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FLOOD RISK & DRAINAGE

Milksey Lane, Graveley - Phase 2
Flood Risk Assessment
December 2024

Report Ref: 29161-FLD-0101

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REPORT REF: 29161-FLD-0101

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REGISTRATION OF AMENDMENTS

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EXECUTIVE SUMMARY

Site Address	Milksey Lane, Graveley, Hertfordshire, SG4 7LA, E: 523023, N: 228248.
Site Description and Setting	The development site is to the north of Graveley with the current site use assumed to be existing greenfield land. The site is bounded to the north by Graveley Lane and to the east is High Street. To the south and west of the is Milksey Lane and the A1m further west.
Proposed Development	A previous application for 10 residential dwellings (17/04017/FP) has been granted permission by North Hertfordshire Council with the Flood Risk Assessment written by Richard Jackson Engineering Consultants in November 2023. The proposed development is for up to 24 residential dwellings with associated infrastructure, parking and access to High Street.
Flood Risk Information	The Flood Map for Planning shows the site is located within Flood Zone 1, which is defined as land assessed as having an annual probability of river flooding of less than 0.1%. The Environment Agency Flood Risk from Surface Water Map, indicates that the site is at low risk of surface water flooding. A small flow route along the site's southern boundary, along Milksey Lane, flows south during the 1 in 1000-year storm event (low risk). The site is at low risk of flooding from all other sources.
Surface Water Drainage Strategy	In accordance with the National SuDS Standards, the strategy involves conveying surface water flows to a series of attenuation features. Surface water will then discharge from the final attenuation basin into an existing surface water sewer within High Street, at a discharge rate of 2.0l/s. This sewer has been proven to connect into the pond adjacent to pondside. In total a storage volume of 695.28m^3 would be required within the attenuation features to accommodate the 1%AEP45CC storm event. Additional drainage features such as permeable paving will be used across the site and will provide extra storage on-site. Permeable paving will act as a first treatment stage for any run-off and will ensure adequate surface water treatment is provided. These features have been excluded from calculations at this stage.
Foul Water Drainage Strategy	Sewer records obtained from Anglian Water show there are no surface water sewers within the vicinity of the site. There is a foul water sewer within Milksey Lane, which flows south towards the George and Dragon public house. A gravity connection into Manhole 1001 within High Street is achievable. All foul connections to the existing public sewerage system will need to be approved by AW in accordance with Section 106 of the Water Industry Act. An application for the connections will need to be submitted to AW in due course to obtain approvals prior to the commencement of works.
Conclusions	With the above measures in place, the development of the site will not create any flood risk issues within the wider area.
This summary should be read in conjunction with the full report and reflects an assessment of the site based on information received by MEC at the time of production.	

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1.0 INTRODUCTION

1.1 MEC Consulting Group Ltd, has been commissioned by Gade Homes (hereafter referred to as 'the Client') to undertake a Flood Risk Assessment for a proposed residential development at Milksey Lane, Graveley (hereafter referred to as 'the Site'). A site location plan is provided in **Appendix A** and a sketch masterplan is contained within **Appendix B**.

1.2 A previous application for 10 residential dwellings (17/04017/FP) was granted permission with the Flood Risk Assessment produced by Richard Jackson Engineering Consultants in November 2023.

1.3 This application is for a proposed development of up to 24 residential dwellings with associated infrastructure, parking and access to High Street.

1.4 The purpose of this Flood Risk Assessment (FRA) is to review freely available information and assess the flood risk posed to the site from a range of sources. The FRA has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG), with respect to flood risk and climate change.

1.5 The assessment has been carried out using our best engineering judgement however there are levels of uncertainty implicit in the historical data and methods of analysis. The Flood Risk Assessment has been carried out in accordance with the requirements of the documents below:

- National Planning Policy Framework (NPPF) - December 2024
- Flood Risk and Coastal Change Planning Practice Guidance (PPG) August 2022
- Environment Agency Flood Map for Planning and Risk of Flooding from Surface Water datasets from the DEFRA Spatial Data Catalogue
- DEFRA MagicMap, 2024
- British Geological Survey Geology Viewer and GeoIndex, 2024
- The Local Hertfordshire Plan – November 2022
- North Hertfordshire Strategic Flood Risk Assessment Addendum (SFRA) – September 2016
- Hertfordshire County Council Preliminary Flood Risk Assessment – June 2011
- Hertfordshire Local Flood Risk Management Strategy – February 2019
- North Hertfordshire Supplementary Planning Document – September 2024

1.6 The Local Planning Authority (LPA) is North Hertfordshire District Council (NHDC) and the Lead Local Flood Authority (LLFA) is Hertfordshire County Council (HCC). The site falls within the Anglian Water (AW) Catchment.

Disclaimer

1.7 MEC has completed this report for the benefit of the individuals referred to in paragraph 1.1 and any relevant statutory authority which may require reference in relation to approvals for the proposed development. Other

third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from MEC.

1.8 MEC accepts no responsibility or liability for:

- The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
- The issue of this document to any third party with whom approval for use has not been agreed.

2.0 POLICY CONTEXT

National Planning Policy Framework

2.1 The National Planning Policy Framework (NPPF) was published and updated most recently in December 2024 by the Ministry of Housing, Communities and Local Government.

2.2 The NPPF is the primary source of national planning guidance in England, setting out the Government's planning policies for England, and how they are expected to be applied by local councils.

2.3 'Chapter 14: Meeting the challenge of climate change, flooding and coastal change' outlines the guiding principles for managing flood risk as part of the planning process, notably paragraphs 161-186.

2.4 The Planning Practice Guidance (PPG) sets out the vulnerability to flooding of different land uses. It encourages development to be in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off-site to the wider catchment.

2.5 The PPG also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing an FRA. The document also includes a series of tables that define Flood Zones, the flood risk vulnerability classification of development land use, and 'compatibility' of development within the defined Flood Zones.

2.6 Therefore, this FRA has been completed in line with the guidance and requirements of the NPPF and PPG.

Local Plan

2.7 The North Hertfordshire Local Plan (2011-2031) was adopted by the council in November 2022. The Local Plan sets out how land within the authorities' boundaries can be used and developed, providing policies which the Council uses to determine planning applications. The plan aims to set out the areas where development will take place, the areas that will be protected and the policies that will be used to determine planning applications.

2.8 More generally, the Core Strategy also lists policies that guide the design and principles of all development within the authority's land. Those relevant to this FRA are summarised as follows;

- Policy SP12: Green Infrastructure, landscape and biodiversity
- Policy D1: Sustainable Design
- Policy NE7: Reducing Flood Risk
- Policy NE8: Sustainable Drainage Systems

Local SFRA

2.9 The North Hertfordshire District Council Strategic Flood Risk Assessment (SFRA) was published in September 2016. The SFRA was produced to provide an appropriate evidence base for the Local Plan and provides a summary of flood risk across the district.

2.10 Appropriate background information has been used to inform this FRA and will be referenced accordingly.

Local PFRA

2.11 The Hertfordshire County Council Preliminary Flood Risk Assessment (PFRA) was published in June 2011 and was prepared to assist Hertfordshire County Council meet its duties to manage local flood risk, and the delivery of any legal requirements placed on it as Lead Local Flood Authority (LLFA) under the Flood Risk Regulations 2009.

2.12 Appropriate background information has been used to inform this FRA and will be referenced accordingly.

Flood Risk Management Strategy

2.13 Hertfordshire County Council Local Flood Risk Management Strategy (FRMS) was published in February 2019 to comply with Section 9 of the Flood and Water Management Act 2010 and aims to provide a framework for meeting its requirements to develop, maintain, apply, and monitor a local strategy for flood risk management.

2.14 The FRMS provides further information regarding surface water runoff, groundwater and sewer flooding and flood risk around the county and the introduction of flood risk alleviation schemes at various scales, including SuDS.

Supplementary Planning Documents

2.15 The North Hertfordshire Flood and Water Supplementary Planning Document (SPD) was adopted in September 2024. The SPD was published to provide developers with information on all aspects of development they will be required to meet as part of an application.

2.16 Specifically for this FRA, this SPD contains information on managing flood risk and the water environment within North Hertfordshire, along with information around SuDS, flood mitigation and how they should be incorporated into designs.

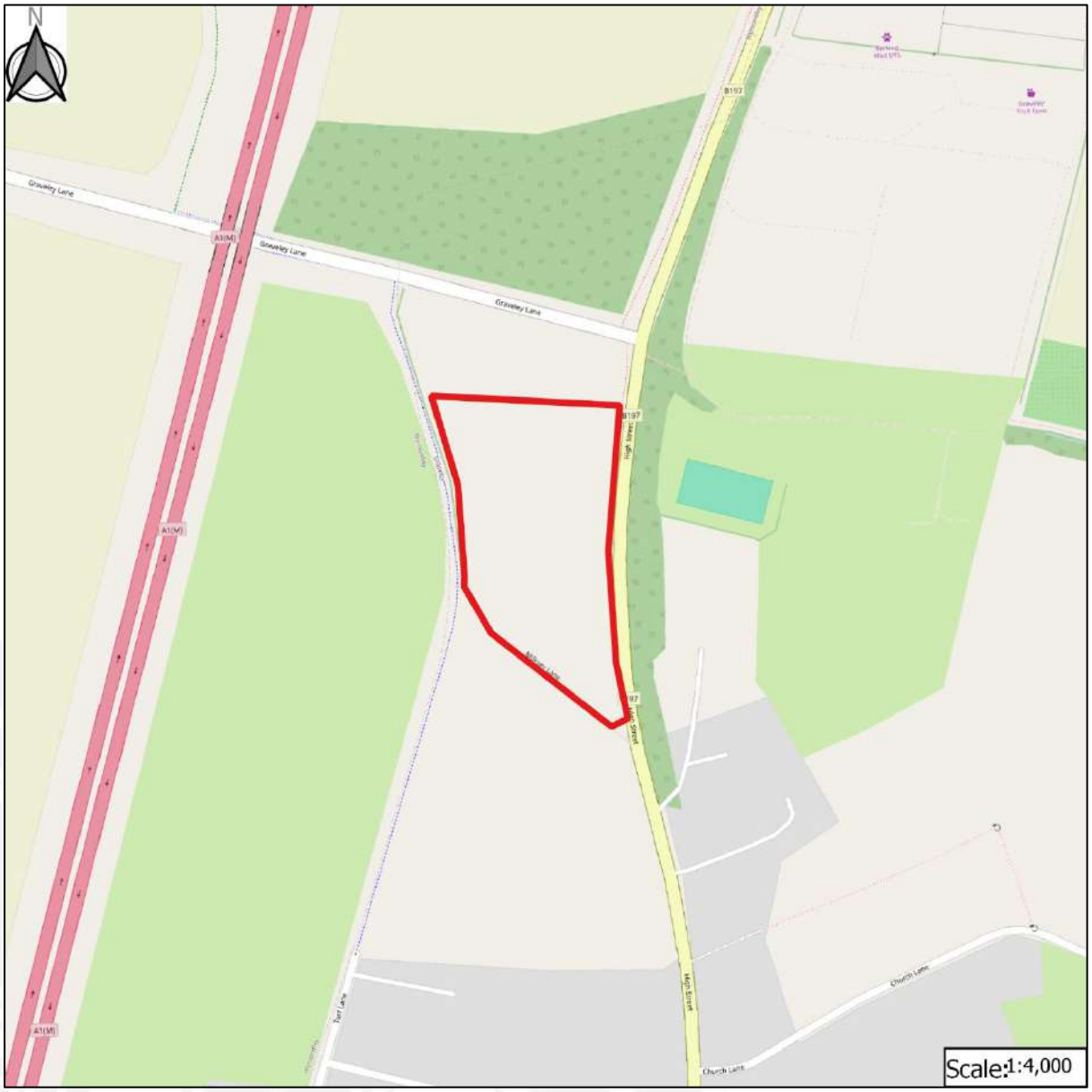
3.0 SITE DESCRIPTION

Site Location and Features

3.1 The Ordnance Survey National Grid Reference (NGR) for the centre of the site, E:523023, N:228248. The development site is to the north of Graveley with the current site use assumed to be existing greenfield land. Therefore, it is assumed to be subject to a natural regime of runoff and/or infiltration where ground conditions permit.

