



ENGINEERING

**Flood Risk Assessment & Sustainable Drainage Strategy,
for the Proposed Residential Development of
Land North of Blacksmiths Lane, Reed, North Hertfordshire**

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3075 – FRA & DS Rev A - Dec 2025

**Flood Risk Assessment & Sustainable Drainage Strategy,
for the Proposed Residential Development of
Land North of Blacksmiths Lane, Reed, North Hertfordshire**

1 Introduction

1.1 MTC Engineering (Cambridge) Limited has been asked to provide a Flood Risk Assessment (FRA) and Sustainable Drainage (SuDS) Strategy for the proposed residential development of land to the north of Blacksmiths Lane, Reed, North Hertfordshire, on behalf of The Turney Trust.

1.2 This FRA & SuDS Strategy is based upon the following information:-

1.2.1 Site Layout by Twentynine Architecture Limited;

1.2.2 Environment Agency Flood Information;

1.2.3 National Standards for Sustainable Drainage Systems (SuDS) Guidance, updated 30 July 2025;

1.2.4 North Hertfordshire District Council Strategic Flood Risk Assessment (SFRA);

1.2.5 Topographic Survey by Sunshine Survey;

1.2.6 Infiltration testing undertaken by Nott Group;

1.2.7 On site drainage investigations;

1.2.8 British Geological Survey Mapping;

- 1.3 The comments and opinions contained in this report including any conclusions are based on the information available to MTC Engineering (Cambridge) Ltd. during our investigations. The conclusions drawn could therefore differ if the information is found to be inaccurate, incomplete or misleading. MTC Engineering (Cambridge) Ltd. accept no liability should this prove to be the case, nor if additional information exists or becomes available with respect to this site.
- 1.4 MTC Engineering (Cambridge) Ltd. makes no representation whatsoever concerning the legal significance of its findings or any other matters referred to in the following report. Except as otherwise requested by the client, MTC Engineering (Cambridge) Ltd. are not obliged and disclaim any obligation to update the report for events taking place after the Assessment was undertaken.
- 1.5 This report is a Flood Risk Assessment and Drainage Strategy relating to flooding and drainage issues associated with the proposed development. The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. This report provides no guarantee against flooding of the study site or elsewhere, nor as to the absolute accuracy of water levels, flow rates and associated probabilities quoted.

2 Site Description and Existing Drainage

- 2.1 The site is located on the northern side of Blacksmiths Lane in western Reed as shown by the site location plan provided in Appendix 1.
- 2.2 A public footpath runs along the northern boundary of the site, with an area of scrubland with trees around the boundary to the north, then open agricultural land.
- 2.3 To the east the site is bound by existing residential development off Willow Close.
- 2.4 To the south a drainage ditch runs along the boundary with Blacksmiths Lane, past which is the road itself then another drainage ditch (the eastern end of which is culverted) with residential dwellings fronting Blacksmiths Lane on the opposite side of the road which are accessed via a series of culverts along the drain on that side of Blacksmiths Lane.
- 2.5 To the west the site is bound by London Road (the A10), with a café, veterinary surgery, and auto sales and repair site on the opposite side, past which is open agricultural land.
- 2.6 The site itself is currently an undeveloped area grass with bushes and trees along the northern, eastern and southern boundaries. Informal paths run within the south and north boundaries whilst the latter area also includes the route of Public Footpath FP003, with a topographic survey provided in Appendix 2.
- 2.7 This shows London Road has a shallow fall in a southerly direction past the site, from centreline levels of about 156.7m above Ordnance Datum (AOD) adjacent to the northern corner of the site to 156.85m AOD at the southern edge. An asphalt footpath with similar back of path levels to centreline levels runs along the eastern side of London Road, with a shallow bank up to generally 20 to 30cm above back of path levels along the western edge of the site. The main body of the site itself then falls in an easterly direction to levels of approximately 155m AOD at the eastern boundary. Blacksmiths Lane also falls in an easterly direction, generally with centreline levels similar to levels on the southern edge of the site although is lower at the western end.

- 2.8 A 150mm surface water sewer taking highway drainage is present running in a southerly direction along London Road beneath the footway adjacent to the site as shown on the survey, which is believed to be connected into the western end of the drain along the sites boundary. This drain runs east picking up highway drainage from Blacksmith's Lane via highway drainage grips. No outfall pipe is shown on the survey, however a 225mm diameter surface water pipe is shown at a manhole a short distance east with a connection from this running south to the open drain along the boundary between Blacksmiths Lane and the Cricket Club on the opposite side of the road.
- 2.9 The drain on the opposite side of Blacksmiths Lane runs in an easterly direction through a number of short culverts beneath accesses to properties on the opposite side of the road. It then culverted through a 300mm pipe for a longer length, before reemerging as an open drain at the front of the cricket field to the east and continuing eastwards between the cricket field and road.
- 2.10 The Hertfordshire Flood Risk Management Viewer extract provided in Appendix 3 confirms that from this point the drain (which is an Ordinary Watercourse) continues running east through Reed, and towards Barkway, before running southeast to join another Ordinary Watercourse flowing beneath High Street, then joining the River Quin which is a designated Main River running south from Barkway to join the River Rib.
- 2.11 A significant proportion of the drainage is shown on the site survey, however as the outfall pipe at the eastern end of the site frontage and western end of the drain at the cricked club boundary was not indicated, additional onsite investigation has also taken place to demonstrate connectivity and continuation of the drains.
- 2.12 The plan provided in Appendix 4 details the location of the 300mm concrete pipe (and land drain) found at the eastern end of the drain along the site boundary, which are shown on the first three photographs provided in the Appendix, with the 300mm pipe shown at the western end of the drain adjacent to the cricket club shown in the last two photographs.

- 2.13 Aside from the drains noted above there are no further significant surface water features in the vicinity of the site.
- 2.14 British Geological Survey Mapping shows the site and wider area to be underlain by a superficial geology of the Lewes Nodular chalk formation, with a superficial geology of the Lowestoft formation present.
- 2.15 Whilst the underlying chalk geology is generally a permeable geology, the superficial geology is a much lower permeability and as such surface water drainage from the site is via run off to the adjacent surface water drains in the area at greenfield rates.

3 Sources of Potential Flood Risk

- 3.1 In accordance with The National Planning Policy Framework all forms of flood risk need to be considered in relation to any development.
- 3.2 The first form of flood risk to be considered in respect of The National Planning Policy Framework is fluvial flooding.
- 3.3 The Fluvial and Tidal Flood Map for Planning (Appendix 5) shows the site and all land in the vicinity of the site to lie in Flood Zone 1, with the SFRA also indicating no significant risk of fluvial or tidal flooding to the site.
- 3.4 The drains along the site boundary have no significant catchment area thus are not considered to give rise of any significant risk of flooding, whilst even in the event of a blockage water would either reenter the drain downstream of the blockage or flow east along Blacksmiths Lane given the fall on the road which could act as a channel. It is not considered that there would be any significant risk to the site itself in such an event.
- 3.5 Therefore the overall fluvial flood risk to the site is low.
- 3.6 The second form of flood risk to be considered in respect of The National Planning Policy Framework is flooding from the sea.
- 3.7 The site is located well inland and with levels of 155m AOD or higher the site is not at any significant risk of flooding from the sea.
- 3.8 The third form of flood risk to be considered in respect of The National Planning Policy Framework is flooding from land.
- 3.9 Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can quickly run off land and result in local flooding. In developed areas, this flood water can be polluted with domestic sewage with foul sewer surcharge and overflow. Local topography and built form can have a strong influence on the

direction and depth of flow. The design of development down to a micro level can influence or exacerbate this. Overland flow paths need to be taken into account in development to minimise the risk of flooding from overland flow.

- 3.10 The site and surrounding area do not have flat topography which gives rise to risks of surface water ponding in low spots, whilst there are generally drains present along low channels which would pick up flows from surface water running off slopes before sufficient water collected that significant overland flows would develop.
- 3.11 The Surface Water Flood Map for Planning (Appendix 6) confirms this showing that even in the most extreme 1 in 1000 year surface water flood event aside from a couple of very small isolated patches of surface water none of which are present on the site which is not considered to be at any significant risk of flooding from surface water.
- 3.12 The fourth form of flood risk to be considered in accordance with The National Planning Policy Framework is flooding from rising groundwater.
- 3.13 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands and river gravels in valley bottoms underlain by less permeable rocks. Water levels below the ground rise during wet winter months, and fall again in the summer as water flows out into rivers. In very wet winters, rising water levels may lead to the flooding of normally dry land.
- 3.14 The underlying bedrock chalk geology would likely have groundwater present, however this is not considered to give rise to any significant risk of flooding at ground level at the site for several reasons, being;
- The chalk geology extends into lower areas in which ground levels would be reached first by any water table.
 - Even if water were to come close to surface levels superficial geology would tend to act as a capping layer preventing outflow at ground level;

- If water were to come close to ground level, and the superficial geology did permit any flow of groundwater through then outflow would be directly into the drain long the southern boundary as baseflow rather than outflow/springs developing at surface level.

- 3.15 Further to the above, no groundwater was found during infiltration testing at the site indicating water levels are not close to ground levels and as such the overall risk of flooding from groundwater is therefore considered to be low
- 3.16 The fifth form of flood risk to be considered in accordance with the National Planning Policy Framework is the risk of flooding from blocked, overloaded, or burst sewers and water mains.
- 3.17 There are no known existing sewers and water mains on the site itself likely to pose any significant flood risk, and any flow from such systems on Blacksmiths Lane under any circumstances would either enter the drains along either side of the road or run east along the road itself rather than coming on to the site.
- 3.18 The risk of the site flooding as a result of a blocked, overloaded or burst sewers or water mains is therefore considered to be low.
- 3.19 The last form of flood risk to be considered in accordance with the National Planning Policy Framework is flooding from reservoirs, canals or other artificial sources.
- 3.20 There are no significant artificial sources of water considered to pose a significant flood risk to the site.

4 The Proposed Development

- 4.1 The proposal involves a Planning Application for the erection of 21 residential dwellings at the site, along with associated access, surface water drainage, landscaping and other works as shown on the layout provided in Appendix 7.
- 4.2 As detailed in Section 3, the site is at a low risk of flooding by any means, thus no minimum finished floor levels are required on flood related grounds and no specific flood resilient or resistant construction is required.
- 4.3 Good practice should however be taken at the detailed design phase, with external levels set to ensure that the existing flow paths are maintained across the site in a southerly/southeasterly direction, and that floor levels of dwellings are set sufficiently above ground levels surrounding the dwelling with falls away access points in order to ensure that water will not pond in the vicinity of access points or enter dwellings under any circumstances.
- 4.4 The primary flood risk aspect associated with the proposed development is therefore ensuring that surface water runoff/drainage from the site is dealt with in accordance with all relevant local and national guidance/standards to ensure that there is no adverse impact upon the downstream risk of flooding as a result of the development.
- 4.5 To demonstrate this an outline surface water drainage strategy is detailed in Section 5 which has been developed at an early stage in site development, with sufficient detail provided to allow the full detailed surface water drainage design to be secured by appending appropriate planning conditions to any approval granted.

5 Sustainable Drainage Strategy

5.1 Point of Discharge/Runoff Destination

- 5.1.1 In line with Standard 1 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance, updated 30 July 2025, the first priority means of disposal for surface water is via collection for non-potable use.
- 5.1.2 A form of rainwater collection for non-potable use, being either rainwater harvesting systems or water butts, will therefore be provided at each dwelling to meet this standard.
- 5.1.3 Rainwater collection systems for non-potable use can however become full, particularly if a property is vacant for a period of time, therefore drainage of surface water via an alternative means is required to ensure that flood risk would not be increased elsewhere in the event that these systems were to become full.
- 5.1.4 It is this aspect of the drainage system that requires more detailed consideration at application stage, as failure to adequately plan for drainage could result in an increased risk of flooding elsewhere and as such the focus of this drainage strategy is on ensuring that off site flood risks would not be increased in the event that the rainwater collection systems provided became full and discharge of surface water elsewhere is required.
- 5.1.5 The second priority for disposal of surface water is by infiltration into the ground. Whilst the underlying chalk geology may be suitable for the use of infiltration systems, the superficial geology is a much lower permeability.
- 5.1.6 Nonetheless to check the permeability of the soils infiltration testing and a groundwater depth check was carried out, with a copy of the report provided in Appendix 8. This showed that at two of the three locations tested the tests failed, whilst at the third location an extremely low rate of 1.6×10^{-6} m/s was obtained. As such it is not considered that infiltration provides a viable means of discharge in this instance.

5.1.7 The third priority for discharge in line with the Drainage Hierarchy is for discharge to a surface watercourse. As such assuming infiltration is not feasible following testing discharge of surface water will be to the drain along the southern boundary of the site, restricted to existing greenfield rates to ensure that there is no adverse impact upon the downstream risk of flooding.

