water flows which may emanate on the site will be managed within the proposed drainage network following development of the site.

3.17 At the detailed design stage, final external levels will be designed to ensure that surface water flows are routed away from the vulnerable areas and directed towards the existing watercourses.

Flooding from Groundwater

3.18 A Phase 1 (Desk Study) Report and Phase 2 (Ground Investigation) Assessment Report were carried out by Humberside Materials Laboratory Ltd in October 2025 and January 2026, respectively. Relevant extracts from the reports are included in **Appendix H**.

3.19 The revealed ground conditions across the site were noted as follows:

i. (Reworked) Topsoil/Subsoil - found in all exploratory holes, typically: c. 0.2m- to 0.4m-thick layer of silty or sandy loamy soil
i. Stony/Rubbly made ground - found only in BH1 and TP9, sand and stone gravel with brick and/or concrete fragments – to a maximum depth of 0.5m
ii. Shallow tidal deposits (less than 2m depth) – silt, clay and fine sand
iii. Moderate depth tidal/marine deposits (2m to 12m depth) – shelly fine sand
iv. Deep tidal/marine deposits (12m to 15m depth) – sand with variable gravel - base depth recorded to range between 13.50m and 15.00m BEGL
v. Glacial deposits – boulder clay (14m to 18m depth) - revealed across the site – to the maximum depth of borehole exploration (of about 18.4m), stiff grey slightly sandy CLAY with occasional chalk gravel

3.20 Groundwater was observed in many of the exploratory holes, especially those greater than 2m depth BEGL. Initial groundwater strikes or ingresses were noted at between 1.50m and 3.30m depth.

3.21 Groundwater monitoring results confirmed resting groundwater levels of between 1.1m and 3.3m below existing ground level.

3.22 It is considered that groundwater at this depth is sufficiently deep that it is unlikely to contribute to flooding at the surface. However, to avoid potential groundwater ingress into the proposed drainage features, lining will be necessary.

Flooding from Sewers

3.23 A copy of the Anglian Water Asset Plan illustrating the site extents and the immediate surrounding areas on Ordnance Survey (OS) mapping; together with appropriate locations of assets is enclosed in **Appendix I**.

3.24 From the plan, it can be seen that there is an existing foul rising main which runs through the site. The records also show the presence of surface water sewers and foul sewers located within the roads of residential areas to the north, west and south of the site.

3.25 A sewer flooding enquiry was carried out with Anglian Water, in their response they advised that there have been instances of flooding within the vicinity of the proposed development and recommend that a Pre-Planning Assessment report was commissioned to confirm any implications for the proposed development.

3.26 In light of the above AW were duly commissioned to prepare a pre-planning assessment report a copy of which is included in **Appendix M**, the report does not raise any concerns within the site area in relation to historic flooding incidents.

3.27 In line with AW requirements, the proposed layout provides a 3m easement on either side of the existing foul rising main which will be kept free from built development.

3.28 Based on the information above, the proposed site is not considered to be at risk of flooding from this source.

Flooding from Reservoirs, Canals and Other Artificial Sources

3.29 The EA Reservoir Flood Map shows that no part of the site or any immediate neighbouring land is shown to be at risk of flooding from reservoirs. A copy of this mapping is enclosed in **Appendix J.**

3.30 It should be noted that an occurrence of flooding from reservoirs is considered by the EA to be extremely rare. There has been no loss of life in the UK from reservoir flooding since 1925.

3.31 Based on the above, the proposed residential development is not considered to be at risk of flooding from the aforementioned source.

Risk of Flooding from the Proposed Development

3.32 Presented below is a summary and analysis of the potential for the site to exacerbate the risk of flooding to third parties both upstream and downstream.

Encroachment onto Floodplain

3.33 As outlined previously, the site and wider surrounding area is located in EA Flood Zone 3.

3.34 However the SFRA Hazard mapping does not show the development site in an area of flood risk. In addition, the SFRA states that within the South Holland District, the functional floodplain comprises of the designated flood storage areas of the Crowland and Cowbit Washes, and Surfleet Reservoir.

Impedance of Flood Flows

3.35 As previously mentioned, the EA Surface Water Flood map identifies areas within the site to be at low to high chance of surface water flooding, with the majority shown as low chance. There are no significant surface water flow routes present within the site, and as such, any surface water emanating from the site will be directed into the surface water drainage system to be implemented on site.

3.36 Furthermore, it is noted that the majority of the flood extent shown on the Surface Water Flood Map does not appear on the associated surface water depth map, indicating that these areas are likely to experience shallow flooding of less than 0.2m.

3.37 At the detailed design stage, final external levels will be designed to ensure that surface water flows are routed away from the vulnerable areas and directed towards the existing watercourses.

Contribution of Flood Flows by Development Drainage

3.38 As previously mentioned, the application site covers an area of approximately 4.82 ha.

3.39 The proposals are for a Full Planning Application for 230 dwellings with associated access, drainage, internal roads, landscaping, and associated works. Most of these elements will contribute to the development's surface water discharge.

3.40 If considered appropriate at the detailed design stage, flood routing measures will be incorporated to ensure that flood waters in excess of those for which the site has been designed to accommodate, will be routed away from the more vulnerable areas of the site.

3.41 The surface and foul water disposal strategies for the site are described in greater detail in the following 'Chapter 4 – Proposed Development Drainage Strategy'.

Climate Change

3.42 The EA's guidance document 'Flood risk assessment: climate change allowances' (FRA:CC) sets out the requirements for accounting for climate change within flood risk assessments and drainage strategies.

3.43 The FRA:CC provides allowances for peak river flow and peak rainfall intensity as percentage uplifts that vary by management catchment. These allowances must be applied when assessing fluvial flood risk and in the design of site-wide drainage.

3.44 The peak rainfall allowances for the application site have been taken from the EA's published data for the 'Welland Management Catchment' and are as follows;

Epoch	**Central allowance**	**Upper end allowance**
3.3% annual exceedance rainfall event		
2050s	20%	35%
2070s	25%	35%
1% annual exceedance rainfall event		
2050s	20%	40%
2070s	25%	40%

Table 3.3: Welland Management Catchment peak rainfall allowances

3.45 It is advised to use '2050s' for development with a lifetime up to the 2060 and the 2070s epoch for development with a lifetime between 2061 and 2125.

3.46 Considering the above, the climate change allowance that the proposed development's drainage strategy will be based on, is set at a value of +40% (Upper end allowance, representing the total potential change anticipated for 2061 – 2125). This reflects best practice and is in line with Lincolnshire guidance.

Proposed Development
Drainage Strategy

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Proposed Development Drainage Strategy

The following paragraphs will provide detail on the proposed site generated foul and surface water disposal methods, design criteria, maintenance regimes and potential third-party legal agreements.

4.1 In addition to ensuring that the development is not at risk of flooding from external sources, it is also important to ensure that the scheme itself does not exacerbate flood risk for others. It is therefore essential that the arrangements for storm and foul water disposal are fully assessed to guarantee that the effects are mitigated and that there will be no impact on the existing land drainage regime.

Surface Water Drainage Strategy

4.2 All of the recent guidance on the arrangements for surface water disposal from new developments encourages the application of a hierarchy for surface water disposal. This hierarchy is set out in the Building Regulations Part H and is consistent with LLFA guidance and the National Standards for SuDS.

4.3 The first preference for surface water runoff is collection for non-potable use, such as rainwater harvesting or landscape irrigation. Rainwater harvesting will be utilised on site through the provision of water butts, however, at this stage, these measures are not included in the drainage calculations as it will be part of the detailed drainage design. In terms of the formal drainage strategy, disposal will follow the hierarchy: first via infiltration into the ground, then to a ditch and/ or watercourse, followed by a surface water sewer or other piped drainage system. The last option to be considered is discharge to a combined sewer.

4.4 The surface water drainage strategy will also seek to manage everyday rainfall, including the initial 5mm of rainfall for the majority of rainfall events, within the site to avoid direct runoff to surface waters or piped drainage systems. This will be achieved through the use of sustainable drainage measures such as infiltration systems (where possible), detention features, and rainwater harvesting, ensuring that runoff is either collected for use, infiltrated to ground or retained within SuDS features where it can be naturally absorbed or lost through evapotranspiration.

Method of Surface Water Discharge

Infiltration

4.5 On-site infiltration testing was undertaken by Humberside Materials Laboratory Ltd and the results are contained within the Phase 2 (Ground Investigation) Assessment Report provided in **Appendix H**.

4.6 From the report it is noted that at least about 4 x 10-6 m/s infiltration might be available within the silty sand which appears to predominate below the site at about 1m to 2m depth. Lower infiltration rates of about 1.5 x 10-6 m/s might be available in the shallower siltier soils at about 0.5m to 1.0m depth.

4.7 Given the relatively shallow groundwater depth of around 1.1m below ground level, it is considered that an infiltration based surface water drainage strategy would not be suitable at the site.

4.8 Furthermore, the proposed drainage features will be lined to prevent groundwater ingress.

4.9 In light of the above, and in accordance with the hierarchy for surface water disposal, the next option to be explored is disposal to ditch and/or watercourse.

Ditch and/or Watercourse

4.10 As previously mentioned, the nearest watercourses to the site are the Hills Drain, the River Welland and an unnamed ditch to the west. The Hills Drain lies to the east of the railway line and discharging to it would present significant challenges due to the complexity of constructing a sewer beneath an active railway.

4.11 The River Welland is located more than 500m from the site and an outfall to it would also require crossing the railway line.

4.12 The wider Broadgate Homes development (Holland Park Northern Neighbourhood Phase 1 & Phase 2) located to the south west of the proposed site discharges to a drainage ditch to the west which runs in a north – south orientation. The surface water drainage strategy for the wider site was designed to accommodate all parcels, including the application site.

4.13 It is therefore proposed that surface water runoff from the southern and eastern portions of the site will be discharged into an existing sewer located within Steeple View via a flow control device, at a maximum rate of 9.3 l/s. The connection will be made via a stub that was left for the application site. This sewer discharges into the above mentioned drainage ditch to the west of the site.

4.14 Due to the topography of the site, not the whole site can discharge by gravity in this manner. Therefore, it is proposed that runoff from the north western quadrant will discharge at a maximum rate of 3.6 l/s into an existing surface water sewer that currently serves the factory warehouse. This sewer connects to the Anglian Water Surface water sewer located at the end of Aalsmeer Rise.

Discharge Strategy

Rainfall Data

4.15 The Flood Estimation Handbook (FEH) methodology has been used in order to determine the requirements of the drainage network.

Runoff Rate

4.16 The total impermeable area of the site has been calculated to be 4 ha based on the Illustrative Masterplan. The impermeable area comprises surfaces occupied by the proposed houses, garages, private drives, access roads and footpaths.

Attenuation Volume Requirement

4.17 The majority of the site is currently undeveloped; therefore, the proposed development will generate an increase in impermeable area. Based upon the current layout drawings, the proposed development would generate an impermeable area of approximately 4 ha.

4.18 It is therefore necessary to ensure that sufficient attenuation is provided within the site to accommodate the 4 ha of impermeable surfacing during the 1 in 100 (+40% climate change) storm event.

4.19 The associated drainage calculations can be found in **Appendix L**. These calculations demonstrate that the proposed attenuation features are capable of accepting flows from the 100 year rainfall events, including 40% allowance for climate change.

Method of Attenuation

4.20 In accordance with current guidelines and best practice, the Developer's best endeavours will be made to ensure that appropriate Sustainable Urban Drainage Systems (SuDS) are used wherever practicable. There are a number of primary methods available, the appropriateness of which has been considered and summarised in Table 4.1 below;

Table 4.1: SuDS Feasibility Consideration

SuDS System	Feasibility	Comments
Green Roofs	X	Cost is likely to adversely affect the scheme's viability.
Permeable Paving	X	Permeable paving is not currently proposed within the drainage strategy.
Soakaways	X	Ground conditions are considered unsuitable for infiltration methods.
Rainwater Harvesting	✓	Feasible and will be utilised where practicable, although not accounted for within currently proposed drainage strategy or attenuation calculations.
Swales	X	Not currently proposed.
Attenuation Basin	✓	Two attenuation ponds are currently proposed on this scheme to provide surface water storage and treatment.
Geo-cellular Storage Crates	X	Not currently proposed as the proposed attenuation pond offers a more sustainable solution.

4.21 Based upon the assessment above, which takes into account the underlying ground conditions, it is proposed to provide surface water storage for the site within the proposed attenuation ponds in the south western and north western extent of the site.

4.22 The proposed attenuation basin in the south western extent of the development will provide approximately 3,171m^3 of storage, whilst the north western basin will provide 1,443m^3 of storage. The two attenuation basins have a total storage volume of 4,614m^3 as shown on the Proposed Drainage Strategy included in **Appendix K**. The calculations provided in **Appendix L** demonstrate that the proposed attenuation ponds are capable of accepting flows from the 100 year rainfall events, including 40% allowance for climate change.

Surface Water Conveyance

4.23 Surface water runoff from the proposed roofs and roads will either be conveyed towards the attenuation basin in the south western or north western extents of the site via a network of surface water sewers which run underneath the proposed roads.

4.24 From the north western attenuation basin, surface water runoff will be conveyed at a maximum rate of 3.6 l/s into an existing surface water sewer that currently serves the factory warehouse.

4.25 From the south western attenuation basin, surface water runoff will outfall to the existing surface water sewer which runs adjacent to the southern site boundary in Steeple View (Phase 1), at a maximum rate of 9.3l/s/impermeable hectare. This sewer ultimately discharges to a ditch located west of the site, and it should be noted that if the application site was developed at the same time as the Phase 1 site, surface water runoff would have discharged directly to this ditch.

4.26 The maximum discharge rate for the Phase 1 development is currently 12.2 l/s, therefore when combined with the application site, the total discharge rate into the ditch will be is 21.5 l/s. On this basis the flow control will be adjusted accordingly to restrict the final flows into the ditch to 21.5 l/s during all storms up to and including the 100 year event plus 40% climate change.

4.27 The proposed drainage network has been modelled using Microdrainage software. The results demonstrate that the features are capable of accepting flows from the 100 year storm event, including 40% allowance for climate change. The proposed drainage strategy and associated calculations can be found in **Appendix K and L**, respectively.

Surface Water Drainage Maintenance

4.25 The arrangements for further maintenance of the surface water drainage system needs to be fully considered and, in that respect, it is anticipated that the onsite piped drainage network would be adopted by Anglian Water through a Section 104 Agreement (Water Industry Act 1991).

4.26 The proposed attenuation pond will be maintained by a management company.

4.27 A summary of the likely maintenance requirements for the attenuation pond is provided in Table 4.2 on the following page.

Table 4.2: Recommended Maintenance for the Attenuation Pond

Attenuation Pond	
Monitoring	**Frequency**
To be visually inspected after heavy rainfall events to ensure they are free of debris and litter.	As required
Regular Maintenance	
Litter and debris removal from the site.	Monthly
Amenity grass cutting at 35 – 50mm	As required
Inspect and clear inlets, outlets, control structures and overflows	Monthly
Occasional Maintenance	
Remove lead accumulation	As required
Remove sediments from inlets and structures	As required
Remedial Work	
Inspect and repair damage to inlets, outlets, banks and overflows	As required

4.28 It should be noted that the maintenance schedule described above should be considered indicative only. The frequency and type of maintenance tasks to be carried out should be reviewed as necessary to ensure that the schedule remains relevant to the nature and location of the proposed residential development.

Foul Water Drainage Strategy

4.29 The proposed foul water drainage strategy is shown on the Drainage Strategy which can be found in **Appendix K**.

4.30 It is proposed to discharge foul flows from the northern part of the site, via a network of gravity pipes which ultimately connect to the existing foul water network for Phase 1 of the wider development, using an existing stub upstream of manhole F113.

4.31 Foul flows from the remainder of the site are proposed to drain, via gravity, to a pumping station located in the south western extent of the site. From the pumping station, flows will be pumped to manhole F32, before ultimately discharging via gravity into the proposed foul network serving the adjacent site via manhole F98.

4.32 The Anglian Water Pre-Planning Assessment Report (July 2025) contained in **Appendix M**, states that the site is within the catchment of Spalding Water Recycling Centre which currently can accommodate the additional flows generated by the proposed development.

4.33 The report also confirms that the existing foul sewerage network up to the water recycling centre has capacity to accommodate the foul flows from the proposed development.

4.34 In accordance with relevant drainage policy, Anglian Water are obliged to accept foul water flows from a proposed development, subject to the site receiving planning consent. In anticipation that such a consent will be granted for the proposed residential scheme, it is expected that Anglian Water will make the necessary arrangements to ensure that the required provision within their public foul sewer network and treatment works will be available at the time that the Applicant wishes to connect the site's foul sewers to the aforementioned public foul network.

Summary and Conclusion

Summary and Conclusions

The following paragraphs summarise the findings of this Flood Risk Assessment and Drainage Strategy. Details of foul and surface water outfalls, SuDS features and legal agreements are also provided.

5.1 This Flood Risk Assessment (FRA) and Drainage Strategy has been prepared by Woods Hardwick Ltd on behalf of Broadgate Homes in relation to a Full Planning Application for 230 dwellings with associated access, drainage, internal roads, landscaping and associated works for their site known as 'Meadow Way/Hawthorn Bank', Spalding.

5.2 In terms of flood risk, the application site is shown on the EA's Flood map for planning as being located within Flood Zone 3. However, the hazard mapping contained within the SFRA shows that in the worst modelled scenario (2115), the site and surrounding area are not expected to experience flooding.

5.3 All other potential sources of flooding to the proposed development have been considered and it has been demonstrated that the site will not be at any significant risk of flooding.

5.4 It has been demonstrated that the proposed development will not exacerbate the risk of flooding to third parties either upstream or downstream from the site.

5.5 The Surface Water Drainage Strategy has been developed in accordance with the hierarchy for sustainable surface water disposal. The Phase 2 (Ground Investigation) Assessment Report prepared by Humberside Materials Laboratory Ltd indicates that the underlying ground conditions are unsuitable for infiltration techniques. As such, it is proposed to discharge to the existing ditch to the west of the site via an existing sewer located within Steeple View for the southern and eastern sections of the site, while the north western section of the site will discharge to an existing surface water sewer that currently serves the factory warehouse which connects to the Anglian Water Surface water sewer located at the end of Aalsmeer Rise.

5.6 It should be noted that the development to the south forms part of the wider Broadgate Homes development owned by the applicant. The surface water drainage strategy for the wider site was designed to accommodate all parcels, including the application site.

5.7 Surface water storage for the application site will be provided within the two proposed attenuation ponds in the north western and south western extents of the site.

5.8 Surface water will be conveyed to each attenuation pond via gravity pipes which run underneath the roads.

5.9 From the south western attenuation basin, surface water will flow into the sewer in Steeple Brook at a maximum rate of 9.3l/s, while surface water from the north western attenuation basin will flow into the sewer that currently serves the factory warehouse at a rate of 3.6l/s.

5.10 With regard to foul water, it is proposed to discharge foul flows from the northern part of the site, via a network of gravity pipes which ultimately connect to the existing foul water network for Phase 1 of the wider development, using an existing stub upstream of manhole F113.

5.11 Foul flows from the remainder of the site are proposed to drain, via gravity, to a pumping station located in the south western extent of the site. From the pumping station, flows will be pumped to manhole F32, before ultimately discharging via gravity into the proposed foul network serving the adjacent site via manhole F98.

5.12 The Anglian Water Pre-Planning Assessment Report confirms the site is within the catchment of Spalding Water Recycling Centre which currently can accommodate the additional flows generated by the proposed development. The report also confirms that the existing foul sewerage network up to the water recycling centre has capacity to accommodate the foul flows from the proposed development.

5.13 Anglian Water are obliged to accept foul water flows from a proposed development, subject to the site receiving planning consent. In anticipation that such a consent will be granted for the proposed residential scheme, it is expected that Anglian Water will make the necessary arrangements to ensure that the required provision within their public foul sewer network and treatment works will be available at the time that the Applicant wishes to connect the site's foul sewers to the aforementioned public foul network.

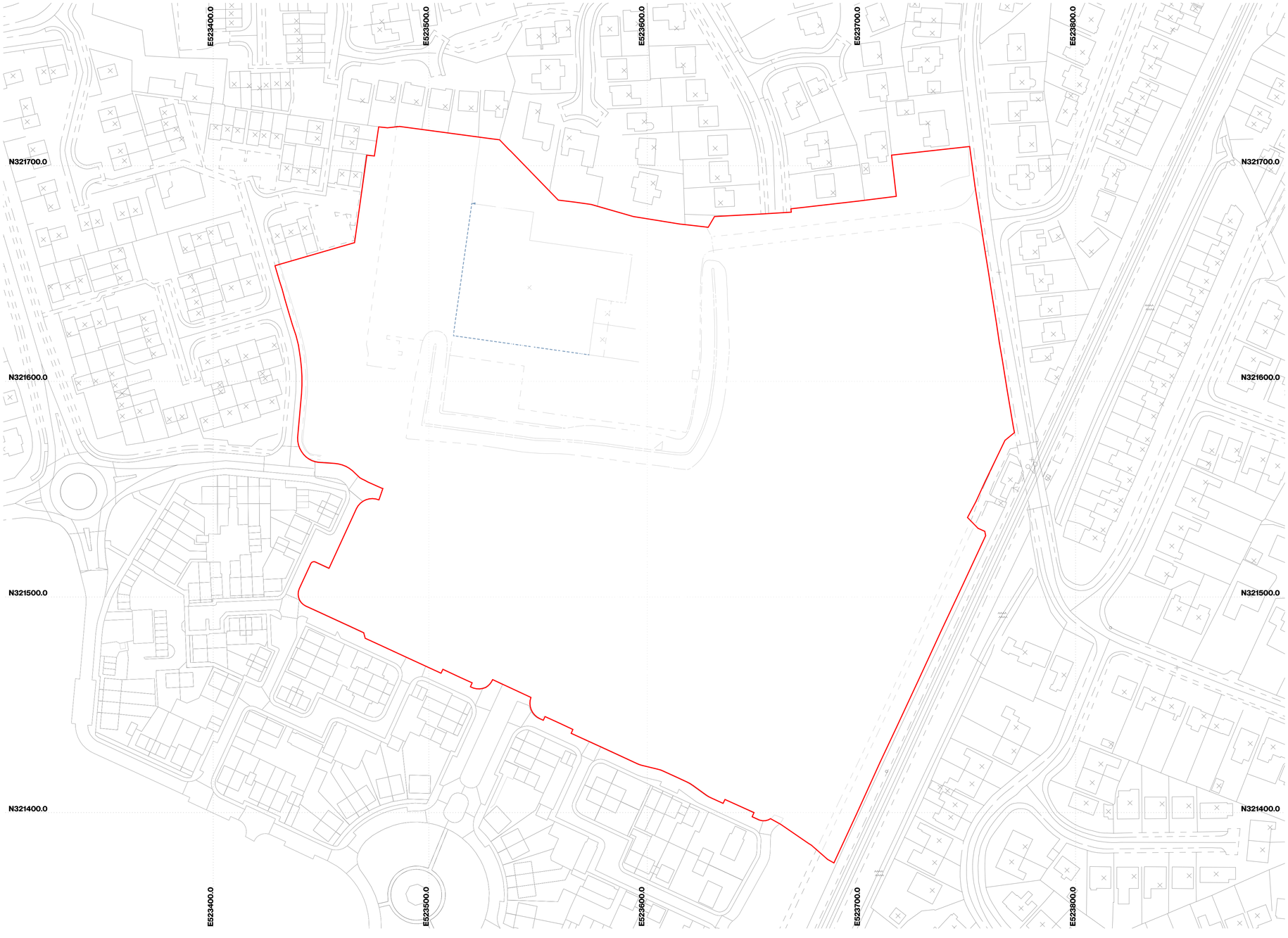
5.14 From the information provided within this report, it is concluded that there is no reason in terms of drainage or flood risk why the residential development proposed at 'Meadow Way/Hawthorn Bank', Spalding, should not be fully supported through the planning process.

Appendix A

Site Location Plan

REVISIONS

Revision	Date	Change	Initials	Chk'd By
P01	15/09/2025	First Issue	BF	SD
C01	27/09/2025	Planning Issue	SD	SD



1:1000 0 10m 50m 100m

1000 KEY

Site Boundary

Site Area = 7.82Ha

Legal Information

© 24/7Three Consultants Ltd. Reg: 13182179. For use by commissioning client only. Not for construction. Use for noted status only. All dimensions in millimetres unless noted otherwise. Do not scale from drawing. Survey information provided by others. Verify all site dimensions. Site boundaries based on OS data and not confirmed as the legal boundary. Read in conjunction with related project documents. 24/7three accepts no liability for third party information. Report discrepancies immediately.

BROADGATE HOMES EST. '76

HOMES WITH HEART

24 THREE

Northampton 01604272363
Vulcan Works, 34-38 Guildhall Road, Northampton, NN1 1EW

Newark 01636376520
The Barn, Huddlestone Wharf, Newark, NG24 4UL

hello@24three.co.uk

www.24three.co.uk

Client:

Broadgate Homes

Broadgate House, 519 Broadgate, Weston Hills, Spalding, Lincolnshire. PE12 6DB

Project Title:

Hawthorn Bank / Meadow Way

Drawing Name:

Site Location Plan

Drawing Stage:	Preliminary
STATUS:	S3 Suitable for Review and Comment
243 File Ref:	25029-243-XX-XX-M3-A-1200_Proposed_Masterplan.pln

25029	SD	LBF	1:1000 @ A1	C01
243 Project No.	Drawn	Chk'd By	Scale	Rev

DRAWING TITLE

25029-243-XX-XX-DR-A-1000

PROJECT CODE ORIGINATOR FUNCTIONAL SPATIAL FORM DISCIPLINE DOC NUMBER

Appendix B

Topographical Survey and Utility Trace Survey

Woods Hardwick

Architecture | Engineering | Planning | Surveying

E630400.00 E630475.00 E630550.00 E630625.00 E630700.00 E630775.00 E630850.00 E630925.00 E631000.00 E631075.00 E631150.00

N321750.00 N321725.00 N321700.00 N321675.00 N321650.00 N321625.00 N321600.00 N321575.00

N

NOTES

ABBREVIATIONS & SYMBOLS

AV	AIR VALVE	OHC	OVERHEAD CABLE
BH	BORE HOLE	PB	POST BOX
BOL	BOLLARD	PINV	PIPE INVERT LEVEL
CATV	CABLE TV MH	PM	PARKING METER
CCTV	SECURITY CAM	PO	POST
CL	CABLE LEVEL	PTL	POST TOP LEVEL
CH	CHANNEL	P/R	POST & RAIL FENCE
COL	COLUMN	P/W	POST & WIRE FENCE
CV	CONTROL VLV	RAMP	RAMP INCL SLOPING KERB
DP	DOWN PIPE	RE	RODDING EYE/POINT
DR	DRAIN	RL	RIDGE LEVEL
EL	EAVES LEVEL	RP	REFLECTIVE POST
EP	ELECTRIC POLE	RS	ROAD SIGN
FB	FLOWER BED	SCL	SITE CLEARANCE LINE
FB	FLOWER BED	SOFFIT	SOFFIT LEVEL
FH	FIRE HYDRANT	SV	VALVE
FFL	FINISHED FLOOR LEVEL	TW	TRENCH WATER
FP	FLAG POLE	TAC	TACTILE PAVING
FW	FOUL WATER	TH	TRIAL HOLE
GV	GAS VALVE	TL	TRAFFIC LIGHTS
HW	HEADWALL	TLVL	TARMAC LEVEL
IC	INSPECTION COVER	TOP	TOP OF KERB LEVEL
IL	INVERT LEVEL	TP	TELEGRAPH POLE
KB	KERB BOTTOM	TRK	TRACK
KO	KERB OFFLET	UO	UNABLE TO LIFT
KT	KERB TOP	UPVC	UPVC PIPE
LP	LAMP POST	WL	WATER LEVEL
LC	LIGHT COLUMN	WLVL	WATER LEVEL
MH	MANHOLE	WM	WATER METER
MP	MARKER POST	WO	WASH-OUT POINT

FENCE, HEDGE, ELECTRIC, BANK EDGE, STORM LINE, FOUL LINE, TELECOM LINE, GAS LINE, LARSON PILES, CHANNELS, WATER MAIN, TREE, BOREHOLE, STATION, TRM, MANHOLE, GULLY, BATTER, WATER LVL, GATE

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7. THE CONTRACTOR MUST CHECK AND VERIFY ALL SITE LEVELS, DIMENSIONS AND SETTING OUT BEFORE WORK COMMENCES. THE COMMENCEMENT OF ANY SITE WORKS BY THE CONTRACTOR MUST BE NOTIFIED TO DANIEL CHARLES SURVEYS LTD.

8. ALL SURVEY STATION CONTROL POINTS MUST BE CHECKED BY THE CONTRACTOR PRIOR TO STARTING ANY SITE WORKS.

SURVEY CONTROL POINT INFORMATION.

Point	Easting	Northing	Elevation
9000	523474.117	321545.531	3.204
9002	523441.077	321497.157	3.436
9003	523548.526	321445.652	3.518
9004	523659.653	321391.335	3.450
9005	523615.500	321627.179	3.268
9006	523612.500	321581.883	3.325
9007	523593.249	321671.050	2.945

SURVEY DATE	MARCH 24	INITIALS	MJW

Rev.	Amendments	Drn.	Date

Client: BROADGATE HOMES

Project Title: LAND OFF MEADOW WAY HOLLAND PARK SPALDING - LINCS

Drawing Title: TOPOGRAPHICAL SURVEY 1 of 4

Scale @ A0: 1:250	Date: 13/03/2024
Drawing No: 24 - 26 - 01	Rev:
C.A.D.Title: brookgate homes - westside+meadow way - spalding1. magnet master files\ meadow way\master topo (24-26-01+02+03+04).mjg	
Drawn By: MJW	Checked By: CED

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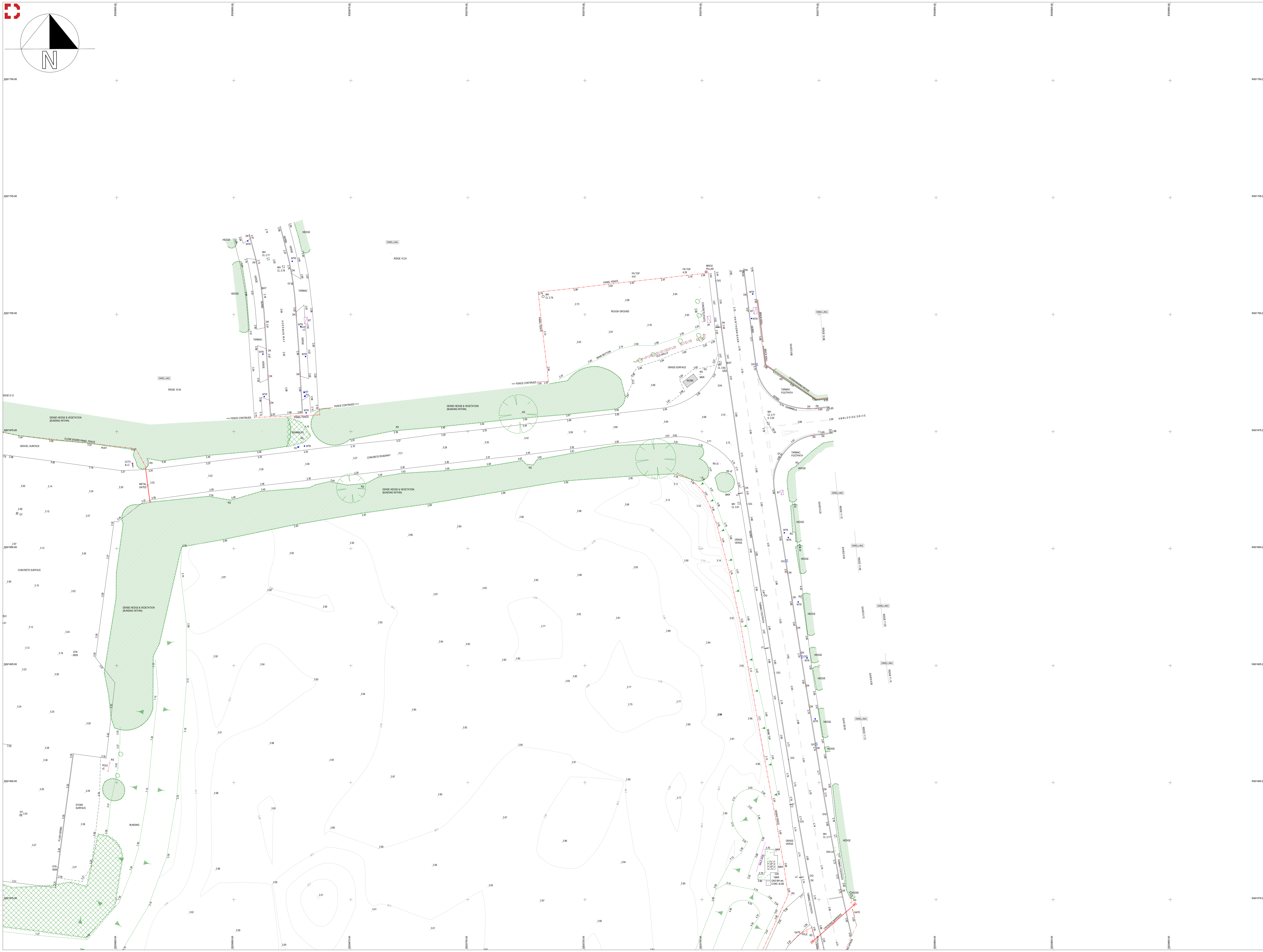

NOTES

ABBREVIATIONS & SYMBOLS

AV	AIR VALVE	OHC	OVERHEAD CABLE
BH	BORE HOLE	PB	POST BOX
BOL	BOLLARD	PINV	PIPE INVERT LEVEL
CATV	CABLE TV MH	PM	PARKING METER
CCTV	SECURITY CAM	PO	POST
CL	COVER LEVEL	PT	PIPE TOP LEVEL
CH	CHANNEL	P/R	POST & RAIL FENCE
COL	COLUMN	P/W	POST & WIRE FENCE
DC	CABLE TV LID	RD	EDGE OF ROAD/NO KERB
DP	DOWN PIPE	RE	RODDING EYE/POINT
DR	DRAIN	RL	RIDGE LEVEL
EL	EAVES LEVEL	RP	REFLECTIVE POST
EP	ELECTRIC POLE	RS	ROAD SIGN
ER	EARTH ROD	SLVL	STONE LEVEL
FB	FLOWER BED	SOFF	SOFFIT LEVEL
FH	FIRE HYDRANT	SV	VALVE
FFL	FINISHED FLOOR LEVEL	SW	SURFACE WATER
FP	FLAG POLE	Tac	TACTILE PAVING
FW	FOUL WATER	TH	TRIAL HOLE
GV	GAS VALVE	TL	TRAFFIC LIGHTS
HW	HEADWALL	TLVL	TARMAC LEVEL
IC	INSPECTION COVER	TOW	TOP OF WALL LEVEL
IL	I NVERT LEVEL	TP	TELEGRAPH POLE
KB	KERB BOTTOM	TRK	TRACK
KO	KERB OFFLET	UTL	UNABLE TO LIFT
KT	KERB TOP	VP	VENT PIPE
LP	LAMP POST	WL	WATER LEVEL
LC	LIGHT COLUMN	WLVL	WATER LEVEL
MH	MANHOLE	WM	WATER METER
MP	MARKER POST	WO	WASH OUT POINT

FENCE
HEDGE
ELECTRIC
BANK EDGE
STORM LINE
FOUL LINE
TELECOM LINE
GAS LINE
LARSON PILES
CHANNELS
WATER MAIN
TREE
BOREHOLE
STATION
TBM
MANHOLE
GULLY
BATTER
WATER LVL
GATE

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9005	523615.500	321627.179	3.268
9006	523612.500	321581.883	3.325
9007	523593.249	321671.050	2.945