3.2 The site is bounded to the north by Graveley Lane and to the east is High Street. To the south and west of the site is Milksey Lane and the A1m is further west. The site location is shown in Figure 2.1.

Figure 2.1: Site Location Plan



Topographic Data

3.3 A topographical survey was undertaken by Axis Surveys in August 2024 and can be found in **Appendix C**. The information shows the site falls from north to south with levels ranging from 110.97m AOD to 100.00m AOD.

Flood Zone Maps & Flood Defence Data

3.4 Information relating to the current flood risk to the application site has been obtained from the Environment Agency and .gov.uk websites. There is no recorded evidence of flood defences in the vicinity of the site.

Watercourses & Hydrology

3.5 A review of the topographical survey confirms there are no ditches, or watercourses onsite. There are two gullies on Milksey Lane, close to the junction with High Street.

3.6 The closest watercourse is located approximately 153m south of the site. The watercourse flows from west to east and becomes culverted along High Street before outfalling into the existing pond on Pondside.

3.7 The closest designated Main River, the Weston Tributary, is situated approximately 3.60km to the northeast, which is a tributary of the River Beane.

Historic Flooding

3.8 Information published from the North Hertfordshire SFRA suggests there is no evidence of historic flooding within the site.

Geological Data

3.9 The 1:50,000 British Geological Survey (BGS) viewer shows the whole of the site is underlain by the Holywell Nodular Chalk Formation and New Pit Chalk Formation consisting of Chalk. Superficial deposits of Lowersoft Formation consisting of Diamicton and Glaciofluvial deposits consisting of sand and gravel overlie the bedrock.

3.10 As part of the previous application the site was investigated for its infiltration potential in January 2018 by Richard Jackson Engineering Consultants (ref: KB/48759). The report highlights the underlying ground conditions through the trial pit. The ground conditions at the site are generally made ground to a depth of 0.75m BGL in TP1 and 0.20m BGL. The full infiltration results can be found in **Appendix D.**

Sewers

3.11 Sewer records have been obtained from Anglian Water, see **Appendix E.** The records show there are no surface water sewers within the vicinity of the site. There is a foul water sewer within Milksey Lane, which flows south towards the George and Dragon public house.

3.12 The topographical survey shows there are two gullies on Milksey Lane, close to its junction with High Street. These gullies are assumed to outfall to the existing surface water sewers in High Street. The development is assumed to outfall into these gullies when rainfall conditions result in overland flows down Milksey Lane.

3.13 A CCTV Survey by SB Drain Services was undertaken as part of an application for a development south of Milksey Lane (23/00186/FP). A dye test was undertaken of the existing watercourse and surface water sewer in High Street. The survey proved connectivity from the watercourse, into the surface water sewer and into the pond adjacent to Pondside, south of Oak Lane.

3.14 An additional CCTV survey was undertaken by AquaTech Drain Services in November 2024 to establish drainage connections around the proposed development. AquaTech found there were two manholes located within the treeline along the site's eastern boundary. The CCTV survey shows these manholes connect into the system downstream. Therefore, it is assumed that all of the development in Graveley currently outfalls into this system. The CCTV survey can be found in **Appendix F.**

4.0 FLOOD RISK TO SITE

Flood Zone Allocation

4.1 The Flood Map for Planning is shown in Figure 4.1. The map shows the site lies within Flood Zone 1. Flood Zone 1 (FZ1) is defined as land assessed as having an annual probability of river flooding less than 0.1%.

Figure 4.1: Environment Agency's Flood Map for Planning (Rivers and Seas)

Surface Water Flooding Risk

4.2 The Environment Agency Flood Risk from Surface Water Map (Figure 4.2) indicates that the site is at low risk of surface water flooding. A small flow route along the site's southern boundary, along Milksey Lane, flows south during the 1 in 1000-year storm event (low risk).

Figure 4.2: Environment Agency's Flood Risk from Surface Water Map

Artificial Waterbodies Flood Risk

4.3 The Environment Agency Mapping shows that the site is not at risk of reservoir flooding, as such, the risk of flooding from reservoirs is low.

Groundwater Flood Risk

4.4 Groundwater Vulnerability Mapping within MagicMaps indicates that the site is located within a medium-high Groundwater Vulnerability Area.

4.5 Groundwater monitoring has not been undertaken at this stage, however, previous infiltration testing which was undertaken in January 2018 to a depth of 2.0m, did not encounter groundwater. Therefore, the risk of groundwater flooding from the site is considered low.

Sewer Flood Risk

4.6 The SFRA shows there has been no recorded sewer flooding within the postcode area of the planned site. Given there is no direct reference to flooding to the site the risk can be taken as low.

5.0 FLOOD RISK ASSESSMENT

Flood Risk Assessment Methodology & Objectives

5.1 It is recognised that developments that are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. Current guidance on development and flood risk identifies several key aims for development to ensure that it is sustainable in flood risk terms.

5.2 These aims are as follows:

- The development should not be at significant risk of flooding and should not be susceptible to damage due to flooding;
- The development should not be exposed to flood risk such that the health, safety and welfare of the users of the development, or the population elsewhere, are threatened;
- Safe access to and from the development should be possible during flood events;
- The development should not increase flood risk elsewhere;
- The development should not prevent safe maintenance of watercourses or maintenance and operation of flood defences;
- The development should not be associated with an onerous or difficult operation and maintenance regime to manage flood risk. The responsibility for any operation and maintenance required should be clearly defined;
- Future users of the development should be made aware of any flood risk issues relating to the development;
- The development should not lead to the degradation of the environment; and
- The development should meet all of the above criteria for its lifetime, including considering the potential effects of climate change.

5.3 This Flood Risk Assessment is undertaken with due consideration of these sustainability aims and has been prepared to inform the proposed scheme.

Project Scope

5.4 In order to achieve the aims outlined above, this Flood Risk Assessment has been undertaken in accordance with current best-practice guidance, including the National Planning Practice Guidance. A scoping study was initially undertaken to identify all potential sources of flooding at the site, which may warrant further consideration. Any potential flooding issues identified in the scoping study have subsequently been considered within this FRA. The scoping study aims to review all available information and provide a qualitative assessment of the flood risk to the site and the impact of the site on flood risk elsewhere. The report has been undertaken with due regard to the EA's National Standing Advice on Development and Flood Risk.

Scoping Study

5.5 All potential sources of flooding must be considered for any proposed development.

5.6 Using the EA Flood Zone mapping, topographical survey and Ordnance Survey maps, a summary of the potential sources of flooding and a review of the potential risk posed by each source on the development area of the application site is presented in Table 5.1.

Table 5.1: Potential Risks posed by Flooding Sources

Source	Risk			Comments
	High	Medium	Low	
Fluvial			✓	The site is located within Flood Zone 1 (Low Probability).
Coastal & Tidal			✓	The site is not located near to the coast and is not affected by coastal or tidal flooding.
Surface Water			✓	The site is at low risk of surface water flooding.
Groundwater			✓	Groundwater was not encountered during previous infiltration testing.
Sewer			✓	Limited extent of sewers in the immediate vicinity
Reservoirs & Artificial Waterbodies			✓	The site is at low risk of reservoir or artificial watercourse flooding.

Flood Risk Mitigation

5.7 It is vital that the correct mitigation is put in place to minimise the flood risk to the development. In accordance with the NPPF, this includes preventing harm from occurring to the users of the site as well as ensuring the development itself is protected.

Fluvial Flood Risk Mitigation

5.8 The proposed development falls entirely in Flood Zone 1. Given the site is in Flood Zone 1 and at very low risk of fluvial flooding, there would be no requirements to provide any further formal mitigation at this development site.

Surface Water Flood Risk Mitigation

5.9 The Environment Agency Flood Risk from Surface Water Map indicates that the site is at low risk of surface water flooding. In accordance with the NPPF, finished floor levels will be set to a minimum of 150mm above the adjacent site levels. Permeable paving will be utilised to avoid any ponding of surface water above the ground. Surface water is likely to be collected by the proposed site-wide drainage infrastructure and conveyed to a proposed discharge point on site. Based on the above, the risk of flooding will be managed at the development site post-development and the remaining risk will be low

Vulnerability Classification of Proposed Development

5.10 The National Planning Practice Guidance: Flood Zone and Flood Risk Tables provide information on the vulnerability classification of various developments. The proposed residential development end use of this site falls in the “more vulnerable” classification. The proposed new dwellings should be situated wholly within Flood Zone 1. A comparison of the ‘more vulnerable’ use with the development proposals within Flood Zone 1 shows that development proposals are acceptable, as shown in Table 5.2.

Table 5.2: Flood risk vulnerability and flood zone 'compatibility' from Flood Risk and Coastal Change - Planning Practice Guidance

Flood Risk Vulnerability classification		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1 (<0.1%)	✓	✓	✓	✓	✓
	Zone 2 (0.1% < p <1%)	✓	✓	Exception Test Required	✓	✓
	Zone 3a (1% < p <5%)	Exception Test required	✓	x	Exception Test Required	✓
	Zone 3b 'Functional Floodplain' p > 5%)	Exception Test Required	✓	x	x	x

Sequential Test

5.11 According to National Planning Practice Guidance: Flood Zone and Flood Risk, the Sequential Test gives preference for locating new development in low-risk areas from all sources of flooding, However, if there is no allocated land within low-risk areas which meets the policy aims of the published Local Authority Local Plan or Local Development Framework then other sites in higher flood risk categories can be considered for that development.

5.12 The site lies within Flood Zone 1 and is at low risk of surface water flooding. This meets the requirements of the PPG which states the aim of the sequential test is to

"… ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding".

Exception Test

5.13 Based on the above the proposed development is in accordance with paragraphs 161-186 of the NPPF, as such an exception test is not required.

6.0 SURFACE WATER MANAGEMENT STRATEGY

6.1 It is essential that the proposed development does not increase flood risk to adjacent land or downstream of the Site, as well as protecting the development from flooding itself. To ensure that the flood risk is minimised, the drainage design will incorporate the following flood mitigation measures:

- Site levels will be designed to direct all overland surface water flows away from the dwellings following the land's natural topography.
- The proposed development will include a surface water drainage system that will intercept runoff generated within the development. This will minimise the risk of flooding within the proposed development and also reduce the incidence of overland flows.
- The surface water drainage system will convey flows to a series of geo-cellular tanks and attenuation basin on-site and will accommodate all storm events up to and including a 1%AEP40CC event.

Surface Water Outfall

6.2 Surface water arising from developed sites should, as far as practical, be managed in a sustainable manner to mimic the surface water flows arising from the undeveloped site. When considering the surface water discharge the SuDS hierarchy needs to be adhered to. The SuDS hierarchy states that the options below must be adhered to in order of sustainability or evidenced otherwise before moving down to a less sustainable discharge method;

- Water reuse (where a need is identified)
- Discharge at source (soakaway)
- Watercourse or waterbody
- Surface water sewer, highway drain or other drainage system
- To a combined sewer

Discharge at Source

6.3 The 1:50,000 British Geological Survey (BGS) viewer shows the whole of the site is underlain by the Holywell Nodular Chalk Formation and New Pit Chalk Formation consisting of Chalk. Superficial deposits of Lowersoft Formation consisting of Diamicton and Glaciofluvial deposits consisting of sand and gravel overlie the bedrock.

6.4 Soil Infiltration Rate Testing has been undertaken at the site in January 2018 by Richard Jackson Engineering Consultants, in accordance with BRE365 (ref: KB/48759). Testing was undertaken in 3 trial pits, however, due to the observed poor infiltration rates, only a single test in each pit was undertaken. Due to the cohesive nature of the subsoil, infiltration is not feasible at the site and an alternative option should be sought. Infiltration results can be found in **Appendix D.**

Discharge at Watercourse

6.5 The closest designated Main River, the Weston Tributary, is situated approximately 3.60km to the northeast, which is a tributary of the River Beane. The closest watercourse is located approximately 153m south of the site. The watercourse flows from west to east and becomes culverted along High Street before outfalling into the existing pond on Pondside.

6.6 Any direct route to these watercourses would cross third-party land and therefore they would not be feasible to outfall to and an alternative option should be sought.