5.2 **Proposed Drainage Areas, Discharge Rates and Attenuation Volume Requirement**

5.2.1 An outline drainage plan based upon the layout provided in Appendix 9, which shows;

- The area of access roads and parking spaces to be approximately 1,610m², including areas of footway adjacent to the main access road;
- The roof area of the proposed dwellings will be 1,460m²;
- A landscaped pond area of 90m²;
- As such the total positively drained area at the site would be 3,160m².

5.2.2 Other pedestrian access areas and footways will all be designed as permeably surfaced, have no additional areas drained to them, and drain through unlined or permeably lined base area, thus will essentially maintain greenfield characteristics and are therefore scoped out of any further consideration within this drainage strategy.

5.2.3 The total development area requiring positive drainage is therefore 3,160m², or 0.316Ha. Causeway Flow calculations (Appendix 10) to establish the greenfield run off rate from this area indicate that the existing QBAR discharge rate is 0.9l/s. The 1 in 1, 1 in 30 and 1 in 100 year greenfield discharge rates are 0.8/s 2.4l/s, and 3.7l/s respectively.

5.2.4 Attenuation calculations included in Appendix 10 show that in a 1 in 100 year plus 40% climate change event, an attenuation volume of 312m³ would be required to restrict discharge rates to a maximum of 0.9l/s in this event, based upon an impermeable area of 3,310m² or 0.331 Ha, which is equivalent to the measured 3,160m² plus a 10% allowance to the roof areas of 1,460m² for urban creep in accordance with Paragraph 3.33 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance.

5.3 Proposed SuDS Systems, Potential Attenuation Volumes and Interception Design

- 5.3.1 A range of SuDS systems have been considered in relation to the proposed development at an early stage.
- 5.3.2 Living/green roof systems are a preferred SuDS technique, given that they are a flood reduction measure, reduce pollution through filtration, and provide a landscape and wildlife benefit.
- 5.3.3 All cycle and bin storage areas are designed with green sedum roofs as shown on the drawings for these structures included in Appendix 11, whilst any areas of flat roofing at the dwellings will therefore use a green roof except where other design factors such as use of the space for solar panels may make this impossible.
- 5.3.4 Basins and ponds are considered preferred SuDS features as they provide both a flood and pollution reduction measure along with landscape and wildlife benefits.
- 5.3.5 An attenuation pond will therefore be provided in the southwest corner of the development site as shown on the site layout. The pond is required to be in this part of the site due to there being a grade II listed building opposite the south-western area of the site, thus locating the pond in this area of the site will mitigate any visual impact upon the listed building by acting as separation from the built element of the development to the listed building.
- 5.3.6 A side slope of 1 in 3 will be used which is considered a safe side slope to use without requiring special design considerations from a safety perspective, whilst the maximum storage depth will be 600mm, with 300mm freeboard from the top of bank.
- 5.3.7 As such the landscaped basin will provide an attenuation volume of approximately 12m³ thus this feature is provided primarily to add to the variety of surface SuDS features at the site and with suitable landscaping will ensure that the overall system meets Standard 5 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance which requires SuDS systems to provide amenity value, and Standard 6 of

the National Standards for Sustainable Drainage Systems (SuDS) Guidance requiring systems to contribute to biodiversity.

- 5.3.8 Permeable paving is another surface SuDS technique that is appropriate to use at most developments, including the proposed development, and provides both a flood reduction benefit due to the attenuation provided in the base and a pollution reduction benefit due to the filtration of water as it passes through the permeable surfacing.
- 5.3.9 Permeable paving will therefore be used on all roads at the site, given that these will not be adopted, alongside all vehicular parking areas. Given that permeable paving can be constructed with a 300mm stone layer with 30% void space over a cellular base (such as Aquacell) with 95% void space and 400mm depth, permeable paving can provide up to 0.47m³ per m² surface area.
- 5.3.10 Based upon the 1,610m² permeably paved areas shown in Appendix 8, a total attenuation volume of up to 757m³ could therefore comfortably be provided beneath the permeably surfaced areas at the site.
- 5.3.11 As the system only requires approximately 312m³ of attenuation to reduce post development discharge rates in a 1 in 100 year plus 40% climate change event to the Q_{bar} rate of 0.9 l/s, all required storage can easily be provided beneath the permeably paving. With a possible volume available in excess of twice what calculations indicate is required there is a significant freeboard for any minor alterations required to the volume shown when the full detailed design takes place at conditional discharge stage.
- 5.3.12 The attenuation volumes and discharge rates from the site will therefore be compliant with Standard 3 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance which relates to management of extreme rainfall and flooding.
- 5.3.13 With regards Standard 2 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance, which relates to interception regardless of soil type unlined detention basins are considered to achieve requirements for up to 5 times their area being drained

to the system, with unlined (or permeably lined) permeable paving providing sufficient interception for an additional impermeable area no greater than that of the permeable paving regardless as to the soil infiltration rates beneath

5.3.14 As such the permeable paving provides allowance for up to 1,610m² of additional impermeable area to drain to this, with up to 450m² of additional impermeable area able to drain to the attenuation basin.

5.3.15 Given that upto 2,060m² of impermeable area could therefore drain via these features whereas the additional area is actually only 1,460m², Standard 2 of the National Standards for Sustainable Drainage Systems will be met.

5.4 **SuDS Treatment Stages**

5.4.1 All surface water will receive an appropriate level of treatment in line with requirements prior to discharge to the surface water sewer network.

5.4.2 Drainage from all parking and access areas will initially be through permeably paving which provides a filtration system removing pollutants such as hydrocarbons and provides the first treatment stage for drainage from all lightly trafficked areas.

5.4.3 Surface water from roof areas is considered a clean discharge, thus only requires one treatment stage which will be provided either via by filtration through the membrane such as Terram in which the storage blanket beneath the permeable paving is wrapped or via discharge through the attenuation basin as appropriate.

5.4.4 A summary of the pollutant hazard indices and relevant mitigation indices using Table 26.2 and Table 26.3 of the CIRIA C753 The SuDS Manual is detailed in Table 5.1 below (excluding the adopted road that will be in accordance with LHA requirements).

			TSS	Metals	Hydrocarbons
Access Road (low trafficked road)	Pollution Hazard Level	Low	0.5	0.4	0.4
	First SuDS Component mitigation index	Permeable paving	0.7	0.6	0.7
Residential Roofs	Pollution Hazard Level	Very Low	0.2	0.2	0.05
	SuDS Component mitigation index	Permeable paving	0.7	0.6	0.7
	0.5 times Second SudS Component mitigation index	Or Detention Basin	0.5	0.5	0.6

Table 5.1: Pollution Hazard Indices and Mitigation Measures

5.4.5 Appropriate treatment will therefore be provided to all surface water discharge from the proposed development, with all mitigation indices at least matching if not exceeding all pollution hazard levels as is required.

5.4.6 As detailed above, Standard 4 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance, which relates to water quality, will be met by the proposed development.

5.5 Maintenance of SuDS Systems

5.5.1 Several bodies will be responsible for various aspects of the proposed surface water drainage system to be provided at the development, with these to include individual householders for systems serving individual properties only and shared responsibility (via deeds or a maintenance company to be set up) for communal areas.

5.5.2 A full maintenance plan will be provided including full details of the maintenance responsibilities for maintenance of the system alongside the details of the required maintenance activities and frequency schedule for all elements of the system once the detailed design is completed. As such this will form part of the discharge requirements for the appropriate drainage condition to be applied to any approval granted.

5.5.3 These plans will ensure that Standard 7 of the National Standards for Sustainable Drainage Systems (SuDS) Guidance which relates to the operation and maintenance of drainage systems is met.

5.6 **Exceedance Flow**

5.6.1 With an open drain along the southern boundary of the site to which discharge currently occurs via overland flow at greenfield rates, post development level design will ensure that exceedance flow paths around dwellings and to this drain are provided by low channels running through the development.

5.7 **Other Surface Water Drainage Considerations**

5.7.1 As access points will be required across the drain along the southern boundary of the site these will need to be designed to ensure no adverse impact upon the downstream risk of flooding by either having an adverse impact upon the flow or storage capacity.

5.7.2 The flow rate to the drain downstream of the site from the section along the site frontage is controlled by the existing outfall pipe shown in Appendix 4. The diameter, invert level, gradient, and outfall of this pipe will all remain as at present, thus so long as water levels in the drain are not increased there will be no adverse impact upon the rate of flow from this section of the drain to downstream sections and therefore no associated adverse impact upon the downstream risk of flooding.

5.7.3 To ensure there is no increase in water level in the section of the drain along the site boundary, access points will be designed to ensure that there is no loss in storage in this section of the drain, which essentially requires the cross sectional area of any culvert beneath the access point to be the same as or greater than that of the current cross section of the drain thus can clearly be achieved.

5.7.4 Full detailed design of the access points and crossings is therefore appropriate to secure by imposition of appropriate planning conditions as part of any approval granted.

5.8 Foul Drainage

- 5.8.1 Subject to available capacity in the used water network and water recycling centre serving Reed at present then foul drainage will be to the Thames Water Foul Sewer on Blacksmiths Lane, Reed as shown on the mapping provided in Appendix 12.
- 5.8.2 Only the event that this is not feasible then sufficient evidence will be provided to the Environment Agency with a package treatment plant discharging to the adjacent drain then used.
- 5.8.3 Full details of foul drainage design are appropriate to secure by Planning Condition.
- 5.9 The final detailed design will only take place once planning permission has been granted and will be based upon this Sustainable Drainage Strategy with the design to accommodate all rainfall during a 1 in 100 year plus 40% climate change rainfall event without having any adverse impact upon the downstream system or flood risk.
- 5.10 It has been clearly demonstrated that the proposed development can be drained in accordance with all national and local requirements, and no further surface water drainage information is required at the current application stage. All remaining information can be secured by means of appending appropriate planning conditions to any approval granted.

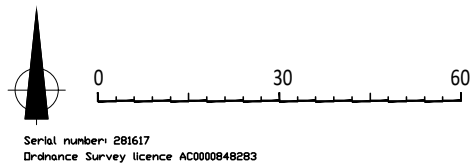
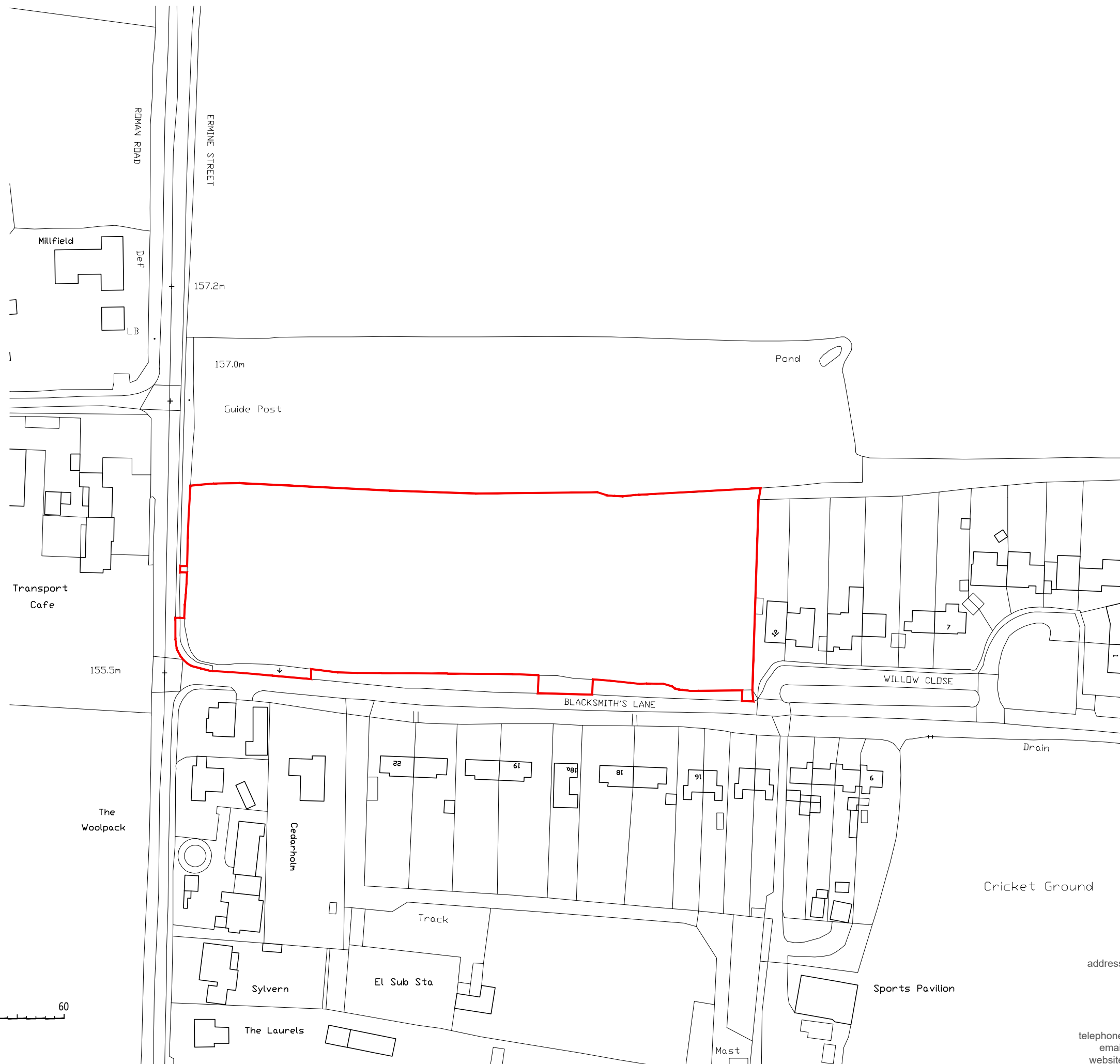
6 Conclusion