SURVEY DATE	MARCH 24	INITIALS	MJW

Rev	Amendments	Drn	Date

Client:
BROADGATE HOMES

Project Title:
LAND OFF MEADOW WAY
HOLLAND PARK
SPALDING - LINCS

Drawing Title:
TOPOGRAPHICAL SURVEY 2 of 4

Scale @ A0: 1:250
Date: 13/03/2024
Drawing No: 24 - 26 - 02
Rev:
C.A.D.Title: broadgate homes - westside+meadow way - spalding\1. magnet master files\meadow way\master topo (24-26-01+02+03+04).mjo
Drawn By: MJW
Checked By: CED

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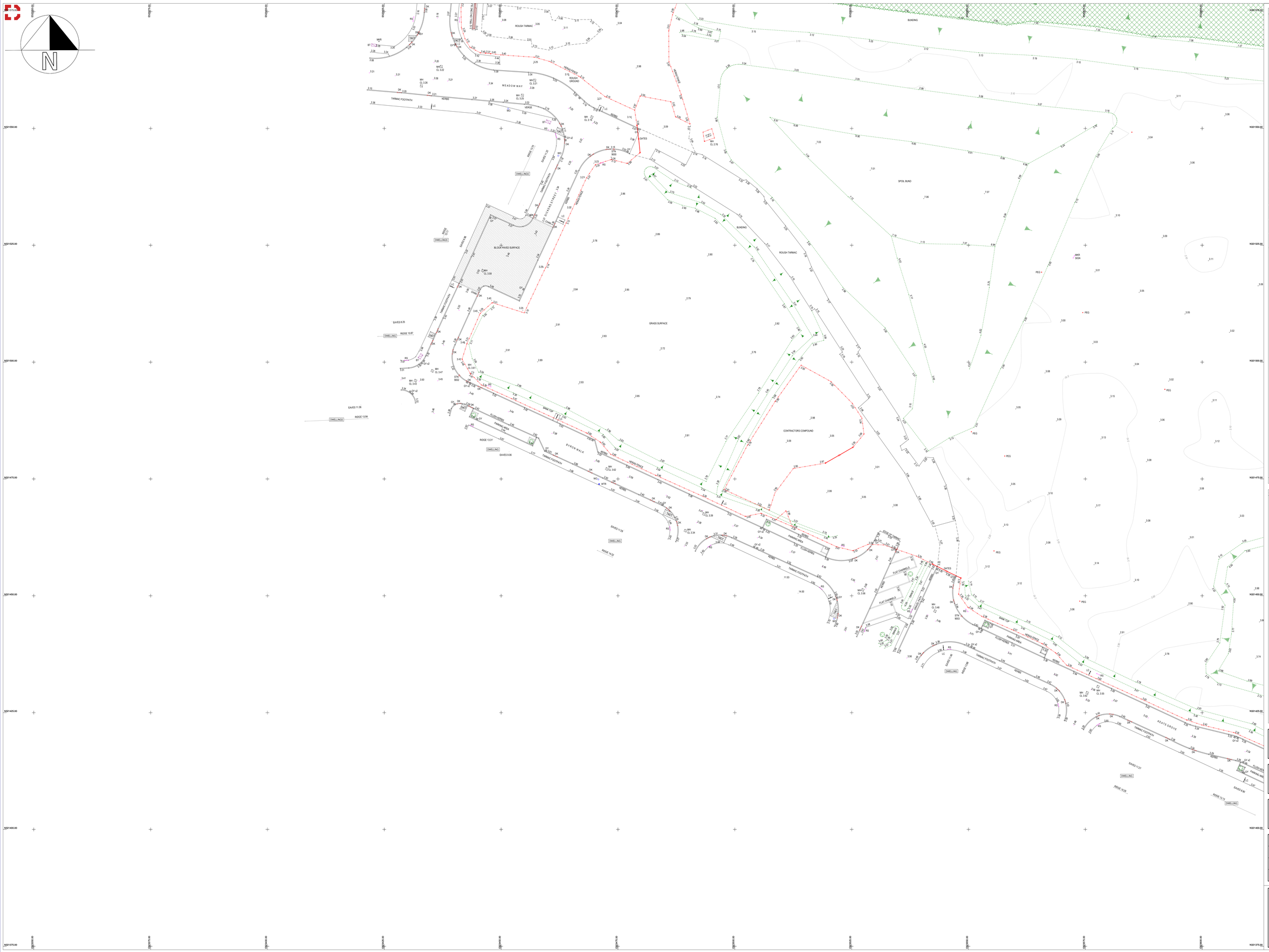

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AV	AIR VALVE	OHC	OVERHEAD CABLE
BH	BORE HOLE	PB	POST BOX
BOL	BOLLARD	PINV	PIPE INVERT LEVEL
CATV	CABLE TV MH	PM	PARKING METER
CCTV	SECURITY CAM	PO	POST
CL	CENTRE LEVEL	PTL	POST TOP LEVEL
CH	CHANNEL	P/R	POST & RAIL FENCE
COL	COLUMN	P/W	POST & WIRE FENCE
CP	CONTROL PT LIO	RCK	RODDING EYE/GROUND KERB
DP	DOWN PIPE	RE	RODDING EYE/POINT
DR	DRAIN	RL	RIDGE LEVEL
EL	EAVES LEVEL	RP	REFLECTIVE POST
EP	ELECTRIC POLE	RS	ROAD SIGN
ER	ELEC. RISER	SC	SCRAPE LEVEL
FB	FLOWER BED	SFL	SOFFIT LEVEL
FH	FIRE HYDRANT	SV	VALVE
FFL	FINISHED FLOOR LEVEL	TW	SURFACE WATER
FP	FLAG POLE	TAC	TACTILE PAVING
FW	FOUL WATER	TH	TRIAL HOLE
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HW	HEADWALL	TLW	TARMAC LEVEL
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9007	523593.249	321671.050	2.945

SURVEY DATE	MARCH 24	INITIALS	MJW

Rev.	Amendments	Drn	Date

Client:
BROADGATE HOMES

Project Title:
LAND OFF MEADOW WAY
HOLLAND PARK
SPALDING - LINCS

Drawing Title:
TOPOGRAPHICAL SURVEY 3 of 4

Scale @ A0: 1:250	Date: 13/03/2024
Drawing No: 24 - 26 - 03	Rev:
C.A.D. File: broadgate homes - westside+meadow way - spalding\1. magnet master files\ meadow way\master topo\ 24-26-01+02+03+04.mp	
Drawn By: MJW	Checked By: CED

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COL	COLUMN	P/W	POST & WIRE FENCE
CP	CONC. PIPE I/O	RK	ROLLED TOP KERB
DP	DOWN PIPE	RE	RIDGING EVE/POINT
DR	DRAIN	RL	RIDGE LEVEL
EL	EAVES LEVEL	RP	REFLECTIVE POST
EP	ELECTRIC POLE	RS	ROAD SIGN
FB	FLOWER BED	SL	SOFFIT LEVEL
FB	FLOWER BED	SOFF	SOFFIT LEVEL
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9006	523612.500	321581.883	3.325
9007	523693.249	321671.090	2.945

SURVEY DATE: MARCH 24 | INITIALS: MJW

Rev.	Amendments	Drn.	Date

Client:
BROADGATE HOMES

Project Title:
LAND OFF MEADOW WAY
HOLLAND PARK
SPALDING - LINCS

Drawing Title:
TOPOGRAPHICAL SURVEY 4 of 4

Scale @ A0: 1:250	Date: 13/03/2024
Drawing No: 24 - 26 - 04	Rev:
C.A.D.Title: brookgate homes - westside+meadow way - spalding\1. magnet master files\ meadow way\master topo (24-26-01+02+03+04).mpj	
Drawn By: MJW	Checked By: CED

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www.daniel-charles.co.uk

Equipment Information

Equipment	Manufacturer	Model	Serial Number	MKS REF	Date of Calibration
EML Tx Transmitter	SPX Radiodetection	RD8200	10/TX-3-870	RD28	02/10/2024
EML Rx Receiver	SPX Radiodetection	RD8200	10/82-GB-627	RD28	02/10/2024
GPR	IDS Georadar	Leica DS2000	SN010-16-000409	GPR14	Day of Survey
GPS	Geomax	Zenith 06	ZN06662200264	GPS32	N/A

Survey Information

Fieldwork dates	12/08	13/08	14/08	15/08	18/08	19/08	20/08	21/08	22/08	
Weather conditions	☀	☀	☀	☀	☀	☀	☀	☀	☀	
Ground conditions	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
Drainage	Anglian Water	18/07/2025
Water	Anglian Water	18/07/2025
Gas	Cadent	18/07/2025
Electricity	National Grid Electricity Distribution	18/07/2025
Telecom	Openreach	18/07/2025
CATV	Virgin Media	18/07/2025
New Installations	GTC	18/07/2025
Tunnels & Pipelines	LinesearchbeforeUdig	18/07/2025

DETECTION SURVEY REPORT

GENERAL
This survey was carried out in accordance with PAS 128:2022 (Publicly Available Specification from BSI) by an experienced surveyor/surveyors, qualified to a minimum of QCF Level 3. After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2022. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT
Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the attachments page of the desktop utility report.

DETECTION SURVEY
DRAINAGE
Drainage was lifted with pipe sizes and invert levels recorded from surface level, no allowance has been made for confined space entry unless otherwise stated. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven to QB2 or above. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Unable to locate rising main in field recommend slip trenches to confirm position and depth

WATER
Unable to locate water using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

GAS
Unable to locate poly pipes using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

ELECTRICITY
Cables have been located using EML methods with electronically derived depths recorded cables located comply with records provided. Recommend trial excavations in critical areas to confirm position and depth of cables.

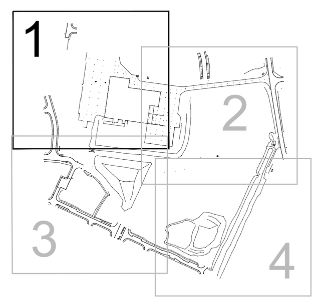
TELECOM
Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly.

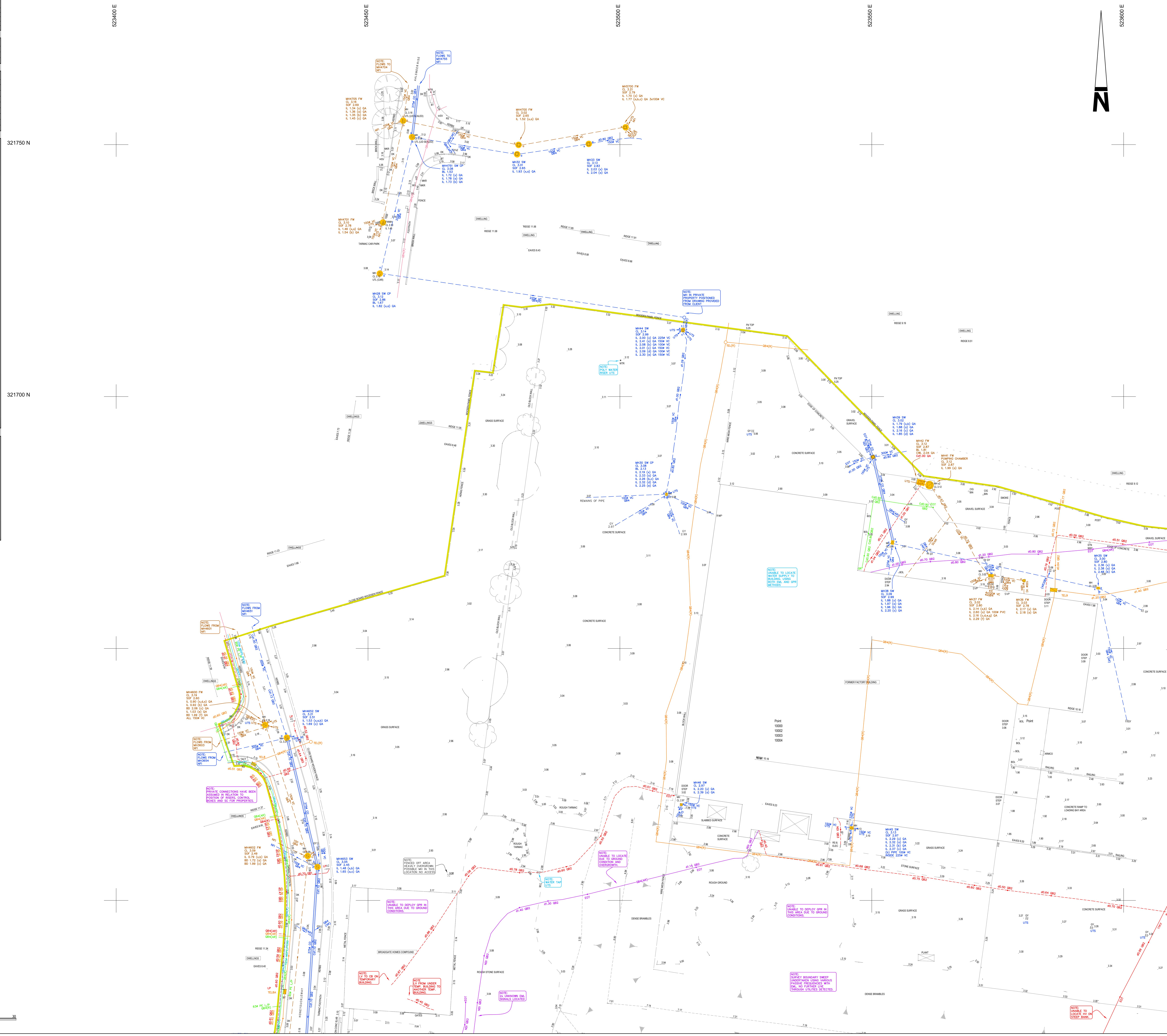
CATV
Virgin media shown on records but no covers located on site assumed to be laid with the telecom or for future use, recommend contacting Virgin Media for more info. Trial excavations are recommended to confirm depth and position in critical areas.

UNKNOWNS
Unknown anomalies consistent with buried utilities have been located using EML and GPR techniques with depths obtained to quality level QB2. Recommend trial excavations in critical areas to confirm depth, identity and utility.
Some unknown targets identified on the drawing using GPR are classified as "non-linear targets". These are not consistent with what we expect to see when identifying a buried utility, and appear on the drawing as single targets with depths (i.e. not linking two or more depth readings). This does not mean they are not utilities, we are just unable to positively identify them as a utility. We would strongly recommend that further verification surveys (PAS 128:2022 survey type A) are carried out to identify these targets in critical areas.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Sheet Layout: (Not to Scale)





SCALE 1:250

Notes :

1. UTILITY AND SERVICE INFORMATION ADDED TO TOPOGRAPHICAL SURVEY PROVIDED BY CLIENT. JOB No. UNKNOWN. DATE UNKNOWN. NO SITE VERIFICATION CARRIED OUT BY WHS, INCLUDING COVER LEVELS. ANY ADDITIONAL FEATURES SURVEYED HAVE BEEN ADDED RELATIVE TO THE PROVIDED TOPOGRAPHICAL SURVEY.
2. THIS SURVEY SHOULD ALWAYS BE READ IN CONJUNCTION WITH THE DESKTOP UTILITY REPORT, THAT WAS CARRIED OUT AS A PREREQUISITE TO THE DETECTION SURVEY.

KEY

GENERAL

Av.	AVERAGE
COW	CABLE ON WALL
CW	COMBINED WATER
DIS	DISUSED
DK	DROP KERB
EML	ELECTROMAGNETIC LOCATOR
EOT	END OF TRACE
FO	FIBRE OPTIC
FP	FOOTPATH
FW	FOUL WATER
GP	GATE POST
GPR	GROUND PENETRATING RADAR
HB	HARD BED
H/P	HIGH PRESSURE
HV	HIGH VOLTAGE
KV	KILO VOLT
I/P	INTERMEDIATE PRESSURE
L/P	LOW PRESSURE
LV	LOW VOLTAGE
M/P	MEDIUM PRESSURE
NDI	NO DEPTH INFORMATION
NFI	NO FURTHER INFORMATION
NDV	NO DUCTS VISIBLE
NPV	NO PIPES VISIBLE
OSBM	ORDNANCE SURVEY BENCHMARK
POW	PIPE ON WALL
P.BOX	POST BOX
RED	REDUNDANT SERVICE
RW	RETAINING WALL
SB	SOFT BED
SNP	STREET NAME PLATE
SW	SURFACE WATER
TAC	TACTILE PAVING
TOW	TOP OF WALL
TW	TRADE EFFLUENT WATER
UTL	UNABLE TO LOCATE
UTR	UNABLE TO RAISE
UTS	UNABLE TO SURVEY

APPARATUS

ACU	AIR CONDITIONING UNIT
AV	AIR VALVE
BB	BELISHA BEACON
BO	BOLLARD
BOL	BOLLARD LIGHT
BS	BUS STOP
CATV	CABLE TELEVISION
CB	CONTROL BOX
CCB	CROSSING CONTROL BUTTON
CP	CATCH PIT
CR	CABLE RISER
DCH	DRAINAGE CHANNEL
EB	ELECTRIC CONTROL BOX
EP	ELECTRIC POLE
ER	EARTH ROD
FD	FILTER DRAIN
FFP	FUEL TANK FILL POINT
FH	FIRE HYDRANT
GR	GAS RISER
GV	GAS VALVE
GY	GULLY
IC	INSPECTION COVER
INT	INTERCEPTOR
IT	INLET
KO	KERB OUTLET
LD	LOOP DETECTOR
LH	LAMP HOLE
LP	LAMP POST
MH	MANHOLE
MK	MARKER POST / PLATE
MT	METER
MW	MONITORING WELL
OL	OUTLET
OU	OUTFALL
PO	POST
PTG	PIPE TO GROUND
PTS	PIPE TO SURFACE
PU	PUMP
RE	RODDING EYE
RS	ROAD SIGN
RM	RISING MAIN
RWP	RAIN WATER PIPE
SC	STOP COCK
SO	SOAKAWAY
SP	SOIL PIPE
ST	STAY CABLE
SV	STOP / SLUICE VALVE
SVP	SOIL VENT PIPE
TCB	TELEPHONE CALL BOX
TEL	TELECOM INSPECTION COVER
TL	TRAFFIC LIGHT
TLC	TRAFFIC LIGHT COVER
TM	TICKET MACHINE
TP	TELECOM POLE
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
WR	WATER RISER
WT	WATER TAP
WW	WET WELL

DEPTHS

d	ELECTRONICALLY DERIVED
Pd	PASSIVELY DERIVED
Bd	BASE DEPTH
Cd	DEPTH TO CROWN
Id	DEPTH TO INVERT
Sd	DEPTH TO SOFFIT
STd	DEPTH TO SILT

PIPE MATERIALS

AC	ASBESTOS CEMENT
ALK	ALKATHENE
BK	BRICK
CI	CAST IRON
CO	CONCRETE
DI	DUCTILE IRON
HDPE	HIGH DENSITY PE
MDPE	MEDIUM DENSITY PE
PE	POLYETHYLENE
PF	PITCH FIBRE
PP	POLYPROPYLENE
PVC	POLYVINYL CHLORIDE
PVC-U	ULTRA RIB (PVC)
SI	SPUN IRON
ST	STEEL
VC	VITRIFIED CLAY

FENCES

B/W	BARBED WIRE FENCE
C/B	CLOSED BOARDED FENCE
CPL	CONCRETE PANEL FENCE
C/I	CORRUGATED IRON FENCE
CNP	CHESTNUT PAILING
C/L	CHAIN LINK FENCE
I/R	IRON RAILINGS
L/L	LARCH LAP FENCE
P/R	POST AND RAIL FENCE
P/W	POST AND WIRE FENCE
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LEVELS

BD	BACKDROP LEVEL
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CWL	CROWN LEVEL
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FL	FLOOR LEVEL
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RL	ROOF LEVEL
SL	SILT LEVEL
SOF	SOFFIT LEVEL
THL	THRESHOLD LEVEL
WL	WATER LEVEL

LINESTYLE

INTERNAL METER
POT ENDED SERVICE
SEWER CAPPED RUN
SURVEY ABANDONED
INTERNAL VALVE
UNKNOWN UNDERGROUND ANOMALY
UNDERGROUND CHAMBERS
VERIFICATION TRIAL HOLE/EXCAVATION
ABOVE GROUND (AG)
ASSUMED ROUTE (AR)
EMPTY DUCTS (E)
OVERHEAD (OH)
BACK DROP
P TRAP
UTILITY CROSSOVER
SURVEY BOUNDARY
VERBAL INFORMATION (VI)
RECORD INFORMATION (R)
REDUNDANT SERVICE
RISING MAIN
CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

CATV / DATA
ELECTRICITY (HV)
ELECTRICITY (LV)
FUEL
GAS
HEATING
OVERHEAD ELECTRIC
OVERHEAD TELECOM
COMBINED SEWER
FOUL SEWER
SURFACE SEWER
TRADE EFFLUENT
UNIDENTIFIED SEWER
TELECOM
UNKNOWN SERVICE
WATER

SERVICES SURVEY WARNING

CAUTIONARY NOTES

1. EML techniques have been used in the detection of underground utilities as outlined in Table 2 of PAS 128:2022, the results are not infallible and trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
2. GPR techniques has been used in the detection of non-metallic utilities as outlined in Table 2 of PAS 128:2022. The interpretation of these results is not infallible and success will depend on a number of factors including soil type, ground water levels and surface conditions, hence trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
3. Depths derived via EML are taken to the centre of the conductor (cable, metallic pipe) and those derived via GPR are usually to the crown of the utility unless otherwise indicated.
4. Where cables cannot be detected individually an average depth has been obtained and trial excavations are recommended to confirm number and depths of cables banded together.
5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
6. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
7. Within close proximity of electric substations and similar structures results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
8. Underneath overhead power lines results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
9. Drainage information has been obtained without man entry into the chamber.
10. Wherever possible we have attempted to locate the route of the sewer. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases recommendations have been made for further survey or maintenance work.
11. Pipe / duct sizes have been recorded from surface inspection or taken from record information. Pipe sizes have been recorded in millimetres and depths in metres, except in instances where sizes are recorded in imperial units on the record information.
12. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, wherever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
13. All utilities detected should be considered live unless confirmed otherwise by client or service provider.
14. We cannot confirm when utilities are redundant unless there is visual or record evidence to indicate this. In addition we cannot guarantee being able to detect all redundant utilities.
15. Wherever available the results of our investigations have been cross referenced with record information. If a utility shown on the records cannot be detected on site, the information has been added to the drawing and indicated as QB4 (R). However it should be noted that the completeness and accuracy of the records cannot be guaranteed.
16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
17. The responsibility for avoiding damage to assets and utilities on site shall be that of the persons proposing to excavate within the surveyed area, who shall be liable to the asset owner and any third party who may be affected in any way for any loss or damage.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING.

PAS 128:2022 Quality Level Guide

Quality Level	Description	Accuracy
QB4 (QL-B4)	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 (QL-B3) QB3P (QL-B3P)	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 (QL-B2) QB2P (QL-B2P)	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
QB1 (QL-B1) QB1P (QB-1P)	Horizontal and vertical location only using two geophysical techniques.	+/- 150mm or +/- 15% of depth whichever is greater
QA (QL-A)	Service verified in an open excavation, inside an inspection chamber / draw pit, or at the point the service enters / exits the ground.	+/- 50mm Horizontal +/- 50mm Vertical

REV	DESCRIPTION	DRN	CHD	DATE
A	RISING MAIN AMENDED FOLLOWING TRIAL TRENCHES	HC	NC	03-10-2025

☐ PRELIMINARY ■ INFORMATION ☐ TENDER
☐ CONSTRUCTION ☐ AS BUILT

SCALE 1:250 @ A0 DATE SEPTEMBER 2025

DRAWN MK CHK NC

DRAWING NO. 19690-7-851 REV A

TITLE HAWTHORN BANK SPALDING

DETAILS PAS 128:2022 UTILITY SURVEY SHEET 1 of 4

Woods Hardwick
Architecture | Engineering | Planning | Surveying

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T: +44 (0) 1234 268862

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Birmingham B24 9FE
T: +44 (0) 121 6297784

ONLINE: mail@woodshardwick.com | woodshardwick.com

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS DRAWING

Equipment Information

Equipment	Manufacturer	Model	Serial Number	MKS REF	Date of Calibration
EML Tx Transmitter	SPX Radiodetection	RD8200	10/TX-3-870	RD28	02/10/2024
EML Rx Receiver	SPX Radiodetection	RD8200	10/82-GB-627	RD28	02/10/2024
GPR	IDS Georadar	Leica DS2000	SN010-16-000409	GPR14	Day of Survey
GPS	Geomax	Zenith 06	ZN06662200264	GPS32	N/A

Survey Information

Fieldwork dates	12/08	13/08	14/08	15/08	18/08	19/08	20/08	21/08	22/08	
Weather conditions	☀	☀	☀	☀	☀	☀	☀	☀	☀	
Ground conditions	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
Drainage	Anglian Water	18/07/2025
Water	Anglian Water	18/07/2025
Gas	Cadent	18/07/2025
Electricity	National Grid Electricity Distribution	18/07/2025
Telecom	Openreach	18/07/2025
CATV	Virgin Media	18/07/2025
New Installations	GTC	18/07/2025
Tunnels & Pipelines	LinesearchbeforeUdig	18/07/2025

DETECTION SURVEY REPORT

GENERAL
This survey was carried out in accordance with PAS 128:2022 (Publicly Available Specification from BSI) by an experienced surveyor/surveyors, qualified to a minimum of QCF Level 3. After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2022. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT
Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the attachments page of the desktop utility report.

DETECTION SURVEY
DRAINAGE
Drainage was lifted with pipe sizes and invert levels recorded from surface level, no allowance has been made for confined space entry unless otherwise stated. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven to QB2 or above. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Unable to locate rising main in field recommend slip trenches to confirm position and depth

WATER
Unable to locate water using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

GAS
Unable to locate poly pipes using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

ELECTRICITY
Cables have been located using EML methods with electronically derived depths recorded cables located comply with records provided. Recommend trial excavations in critical areas to confirm position and depth of cables.

TELECOM
Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly.

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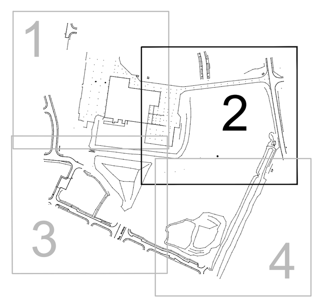
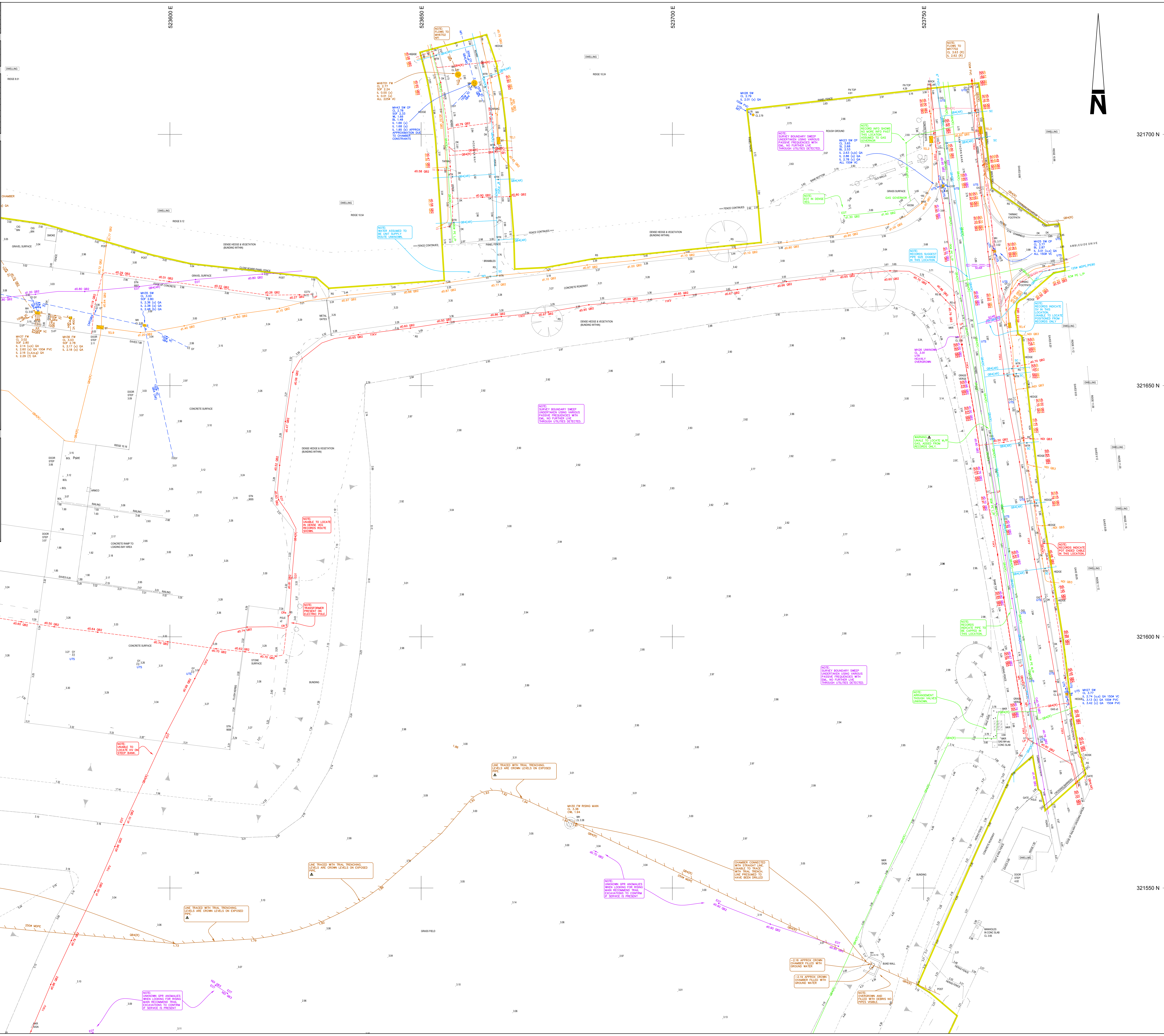
Virgin media shown on records but no covers located on site assumed to be laid with the telecom or for future use, recommend contacting Virgin Media for more info. Trial excavations are recommended to confirm depth and position in critical areas.

UNKNOWNS
Unknown anomalies consistent with buried utilities have been located using EML and GPR techniques with depths obtained to quality level QB2. Recommend trial excavations in critical areas to confirm depth, identity and utility.
Some unknown targets identified on the drawing using GPR are classified as "non-linear targets". These are not consistent with what we expect to see when identifying a buried utility, and appear on the drawing as single targets with depths (i.e. not linking two or more depth readings). This does not mean they are not utilities, we are just unable to positively identify them as a utility. We would strongly recommend that further verification surveys (PAS 128:2022 survey type A) are carried out to identify these targets in critical areas.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Sheet Layout: (Not to Scale)





Notes :

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SL	SILT LEVEL
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WL	WATER LEVEL

LINESTYLE

- INTERNAL METER
- POT ENDED SERVICE
- SEWER CAPPED RUN
- SURVEY ABANDONED
- INTERNAL VALVE
- UNKNOWN UNDERGROUND ANOMALY
- UNDERGROUND CHAMBERS
- VERIFICATION TRIAL HOLE/EXCAVATION
- ABOVE GROUND (AG)
- ASSUMED ROUTE (AR)
- EMPTY DUCTS (E)
- OVERHEAD (OH)
- BACK DROP
- P TRAP
- UTILITY CROSSOVER
- SURVEY BOUNDARY
- VERBAL INFORMATION (VI)
- RECORD INFORMATION (R)
- REDUNDANT SERVICE
- RISING MAIN

CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

- CATV / DATA
- ELECTRICITY (HV)
- ELECTRICITY (LV)
- FUEL
- GAS
- HEATING
- OVERHEAD ELECTRIC
- OVERHEAD TELECOM
- COMBINED SEWER
- FOUL SEWER
- SURFACE SEWER
- TRADE EFFLUENT
- UNIDENTIFIED SEWER
- TELECOM
- UNKNOWN SERVICE
- WATER

SERVICES SURVEY WARNING ⚠

CAUTIONARY NOTES

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PAS 128:2022 Quality Level Guide

Quality Level	Description	Accuracy
QB4 (QL-B4)	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 (QL-B3) QB3P (QL-B3P)	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 (QL-B2) QB2P (QL-B2P)	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
QB1 (QL-B1) QB1P (QB-1P)	Horizontal and vertical location only using two geophysical techniques.	+/- 150mm or +/- 15% of depth whichever is greater
QA (QL-A)	Service verified in an open excavation, inside an inspection chamber / draw pit, or at the point the service enters / exits the ground.	+/- 50mm Horizontal +/- 50mm Vertical

REV	DESCRIPTION	DRN	CHD	DATE
A	RISING MAIN AMENDED FOLLOWING TRIAL TRENCHES	HC	NC	03/10/2025

☐ PRELIMINARY ☐ INFORMATION ☐ TENDER
☐ CONSTRUCTION ☐ AS BUILT

SCALE 1:250 @ A0 DATE SEPTEMBER 2025

DRAWN MK CHK NC

DRAWING NO. 19690-7-852 REV A

TITLE HAWTHORN BANK SPALDING

DETAILS PAS 128:2022 UTILITY SURVEY SHEET 2 of 4

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS DRAWING

Equipment Information

Equipment	Manufacturer	Model	Serial Number	MKS REF	Date of Calibration
EML Tx Transmitter	SPX Radiodetection	RD8200	10/TX-3-870	RD28	02/10/2024
EML Rx Receiver	SPX Radiodetection	RD8200	10/82-GB-627	RD28	02/10/2024
GPR	IDS Georadar	Leica DS2000	SN010-16-000409	GPR14	Day of Survey
GPS	Geomax	Zenith 06	ZN06662200264	GPS32	N/A

Survey Information

Fieldwork dates	12/08	13/08	14/08	15/08	18/08	19/08	20/08	21/08	22/08
Weather conditions	☀	☀	☀	☀	☀	☀	☀	☀	☀
Ground conditions	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
Drainage	Anglian Water	18/07/2025
Water	Anglian Water	18/07/2025
Gas	Cadent	18/07/2025
Electricity	National Grid Electricity Distribution	18/07/2025
Telecom	Openreach	18/07/2025
CATV	Virgin Media	18/07/2025
New Installations	GTC	18/07/2025
Tunnels & Pipelines	LinesearchbeforeUdig	18/07/2025

DETECTION SURVEY REPORT

GENERAL

This survey was carried out in accordance with PAS 128:2022 (Publicly Available Specification from BSI) by an experienced surveyor/surveyors, qualified to a minimum of QCF Level 3. After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2022. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT

Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the attachments page of the desktop utility report.

DETECTION SURVEY

DRAINAGE

Drainage was lifted with pipe sizes and invert levels recorded from surface level, no allowance has been made for confined space entry unless otherwise stated. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven to QB2 or above. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Unable to locate rising main in field recommend slip trenches to confirm position and depth

WATER

Unable to locate water using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

GAS

Unable to locate poly pipes using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

ELECTRICITY

Cables have been located using EML methods with electronically derived depths recorded cables located comply with records provided. Recommend trial excavations in critical areas to confirm position and depth of cables.

TELECOM

Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly.

CATV

Virgin media shown on records but no covers located on site assumed to be laid with the telecom or for future use, recommend contacting Virgin Media for more info. Trial excavations are recommended to confirm depth and position in critical areas.

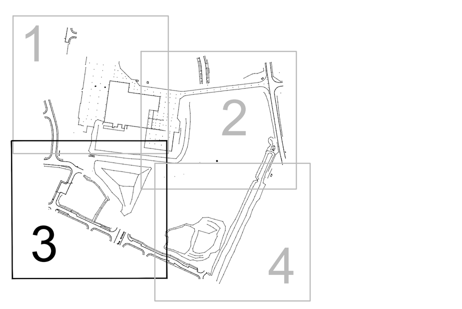
UNKNOWNS

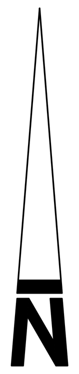
Unknown anomalies consistent with buried utilities have been located using EML and GPR techniques with depths obtained to quality level QB2. Recommend trial excavations in critical areas to confirm depth, identity and utility.