Discharge to Sewers

6.7 Sewer records have been obtained from Anglian Water, see **Appendix E.** The records show there are no surface water sewers within the vicinity of the site. There is a foul water sewer within Milksey Lane, which flows south towards the George and Dragon public house. It is not feasible to discharge to a foul water sewer unless all other options have been exhausted and therefore an alternative option should be sought.

6.8 The topographical survey shows there are two gullies on Milksey Lane, close to its junction with High Street. These gullies are assumed to outfall to the existing surface water sewers in High Street. The development is assumed to outfall into these gullies when rainfall conditions result in overland flows down Milksey Lane.

6.9 A CCTV Survey by SB Drain Services was undertaken as part of an application for a development south of Milksey Lane (23/00186/FP). A dye test was undertaken of the existing highways surface water sewer in High Street. The survey proved connectivity from the surface water sewer to the surface water ponds located adjacent to Pondside, south of Oak Lane.

6.10 An additional CCTV survey was undertaken by AquaTech Drain Services in November 2024 to establish drainage connections around the proposed development. AquaTech found there were two manholes located within the treeline along the site's eastern boundary. The CCTV survey shows these manholes connect into the system downstream. Therefore, it is assumed that all of the development in Graveley currently outfalls into this system. In accordance with the drainage hierarchy, surface water can outfall into the existing sewer system within High Street. The results for the CCTV surveys can be found in **Appendix F.**

Land Use

6.11 In order to calculate the drainage requirements an understanding of the land uses on-site needs to be known. Table 6.1, below summarises the proposed land uses within the site. The site within the red line boundary currently consists of existing open greenspace, with an existing dwelling with associated hardstanding areas. The current land use has been calculated using the existing site plan and the post-development land use has been measured from the proposed layout.

Table 6.1: Land Use Summary.

Land Use Type	Existing Site Areas		Proposed Site Areas	
	Ha	%	Ha	%
Impermeable Areas	0.21	15	0.59	41
Green Landscape / Permeable areas	1.19	85	0.81	59
TOTAL	**1.40**	**100**	**1.40**	**100**

Urban Creep Allowances

6.12 Urban creep is the conversion of permeable surfaces to impermeable ones over time, e.g., extensions to existing buildings. It has been shown that, over the lifetime of development, urban creep can increase impermeable areas by as much as 10%. An allowance of 10% for increases in the impermeable area due to urban creep over the lifetime of the development will be included within the drainage calculations. The impermeable area is therefore adjusted to 0.65ha.

Climate Change Allowances

6.13 The influence of climate change on rivers and watercourses is likely to increase the frequency of flood events and the overall volume of water that passes the site. When considering surface water runoff from the site, the increase in peak rainfall intensity varies over the lifetime of the development. Where residential developments with a lifetime beyond the 2070s are proposed the NPPF states the use of the Upper-End Allowance for the 2070s epoch (2061 to 2125) should be used, as highlighted in red in Table 6.2.

Table 6.2: Peak Rainfall intensity allowance in small and urban catchments from the Flood Risk Assessments: Climate Change Allowances Guidance

Annual Exceedance Probability	Total potential change anticipated for the '2050s' (2022 to 2060)		Total potential change anticipated for the '2070s' (2061 to 2125)	
	Central	Upper End	Central	Upper End
3.3 % AEP	20%	35%	25%	35%
1 % AEP	20%	40%	25%	40%

Discharge Rate

6.14 Existing runoff conditions have been calculated using the FEH method within Flow Causeway. For an impermeable area of 0.59ha, the QBAR Greenfield Rate has been calculated as 0.6l/.s As this is a low rate, that may cause blockages in the system, a minimum discharge rate of 2.0l/s has been applied. The calculation of the Greenfield rate is included in **Appendix G.**

Drainage Strategy

6.15 The overall drainage strategy has been based on the land use table, discharge rates and the current site layout presented in **Appendix B**. In accordance with the National SuDS standards, the strategy involves conveying surface water flows to a series of attenuation tanks, prior to outfalling into an attenuation basin within the southern boundary of the site.

6.16 Due to the topography of the site the drainage system has been designed with a number of flow controls after each geo-cellular tank to allow the retention of water and the utilisation of storage at differing site levels.

Attenuation Tank 1:

6.17 Surface water flows for an impermeable area plus urban creep of 0.082ha will be conveyed to the proposed Attenuation Tank 1 onsite. A storage volume of 43.50m^3 is required within Attenuation Tank 1 to allow sufficient time for water to discharge at 2.0l/s into Attenuation Basin 1 and cater for all events up to and including the 1%AEP40CC.

Attenuation Tank 2:

6.18 Surface water flows for an impermeable area plus urban creep of 0.125ha will be conveyed to the proposed Attenuation Tank 2 onsite. A storage volume of 76.36m^3 is required within Attenuation Tank 2 to allow sufficient time for water to discharge at 2.0l/s into Attenuation Basin 1 and cater for all events up to and including the 1%AEP40CC.

Attenuation Tank 3:

6.19 Surface water flows for an impermeable area plus urban creep of 0.144ha and attenuation from tanks 1 and 2 will be conveyed to the proposed Attenuation Tank 3 onsite. A storage volume of 176.09m^3 is required within Attenuation Tank 3 to allow sufficient time for water to discharge at 3.0l/s into Attenuation Basin 1 and cater for all events up to and including the 1%AEP40CC.

Attenuation Basin 1:

6.20 Surface water flows for an impermeable area plus urban creep of 0.300ha and attenuation from attenuation tanks 1 - 3 will be conveyed to the proposed Attenuation Basin 1 onsite. A storage volume of 399.33m^3 is required within Attenuation Basin 1 to allow sufficient time for water to discharge at 2.0l/s into Attenuation Basin 1 and cater for all events up to and including the 1%AEP40CC. The attenuation basin has been designed to accommodate a 1:3 gradient for the internal slopes, whilst a gabion structure will be constructed for the external batters due to topographical and RPA constraints.

6.21 In total a storage volume of 695.28m^3 would be required within the storage features to accommodate the 1%AEP40CC storm event. The results of this analysis are shown in Table 6.3. The calculations for the proposed design can be seen in **Appendix G**, and a drainage strategy based on the principles above is shown in drawing 29161_01_230_01 in **Appendix H**.

Table 6.3: Discharge Rates and Storage Requirements

	Impermeable Area Plus Urban Creep	Discharge Rate	Max Storage Requirements (1%AEP45CC)
Attenuation Tank 1	0.082ha	2.0l/s into Attenuation Tank 3	43.50m^3
Attenuation Tank 2	0.125ha	2.0l/s into Attenuation Tank 3	76.36m^3
Attenuation Tank 3	0.144ha and attenuation from Tanks 1 and 2	3.0l/s into Attenuation Basin 1	176.09m^3
Attenuation Basin 1	0.300ha and attenuation from Tank 3	2.0l/s	399.33m^3
Total	**0.651ha**	**2.0l/s**	**695.28m^3**

6.22 Permeable paving will be proposed on-site within car parking spaces. These features will provide extra storage on-site, act as a first treatment stage for any run-off and will ensure adequate surface water treatment is provided. These features have been excluded from the calculations at this stage.

6.23 A drainage strategy based on the principles above is shown in drawing 29161_01_010_01 in **Appendix H.**

Applicable SuDS Techniques

6.24 The National Standards for Sustainable drainage systems (Ref. 16) that deals with SuDS cover a whole range of sustainable approaches to surface water drainage management including:

- source control measures including rainwater recycling and drainage;
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns;
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed; and
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.

6.25 Each of the five SuDS considerations listed above is discussed below in Table 6.4, with reference to their suitability for the proposed development.

Table 6.4: Suitability of SuDS techniques

	COMPONENT	SUITABILITY	REASON
Source Control	Rainwater Harvesting	Yes	Rainwater harvesting could be used across the site but has not been included within the calculations
	Green Roofs	No	Green roofs are generally not suitable for residential developments.
	Bio-retention Systems/ Rain Gardens	Yes	Rain gardens could be used across the site within open space but has not been included within the calculations
Proprietary Systems	Proprietary bio-retention systems	No	More appropriate SuDS features can be accommodated within the development and are preferred.
Infiltration Devices	Permeable Paving	Yes	Permeable paving is suitable for the proposed development within private roads and shared spaces.
	Infiltration trenches/ Soakaways	No	Infiltration has been proven to be unfeasible at the proposed development.
Filtration	Open Swales, Filter Strips/ Drains	No	This would not be appropriate given the scope and scale of the development.
Retention/ Detention	Detention Basin, Attenuation Pond/ Tanks	Yes	The proposed attenuation tanks and basin will provide surface water storage and treatment prior to discharging from the site.

Surface Water Quality

6.26 The SuDS Manual CIRIA document C753 (Ref. 10), indicates the minimum treatment indices appropriate for contributing pollution hazards for different land use classifications. To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant) that equals or exceeds the pollution hazard index.

6.27 Surface water runoff from residential roofs will have a very low pollution hazard level, while the residential parking areas will have a low pollution hazard level. The pollution hazard indices, mitigation indices of each SuDS component and the accompanying calculations are provided in Table 6.5.

Table 6.5: SuDS Mitigation Indices (Extract from CIRIA 753 Table 26.3)

SuDS Component	Mitigation Indices		
	Total Suspended Solids	***Metal***	***Hydrocarbons***
Residential Roofs	0.2	0.2	0.05
Residential Parking Areas	0.5	0.4	0.4
Attenuation Basin	0.5	0.5	0.6
Permeable Paving	0.7	0.6	0.7
SuDS Mitigation Index	**0.85**	**0.8**	**0.95**
Mitigation Requirement Met?	**Yes**	**Yes**	**Yes**

6.28 For the very low to low pollution hazard levels generated at the site, the proposed attenuation basin and permeable paving would provide sufficient treatment in accordance with the Simple Index Approach.

Exceedance and Flow Routing

6.29 The risk of overland flooding from adjacent land to dwellings is very low. The design of levels and features on the site will follow best practice by ensuring any overland flow on the site is routed safely away from dwellings and to areas of the lowest risk on site. Any surcharging and subsequent flooding of sewers will be mitigated by the flood routing described above. The exceedance flows will remain within the site and will flow away from the proposed dwellings.

Maintenance and Management

6.30 An integrated approach to the maintenance and management of SuDS systems is a requirement of the NPPF and by the Flood & Water Management Act 2010. The aim of a maintenance and management plan is to ensure that there is a clear understanding of responsibilities and that a maintenance regime is implemented for all new drainage systems for the lifetime of the development, so they can continue to function as required.

6.31 The surface water drainage network is to be offered to AW for adoption.

6.32 All private drainage systems, including the SuDS features, will be maintained by the landowner, or an appointed management company.

6.33 A proposed maintenance schedule that breaks down the maintenance requirements of the various proposed assets can be found in **Appendix I**.

7.0 FOUL WATER STRATEGY

7.1 According to The Building Regulations (2010), foul water drainage from new developments should be discharged into the following in order of priority:

- A public sewer, or;
- A private sewer communicating with a public sewer, or;
- A septic tank which has an appropriate form of secondary treatment, or;
- A cesspool.

7.2 Sewer records have been obtained from Anglian Water, see **Appendix E.** The records show there are no surface water sewers within the vicinity of the site. There is a foul water sewer within Milksey Lane, which flows south towards the George and Dragon public house.

7.3 A gravity connection into Manhole 1001 within High Street is achievable. The proposed connections are shown on drawing 29161_01_010_01 in **Appendix H.**

7.4 All foul connections to the existing public sewerage system will need to be approved by AW in accordance with Section 106 of the Water Industry Act. An application for the connections will need to be submitted to AW in due course to obtain approvals prior to the commencement of works.

8.0 CONCLUSION AND SUMMARY

8.1 MEC has been commissioned by Gade Homes to undertake a Flood Risk Assessment for a proposed residential development at Milksey Lane, Graveley. This assessment has been undertaken to ascertain the constraints of the development to the site and to assess the impact of the design, concerning flood risk.