- 6.1 The proposal involves the application for the erection of up to 21 residential dwellings on land north of Blacksmiths Lane, Reed.
- 6.2 The site is shown on the Environment Agency Flood Map as lying completely in Flood Zone 1. 'More vulnerable' development such as that proposed is appropriate in Flood Zone 1 without the need to apply the Exception Test, whilst given that there are no significant risks of flooding from any other source a Sequential Test is not required.
- 6.3 There are no significant flood risks to the site, and no finished floor levels or specific flood resistant/resilient construction methods are required in this instance.
- 6.4 External level design should however maintain the existing fall of the site around dwellings site with floor levels and external ground levels set so that water will not pond in the vicinity of access points or enter dwellings under any circumstances, and that any exceedance flows will be directed towards the drain along the southern boundary.
- 6.5 Infiltration drainage is not feasible at the proposed development due to the underlying superficial geology, as demonstrated by the testing undertaken at the site included in Appendix 8.
- 6.6 Surface water drainage will therefore continue to be drained to the adjacent watercourse along the southern boundary, but with discharge rates restricted to the greenfield QBAR rate of 0.9 l/s during all events upto and including a 1 in 100 year plus 40% climate change event to ensure there is no adverse impact upon the off-site risk of flooding.
- 6.7 An outline design based upon the use of a simple control structure (which is more conservative than the complex control method) provided in Section 5 demonstrates that based upon the indicative layout the required attenuation volume of 312m³ can be comfortably provided at the site.

- 6.8 It is also demonstrated in Section 5 that all other relevant local and national requirements, including those of the recently updated National Standards for Sustainable Drainage Systems, will be met by the proposed drainage system.
- 6.9 This Flood Risk Assessment and Sustainable Drainage Strategy is fully in line with current Local and National policy and there are no flood risk or drainage related grounds on which to object to the proposed development of up to 21 residential dwellings on land along the northern side of Blacksmiths Lane, Reed.

APPENDIX 1

SITE LOCATION PLAN



Serial number: 281617
Drainage Survey licence AC0000848283

LOCATION PLAN 1:1250@ A3

address 25 Cromwell Road
Cambridge
Cambridgeshire
CB1 3EB

telephone +44 (0)1223 212253
email info@29architecture.co.uk
website www.29architecture.co.uk



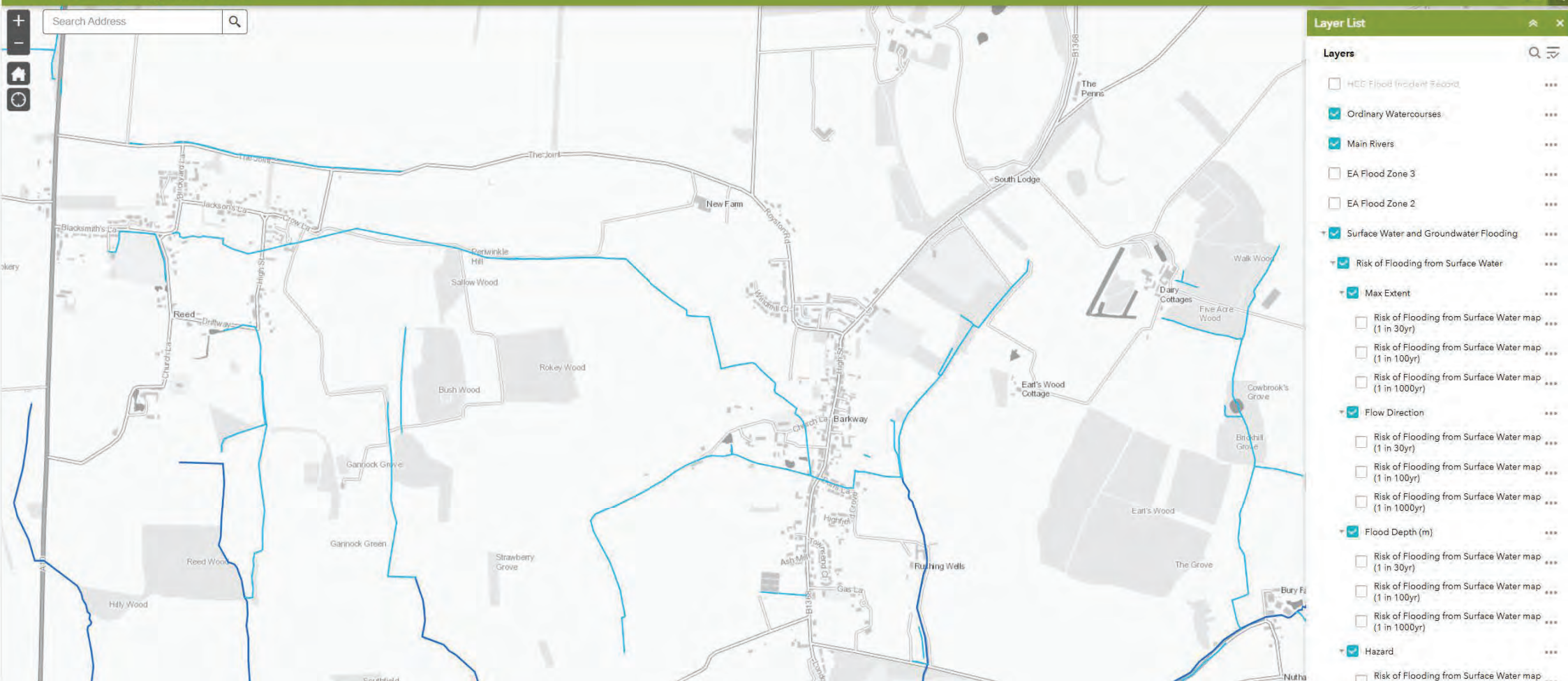
APPENDIX 2

TOPOGRAPHIC SURVEY

APPENDIX 3

HERTFORDSHIRE ORDINARY WATERCOURSE MAPPING

Maps and Geographic Information

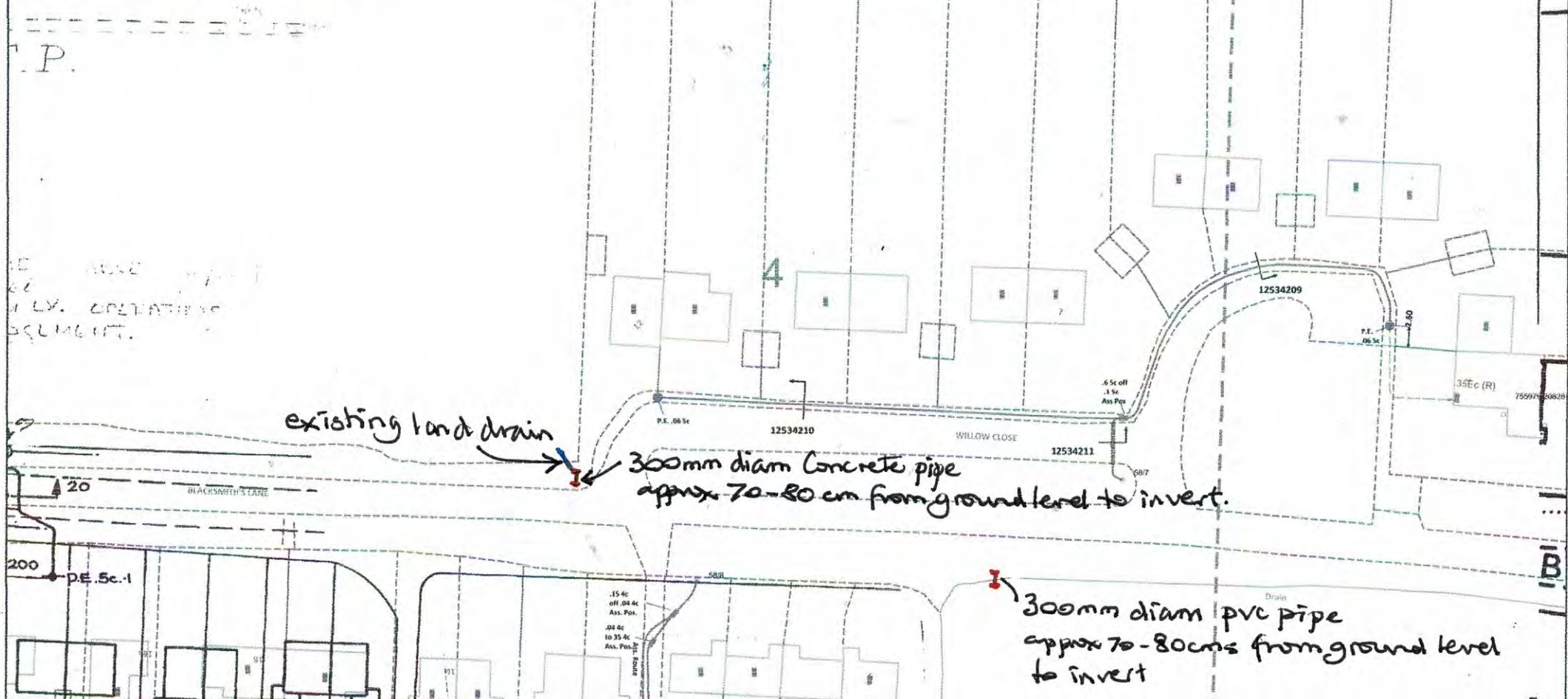


APPENDIX 4

ADDITIONAL ON SITE DRAINAGE INVESTIGATION

BLACKSMITHS LANE, REDD

24/07/23



This plan must be used with the attached 'Symbols' document. Date Requested: 02/11/2021 Job Reference: 23756323 Site Location: 535543 236139 Requested by: Mr Duncan Phillips Your Schema/Reference: RD1 Scale: 1:500 (When plotted at A3)		1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed. 2. The exact position of the apparatus should be verified - use approved cable avoidance tools prior to excavation using suitable hand tools. 3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all the cables have been determined. 4. It must be assumed that there is a service cable into each property, lamp column and street sign, etc. 5. All cables must be treated as being live unless proved otherwise by UK Power Networks. 6. The information provided must be given to all people working near UK Power Networks plant and equipment. Do not use plans more than 3 months after the issue date for excavation purposes. 7. Please be aware that electric cables/lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.		1. UK Power Networks does not warrant that the information provided to you is correct. You rely upon it at your own risk. 2. UK Power Networks does not exclude or limit its liability if it causes the death of any persons or causes personal injury to a person. 3. Subject to paragraph 2 UK Power Networks has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise for any loss, damage, cost, claims, demands, or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever. 4. This plan has been provided to you on the basis of the terms of use set out in the covering letter that accompanies this plan. If you do not accept and/or do not understand the terms of use set out in the covering letter you must not use the plan and must return it to the sender of the letter. 5. You are responsible for the security of the information provided to you. It must not be given, sold or made available upon payment of a fee to a third party.		The quality and accuracy of any print will depend on your printer, your computer and its print settings. Measurements scaled from this plan may not match measurements between the same points on the ground. IF IN DOUBT - ASK! PHONE 0800 056 5866 EMERGENCY - If you damage a cable or line Phone 0800 783 8838 (24hrs) URGENTLY ALWAYS LOOK UP BEFORE YOU START WORK Refer to HSE Guidance note G56	
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APPENDIX 5

FLUVIAL AND TIDAL FLOOD MAP FOR PLANNING

Flood map for planning

Your reference	Location (easting/northing)	Created
Unspecified	535787/236339	13 December 2025 13:57