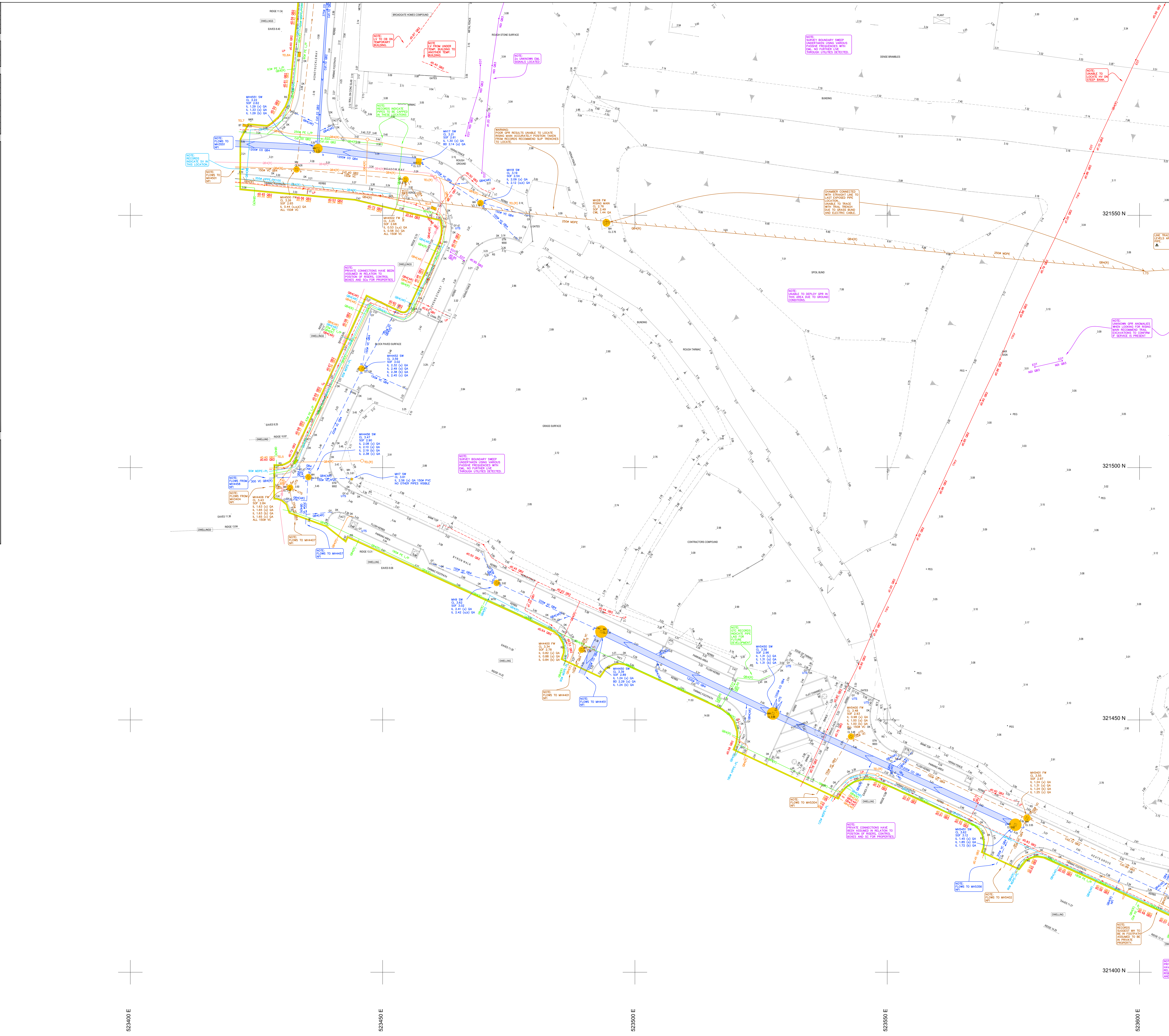
Some unknown targets identified on the drawing using GPR are classified as "non-linear targets". These are not consistent with what we expect to see when identifying a buried utility, and appear on the drawing as single targets with depths (i.e. not linking two or more depth readings). This does not mean they are not utilities, we are just unable to positively identify them as a utility. We would strongly recommend that further verification surveys (PAS 128:2022 survey type A) are carried out to identify these targets in critical areas.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Sheet Layout: (Not to Scale)







Notes :

1. UTILITY AND SERVICE INFORMATION ADDED TO TOPOGRAPHICAL SURVEY PROVIDED BY CLIENT. JOB No. UNKNOWN. DATE UNKNOWN. NO SITE VERIFICATION CARRIED OUT BY WHS, INCLUDING COVER LEVELS. ANY ADDITIONAL FEATURES SURVEYED HAVE BEEN ADDED RELATIVE TO THE PROVIDED TOPOGRAPHICAL SURVEY.
2. THIS SURVEY SHOULD ALWAYS BE READ IN CONJUNCTION WITH THE DESKTOP UTILITY REPORT, THAT WAS CARRIED OUT AS A PREREQUISITE TO THE DETECTION SURVEY.

KEY

GENERAL

Av.	AVERAGE
COW	CABLE ON WALL
CW	COMBINED WATER
DIS	DISUSED
DK	DROP KERB
EML	ELECTROMAGNETIC LOCATOR
EOT	END OF TRACE
FO	FIBRE OPTIC
FP	FOOTPATH
FW	FOUL WATER
GP	GATE POST
GPR	GROUND PENETRATING RADAR
HB	HARD BED
H/P	HIGH PRESSURE
HV	HIGH VOLTAGE
KV	KILO VOLT
I/P	INTERMEDIATE PRESSURE
L/P	LOW PRESSURE
LV	LOW VOLTAGE
M/P	MEDIUM PRESSURE
NDI	NO DEPTH INFORMATION
NFI	NO FURTHER INFORMATION
NDV	NO DUCTS VISIBLE
NPV	NO PIPES VISIBLE
OSBM	ORDNANCE SURVEY BENCHMARK
POW	PIPE ON WALL
P.BOX	POST BOX
RED	REDUNDANT SERVICE
RW	RETAINING WALL
SB	SOFT BED
SNP	STREET NAME PLATE
SW	SURFACE WATER
TAC	TACTILE PAVING
TOW	TOP OF WALL
TW	TRADE EFFLUENT WATER
UTL	UNABLE TO LOCATE
UTR	UNABLE TO RAISE
UTS	UNABLE TO SURVEY

APPARATUS

ACU	AIR CONDITIONING UNIT
AV	AIR VALVE
BB	BELISHA BEACON
BO	BOLLARD
BOL	BOLLARD LIGHT
BS	BUS STOP
CATV	CABLE TELEVISION
CB	CONTROL BOX
CCB	CROSSING CONTROL BUTTON
CP	CATCH PIT
CR	CABLE RISER
DCH	DRAINAGE CHANNEL
EB	ELECTRIC CONTROL BOX
EP	ELECTRIC POLE
ER	EARTH ROD
FD	FILTER DRAIN
FFP	FUEL TANK FILL POINT
FH	FIRE HYDRANT
GR	GAS RISER
GV	GAS VALVE
GY	GULLY
IC	INSPECTION COVER
INT	INTERCEPTOR
IT	INLET
KO	KERB OUTLET
LD	LOOP DETECTOR
LH	LAMP HOLE
LP	LAMP POST
MH	MANHOLE
MK	MARKER POST / PLATE
MT	METER
MW	MONITORING WELL
OL	OUTLET
OU	OUTFALL
PO	POST
PTG	PIPE TO GROUND
PTS	PIPE TO SURFACE
PU	PUMP
RE	RODDING EYE
RS	ROAD SIGN
RM	RISING MAIN
RWP	RAIN WATER PIPE
SC	STOP COCK
SO	SOAKAWAY
SP	SOIL PIPE
ST	STAY CABLE
SV	STOP / SLUICE VALVE
SVP	SOIL VENT PIPE
TCB	TELEPHONE CALL BOX
TEL	TELECOM INSPECTION COVER
TL	TRAFFIC LIGHT
TLC	TRAFFIC LIGHT COVER
TM	TICKET MACHINE
TP	TELECOM POLE
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
WR	WATER RISER
WT	WATER TAP
WW	WET WELL

DEPTHS

d	ELECTRONICALLY DERIVED
Pd	PASSIVELY DERIVED
Bd	BASE DEPTH
Cd	DEPTH TO CROWN
Id	DEPTH TO INVERT
Sd	DEPTH TO SOFFIT
STd	DEPTH TO SILT

PIPE MATERIALS

AC	ASBESTOS CEMENT
ALK	ALKATHENE
BK	BRICK
CI	CAST IRON
CO	CONCRETE
DI	DUCTILE IRON
HDPE	HIGH DENSITY PE
MDPE	MEDIUM DENSITY PE
PE	POLYETHYLENE
PF	PITCH FIBRE
PP	POLYPROPYLENE
PVC	POLYVINYL CHLORIDE
PVC-U	ULTRA RIB (PVC)
SI	SPUN IRON
ST	STEEL
VC	VITRIFIED CLAY

FENCES

B/W	BARBED WIRE FENCE
C/B	CLOSED BOARDED FENCE
CPL	CONCRETE PANEL FENCE
C/I	CORRUGATED IRON FENCE
CNP	CHESTNUT PAILING
C/L	CHAIN LINK FENCE
I/R	IRON RAILINGS
L/L	LARCH LAP FENCE
P/R	POST AND RAIL FENCE
P/W	POST AND WIRE FENCE
W/M	WIRE MESH FENCE

LEVELS

BD	BACKDROP LEVEL
BL	BASE LEVEL
CL	COVER LEVEL
CWL	CROWN LEVEL
DPC	DAMP PROOF COURSE
FL	FLOOR LEVEL
IL	INVERT LEVEL
PT	P TRAP LEVEL
RL	ROOF LEVEL
SL	SILT LEVEL
SOF	SOFFIT LEVEL
THL	THRESHOLD LEVEL
WL	WATER LEVEL

LINESTYLE

INTERNAL METER
POT ENDED SERVICE
SEWER CAPPED RUN
SURVEY ABANDONED
INTERNAL VALVE
UNKNOWN UNDERGROUND ANOMALY
UNDERGROUND CHAMBERS
VERIFICATION TRIAL HOLE/EXCAVATION
ABOVE GROUND (AG)
ASSUMED ROUTE (AR)
EMPTY DUCTS (E)
OVERHEAD (OH)
BACK DROP
P TRAP
UTILITY CROSSOVER
SURVEY BOUNDARY
VERBAL INFORMATION (VI)
RECORD INFORMATION (R)
REDUNDANT SERVICE
RISING MAIN

CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

CATV / DATA
ELECTRICITY (HV)
ELECTRICITY (LV)
FUEL
GAS
HEATING
OVERHEAD ELECTRIC
OVERHEAD TELECOM
COMBINED SEWER
FOUL SEWER
SURFACE SEWER
TRADE EFFLUENT
UNIDENTIFIED SEWER
TELECOM
UNKNOWN SERVICE
WATER

SERVICES SURVEY WARNING ⚠

CAUTIONARY NOTES

1. EML techniques have been used in the detection of underground utilities as outlined in Table 2 of PAS 128:2022, the results are not infallible and trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
2. GPR techniques has been used in the detection of non-metallic utilities as outlined in Table 2 of PAS 128:2022. The interpretation of these results is not infallible and success will depend on a number of factors including soil type, ground water levels and surface conditions, hence trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
3. Depths derived via EML are taken to the centre of the conductor (cable, metallic pipe) and those derived via GPR are usually to the crown of the utility unless otherwise indicated.
4. Where cables cannot be detected individually an average depth has been obtained and trial excavations are recommended to confirm number and depths of cables banded together.
5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
6. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
7. Within close proximity of electric substations and similar structures results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
8. Underneath overhead power lines results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
9. Drainage information has been obtained without man entry into the chamber.
10. Wherever possible we have attempted to locate the route of the sewer. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases recommendations have been made for further survey or maintenance work.
11. Pipe / duct sizes have been recorded from surface inspection or taken from record information. Pipe sizes have been recorded in millimetres and depths in metres, except in instances where sizes are indicated in imperial units on the record information.
12. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
13. All utilities detected should be considered live unless confirmed otherwise by client or service provider.
14. We cannot confirm when utilities are redundant unless there is visual or record evidence to indicate this. In addition we cannot guarantee being able to detect all redundant utilities.
15. Wherever available the results of our investigations have been cross referenced with record information. If a utility shown on the records cannot be detected on site, the information has been added to the drawing and indicated as QB4 (R). However it should be noted that the completeness and accuracy of the records cannot be guaranteed.
16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
17. The responsibility for avoiding damage to assets and utilities on site shall be that of the persons proposing to excavate within the surveyed area, who shall be liable to the asset owner and any third party who may be affected in any way for any loss or damage.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING.

PAS 128:2022 Quality Level Guide

Quality Level	Description	Accuracy
QB4 (QL-B4)	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 (QL-B3) QB3P (QL-B3P)	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 (QL-B2) QB2P (QL-B2P)	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
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REV	DESCRIPTION	DRN	CHD	DATE
A	RISING MAIN AMENDED FOLLOWING TRIAL TRENCHES	HC	NC	03/10/2025

☐ PRELIMINARY ☐ INFORMATION ☐ TENDER
☐ CONSTRUCTION ☐ AS BUILT

SCALE	1:250 @ A0	DATE	SEPTEMBER 2025
DRAWN	MK	CHK	NC
DRAWING NO.	19690-7-853	REV	A

TITLE: HAWTHORN BANK SPALDING

DETAILS: PAS 128:2022 UTILITY SURVEY SHEET 3 of 4

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Equipment Information

Equipment	Manufacturer	Model	Serial Number	MKS REF	Date of Calibration
EML Tx Transmitter	SPX Radiodetection	RD8200	10/TX-3-870	RD28	02/10/2024
EML Rx Receiver	SPX Radiodetection	RD8200	10/82-GB-627	RD28	02/10/2024
GPR	IDS Georadar	Leica DS2000	SN010-16-000409	GPR14	Day of Survey
GPS	Geomax	Zenith 06	ZN06662200264	GPS32	N/A

Survey Information

Fieldwork dates	12/08	13/08	14/08	15/08	18/08	19/08	20/08	21/08	22/08	
Weather conditions	☀	☀	☀	☀	☀	☀	☀	☀	☀	
Ground conditions	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
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CATV	Virgin Media	18/07/2025
New Installations	GTC	18/07/2025
Tunnels & Pipelines	LinesearchbeforeUdig	18/07/2025

DETECTION SURVEY REPORT

GENERAL
This survey was carried out in accordance with PAS 128:2022 (Publicly Available Specification from BSI) by an experienced surveyor/surveyors, qualified to a minimum of QCF Level 3. After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2022. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT
Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the attachments page of the desktop utility report.

DETECTION SURVEY
DRAINAGE
Drainage was lifted with pipe sizes and invert levels recorded from surface level, no allowance has been made for confined space entry unless otherwise stated. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven to QB2 or above. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Unable to locate rising main in field recommend slip trenches to confirm position and depth

WATER
Unable to locate water using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

GAS
Unable to locate poly pipes using GPR methods and has been positioned from records only recommend trial excavations in critical areas to confirm position and depth of pipes. Street furniture suggests route shown on records is correct.

ELECTRICITY
Cables have been located using EML methods with electronically derived depths recorded cables located comply with records provided. Recommend trial excavations in critical areas to confirm position and depth of cables.

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Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly.

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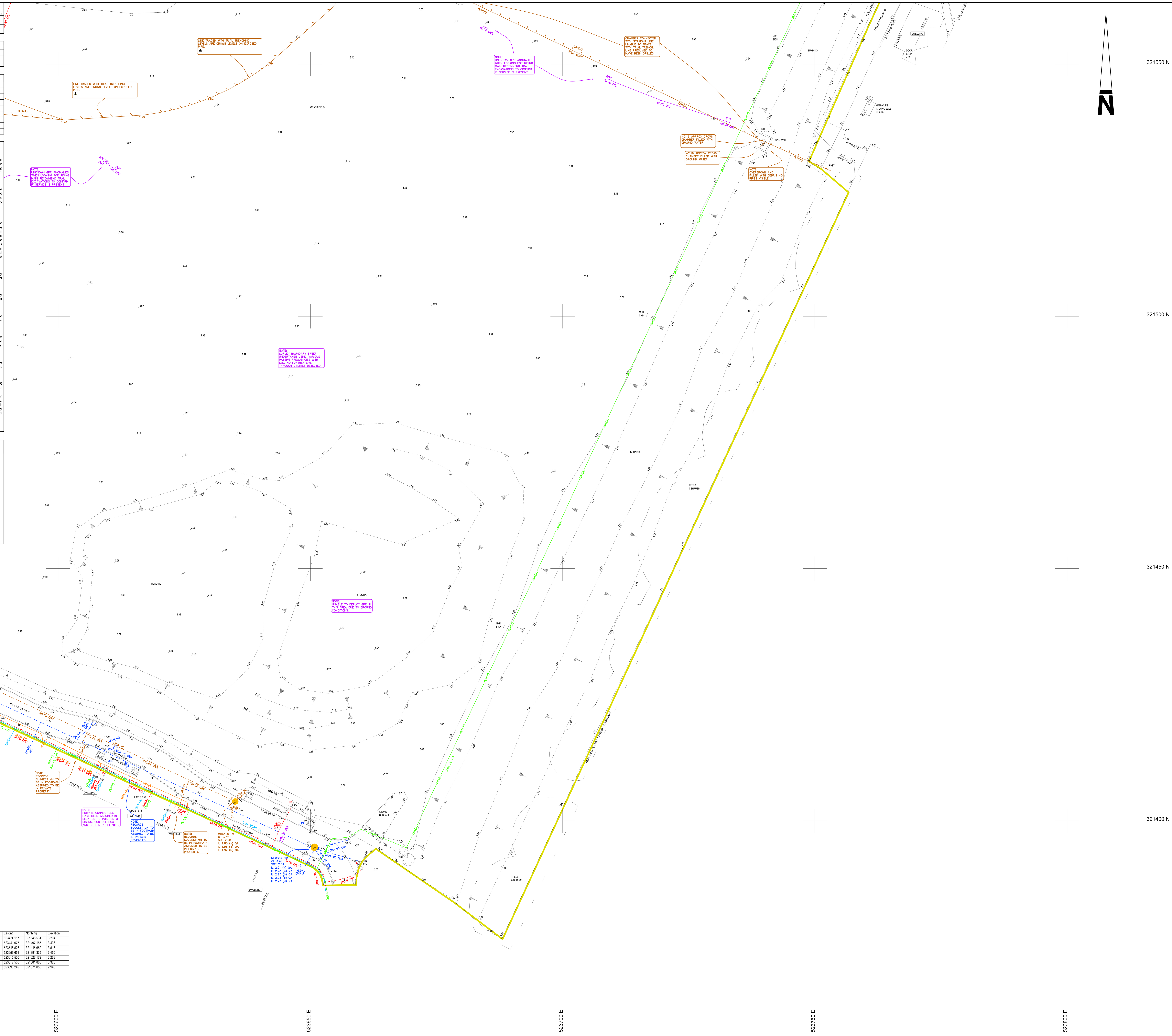
Virgin media shown on records but no covers located on site assumed to be laid with the telecom or for future use, recommend contacting Virgin Media for more info. Trial excavations are recommended to confirm depth and position in critical areas.

UNKNOWNS
Unknown anomalies consistent with buried utilities have been located using EML and GPR techniques with depths obtained to quality level QB2. Recommend trial excavations in critical areas to confirm depth, identity and utility.
Some unknown targets identified on the drawing using GPR are classified as "non-linear targets". These are not consistent with what we expect to see when identifying a buried utility, and appear on the drawing as single targets with depths (i.e. not linking two or more depth readings). This does not mean they are not utilities, we are just unable to positively identify them as a utility. We would strongly recommend that further verification surveys (PAS 128:2022 survey type A) are carried out to identify these targets in critical areas.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Sheet Layout: (Not to Scale)

1 2 3 4



Point	Easting	Northing	Elevation
9000	523474.117	321545.531	3.204
9002	523441.077	321497.157	3.436
9003	523548.526	321445.652	3.518
9004	523659.653	321391.335	3.450
9005	523615.500	321627.179	3.268
9006	523612.500	321581.883	3.325
9007	523593.249	321671.050	2.945

Notes :

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C/I CORRUGATED IRON FENCE
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C/L CHAIN LINK FENCE
I/R IRON RAILINGS
L/L LARCH LAP FENCE
P/R POST AND RAIL FENCE
P/W POST AND WIRE FENCE
W/M WIRE MESH FENCE

LEVELS

BD BACKDROP LEVEL
BL BASE LEVEL
CL COVER LEVEL
CWL CROWN LEVEL
DPC DAMP PROOF COURSE
FL FLOOR LEVEL
IL INVERT LEVEL
PT P TRAP LEVEL
RL ROOF LEVEL
SL SILT LEVEL
SOF SOFFIT LEVEL
THL THRESHOLD LEVEL
WL WATER LEVEL

LINESTYLE

INTERNAL METER (MT)
POT ENDED SERVICE
SEWER CAPPED RUN
SURVEY ABANDONED
INTERNAL VALVE
UNKNOWN UNDERGROUND ANOMALY
UNDERGROUND CHAMBERS
VERIFICATION TRIAL HOLE/EXCAVATION
ABOVE GROUND (AG)
ASSUMED ROUTE (AR)
EMPTY DUCTS (E)
OVERHEAD (OH)
BACK DROP
P TRAP
UTILITY CROSSOVER
SURVEY BOUNDARY
VERBAL INFORMATION (VI)
RECORD INFORMATION (R)
REDUNDANT SERVICE
RISING MAIN
CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

CATV / DATA
ELECTRICITY (HV)
ELECTRICITY (LV)
FUEL
GAS
HEATING
OVERHEAD ELECTRIC
OVERHEAD TELECOM
COMBINED SEWER
FOUL SEWER
SURFACE SEWER
TRADE EFFLUENT
UNIDENTIFIED SEWER
TELECOM
UNKNOWN SERVICE
WATER
SERVICES SURVEY WARNING ⚠

CAUTIONARY NOTES

1. EML techniques have been used in the detection of underground utilities as outlined in Table 2 of PAS 128:2022, the results are not infallible and trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
2. GPR techniques has been used in the detection of non-metallic utilities as outlined in Table 2 of PAS 128:2022. The interpretation of these results is not infallible and success will depend on a number of factors including soil type, ground water levels and surface conditions, hence trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
3. Depths derived via EML are taken to the centre of the conductor (cable, metallic pipe) and those derived via GPR are usually to the crown of the utility unless otherwise indicated.
4. Where cables cannot be detected individually an average depth has been obtained and trial excavations are recommended to confirm number and depths of cables banded together.
5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
6. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
7. Within close proximity of electric substations and similar structures results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
8. Underneath overhead power lines results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
9. Drainage information has been obtained without man entry into the chamber.
10. Wherever possible we have attempted to locate the route of the sewer. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases recommendations have been made for further survey or maintenance work.
11. Pipe / duct sizes have been recorded from surface inspection or taken from record information. Pipe sizes have been recorded in millimetres and depths in metres, except in instances where sizes are indicated in imperial units on the record information.
12. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
13. All utilities detected should be considered live unless confirmed otherwise by client or service provider.
14. We cannot confirm when utilities are redundant unless there is visual or record evidence to indicate this. In addition we cannot guarantee being able to detect all redundant utilities.
15. Wherever available the results of our investigations have been cross referenced with record information. If a utility shown on the records cannot be detected on site, the information has been added to the drawing and indicated as QB4 (R). However it should be noted that the completeness and accuracy of the records cannot be guaranteed.
16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
17. The responsibility for avoiding damage to assets and utilities on site shall be that of the persons proposing to excavate within the surveyed area, who shall be liable to the asset owner and any third party who may be affected in any way for any loss or damage.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING.

PAS 128:2022 Quality Level Guide

Quality Level	Description	Accuracy
QB4 (QL-B4)	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 (QL-B3) QB3P (QL-B3P)	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 (QL-B2) QB2P (QL-B2P)	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
QB1 (QL-B1) QB1P (QB-1P)	Horizontal and vertical location only using two geophysical techniques.	+/- 150mm or +/- 15% of depth whichever is greater
QA (QL-A)	Service verified in an open excavation, inside an inspection chamber / draw pit, or at the point the service enters / exits the ground.	+/- 50mm Horizontal +/- 50mm Vertical

REV	DESCRIPTION	DRN	CHD	DATE
A	RISING MAIN AMENDED FOLLOWING TRIAL TRENCHES	HC	NC	03/10/2025

☐ PRELIMINARY ☐ INFORMATION ☐ TENDER
☐ CONSTRUCTION ☐ AS BUILT

SCALE 1:250 @ A0 DATE SEPTEMBER 2025
DRAWN MK CHK NC
DRAWING NO. 19690-7-854 REV A
TITLE HAWTHORN BANK SPALDING
DETAILS PAS 128:2022 UTILITY SURVEY SHEET 4 of 4

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS DRAWING

Appendix C

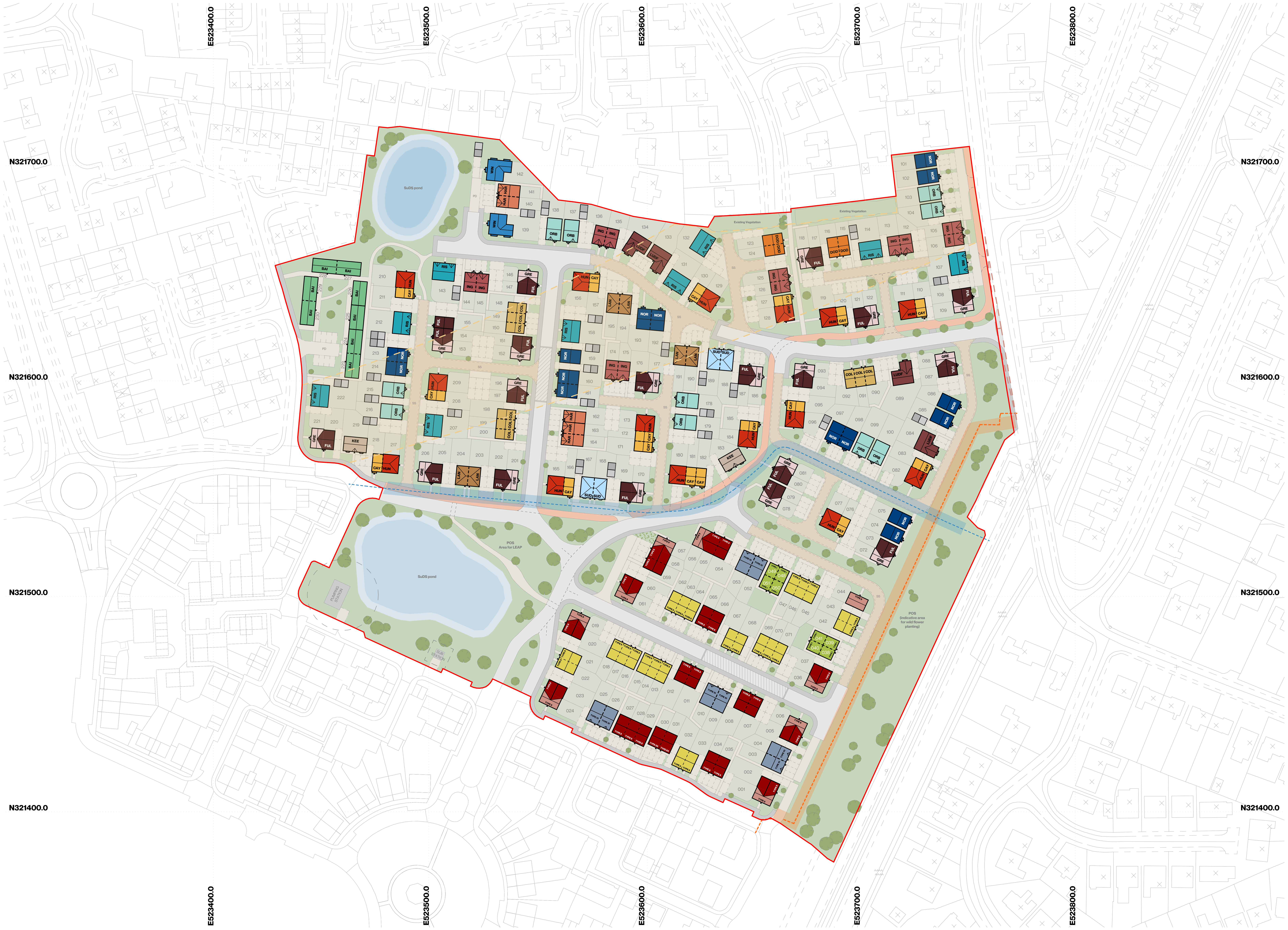
Illustrative Masterplan

Woods Hardwick

Architecture | Engineering | Planning | Surveying

REVISIONS

Revision	Date	Change	Initials	Chk'd By
P04	28/11/2025	Amendments following clients comments	SD	LBF
P05	17/12/2025	Amends following client comments recieved 02/12	BF	SD
P06	05/02/2026	Amendments following revised mix	SD	LBF
P07	13/02/2026	Plot by plot schedule included, amends ollowing DTM 260213	SD	SD
P08	18/02/2026	Amendments to basins, turning heads, cyclepath & additional footpaths to HA parcel.	SD	SD
P09	19/02/2026	Amendments to turning heads and model coordinate location.	SD	SD
P10	23/02/2026	Coordinate location amended.	SD	SD
P11	27/02/2026	Amendments following clients comments	BF	SD
P12	13/03/2026	Amendments following client comments	BF	SD
C01	27/03/2026	Planning Issue	SD	SD



1:1000 0 10m 50m 100m

Plot Schedule

Plot No.	House Type	Plot No.	House Type	Plot No.	House Type
001	Type 9	101	The Normanton	201	The Greetham
002	Type 8	102	The Normanton	202	The Fulbeck
003	Type 10	103	The Orby	203	The Langworth
004	Type 10	104	The Orby	204	The Langworth
005	Type 8	105	The Ingleby	205	The Fulbeck
006	Type 9	106	The Ingleby	206	The Greetham
007	Type 8	107	The Riseholme	207	The Riseholme
008	Type 8	108	The Fulbeck	208	The Caythorpe
009	Type 10	109	The Greetham	209	The Hundleby
010	Type 10	110	The Caythorpe	210	The Hundleby
011	Type 8	111	The Hundleby	211	The Caythorpe
012	Type 8	112	The Ingleby	212	The Riseholme
013	Type 6	113	The Ingleby	213	The Normanton
014	Type 6	114	The Riseholme	214	The Normanton
015	Type 6	115	The Doddington	215	The Orby
016	Type 6	116	The Doddington	216	The Orby
017	Type 6	117	The Fulbeck	217	The Hundleby
018	Type 6	118	The Greetham	218	The Caythorpe
019	Type 9	119	The Hundleby	219	The Keelby
020	Type 8	120	The Caythorpe	220	The Fulbeck
021	Type 6	121	The Fulbeck	221	The Greetham
022	Type 6	122	The Greetham	222	The Riseholme
023	Type 8	123	The Doddington	223	The Bain
024	Type 9	124	The Doddington	224	The Bain
025	Type 10	125	The Ingleby	225	The Bain
026	Type 10	126	The Ingleby	226	The Bain
027	Type 8	127	The Caythorpe	227	The Bain
028	Type 8	128	The Hundleby	228	The Bain
029	Type 8	129	The Hundleby	229	The Bain
030	Type 8	130	The Caythorpe	230	The Bain
031	Type 8	131	The Riseholme		
032	Type 6	132	The Riseholme		
033	Type 6	133	The Ludford		
034	Type 8	134	The Ludford		
035	Type 8	135	The Ingleby		
036	Type 9	136	The Ingleby		
037	Type 8	137	The Orby		
038	Type 1	138	The Orby		
039	Type 1	139	The Winteringh...		
040	Type 1	140	The Harrington		
041	Type 1	141	The Harrington		
042	Type 6	142	The Winteringh...		
043	Type 6	143	The Riseholme		
044	Type 9	144	The Ingleby		
045	Type 6	145	The Ingleby		
046	Type 6	146	The Greetham		
047	Type 6	147	The Fulbeck		
048	Type 1	148	The Colsterworth		
049	Type 1	149	The Colsterworth		
050	Type 1	150	The Colsterworth		
051	Type 1	151	The Fulbeck		
052	Type 10	152	The Greetham		
053	Type 10	153	The Greetham		
054	Type 8	154	The Fulbeck		
055	Type 8	155	The Fulbeck		
056	Type 9	156	The Hundleby		
057	Type 9	157	The Caythorpe		
058	Type 8	158	The Riseholme		
059	Type 8	159	The Normanton		
060	Type 8	160	The Normanton		
061	Type 9	161	The Normanton		
062	Type 6	162	The Harrington		
063	Type 6	163	The Harrington		
064	Type 6	164	The Harrington		
065	Type 8	165	The Hundleby		
066	Type 8	166	The Caythorpe		
067	Type 6	167	The Sudbrooke		
068	Type 6	168	The Sudbrooke		
069	Type 6	169	The Fulbeck		
070	Type 6	170	The Greetham		
071	Type 6	171	The Caythorpe		
072	The Greetham	172	The Caythorpe		
073	The Fulbeck	173	The Hundleby		
074	The Normanton	174	The Ingleby		
075	The Normanton	175	The Ingleby		
076	The Caythorpe	176	The Fulbeck		
077	The Hundleby	177	The Greetham		
078	The Greetham	178	The Orby		
079	The Fulbeck	179	The Orby		
080	The Fulbeck	180	The Hundleby		
081	The Greetham	181	The Caythorpe		
082	The Hundleby	182	The Caythorpe		
083	The Caythorpe	183	The Keelby		
084	The Ludford	184	The Hundleby		
085	The Normanton	185	The Caythorpe		
086	The Normanton	186	The Greetham		
087	The Fulbeck	187	The Fulbeck		
088	The Greetham	188	The Sudbrooke		
089	The Ludford	189	The Sudbrooke		
090	The Colsterworth	190	The Langworth		
091	The Colsterworth	191	The Langworth		
092	The Colsterworth	192	The Normanton		
093	The Greetham	193	The Normanton		
094	The Fulbeck	194	The Langworth		
095	The Caythorpe	195	The Langworth		
096	The Hundleby	196	The Greetham		
097	The Normanton	197	The Fulbeck		
098	The Normanton	198	The Colsterworth		
099	The Orby	199	The Colsterworth		
100	The Orby	200	The Colsterworth		

Affordable Housetype Mix

Housetype	Beds	Persons	Storeys	No.	Housetype footprint (sqft)
The Bain	1B	2	1	8	650.0
				8	*5200.0*
Type 8	3B	5	2	2	866.6
				2	*1733.2*
				10	**6933.2**

Housetype Mix

Housetype	Beds	Persons	Storeys	No.	Housetype footprint (sqft)
Type 1	1B	2	2	8	530.2
				8	*4241.6*
The Caythorpe	2B	4	2	17	629.7
				17	*10704.9*
The Colsterworth	2B	4	2	9	649.3
				9	*5843.7*
The Doddington	2B	4	2	4	738.0
				4	*2952.0*
Type 6	2B	4	2	23	770.9
				23	*17730.7*
The Harrington	3B	4	2	5	909.5
				5	*4547.5*
The Keelby	3B	4	2	2	1202.5
				2	*2405.0*
The Fulbeck	3B	5	2	19	773.0
				19	*14687.0*
The Greetham	3B	5	2	18	853.1
				18	*15355.8*
Type 8	3B	5	2	21	866.6
				21	*18198.6*
Type 9	3B	5	2	9	912.7
				9	*8214.3*
The Ingleby	3B	5	2.5	12	1086.9
				12	*13042.8*
The Hundleby	3B	5	2	15	1110.1
				15	*16651.5*
The Langworth	3B	5	3	6	1230.5
				6	*7383.0*
The Ludford	3B	5	2	4	1429.7
				4	*5718.8*
Type 10	4B	6	2	8	984.1
				8	*7872.8*
The Normanton	4B	6	2	15	1050.9
				15	*15763.5*
The Orby	4B	6	2	10	1217.8
				10	*12178.0*
The Riseholme	4B	6	2	9	1387.3
				9	*12485.7*
The Sudbrooke	4B	6	3	4	1431.9
				4	*5727.6*
The Winteringham	4B	6	2	2	1583.0
				2	*3166.0*
				220	**204870.8**
				230	**211804.0**

Landscaping shown based on Landscape Architerct's proposal, please refer to LA's proposals for further details.