- The site is located within Flood Zone 1 and is therefore compatible with a “more vulnerable” development use in line with policy guidance.
- The site is at very low risk of surface water flooding.
- The risk of flooding from all other sources is low.
- Groundwater was not encountered during ground investigations.
- A CCTV survey of the highways sewer system showed connectivity from the two manholes located within the treeline on the easternmost boundary of the site. The sewer runs along High Street and into the surface water ponds located adjacent to Pondside, south of Oak Lane.
- Existing runoff conditions have been calculated using the FEH method within Flow Causeway. For an impermeable area of 0.59ha, the QBAR Greenfield Rate has been calculated as 0.6l/s. As this is a low rate, that may cause blockages in the system, a minimum discharge rate of 2.0l/s has been applied.
- In accordance with the National SuDS Standards, the strategy involves conveying surface water flows to a series of attenuation features, which will then discharge into the existing highways surface water sewer within High Street, at a controlled discharge rate of 2.0l/s.
- In total a storage volume of 695.28m^3 would be required within the attenuation basins to accommodate the 1%AEP40CC storm event.
- Additional drainage features such as permeable paving will be used across the site and will provide extra storage on-site. Permeable paving will act as a first treatment stage for any run-off and will ensure adequate surface water treatment is provided. These features have been excluded from calculations at this stage.
- Foul water from the site will discharge via gravity into the existing public foul water sewer within High Street, at Manhole 1001, subject to agreement with Anglian Water.

8.2 With the above measures in place, the development of the site will not create any flood risk issues for the wider area.

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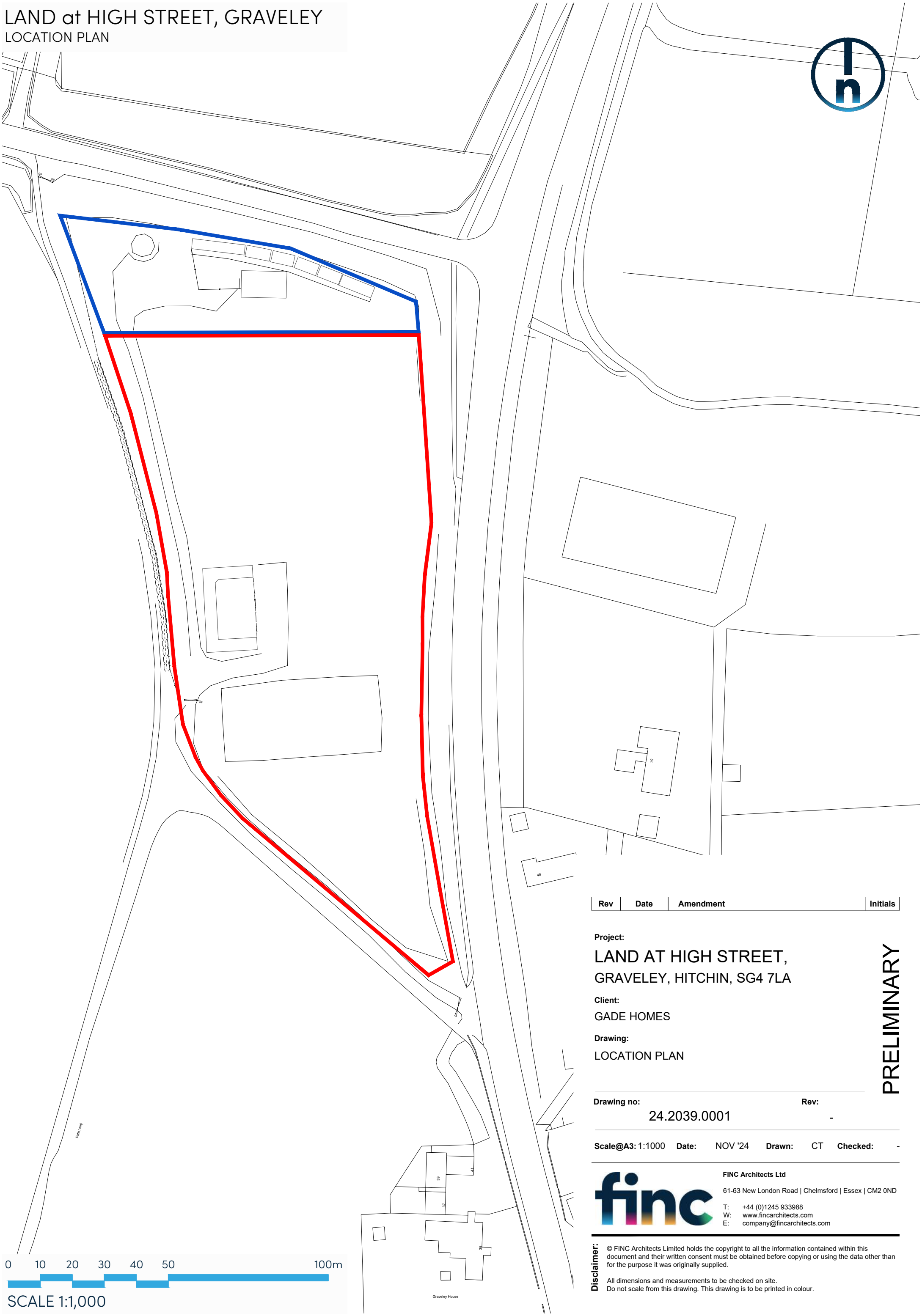
APPENDICES

APPENDIX A

LAND at HIGH STREET, GRAVELEY
LOCATION PLAN



Rev	Date	Amendment	Initials

Project:

LAND AT HIGH STREET,
GRAVELEY, HITCHIN, SG4 7LA

Client:

GADE HOMES

Drawing:

LOCATION PLAN

PRELIMINARY

Drawing no: 24.2039.0001 **Rev:** -

Scale@A3: 1:1000 **Date:** NOV '24 **Drawn:** CT **Checked:** -

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All dimensions and measurements to be checked on site.
Do not scale from this drawing. This drawing is to be printed in colour.

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APPENDICES

APPENDIX B

LAND AT HIGH STREET, GRAVELEY

PROPOSED SITE LAYOUT

KEY

- Affordable Houses
- Indicative Tree Planting

0 5 10 20 30 40 50m

SCALE 1:500

Rev	Date	Amendment	Initials
A	18/12/24	AMENDED TO CLIENT COMMENTS	CT

Project:

LAND AT HIGH STREET,

GRAVELEY, HITCHIN, SG4 7LA

Client:

GADE HOMES

Drawing:

PROPOSED SITE LAYOUT

PLANNING

Drawing no: 24.2039.1000 **Rev:** A

Scale@A1: 1:500 **Date:** NOV '24 **Drawn:** CT **Checked:** _

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APPENDICES

APPENDIX C

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LEGEND

Buildings	Overhead Cable	IC	Inspection chamber	Boll	Bollard
Wall	Concrete edge	PInv	Pipe invert	IB	Illuminated bollard
Kerb line	Tarmac edge	Gy	Gully	Bin	Rubbish bin
Line marking	Grass verge	Dp	Down pipe	Vp	Vent pipe
Drop kerb	Canopy/Overhang	Pipe	Pipe above ground	Gl	Ground light
Centre line	Verge	MH	Manhole	Lbox	Letter box
Bank Top	Bank Bottom	WL	Water level	Sty	Stile
AX1 100.000	Station and Name Station Level	Fl	Flood light	IFL	Internal floor level
		Lp	Lamp post	THL	Threshold level
		Tp	Telegraph post	Sp	Sign post
Tree / Bush / Sapling		Ep	Electricity post	TH	Trialhole
Area of Undergrowth		Tl	Traffic light	BH	Borehole
Hedge		Bus	Bus stop	ELEC	Electric
Ridge 0.00	Ridge Level	Sv	Stop valve	BT	British Telecom
Eave 0.00	Eaves Level	St	Stop tap	C'box	Control box
Flat 0.00	Flat Roof Level	Er	Earth rod	IC	Inspection chamber
	Gate	Wm	Water meter	R/wall	Retaining wall
200 H 1.2m Interwoven	Interwoven	Gv	Gas valve	UTL	Unable to lift
Railing H 1.2m	Iron Railings	Av	Air valve	TCL	Tree canopy level
Wire Fence H 0.9m	Wire Mesh	Wo	Wash out	G:	Girth
P & R H 1.2m	Post & Rail	Re	Rodding eye	MB	Multi Bowl
P & W H 1.2m	Post & Wire	BB	Belisha beacon	Stmp	Tree Stump
C/L H 1.8m	Chain Link	CTV	Cable tv	CL:	Cover level
Panel Fence H 2.0m	Wooden Panels	Mkr	Marker post	IL:	Invert level
Conc Fence H 2.0m	Concrete Panels	Gmkr	Gas marker post		
Sec Fence H 2.0m	Steel Palisade	So	Soffit		

NOTES

This plan should only be used for its original purpose. Axis Surveys accepts no responsibility for this plan if supplied to any party other than the original client. Do not scale, all dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore no allowance has been made for any sub surface entry into manholes, chambers or voids. Therefore any details relating to depths, sizes, ETC will be approximate only.

The contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts.

Should there be any conflict between the details indicated on this drawing and those indicated on other drawings, the engineer should be informed prior to construction on site.

It is important to note that the same accuracies implied by the plotting scale are equally applicable to digital data supplied for CAD

Every effort if made to identify all visible above ground features, however is it should be borne in mind that there may be items obscured at the time of survey.

Visible features in the vicinity if the boundaries, as shown on this survey may not represent the extent of legally conveyed ownership.

THIS SURVEY HAS BEEN ORIENTATED TO THE ORDNANCE SURVEY (O.S) NATIONAL GRID (OSGB36) VIA GLOBAL NAVIGATION SATELLITE SYSTEMS (GNSS) AND THE O.S. ACTIVE NETWORK (OS NET).

A TRUE OSGB36 COORDINATE HAS BEEN ESTABLISHED NEAR TO THE SITE CENTRE VIA A TRANSFORMATION USING THE OSTN15 & OSGM15 TRANSFORMATION MODELS. THE SURVEY HAS BEEN CORRELATED TO THIS POINT AND A FURTHER ONE OR MORE OSGB36 POINTS ESTABLISHED TO CREATE A TRUE O.S. BEARING FOR ANGLE ORIENTATION.

A SCALE FACTOR OF 1.000000 HAS BEEN APPLIED TO THIS SURVEY.

SURVEY STATION INFORMATION

Station	Easting	Northing	Level
AX1	522976.673	228290.658	109.962
AX2	522985.353	228252.514	108.650
AX3	522991.818	228226.103	107.636
AX4	523081.928	228093.346	98.164
AX5	523076.177	228154.659	99.953
AX6	523076.003	228206.610	102.028
AX7	523076.885	228248.378	103.958
ST01	523118.277	227975.156	95.616

0 2 4 6 8 10 20 30 40 50m

axis surveys
01283 550969
info@axis-surveys.com
www.axis-surveys.com
Laurus House, First Avenue, Centrum 100
Burton-on-Trent, DE14 2WH

CLIENT: Gade Homes

PROJECT: Land at Milksey Lane, Graveley, Hitchin, SG4 7LA

TITLE: Topographical Survey

SCALE @A0	1:500	DATE	August 2024
DRAWN	LB	CHECKED	JL
REF NO.	4367	STATUS: Final	SHEET: 1/1

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MEC Consulting Group

APPENDICES

APPENDIX D

RichardJackson
Engineering Consultants

Our Ref: KB/48759
Your Ref:

07 February 2018

Paul Smith
PCS Homebuild Ltd
39 Upperfield Road
Welwyn Garden City
Hertford
AL7 3LP

BY EMAIL ONLY TO:
paulsmith.welwynservices@live.co.uk

Dear Paul,

Re: Milksey Lane, Graveley –Infiltration Testing

As you are aware we recently attended the above site to undertake soil infiltration tests. The findings of this testing are summarised in this letter and shall be read in accordance with our limitations of investigation, which are enclosed.

Project Understanding

It is our understanding that the site will be developed for residential use, with the proposed site layout to comprise 10no. detached dwellings with associated gardens and access roads. A proposed development plan is enclosed as drawing no. SM1/17/02.

Infiltration testing was undertaken at the site to provide information for consideration in the drainage strategy for the proposed scheme.

Site Location & Description

The site was located at Milksey Lane, Graveley, Hitchin, SG4 7LA. At the time of the investigation, the site comprised stables with a number of stable buildings and grassed paddocks observed to be present on site. A site location plan is presented as Figure 1 and is enclosed.