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

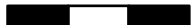
Unspecified

Location (easting/northing)
535787/236339

Scale
1:2,500

Created
13 Dec 2025 13:57

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



0 20 40 60m

APPENDIX 6

SURFACE WATER FLOOD MAP FOR PLANNING

Get a boundary report

- Edit
- Delete

Datasets

- ☐ Flood zones 2 and 3
- ☒ Surface water
- ☐ None

Annual likelihood of flooding

- ☐ 1 in 30
- ☐ 1 in 100
- ☒ 1 in 1000

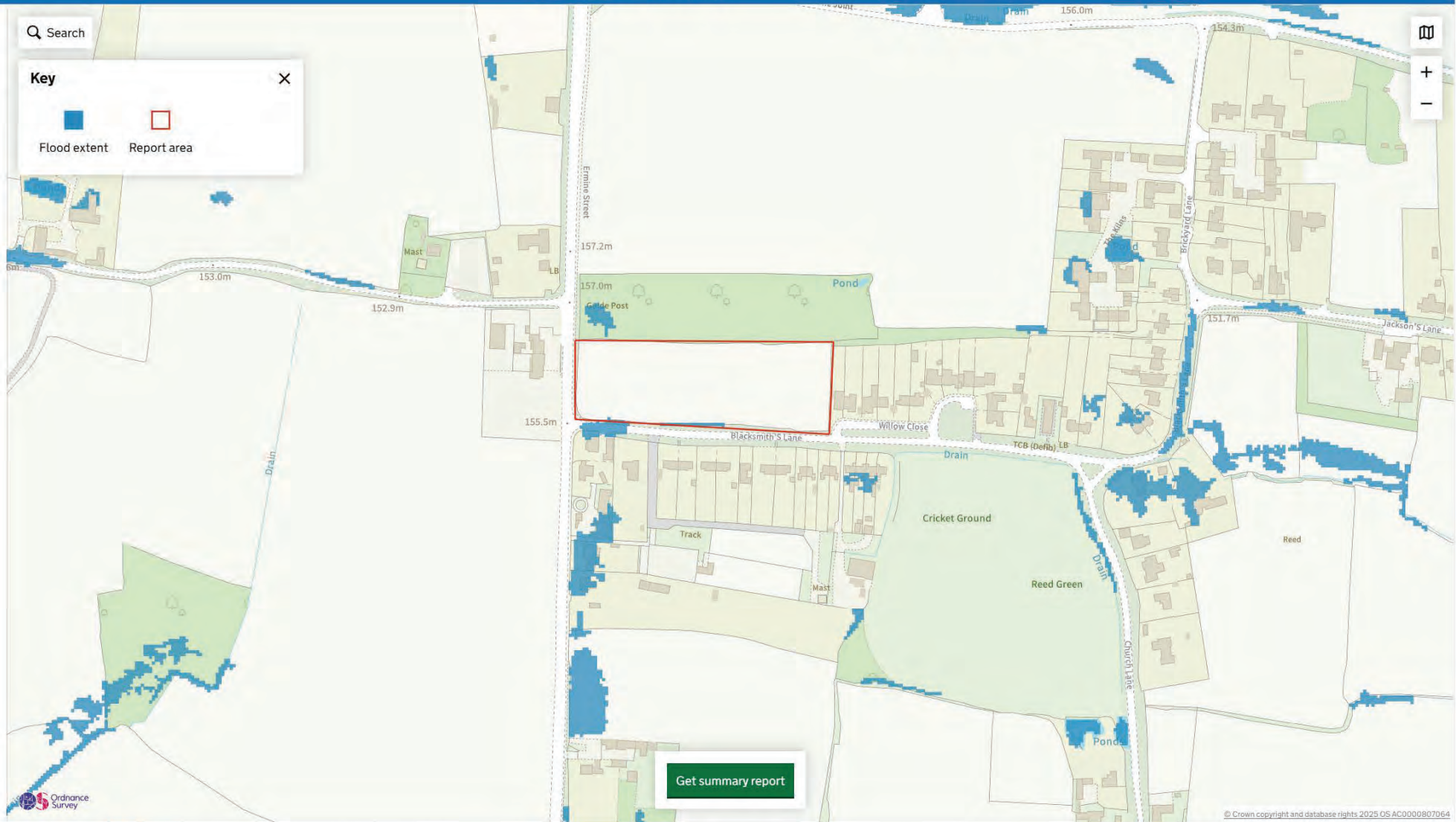
Map features

- ☐ Water storage
- ☐ Flood defence
- ☐ Main Rivers

Search

Key

- Flood extent
- Report area



Get summary report

APPENDIX 7

PROPOSED DEVELOPMENT LAYOUT

general notes

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The drawing is to be read in conjunction with all other relevant drawings and specifications.

All dimensions to be checked on site prior to commencement of works and any discrepancies to be checked immediately.

Do not scale from this drawing.

Unless otherwise stated, all dimensions are in mm.



APPENDIX 8

INFILTRATION TEST REPORT

Soil Infiltration Testing Results - Factual Report

**Land to the North of
Blacksmith's Lane, Reed**

Client: Trustees of the Turney Trust

Reference: 74031/R/002
Status: Draft for Initial Comments
Date: 15th June 2023

Issued by: **Nott Group**
27 Barton Road
Thurston
Suffolk
IP31 3PA

Prepared by:

Name Mark Hiatt MSci (Hons) CGeol EurGeol M.I. Soil Sci FGS
Signature
Title **Geotechnical Director**

Checked and Approved by:

Name Ed Bullivant BSc FGS CGeol SILC
Signature
Title **Director**

Telephone: 01284 799464

www.nottgroup.co.uk

Nott Group has prepared this report with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.



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APPENDICES

APPENDIX A TRIAL PIT LOCATION PLAN

APPENDIX B INFILTRATION TEST RESULTS

APPENDIX C TRIAL PIT LOGS

1. BRIEF

The Nott Group have been instructed by the client to undertake soil infiltration testing at the above site.

This report has been prepared for the exclusive use of the client for the purpose of assisting them in evaluating the potential soakaway design for the above site.

The information presented within this report is based on observations made on site and ground conditions encountered which can vary between test locations.

2. GROUND CONDITIONS SUMMARY

2.1 PUBLISHED GEOLOGY

The following table summarises the published geological information for the site.

TABLE 1: PUBLISHED SITE GEOLOGY

Data	Information
Solid Geology	Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) are mapped across the entire site and are described by the BGS as comprising of chalk with flints and discrete marl seams.
Superficial Geology	The Lowestoft Formation is mapped across the entire site and is described by the BGS as comprising of Glacial till, together with outwash sands and gravels, silts and clays. The till is characterised by its chalk and flint content.
Artificial and Made Ground	None mapped on-site by the BGS.

2.2 GROUND CONDITIONS ENCOUNTERED

The following table summarises the ground conditions encountered during the site works for the infiltration testing. Full descriptions of the ground conditions encountered can be found in Appendix C.

TABLE 2: GROUND CONDITIONS ENCOUNTERED SUMMARY IN TRIAL PITS

Strata Encountered	Description	Depth in meters below ground level (m bgl)
Topsoil	Slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets	TP1: 0.00m – 0.20m TP2: 0.00m – 0.29m TP3: 0.00m – 0.28m
Natural Superficial Geology (Lowestoft Formation)	Slightly sandy slightly gravelly to gravelly silty CLAY	TP1: 0.20m – 2.00m TP2: 0.29m – 1.95m TP3: 0.28m – 0.60m

3. TESTING METHODOLOGY AND RESULTS

3.1 INFILTRATION TESTING AND RESULTS

The testing has been undertaken in general accordance with BRE Digest 365 2016 for Soakaway Design. The results of the testing are summarised in the following table. A full set of results with the adopted methodology are enclosed in Appendix B.

The site works were undertaken on the 17th and 18th May 2023 and comprised the excavation of pits, the filling of water with follow-up monitoring and recording.

The test locations and trial pit logs are enclosed in Appendix A and C.

TABLE 3: RESULTS SUMMARY

Trial Pit Location	Depth of Pit (m begl)	Minimum Result Obtained (m/s)	Comments
TP1	2.00m	-	Test failed. Water did not empty to 50% in 24hrs
TP2	1.95m	-	Test failed. Water did not empty to 50% in 24hrs
TP3	0.60m	1.6E-06 m/s	3 tests undertaken.

3.2 ASSESSMENT OF RESULTS AND RECOMMENDATIONS

Based upon the above results and the ground conditions encountered (in accordance with BRE 365 2016) we recommend that 2.0m deep soakaways (below existing ground level) are not suitable in the vicinity of TP1 and TP2 and alternative methodologies to deal with surface water drainage should be explored.

In the location of TP3 at a depth of 0.6m below existing ground level, we recommend that an infiltration rate of 1.6E-06 m/s is adopted.

Further testing may be warranted during the detailed design stage.

Appendix A **TRIAL PIT LOCATION PLAN**

Appendix B **INFILTRATION TEST RESULTS**



Project No.: 74031

Nott Group

Site: Reed

Infiltration Test

Test Location: TP1 - test 1

Date: 17th and 18th May 2023

Analysis using method as described in
BRE Digest 365

test pit top dimensions width (m) length (m)
0.47 2.47
test pit base dimensions 0.45 2.4
test pit depth 2 m

test infiltration rate (f) = 3.1E-07 m/s
groundwater depth before adding water (m) = 0

	time (mins)	depth to water surface (m)	depth of water in pit (m)	time elapsed from test start (mins)	volume of water lost from test start (m ³)	area of walls and base from test start (m ²)
	0	0.2	1.8	0	0.00	11.49
	1	0.205	1.795	1	0.01	11.47
	2	0.21	1.79	2	0.01	11.46
	20	0.215	1.785	20	0.02	11.44
	25	0.215	1.785	25	0.02	11.44
	30	0.215	1.785	30	0.02	11.44
	45	0.22	1.78	45	0.02	11.43
	60	0.23	1.77	60	0.03	11.40
	75	0.235	1.765	75	0.04	11.38
	90	0.24	1.76	90	0.05	11.37
	120	0.245	1.755	120	0.05	11.35
	150	0.245	1.755	150	0.05	11.35
	180	0.245	1.755	180	0.05	11.35
	210	0.25	1.75	210	0.06	11.34
	240	0.25	1.75	240	0.06	11.34
	270	0.255	1.745	270	0.06	11.32
	300	0.26	1.74	300	0.07	11.31
	330	0.26	1.74	330	0.07	11.31
	360	0.265	1.735	360	0.07	11.30
	420	0.27	1.73	420	0.08	11.28
	1020	0.34	1.66	1020	0.16	11.08
	1200	0.355	1.645	1200	0.18	11.03
	1260	0.36	1.64	1260	0.18	11.02
	1440	0.37	1.63	1440	0.20	10.99

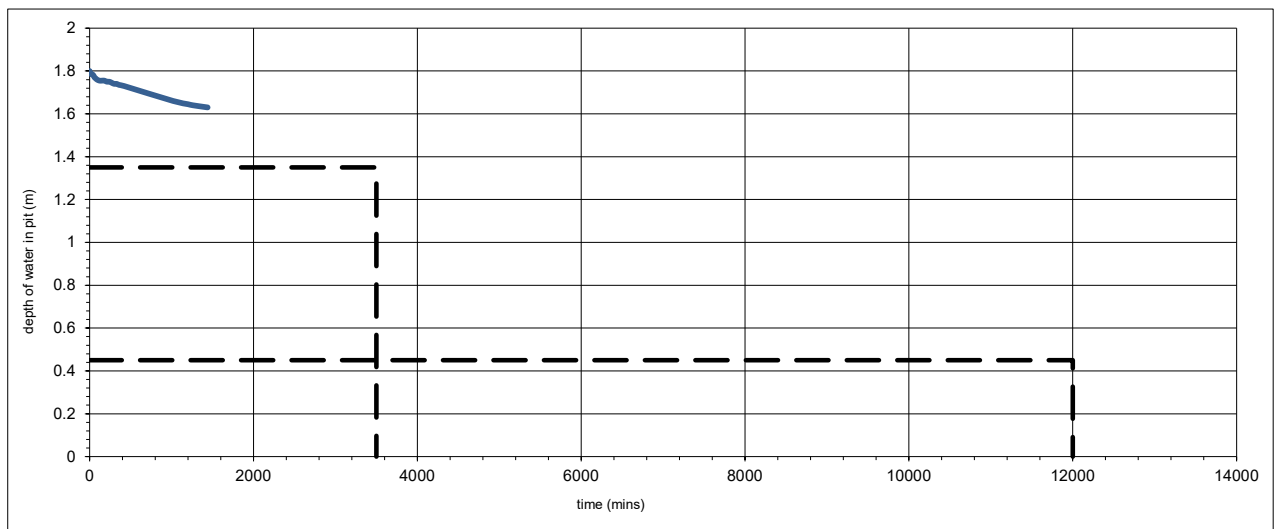
From graph:

test start - 75% depth at
1.35 m water depth
time is 3500.0 minutes

test end - 25% depth at
0.45 m water depth
time is 12000.0 minutes

Extrapolated values

	Tp75-25		Vp75-25		Ap50	F
3500	0.65	1.35	0	0.00		
12000	1.55	0.45	8500	1.00	6.26	3.1E-07





Project No.: 74031

Nott Group

Site: Reed

Infiltration Test

Test Location: TP2 - test 1

Date: 17th and 18th May 2023

Analysis using method as described in
BRE Digest 365

test pit top dimensions width (m) length (m)
0.49 2.35
test pit base dimensions 0.45 2.25
test pit depth 2 m

test infiltration rate (f) = 2.9E-07 m/s
groundwater depth before adding water (m) =