1201 KEY

- Site Boundary
- Existing Rising Main Sewer
- Existing Rising Main Sewer Easement
- Existing Bund
- Existing Gas Pipe
- Existing Gas Pipe Easement
- Hawthorn Bank Visibility Splays
- Approximate coverage area of former railway line through site.

Legal Information

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BROADGATE HOMES EST. '76 HOMES WITH HEART

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Client:

Broadgate Homes

Broadgate House, 519 Broadgate, Weston Hills, Spalding, Lincolnshire. PE12 6DB

Project Title:

Hawthorn Bank / Meadow Way

Drawing Name:

Proposed Masterplan

Drawing Stage:	Preliminary
STATUS:	S3 Suitable for Review and Comment
243 File Ref:	25029-243-XX-XX-M3-A-1200_Proposed_Masterplan.pln

243 Project No:	Drawn:	Chk'd By:	Scale:	Rev:
25029	SD	LBF	1:1000 @ A1	C01

DRAWING TITLE

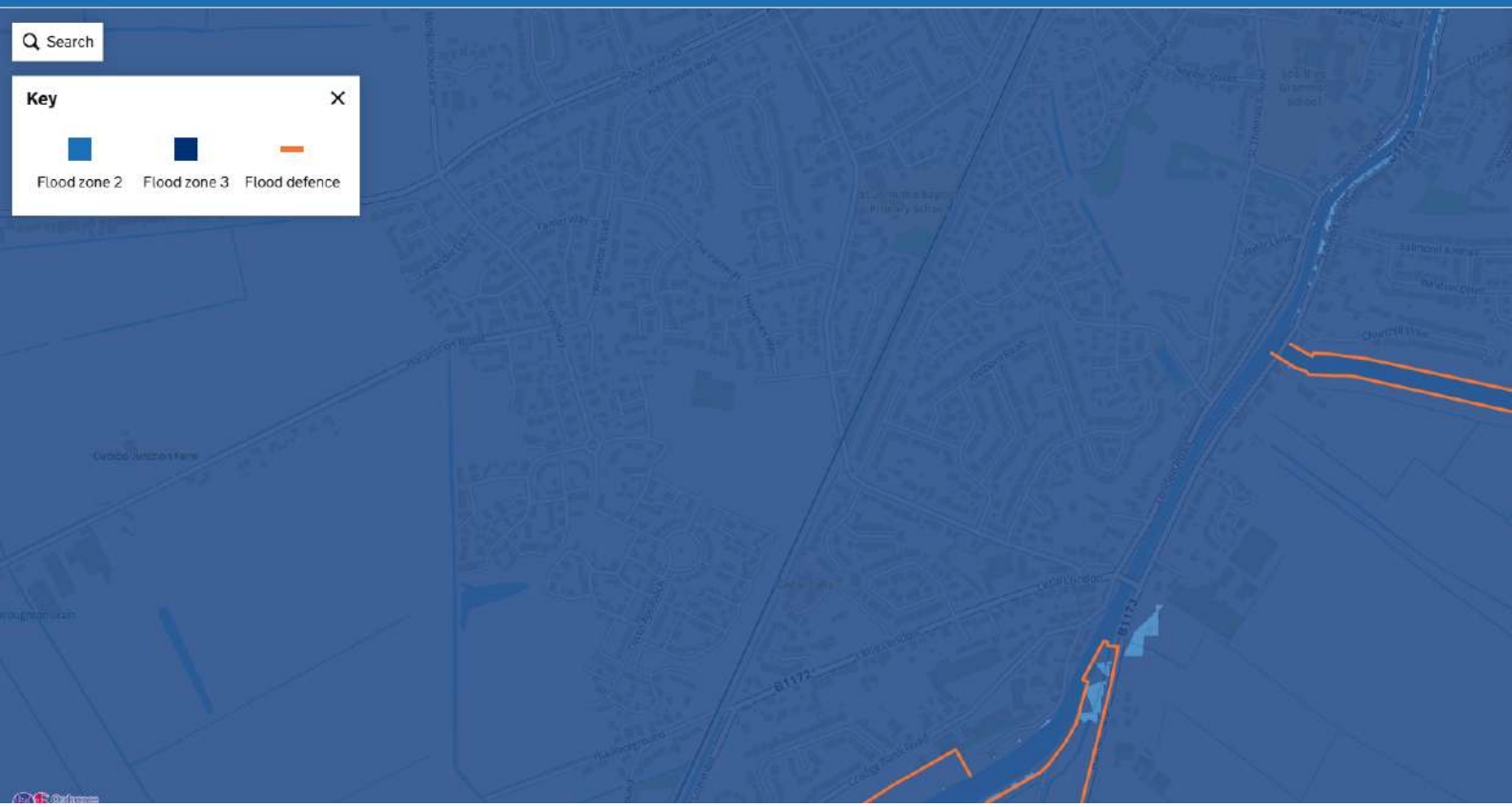
25029-243-XX-XX-DR-A-1201

PROJECT CODE ORIGINATOR FUNCTIONAL SPATIAL FORM DISCIPLINE DOC. NUMBER

Appendix D

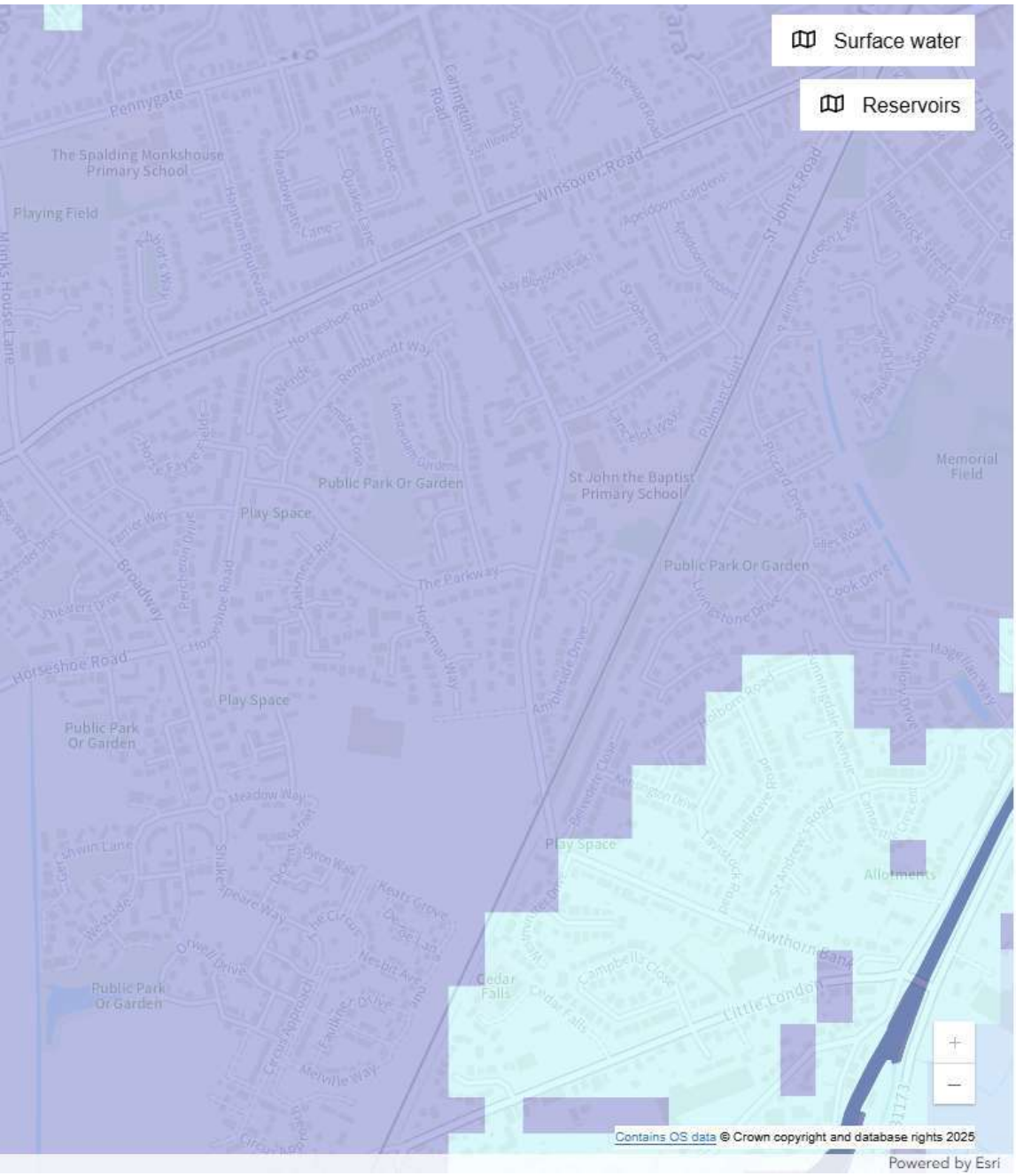
Environment Agency - Flood Map for Planning

Flood map for planning



Appendix E

Environment Agency – Rivers and Sea Flood Map



Rivers and sea map

Yearly chance of flooding

- (●) Extent
  - High chance
    More than 3.3% chance each year
  - Medium chance
    Between 1% and 3.3% chance each year
  - Low chance
    Between 0.1% and 1% chance each year
  - Very low chance
    Less than 0.1% chance each year
- ( ) Depth

Yearly chance of flooding between 2036 and 2069

- ( ) Extent
- ( ) Depth

Map details

- [x] Show flooding

Appendix F

South East Lincolnshire Strategic Flood Risk Assessment – Hazard Mapping

Woods Hardwick

Architecture | Engineering | Planning | Surveying

N

NOTES

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.

2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.

3. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas

4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.

5. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

6. Land outside South Holland District is not considered.

7. This map shows the extents only of the flooding probability bands relevant to the map Title

Map Legend

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)
- Functional Floodplain
- South Holland District Boundary

REV	DATE	REMARKS
2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

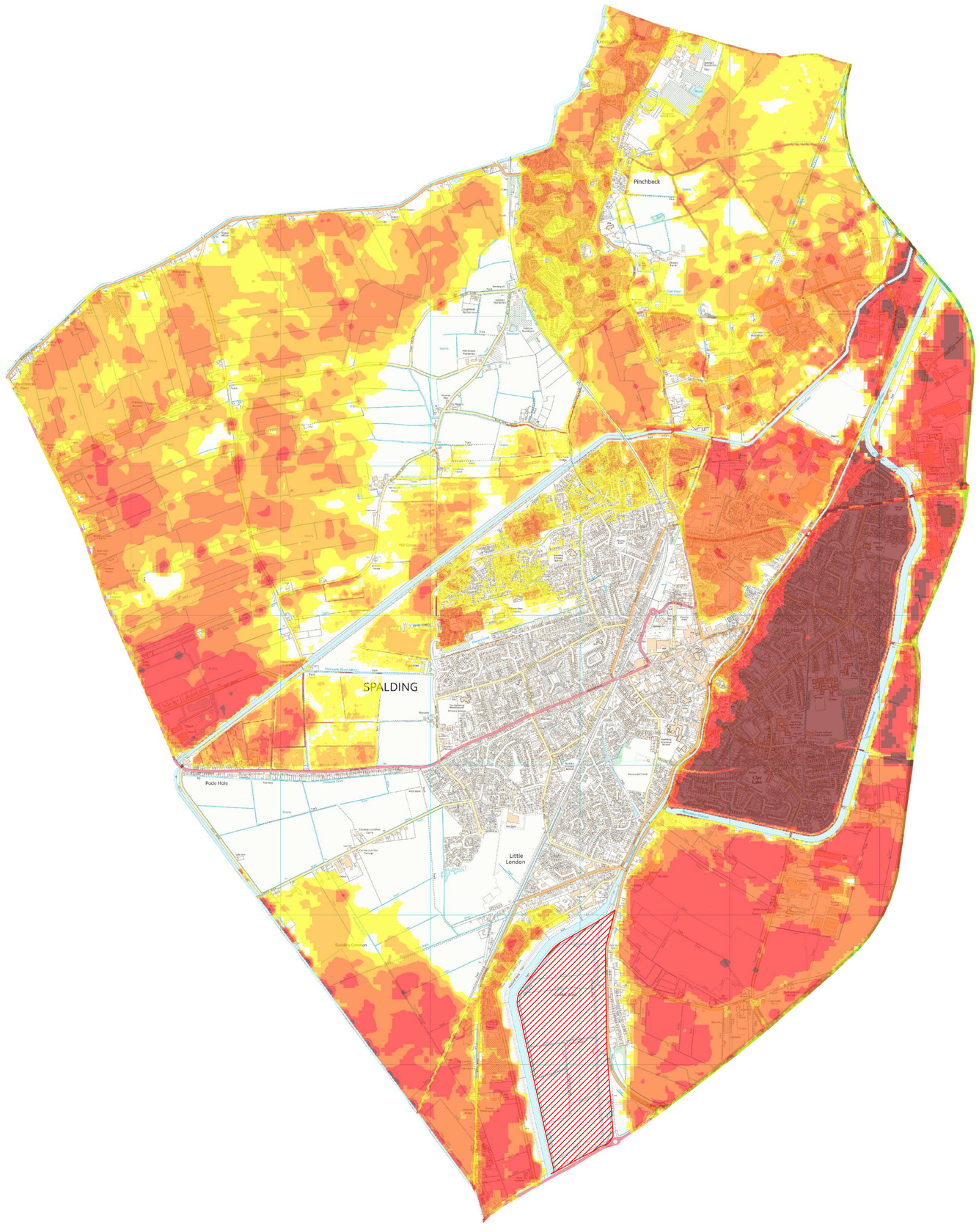
Residual Flood Hazard
Spalding - Year 2115
0.1% Event Probability

DATE OF ISSUE: Feb 2017 **REV NO:** 2

SCALE: 1 : 16,000 @ A1

MAP NO:

N



NOTES

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.

2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.

3. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas

4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.

5. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

6. Land outside South Holland District is not considered.

7. This map shows the extents only of the flooding probability bands relevant to the map Title

Map Legend

Peak Depth

- 0m - 0.25m
- 0.25m - 0.5m
- 0.5m - 1m
- 1m - 2m
- 2m +
- Functional Floodplain
- South Holland District Boundary

REV	DATE	REMARKS
2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Residual Peak Depth
Spalding - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: Feb 2017 **REV NO:** 2

SCALE: 1 : 15,000 @ A1

MAP NO:

Appendix G

Environment Agency - Surface Water Flood Maps

Surface water map

Yearly chance of flooding

- ○ Extent
- ○ Depth

Yearly chance of flooding between 2040 and 2060

- ◉ Extent
  - High chance
    More than 3.3% chance each year
  - Medium chance
    Between 1% and 3.3% chance each year
  - Low chance
    Between 0.1% and 1% chance each year
- ○ Depth

Map details

- ☑ Show flooding

Appendix H

Humberside Phase 1 Desk Study Report and Phase 2 Ground Investigation Assessment Report

Woods Hardwick

Architecture | Engineering | Planning | Surveying

Phase 1 (Desk Study) Report

St John's View, Meadow Way, Spalding, Lincolnshire

Produced for Broadgate Homes

October 2025

5 Geology, Hydrogeology and Hydrology

5.1 Published geology maps

5.1.1 Made ground

No made ground is indicated at the site by local geology maps (for example, as shown below, in Figure 3, and later, in Appendix C). Nevertheless, some made ground is likely to be present, for example, within the existing hard surfacing. Any made ground below the site could be of limited thickness (possibly less than 1m).

5.1.2 Drift deposits

As detailed below (in Figure 3) and later (in Appendix C), the local geology map indicates the superficial (i.e. drift) soil material below the site consists of:

- **TIDAL FLAT DEPOSITS (TFD) – SILT AND CLAY**

Locally the TFD could comprise silty clay and sandy silt which could be slightly organic. Local BGS records suggest that drift deposits (including deeper Fenland Formation deposits and glacial till) could reach a total depth of about 10m to 20m. The deeper drift deposits could be highly competent (in terms of strength and stiffness).

5.1.3 Solid geology

BGS mapping, such as shown below (in Figure 3), indicates the site bedrock is:

- **OXFORD CLAY FORMATION (OXC) – MUDSTONE**

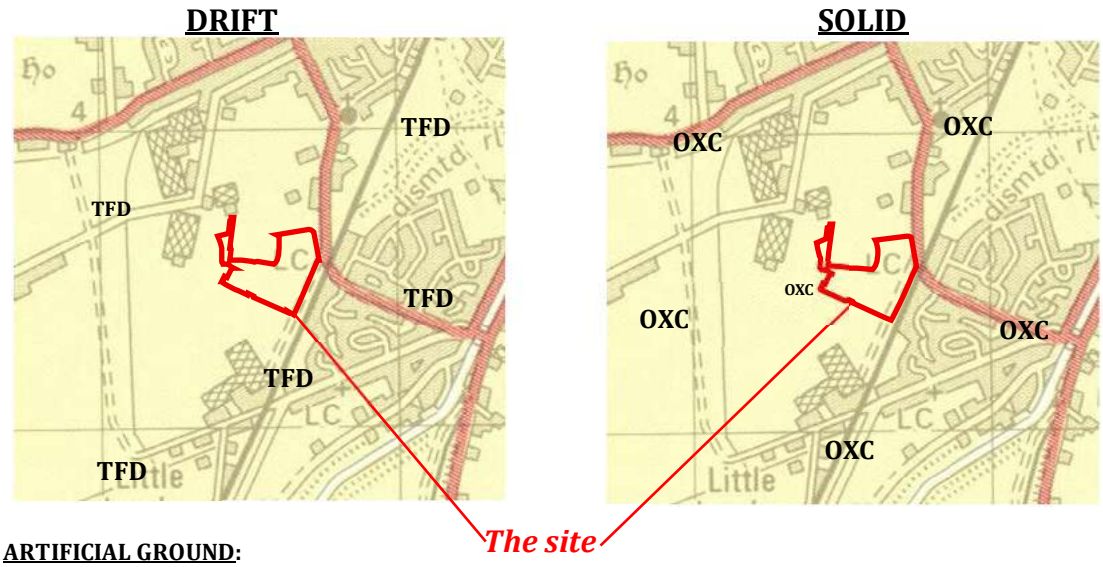
The siltstone and mudstone could be initially mainly encountered as silts and clays grading into stiffer cohesive soils and then mudstone/siltstone. Some thin bands of sands and limestone are possible.

There are no noted faults in the underlying solid bedrock geology.

5.1.4 Anticipated geology

Based on the inspected geological, historical and topographical information, the provisionally anticipated ground conditions are as shown below (in Table 4).

Figure 3: Extracts from the local BGS geology maps



ARTIFICIAL GROUND:

- **None indicated**

DRIFT:

- **TIDAL FLAT DEPOSITS (TFD) – CLAY & SILT**
- Sandy silt, sand or clay of the local Terrington Beds (TTB)

Underlain by:

FENLAND FORMATION (FEND) DEPOSITS – SAND & GRAVEL

Possible marine deposits of medium dense shelly coarse silts, fine sands and basal gravel

- Possible to a depth of 10m to 15m based on nearby BGS records of old boreholes (see Appendix E)
- **GLACIAL TILL – DIAMICTON**
- Locally, the diamicton (traditionally referred to as boulder clay or marl clay) is often revealed as a stiff clay with occasional chalky or flinty gravel. Occasional (water-bearing) bands or lenses of sand and gravel are usually present.
- Common locally below the Fenland Formation (FEND), potentially up to about 7m in thickness

SOLID:

- **OXFORD CLAY FORMATION (OXC) – MUDSTONE**
- Silicate-mudstone, grey, generally smooth to slightly silty, with sporadic beds of argillaceous limestone nodules
- About 30m to 50m in thickness

BGS 1:50000 Series, Spalding, Sheet 144 (1992), Solid & Drift . © NERC

Table 4: Anticipated ground conditions inferred from geology records

Strata	*Description*	*Thickness (m)*	*Depth to base (m BEGL)*
Made ground (MGR)	Possible below hard surfacing, around former features and buried pipes	<2	<2
Tidal Flat Deposits (TFD)	Loose sandy silt, sand and/or clay	1 – 3	3
Fenland Formation (FEND)	Medium dense (shelly) marine sands and gravel	7 – 12	10 – 15
Glacial Till	Boulder clay with occasional sands and gravels	0 – 5	10 – 20
Oxford Clay Formation (OXC)	Grey silty mudstone with limestone nodules	30 – 50	40 – 70
All anticipated ground conditions are subject to confirmation with site works			

5.2 Mining and quarrying

5.2.1 BGS recorded mineral sites

The nearest reported BGS recorded mineral sites are:

- Little London Brick Field (988m south) – opencast Common Clay and Shale extraction; Status: Ceased

5.2.2 Mining

The site is not in an area which might not be affected by coal mining.

Also, non-coal mining is not expected to affect the site. No historical recorded mine workings have been identified.

5.3 BGS geological hazards

The British Geological Survey (BGS) rates the geological hazards at the site as *No Hazard* to *Moderate,* as shown below (in Table 5). These are based on presumed ground conditions only and are subject to further assessment based on the findings of site works.

Table 5: BGS-rated geological hazards

Hazard	*Hazard potential*
Collapsible ground stability	No hazard
Compressible ground stability	Moderate
Ground dissolution stability	No hazard
Landslide ground stability	Very low
Running sand ground stability	Moderate
Shrinking & swelling clay	Low

5.4 Hydrogeology (i.e. groundwater)

5.4.1 Groundwater table

The location of the groundwater table is unknown without confirmation by site works. However, the natural groundwater table is likely to be shallow given the site's low elevation (about 3m AOD).

There could be very shallow perched groundwater within the shallow granular soils (sands, gravels) underlain by clayey soil.

Groundwater levels could also be significantly affected by recent weather and seasonal conditions. Temporarily very high water levels might be present after heavy rains.

5.4.2 Permeability, aquifers and groundwater vulnerability

The combined groundwater vulnerability at the site is classed as Unproductive. This reflects the following hydrogeological data:

- The anticipated Mudstone bedrock is classed as Unproductive Strata
- The anticipated shallow TFD drift deposits are classed as Unproductive Strata
- There are no nearby recorded groundwater abstractions (none within 1km)
- The site is not within or near to a groundwater Source Protection Zone (SPZ)

5.5 Hydrology (i.e. surface water)

5.5.1 Nearby water courses

The nearest identified surface water features are as follows:

- Drain/ditch (25m southeast) – Hill's Drain, far side of adjacent railway line
- River Welland (0.6km east)
- The nearest recorded surface water abstractions (836m east, 1297m and 1362m north) are for General Farming And Domestic

5.5.2 Flooding

A flood risk assessment is beyond the scope of this report. Nevertheless, the following factual information is noted.

- The entire site is within an area (Flood Zone 3) with a reported high probability of flooding
- There are no nearby reported Flood Defences
- The site is not within or near an Area Benefitting from Flood Defences
- The site could be affected by surface water flooding

Phase 2 (ground investigation) assessment report

St John's View, Meadow Way, Spalding, Lincolnshire

Produced for Broadgate Homes

January 2026

5 Revealed Ground and Groundwater Conditions

5.1 Sequence of sub-strata

The sub-strata as revealed at the site are summarised below (in Table 9). Copies of the exploratory hole logs are presented later (in Appendix B).

Table 9: Summary of revealed ground conditions

	Exploratory holes:	Boreholes							Trial pits								
		BH1	BH2	BH3	BH4	BH5	BH6	BH7	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
	Ground level (m AOD):																
STRATA		***DEPTH TO BASE OF STRATA (m BEGL)***															
MADE GROUND	Brown silty or sandy topsoil / subsoil	0.25	0.20	0.20	0.40	0.40	0.20		0.20	0.12	0.45	0.37	0.25	0.42	0.40	0.40	0.10
	Brown silty SAND with occasional gravel sized fragments of brick and cement																0.30
	Stone and concrete hardcore	0.50															
TIDAL / MARINE DEPOSITS	Light brown and buff SILT/ fine SAND				1.50		1.70		0.70	0.49	0.75	0.55				0.70	
	(Soft to) firm slightly organic brown SILT/CLAY				2.00				1.15			0.60					
	Firm/Stiff grey/brown (slightly) sandy SILT/CLAY							1.90		0.60	1.05	0.95+	1.20			1.60	0.47
	Light grey/brown sandy SILT																1.30+
	Light brown fine SAND			1.80					2.05+	0.95+	2.05+		1.90+	0.95+	1.00+	1.90+	
	Brown sandy SILT	3.00	3.00		3.50	3.00	3.50										
	(Possibly locally slightly organic) grey/brown silty fine SAND	6.00	6.00	9.00	6.00	7.00											
	Brown slightly silty SAND (with rare marine shells) (with occasional stone gravel)	13.50	12.00	13.80	10.00+	14.50	13.00	11.70									
	Brown silty SAND and mixed fine to medium GRAVEL (interbedded with gravelly very silty SAND)		15.00+	14.60			15.00	14.30									
TILL	(Very) Stiff grey slightly sandy CLAY with occasional chalk gravel	18.37+		18.39+		18.38+	18.45+	18.00+									

The revealed ground conditions were generally as expected based on geological and historical desktop information. The natural ground conditions consisted of tidal / marine deposits over glacial till.

The ground conditions around the site were relatively uniform. Nevertheless, the shallower tidal soils ranged between sand, silt and clay.

5.2 Made ground (MGR)

5.2.1 Extent and thickness of the made ground (MGR)

A thin layer of made ground (or possible made ground) was revealed across the site. It was noted in all exploratory holes and recorded to between 0.1m and 0.5m depth.

The deepest recorded thickness of made ground (0.5m) was in TP9 located in the west part of the site. This could be related to previous development in this area.

No deep made ground was recorded below the former railway embankment (around TP5 and TP6). No railway ballast was recorded or other infill. It is possible the former railway embankment had only a shallow foundation.

5.2.2 Nature of the made ground (MGR)

The revealed made ground was found to comprise:

1. Sandy or silty topsoil – in nearly all exploratory holes
2. Rubble or stone fill – in only two exploratory holes (BH1 and TP9) – both located in the west part of the site

The recorded topsoil made ground could be natural *in situ* topsoil that has been reworked. The topsoil was almost entirely free of any notable manmade material. It consisted almost completely of natural sand, silt and clay soil.

5.2.3 Visual or olfactory indicators of potential contamination in the made ground (MGR)

No signs of gross contamination were recorded. No or unusual odours or oily staining were noted in the made ground. No sign of any petroleum impacted ground material was identified.

On the other hand, there were still signs of potential contamination in the made ground:

- Rubbly and stony fill was noted in the west part of the site (in TP9 and BH1). This fill could include asbestos, metals and PAHs

5.3 Tidal / marine deposits

5.3.1 Extent and thickness of the tidal / marine deposits

Tidal deposits were revealed across the site to significant depth in all exploratory holes. The base of the tidal deposits was found to be between 13.5m and 15.0m below existing ground level (BEGL).

5.3.2 Nature of the tidal / marine deposits

The revealed tidal deposits were found to comprise (in descending order):

- *Less than 2m depth:* a variety of either **cohesive** (clay, silt) or **granular** (coarse silt, sand) soils.
- *2m to 5m depth:* **loose** fine granular soil (of **coarse SILT and fine SAND**), possibly locally slightly organic
- *5m to 12m depth:* **medium dense** slightly silty **fine SAND** locally with some marine shell fragments and/or fine stone gravel
- *12m to 15m depth:* **possibly loose to medium dense** slightly silty fine to coarse **SAND with** variable amounts of fine to medium stone **gravel**

The results are very consistent with the findings of local BGS historical borehole records. These have recorded very similar tidal deposits.

The shallow ground conditions vary considerably around the site, but no clear pattern to the variation has yet been identified. There are no clear areas of cohesive (silts and clays) or granular (silt and sand) soils.

5.3.3 Visual or olfactory indicators of potential contamination in the tidal deposits

No signs of contamination were recorded in the tidal flat deposits. No anthropogenic materials were noted. No unusual odours or oily staining were identified. No signs of any petroleum impacted ground material was reported. The tidal deposits were consistent in appearance with a clean, natural soil.

5.4 Glacial till deposits – boulder clay

5.4.1 Extent and thickness of the glacial till deposits

A moderately thick layer of boulder clay has been recorded across the site in the bases of the deeper boreholes. The glacial deposits were encountered at between 13.5m and 15.0m depth. The glacial till was revealed to the maximum depth of exploration (of up to 18.4m) in all boreholes. The thickness of the boulder clay has been proven to be at least 4.9m in the area of the site.

Incidentally, the boulder clay is only expected to be about 5m in thickness in the area of the site. Local BGS records suggest the boulder clay is underlain at about 19m depth BEGL by residual clays of the local Oxford Clay mudstone formation (which reach a depth of about 55m BEGL).

5.4.2 Nature of the glacial till deposits

The glacial deposits were found to mostly comprise:

1. Stiff (or very stiff) grey slightly sandy CLAY with occasional chalk gravel

Such clay is commonly referred to as boulder clay, or more academically, as diamicton. Boulder clay (or diamicton) is the main constituent of glacial till.

5.5 Oxford Clay Formation (OXC)

Based on local BGS borehole records, the top of the OXC is expected to be about 19m depth below ground level. The Oxford Mudstone Formation (OXC) was not sampled or revealed during recent site works. The deepest boreholes only reached a depth of about 18.5m.

Nevertheless, the OXC could potentially have been reached at about 18.4m depth in a couple of boreholes (BH1, BH3 and BH5). All three boreholes reported SPT refusal at about 18.4m depth. The SPT refusal could have been because of hard clay or flint cobbles within the revealed boulder clay. However, the SPT could alternatively represent the presence of a hard limestone nodule within the top of the local OXC.

5.6 Groundwater observations

Groundwater was observed in many of the exploratory holes, especially those greater than about 2m depth BEGL, as detailed below (in Table 10). Initial groundwater strikes or ingresses were noted at between 1.50m and 3.30m depth.

Groundwater monitoring results (presented later in Appendix E) saw resting groundwater levels of between 1.1m and 3.3m below existing ground level as summarised below (in Table 11). Evidently, the average water table is roughly 2m below ground level within the silty, sandy tidal deposits.

As illustrated below (in Figure 2), groundwater levels around the site appear to rise and fall relatively uniformly suggesting the groundwater around the site is hydraulically connected. It also suggests the water-bearing ground material could be relatively free-draining.

5.7 Observations of exploratory hole stability

No instability was recorded in any of the trial pits or in any of the boreholes at moderately shallow depth. The results suggest that trench excavations to about 2m depth could be generally stable, at least for a short period in favourable weather conditions.

Table 10: Groundwater observations from recent site works

Hole	Approx ground level (m AOD)	Total depth (m)	Approx. elevation of base (m AOD)	Groundwater observations in chronological order (left to right)						
				Observation 1 (OB1)		Observation 2 (OB2)		Observation 3 (OB3)		
				Depth (m BEGL)	Details	Depth (m BEGL)	Details	Depth (m BEGL)	Details	Date (dd/mm /yyyy)
BH1		18.37		**3.30**	GW ingress	**3.50**	GWL 15hrs after drilling to 12m depth	*No other groundwater observation recorded*		19 & 20 Aug 2025
BH2		15.00		**6.70**	GW ingress	**5.00**	GWL 15 mins after ingress	**2.30**	GWL 15hrs after drilling to 9m depth	01 & 02 Sep 2025
BH3		18.39		*No groundwater observation recorded**						03 & 04 Sep 2025
BH4		10.00		**1.50**	GW ingress	**2.00**	GWL with hole & casing at 4.0m depth	*No other groundwater observation recorded*		20 Aug 2025
BH5		18.38		*No groundwater observation recorded**						09 Sep 2025
BH6		18.45		*No groundwater observation recorded**						05 & 10 Sep 2025
BH7		18.00		*No groundwater observation recorded**						10 Sep 2025
TP1		2.05		**1.15m-2.00m**	[Sand layer] moist at base	**2.00**	Slight GW ingress	No other groundwater observation recorded		21 Jul 2025
TP2		0.95		*No groundwater observation recorded*						
TP3		2.05		**1.15m-2.05m**	[Sand layer] moist at base	*No other groundwater observation recorded*				
TP4		0.95		*No groundwater observation recorded*						
TP5		1.90		*No groundwater observation recorded*						
TP6		0.95		*No groundwater observation recorded*						
TP7		1.00		*No groundwater observation recorded*						
TP8		1.90		**1.60m-1.90m**	[Sand layer] moist at base	*No other groundwater observation recorded*				
TP9		1.30		*No groundwater observation recorded*						

GW – groundwater; GWL – groundwater level.
Estimated elevations of resting groundwater levels are shown in square brackets.
*groundwater was certainly present, but just not recorded, possibly due to the required addition of water to stabilise the borehole

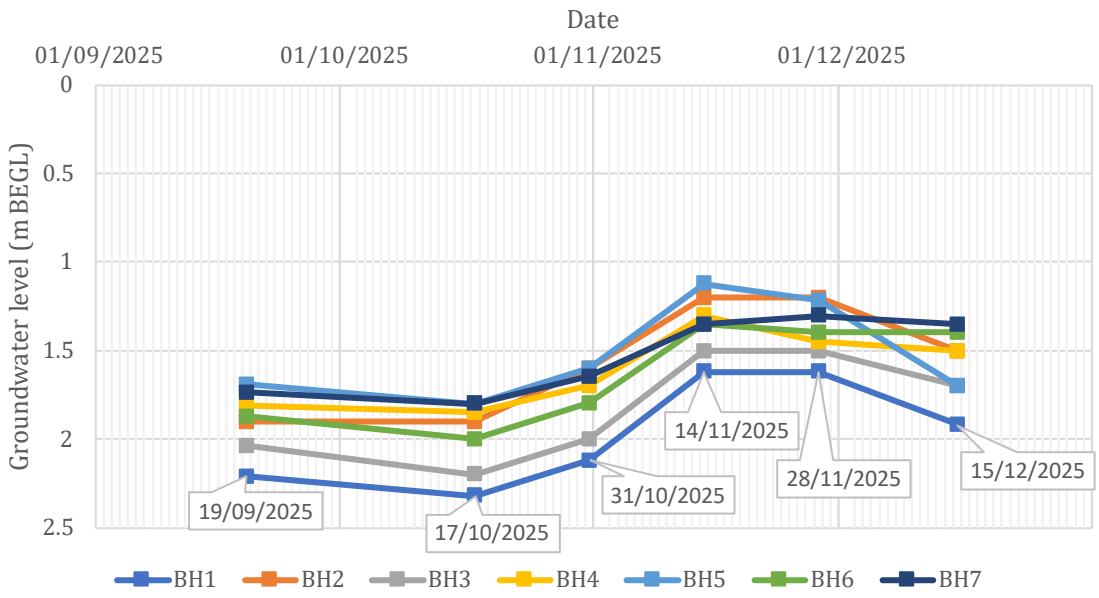
Table 11: Groundwater observations from monitoring

Bore-hole	Well total depth (m)	Date (dd/mm/yyyy)					
		19/09/2025	17/10/2025	31/10/2025	14/11/2025	28/11/2025	15/12/2025
		Standing ground water level (m BEGL)					
BH1	9.70	2.21	2.32	2.12	1.62	1.62	1.92
BH2	3.70	1.90	1.90	1.60	1.20	1.20	1.50
BH3	4.10	2.04	2.20	2.00	1.50	1.50	1.70
BH4	9.90	1.81	1.85	1.70	1.30	1.45	1.50
BH5	3.70	1.69	1.80	1.60	1.12	1.22	1.70
BH6	2.40	1.87	2.00	1.80	1.35	1.40	1.40
BH7	4.05	1.74	1.80	1.65	1.35	1.30	1.35

n/r – not recorded

On the other hand, most of the boreholes recorded deep water-bearing silty fine sands which became unstable. Several boreholes noted the silts and sands flowing up the into the bottom of the borehole casing. Once excavations reach groundwater, they are likely to become unstable.