Fieldwork

The fieldwork on which the report is based was undertaken on 29th January 2017 and comprised the mechanical excavation of 3no. trial pits (TP1 – TP3). An exploratory hole location plan is enclosed as Figure 2 and indicates the location of the trial pits with respect to existing site layout.

Cont'd.../

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also at: London 020 7448 9910, Colchester 01206 228800, Bristol 01172 020070 and Norwich 01603 230240
Richard Jackson is a trading name of Richard Jackson Ltd. Registration No. 2744316 England.
Registered Office 847 The Crescent, Colchester, CO4 9YQ.

Soakage tests were undertaken in each of the trial pits in accordance with BRE Digest 365 (2016). Disturbed samples were recovered from throughout the depths of each exploratory hole for record keeping purposes. The exploratory hole logs are enclosed and give descriptions and depths of strata encountered, together with details of samples taken and other relevant information.

Where applicable, investigative techniques, sampling and logging of soils complied with the requirements of British Standard BS5930:- 'Code of Practice for Site Investigations' (2015).

Trial Pitting

A mechanical excavator was used to form 3no. trial pits (TP1-TP3) to depths of between 1.70m below ground level (bgl) (TP2) and 2.00m bgl (TP1). Trial pits were positioned to provide representative coverage of the site.

Soakage tests were undertaken in each of the trial pits as discussed below.

Infiltration Testing

Infiltration testing was undertaken in each of the 3no. trial pits (TP1 – TP3) in accordance with current guidance as detailed in BRE Digest 365, 'Soakaway Design' (2016).

Trial pits were filled with clean water from a water tanker and the fall in water level in the trial pits was monitored at regular intervals.

A single infiltration test was undertaken in each of the 3no. trial pits. Repeat tests were not undertaken due to the observed poor infiltration and associated time constraints.

Infiltration rates have not been determined for the encountered soils due to insufficient observed infiltration.

Table 1, provides a summary of the duration of monitoring and the observed fall in water level. Full results of the infiltration testing are enclosed.

Trial Pit	Monitoring Period Duration (mins)	Observed change in water level (cm)
TP1	300	-1
TP2	272	-1
TP3	240	+3

<u>Ground Conditions</u>

This investigation encountered the following sequence of strata from ground level:

- Topsoil/Made Ground
- Lowestoft Formation

Cont'd.../

Topsoil/Made Ground

Topsoil was encountered from the surface in 2no. trial pits (TP2 & TP3) to a depth of 0.20m bgl. The topsoil was encountered as a dark brown slightly gravelly slightly silty sand in TP2 and as a brown slightly sandy slightly gravelly clay in TP3. The gravel was recorded to comprise flint in both trial pits and rootlets were recorded within the topsoil.

Made ground was encountered from the surface to a depth of 0.70m bgl in TP1. The made ground comprised grey sandy gravelly clay with gravel of brick, chalk and flint, overlying soft brown gravelly clay with gravel of brick, concrete, chalk and flint with cobbles of brick and concrete.

Lowestoft Formation

Soils interpreted to represent the Lowestoft Formation were encountered beneath the topsoil/made ground to the maximum depth of this investigation 2.00m (TP1). These soils were typically encountered as firm to stiff grey/brown gravelly clay with gravel of flint and chalk.

Groundwater

Groundwater was not encountered in the trial pits during excavation.

Summary

On the basis of the findings of this investigation, the Lowestoft Formation is not considered an appropriate stratum for the adoption of infiltration drainage.

Alternative methods of surface water disposal should be investigated.

General

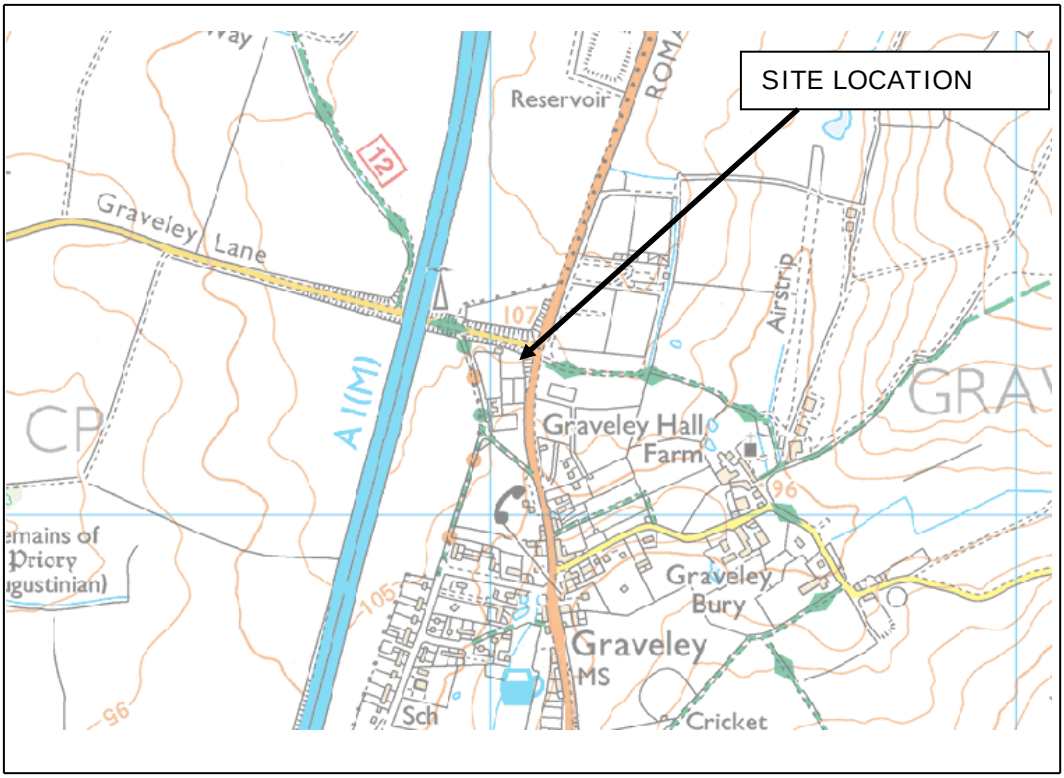
We trust that the above is clear and acceptable, however, should you have any further questions or queries please do not hesitate to contact us.

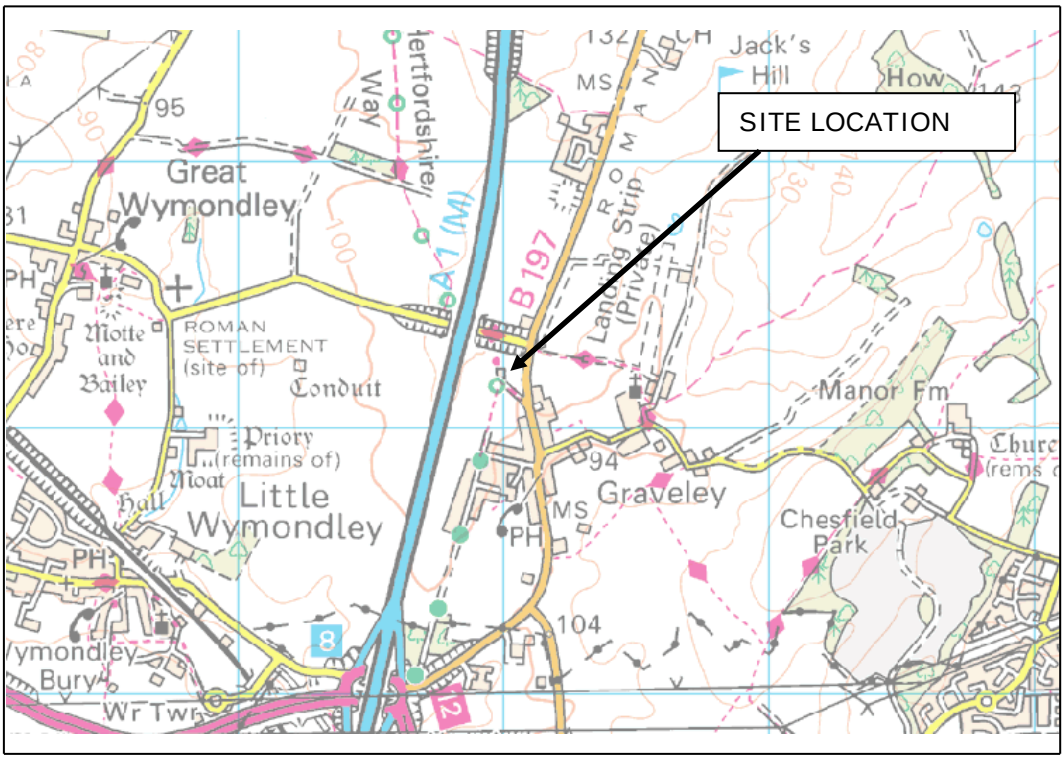
Yours sincerely

Katherine Brightwell BSc (Hons)
Graduate Geotechnical Engineer

on behalf of Richard Jackson Limited

Enc. Figure 1 – Site Location Plan
Figure 2 – Exploratory Hole Location Plan
Figure 3 – Proposed Development Plan (drawing no. SM1/17/02)
Trial Pit Logs
Infiltration Test Results
Limitations of Investigation





REPRODUCED FROM ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONARY OFFICE, © CROWN COPYRIGHT RICHARD JACKSON LTD – ACC No. 100002572

RichardJackson Engineering Consultants

consulting civil & structural engineers
5 Quern House, Mill Court, Gt Shelford,
Cambridge CB22 5LD
Tel: 012223 314794

Milksey Lane, Graveley, Hitchin, SG4 7LA

FIGURE 1

SITE LOCATION PLAN

SCALE: N.T.S.

JOB NO: 48759

DO NOT SCALE

KEY:

: SOAKAGE TEST LOCATIONS (TP1, TP2 & TP3)

REV	DATE	DESCRIPTION	DRAWN	CHKD

REVISIONS

This drawing is to be read in conjunction with all other Engineer's drawings and all other project information. Any discrepancy between the Engineer's drawings and other project information is to be reported to the Engineer immediately.

Project
MILKSEY LANE, GRAVELEY, HITCHIN, SG4 7LA

Title
EXPLORATORY HOLE LOCATION PLAN

Client
PCS HOMEBUILD LTD

Scale	Drawn	Date
1:1000 @ A3	MW	FEB 2018
Job Manager	Checked	Approved
BF	KB	KB

RichardJackson Engineering Consultants

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The Wheelhouse, Bonds Mill, Stonehouse, Gloucestershire GL10 3RF — Tel: 01172 020070 ☐

Email Address: mail@rj.uk.com — Website: http://www.rj.uk.com

Drawing No.
48759-G-FIG02

Revision

Drawing Status
☒ INFORMATION ☐ APPROVAL ☐ COSTING
☐ TENDER ☐ CONSTRUCTION ☐ AS CONSTRUCTED

A3

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SUDS provided by the use of permeable brick pavers in driveways, underground surface water storage system by specialists soakaways & infiltation trenches

New tree (species to be agreed)

SITE PLAN 1:500

0 5 10 20 30
meters

No.	Date	Revision	Initial

Project

RESIDENTIAL DEVELOPMENT ON LAND AT MILKSEY LANE, GRAVELEY, HERTS SG4 7LA

Client

MR PAUL SMITH

Drawing

PROPOSED SITE PLAN

Scale 1:500 @ A1 Drawn C.R

Checked Date Sept 17

Drawing No.