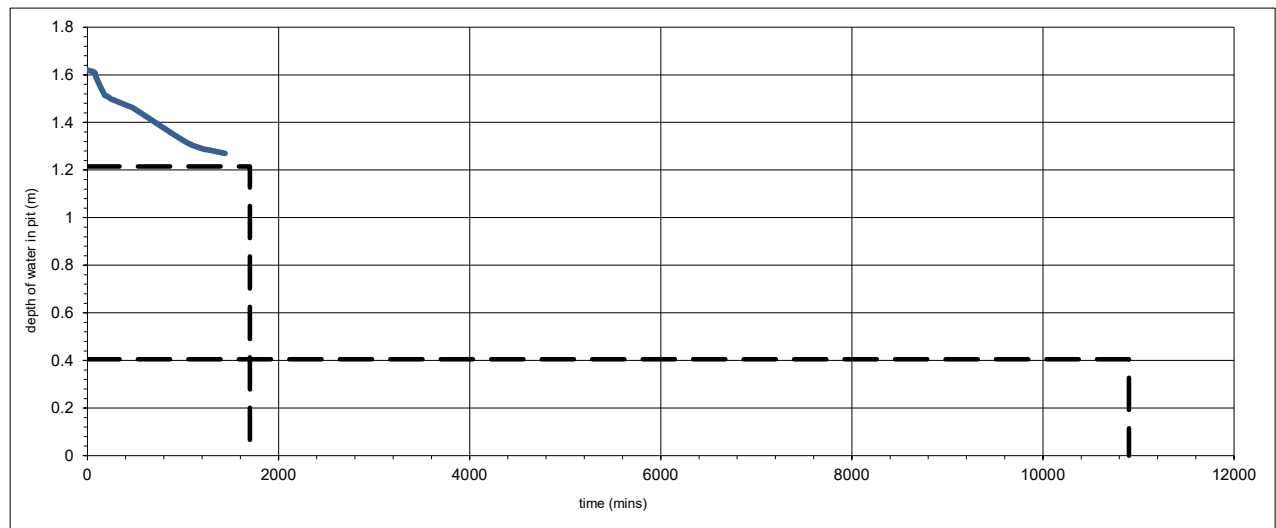
	time (mins)	depth to water surface (m)	depth of water in pit (m)	time elapsed from test start (mins)	volume of water lost from test start (m ³)	area of walls and base from test start (m ²)
	0	0.38	1.62	0	0.00	9.94
	75	0.39	1.61	75	0.01	9.92
	90	0.41	1.59	90	0.03	9.86
	180	0.485	1.515	180	0.12	9.65
	210	0.49	1.51	210	0.12	9.64
	240	0.5	1.5	240	0.13	9.61
	270	0.505	1.495	270	0.14	9.59
	300	0.51	1.49	300	0.15	9.58
	330	0.515	1.485	330	0.15	9.57
	360	0.52	1.48	360	0.16	9.55
	420	0.53	1.47	420	0.17	9.52
	480	0.54	1.46	480	0.18	9.49
	1020	0.68	1.32	1020	0.33	9.10
	1200	0.71	1.29	1200	0.37	9.02
	1260	0.715	1.285	1260	0.37	9.01
	1440	0.73	1.27	1440	0.39	8.96

From graph:

test start - 75% depth at
1.215 m water depth
time is 1700.0 minutes

test end - 25% depth at
0.405 m water depth
time is 10900.0 minutes

Extrapolated values			Tp75-25	Vp75-25	Ap50	F
1700	0.785	1.215	0	0.00		
10900	1.595	0.405	9200	0.87	5.44	2.9E-07





Project No.: 74031

Nott Group

Site: Reed

Infiltration Test

Test Location: TP3 - test 1

Date: 17th and 18th May 2023

Analysis using method as described in
BRE Digest 365

	width (m)	length (m)
test pit top dimensions	0.45	1.65
test pit base dimensions	0.45	1.6
test pit depth	0.6	m

test infiltration rate (f) = 5.0E-06 m/s
groundwater depth before adding water (m) = 0

hrs	time (mins)	depth to water surface (m)	depth of water in pit (m)	time elapsed from test start (mins)	volume of water lost from test start (m ³)	area of walls and base from test start (m ²)
	0	0.19	0.41	0	0.00	2.42
	1	0.195	0.405	1	0.00	2.40
	2	0.195	0.405	2	0.00	2.40
	3	0.195	0.405	3	0.00	2.40
	4	0.2	0.4	4	0.01	2.39
	5	0.2	0.4	5	0.01	2.39
	10	0.205	0.395	10	0.01	2.38
	15	0.21	0.39	15	0.01	2.37
	20	0.21	0.39	20	0.01	2.37
	25	0.215	0.385	25	0.02	2.36
	30	0.22	0.38	30	0.02	2.35
	45	0.23	0.37	45	0.03	2.33
	60	0.25	0.35	60	0.04	2.29
	75	0.275	0.325	75	0.06	2.24
	90	0.3	0.3	90	0.08	2.19
	120	0.34	0.26	120	0.11	2.10
	150	0.36	0.24	150	0.12	2.06
	180	0.39	0.21	180	0.15	2.00
	540	0.57	0.03	540	0.28	1.63

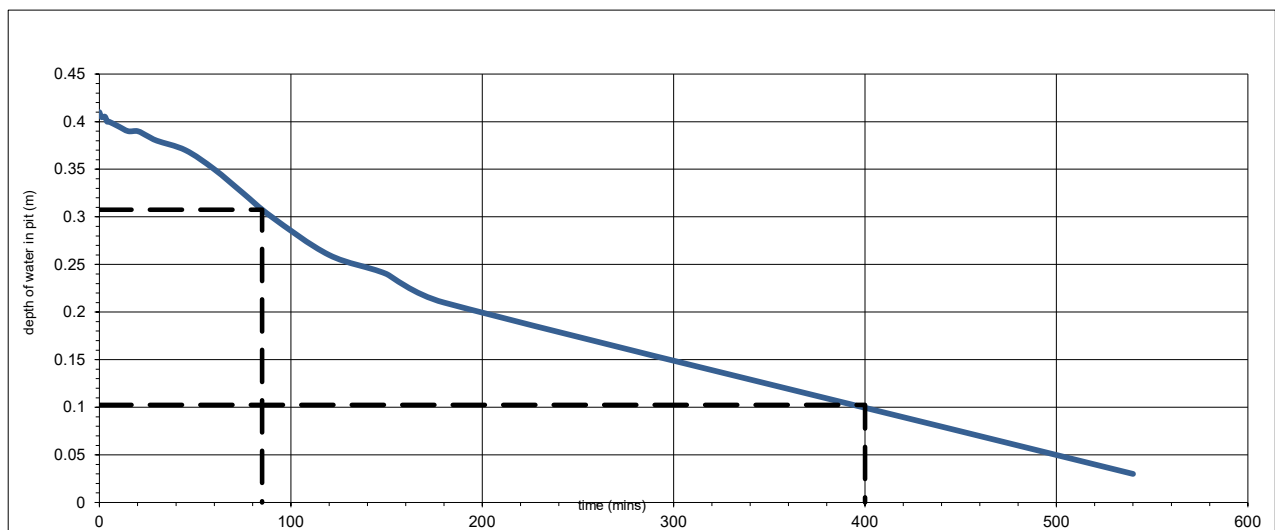
From graph:

test start - 75% depth at
0.3075 m water depth
time is 85.0 minutes

test end - 25% depth at
0.1025 m water depth
time is 400.0 minutes

Extrapolated values

			Tp75-25	Vp75-25	Ap50	F
85	0.2925	0.3075	0	0.00		
400	0.4975	0.1025	315	0.15	1.56	5.0E-06





Project No.: 74031

Nott Group

Site: Reed

Infiltration Test

Test Location: TP3 - test 2

Date: 17th and 18th May 2023

Analysis using method as described in
BRE Digest 365

	width (m)	length (m)
test pit top dimensions	0.45	1.65
test pit base dimensions	0.45	1.6
test pit depth	0.6	m

test infiltration rate (f) = 4.8E-06 m/s
groundwater depth before adding water (m) = 0

hrs	time (mins)	depth to water surface (m)	depth of water in pit (m)	time elapsed from test start (mins)	volume of water lost from test start (m ³)	area of walls and base from test start (m ²)
	0	0.11	0.49	0	0.00	2.75
	4	0.12	0.48	4	0.01	2.73
	5	0.12	0.48	5	0.01	2.73
	10	0.125	0.475	10	0.01	2.72
	15	0.13	0.47	15	0.01	2.71
	30	0.13	0.47	30	0.01	2.71
	45	0.14	0.46	45	0.02	2.69
	60	0.16	0.44	60	0.04	2.64
	90	0.19	0.41	90	0.06	2.58
	120	0.22	0.38	120	0.08	2.52
	150	0.25	0.35	150	0.10	2.46
	180	0.27	0.33	180	0.12	2.42
	210	0.29	0.31	210	0.13	2.37
	240	0.31	0.29	240	0.15	2.33

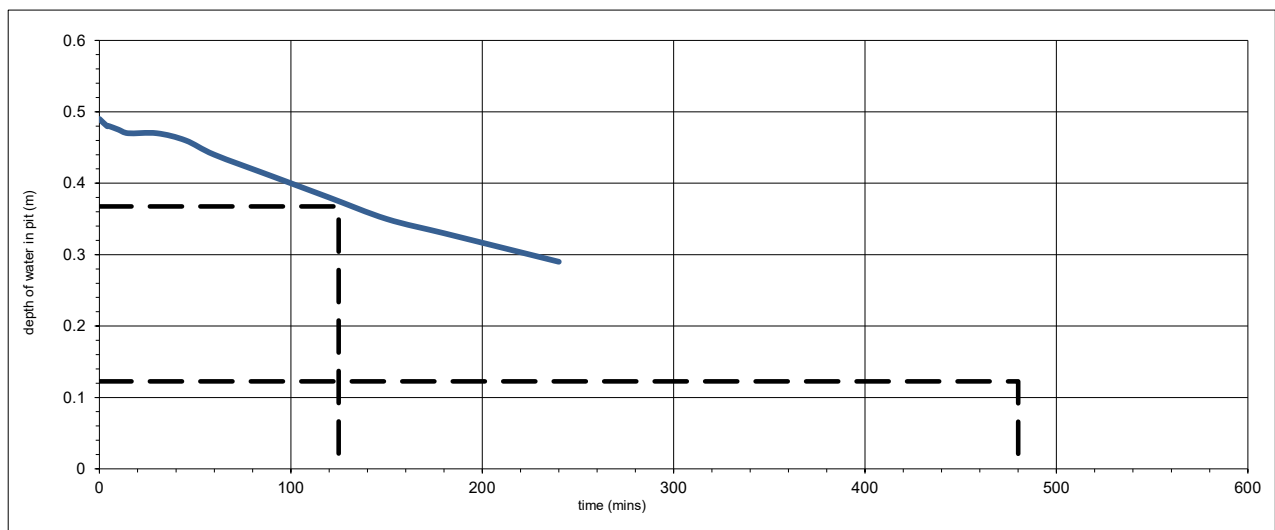
From graph:

test start - 75% depi 0.59
0.3675 m water depth
time is 125.0 minutes

test end - 25% depth at
0.1225 m water depth
time is 480.0 minutes

Extrapolated values

			Tp75-25	Vp75-25	Ap50	F
125	0.2325	0.3675	0	0.00		
480	0.4775	0.1225	355	0.18	1.73	4.8E-06





Project No.: 74031

Nott Group

Site: Reed

Infiltration Test

Test Location: TP3 - test 3

Date: 17th and 18th May 2023

Analysis using method as described in BRE Digest 365

test pit top dimensions width (m) length (m)
 test pit base dimensions 0.45 1.65
 test pit depth 0.45 1.6
 test pit depth 0.6 m

test infiltration rate (f) = 1.6E-06 m/s
 groundwater depth before adding water (m) = 0

hrs	time (mins)	depth to water surface (m)	depth of water in pit (m)	time elapsed from test start (mins)	volume of water lost from test start (m ³)	area of walls and base from test start (m ²)
	0	0.19	0.41	0	0.00	2.42
	1	0.195	0.405	1	0.00	2.40
	2	0.195	0.405	2	0.00	2.40
	3	0.195	0.405	3	0.00	2.40
	4	0.2	0.4	4	0.01	2.39
	5	0.2	0.4	5	0.01	2.39
	10	0.205	0.395	10	0.01	2.38
	15	0.21	0.39	15	0.01	2.37
	20	0.21	0.39	20	0.01	2.37
	25	0.215	0.385	25	0.02	2.36
	30	0.22	0.38	30	0.02	2.35
	45	0.23	0.37	45	0.03	2.33
	60	0.24	0.36	60	0.04	2.31
	75	0.25	0.35	75	0.04	2.29
	90	0.255	0.345	90	0.05	2.28
	120	0.26	0.34	120	0.05	2.27
	420	0.32	0.28	420	0.10	2.14
	600	0.36	0.24	600	0.12	2.06