Figure 2: **Monitored groundwater levels (m BEGL)**



6 Results of Percolation Tests

The results of water soakaway infiltration/percolation testing in exploratory holes allow an assessment of the soil infiltration rate. This reflects the permeability of the ground conditions and helps determine the drainage potential of the ground conditions.

6.1 Results

Percolation testing was carried out in six trial pits (TPs 1 to 6). The tests were carried out in the ground material at depths ranging between 0.41m and 2.10m below existing ground level (BEGL), as inferred from the summarised information below (in Table 12). The tests involved soakage of the shallow tidal deposits of silt and sand.

Table 12: Example water level changes during percolation tests

Test pit	*Ground conditions*	*Test pit depth (m)*	*Fill 1*		*Fill 2*		*Fill 3*	
			Time (mins)	*Water level (m BEGL)*	*Time (mins)*	*Water level (m BEGL)*	*Time (mins)*	*Water level (m BEGL)*
TP1	Silty sand	2.05	0	1.49	0	1.48	0	1.43
			125	1.83	10	1.52	61	1.60
			220	1.91	195	1.87	208	1.86
TP2	Silty sand	0.95	0	0.47	0	0.41	0	0.47
			43	0.60	58	0.55	71	0.58
			212	0.85	240	0.82	290	0.83
TP3	Silty sand	2.05	0	1.53	0	1.46	0	1.51
			77	1.73	50	1.59	45	1.59
			195	1.88	245	1.87	250	1.88
TP4	Sandy silt	0.95	0	0.46	0	0.45	0	0.44
			50	0.57	110	0.55	152	0.57
			650	0.83	750	0.82	795	0.83
TP5	Silty sand	1.90	0	1.45	0	1.43	0	1.48
			96	1.63	8	1.50	89	1.60
			248	1.80	290	1.80	280	1.80
TP6	Silty sand	0.95	0	0.64	0	0.57	0	0.57
			106	0.75	105	0.67	135	0.66
			300	0.87	455	0.86	508	0.86

Note: CL – clay; SI - silt
Not all recorded water level changes shown above, only key data

Moderate infiltration was seen within most of the tidal silt and sand deposits, as seen above (in Table 12). 75% of inputted water usually drained away within a few hours.

The slowest infiltration was seen within the shallower siltier (possibly cohesive) ground material in TP4. It took about 11 to 14 hours for 75% of the added water to drain away.

Overall, the results indicate that substantial drainage should be available in the predominant sandy tidal deposits. On the other hand, the siltier (possibly cohesive) shallower soils might be poorer draining.

6.2 Soil infiltration rates

Groundwater infiltration rates have been calculated using the methodology outlined in BRE 265 (Garvin, 2016), as summarised below (in Table 13). The rates confirm:

a) At least about 4 x 10^{-6} m/s of soil infiltration might be available within the silty sand – which appears to predominate below the site at about 1m to 2m depth
b) Lower infiltration of about 1.5 x 10^{-6} m/s might be available in the shallower siltier soils at about 0.5m to 1.0m depth.

Table 13: Calculated soil infiltration rates

Test hole	*Hole depth (m)*	*Calculated soil infiltration rate (m/s)*		
		Fill 1	*Fill 2*	*Fill 3*
TP1	2.05*	7.72 x 10^{-6}	6.55 x 10^{-6}	6.48 x 10^{-6}
TP2	0.95	5.76 x 10^{-6}	4.94 x 10^{-6}	4.19 x 10^{-6}
TP3	2.05*	5.59 x 10^{-6}	4.81 x 10^{-6}	4.79 x 10^{-6}
TP4	0.95	1.58 x 10^{-6}	1.53 x 10^{-6}	1.53 x 10^{-6}
TP5	1.90	4.56 x 10^{-6}	4.21 x 10^{-6}	4.05 x 10^{-6}
TP6	0.95	3.05 x 10^{-6}	2.31 x 10^{-6}	2.22 x 10^{-6}
* no infiltration observed at depths greater than about 2.00m depth – presumably due to ground saturation				

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BOREHOLE LOG

Borehole No **BH1**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 19-20 Aug 2025

Coordinates E: 523452 N: 321643
Elevation :- 3.1
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK)

Depth (m)	Lithology / Description / Depth (m)	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	MADE GROUND: Driller's description: "Grass [over] Fine brown silts with gravel" 0.25	0.25	1,B			
	MADE GROUND: Driller's description: "Dense stone and hardcore concrete fill" 0.50	0.25				
1.0	Brown to dark brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS) 1.00	0.50	2,B		15	SPT at 1.20m: 1,3,4,4,3,4
	(Possibly medium dense becoming) Loose brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS)	2.00	4,B			
2.0			3,SS		7	SPT at 2.00m: 1,1,0,2,2,3
			5,SS			
3.0	3.00		6,B	3.30m: GW ingress 3.50m: resting GWL c.15hrs after drilling to 12m BGL	6	SPT at 3.00m: 1,0,1,1,2,2
	Loose (possibly slightly organic) Grey and brown silty fine SAND locally with slight organic odour. Organic material is amorphous peat. (TIDAL/MARINE DEPOSITS)	3.00	8,B			
4.0			7,SS		6	SPT at 4.00m: 1,1,2,1,1,2
			9,SS			
5.0			10,B			5.00m-13.50m: fine sands reportedly repeatedly flowed up into the borehole casing. Some sinking of casing recorded.
			11,SS			
6.0	6.00		12,B			
	Greyish brown slightly silty fine SAND. (TIDAL/MARINE DEPOSITS)	2.50				
7.0			13,B			
8.0	8.50					
	Brown slightly silty fine SAND with rare fine gravel sized very weak marine shell fragments. (TIDAL/MARINE DEPOSITS)	3.50	14,B			
9.0						
10.0						
11.0						
12.0	12.00					
	Brown slightly silty fine to coarse SAND with occasional fine to medium mixed stone gravel. (TIDAL/MARINE DEPOSITS)	1.50	15,B			
13.0	13.50					
	Stiff becoming very stiff grey slightly sandy CLAY with occasional fine to medium chalk gravel. (GLACIAL TILL)	4.87	16,B			
14.0			17,SS		28	SPT at 14.00m: 4,4,5,6,7,10
15.0						
16.0			18,SS		35	SPT at 15.50m: 4,5,6,8,9,12
17.0			19,SS		43	SPT at 17.00m: 3,5,7,9,11,16 17.00m-18.00m: 1 hour of chiselling required (due to hard strata).
18.0	18.37		20,SS			SPT at 18.00m: 6,9,13,16,21/70mm (SPT refusal)
19.0						
20.0						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-18.45

Casing depth :- Advanced to BH1 base with each SPT. Maximum depth: 16.50m.

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No **BH2**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 01-02 Sep 2025

Coordinates E: 523473 N: 321510
Elevation :- 2.9
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK) - Subcontractor

Depth (m)	Lithology / Description / Depth (m)	Thickness (m)	Samples	Water level & well	SPT	Notes
0.0	Possible Made Ground: Brown clayey soily SAND with occasional rootlets. (TOPSOIL) 0.20	0.20	1,D			
1.0	Loose brown, light brown and light grey mottled sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS) 1.90	1.70	2,B 3,B		5	SPT at 1.20m: 1,1,2,1,1,1
2.0	Loose brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS) 3.00	1.10	4,D 5,B 6,D	2.30m: resting GWL c.15hrs after drilling to 9m BGL	7 2	SPT at 2.00m: 1,1,2,2,1,2 SPT at 3.00m: 1,2,0,1,0,1
3.0	(Possibly very loose to loose becoming medium dense) Locally slightly organic greyish brown and brown mottled silty fine SAND. (TIDAL/MARINE DEPOSITS)		7,B 8,D			
4.0		3.00	9,B 10,D		10	SPT at 4.00m: 2,2,2,3,2,3
5.0			11,B	5.00m: GWL 20 mins after strike at 6.70m.	18	SPT at 5.00m: 3,3,4,4,5,5
6.0	Medium dense brown and greyish brown slightly silty to silty fine SAND. (TIDAL/MARINE DEPOSITS) 6.00		12,D 13,B		26	SPT at 6.00m: 4,5,6,6,7,7
7.0		3.00	14,D 15,B	6.70m: GW ingress	24	SPT at 7.00m: 5,5,5,6,6,7
8.0						
9.0	Loose (becoming loose to medium dense) light greyish brown and brown slightly silty fine SAND with occasional fine to medium mixed flinty gravel. (TIDAL/MARINE DEPOSITS) 9.00		16,D 17,B		5	SPT at 9.00m: 2,1,2,1,1,1
10.0		3.00	18,D 19,B		11	SPT at 10.50m: 2,2,3,3,2,3
11.0						
12.0	Loose to medium dense brown slightly silty locally very silty fine to coarse SAND and fine to medium mixed flinty cherty GRAVEL with many thin beds of brown gravelly very silty fine SAND. (TIDAL/MARINE DEPOSITS) 15.00		20,D 21,B		11	SPT at 12.00m: 1,2,2,2,3,4
13.0		3.00	22,D 23,B		10	SPT at 13.50m: 2,2,2,2,3,3
14.0			24,D			
15.0					9	SPT at 15.00m: 2,2,2,2,2,3
16.0						
17.0						
18.0						
19.0						
20.0						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-19.00
Casing depth :- Advanced to BH2 base with each SPT

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No **BH3**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 03-04 Sep 2025

Coordinates E: 523596 N: 321480
Elevation :- 3.1
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK) - Subcontractor

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0.0	Possible Made Ground: brown clayey fine to medium soily SAND with occasional rootlets. (TOPSOIL) 0.20	0.0	0.20	1,D				
1.0	Loose light brown mottled brown and grey silty to very silty (Locally very clayey) fine SAND. (TIDAL/MARINE DEPOSITS) 1.80	1.0	1.60	2,B 3,SS		8		SPT at 1.20m: 1,1,2,2,2,2
2.0	(Very loose to loose becoming medium dense) Brown silty fine SAND. (TIDAL/MARINE DEPOSITS)	2.0		4,D 5,B		4		SPT at 2.00m: 1,1,1,2,1,0
3.0		3.0	2.20	6,D 7,B		13		SPT at 3.00m: 2,2,3,3,3,4
4.0	4.00	4.0		8,D 9,D		12		SPT at 4.00m: 2,2,2,3,3,4
5.0	Medium dense greyish brown and brown slightly silty to silty fine to medium SAND. (TIDAL/MARINE DEPOSITS)	5.0		10,B 11,D		14		SPT at 5.00m: 2,2,3,3,4,4
6.0		6.0	5.00	12,B 13,D		13		SPT at 6.00m: 3,3,3,3,3,4
7.0		7.0		14,B 15,D		14		SPT at 7.50m: 3,3,3,4,4,3
8.0		8.0		16,B 17,D				
9.0	9.00	9.0		18,B		19		SPT at 9.00m: 3,4,4,5,5,5
10.0	Medium dense brown slightly silty fine SAND with occasional fine mixed stone gravel. (TIDAL/MARINE DEPOSITS)	10.0		19,D		21		SPT at 10.50m: 4,4,5,5,5,6
11.0		11.0	10.80	20,B				
12.0		12.0		21,D 22,B		22		SPT at 12.00m: 4,5,5,5,6,6
13.0		13.0		23,D				
13.80						9		SPT at 13.50m: 2,2,2,2,3,2
14.0	(Possibly loose to medium dense) Brown locally very clayey fine to coarse SAND and fine to medium subrounded to subangular weak to medium strong mixed stone flinty cherty GRAVEL. (TIDAL/MARINE DEPOSITS) 14.60	14.0	0.80	24,B				
15.0	Stiff grey slighlty sandy silty CLAY with occasional fine to medium chalky gravel. (GLACIAL TILL)	15.0		25,D 26,B		32		SPT at 15.00m: 5,7,7,8,8,9
16.0		16.0	2.40	27,D				
17.0	17.00	17.0		28,B		37		SPT at 16.50m: 8,8,9,9,9,10
18.0	Very stiff grey slighlty sandy silty CLAY with occasional fine to medium chalky gravel. (GLACIAL TILL) 18.39	18.0	1.39	29,D 30,SS				SPT at 18.00m: 10,10,12,14,18,6/15mm (SPT refusal)
19.0		19.0						
20.0		20.0						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-18.00
Casing depth :- Advanced to BH3 base with each SPT

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No
BH4

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 20 Aug 2025

Coordinates E: 523666 N: 321510
Elevation :- 3.0
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK)

Depth (m)	Lithology / Description / Depth (m)	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Possible Made Ground: Brown sandy soily SILT. Sand is fine. (TOPSOIL) 0.40	0.40	1,B			
1.0	Light brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS) 1.50	1.10	2,B	1.50m: GW ingress	7	SPT at 1.20m: 1,0,1,3,2,1
2.0	Firm (becoming soft and slightly organic) light grey mottled brown slightly sandy silty CLAY with some partings of light brown silty fine SAND. (TIDAL/MARINE DEPOSITS) 2.00	0.50	4,D	2.00m: GWL with hole and casing at 4.00m depth	10	SPT at 2.00m: 1,2,3,3,2,2
3.0	Loose brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS)	2.00	6,D		5	SPT at 3.00m: 1,0,1,1,2,1
4.0	4.00 (Possibly loose becoming) medium dense brown to greyish brown slightly silty to silty fine SAND. (TIDAL/MARINE DEPOSITS)		8,D		5	SPT at 4.00m: 1,1,2,1,1,1
5.0			10,D		11	SPT at 5.00m: 1,1,3,3,2,3
6.0			12,D		12	SPT at 6.00m: 2,1,2,3,3,4 6.00m: fine sands reportedly flowed up into the borehole casing.
7.0		6.00	14,D		12	SPT at 7.50m: 1,2,2,3,3,4
8.0			16,D		17	SPT at 9.00m: 2,2,3,4,5,5
9.0			18,D			
10.0	10.00					
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						
19.0						
20.0						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-10.00
Casing depth :- Advanced to BH4 base with each SPT

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No **BH5**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 09 Sep 2025

Coordinates E: 523703 N: 321638
Elevation :- 2.8
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK) - Subcontractor

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Possible Made Ground: brown clayey fine SAND with occasional rootlets. (TOPSOIL) 0.40	0.0	0.40	2,D			
1.0	Loose brown sandy SILT. Sand is fine. (TIDAL/MARINE DEPOSITS)	1.0		1,B		6	SPT at 1.20m: 1,1,1,2,2,1
2.0		2.0	2.60	3,B 4,D 5,B 6,D		8	SPT at 2.00m: 1,1,2,2,2,2
3.0	3.00 Loose greyish brown silty fine SAND. (TIDAL/MARINE DEPOSITS) 4.00	3.0	1.00	7,B 8,D		7	SPT at 3.00m: 1,2,2,1,2,2
4.0	Loose greyish brown silty fine SAND with rare fine stone gravel. (TIDAL/MARINE DEPOSITS) 5.00	4.0	1.00	9,B 10,D		9	SPT at 4.00m: 2,2,2,2,2,3
5.0	Medium dense (possibly slighlty organic) greyish brown locally with occasional black mottling slightly silty to silty fine SAND with occasional degraded rootlets and rare fine gravel sized extremely weak marine shells. (TIDAL/MARINE DEPOSITS) 7.00	5.0	2.00	11,B 12,D 13,B 14,D		11	SPT at 5.00m: 2,2,3,2,3,3
6.0		6.0				13	SPT at 6.00m: 3,3,3,3,3,4
7.0	Medium dense greyish brown to brown slighlty silty fine to medium sand with rare fine stone gravel and rare fine gravel sized extremely weak marine shells and marine shell fragments. (TIDAL/MARINE DEPOSITS)	7.0				14	SPT at 7.50m: 4,3,3,3,4,4
8.0		8.0	3.00	15,B 16,D			
9.0	10.00	9.0		17,B 18,D		19	SPT at 9.00m: 4,4,4,5,5,5
10.0	Medium dense (possibly becoming medium dense) brown to greyish brown slighlty silty fine to medium SAND with occasional fine to medium mixed stone cherty and flinty gravel. (TIDAL/MARINE DEPOSITS)	10.0				22	SPT at 10.50m: 4,4,5,5,6,6
11.0		11.0		19,B 20,D			
12.0		12.0	4.50	21,B 22,D		16	SPT at 12.00m: 5,5,5,6,3,2
13.0		13.0				7	SPT at 13.50m: 2,2,1,2,2,2
14.0	14.50	14.0		23,B 24,D			
15.0	Stiff grey slighlty sandy CLAY with occasional fine to medium mixed stone gravel mainly of chalk. (GLACIAL TILL)	15.0				25	SPT at 15.00m: 4,4,5,6,6,8
16.0		16.0		25,B 26,D			
17.0		17.0	3.88	27,B 28,D		40	SPT at 16.50m: 8,8,9,9,10,12
18.0	18.38	18.0		29,SS			SPT at 18.00m: 9,10,12,16,8,4/10mm (SPT refusal)
19.0		19.0					
20.0		20.0					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-18.00

Casing depth :- Advanced to 1m above BH5 base with each SPT. Max. depth 14m.

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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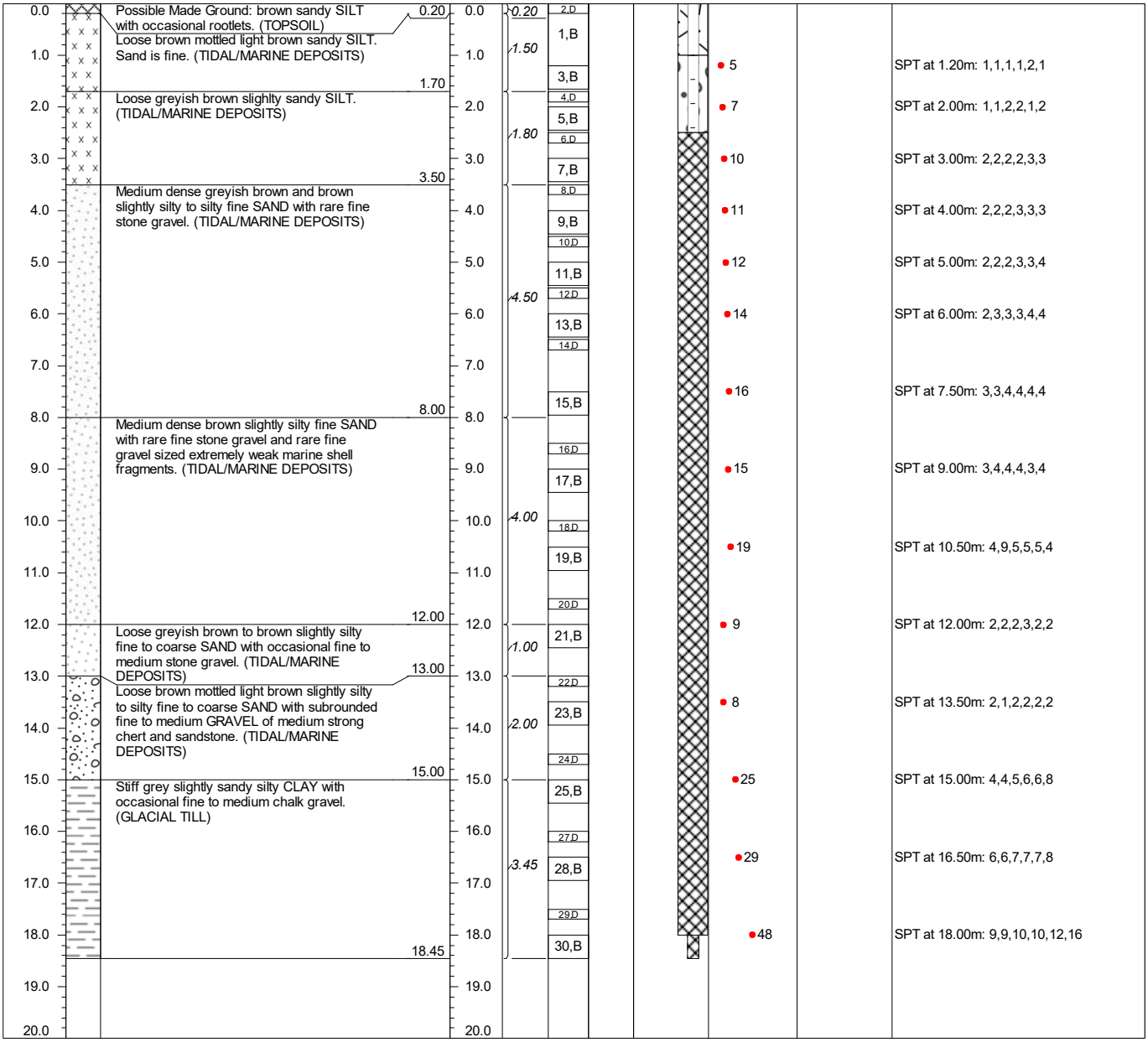
BOREHOLE LOG

Borehole No **BH6**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 05 & 10 Sep 2025

Coordinates E: 523646 N: 321574
Elevation :- 3.1
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK) - Subcontractor



Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-18.00
Casing depth :- Advanced to BH6 base with each SPT.

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No **BH7**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 10 Sep 2025

Coordinates E: 523731 N: 321600
Elevation :- 2.9
Excavated by :- Dando 3000 (shell/auger)
Drilled by :- SIS Drill (UK) - Subcontractor

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Driller's description: "Brown silty sandy clay"	0.0	1.90				Driller's notes: "Casing shoe and SPT rod snapped. Drilling out in 8" to retrieve rods and advance depth but no sample recovery or SPT data."
1.90	Driller's description: "Brown silty sand" (TIDAL/MARINE DEPOSITS)	1.90	3.60				
5.50	Driller's description: "Brown fine to coarse sand" (TIDAL/MARINE DEPOSITS)	5.50	6.20				
11.70	Driller's description: "Loose brown sandy gravel" (TIDAL/MARINE DEPOSITS)	11.70	2.60				
14.30	Driller's description: "Stiff grey silty boulder clay" (GLACIAL TILL)	14.30	3.70				
18.00		18.00					
20.0		20.0					

SPT: 0 25 50 75 100
SH DCP: 0 20 40

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-14.30
Casing depth :- Advanced to BH7 base with each SPT

File Ref :- 1720/ 6810
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No **TP1**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523451 N: 321656
Elevation (m AOD) :- 3.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples		Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Possible Made Ground: Brown slightly clayey fine SAND with occasional rootlets. (TOPSOIL) (0.20) 0.20	0					
0.5	Light brown and buff silty fine SAND (TIDAL DEPOSITS) (0.50) 0.70	0.5	1	D			
1	Soft to firm slightly organic greyish brown and light brown mottled silty CLAY (TIDAL DEPOSITS) (0.45) 1.15	1	2	D			
1.5	Greyish brown and light brown mottled silty fine to medium SAND. Moist at base. (TIDAL DEPOSITS) (0.90) 2.05	1.5					
2		2			2.00m: Slight water ingress		
2.5		2.5					
3		3					
3.5		3.5					
4		4					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No

TP2

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523510 N: 321511
Elevation (m AOD) :- 2.8
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0, 50, 100, 150)	Notes
0	Possible Made Ground: brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.12 (0.12)	0				
	Light brown, buff and light grey silty fine SAND (TIDAL DEPOSITS) 0.49 (0.37)		1 D			
0.5	Stiff dark grey and light grey mottled slightly sandy silty CLAY (TIDAL DEPOSITS) 0.60 (0.11)	0.5				
	Brown, light brown and light grey silty fine to medium SAND (TIDAL DEPOSITS) 0.95 (0.35)		2 D			No groundwater observations recorded.
1		1				
1.5		1.5				
2		2				
2.5		2.5				
3		3				
3.5		3.5				
4		4				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No

TP3

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523566 N: 321452
Elevation (m AOD) :- 3.1
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)		Elevation	Samples		Water level	Mackintosh Probe 0 50 100 150	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL)	(0.15)	0					
	0.15							
	Possible Made ground: brown silty fine SAND with occasional rootlets (SUBSOIL)	(0.30)		1	D			
0.5	0.45		0.5					
	Light brown, buff and light grey silty fine SAND (TIDAL DEPOSITS)	(0.30)						
	0.75							
	Firm greyish brown, grey and brown mottled slightly sandy clayey SILT (TIDAL DEPOSITS)	(0.30)		2	D			
1	1.05		1					
	Greyish brown, grey and brown mottled silty fine to medium SAND. Moist at base. (TIDAL DEPOSITS)	(1.00)						
1.5			1.5					
2	2.05		2					
2.5			2.5					
3			3					
3.5			3.5					
4			4					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No **TP4**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523633 N: 321484
Elevation (m AOD) :- 3.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.17 (0.17)	0				
	Possible Made Ground: Brown to greyish brown silty fine SAND with occasional rootlets (SUBSOIL) 0.37 (0.20)		1 D			
0.5	Light brown, buff and light grey silty fine SAND (TIDAL DEPOSITS) 0.55 (0.18)	0.5				
	Firm slightly organic dark grey clayey SILT (TIDAL DEPOSITS) 0.60 (0.05)					
	Firm greyish brown and grey mottled slightly sandy clayey SILT (TIDAL DEPOSITS) 0.95 (0.35)		2 D			No groundwater observations recorded.
1		1				
1.5		1.5				
2		2				
2.5		2.5				
3		3				
3.5		3.5				
4		4				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No **TP5**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523674 N: 321640
Elevation (m AOD) :- 2.9
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.10 (0.10)	0				
	Possible Made Ground: Brown to greyish brown silty fine SAND with occasional rootlets (TOPSOIL) 0.25 (0.15)		1	D		
	Stiff grey, light brown, brown and orangish brown clayey SILT (TIDAL DEPOSITS) 0.50 (0.25)					
0.5	Firm grey, light brown, brown and orangish brown clayey SILT (TIDAL DEPOSITS)	0.5	2	D		
1	1.20 (0.70)	1				
	Greyish brown, brown and light brown silty fine SAND (TIDAL DEPOSITS)					
1.5	1.90 (0.70)	1.5				
2		2				No groundwater observations recorded.
2.5		2.5				
3		3				
3.5		3.5				
4		4				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No

TP6

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523733 N: 321651
Elevation (m AOD) :- 3.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples		Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.13 (0.13)	0					
	Possible Made Ground: Brown silty fine SAND with occasional rootlets (SUBSOIL) (0.29) 0.42		1	D			
0.5	Light grey and brown mottled silty fine to medium SAND (TIDAL DEPOSITS) (0.53)	0.5	2	D			
1	0.95	1					
1.5		1.5					
2		2					
2.5		2.5					
3		3					
3.5		3.5					
4		4					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No

TP7

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523685 N: 321485
Elevation (m AOD) :- 2.8
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples		Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.10 (0.10)	0					
	Possible Made Ground: Brown and greyish brown silty fine SAND with occasional rootlets (SUBSOIL) 0.40 (0.30)		1	D			
0.5	Dark grey, light grey and light brown mottled sandy SILT (TIDAL DEPOSITS) 0.50 (0.10)	0.5					
	Light grey and brown mottled silty fine SAND (TIDAL DEPOSITS) (0.50)		2	D			
1	1.00	1					No groundwater observations recorded.
1.5		1.5					
2		2					
2.5		2.5					
3		3					
3.5		3.5					
4		4					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

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TRIAL PIT LOG

Trial pit No **TP8**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523457 N: 321501
Elevation (m AOD) :- 3.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe 0 50 100 150	Notes
0	Possible Made Ground: Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.10 (0.10)	0				
	Possible Made Ground: Buff light brown silty fine SAND with occasional rootlets (SUBSOIL) 0.20 (0.10)					
	Possible Made Ground: Brown and greyish brown silty fine SAND with occasional rootlets (SUBSOIL) 0.40 (0.20)		1 D			
0.5	Light grey mottled buff silty fine SAND (TIDAL DEPOSITS) 0.70 (0.30)	0.5				
	Firm slightly organic dark grey, light grey and brown mottled clayey SILT (TIDAL DEPOSITS) 0.74 (0.04)					
1	Firm light grey and brown mottled sandy SILT (TIDAL DEPOSITS) (0.86)	1	2 D			
1.5	1.60	1.5				
	Light greyish brown and light brown mottled silty fine SAND. Moist at base. (TIDAL DEPOSITS) (0.30)		3 D			
2	1.90	2				
2.5		2.5				
3		3				
3.5		3.5				
4		4				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

HUMBERSIDE MATERIALS LABORATORY Ltd.
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TRIAL PIT LOG

Trial pit No **TP9**

Client :- Broadgate Homes
Site :- St John's View Spalding
Project No :- 6810

Location :- see site plan
Date :- 21 Jul 2025

Coordinates E: 523466 N: 321612
Elevation (m AOD) :- 3.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Brown clayey fine to medium SAND with occasional rootlets (TOPSOIL) 0.10 (0.10)	0				
	Brown silty SAND with occasional fine to medium gravels of brick, mortar and occasional rootlets (MADE GROUND) 0.30 (0.20)		1 D			
	Stiff dark grey and black mottled sandy SILT (slightly organic) (TIDAL DEPOSITS) 0.47 (0.17)					
0.5	Light greyish brown, light grey and brown mottled sandy SILT (TIDAL DEPOSITS) 0.88 (0.41)	0.5	2 D			
	Firm to stiff dark grey and grey slightly sandy SILT (TIDAL DEPOSITS) 0.98 (0.10)					
1	Light greyish brown, light grey and brown mottled sandy SILT (TIDAL DEPOSITS) 1.30 (0.32)	1				No groundwater observations recorded.
1.5		1.5				
2		2				
2.5		2.5				
3		3				
3.5		3.5				
4		4				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1720 / 6810
Logged by :- DD (HML)

Appendix I

Anglian Water Asset Plan

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Wastewater Plan A1
Powered by digdat

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2025 Ordnance Survey AC0000813445.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station
*(Colour denotes effluent type)