SMI/17/02

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RichardJackson Engineering Consultants

5 Quern House
Mill Court
Great Shelford
CB22 5LD

Trial Pit No.
TP1
Sheet 1 of 1

Project Name: Milksey Lane	**Project No.** 48759	**Co-ords:**	Date **29/01/2018**
		Orientation:	**Dimensions (m)** 1.40 × 0.60
Location: Graveley, Hitchin, SG4 7LA		**Level (m, aOD):**	Scale **1:20**
Client: PCS Homebuild Ltd		**Depth (m):** 2.00	Logged **KB**

Ground water	Samples & In Situ Testing: Depth	Type	Results	Level (m)	Depth (m)	Legend	Stratum Description
	0.10	D1			0.25		Grey sandy gravelly CLAY. Gravel of sub-angular to sub-rounded fine to coarse brick, chalk and flint. MADE GROUND
	0.50	D2			0.75		Soft brown gravelly slightly cobbly CLAY. Gravel of angular to sub-rounded fine to coarse brick, concrete, chalk and flint with cobbles of brick and concrete. MADE GROUND *...fragments of plastic sheeting at 0.70m bgl*
	0.80	D3			1.00		Soft dark brown slightly gravelly sandy CLAY. Gravel of fine to medium sub-rounded to sub-angular flint and chalk. LOWESTOFT FORMATION
					2.00		Firm to stiff greyish brown mottled light brown slightly sandy gravelly CLAY. Gravel of sub-angular to sub-rounded fine to coarse flint and chalk. LOWESTOFT FORMATION
							End of Pit at 2.000m

1 2 3 4

Groundwater: Groundwater not encountered.

Stability: Stable sides

Remarks: Soakage test undertaken.

Key

D	Disturbed	IVN	Hand Vane
B	Bulk	PID	PID Reading
ES	Environmental	PP	Pocket Penetrometer
	Groundwater strike		Standing water level

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Mill Court
Great Shelford
CB22 5LD

Trial Pit No.
TP2
Sheet 1 of 1

Project Name: Milksey Lane	**Project No.** 48759	**Co-ords:**	Date **29/01/2018**
		Orientation:	
Location: Graveley, Hitchin, SG4 7LA		**Level (m, aOD):**	Scale **1:20**
Client: PCS Homebuild Ltd		**Depth (m):** 1.70	Logged **KB**

Dimensions (m): 1.50 × 0.60

Ground water	Samples & In Situ Testing: Depth	Type	Results	Level (m)	Depth (m)	Legend	Stratum Description
					0.20		Dark brown slightly silty slightly gravelly SAND with rootlets. Gravel of sub-angular to sub-rounded fine to medium flint. TOPSOIL
	0.50	D1			0.70		Soft brown slightly sandy slightly gravelly CLAY. Gravel of sub-angular to sub-rounded fine to medium flint and chalk. LOWESTOFT FORMATION
	1.20	D2			1.70		Firm to stiff greyish brown gravelly CLAY. Gravel of sub-angular to sub-rounded fine to coarse flint and chalk. LOWESTOFT FORMATION
							End of Pit at 1.700m

1 2 3 4

Groundwater: Groundwater not encountered.

Stability: Stable sides

Remarks: Soakage test undertaken.

Key

D	Disturbed	IVN	Hand Vane
B	Bulk	PID	PID Reading
ES	Environmental	PP	Pocket Penetrometer
	Groundwater strike		Standing water level

RichardJackson Engineering Consultants

5 Quern House
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Trial Pit No.
TP3
Sheet 1 of 1

Project Name: Milksey Lane	**Project No.** 48759	**Co-ords:**	Date **29/01/2018**
		Orientation:	
Location: Graveley, Hitchin, SG4 7LA		**Level (m, aOD):**	Scale **1:20**
Client: PCS Homebuild Ltd		**Depth (m):** 1.85	Logged **KB**

Dimensions (m): 1.30 × 0.55

Ground water	Samples & In Situ Testing: Depth	Type	Results	Level (m)	Depth (m)	Legend	Stratum Description
					0.20		Brown slightly sandy slightly gravelly CLAY with roots. Gravel of sub-angular to sub-rounded fine flint. TOPSOIL
	1.50	D1			1.85		Firm orange brown mottled grey slightly gravelly CLAY with occasional black organic matter. Gravel of angular to sub-rounded fine to coarse flint and rare fine chalk. LOWESTOFT FORMATION
							End of Pit at 1.850m

1
2
3
4

Groundwater: Groundwater not encountered.

Stability: Stable sides.

Remarks: Soakage test undertaken.

Key

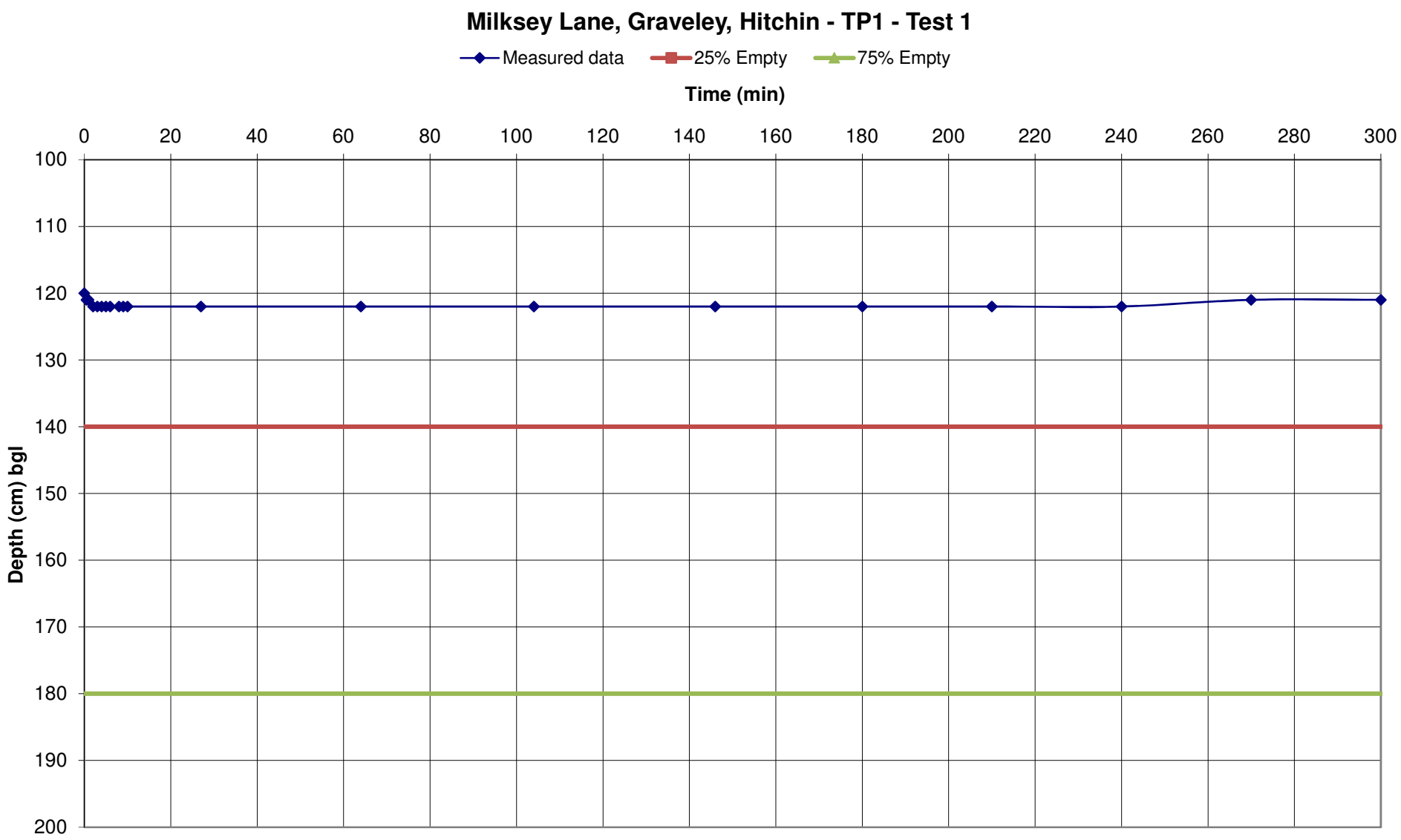
D	Disturbed	IVN	Hand Vane
B	Bulk	PID	PID Reading
ES	Environmental	PP	Pocket Penetrometer
	Groundwater strike		Standing water level

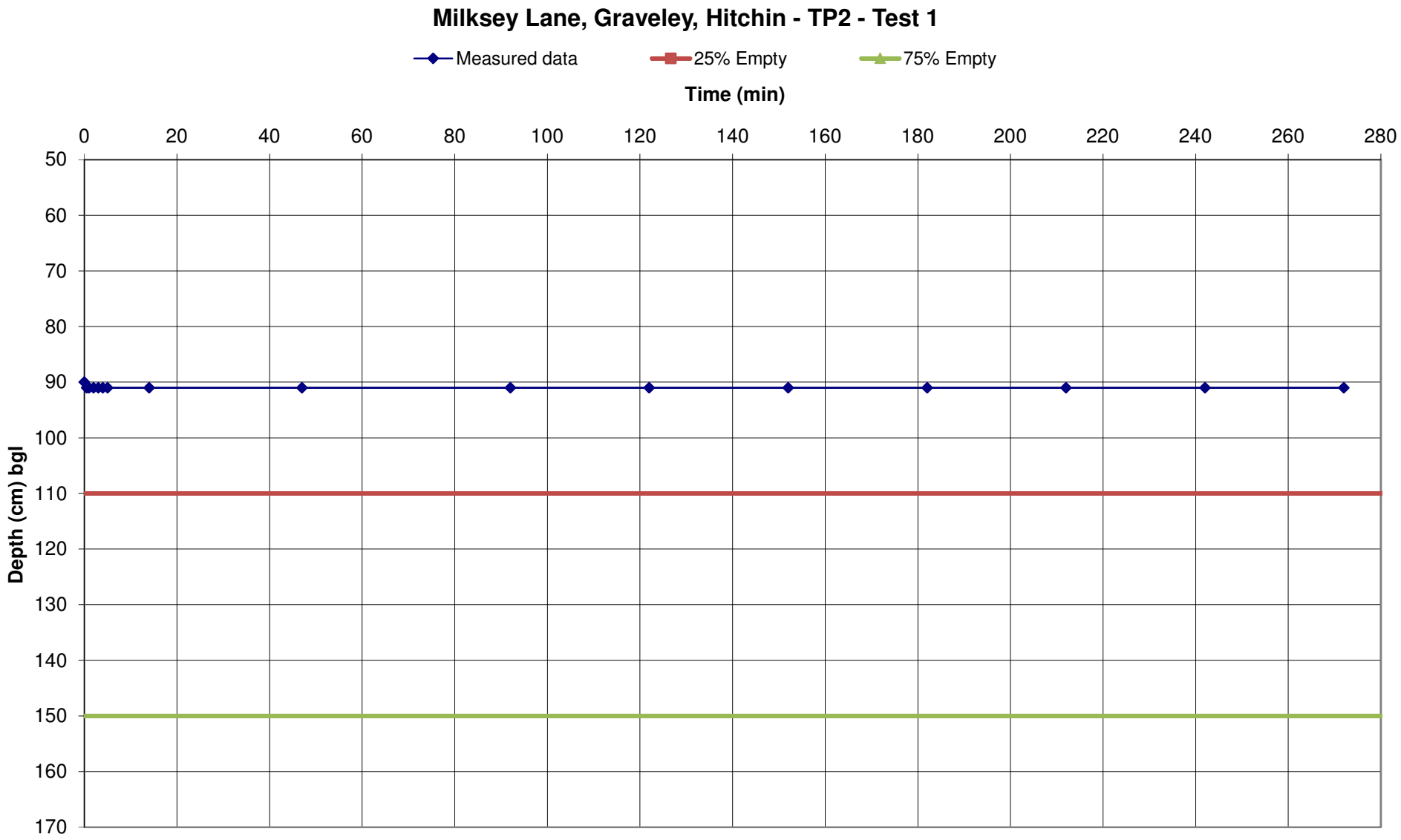
Soil infiltration Rate (f) = Vp_{75-25}/ (ap_{50}*tp_{75-25})