From graph:

test start - 75% depth at

0.3075 m water depth

time is 300.0 minutes

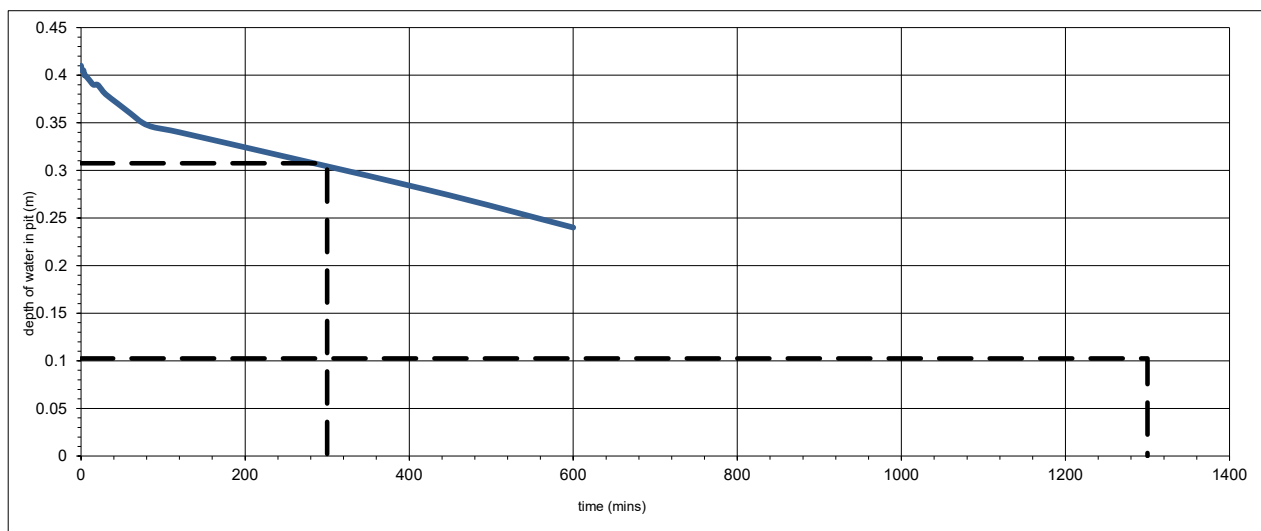
test end - 25% depth at

0.1025 m water depth

time is 1300.0 minutes

Extrapolated values

			Tp75-25	Vp75-25	Ap50	F
300	0.2925	0.3075	0	0.00		
1300	0.4975	0.1025	1000	0.15	1.56	1.6E-06

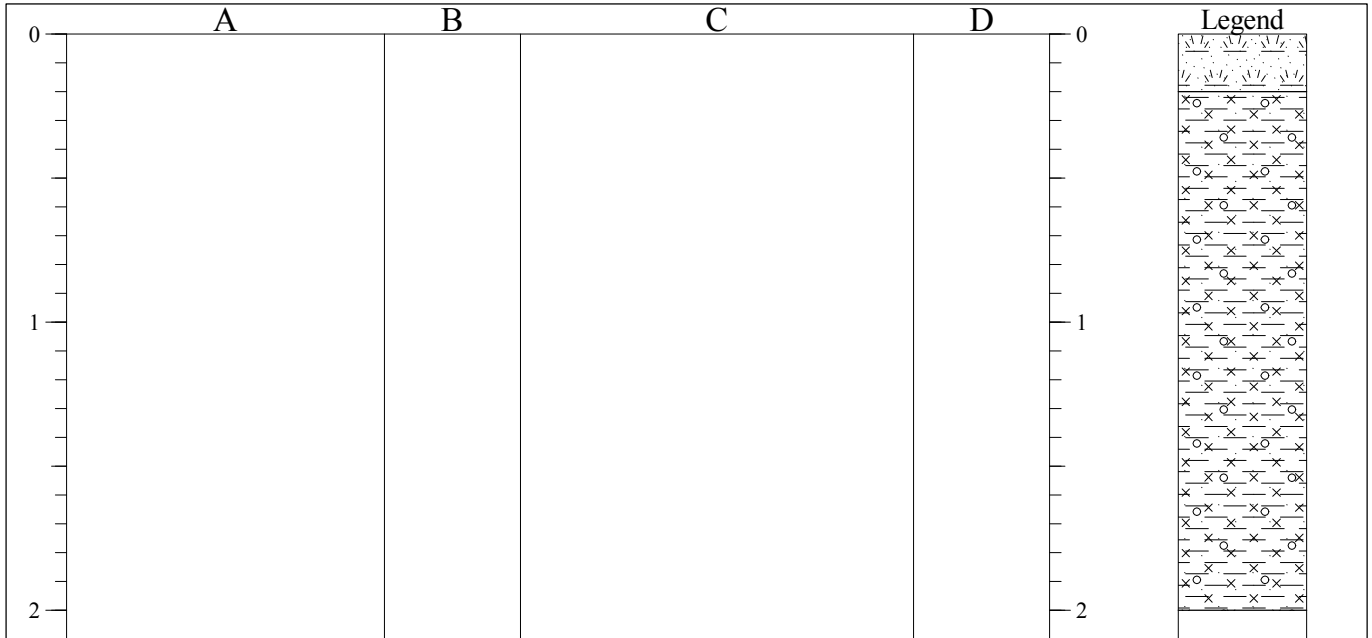


Appendix C TRIAL PIT LOGS

TRIAL PIT LOG



Project Land at Blacksmith's Lane, Reed				TRIAL PIT No TP1
Job No 74031	Date 17-05-23	Ground Level (m)	Co-Ordinates ()	
Contractor Nott Group				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.20		Grass over soft light brown and brown slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets. Gravel is fine to medium sub angular flint. (Topsoil).				
0.20-2.00		Stiff light brown, light grey and light orange brown slightly sandy gravelly silty CLAY. Gravel is fine to coarse angular to sub angular chalk. (Lowestoft Formation).				

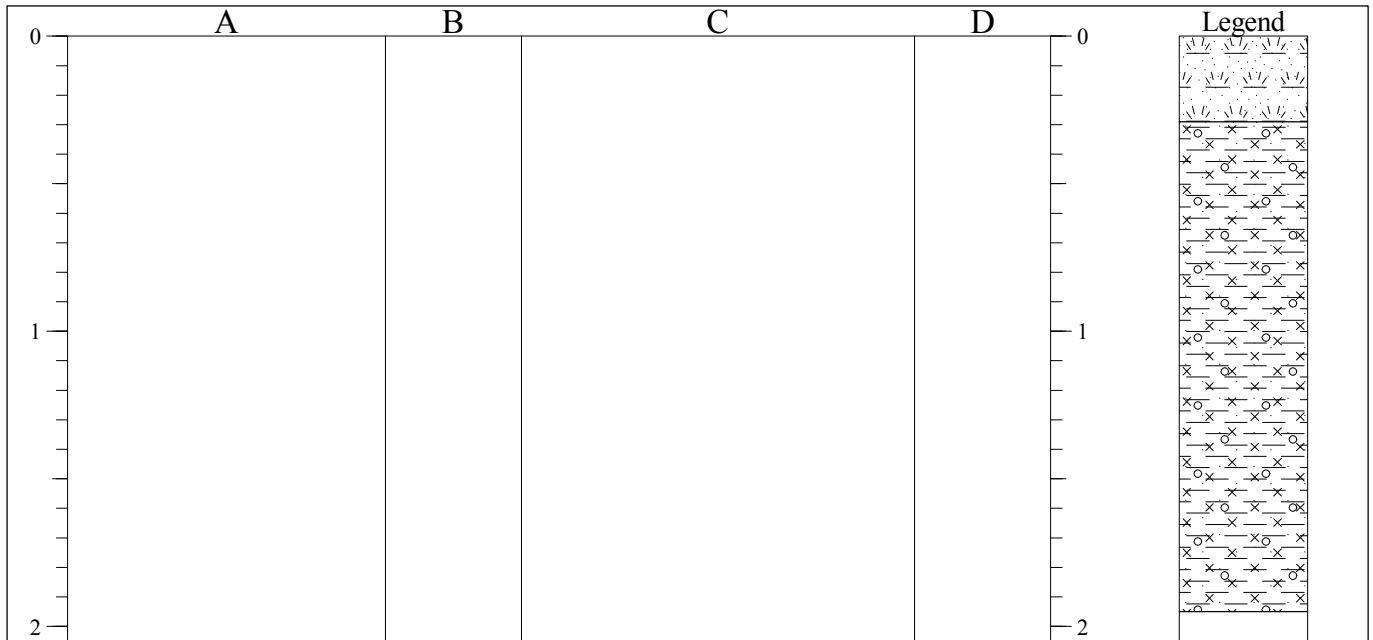
Shoring/Support: None. Stability: All sides noted to be stable.	GENERAL REMARKS 1. No groundwater encountered.
--	---

All dimensions in metres Scale 1:26.25	Client Trustees of the Turney Trust	Method/ Plant Used Mechanical Excavator	Logged By EB
---	--	---	-----------------

TRIAL PIT LOG



Project Land at Blacksmith's Lane, Reed				TRIAL PIT No TP2
Job No 74031	Date 17-05-23	Ground Level (m)	Co-Ordinates ()	
Contractor Nott Group				Sheet 1 of 1



STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.29		Grass over soft light brown and brown slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets. Gravel is fine to medium sub angular flint. (Topsoil).				
0.29-1.95		Stiff dark orange brown and dark grey slightly sandy slightly gravelly to gravelly silty CLAY. Gravel is fine to coarse sub angular to sub rounded chalk and fine sub angular to sub rounded flint. (Lowestoft Formation).				

Shoring/Support: None. Stability: All sides noted to be stable.		GENERAL REMARKS 1. No groundwater encountered.

All dimensions in metres Scale 1:25.625	Client Trustees of the Turney Trust	Method/ Plant Used Mechanical Excavator	Logged By EB
--	--	---	-----------------

AGS3 UK TP BLACKSMITHS LANE REED GPJ GINT STD AGS 3_1.GDT 12/6/23

TRIAL PIT LOG



Project Land at Blacksmith's Lane, Reed				TRIAL PIT No TP3
Job No 74031	Date 17-05-23	Ground Level (m)	Co-Ordinates ()	
Contractor Nott Group				Sheet 1 of 1

0	A	B	C	D	0	Legend

STRATA				SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests	
0.00-0.28		Grass over soft light brown and brown slightly sandy slightly gravelly silty CLAY with occasional roots and rootlets. Gravel is fine to medium sub angular flint. (Topsoil).				
0.28-0.60		Stiff light brown, light grey and light orange brown slightly sandy gravelly silty CLAY. Gravel is fine to coarse angular to sub angular chalk. (Lowestoft Formation).				

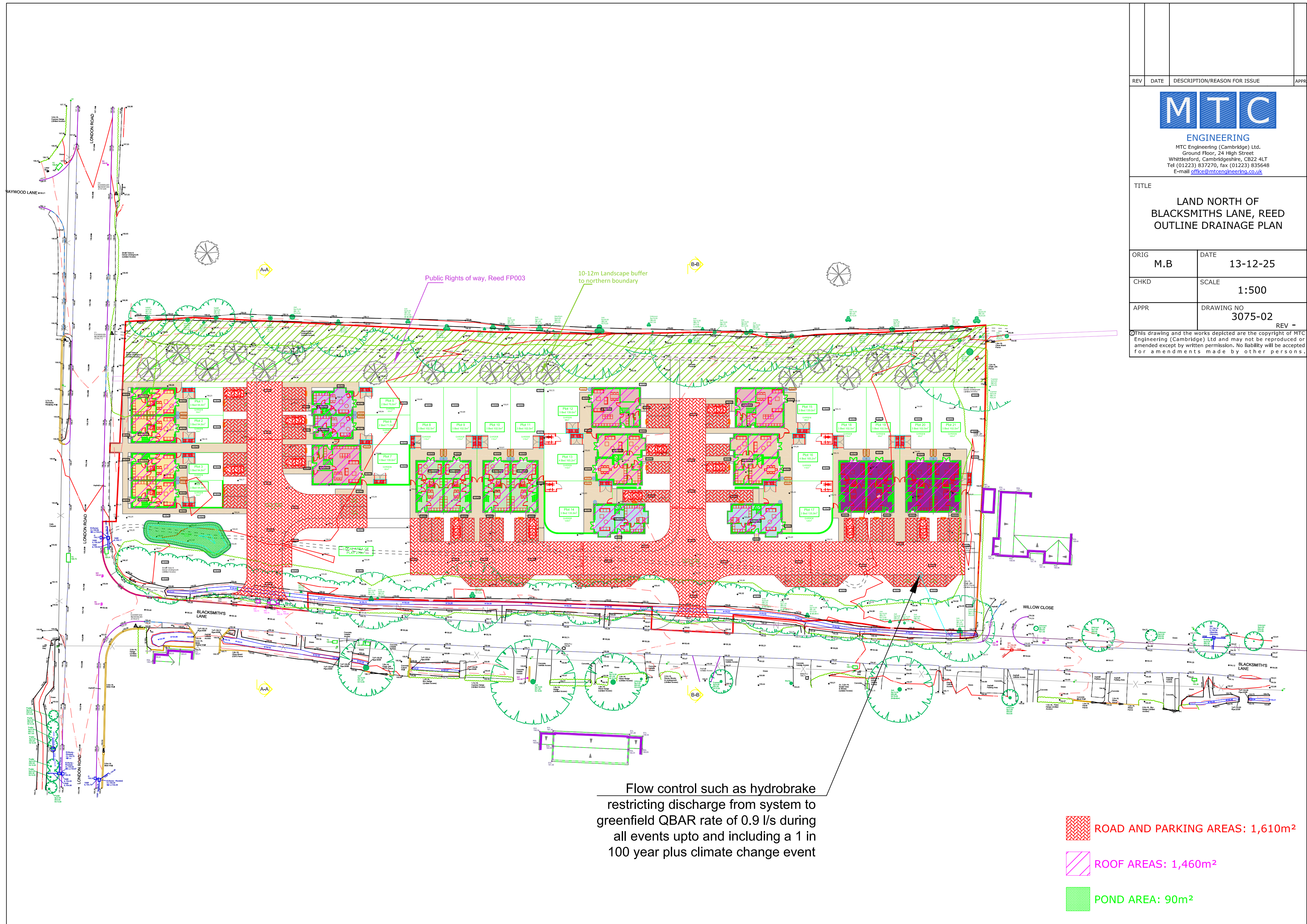
Shoring/Support: None. Stability: All side noted to be stable.	GENERAL REMARKS 1. No groundwater encountered.