sam@utilityconsult.co.uk
C1493

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0301	524099	321366	F	3.267	0.097	3.17
0302	524068	321375	F	3.44	-0.153	3.593
0304	524015	321395	F	3.352	-0.578	3.93
0401	524041	321439	F	2.897	-0.163	3.06
0402	524045	321462	F	2.933	-0.047	2.98
0403	524026	321483	F	2.836	0.156	2.68
0404	524091	321409	F	-	-	-
0501	524075	321547	F	2.493	0.403	2.09
0502	524090	321571	F	2.404	0.554	1.85
0503	524014	321577	F	2.88	1.32	1.56
0504	524015	321595	F	3.003	1.423	1.58
0601	524070	321629	F	2.426	0.986	1.44
0602	524009	321667	F	2.748	1.898	0.85
0603	524023	321677	F	2.857	1.477	1.38
0604	524045	321691	F	2.978	1.258	1.72
0605	524055	321699	F	2.833	1.703	1.13
0701	524091	321724	F	2.912	1.442	1.47
0702	524022	321802	F	-	-	-
0703	524035	321799	F	-	-	-
0704	524058	321772	F	-	-	-
0705	524053	321802	F	-	-	-
0706	524003	321747	F	-	-	-
0800	524091	321822	F	-	-	-
0801	524007	321901	F	-	-	-
0802	523085	321891	F	2.927	-0.093	3.02
0802	524099	321840	F	-	-	-
0803	523086	321815	F	3.02	0.45	2.57
0803	524088	321848	F	-	-	-
1300	523161	321369	F	-	-	-
1301	523190	321395	F	-	-	-
1302	523128	321400	F	-	-	-
1302	523140	321390	F	-	-	-
1302	523128	321390	F	-	-	-
1302	523126	321390	F	-	-	-
1302	523133	321390	F	-	-	-
1302	523132	321390	F	-	-	-
1302	523136	321390	F	-	-	-
1302	523137	321390	F	-	-	-
1302	523116	321382	F	-	-	-
1302	523131	321397	F	-	-	-
1302	523126	321393	F	-	-	-
1302	523116	321376	F	-	-	-
1302	523118	321346	F	-	-	-
1302	523117	321368	F	-	-	-
1302	523118	321361	F	-	-	-
1302	523126	321369	F	-	-	-
1302	523134	321359	F	-	-	-
1302	523134	321367	F	-	-	-
1302	523134	321363	F	-	-	-
1302	523134	321361	F	-	-	-
1302	523133	321369	F	-	-	-
1302	523145	321382	F	-	-	-
1302	523145	321379	F	-	-	-
1302	523146	321370	F	-	-	-
1302	523154	321371	F	-	-	-
1302	523164	321366	F	-	-	-
1302	523173	321356	F	-	-	-
1302	523155	321396	F	-	-	-
1302	523170	321395	F	-	-	-
1302	523117	321364	F	-	-	-
1400	523121	321477	F	-	-	-
1401	523148	321487	F	-	-	-
1402	523118	321492	F	-	-	-
1402	523119	321484	F	-	-	-
1402	523137	321492	F	-	-	-
1402	523141	321491	F	-	-	-
1402	523136	321495	F	-	-	-
1403	523116	321439	F	-	-	-
1403	523130	321413	F	-	-	-
1403	523134	321407	F	-	-	-
1403	523138	321403	F	-	-	-
1403	523115	321449	F	-	-	-
1403	523103	321459	F	-	-	-
1403	523114	321460	F	-	-	-
1403	523114	321467	F	-	-	-
1403	523169	321431	F	-	-	-
1403	523171	321428	F	-	-	-
1403	523175	321423	F	-	-	-
1403	523157	321424	F	-	-	-
1403	523165	321416	F	-	-	-
1403	523144	321425	F	-	-	-
1403	523164	321415	F	-	-	-
1403	523158	321410	F	-	-	-
1403	523148	321419	F	-	-	-
1403	523150	321404	F	-	-	-
1403	523165	321401	F	-	-	-
1403	523177	321411	F	-	-	-
1403	523180	321427	F	-	-	-
1403	523181	321428	F	-	-	-
1403	523186	321420	F	-	-	-
1403	523200	321420	F	-	-	-
1403	523198	321422	F	-	-	-
1403	523199	321423	F	-	-	-
1403	523186	321400	F	-	-	-
1403	523183	321404	F	-	-	-
1500	523162	321510	F	-	-	-
1500	523158	321511	F	-	-	-
1500	523155	321505	F	-	-	-
1500	523163	321520	F	-	-	-
1500	523159	321514	F	-	-	-
1500	523154	321516	F	-	-	-
1500	523150	321518	F	-	-	-
1500	523141	321501	F	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
1501	523189	321514	F	-	-	-
1502	523190	321517	F	-	-	-
1502	523184	321520	F	-	-	-
1502	523193	321523	F	-	-	-
1502	523195	321511	F	-	-	-
1502	523194	321512	F	-	-	-
1600	523193	321698	F	-	-	-
1601	523198	321623	F	-	-	-
1700	523124	321772	F	3.06	0.08	2.98
1701	523128	321749	F	3.15	-0.13	3.28
1702	523174	321798	F	3.01	0.82	2.19
1703	523187	321778	F	3.15	1.18	1.97
1704	523188	321733	F	-	-	-
1705	523188	321746	F	-	-	-
1800	523189	321899	F	3.108	1.556	1.552
1801	523188	321822	F	3.01	1.06	1.95
1802	523170	321816	F	3.01	0.69	2.32
1803	523136	321818	F	2.99	0.5	2.49
1804	523119	321814	F	2.98	0.42	2.56
1805	523102	321802	F	3.11	0.31	2.8
1805	524104	321848	F	-	-	-
1806	523136	321846	F	2.9	1.44	1.46
1807	523147	321862	F	3.05	1.71	1.34
1808	523155	321870	F	3.1	1.8	1.3
1900	523112	321922	F	-	-	-
2200	523232	321291	F	-	-	-
2204	523238	321273	F	-	-	-
2205	523233	321277	F	-	-	-
2300	523298	321363	F	-	-	-
2301	523298	321370	F	-	-	-
2302	523234	321377	F	-	-	-
2302	523217	321375	F	-	-	-
2302	523218	321375	F	-	-	-
2302	523222	321375	F	-	-	-
2302	523230	321384	F	-	-	-
2302	523222	321383	F	-	-	-
2302	523220	321397	F	-	-	-
2302	523218	321399	F	-	-	-
2302	523221	321393	F	-	-	-
2302	523221	321391	F	-	-	-
2302	523221	321389	F	-	-	-
2302	523221	321387	F	-	-	-
2302	523202	321394	F	-	-	-
2302	523261	321399	F	-	-	-
2302	523262	321391	F	-	-	-
2302	523269	321398	F	-	-	-
2302	523248	321380	F	-	-	-
2302	523239	321381	F	-	-	-
2303	523251	321305	F	-	-	-
2400	523209	321493	F	-	-	-
2401	523223	321489	F	-	-	-
2402	523226	321449	F	-	-	-
2403	523290	321455	F	-	-	-
2404	523288	321470	F	-	-	-
2405	523225	321433	F	-	-	-
2406	523219	321421	F	-	-	-
2407	523241	321408	F	-	-	-
2408	523241	321468	F	-	-	-
2408	523256	321469	F	-	-	-
2408	523273	321471	F	-	-	-
2408	523272	321471	F	-	-	-
2408	523269	321471	F	-	-	-
2408	523266	321470	F	-	-	-
2408	523264	321470	F	-	-	-
2408	523261	321470	F	-	-	-
2408	523259	321470	F	-	-	-
2408	523265	321480	F	-	-	-
2408	523266	321475	F	-	-	-
2408	523296	321447	F	-	-	-
2408	523228	321402	F	-	-	-
2408	523212	321408	F	-	-	-
2408	523213	321407	F	-	-	-
2408	523216	321403	F	-	-	-
2408	523218	321401	F	-	-	-
2408	523255	321439	F	-	-	-
2408	523281	321477	F	-	-	-
2408	523255	321433	F	-	-	-
2408	523267	321420	F	-	-	-
2408	523267	321421	F	-	-	-
2408	523267	321424	F	-	-	-
2408	523246	321487	F	-	-	-
2408	523267	321425	F	-	-	-
2408	523245	321490	F	-	-	-
2408	523267	321428	F	-	-	-
2408	523245	321492	F	-	-	-
2408	523266	321430	F	-	-	-
2408	523245	321495	F	-	-	-
2408	523266	321435	F	-	-	-
2408	523247	321497	F	-	-	-
2408	523273	321436	F	-	-	-
2408	523248	321498	F	-	-	-
2408	523273	321442	F	-	-	-
2408	523260	321406	F	-	-	-
2408	523246	321405	F	-	-	-
2408	523237	321432	F	-	-	-
2408	523237	321431	F	-	-	-
2408	523236	321428	F	-	-	-
2408	523235	321424	F	-	-	-
2408	523235	321423	F	-	-	-
2408	523234	321419	F	-	-	-
2408	523230	321420	F	-	-	-
2408	523225	321421	F	-	-	-
2408	523261	321434	F	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
2408	523204	321431	F	-	-	-
2408	523205	321434	F	-	-	-
2408	523205	321441	F	-	-	-
2408	523213	321441	F	-	-	-
2408	523204	321416	F	-	-	-
2408	523204	321428	F	-	-	-
2408	523282	321447	F	-	-	-
2500	523252	321529	F	-	-	-
2501	523238	321520	F	-	-	-
2502	523211	321540	F	-	-	-
2503	523250	321547	F	-	-	-
2504	523250	321557	F	-	-	-
2505	523250	321563	F	-	-	-
2506	523239	321565	F	-	-	-
2507	523216	321569	F	-	-	-
2508	523216	321565	F	-	-	-
2509	523215	321560	F	-	-	-
2510	523205	321500	F	-	-	-
2510	523212	321513	F	-	-	-
2510	523250	321501	F	-	-	-
2510	523251	321502	F	-	-	-
2510	523253	321504	F	-	-	-
2510	523254	321506	F	-	-	-
2510	523256	321508	F	-	-	-
2510	523259	321509	F	-	-	-
2510	523260	321509	F	-	-	-
2510	523263	321509	F	-	-	-
2510	523265	321509	F	-	-	-
2510	523270	321510	F	-	-	-
2510	523269	321513	F	-	-	-
2510	523268	321519	F	-	-	-
2510	523252	321517	F	-	-	-
2510	523237	321503	F	-	-	-
2510	523249	321558	F	-	-	-
2510	523248	321548	F	-	-	-
2510	523238	321564	F	-	-	-
2510	523243	321564	F	-	-	-
2510	523249	321563	F	-	-	-
2511	523208	321505	F	-	-	-
2511	523214	321517	F	-	-	-
2511	523210	321509	F	-	-	-
2511	523210	321510	F	-	-	-
2511	523212	321514	F	-	-	-
2600	523275	321615	F	-	-	-
2601	523263	321656	F	-	-	-
2602	523221	321653	F	-	-	-
2603	523202	321650	F	-	-	-
2604	523221	321657	F	-	-	-
2700	523275	321760	F	-	-	-
2701	523285	321761	F	-	-	-
2702	523237	321753	F	-	-	-
2800	523257	321808	F	-	-	-
2801	523230	321851	F	3.098	1.881	1.217
2802	523292	321805	F	3.05	2.28	0.77
2803	523291	321827	F	3.07	2.04	1.03
2804	523273	321823	F	3.01	2.32	0.69
2805	523290	321837	F	3.14	1.9	1.24
2806	523287	321855	F	3.12	1.78	1.34
2807	523287	321872	F	3	1.67	1.33
2808	523292	321890	F	2.92	1.54	1.38
2809	523216	321842	F	3.13	2.03	1.1
2903	523210	321920	F	2.752	1.342	1.41
2905	523297	321910	F	2.77	1.41	1.36
2906	523203	321911	F	2.88	1.386	1.494
2907	523282	321926	F	-	-	-
3200	523334	321286	F	-	-	-
3300	523391	321303	F	-	-	-
3301	523378	321316	F	-	-	-
3302	523359	321318	F	-	-	-
3303	523327	321333	F	-	-	-
3304	523322	321352	F	-	-	-
3400	523353	321484	F	-	-	-
3401	523315	321476	F	-	-	-
3403	523347	321482	F	-	-	-
3404	523390	321493	F	-	-	-
3405	523393	321411	F	-	-	-
3406	523339	321452	F	-	-	-
3407	523344	321434	F	-	-	-
3408	523340	321441	F	-	-	-
3409	523305	321431	F	-	-	-
3409	523310	321432	F	-	-	-
3409	523306	321431	F	-	-	-
3409	523316	321479	F	-	-	-
3409	523324	321489	F	-	-	-
3409	523323	321494	F	-	-	-
3409	523323	321495	F	-	-	-
3409	523323	321498	F	-	-	-
3409	523323	321500	F	-	-	-
3409	523317	321452	F	-	-	-
3409	523306	321449	F	-	-	-
3409	523302	321449	F	-	-	-
3409	523310	321450	F	-	-	-
3409	523308	321432	F	-	-	-
3409	523334	321490	F	-	-	-
3409	523305	321487	F	-	-	-
3409	523306	321484	F	-	-	-
3409	523306	321483	F	-	-	-
3409	523306	321480	F	-	-	-
3500	523340	321548	F	-	-	-
3501	523397	321587	F	-	-	-
3502	523322	321503	F	-	-	-
3502	523320	321505	F	-	-	-
3502	523319	321506	F	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
3502	523316	321508	F	-	-	-
3502	523315	321509	F	-	-	-
3502	523313	321511	F	-	-	-
3502	523312	321512	F	-	-	-
3502	523309	321514	F	-	-	-
3502	523306	321514	F	-	-	-
3502	523304	321514	F	-	-	-
3502	523328	321511	F	-	-	-
3502	523332	321503	F	-	-	-
3600	523336	321687	F	-	-	-
3601	523305	321668	F	-	-	-
3602	523377	321643	F	-	-	-
3603	523383	321622	F	-	-	-
3604	523388	321605	F	-	-	-
3605	523316	321630	F	-	-	-
3606	523328	321647	F	-	-	-
3607	523322	321645	F	-	-	-
3608	523325	321635	F	-	-	-
3700	523332	321768	F	-	-	-
3701	523331	321706	F	-	-	-
3702	523338	321741	F	-	-	-
3800	523386	321873	F	-	1.428	-
3801	523388	321867	F	-	1.491	-
3802	523381	321815	F	-	1.891	-
3803	523346	321858	F	-	-	-
3902	523392	321914	F	-	1.09	-
3906	523300	321926	F	2.646	1.3	1.346
3907	523393	321900	F	-	-	-
4200	523446	321278	F	-	-	-
4202	523410	321294	F	-	-	-
4301	523476	321393	F	-	-	-
4302	523461	321379	F	-	-	-
4303	523422	321397	F	-	-	-
4304	523491	321397	F	-	-	-
4305	523413	321377	F	-	-	-
4306	523403	321364	F	-	-	-
4307	523408	321346	F	-	-	-
4308	523422	321339	F	-	-	-
4400	523490	321464	F	-	-	-
4401	523478	321439	F	-	-	-
4402	523450	321451	F	-	-	-
4403	523445	321441	F	-	-	-
4404	523422	321451	F	-	-	-
4405	523414	321455	F	-	-	-
4406	523433	321496	F	-	-	-
4407	523433	321477	F	-	-	-
4500	523434	321561	F	-	-	-
4501	523397	321563	F	-	-	-
4502	523455	321558	F	-	-	-
4503	523429	321594	F	-	-	-
4504	523423	321593	F	-	-	-
4505	523415	321591	F	-	-	-
4506	523407	321589	F	-	-	-
4600	523430	321635	F	-	-	-
4601	523416	321682	F	-	-	-
4602	523438	321609	F	-	-	-
4603	523412	321696	F	-	-	-
4604	523454	321684	F	-	-	-
4605	523435	321687	F	-	-	-
4606	523455	321690	F	-	-	-
4607	523429	321609	F	-	-	-
4700	523480	321749	F	-	-	-
4701	523456	321735	F	-	-	-
4702	523419	321792	F	-	-	-
4703	523437	321793	F	-	-	-
4704	523459	321783	F	-	-	-
4705	523458	321751	F	-	-	-
4706	523451	321800	F	-	-	-
4800	523400	321851	F	-	1.9	-
4801	523441	321845	F	2.942	0.652	2.29
4802	523448	321868	F	-	0.519	-
4803	523466	321891	F	3.124	0.366	2.758
4804	523498	321818	F	-	-	-
4805	523444	321812	F	-	-	-
4806	523439	321829	F	-	-	-
4807	523469	321821	F	-	-	-
4808	523401	321898	F	-	-	-
4809	523405	321897	F	-	-	-
4810	523406	321897	F	-	-	-
4901	523501	321921	F	3.15	0.02	3.13
4906	523449	321910	F	-	1.25	-
4907	523435	321916	F	3	1.353	1.647
5200	523512	321282	F	-	-	-
5202	523546	321283	F	-	-	-
5300	523595	321314	F	-	-	-
5301	523527	321343	F	-	-	-
5302	523530	321356	F	-	-	-
5303	523530	321370	F	-	-	-
5304	523517	321390	F	-	-	-
5305	523501	321397	F	-	-	-
5306	523592	321388	F	-	-	-
5307	523586	321374	F	-	-	-
5308	523523	321381	F	-	-	-
5400	523542	321447	F	-	-	-
5401	523577	321431	F	-	-	-
5402	523564	321400	F	-	-	-
5700	523503	321753	F	-	-	-
5701	523597	321783	F	-	-	-
5702	523575	321775	F	-	-	-
5703	523571	321728	F	-	-	-
5704	523571	321760	F	-	-	-
5801	523614	321840	F	2.71	-0.35	3.06
5802	523546	321885	F	3.12	-0.18	3.3

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
6300	523615	321361	F	-	-	-
6400	523635	321404	F	-	-	-
6700	523618	321789	F	-	-	-
6701	523657	321712	F	-	-	-
6702	523645	321743	F	-	-	-
6703	523666	321750	F	-	-	-
6704	523695	321791	F	-	-	-
6705	523695	321767	F	-	-	-
6706	523697	321723	F	-	-	-
6707	523686	321752	F	-	-	-
6801	523637	321847	F	2.71	-0.45	3.16
6803	523697	321864	F	-	-	-
6804	523640	321882	F	-	1.69	-
6805	523607	321817	F	-	-	-
6806	523626	321856	F	-	-	-
6910	523630	321921	F	-	1.46	-
7301	523768	321339	F	2.878	1.878	1
7302	523753	321362	F	2.983	1.593	1.39
7303	523794	321392	F	3.088	1.618	1.47
7304	523759	321394	F	3.134	1.454	1.68
7401	523776	321414	F	3.251	1.371	1.88
7402	523794	321428	F	-	-	-
7403	523797	321494	F	3.652	1.182	2.47
7601	523791	321680	F	3.8	2.44	1.36
7602	523793	321612	F	-	-	-
7603	523800	321633	F	-	-	-
7604	523797	321624	F	-	-	-
7702	523754	321778	F	3.63	2.62	1.01
7801	523765	321827	F	-	-	-
7803	523780	321884	F	3.53	1.97	1.56
7804	523720	321870	F	-	-	-
7805	523790	321897	F	-	-	-
8202	523828	321297	F	3.011	1.432	1.579
8301	523832	321316	F	2.971	1.851	1.12
8302	523813	321385	F	3.019	1.819	1.2
8303	523864	321386	F	2.869	2.219	0.65
8401	523853	321465	F	-	-	-
8402	523815	321482	F	3.531	1.061	2.47
8501	523823	321521	F	3.52	1.37	2.15
8502	523854	321591	F	2.74	1.69	1.05
8601	523885	321660	F	2.87	1.82	1.05
8701	523801	321706	F	3.7	0.39	3.31
8702	523824	321763	F	3.44	0.76	2.68
8703	523886	321710	F	-	-	-
8704	523888	321731	F	-	-	-
8801	523843	321812	F	3.2	1.13	2.07
8802	523839	321824	F	3.14	1.24	1.9
8803	523861	321845	F	3	1.4	1.6
8804	523870	321860	F	2.9	1.54	1.36
8805	523810	321891	F	-	-	-
9204	523949	321279	F	2.87	0.272	2.598
9205	523965	321284	F	2.951	0.01	2.941
9206	523960	321296	F	2.88	-0.16	3.04
9210	523946	321290	F	2.923	0.353	2.57
9301	523927	321326	F	2.901	1.201	1.7
9302	523906	321341	F	2.807	0.067	2.74
9303	523994	321375	F	-	-	-
9304	523933	321358	F	2.807	0.067	2.74
9305	523987	321328	F	2.37	-0.38	2.75
9306	523951	321309	F	2.8	1.63	1.17
9307	523933	321337	F	-	-	-
9401	523961	321423	F	3.542	0.352	3.19
9402	523900	321447	F	-	-	-
9501	523996	321505	F	-	-	-
9502	523991	321540	F	2.71	0.77	1.94
9503	523939	321560	F	2.93	1.61	1.32
9504	523911	321570	F	2.9	1.41	1.49
9505	523902	321575	F	2.87	2.23	0.64
9506	523954	321599	F	2.847	1.675	1.172
9601	523933	321620	F	3.11	2.02	1.09
9602	523991	321661	F	2.83	1.69	1.14
9700	523917	321726	F	-	-	-
9701	523967	321755	F	-	-	-
9702	523953	321716	F	-	-	-
9703	523944	321706	F	-	-	-
9704	523980	321733	F	-	-	-
9705	523950	321791	F	-	-	-
9706	523941	321778	F	-	-	-
9707	523967	321801	F	-	-	-
9708	523936	321766	F	-	-	-
9709	523991	321732	F	-	-	-
9800	523998	321825	F	-	-	-
9801	523953	321825	F	-	-	-
9802	523997	321882	F	-	-	-
9803	523989	321860	F	-	-	-
9804	523991	321843	F	-	-	-
9805	523956	321831	F	-	-	-
9806	523951	321832	F	-	-	-
9807	523947	321833	F	-	-	-
9809	523981	321848	F	-	-	-
9810	523980	321846	F	-	-	-
0351	523096	321313	S	-	-	-
0352	523095	321304	S	-	-	-
0751	523086	321716	S	-	-	-
0851	524075	321853	S	-	-	-
0852	524095	321824	S	-	-	-
0853	523088	321890	S	2.887	1.027	1.86
0854	523087	321817	S	3	1.37	1.63
0951	524013	321919	S	-	-	-
1351	523169	321311	S	-	-	-
1352	523143	321312	S	-	-	-
1353	523147	321346	S	-	-	-
1354	523178	321388	S	-	-	-

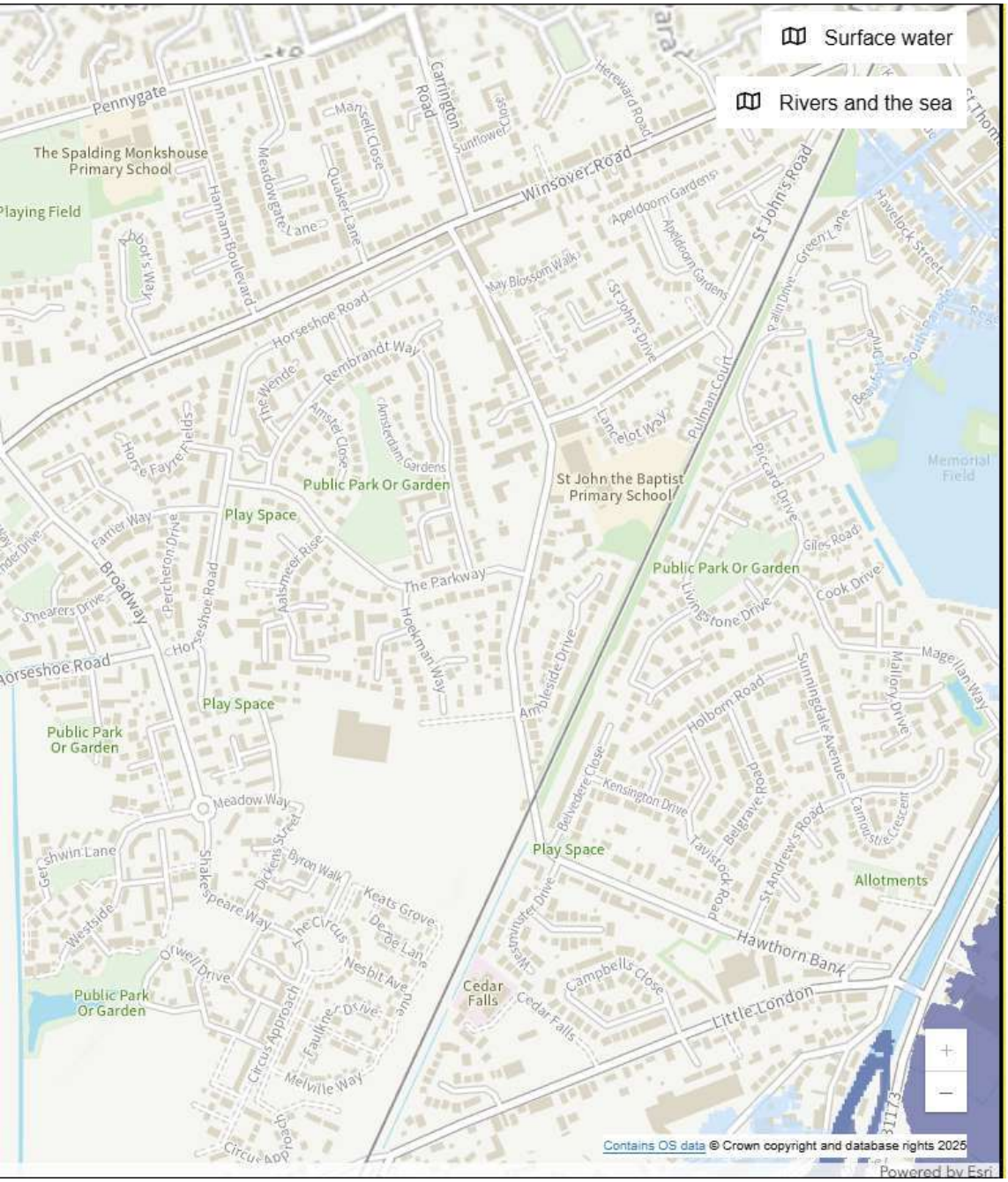
Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
1355	523160	321372	S	-	-	-
1356	523144	321319	S	-	-	-
1357	523144	321354	S	-	-	-
1357	523131	321396	S	-	-	-
1357	523127	321390	S	-	-	-
1357	523127	321381	S	-	-	-
1357	523130	321376	S	-	-	-
1357	523131	321360	S	-	-	-
1357	523131	321351	S	-	-	-
1357	523110	321389	S	-	-	-
1357	523116	321394	S	-	-	-
1357	523191	321351	S	-	-	-
1357	523146	321391	S	-	-	-
1357	523186	321357	S	-	-	-
1357	523145	321375	S	-	-	-
1357	523182	321362	S	-	-	-
1357	523145	321382	S	-	-	-
1357	523117	321359	S	-	-	-
1357	523132	321339	S	-	-	-
1357	523176	321392	S	-	-	-
1357	523154	321399	S	-	-	-
1357	523172	321374	S	-	-	-
1357	523195	321380	S	-	-	-
1357	523190	321386	S	-	-	-
1357	523188	321342	S	-	-	-
1451	523119	321478	S	-	-	-
1452	523151	321490	S	-	-	-
1453	523117	321496	S	-	-	-
1453	523118	321484	S	-	-	-
1453	523104	321492	S	-	-	-
1453	523107	321496	S	-	-	-
1453	523146	321493	S	-	-	-
1453	523139	321496	S	-	-	-
1454	523106	321430	S	-	-	-
1454	523115	321438	S	-	-	-
1454	523179	321441	S	-	-	-
1454	523192	321437	S	-	-	-
1454	523199	321422	S	-	-	-
1454	523111	321470	S	-	-	-
1454	523157	321409	S	-	-	-
1454	523151	321414	S	-	-	-
1454	523196	321408	S	-	-	-
1454	523188	321402	S	-	-	-
1550	523117	321504	S	-	-	-
1550	523157	321513	S	-	-	-
1550	523156	321512	S	-	-	-
1550	523151	321516	S	-	-	-
1551	523150	321517	S	-	-	-
1552	523190	321514	S	-	-	-
1552	523188	321514	S	-	-	-
1552	523190	321518	S	-	-	-
1552	523183	321521	S	-	-	-
1651	523131	321668	S	-	-	-
1652	523197	321655	S	-	-	-
1653	523193	321677	S	-	-	-
1751	523117	321785	S	3.1	1.37	1.73
1752	523171	321796	S	3.04	1.47	1.57
1753	523186	321774	S	3.16	1.54	1.62
1754	523187	321762	S	3.05	1.59	1.46
1755	523124	321725	S	-	-	-
1756	523186	321734	S	-	-	-
1757	523185	321739	S	-	-	-
1851	523189	321896	S	-	-	-
1852	523187	321883	S	3.22	0.97	2.25
1853	523147	321860	S	3	1.02	1.98
1854	523139	321847	S	2.89	1.07	1.82
1855	523137	321816	S	3.01	1.21	1.8
1856	523120	321812	S	2.95	1.27	1.68
1857	523105	321803	S	3.1	1.29	1.81
1858	523166	321813	S	3	1.35	1.65
1859	523179	321815	S	3	1.5	1.5
1952	523109	321914	S	2.739	0.969	1.77
2250	523253	321286	S	-	-	-
2351	523295	321381	S	-	-	-
2352	523245	321310	S	-	-	-
2353	523258	321308	S	-	-	-
2354	523262	321321	S	-	-	-
2355	523281	321347	S	-	-	-
2356	523262	321377	S	-	-	-
2356	523237	321381	S	-	-	-
2356	523223	321378	S	-	-	-
2356	523229	321400	S	-	-	-
2356	523231	321384	S	-	-	-
2356	523216	321382	S	-	-	-
2356	523261	321392	S	-	-	-
2356	523260	321399	S	-	-	-
2356	523270	321383	S	-	-	-
2408	523237	321406	S	-	-	-
2451	523224	321435	S	-	-	-
2452	523225	321446	S	-	-	-
2453	523290	321433	S	-	-	-
2454	523286	321468	S	-	-	-
2455	523220	321493	S	-	-	-
2456	523203	321495	S	-	-	-
2457	523288	321453	S	-	-	-
2458	523215	321419	S	-	-	-
2459	523206	321436	S	-	-	-
2459	523213	321438	S	-	-	-
2459	523204	321416	S	-	-	-
2459	523206	321429	S	-	-	-
2459	523296	321445	S	-	-	-
2459	523234	321453	S	-	-	-
2459	523241	321454	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
2459	523239	321470	S	-	-	-
2459	523255	321472	S	-	-	-
2459	523256	321461	S	-	-	-
2459	523295	321491	S	-	-	-
2459	523296	321475	S	-	-	-
2459	523281	321475	S	-	-	-
2459	523237	321480	S	-	-	-
2459	523267	321429	S	-	-	-
2459	523244	321402	S	-	-	-
2459	523247	321481	S	-	-	-
2459	523246	321495	S	-	-	-
2459	523231	321442	S	-	-	-
2459	523230	321439	S	-	-	-
2459	523259	321415	S	-	-	-
2459	523286	321431	S	-	-	-
2459	523287	321418	S	-	-	-
2460	523203	321499	S	-	-	-
2551	523251	321532	S	-	-	-
2552	523295	321542	S	-	-	-
2553	523285	321575	S	-	-	-
2555	523209	321538	S	-	-	-
2556	523234	321519	S	-	-	-
2557	523259	321535	S	-	-	-
2558	523295	321523	S	-	-	-
2558	523293	321511	S	-	-	-
2558	523258	321540	S	-	-	-
2558	523227	321545	S	-	-	-
2558	523253	321555	S	-	-	-
2558	523256	321508	S	-	-	-
2558	523270	321509	S	-	-	-
2558	523269	321520	S	-	-	-
2558	523253	321518	S	-	-	-
2558	523247	321515	S	-	-	-
2559	523207	321505	S	-	-	-
2559	523217	321501	S	-	-	-
2651	523249	321606	S	-	-	-
2652	523277	321614	S	-	-	-
2653	523267	321652	S	-	-	-
2751	523270	321765	S	3.354	1.234	2.12
2851	523257	321803	S	3.489	1.182	2.307
2852	523227	321851	S	3.109	1.125	1.984
2853	523290	321815	S	2.96	1.41	1.55
2854	523288	321838	S	3.12	1.32	1.8
2855	523284	321857	S	3.11	1.21	1.9
2856	523290	321888	S	2.91	-	-
2857	523284	321870	S	3.02	1.16	1.86
2858	523213	321842	S	-	-	-
2952	523212	321918	S	2.76	0.935	1.825
2955	523296	321914	S	2.74	1.09	1.65
2956	523201	321907	S	2.88	0.915	1.965
3250	523338	321280	S	-	-	-
3251	523305	321275	S	-	-	-
3350	523392	321344	S	-	-	-
3351	523380	321325	S	-	-	-
3352	523361	321319	S	-	-	-
3353	523338	321330	S	-	-	-
3354	523329	321335	S	-	-	-
3355	523327	321341	S	-	-	-
3356	523331	321314	S	-	-	-
3357	523396	321302	S	-	-	-
3451	523341	321499	S	-	-	-
3452	523338	321467	S	-	-	-
3453	523325	321427	S	-	-	-
3454	523394	321407	S	-	-	-
3455	523329	321438	S	-	-	-
3456	523301	321431	S	-	-	-
3456	523318	321433	S	-	-	-
3456	523319	321424	S	-	-	-
3456	523318	321451	S	-	-	-
3456	523307	321448	S	-	-	-
3456	523334	321490	S	-	-	-
3456	523323	321489	S	-	-	-
3456	523322	321495	S	-	-	-
3551	523383	321566	S	-	-	-
3552	523371	321547	S	-	-	-
3553	523308	321524	S	-	-	-
3553	523333	321504	S	-	-	-
3553	523322	321503	S	-	-	-
3651	523338	321686	S	-	-	-
3652	523379	321643	S	-	-	-
3653	523390	321604	S	-	-	-
3654	523386	321620	S	-	-	-
3751	523337	321759	S	-	-	-
3752	523333	321705	S	-	-	-
3753	523341	321744	S	-	-	-
3851	523348	321808	S	-	-	-
3952	523298	321926	S	2.68	1.08	1.6
4251	523448	321279	S	-	-	-
4300	523458	321378	S	-	-	-
4301	523469	321390	S	-	-	-
4302	523402	321366	S	-	-	-
4303	523464	321314	S	-	-	-
4304	523473	321333	S	-	-	-
4305	523435	321330	S	-	-	-
4306	523444	321322	S	-	-	-
4307	523490	321324	S	-	-	-
4450	523493	321468	S	-	-	-
4451	523479	321437	S	-	-	-
4452	523454	321448	S	-	-	-
4453	523450	321437	S	-	-	-
4454	523423	321449	S	-	-	-
4455	523415	321453	S	-	-	-
4456	523436	321497	S	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
4457	523436	321479	S	-	-	-
4458	523403	321496	S	-	-	-
4551	523438	321562	S	-	-	-
4552	523446	321520	S	-	-	-
4651	523420	321680	S	-	-	-
4652	523433	321634	S	-	-	-
4653	523440	321604	S	-	-	-
4654	523455	321682	S	-	-	-
4655	523439	321685	S	-	-	-
4656	523415	321699	S	-	-	-
4751	523460	321747	S	-	-	-
4752	523419	321752	S	-	-	-
4753	523418	321794	S	-	-	-
4754	523434	321795	S	-	-	-
4755	523461	321785	S	-	-	-
4851	523448	321865	S	-	1.336	-
4852	523470	321890	S	3.124	1.298	1.826
4853	523428	321899	S	-	-	-
4854	523445	321814	S	-	-	-
4855	523452	321802	S	-	-	-
4856	523442	321826	S	-	-	-
4951	523492	321912	S	3.354	1.255	2.099
4952	523450	321911	S	-	1.527	-
4954	523431	321918	S	-	1.68	-
5251	523511	321285	S	-	-	-
5252	523535	321274	S	-	-	-
5253	523541	321287	S	-	-	-
5350	523563	321332	S	-	-	-
5351	523530	321344	S	-	-	-
5352	523532	321359	S	-	-	-
5353	523515	321329	S	-	-	-
5354	523579	321375	S	-	-	-
5355	523585	321388	S	-	-	-
5356	523561	321399	S	-	-	-
5450	523527	321452	S	-	-	-
5451	523574	321429	S	-	-	-
5951	523505	321921	S	-	1.236	-
6350	523611	321307	S	-	-	-
6351	523631	321351	S	-	-	-
6352	523651	321396	S	-	-	-
6851	523642	321882	S	-	1.754	-
6852	523668	321890	S	-	1.83	-
6951	523605	321903	S	-	1.67	-
6952	523634	321912	S	-	1.703	-
6961	523631	321925	S	-	1.728	-
9652	523915	321718	S	-	-	-
9754	523959	321793	S	-	-	-
9755	523979	321730	S	-	-	-
9756	523953	321713	S	-	-	-
9757	523945	321703	S	-	-	-
9852	523995	321881	S	-	-	-
9853	523991	321872	S	-	-	-
9854	523987	321858	S	-	-	-
9855	523990	321840	S	-	-	-
9856	523996	321824	S	-	-	-
9857	523998	321818	S	-	-	-
9858	523989	321846	S	-	-	-
9859	523965	321803	S	-	-	-
9860	523952	321822	S	-	-	-

Appendix J

Environment Agency - Reservoir Flood Map



Reservoirs map

Extent

When river levels are normal

When there is also flooding from rivers

Map details

Show flooding

Appendix K

Proposed Drainage Strategy

NOTES

1. Contractors must check all dimensions on site. Only figured dimensions are to be worked from. Discrepancies must be reported to the Architect or Engineer before proceeding. © This drawing is copyright.

2. All plans and drawings are drawn true to stated scales and can be used for the purpose of planning only. Responsibility is not accepted for errors made by others in scaling from this drawing.

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4. Until technical approval has been obtained from the relevant authorities, all drawings are issued as preliminary and not for construction. Should the Contractor commence site work prior to approval being given it is entirely at their own risk.

5. Drainage subject to planning and detailed designs.

6. Surface Water drainage designed to prevent flooding during a 1 in 100 year event plus 40% allowance for Climate Change.

7. Attenuation Basins additionally designed to accomodate 10% Urban Creep.

8. Finished floor levels are indicative only and subject to detailed design (approx. +/-450mm).

9. Location and height of retaining features are indicative and subject to detailed design.

KEY

- Proposed Adoptable Foul Sewer
- Proposed Adoptable Surface Water Sewer
- Adoptable Drainage Easement
- Proposed Adoptable Rising Main
- FFL X.XXX — Proposed Finished Floor Level
- Contours (50mm spacing)
- Gravel Board
- RET xxx — Retaining Wall
- EFB xxx — Extra face brickwork
- Banking (1:3)
- Existing Gas main and easement
- FW Rising Main and easement
- Existing SWS
- Existing FWS
- Proposed attenuation basin

REV	DESCRIPTION	DRN	CHD	DATE
■	PRELIMINARY	☐	INFORMATION	☐	TENDER
☐	CONSTRUCTION	☐	AS BUILT		

SCALE	1:500 @ A0	DATE	April 2026
DRAWN	AT	CHK	GBR
DRAWING NO.	19690-MEAD-5-101	REV	-

TITLE: Land off Meadow Way
Spalding

DETAILS: Prelimary Drainage Strategy
.