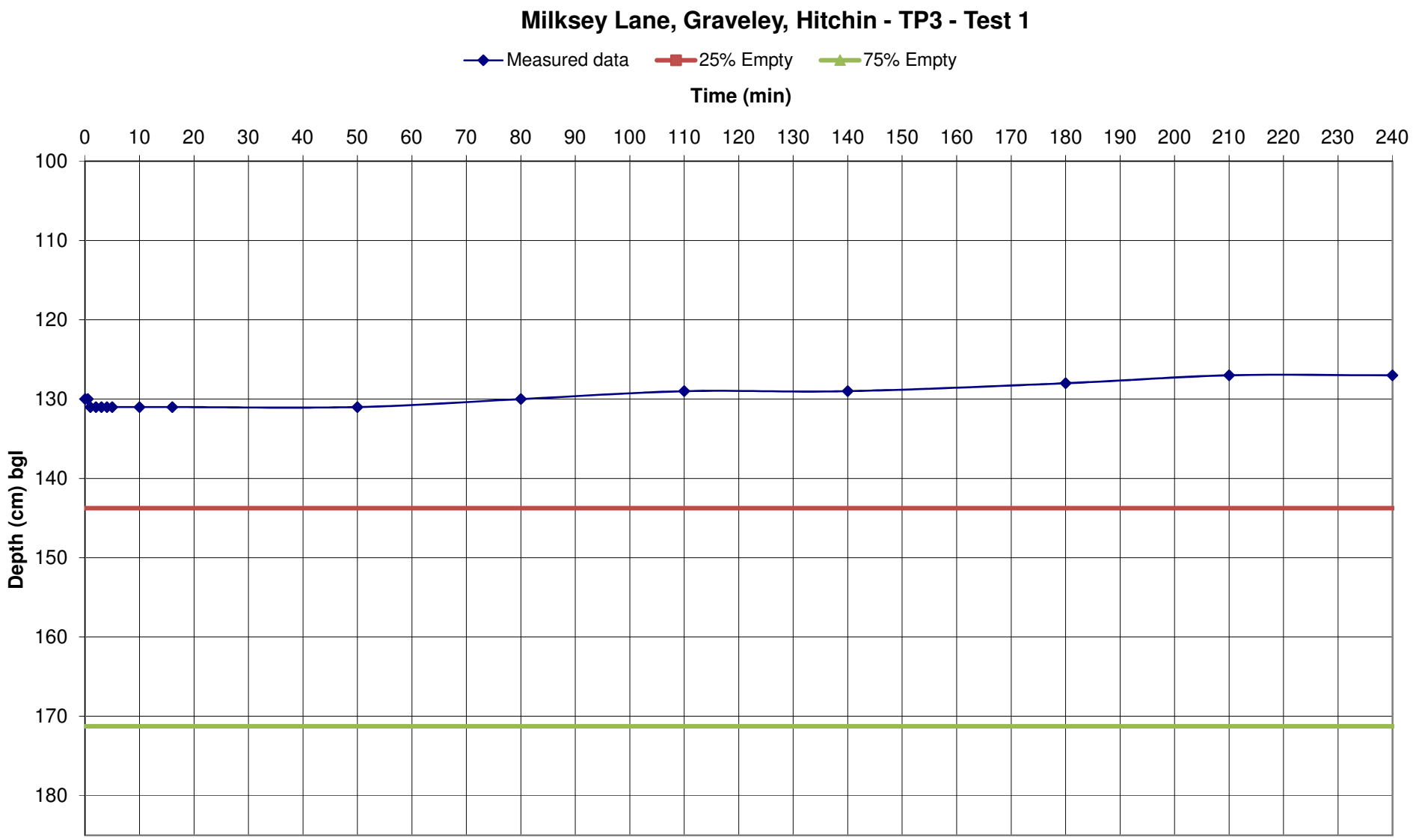
Soakaway TP1 - Test 1	
Trial Pit Dimensions	
Length (m)	1.40
Width (m)	0.60
Depth (m)	2.00
Effective Depth (m)	0.80
$tp_{75\ (mins)}$	Not reached
$tp_{25\ (mins)}$	Not reached
Calculations	
Vp_{75-25}	0.336
ap_{50}	2.44
tp_{75-25}	N/A
f =	**N/A** m/s

Soakaway TP2 - Test 1	
Trial Pit Dimensions	
Length (m)	1.50
Width (m)	0.60
Depth (m)	1.70
Effective Depth (m)	0.80
$tp_{75\ (mins)}$	Not reached
$tp_{25\ (mins)}$	Not reached
Calculations	
Vp_{75-25}	0.36
ap_{50}	2.58
tp_{75-25}	N/A
f =	**N/A** m/s

Soakaway TP3 - Test 1	
Trial Pit Dimensions	
Length (m)	1.30
Width (m)	0.55
Depth (m)	1.85
Effective Depth (m)	0.55
$tp_{75\ (mins)}$	Not reached
$tp_{25\ (mins)}$	Not reached
Calculations	
Vp_{75-25}	0.196625
ap_{50}	1.7325
tp_{75-25}	N/A
f =	**N/A** m/s


Milksey Lane, Graveley, Hitchin - TP1 - Test 1
Measured data
25% Empty
75% Empty
Time (min)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Depth (cm) bgl
100
110
120
130
140
150
160
170
180
190
200


Milksey Lane, Graveley, Hitchin - TP2 - Test 1
Measured data
25% Empty
75% Empty
Time (min)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Depth (cm) bgl
50
60
70
80
90
100
110
120
130
140
150
160
170


Milksey Lane, Graveley, Hitchin - TP3 - Test 1
Measured data
25% Empty
75% Empty
Time (min)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
Depth (cm) bgl
100
110
120
130
140
150
160
170
180

Limitations of Investigation

This report is based on the results of the exploratory boreholes, the laboratory testing carried out on samples recovered from those boreholes and on details of the scheme provided by the Client.

This report has been prepared for the benefit of PCS Homebuild Ltd, and its contents should not be relied upon by others without the written authority of Richard Jackson Ltd. If any unauthorised third party makes use of this report they do so at their own risk and Richard Jackson Ltd owes them no duty of care or skill.

All information provided by others is taken as being in good faith as being accurate, but Richard Jackson Ltd cannot, and does not, accept any liability for the detailed accuracy, errors or omissions in such information.

Subsoils are by their nature hidden from view and no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may well be present beneath the site which was not evident from the investigations carried out.

Geological data, with the exception of geological maps held by Richard Jackson Ltd, Ordnance Survey maps and aerial photographs have not been inspected, nor has any other data relating to site conditions past or present, or any information regarding underground services, other than as indicated.

Groundwater levels can be subject to considerable seasonal variations, and the conditions encountered in the exploratory holes may not reflect long-term conditions.

There can be no guarantee that the samples analysed represent the highest concentrations of contamination present beneath the site. The chemical analysis results have been assessed to standards appropriate at the time of investigation.

Unless a greater period of retention of samples is agreed, it is our normal practice to discard all samples one month after submission of our final report.

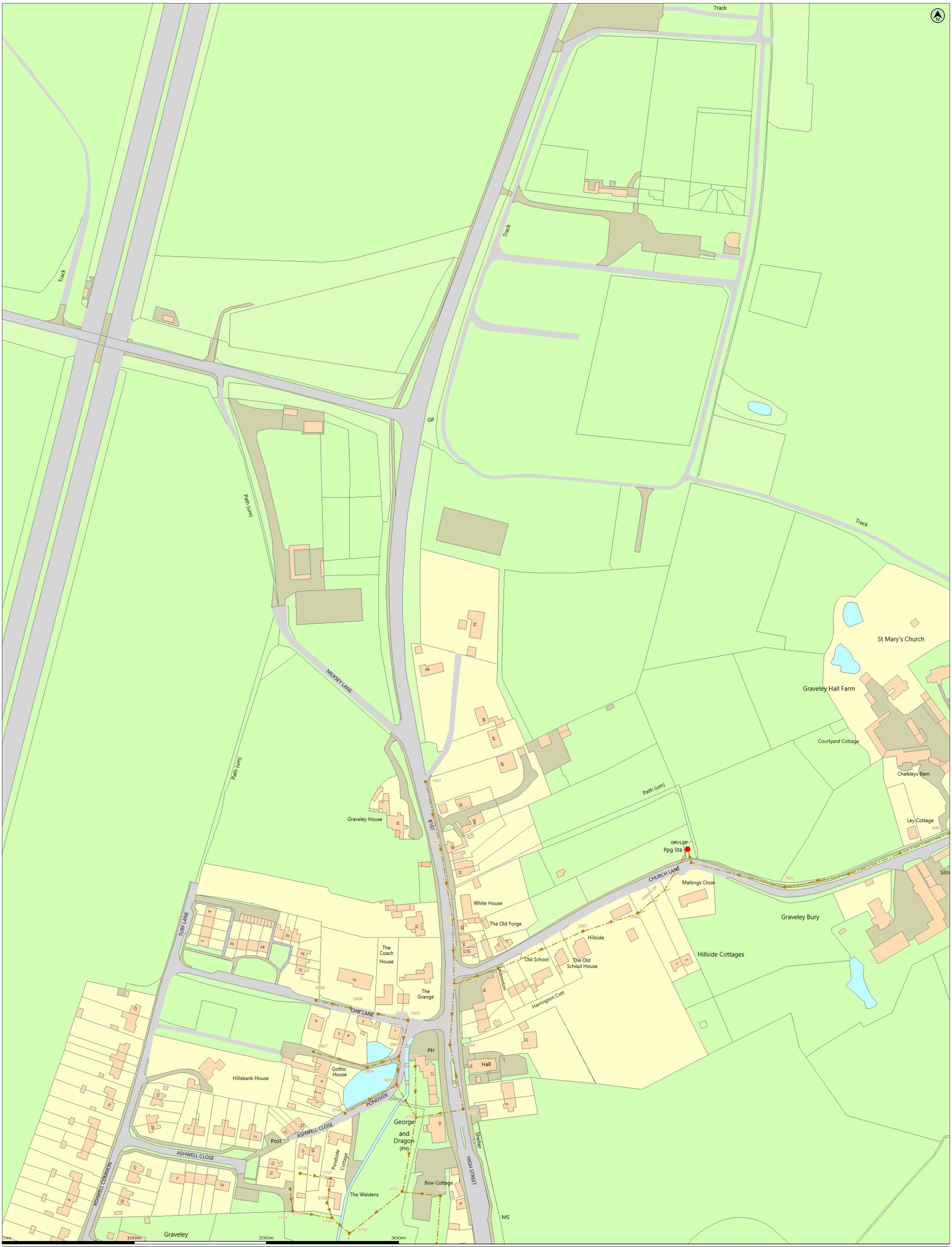
5 Quern House Mill Court
Great Shelford Cambridge
CB22 5LD

Telephone: 01206 228800
www.rj.uk.com

MEC Consulting Group

APPENDICES

APPENDIX E



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Data updated: 04/01/18

Scale: 1:1250
Map Centre: 523140,228162
Date: 27/02/18
Our Ref: 254887 - 1
Wastewater Plan A1
Powered by digdat

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

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station

*(Colour denotes effluent type)

markgeddes@rj.uk.com
milksey lane

love every drop
anglianwater

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 2018 Ordnance Survey 100022432.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.

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert
0701	523085	227732	F	-	-	-
0702	523045	227701	F	-	-	-
0703	523095	227788	F	-	-	-
0704	523041	227792	F	-	-	-
0705	523031	227712	F	-	-	-
0706	523028	227724	F	-	-	-
0707	523031	227742	F	-	-	-
0708	523008	227746	F	-	-	-
0709	523001	227718	F	-	-	-
0801	523094	227827	F	-	-	-
0802	523080	227813	F	-	-	-
0803	523082	227835	F	-	-	-
0804	523058	227826	F	-	-	-
0805	523089	227862	F	-	-	-
0806	523046	227871	F	-	-	-
0807	523017	227838	F	-	-	-
0808	523019	227877	F	-	-	-
1001	523102	228042	F	-	-	-
1701	523113	227729	F	-	-	-
1702	523131	227795	F	-	-	-
1801	523124	227889	F	-	-	-
1802	523121	227843	F	-	-	-
1901	523157	227901	F	-	-	-
1902	523123	227938	F	-	-	-
1903	523114	227991	F	-	-	-
2901	523221	227929	F	-	-	-
2902	523263	227943	F	-	-	-
3901	523303	227981	F	-	-	-
3902	523374	227963	F	-	-	-
4001	523499	228003	F	-	-	-
4901	523423	227973	F	-	-	-
9702	523000	227734	F	-	-	-

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Easting	Northing	Liquid Type	Cover Level	Invert Level	Depth to Invert

MEC Consulting Group

APPENDICES

APPENDIX F

Drainage Report

Prepared For

Site

Land off Milksey Lane
High Street
Graveley
Essex

AXIS SURVEYS

liam@axis-surveys.com
01283 550929

Land Off Milksey Lane - CCTV Survey Report : 04/02/22

Name :	AXIS SURVEYS
Contact :	Liam Booth
Location :	Larus House, First Avenue
Town :	Burton On Trent
Region :	Staffordshire
Postcode :	DE14 2WH
Email :	liam@axis-surveys.com
Contact Number :	01283 550929
Surveyor :	
Valid Certification No :	

Client Information

Name :	
Contact :	
Location :	
Town :	
Region :	
Postcode :	
Tel :	
Mobile :	
Email :	
Fax :	

Site Information

Name :	Land off Milksey Lane
Contact :	
Location :	High Street
Town :	Graveley
Region :	Essex
Postcode :	
Tel :	
Mobile :	
Email :	
Fax :	

Total Defects for Project

Total DRB Grades for Project

Report interpretation.