All dimensions in metres Scale 1:8.75	Client Trustees of the Turney Trust	Method/ Plant Used Mechanical Excavator	Logged By EB
--	--	---	-----------------

AGS3 UK TP BLACKSMITHS LANE REED GPJ GINT STD AGS 3_1.GDT 12/6/23

APPENDIX 9

OUTLINE DRAINAGE PLAN



Flow control such as hydrobrake restricting discharge from system to greenfield QBAR rate of 0.9 l/s during all events upto and including a 1 in 100 year plus climate change event

- ROAD AND PARKING AREAS: 1,610m²
- ROOF AREAS: 1,460m²
- POND AREA: 90m²

REV	DATE	DESCRIPTION/REASON FOR ISSUE	APPR
M T C ENGINEERING MTC Engineering (Cambridge) Ltd. Ground Floor, 24 High Street Whittlesford, Cambridgeshire, CB22 4LT Tel (01223) 837270, fax (01223) 835648 E-mail office@mtcengineering.co.uk			
TITLE			
LAND NORTH OF BLACKSMITHS LANE, REED OUTLINE DRAINAGE PLAN			
ORIG	M.B	DATE	13-12-25
CHKD		SCALE	1:500
APPR		DRAWING NO	3075-02
		REV	-
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APPENDIX 10

CAUSEWAY FLOW CALCULATIONS

**Design Settings**

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	3.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	100.0		

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Depth (m)
Impermeable Area	0.111	3.00	0.0	155.000	1200	1.425
Impermeable Area 2	0.110	3.00	0.0	155.000	1200	1.425
Impermeable Area 3	0.110	3.00	0.0	155.000	1200	1.425
Attenuation	0.000	3.00	0.0	155.000	1200	1.559
Flow Control	0.000	3.00	0.0	155.000	1200	1.618
Outfall	0.000	3.00	0.0	155.000	1200	1.677

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	Impermeable Area	Attenuation	10.000	0.600	153.575	153.516	0.059	169.5	300	3.14	100.0
1.001	Attenuation	Flow Control	10.000	0.600	153.441	153.382	0.059	169.5	375	3.26	100.0
1.002	Flow Control	Outfall	10.000	0.600	153.382	153.323	0.059	169.5	375	3.38	100.0
2.000	Impermeable Area 2	Attenuation	10.000	0.600	153.575	153.516	0.059	169.5	300	3.14	100.0
3.000	Impermeable Area 3	Attenuation	10.000	0.600	153.575	153.516	0.059	169.5	300	3.14	100.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.204	85.1	40.1	1.125	1.184	0.111	0.0	145	1.188
1.001	1.389	153.4	119.6	1.184	1.243	0.331	0.0	250	1.529
1.002	1.389	153.4	119.6	1.243	1.302	0.331	0.0	250	1.529
2.000	1.205	85.1	39.8	1.125	1.184	0.110	0.0	144	1.184
3.000	1.205	85.1	39.8	1.125	1.184	0.110	0.0	144	1.184

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	10.000	169.5	300	Circular	155.000	153.575	1.125	155.000	153.516	1.184
1.001	10.000	169.5	375	Circular	155.000	153.441	1.184	155.000	153.382	1.243
1.002	10.000	169.5	375	Circular	155.000	153.382	1.243	155.000	153.323	1.302
2.000	10.000	169.5	300	Circular	155.000	153.575	1.125	155.000	153.516	1.184

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Impermeable Area	1200	Manhole	Adoptable	Attenuation	1200	Manhole	Adoptable
1.001	Attenuation	1200	Manhole	Adoptable	Flow Control	1200	Manhole	Adoptable
1.002	Flow Control	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable
2.000	Impermeable Area 2	1200	Manhole	Adoptable	Attenuation	1200	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
3.000	10.000	169.5	300	Circular	155.000	153.575	1.125	155.000	153.516	1.184

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
3.000	Impermeable Area 3	1200	Manhole	Adoptable	Attenuation	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Impermeable Area	155.000	1.425	1200	 0	1.000	153.575	300
Impermeable Area 2	155.000	1.425	1200		2.000	153.575	300
Impermeable Area 3	155.000	1.425	1200	 0	3.000	153.575	300
Attenuation	155.000	1.559	1200		3.000	153.516	300
Flow Control	155.000	1.618	1200	 2 3 0	2.000	153.516	300
					1.000	153.516	300
					1.001	153.441	375
Flow Control	155.000	1.618	1200	 1 0	1.001	153.382	375
					1.002	153.382	375
Outfall	155.000	1.677	1200	 1	1.002	153.323	375

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.8
Rainfall Events	Singular	Drain Down Time (mins)	240	30 year (l/s)	2.4
Summer CV	1.000	Additional Storage (m³/ha)	20.0	100 year (l/s)	3.4
Winter CV	1.000	Starting Level (m)		Check Discharge Volume	✓
Analysis Speed	Normal	Check Discharge Rate(s)	✓	100 year 360 minute (m³)	57

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

**Pre-development Discharge Rate**

Site Makeup	Greenfield	Growth Factor 30 year	2.55
Greenfield Method	IH124	Growth Factor 100 year	3.56
Positively Drained Area (ha)	0.316	Betterment (%)	0
SAAR (mm)	625	QBar	0.9
Soil Index	3	Q 1 year (l/s)	0.8
SPR	0.40	Q 30 year (l/s)	2.4
Region	5	Q 100 year (l/s)	3.4
Growth Factor 1 year	0.87		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.316	Storm Duration (mins)	360
Soil Index	3	Betterment (%)	0
SPR	0.40	PR	0.357
CWI	89.778	Runoff Volume (m ³)	75

Node Flow Control Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	153.382	Product Number	CTL-SHE-0048-9000-0700-9000
Design Depth (m)	0.700	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	0.9	Min Node Diameter (mm)	1200

Node Attenuation Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	153.441
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	500.0	500.0	0.700	500.0	555.5	0.701	0.0	555.5

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.95%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Impermeable Area	1410	154.064	0.489	3.7	1.3142	0.0000	SURCHARGED
1440 minute winter	Impermeable Area 2	1410	154.064	0.489	3.7	1.3073	0.0000	SURCHARGED
1440 minute winter	Impermeable Area 3	1410	154.064	0.489	3.7	1.3073	0.0000	SURCHARGED
1440 minute winter	Attenuation	1410	154.064	0.623	10.9	312.0640	0.0000	SURCHARGED
1440 minute winter	Flow Control	1410	154.064	0.682	2.5	0.7710	0.0000	SURCHARGED
1440 minute winter	Outfall	1410	153.343	0.020	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	Impermeable Area	1.000	Attenuation	3.6	0.467	0.043	0.7042	
1440 minute winter	Impermeable Area 2	2.000	Attenuation	3.6	0.467	0.043	0.7042	
1440 minute winter	Impermeable Area 3	3.000	Attenuation	3.6	0.467	0.043	0.7042	
1440 minute winter	Attenuation	1.001	Flow Control	2.5	0.154	0.016	1.1030	
1440 minute winter	Flow Control	1.002	Outfall	0.9	0.383	0.006	0.0229	76.9