Woods Hardwick
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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS DRAWING

Appendix L

Drainage Calculations

Woods Hardwick

Architecture | Engineering | Planning | Surveying

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes SW Manhole Sizes SW

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	1999
Site Location	GB 523750 321450 TF 23750 21450
C (1km)	-0.022
D1 (1km)	0.299
D2 (1km)	0.305
D3 (1km)	0.222
E (1km)	0.314
F (1km)	2.475
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.309	4-8	1.618	8-12	0.021

Total Area Contributing (ha) = 2.948

Total Pipe Volume (m³) = 369.298

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	13.990	0.095	147.3	0.080	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	32.656	0.140	233.3	0.086	0.00	0.0	0.600	o	450	Pipe/Conduit	
2.000	16.984	0.100	169.8	0.030	4.00	0.0	0.600	o	225	Pipe/Conduit	
3.000	18.389	0.115	159.9	0.030	4.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	4.18	2.235	0.080	0.0	0.0	0.0	1.29	91.4	0.0
1.001	0.00	4.59	2.140	0.166	0.0	0.0	0.0	1.33	211.0	0.0
2.000	0.00	4.28	2.325	0.030	0.0	0.0	0.0	1.00	39.8	0.0
3.000	0.00	4.30	2.415	0.030	0.0	0.0	0.0	1.03	41.0	0.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.001	35.390	0.150	235.9	0.057	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	24.013	0.080	300.2	0.030	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.003	29.461	0.090	327.3	0.100	0.00	0.0	0.600	o	525	Pipe/Conduit	
4.000	31.026	0.185	167.7	0.040	4.00	0.0	0.600	o	225	Pipe/Conduit	
4.001	17.532	0.075	233.8	0.075	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	32.224	0.050	644.5	0.067	0.00	0.0	0.600	o	1050	Pipe/Conduit	
1.005	17.020	0.030	567.3	0.050	0.00	0.0	0.600	o	1050	Pipe/Conduit	
5.000	13.824	0.085	162.6	0.052	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	28.470	0.120	237.3	0.039	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.002	5.413	0.024	225.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.003	6.298	0.026	242.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.004	38.263	0.065	588.7	0.068	0.00	0.0	0.600	o	600	Pipe/Conduit	
6.000	20.304	0.155	131.0	0.040	4.00	0.0	0.600	o	225	Pipe/Conduit	
6.001	7.533	0.050	150.7	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
5.005	24.852	0.045	552.3	0.059	0.00	0.0	0.600	o	600	Pipe/Conduit	
5.006	7.312	0.015	487.5	0.020	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.006	28.827	0.050	576.5	0.024	0.00	0.0	0.600	o	1050	Pipe/Conduit	
1.007	4.941	0.010	494.1	0.029	0.00	0.0	0.600	o	1050	Pipe/Conduit	
7.000	54.126	0.220	246.0	0.027	4.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.001	0.00	4.80	2.225	0.117	0.0	0.0	0.0	1.18	129.8	0.0
1.002	0.00	5.11	2.000	0.313	0.0	0.0	0.0	1.29	278.7	0.0
1.003	0.00	5.51	1.920	0.413	0.0	0.0	0.0	1.23	266.8	0.0
4.000	0.00	4.51	2.090	0.040	0.0	0.0	0.0	1.01	40.0	0.0
4.001	0.00	4.80	1.905	0.115	0.0	0.0	0.0	1.02	72.4	0.0
1.004	0.00	5.91	1.830	0.595	0.0	0.0	0.0	1.35	1168.9	0.0
1.005	0.00	6.10	1.780	0.645	0.0	0.0	0.0	1.44	1246.5	0.0
5.000	0.00	4.23	2.130	0.052	0.0	0.0	0.0	1.02	40.7	0.0
5.001	0.00	4.69	2.045	0.091	0.0	0.0	0.0	1.02	71.8	0.0
5.002	0.00	4.78	1.925	0.091	0.0	0.0	0.0	1.04	73.7	0.0
5.003	0.00	4.88	1.901	0.091	0.0	0.0	0.0	1.01	71.1	0.0
5.004	0.00	5.52	1.875	0.159	0.0	0.0	0.0	1.00	281.7	0.0
6.000	0.00	4.30	2.315	0.040	0.0	0.0	0.0	1.14	45.4	0.0
6.001	0.00	4.39	2.160	0.075	0.0	0.0	0.0	1.28	90.4	0.0
5.005	0.00	5.93	1.810	0.293	0.0	0.0	0.0	1.03	291.0	0.0
5.006	0.00	6.04	1.765	0.313	0.0	0.0	0.0	1.10	309.9	0.0
1.006	0.00	6.44	1.750	0.982	0.0	0.0	0.0	1.43	1236.5	0.0
1.007	0.00	6.49	1.700	1.011	0.0	0.0	0.0	1.54	1336.5	0.0
7.000	0.00	4.90	1.950	0.027	0.0	0.0	0.0	1.00	70.5	0.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.001	8.202	0.020	410.1	0.114	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.002	10.688	0.020	534.4	0.018	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.008	31.722	0.050	634.4	0.030	0.00	0.0	0.600	o	1050	Pipe/Conduit	
8.000	18.462	0.100	184.6	0.053	4.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	21.390	0.230	93.0	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.002	25.074	0.210	119.4	0.055	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.003	6.200	0.095	65.3	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.009	20.767	0.030	692.2	0.034	0.00	0.0	0.600	o	1050	Pipe/Conduit	
1.010	26.802	0.040	670.1	0.055	0.00	0.0	0.600	o	1050	Pipe/Conduit	
9.000	12.978	0.080	162.2	0.122	4.00	0.0	0.600	o	375	Pipe/Conduit	
9.001	29.651	0.100	296.5	0.075	0.00	0.0	0.600	o	375	Pipe/Conduit	
9.002	29.622	0.100	296.2	0.040	0.00	0.0	0.600	o	600	Pipe/Conduit	
10.000	32.233	0.350	92.1	0.069	4.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	13.846	0.565	24.5	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.003	27.597	0.090	306.6	0.030	0.00	0.0	0.600	o	675	Pipe/Conduit	
1.011	12.081	0.020	604.1	0.020	0.00	0.0	0.600	o	1050	Pipe/Conduit	
11.000	18.565	0.130	142.8	0.061	4.00	0.0	0.600	o	225	Pipe/Conduit	
11.001	9.817	0.040	245.4	0.049	0.00	0.0	0.600	o	375	Pipe/Conduit	
11.002	64.472	0.200	322.4	0.162	0.00	0.0	0.600	o	450	Pipe/Conduit	
11.003	55.278	0.095	581.9	0.225	0.00	0.0	0.600	o	825	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.001	0.00	5.04	1.730	0.141	0.0	0.0	0.0	1.00	158.7	0.0
7.002	0.00	5.21	1.710	0.159	0.0	0.0	0.0	1.05	295.9	0.0
1.008	0.00	6.88	1.690	1.200	0.0	0.0	0.0	1.36	1178.2	0.0
8.000	0.00	4.32	2.275	0.053	0.0	0.0	0.0	0.96	38.1	0.0
8.001	0.00	4.58	2.175	0.073	0.0	0.0	0.0	1.36	53.9	0.0
8.002	0.00	4.87	1.945	0.128	0.0	0.0	0.0	1.44	101.6	0.0
8.003	0.00	4.93	1.735	0.154	0.0	0.0	0.0	1.95	137.8	0.0
1.009	0.00	7.15	1.640	1.388	0.0	0.0	0.0	1.30	1127.5	0.0
1.010	0.00	7.48	1.610	1.443	0.0	0.0	0.0	1.32	1146.2	0.0
9.000	0.00	4.15	1.940	0.122	0.0	0.0	0.0	1.42	156.8	0.0
9.001	0.00	4.62	1.860	0.197	0.0	0.0	0.0	1.05	115.6	0.0
9.002	0.00	4.97	1.760	0.237	0.0	0.0	0.0	1.41	398.6	0.0
10.000	0.00	4.39	2.575	0.069	0.0	0.0	0.0	1.36	54.2	0.0
10.001	0.00	4.47	2.225	0.089	0.0	0.0	0.0	3.19	225.4	0.0
9.003	0.00	5.28	1.660	0.356	0.0	0.0	0.0	1.49	533.7	0.0
1.011	0.00	7.63	1.570	1.819	0.0	0.0	0.0	1.39	1207.7	0.0
11.000	0.00	4.28	2.050	0.061	0.0	0.0	0.0	1.09	43.4	0.0
11.001	0.00	4.43	1.920	0.110	0.0	0.0	0.0	1.15	127.2	0.0
11.002	0.00	5.38	1.880	0.272	0.0	0.0	0.0	1.13	179.2	0.0
11.003	0.00	6.13	1.680	0.497	0.0	0.0	0.0	1.22	654.1	0.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
11.004	18.253	0.035	521.5	0.084	0.00	0.0	0.600	o	825	Pipe/Conduit	
1.012	13.604	0.030	453.5	0.015	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.013	31.102	0.050	622.0	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	
12.000	19.012	0.035	543.2	0.268	4.00	0.0	0.600	o	1050	Pipe/Conduit	
1.014	8.845	0.083	106.6	0.265	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.015	10.946	0.008	1368.3	0.000	0.00	0.0	0.600	o	1200	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
11.004	0.00	6.37	1.585	0.581	0.0	0.0	0.0	1.29	691.2	0.0
1.012	0.00	7.76	1.550	2.415	0.0	0.0	0.0	1.75	1979.5	0.0
1.013	0.00	8.11	1.520	2.415	0.0	0.0	0.0	1.49	1688.1	0.0
12.000	0.00	4.22	1.470	0.268	0.0	0.0	0.0	1.47	1274.2	0.0
1.014	0.00	8.26	1.435	2.948	0.0	0.0	0.0	0.97	17.2	0.0
1.015	0.00	8.44	1.352	2.948	0.0	0.0	0.0	1.00	1133.7	0.0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	Ex MH	3.560	1.344	0.000	2800	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	E (1km)	0.314
Return Period (years)	100	F (1km)	2.475
FEH Rainfall Version	1999	Summer Storms	Yes
Site Location	GB 523750 321450 TF 23750 21450	Winter Storms	No
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305	Storm Duration (mins)	15
D3 (1km)	0.222		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 47 (HB), DS/PN: 1.014, Volume (m³): 57.5

Unit Reference	MD-SHE-0131-9300-1700-9300
Design Head (m)	1.700
Design Flow (l/s)	9.3
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	131
Invert Level (m)	1.435
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	9.3	Kick-Flo®	1.039	7.4
Flush-Flo™	0.503	9.3	Mean Flow over Head Range	-	8.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.7	0.800	8.8	2.000	10.0	4.000	13.9	7.000	18.2
0.200	8.1	1.000	7.8	2.200	10.5	4.500	14.7	7.500	18.8
0.300	8.9	1.200	7.9	2.400	10.9	5.000	15.5	8.000	19.4
0.400	9.2	1.400	8.5	2.600	11.4	5.500	16.2	8.500	20.0
0.500	9.3	1.600	9.0	3.000	12.2	6.000	16.9	9.000	20.6
0.600	9.2	1.800	9.6	3.500	13.1	6.500	17.6	9.500	21.1

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Storage Structures for Storm

Tank or Pond Manhole: Basin + UC, DS/PN: 12.000

Invert Level (m) 1.480

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1672.7	1.530	2500.0

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 Winter	1	+0%	30/15 Summer				2.315	-0.220	0.000	0.16
1.001	2	15 Winter	1	+0%	30/15 Summer				2.247	-0.343	0.000	0.12
2.000	3	15 Winter	1	+0%	30/15 Summer				2.378	-0.172	0.000	0.13
3.000	4	15 Winter	1	+0%	30/15 Winter				2.467	-0.173	0.000	0.12
2.001	5	15 Winter	1	+0%	30/15 Winter				2.317	-0.283	0.000	0.13
1.002	6	15 Winter	1	+0%	30/15 Winter				2.167	-0.358	0.000	0.17
1.003	7	15 Winter	1	+0%	30/15 Winter				2.124	-0.321	0.000	0.22
4.000	8	15 Winter	1	+0%	30/15 Summer				2.150	-0.165	0.000	0.16
4.001	9	15 Winter	1	+0%	30/15 Summer				2.097	-0.108	0.000	0.20
1.004	10	15 Winter	1	+0%	100/15 Summer				2.088	-0.792	0.000	0.07
1.005	11	15 Winter	1	+0%	100/15 Summer				2.066	-0.764	0.000	0.10
5.000	12	15 Winter	1	+0%	30/15 Summer				2.201	-0.154	0.000	0.22
5.001	13	15 Winter	1	+0%	30/15 Summer				2.134	-0.211	0.000	0.19
5.002	14	15 Winter	1	+0%	30/15 Summer				2.070	-0.155	0.000	0.22
5.003	15	15 Winter	1	+0%	30/15 Summer				2.068	-0.133	0.000	0.21
5.004	16	15 Winter	1	+0%	30/15 Winter				2.065	-0.410	0.000	0.07
6.000	17	15 Winter	1	+0%	100/15 Summer				2.372	-0.168	0.000	0.15
6.001	18	15 Winter	1	+0%	30/15 Winter				2.242	-0.218	0.000	0.17
5.005	19	15 Winter	1	+0%	30/15 Winter				2.061	-0.349	0.000	0.12
5.006	20	15 Winter	1	+0%	30/15 Summer				2.052	-0.313	0.000	0.13
1.006	21	15 Winter	1	+0%	100/15 Summer				2.049	-0.751	0.000	0.09
1.007	22	15 Winter	1	+0%	100/15 Summer				2.028	-0.722	0.000	0.11
7.000	23	15 Winter	1	+0%	30/15 Summer				2.026	-0.224	0.000	0.06
7.001	24	15 Winter	1	+0%	30/15 Summer				2.026	-0.154	0.000	0.13
7.002	25	15 Winter	1	+0%	30/15 Summer				2.025	-0.285	0.000	0.08
1.008	26	15 Winter	1	+0%	100/15 Summer				2.024	-0.716	0.000	0.10
8.000	27	15 Winter	1	+0%	30/15 Summer				2.348	-0.152	0.000	0.23
8.001	28	15 Winter	1	+0%	30/15 Summer				2.245	-0.155	0.000	0.21

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

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1		12.1	OK	
1.001	2		21.8	OK	
2.000	3		4.5	OK	
3.000	4		4.5	OK	
2.001	5		15.6	OK	
1.002	6		38.7	OK	
1.003	7		48.1	OK	
4.000	8		6.0	OK	
4.001	9		12.5	OK	
1.004	10		61.5	OK	
1.005	11		60.6	OK	
5.000	12		7.9	OK	
5.001	13		12.2	OK	
5.002	14		11.0	OK	
5.003	15		10.5	OK	
5.004	16		17.2	OK	
6.000	17		6.0	OK	
6.001	18		10.2	OK	
5.005	19		27.0	OK	
5.006	20		23.4	OK	
1.006	21		81.1	OK	
1.007	22		78.1	OK	
7.000	23		3.8	OK	
7.001	24		11.6	OK	
7.002	25		11.1	OK	
1.008	26		85.0	OK	
8.000	27		8.0	OK	
8.001	28		10.3	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
8.002	29	15 Winter	1	+0%	30/15 Summer				2.033	-0.212
8.003	30	15 Winter	1	+0%	30/15 Summer				2.007	-0.028
1.009	31	15 Winter	1	+0%	100/15 Summer				2.004	-0.686
1.010	32	15 Winter	1	+0%	100/15 Summer				1.977	-0.683
9.000	33	15 Summer	1	+0%	30/15 Summer				2.042	-0.273
9.001	34	15 Winter	1	+0%	30/15 Summer	100/15 Summer			1.992	-0.243
9.002	35	30 Winter	1	+0%	30/15 Winter				1.967	-0.393
10.000	36	15 Winter	1	+0%	100/15 Summer				2.644	-0.156
10.001	37	15 Winter	1	+0%	100/15 Summer				2.276	-0.249
9.003	38	30 Winter	1	+0%	30/15 Winter				1.964	-0.371
1.011	39	30 Winter	1	+0%	100/15 Summer				1.958	-0.662
11.000	40	15 Winter	1	+0%	30/15 Summer	100/15 Summer			2.124	-0.151
11.001	41	15 Winter	1	+0%	30/15 Summer				2.037	-0.258
11.002	42	15 Winter	1	+0%	30/15 Summer				2.019	-0.311
11.003	43	30 Winter	1	+0%	100/15 Summer				1.964	-0.541
11.004	44	30 Winter	1	+0%	100/15 Summer				1.943	-0.467
1.012	45	30 Winter	1	+0%	100/15 Summer				1.934	-0.816
1.013	46	30 Winter	1	+0%	100/15 Summer				1.914	-0.806
12.000	Basin + UC	960 Winter	1	+0%	100/480 Winter				1.691	-0.829
1.014	47 (HB)	30 Winter	1	+0%	1/15 Summer				1.891	0.306
1.015	48	30 Winter	1	+0%					1.477	-1.075

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.002	29	0.000	0.19		16.8	OK	
8.003	30	0.000	0.21		16.5	OK	
1.009	31	0.000	0.16		91.1	OK	
1.010	32	0.000	0.13		91.6	OK	
9.000	33	0.000	0.17		18.5	OK	
9.001	34	0.000	0.26		26.8	OK	2
9.002	35	0.000	0.06		20.9	OK	
10.000	36	0.000	0.20		10.4	OK	
10.001	37	0.000	0.07		12.7	OK	
9.003	38	0.000	0.06		25.8	OK	
1.011	39	0.000	0.22		101.9	OK	
11.000	40	0.000	0.24		9.2	OK	2
11.001	41	0.000	0.16		14.7	OK	
11.002	42	0.000	0.20		32.6	OK	
11.003	43	0.000	0.07		40.4	OK	
11.004	44	0.000	0.09		35.1	OK	
1.012	45	0.000	0.15		128.3	OK	
1.013	46	0.000	0.11		128.1	OK	
12.000	Basin + UC	0.000	0.02		9.9	OK	
1.014	47 (HB)	0.000	0.60		9.1	SURCHARGED	
1.015	48	0.000	0.01		9.1	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 Winter	30	+0%	30/15 Summer				2.711	0.176	0.000	0.49
1.001	2	30 Winter	30	+0%	30/15 Summer				2.637	0.047	0.000	0.27
2.000	3	15 Winter	30	+0%	30/15 Summer				2.646	0.096	0.000	0.39
3.000	4	15 Winter	30	+0%	30/15 Winter				2.647	0.007	0.000	0.39
2.001	5	15 Winter	30	+0%	30/15 Winter				2.629	0.029	0.000	0.45
1.002	6	15 Winter	30	+0%	30/15 Winter				2.540	0.015	0.000	0.49
1.003	7	15 Winter	30	+0%	30/15 Winter				2.526	0.081	0.000	0.62
4.000	8	15 Winter	30	+0%	30/15 Summer				2.554	0.239	0.000	0.46
4.001	9	15 Winter	30	+0%	30/15 Summer				2.535	0.330	0.000	0.82
1.004	10	15 Winter	30	+0%	100/15 Summer				2.505	-0.375	0.000	0.24
1.005	11	15 Winter	30	+0%	100/15 Summer				2.481	-0.349	0.000	0.31
5.000	12	15 Winter	30	+0%	30/15 Summer				2.724	0.369	0.000	0.62
5.001	13	15 Winter	30	+0%	30/15 Summer				2.696	0.351	0.000	0.53
5.002	14	15 Winter	30	+0%	30/15 Summer				2.607	0.382	0.000	0.61
5.003	15	15 Winter	30	+0%	30/15 Summer				2.541	0.340	0.000	0.57
5.004	16	15 Winter	30	+0%	30/15 Winter				2.497	0.022	0.000	0.22
6.000	17	15 Winter	30	+0%	100/15 Summer				2.506	-0.034	0.000	0.47
6.001	18	15 Winter	30	+0%	30/15 Winter				2.495	0.035	0.000	0.59
5.005	19	15 Winter	30	+0%	30/15 Winter				2.490	0.080	0.000	0.34
5.006	20	15 Winter	30	+0%	30/15 Summer				2.479	0.114	0.000	0.41
1.006	21	15 Winter	30	+0%	100/15 Summer				2.473	-0.327	0.000	0.27
1.007	22	15 Winter	30	+0%	100/15 Summer				2.448	-0.302	0.000	0.29
7.000	23	15 Winter	30	+0%	30/15 Summer				2.456	0.206	0.000	0.16
7.001	24	15 Winter	30	+0%	30/15 Summer				2.451	0.271	0.000	0.64
7.002	25	15 Winter	30	+0%	30/15 Summer				2.446	0.136	0.000	0.42
1.008	26	15 Winter	30	+0%	100/15 Summer				2.443	-0.297	0.000	0.30
8.000	27	15 Winter	30	+0%	30/15 Summer				2.624	0.124	0.000	0.70
8.001	28	15 Winter	30	+0%	30/15 Summer				2.594	0.194	0.000	0.61

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

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1		36.8	SURCHARGED	
1.001	2		50.0	SURCHARGED	
2.000	3		14.0	SURCHARGED	
3.000	4		14.5	SURCHARGED	
2.001	5		52.3	SURCHARGED	
1.002	6		110.0	SURCHARGED	
1.003	7		137.0	SURCHARGED	
4.000	8		17.3	SURCHARGED	
4.001	9		51.1	SURCHARGED	
1.004	10		200.1	OK	
1.005	11		181.4	OK	
5.000	12		21.9	SURCHARGED	
5.001	13		34.6	SURCHARGED	
5.002	14		30.7	SURCHARGED	
5.003	15		28.5	SURCHARGED	
5.004	16		51.5	SURCHARGED	
6.000	17		19.4	OK	
6.001	18		36.3	SURCHARGED	
5.005	19		74.2	SURCHARGED	
5.006	20		75.3	SURCHARGED	
1.006	21		229.0	OK	
1.007	22		204.8	OK	
7.000	23		10.4	SURCHARGED	
7.001	24		57.7	SURCHARGED	
7.002	25		60.3	SURCHARGED	
1.008	26		250.1	OK	
8.000	27		23.9	SURCHARGED	
8.001	28		29.8	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
8.002	29	15 Winter	30	+0%	30/15 Summer				2.553	0.308
8.003	30	15 Winter	30	+0%	30/15 Summer				2.497	0.462
1.009	31	15 Winter	30	+0%	100/15 Summer				2.413	-0.277
1.010	32	15 Winter	30	+0%	100/15 Summer				2.400	-0.260
9.000	33	30 Winter	30	+0%	30/15 Summer				2.551	0.236
9.001	34	15 Winter	30	+0%	30/15 Summer	100/15 Summer			2.477	0.242
9.002	35	15 Winter	30	+0%	30/15 Winter				2.393	0.033
10.000	36	15 Winter	30	+0%	100/15 Summer				2.708	-0.092
10.001	37	15 Winter	30	+0%	100/15 Summer				2.396	-0.129
9.003	38	15 Winter	30	+0%	30/15 Winter				2.385	0.050
1.011	39	15 Winter	30	+0%	100/15 Summer				2.376	-0.244
11.000	40	15 Winter	30	+0%	30/15 Summer	100/15 Summer			2.595	0.320
11.001	41	15 Winter	30	+0%	30/15 Summer				2.584	0.289
11.002	42	15 Winter	30	+0%	30/15 Summer				2.580	0.250
11.003	43	15 Winter	30	+0%	100/15 Summer				2.505	0.000
11.004	44	15 Winter	30	+0%	100/15 Summer				2.410	0.000
1.012	45	15 Winter	30	+0%	100/15 Summer				2.362	-0.388
1.013	46	15 Winter	30	+0%	100/15 Summer				2.347	-0.373
12.000	Basin + UC	960 Winter	30	+0%	100/480 Winter				2.052	-0.468
1.014	47 (HB)	15 Winter	30	+0%	1/15 Summer				2.321	0.736
1.015	48	60 Winter	30	+0%					1.477	-1.075

PN	US/MH Name	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.002	29	0.000	0.52		47.0	SURCHARGED	
8.003	30	0.000	0.72		55.4	SURCHARGED	
1.009	31	0.000	0.49		269.9	OK	
1.010	32	0.000	0.37		257.4	OK	
9.000	33	0.000	0.30		33.2	SURCHARGED	
9.001	34	0.000	0.78		80.1	SURCHARGED	2
9.002	35	0.000	0.26		84.3	SURCHARGED	
10.000	36	0.000	0.66		33.3	OK	
10.001	37	0.000	0.23		42.9	OK	
9.003	38	0.000	0.27		113.4	SURCHARGED	
1.011	39	0.000	0.74		337.3	OK	
11.000	40	0.000	0.66		25.9	SURCHARGED	2
11.001	41	0.000	0.48		44.9	SURCHARGED	
11.002	42	0.000	0.67		111.9	SURCHARGED	
11.003	43	0.000	0.33		183.1	OK	
11.004	44	0.000	0.39		149.3	OK	
1.012	45	0.000	0.53		446.7	OK	
1.013	46	0.000	0.37		429.1	OK	
12.000	Basin + UC	0.000	0.03		17.2	OK	
1.014	47 (HB)	0.000	0.61		9.3	SURCHARGED	
1.015	48	0.000	0.01		9.3	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
1.000	1	15 Winter	100	+40%	30/15 Summer				3.621	1.086	0.000	0.93
1.001	2	15 Winter	100	+40%	30/15 Summer				3.525	0.935	0.000	0.79
2.000	3	15 Winter	100	+40%	30/15 Summer				3.557	1.007	0.000	0.64
3.000	4	15 Winter	100	+40%	30/15 Winter				3.555	0.915	0.000	0.61
2.001	5	15 Winter	100	+40%	30/15 Winter				3.513	0.913	0.000	0.77
1.002	6	15 Winter	100	+40%	30/15 Winter				3.418	0.893	0.000	1.12
1.003	7	15 Winter	100	+40%	30/15 Winter				3.355	0.910	0.000	1.50
4.000	8	15 Winter	100	+40%	30/15 Summer				3.388	1.073	0.000	0.91
4.001	9	15 Winter	100	+40%	30/15 Summer				3.314	1.109	0.000	1.65
1.004	10	15 Winter	100	+40%	100/15 Summer				3.217	0.337	0.000	0.57
1.005	11	15 Winter	100	+40%	100/15 Summer				3.192	0.362	0.000	0.86
5.000	12	15 Winter	100	+40%	30/15 Summer				3.566	1.211	0.000	1.30
5.001	13	15 Winter	100	+40%	30/15 Summer				3.445	1.100	0.000	1.21
5.002	14	15 Winter	100	+40%	30/15 Summer				3.359	1.134	0.000	1.45
5.003	15	15 Winter	100	+40%	30/15 Summer				3.304	1.103	0.000	1.38
5.004	16	15 Winter	100	+40%	30/15 Winter				3.253	0.778	0.000	0.51
6.000	17	15 Winter	100	+40%	100/15 Summer				3.363	0.823	0.000	0.83
6.001	18	15 Winter	100	+40%	30/15 Winter				3.302	0.842	0.000	1.00
5.005	19	15 Winter	100	+40%	30/15 Winter				3.229	0.819	0.000	1.03
5.006	20	15 Winter	100	+40%	30/15 Summer				3.191	0.826	0.000	1.27
1.006	21	15 Winter	100	+40%	100/15 Summer				3.172	0.372	0.000	0.85
1.007	22	15 Winter	100	+40%	100/15 Summer				3.138	0.388	0.000	1.04
7.000	23	15 Winter	100	+40%	30/15 Summer				3.162	0.912	0.000	0.31
7.001	24	15 Winter	100	+40%	30/15 Summer				3.144	0.964	0.000	1.41
7.002	25	15 Winter	100	+40%	30/15 Summer				3.130	0.820	0.000	0.96
1.008	26	15 Winter	100	+40%	100/15 Summer				3.121	0.381	0.000	0.98
8.000	27	15 Winter	100	+40%	30/15 Summer				3.896	1.396	0.000	1.29
8.001	28	15 Winter	100	+40%	30/15 Summer				3.733	1.333	0.000	1.17

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

PN	US/MH Name	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1		70.9	FLOOD RISK	
1.001	2		144.5	FLOOD RISK	
2.000	3		22.8	FLOOD RISK	
3.000	4		22.6	FLOOD RISK	
2.001	5		89.4	SURCHARGED	
1.002	6		251.2	FLOOD RISK	
1.003	7		334.4	SURCHARGED	
4.000	8		34.0	SURCHARGED	
4.001	9		102.4	SURCHARGED	
1.004	10		477.7	SURCHARGED	
1.005	11		498.6	SURCHARGED	
5.000	12		45.9	SURCHARGED	
5.001	13		78.9	SURCHARGED	
5.002	14		72.5	SURCHARGED	
5.003	15		68.9	SURCHARGED	
5.004	16		120.5	SURCHARGED	
6.000	17		34.2	FLOOD RISK	
6.001	18		61.7	SURCHARGED	
5.005	19		223.4	SURCHARGED	
5.006	20		235.3	SURCHARGED	
1.006	21		729.7	SURCHARGED	
1.007	22		736.0	SURCHARGED	
7.000	23		21.0	SURCHARGED	
7.001	24		126.4	SURCHARGED	
7.002	25		136.0	SURCHARGED	
1.008	26		825.5	SURCHARGED	
8.000	27		44.3	FLOOD RISK	
8.001	28		57.6	FLOOD RISK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
8.002	29	15 Winter	100	+40%	30/15 Summer				3.406	1.161
8.003	30	15 Winter	100	+40%	30/15 Summer				3.219	1.184
1.009	31	15 Winter	100	+40%	100/15 Summer				3.077	0.387
1.010	32	15 Winter	100	+40%	100/15 Summer				3.028	0.368
9.000	33	15 Summer	100	+40%	30/15 Summer				3.198	0.883
9.001	34	15 Winter	100	+40%	30/15 Summer	100/15 Summer			3.092	0.857
9.002	35	15 Winter	100	+40%	30/15 Winter				3.021	0.661
10.000	36	15 Winter	100	+40%	100/15 Summer				3.582	0.782
10.001	37	15 Winter	100	+40%	100/15 Summer				3.158	0.633
9.003	38	15 Winter	100	+40%	30/15 Winter				2.998	0.663
1.011	39	15 Winter	100	+40%	100/15 Summer				2.970	0.350
11.000	40	15 Winter	100	+40%	30/15 Summer	100/15 Summer			3.481	1.206
11.001	41	15 Winter	100	+40%	30/15 Summer				3.324	1.029
11.002	42	15 Winter	100	+40%	30/15 Summer				3.264	0.934
11.003	43	15 Winter	100	+40%	100/15 Summer				2.970	0.465
11.004	44	15 Winter	100	+40%	100/15 Summer				2.938	0.528
1.012	45	15 Winter	100	+40%	100/15 Summer				2.907	0.157
1.013	46	15 Winter	100	+40%	100/15 Summer				2.842	0.122
12.000	Basin + UC	1440 Winter	100	+40%	100/480 Winter				2.623	0.103
1.014	47 (HB)	15 Winter	100	+40%	1/15 Summer				2.753	1.168
1.015	48	10080 Summer	100	+40%					1.477	-1.075

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
8.002	29	0.000	1.11		100.3	SURCHARGED	
8.003	30	0.000	1.53		118.4	SURCHARGED	
1.009	31	0.000	1.68		935.5	SURCHARGED	
1.010	32	0.000	1.32		929.5	SURCHARGED	
9.000	33	0.000	1.04		114.9	FLOOD RISK	
9.001	34	2.342	1.72		176.1	FLOOD	2
9.002	35	0.000	0.62		201.2	SURCHARGED	
10.000	36	0.000	1.22		62.1	SURCHARGED	
10.001	37	0.000	0.40		74.5	SURCHARGED	
9.003	38	0.000	0.71		295.4	SURCHARGED	
1.011	39	0.000	2.51		1138.5	SURCHARGED	
11.000	40	0.796	1.39		54.2	FLOOD	2
11.001	41	0.000	1.01		94.4	SURCHARGED	
11.002	42	0.000	1.42		235.2	SURCHARGED	
11.003	43	0.000	0.77		423.8	SURCHARGED	
11.004	44	0.000	1.25		483.3	SURCHARGED	
1.012	45	0.000	1.83		1539.0	SURCHARGED	
1.013	46	0.000	1.32		1522.4	SURCHARGED	
12.000	Basin + UC	0.000	0.01		8.8	SURCHARGED	
1.014	47 (HB)	0.000	0.61		9.3	SURCHARGED	
1.015	48	0.000	0.01		9.3	OK	

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes SW Manhole Sizes SW

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	1999
Site Location	GB 523750 321450 TF 23750 21450
C (1km)	-0.022
D1 (1km)	0.299
D2 (1km)	0.305
D3 (1km)	0.222
E (1km)	0.314
F (1km)	2.475
Maximum Rainfall (mm/hr)	0
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.804	4-8	0.258

Total Area Contributing (ha) = 1.062

Total Pipe Volume (m³) = 41.888

Network Design Table for Storm

- Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	30.250	0.130	232.7	0.070	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	15.136	0.050	302.7	0.082	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	18.304	0.050	366.1	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	0.00	4.49	2.400	0.070	0.0	0.0	0.0	1.03	72.6	0.0
1.001	0.00	4.73	2.270	0.152	0.0	0.0	0.0	1.04	114.4	0.0
1.002	0.00	5.02	2.220	0.201	0.0	0.0	0.0	1.06	168.1	0.0

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Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	50.123	0.330	151.9	0.120	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	41.873	0.190	220.4	0.079	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.004	9.951	0.020	497.6	0.101	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.005	21.621#	0.060	360.4	0.052	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.000	21.923	0.130	168.6	0.034	4.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	31.053	0.100	310.5	0.038	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	11.771	0.050	235.4	0.060	4.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	22.585	0.080	282.3	0.020	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.003	26.135	0.170	153.7	0.067	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.004	13.404#	0.120	111.7	0.021	0.00	0.0	0.600	o	375	Pipe/Conduit	
5.000	9.391#	0.100	93.9	0.083	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	9.242	0.040	231.1	0.186	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.007	3.718	0.040	93.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	0.00	4.66	2.500	0.120	0.0	0.0	0.0	1.27	90.0	0.0
1.003	0.00	5.49	2.170	0.400	0.0	0.0	0.0	1.50	325.7	0.0
1.004	0.00	5.65	1.980	0.501	0.0	0.0	0.0	1.00	215.9	0.0
1.005	0.00	5.96	1.960	0.553	0.0	0.0	0.0	1.17	254.2	0.0
3.000	0.00	4.30	2.500	0.034	0.0	0.0	0.0	1.21	85.4	0.0
3.001	0.00	4.81	2.370	0.072	0.0	0.0	0.0	1.02	113.0	0.0
4.000	0.00	4.19	2.320	0.060	0.0	0.0	0.0	1.02	72.1	0.0
3.002	0.00	5.16	2.270	0.152	0.0	0.0	0.0	1.07	118.5	0.0
3.003	0.00	5.46	2.190	0.219	0.0	0.0	0.0	1.46	161.1	0.0
3.004	0.00	5.59	2.020	0.240	0.0	0.0	0.0	1.71	189.3	0.0
5.000	0.00	4.12	2.000	0.083	0.0	0.0	0.0	1.35	53.7	0.0
1.006	0.00	6.06	1.900	1.062	0.0	0.0	0.0	1.60	451.8	0.0
1.007	0.00	6.12	1.860	1.062	0.0	0.0	0.0	1.04	18.4	0.0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.007	Ex MH	3.100	1.820	0.000	0	0

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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	1.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 1	Number of Storage Structures 1	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	E (1km)	0.314
Return Period (years)	100	F (1km)	2.475
FEH Rainfall Version	1999	Summer Storms	Yes
Site Location GB 523750 321450 TF 23750 21450		Winter Storms	No
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305	Storm Duration (mins)	15
D3 (1km)	0.222		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 63 (FC), DS/PN: 1.007, Volume (m³): 11.0

Unit Reference	MD-SHE-0087-3600-1240-3600
Design Head (m)	1.240
Design Flow (l/s)	3.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	87
Invert Level (m)	1.860
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.240	3.6	Kick-Flo®	0.764	2.9
Flush-Flo™	0.373	3.6	Mean Flow over Head Range	-	3.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.6	0.800	2.9	2.000	4.5	4.000	6.2	7.000	8.1
0.200	3.4	1.000	3.3	2.200	4.7	4.500	6.6	7.500	8.4
0.300	3.6	1.200	3.5	2.400	4.9	5.000	6.9	8.000	8.6
0.400	3.6	1.400	3.8	2.600	5.1	5.500	7.2	8.500	8.9
0.500	3.5	1.600	4.0	3.000	5.4	6.000	7.5	9.000	9.1
0.600	3.4	1.800	4.3	3.500	5.8	6.500	7.8	9.500	9.4

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Storage Structures for Storm