APPENDIX 11

SECTION DRAWINGS FOR BIN AND CYCLE STORES

general notes

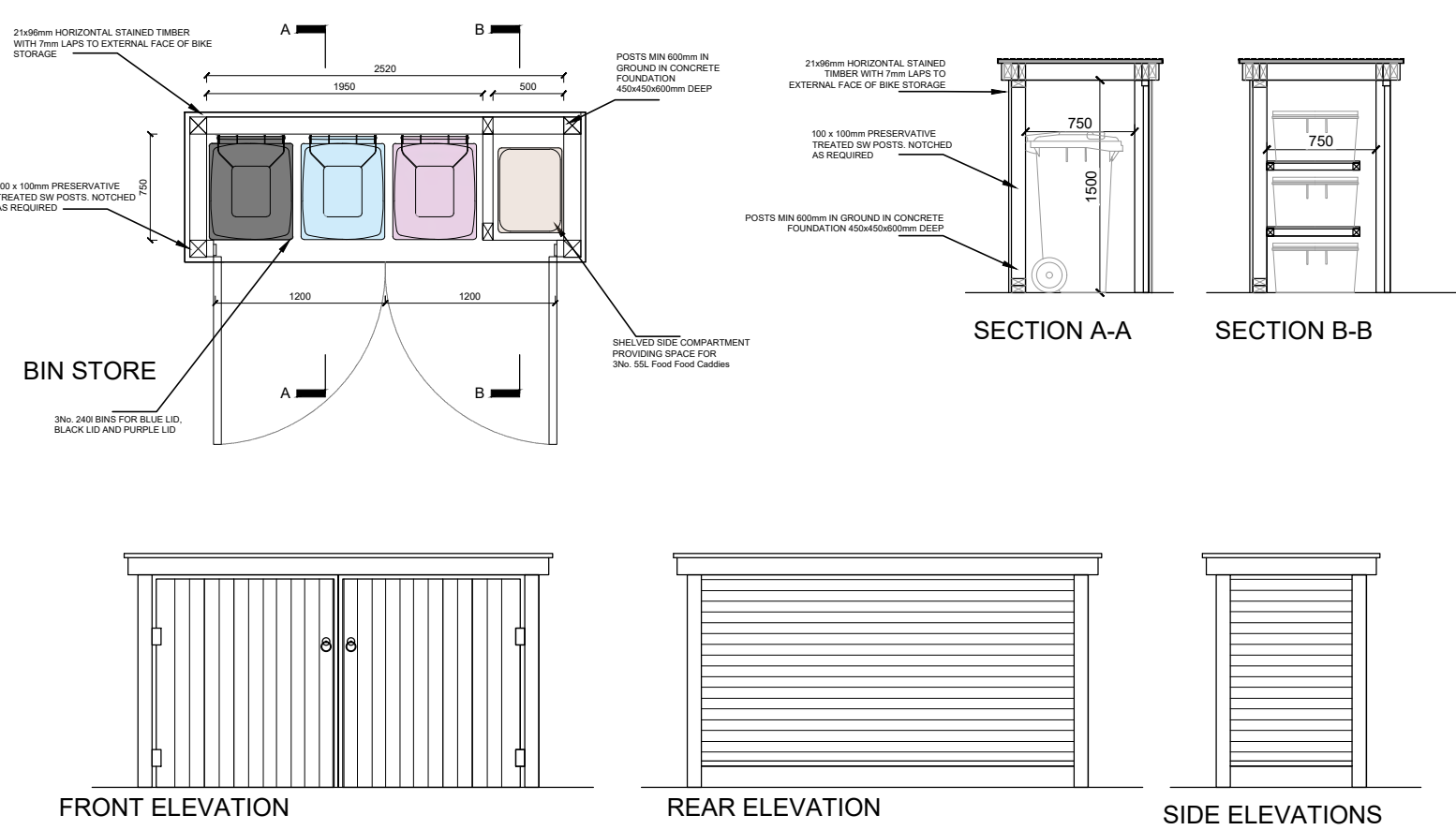
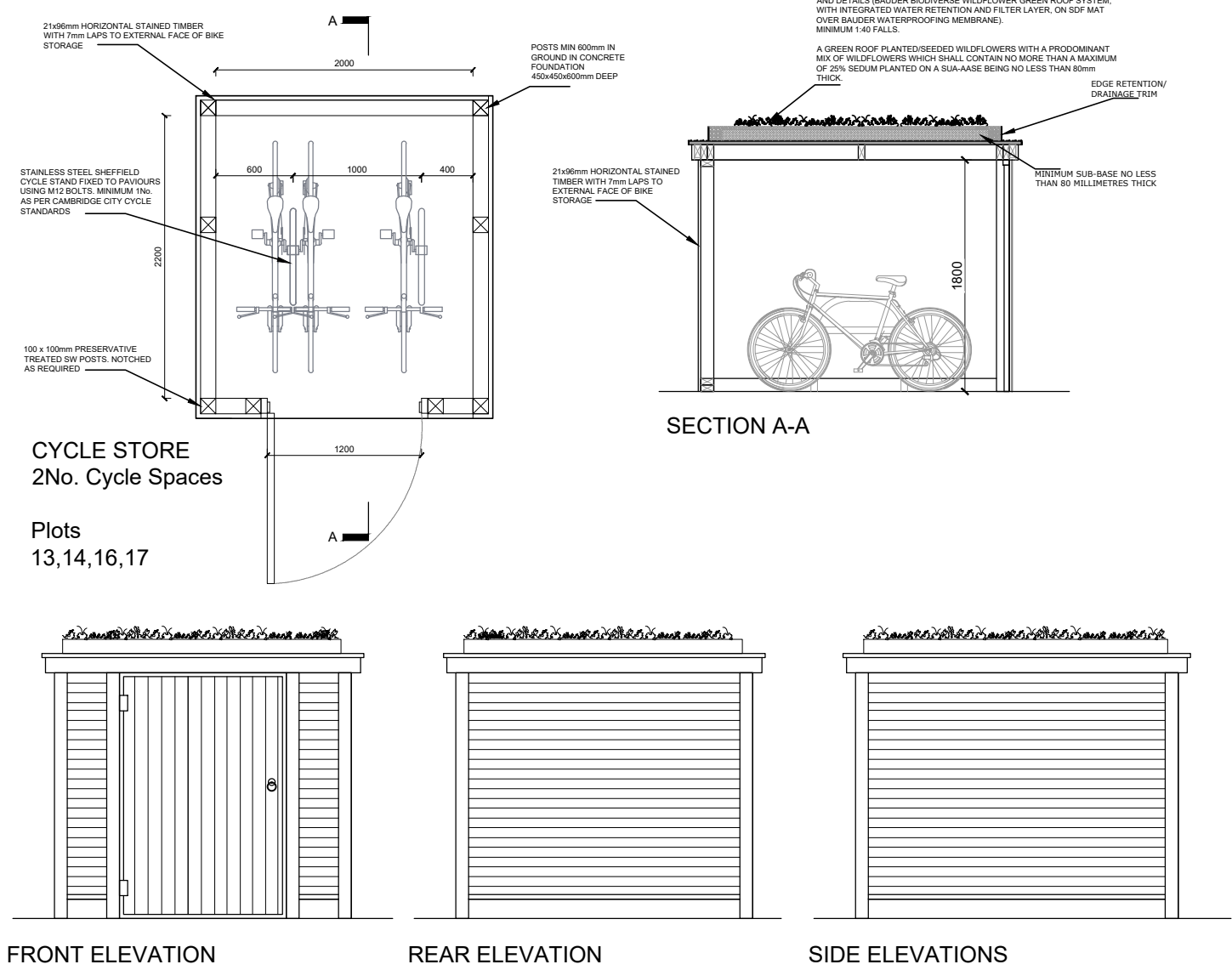
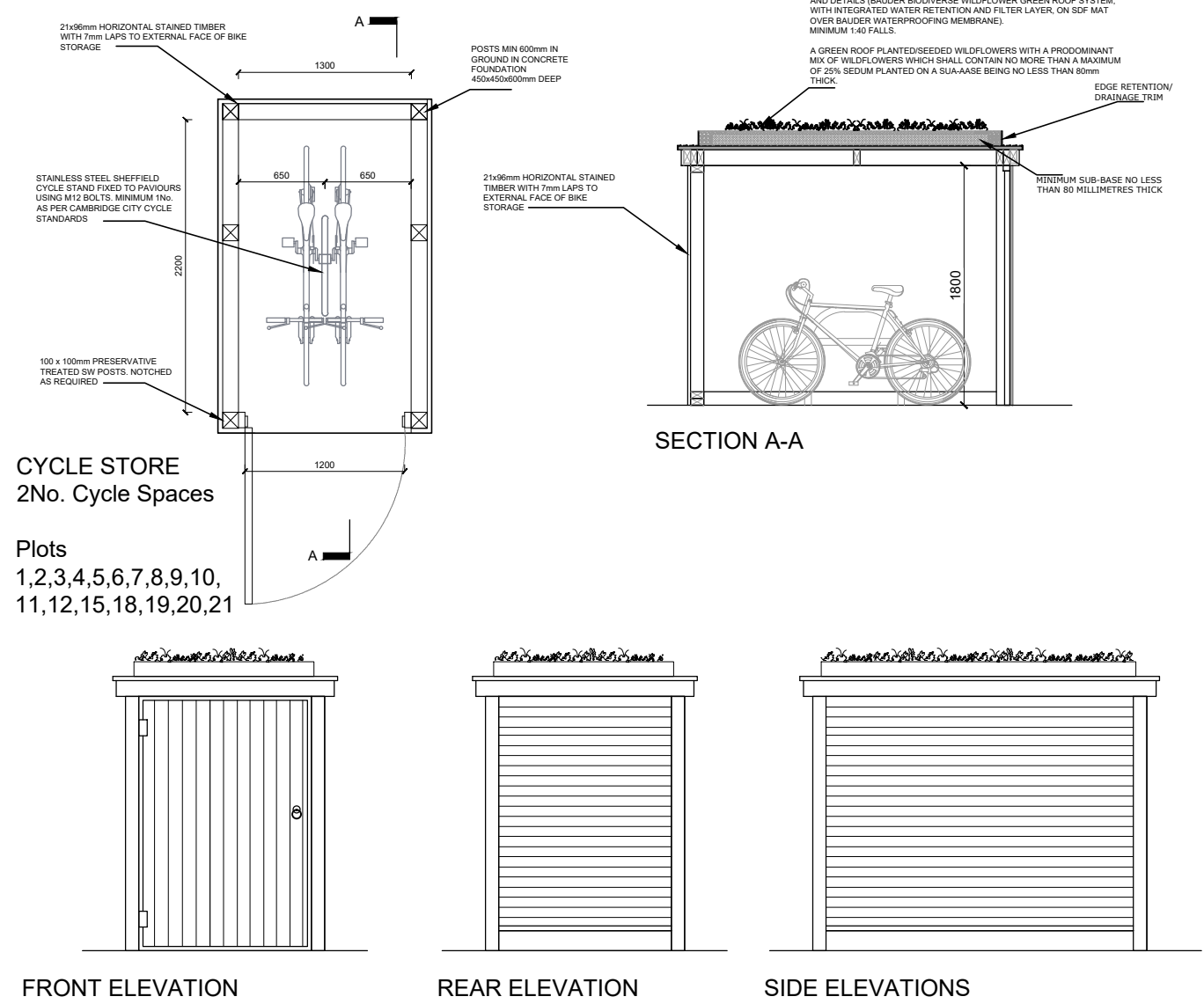
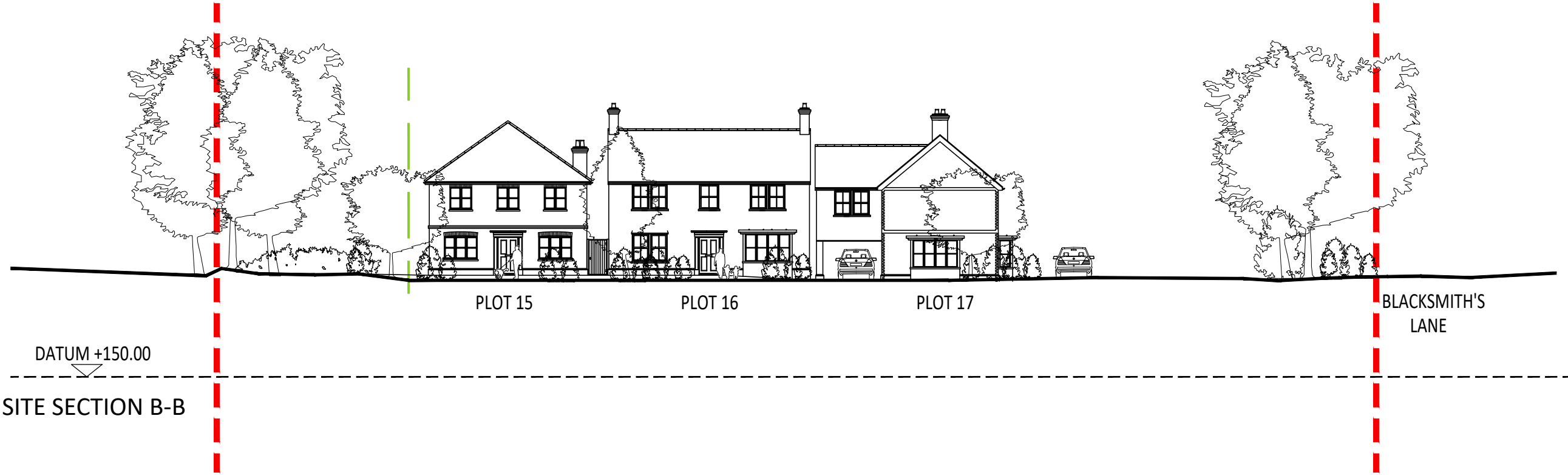
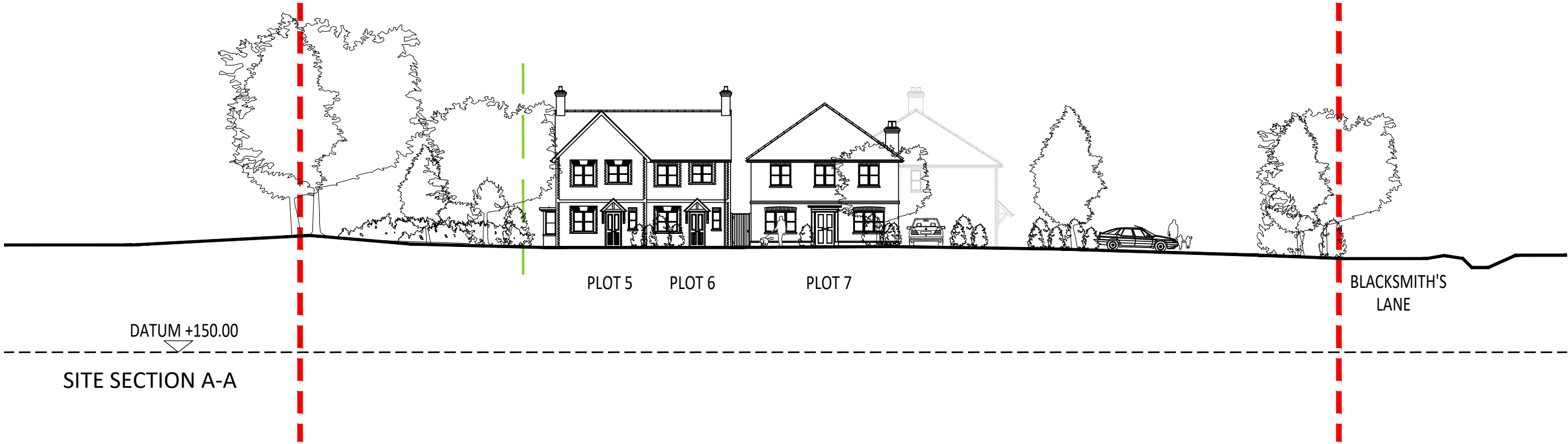
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All dimensions to be checked on site prior to commencement of works and any discrepancies to be checked immediately.

Do not scale from this drawing.

Unless otherwise stated, all dimensions are in mm.



rev P1 date Oct '25 drawn DSR

client The Turney Trust

project Land at Blacksmiths Lane, Reed Royston, Hertfordshire

drawing title Proposed Street Scene, Site Sections and Bin/ Bike Stores

drawing no PL(21)08 checked DSR

scale 1:50 / 1:250 original A1

status PLANNING

address 25 Cromwell Road
Cambridge
Cambridgeshire
CB1 3EB

telephone +44 (0)1223 212253
email info@29architecture.co.uk
website www.29architecture.co.uk



APPENDIX 12

THAMES WATER MAPPING



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Foul Sewer		Other Sewer		Foul Manhole	
Surface Sewer		Private Asset		Surface Manhole	
Combined Sewer		Proposed Asset		Combined Manhole	
Abandoned Sewer		NAV Area		Abandoned Manhole	
Pressure Main				Other Manhole	
				Private Manhole	
				End Item	
				S104 Boundary	

concierge@geodesys.com

SG8 8AX





NAVs Information

<u>Abbreviation</u>	<u>Company Full Name</u>
AWINL	Advanced Water Infrastructure Networks Limited
AWL	Albion Water Limited
CWL	County Water Limited
ESPWL	ESP Water Limited
IWNL	Independent Water Networks Limited
IWSL	Icosa Water Services Limited
LNWL	Leep Networks (Water) Limited
MWL	Matrix Water Limited
STSL	Severn Trent Services Limited