Tank or Pond Manhole: Basin +UC, DS/PN: 1.006

Invert Level (m) 1.900

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	636.6	1.500	1329.5

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	50	15 Winter	1	+0%	30/15 Summer				2.480	-0.220	0.000
1.001	51	15 Winter	1	+0%	30/15 Summer				2.399	-0.246	0.000
1.002	52	15 Winter	1	+0%	100/15 Summer				2.367	-0.303	0.000
2.000	53	15 Winter	1	+0%	100/15 Summer				2.594	-0.206	0.000
1.003	54	15 Winter	1	+0%	100/15 Summer				2.329	-0.366	0.000
1.004	55	15 Winter	1	+0%	30/15 Summer				2.251	-0.254	0.000
1.005	56	15 Winter	1	+0%	100/15 Summer				2.162	-0.323	0.000
3.000	57	15 Winter	1	+0%	100/15 Summer				2.551	-0.249	0.000
3.001	58	15 Winter	1	+0%	100/15 Summer				2.451	-0.294	0.000
4.000	59	15 Winter	1	+0%	100/15 Summer				2.409	-0.211	0.000
3.002	60	15 Winter	1	+0%	100/15 Summer				2.383	-0.262	0.000
3.003	61	15 Winter	1	+0%	100/15 Summer				2.303	-0.262	0.000
3.004	62	15 Winter	1	+0%	30/360 Winter				2.139	-0.256	0.000
5.000	Private	600 Winter	1	+0%	30/30 Winter				2.091	-0.134	0.000
1.006	Basin +UC	600 Winter	1	+0%	100/30 Winter				2.090	-0.410	0.000
1.007	63 (FC)	600 Winter	1	+0%	1/30 Winter				2.093	0.083	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	50	0.16		10.4	OK	
1.001	51	0.21		19.5	OK	
1.002	52	0.18		24.4	OK	
2.000	53	0.21		17.6	OK	
1.003	54	0.17		48.5	OK	
1.004	55	0.52		57.7	OK	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	56	0.31		63.0	OK	
3.000	57	0.07		5.1	OK	
3.001	58	0.09		9.5	OK	
4.000	59	0.15		9.0	OK	
3.002	60	0.20		19.9	OK	
3.003	61	0.20		27.3	OK	
3.004	62	0.22		29.8	OK	
5.000	Private	0.03		1.2	OK	
1.006	Basin +UC	0.02		5.3	OK	
1.007	63 (FC)	0.28		3.5	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	50	15 Winter	30	+0%	30/15 Summer				2.837	0.137	0.000
1.001	51	15 Winter	30	+0%	30/15 Summer				2.750	0.105	0.000
1.002	52	15 Summer	30	+0%	100/15 Summer				2.670	0.000	0.000
2.000	53	15 Winter	30	+0%	100/15 Summer				2.738	-0.062	0.000
1.003	54	15 Winter	30	+0%	100/15 Summer				2.612	-0.083	0.000
1.004	55	15 Winter	30	+0%	30/15 Summer				2.526	0.021	0.000
1.005	56	15 Summer	30	+0%	100/15 Summer				2.485	0.000	0.000
3.000	57	15 Winter	30	+0%	100/15 Summer				2.599	-0.201	0.000
3.001	58	15 Winter	30	+0%	100/15 Summer				2.546	-0.199	0.000
4.000	59	15 Winter	30	+0%	100/15 Summer				2.526	-0.094	0.000
3.002	60	15 Winter	30	+0%	100/15 Summer				2.500	-0.145	0.000
3.003	61	15 Winter	30	+0%	100/15 Summer				2.423	-0.142	0.000
3.004	62	720 Winter	30	+0%	30/360 Winter				2.420	0.025	0.000
5.000	Private	720 Winter	30	+0%	30/30 Winter				2.419	0.194	0.000
1.006	Basin +UC	720 Winter	30	+0%	100/30 Winter				2.419	-0.081	0.000
1.007	63 (FC)	720 Winter	30	+0%	1/30 Winter				2.425	0.415	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	50	0.44		28.8	SURCHARGED	
1.001	51	0.69		62.9	SURCHARGED	
1.002	52	0.59		78.5	OK	
2.000	53	0.65		55.3	OK	
1.003	54	0.57		161.7	OK	
1.004	55	1.79		198.1	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	56	1.01		203.5	OK	
3.000	57	0.22		16.4	OK	
3.001	58	0.33		32.9	OK	
4.000	59	0.49		28.6	OK	
3.002	60	0.68		68.8	OK	
3.003	61	0.69		97.1	OK	
3.004	62	0.05		6.8	SURCHARGED	
5.000	Private	0.05		2.4	SURCHARGED	
1.006	Basin +UC	0.02		6.6	OK	
1.007	63 (FC)	0.29		3.6	SURCHARGED	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FEH	D3 (1km)	0.222
FEH Rainfall Version	1999	E (1km)	0.314
Site Location	GB 523750 321450 TF 23750 21450	F (1km)	2.475
C (1km)	-0.022	Cv (Summer)	0.750
D1 (1km)	0.299	Cv (Winter)	0.840
D2 (1km)	0.305		

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	50	15 Winter	100	+40%	30/15 Summer				3.781	1.081	0.000
1.001	51	15 Winter	100	+40%	30/15 Summer				3.661	1.016	0.000
1.002	52	15 Winter	100	+40%	100/15 Summer				3.539	0.869	0.000
2.000	53	15 Winter	100	+40%	100/15 Summer				4.066	1.266	0.000
1.003	54	15 Winter	100	+40%	100/15 Summer				3.439	0.744	0.000
1.004	55	15 Winter	100	+40%	30/15 Summer				3.142	0.637	0.000
1.005	56	1440 Winter	100	+40%	100/15 Summer				2.922	0.437	0.000
3.000	57	15 Winter	100	+40%	100/15 Summer				3.185	0.385	0.000
3.001	58	15 Winter	100	+40%	100/15 Summer				3.083	0.338	0.000
4.000	59	15 Winter	100	+40%	100/15 Summer				3.075	0.455	0.000
3.002	60	15 Winter	100	+40%	100/15 Summer				2.998	0.353	0.000
3.003	61	1440 Winter	100	+40%	100/15 Summer				2.922	0.357	0.000
3.004	62	1440 Winter	100	+40%	30/360 Winter				2.922	0.527	0.000
5.000	Private	1440 Winter	100	+40%	30/30 Winter				2.922	0.697	0.000
1.006	Basin +UC	1440 Winter	100	+40%	100/30 Winter				2.922	0.422	0.000
1.007	63 (FC)	1440 Winter	100	+40%	1/30 Winter				2.927	0.917	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	50	0.94		62.0	FLOOD RISK	
1.001	51	1.47		134.9	FLOOD RISK	
1.002	52	1.32		176.8	SURCHARGED	
2.000	53	1.32		112.2	FLOOD RISK	
1.003	54	1.24		352.1	SURCHARGED	
1.004	55	3.97		439.8	SURCHARGED	

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

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.005	56	0.09		18.1	SURCHARGED	
3.000	57	0.39		29.6	SURCHARGED	
3.001	58	0.62		61.7	SURCHARGED	
4.000	59	0.96		56.0	SURCHARGED	
3.002	60	1.30		131.7	SURCHARGED	
3.003	61	0.05		6.9	SURCHARGED	
3.004	62	0.06		7.5	SURCHARGED	
5.000	Private	0.06		2.6	SURCHARGED	
1.006	Basin +UC	0.03		7.0	SURCHARGED	
1.007	63 (FC)	0.29		3.6	SURCHARGED	

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Appendix M

Anglian Water Pre-Planning Assessment Report

Woods Hardwick

Architecture | Engineering | Planning | Surveying

Tier 1 Pre-Planning Assessment Report

Domestic Foul Water Drainage Feasibility Study and Potable Water Supply Assessment

Anglian Water Reference Number:	**PPE-0230012**
Report Engineer:	**Maks Zdunek**
Publication Date:	**28/07/2025**
Expiration Date:	**28/07/2026**
Site Name:	**Land off Meadow Way**
Development Details:	**210 dwellings**
Site National Grid Reference:	**TF2360221553**
Development Type:	**Brownfield**
Planning Application Status:	**NA**

This report has been produced for Broadgate Homes Ltd and is to be submitted as part of a developed drainage strategy should planning permission be sought.

Anglian Water will use this report as the basis for any forthcoming planning application response relevant to this application.

Anglian Water cannot reserve capacity and therefore you are recommended to formally apply for a connection at your earliest convenience. Please note that available capacity in both the receiving network and water recycling centre (WRC) can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

Summary

Easements We have assessed above and below ground operational assets in relation to your proposed development site
Water Recycling Centre (WRC) We have assessed the receiving water recycling centre to determine whether it can process the increased flows and effluent quality arising from your development and continue to meet its permitted discharge consents.
Foul Drainage Network - Sustainable Point of Connection (SPOC) We have assessed the receiving foul water drainage system to identify a sustainable point of connection for your site to connect to the public sewerage network without causing a detriment to the operation of the system.
Indicative costs – The water recycling infrastructure charge per dwelling is set for the 2025-26 charging period at £403.00. For a development of 210 dwellings the total infrastructure charge will total £84,630.00 excluding VAT.

Section 1 - Anglian Water Assets and Easements

The comments contained within this report relate to the public water mains and sewers indicated on our records. Your attention is drawn to the disclaimer in the useful information section of this report.

Pipes - We have identified pipework infrastructure within the boundaries of your site

Operational Assets – We do not have operational assets within 20 m of your site

Source Protection Zone (SPZ) – Your site does not sit within an identified SPZ

Water Recycling Centre (WRC) – Your site is not within the encroachment zone of Splading WRC

The proposed development site boundary is highlighted on Anglian Water's asset record in figure 1. Additionally, it is highly recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence.

Any potential instances of asset encroachment are to be identified and addressed at planning. Anglian Water are unable to permit development either over or within the easement strip without prior consent. The extent of asset easements are available in table 1. Please be aware that the existing water mains/public sewers should be located in highway or open space and not in private gardens. This is to ensure available access for any future maintenance and repair and this should be taken into consideration when planning your site layout.

Used Water Easements – Measured either side of the centre line (m)						
	Depth to Invert (m)					
Sewer Diameter(mm)	< 3	3 - 4	4 - 5	5 - 6	6 - 7.5	> 7.5
< 150	3.0	3.0	4.0	5.0	6.0	4.0
150 - 299	3.0	3.0	4.0	5.0	6.0	4.0
300 - 449	3.0	3.0	4.0	5.0	6.0	4.0
450 - 600	3.5	4.0	5.0	6.0	6.0	4.0
601 - 749	3.5	4.0	5.0	6.0	6.0	4.0
750 - 924	4.0	5.0	5.0	6.5	6.5	5.0
925 - 1000	5.0	5.0	6.0	6.5	6.5	5.0

Table 1: Anglian Water used water asset easements

If it is not possible to avoid our assets then these may need to be diverted in accordance with Section 185 of the Water Industry Act (1991). You will need to make a formal application if you would like a diversion to be considered; please note that in some instances assets cannot be diverted; it is therefore vital to engage with our Drainage team prior to finalising site layout. The Drainage team can be contacted by calling 03456 066 087.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

For your information, please be aware:

- We need to inform you that there are water mains (148mm and 196mm) and sewer mains (150mm, 225mm, 250mm and 375mm) within your site boundary.
- Anglian Water does not permit existing assets to be located within the curtilage of the proposed development buildings and we do not permit permeable paving or suds features over our assets. These assets should be located in areas of public open space and/or adoptable highways to ensure on-going maintenance and access is possible. We strongly recommend that the applicant reviews the site layout plan and take the above in consideration to reflect the easement required for the asset.
- Development is not permissible either over or within the established easement strip of any public asset without Anglian Water's granted prior consent.
- A new developments site layout must adhere to the required easements. You may also discuss potential diversions with us.
- Please be aware that existing water mains/public sewers should be located in highway or open space and not in private gardens or curtilages.
- Rising mains may not be located under play equipment or SUDS features. This is to ensure available access for any future maintenance and repair and this should be taken into consideration when planning your site layout.
- No significant planting can be located in the designated easement strip, to ensure that root intrusion does not pose a risk to our assets. Where necessary and to maintain the aesthetics of the proposed landscaping, ornamental/low lying hedges or similar are considered acceptable, but should be limited.
- In any case where site levels are to be altered within an easement strip, Anglian Water will request a CCTV survey is undertaken to understand the existing condition of the affected sewer and potential impact of this proposal. The footage and accompanying report should be provided to Anglian Water alongside any observations or recommendations (should these be identified) by your designer. In addition, the manholes in this area would also need to be raised to finished level. Anglian Water would expect photographs confirming the existing construction of these chambers and a design drawing which illustrates how this outcome will be achieved whilst maintaining compliance with Design and Construction Guidance (DCG) standards.
- Anglian Water will expect confirmation of the established measures that will allow 24 hour unencumbered access for assets within the vicinity of the development. It is beneficial to understand how awareness of Anglian Water's need for access to provide this in perpetuity will be established going forward. It can be assumed that plot transfers (if appropriate) will contain covenants/rights relating to these assets; we would appreciate clarification on this point.
- It is the developer's responsibility to ensure the correct sight surveys are completed i.e. trial holes, to ascertain the exact location of Anglian Water assets. You should then present your findings to Anglian Water – we may need to complete formal risk assessments (at the developers cost) for certain asset types.

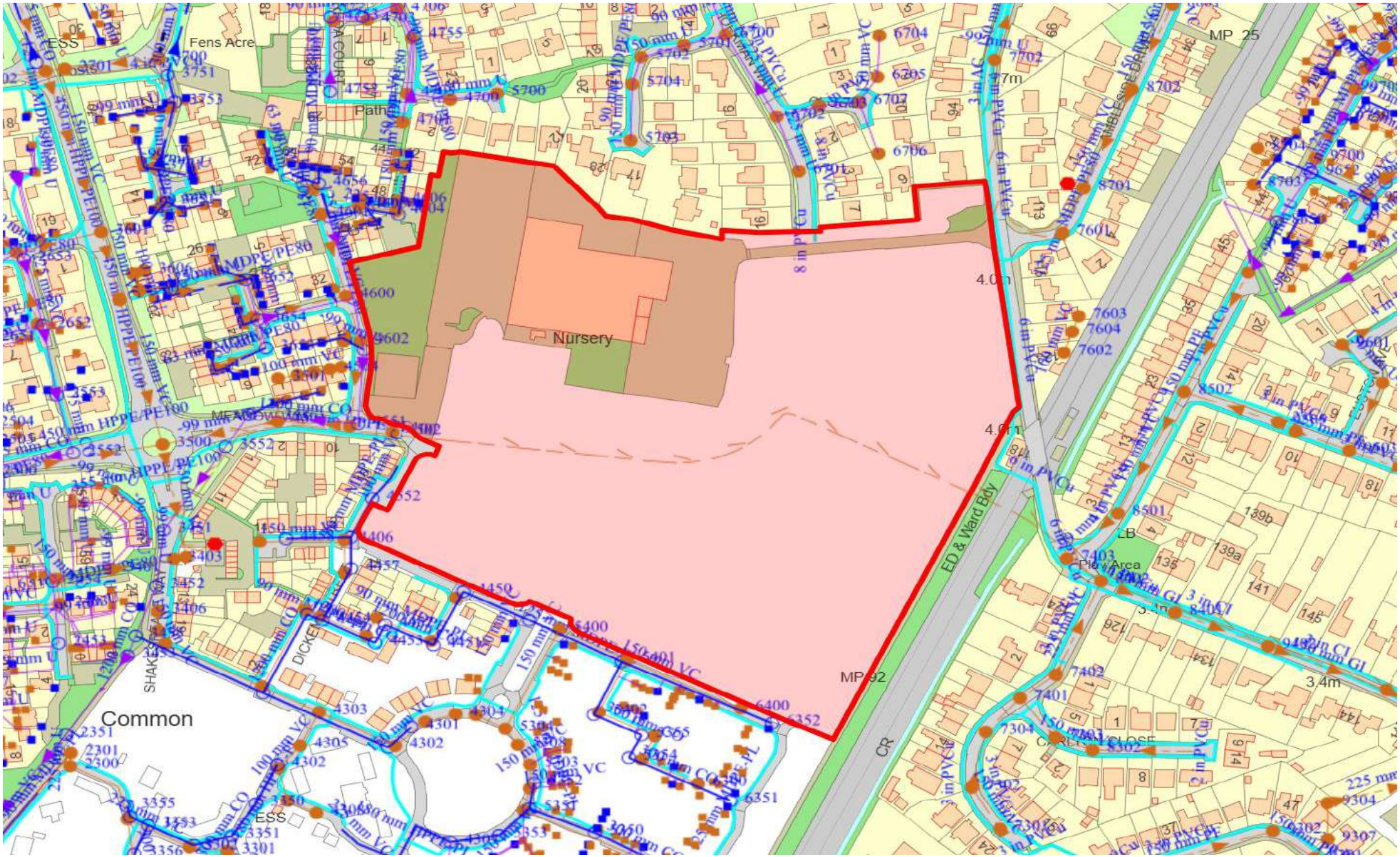

Figure 1: The site boundary for the proposed development as shown on Anglian Water asset records.

Section 2 - Water supply

In examining the available capacity for your development site we assess the capacity and costs for two categories of water main. These are:

Strategic
Offsite potable water mains which deliver water within an area to a large number of development sites often across a number of towns. The strategic provision of these water mains enables us to provide the cheapest solution across a large geographical area.

Local reinforcement
Localised reinforcement mains to enable us to provide water to your development site. On most sites we also have two categories of water mains the Spine Mains and housing Estate Mains (HEMs). To support your budgeting arrangements we have also examined the estimated cost for delivering the onsite water mains needed for a site of your size.

Water Supply Network Capacity
The water supply to the proposed development site can be provided from the existing mains. Our assessment has been based on a flow rate of 2.768l/s, if the flow rate you require is greater than this, please raise a further question through our customer portal. Anglian Water cannot reserve capacity and therefore you are recommended to formally apply for a connection at your earliest convenience. Please note that available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

It is recommended that you apply for a formal mains connection at the earliest opportunity to allow us to design and plan the delivery of your connection work. Additionally, please note that where offsite reinforcement work has been identified, it could take up to 18 months to complete the necessary offsite reinforcement depending on the level of complexity.

The connection point for the site will be in Meadow Way at NGR. TF2347621553.

Connection Point	Address	National Grid Reference
CP-12959	Meadow Way, Spalding	TF2347621553

Budget Water Costs
The costs provided in this report are based on the current information available. These costs are provided as an indicative estimate to help inform you on a budget for supplying water to your site.

Your development site will be required to pay an infrastructure charge for each new property connecting to the public water network that benefits from Full planning permission. The infrastructure charge replaces the zonal charge as previously identified.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

- The Infrastructure Charge is based on the cost of any reinforcement and upgrades to our existing network(“Network Reinforcements”), whether designed to address strategic or local capacity

issues. For more information on our Infrastructure Charge, please see the 'Useful Information' section of this report.

- Site-Specific costs, including those incurred through delivery of new infrastructure up to, and including, the point of connection to our network, **are the responsibility of the developer.** These costs are separate from and additional to any works funded through infrastructure charging.

On-Site Water Supply Infrastructure Delivery Cost Estimate
Anglian Water's cost estimate for the developer to deliver the onsite water mains for the domestic properties in the proposed development is included below:

Onsite Water Main	Number of Units	Estimated cost
Estimated cost of onsite main delivery	210	£231,000.00

Water Infrastructure Charge
Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). however, if the new connection is to non-household premises, the infrastructure charges is calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our website.

The Water Infrastructure charge for your dwellings is:

Infrastructure Charge	Number of Units	Total
£ 502	210	£ 105,420.00

A detailed cost breakdown will be provided on receipt of a formal application for a new water main.

Alternatively, you may wish to have the onsite main delivered by a Self-lay Provider under terms set out in a self-lay agreement. For more information on water mains and self-lay of water mains, please visit our website.

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge and the relevant multiplier will be applied to the figures set out in our 2025-26 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our website.

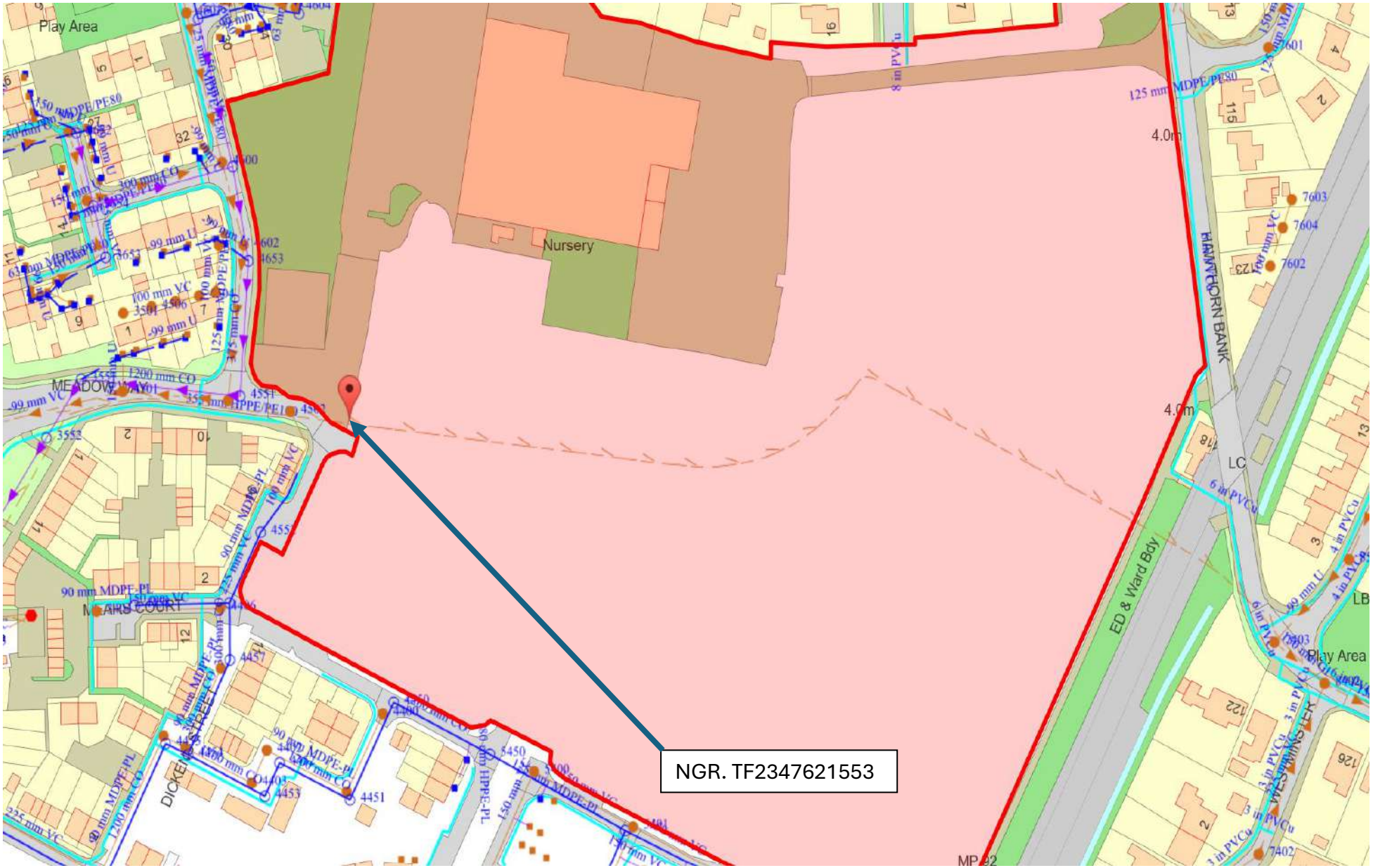

Figure 1: Showing your connection point for potable water supply

Section 3 – Used Water Assessment
In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine the headroom available to manage the increased effluent flows and effluent quality from your development.

Water Recycling Centre
This site is within the catchment of Spalding Water Recycling Centre (WRC), which currently can accommodate the additional flows generated by the proposed development. Spalding WRC is included within our Business Plan as a named growth scheme with investment delivery planned between 2025-2030.

To ensure there is no pollution or deterioration in the receiving watercourse due to the development foul flows we recommend a planning condition is applied if permission is granted.

Condition: Prior to occupation written confirmation from Anglian Water must be submitted confirming there is sufficient headroom at the water recycling centre to accommodate the foul flows from the development site. This condition shall cease to have effect if the development is first occupied after April 2030.

Reason: to protect water quality, prevent pollution and secure sustainable development having regard to paragraphs 7/8 and 187 of the National Planning Policy Framework

Used Water Network
Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network.

This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The applicant's proposed connection points to the sewers in Shakespeare Way, Dickens Street, Byron Walk and Keats Grove are to private sewers that discharge into the 225mm Anglian Water sewer at national grid reference (NGR) TF 23345 21482, to manhole MH3403 in Shakespeare Way. Please note that private assets are not available for assessment by Anglian Water, and should the developers wish to connect to this network, it is recommended they engage with the private owners of the network to request permission to connect. We have assessed the sustainable points of connection, which are to the 150mm sewer at MH4500 located in Meadow Way at National Grid reference (NGR) TF 23433 21560, the sewer upstream of this point in Honeysuckle Way, and the aforementioned 225mm sewer connection in Shakespeare Way. Anglian Water has assessed the local foul sewerage network up to the water recycling centre and determined that the additional foul flow from the proposed development would not create an unacceptable risk of flooding to our existing customers and the environment. In line with the Sewage Sector Guidance - Appendix C - Design and Construction Guidance (DCG), found at https://www.water.org.uk/sewerage-sector-guidance-approved-documents, the pumped discharge will need to connect via an intermediate manhole and at least 5 metres of an appropriately sized gravity sewer. The pump rate and configuration of the connection will be determined with your detailed design. You should submit this detail with your Section 106 new connection application. Anglian Water cannot reserve capacity and therefore you are recommended to formally apply for a connection at your earliest convenience.

Please note that available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.
Please note that Anglian Water will request a suitably worded condition at planning application stage to

ensure this strategy is implemented to mitigate the risk of flooding.

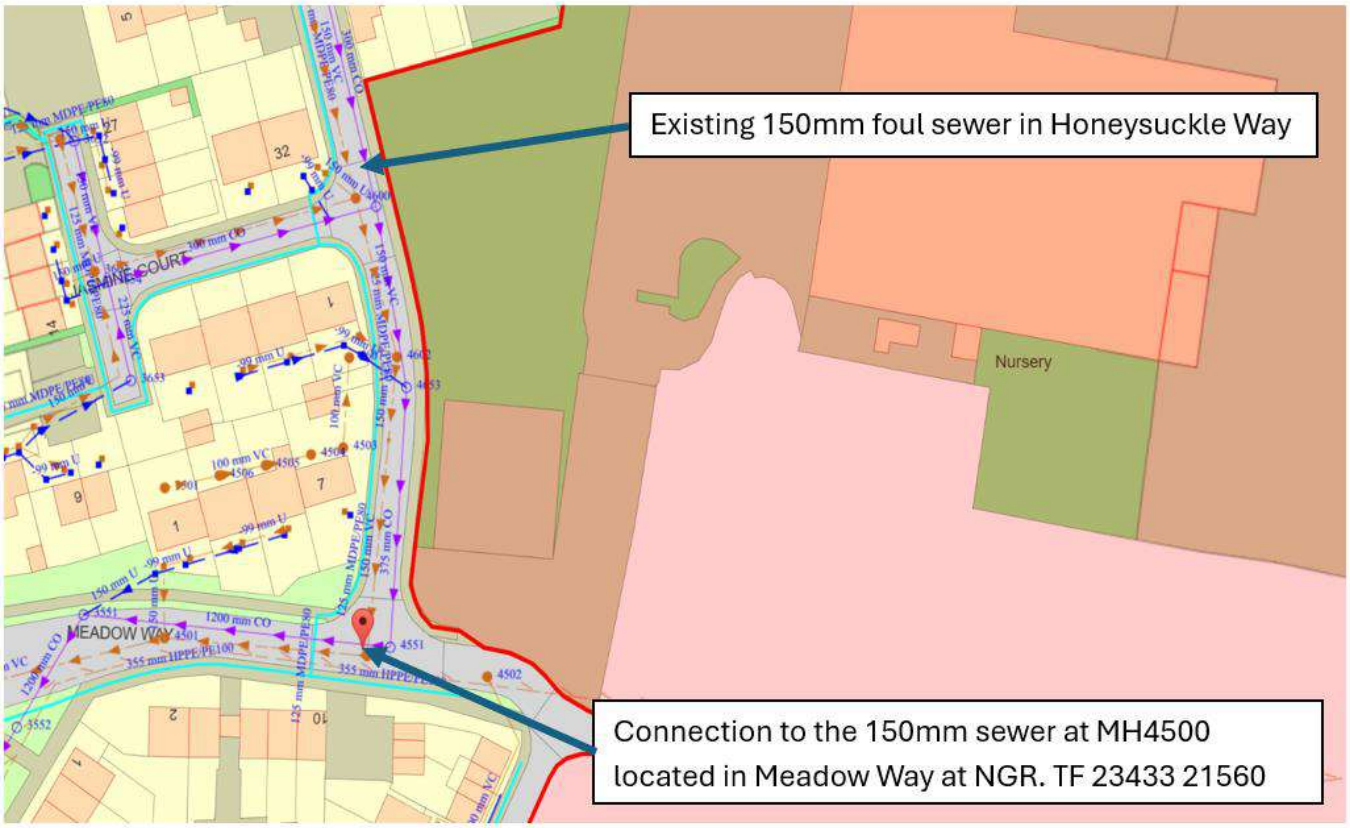

Figure 2: Showing your connection point for foul water

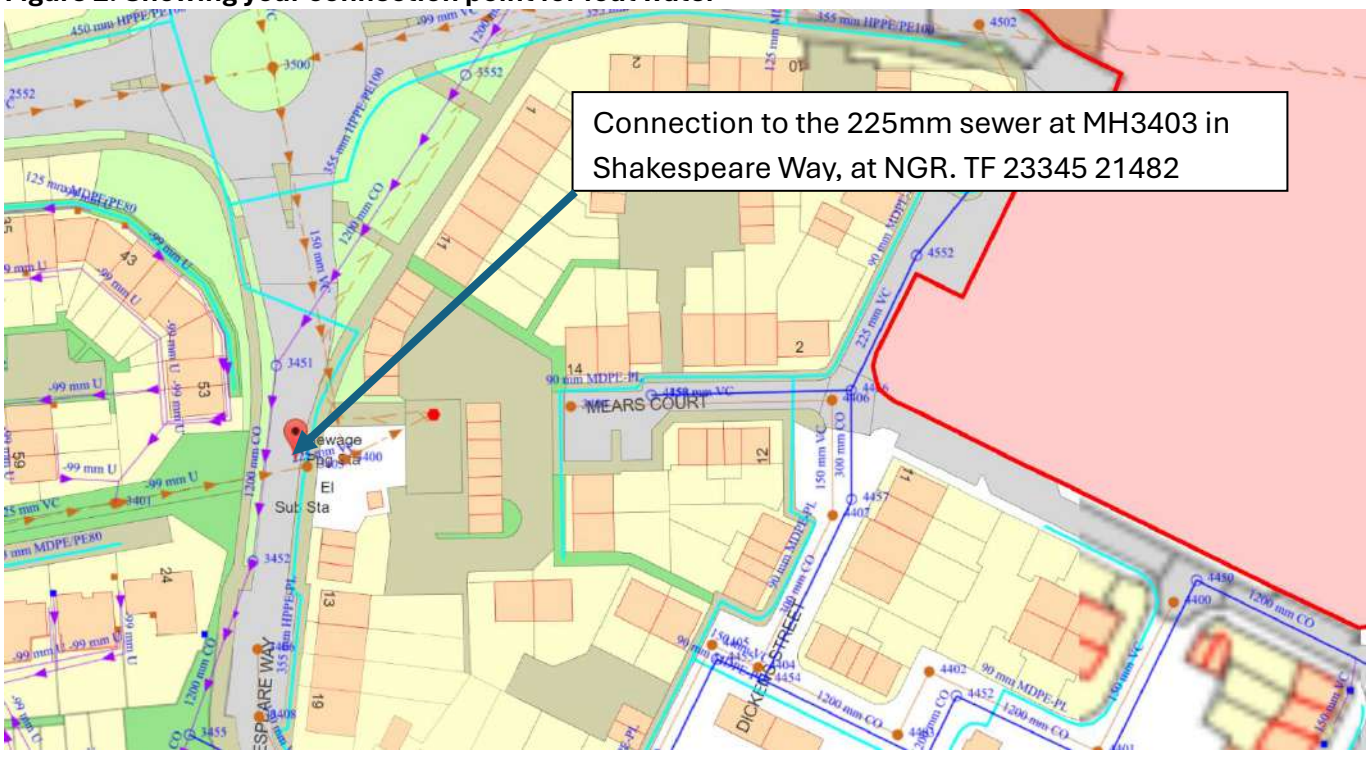

Figure 3: Showing your connection point for foul water

Trade Effluent
It is noted that there are no specified trade effluent requirements for the proposed development site. Should this be required in the future, please submit a Tier 2 PPE assessment.

Used Water Budget Costs
For a development site that benefits from full planning permission, infrastructure charges are raised on a standard basis of one charge per new connection, one each for water supply and drainage connections. Infrastructure charges are applied to each new property connecting to the public water and sewerage network. The infrastructure charge type is set out in Section 146(2) of the Water Industry Act 1991.
The charge should be paid by any party that wishes to build or develop a property and is payable upon request of connection.
The sewerage infrastructure charge per dwelling is set for the 2025-26 charging period at £403.00. For a development of 210 dwellings the total infrastructure charge will total £ 84,630.00.

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge. The relevant multiplier will be applied to the figures set out in our 2025-26 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our website.

Section 4 – Useful Information

Water Industry Act – Key used water sections

Section 98:
This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

Section 102:
This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:
This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:
This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185:
This provides you with the right to have a public sewerage asset diverted. Details on how to make a formal application for a new sewer, new connection or diversion are available on our website or via our Development Services team on 0345 60 66 087.

Surface Water Drainage
All surface water must be managed in line with Building Regs / Sewer Sector Guidance (SSG). Our guidance document and Surface Water policy (insert website link) detail our requirements and expectations. You must explore all on-site options per the SUDS hierarchy before speaking to us about a possible connection to our SW drainage network. We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site to discuss your application.

Sustainable drainage systems
Some existing urban drainage systems have additional risks of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or SuDS. SuDS are a range of

techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website.

Private sewer transfers
Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:
Surface water sewers and lateral drains that do not discharge to the public sewer, e.g. those that discharged to a watercourse.
Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.
Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.
The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.
It is anticipated that all new sewer applications will need to have an approved Section104 application ahead of a Section 106 connection.

Encroachment
Anglian Water operates a risk based approach to development encroachment on our above and below ground infrastructure and assets.

Locating our assets
Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from digdat.
All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge. We have more information on our website.

Charging arrangements
Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our website.

Environmental Incentives
Following regulatory guidance and changes to the charging rules the Infrastructure Charge for connections to our water network will no longer attract an income offset discount after 31st March 2025. This will be replaced with a new Environmental Incentive Scheme (EIS) aimed at promoting water efficiency and sustainability.

Anglian Water's EIS has been developed in accordance with the Environmental Incentive Common Framework (EICF), which was released by Ofwat in December 2024. For this charging year, 2025-26, and in accordance with Ofwat guidance, only household properties will be eligible for our EIS. We will continue to reassess this for future charging years.

There are two elements to our EIS:

Water Environmental Incentive
The applicant must demonstrate the newly connected property is designed to achieve consumption of 90 litres per person per day (pppd) or less.
Post property connection, we will conduct compliance audits on the first connected property and 10% of the remaining properties on a random basis.

Sewerage Environmental Incentive
Post property connection for redeveloped brownfield sites we will complete a site inspection to confirm the removal of surface water flows.

Environmental Component
This charge is used solely to fund the Environmental Incentive and is uniformly applied upon connection of each developed property; this includes connections which do not qualify for the Environmental Incentive.

Environmental Incentives	Charge per property (£)d
Water Environmental Incentive	-500
Environmental Incentive Component Charge Water	100
Additional Water EIS Audit (per premises)	84
Sewerage Environmental Incentive (50% of Sewerage Infra)	-202
Environmental Incentive Component Charge Sewerage	0

Our EIS will be available between 1st April 2025 and 31st March 2030 and during this period, we reserve the right to make any amendments to the EIS as we may see fit, including amendments to the value of both Environmental Incentives and the Component Charges. The EIS may close on 31st March 2030, therefore to qualify for the Environmental Incentives, your plot must be connected to our network, and validated by us. Please refer to our Developer Charging Arrangements for full details. To learn more or apply for our environmental incentive scheme please visit our website Water Environmental Incentive Scheme

Section 5 - Disclaimer
The information provided in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content.

Furthermore, in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid from the date issued and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s). Our pre-planning reports are valid for 12 months. Please note Anglian Water cannot reserve capacity and available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

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