Overview:

Each section of the drainage system is allocated a score indicating areas that require attention. These areas are detailed in the Overview section on the following page and also at the bottom right of the first few pages. We use colour coding as an indicator of severity. Additional information concerning rehabilitation options/recomendations is included in the Overview page, which can also be used as an, "at a glance" indication of system condition. More in depth information for each section, Including images can be found later in the report. Grade indicators are as follows:

Grade A: Drain is serviceable no recommendations required

Grade B: There is an issue that might require remedial works

Grade C: There is a defect that requires remedial works, the drain is not serviceable.

Observations:

Each section of drainage reported on (manhole to manhole for example), contains detailed information about that drain and any observations made concerning condition are detailed below the header section. The observations are colour coded and given a severity score, with more significant defects being given a higher score, using a scale from 1 to 5 as detailed below:

Severity 1 to 2: These defects may require remedial monitoring

Severity 3: These defects probably require some form of remedial works

Severity 4 to 5: Defects that will require remedial repair or replacement

General:

The information provided is relevant at the time of survey. The coding system in this report is based on the Manual of Sewer Condition Classification, 5th edition (MSCC5) domestic codes (BS EN 13508-1:2003). This is the official standard for the water industry.

The severity system is based on significant experience in general practice and the 1 -5 grades represent the severity of individual defects: 5 representing a more serious defect.

Any quieries relating to this report please email enquiries@uklandandunderground.co.uk

Total Defects for Project

Total DRB Grades for Project

Overview

Section: 1 **From: MH01 (x)** **To: MH02**	DRB Grade C	**Structural Grade: 3** **Service Grade: 5** **DRB Grade: C** **Pipe Size: 225** **Material: Vitrified Clay (i.e. all clayware)** **Use: Surface Water**

Section: 2 **From: MH01 (a)** **To: EOT**	DRB Grade C	**Structural Grade: 4** **Service Grade: 5** **DRB Grade: C** **Pipe Size: 225** **Material: Vitrified Clay (i.e. all clayware)** **Use: Surface Water**

Section: 3 **From: MH02 (x)** **To: MAIN CONNECTION**	DRB Grade C	**Structural Grade: 2** **Service Grade: 5** **DRB Grade: C** **Pipe Size: 225** **Material: Vitrified Clay (i.e. all clayware)** **Use: Surface Water**

Total Defects for Project

Total DRB Grades for Project

Section 1 - From MH01 (x) Downstream To MH02

04-02-2022

Client:	Location (Street Name):	City/Town/Village	Location Type:	Land Ownership	Cust Job Ref.	Contr. Job Ref.	Surveyors Name:	Date:	Time:
Liam Booth			RD	PU				04/02/2022	13:55

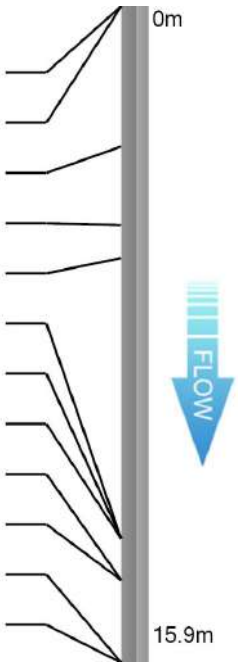
Start Node Ref:	MH01 (x)	Finish Node (2) Ref:	MH02	Direction:	D	Height/Dia:	225	Cleaned:	N
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	S	Width:	0	Flow Control:	N
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Shape	C	Length:	15.9

Node 1 Ref:		Node 3 Ref:		Lining Material:		Drainage Area:	
Node 1 Coordinate:		Node 3 Coordinate:		Lining Type:		Division/District:	
Lat. Inspection Start Point:				Type of Drain:	A	Inspection Stage:	A
Longitudinal Location of Start of Lateral:		Circumreferential Location of Start if Lateral:		Year Constructed:		Critical Drain Sewer:	A

		Video Image		Photographic Image		Client Defined	
Pipe Length Ref:	MH01 (x)X	Storage Media	PHD	Photographic Image Storage Format:	E	Client Def. 1	
Inspection Method:	B	Location System	B			Client Def. 2	
Inspection Purpose:	A	Format	AVI			Client Def. 3	
Standard:	BS EN 13508-2:2003+A1:2011	Filename	MH01 (x) - MH02 141347.avi	Photographic Volume Reference		Client Def. 4	
Pipe Unit Length:						Client Def. 5	
Weather:	D						
Temperature:		Volume Ref					

General Remarks

Position	Code	Description	CD	Pic	Video Ref
00.0	MH	Start node type, manhole			0:00:00
00.0	WL	Water level 0%		0_1	0:00:00
03.4	RTJ	Roots tap at joint		0_2	0:00:30
05.3	RFJ	Roots fine at joint		0_3	0:00:41
06.1	RFJ	Roots fine at joint		0_4	0:00:47
12.9	OBX	Other obstacles, other object in invert 07-08 10%		0_5	0:01:34
12.9	CC	Crack, circumferential 08-10		0_6	0:01:35
12.9	CS	Cracks spiral 03-05		0_7	0:01:35
13.9	RFJ	Roots fine at joint		0_8	0:01:42
13.9	DES	Settled deposits fine 10%		0_9	0:01:42
15.9	WL	Water level 0%		0_1	0:01:57
15.9	MHF	Finish node type, manhole		0_9	



Total Defects for section

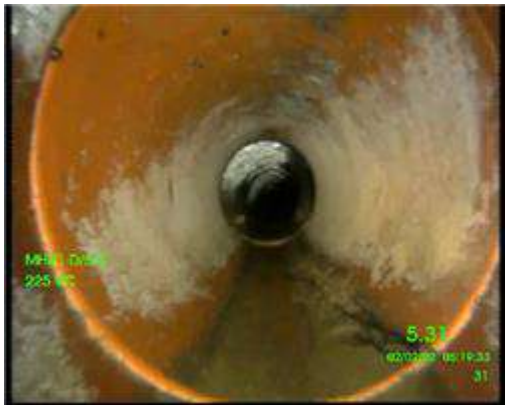
3	2	3	0	0

DRB Grade for Section

C

Descriptive Report with Remarks and Observation Images

Section 1

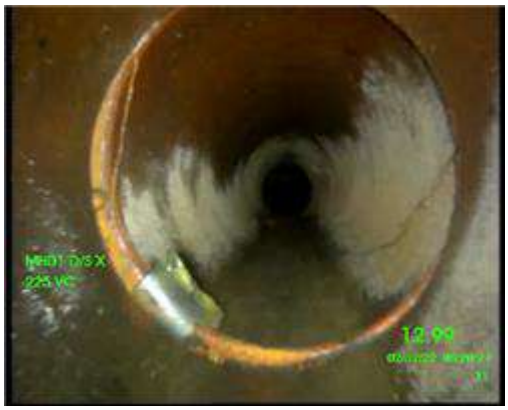
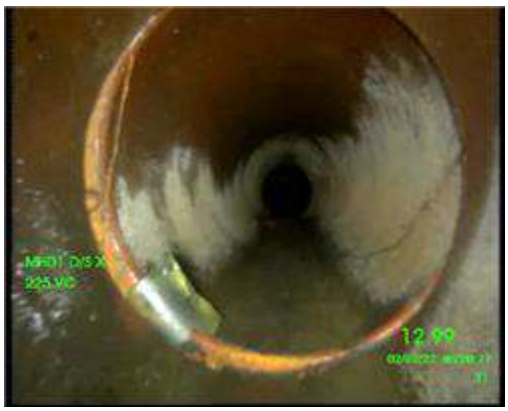
Pos	Video Ref	Code	Cont.	Description	Image
00.0m	0:00:00	MH		Start node type, manhole, reference MH01 (x) MH01 (x)	
00.0m	0:00:00	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 0_1
03.4m	0:00:30	RT		Roots tap at joint - Severity 3	Image Provided - Ref: 0_2
05.3m	0:00:41	RF		Roots fine at joint - Severity 1	Image Provided - Ref: 0_3 

Total Defects for section

3 | 2 | 3 | 0 | 0

DRB Grade for Section

C

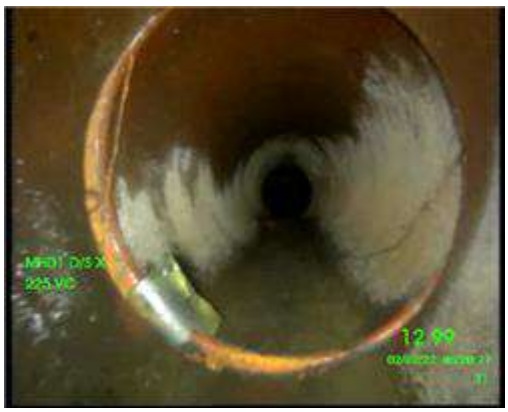
Pos	Video Ref	Code	Cont.	Description	Image
06.1m	0:00:47	RF		Roots fine at joint - Severity 1	Image Provided - Ref: 0_4
12.9m	0:01:34	OBX		Other obstacles, other object in invert from 07 o'clock to 08 o'clock: 10% cross-sectional area loss - Severity 3 POSSIBLE PIECE OF GLASS	Image Provided - Ref: 0_5 
12.9m	0:01:35	CC		Crack, circumferential from 08 o'clock to 10 o'clock - Severity 2	Image Provided - Ref: 0_6 

Total Defects for section

3 2 3 0 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
12.9m	0:01:35	CS		Cracks spiral from 03 o'clock to 05 o'clock - Severity 3	Image Provided - Ref: 0_7 
13.9m	0:01:42	RF		Roots fine at joint - Severity 1	Image Provided - Ref: 0_8
13.9m	0:01:42	DES		Settled deposits fine: 10% cross-sectional area loss - Severity 2	Image Provided - Ref: 0_9

Total Defects for section

3 2 3 0 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
15.9m	0:01:57	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 0_10
15.9m		MHF		Finish node type, manhole, reference MH02 MH02	Image Provided - Ref: 0_9999

Total Defects for section

3 2 3 0 0

DRB Grade for Section

C

Section 2 - From MH01 (a) Upstream To EOT

04-02-2022

Client:	Location (Street Name):	City/Town/Village	Location Type:	Land Ownership	Cust Job Ref.	Contr. Job Ref.	Surveyors Name:	Date:	Time:
Liam Booth			RD	PU				04/02/2022	13:55

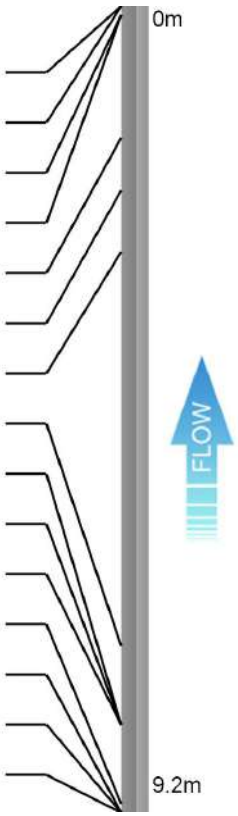
Start Node Ref:	MH01 (a)	Finish Node (2) Ref:	EOT	Direction:	U	Height/Dia:	225	Cleaned:	N
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	S	Width:	0	Flow Control:	N
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Shape	C	Length:	9.2

Node 1 Ref:		Node 3 Ref:		Lining Material:		Drainage Area:	
Node 1 Coordinate:		Node 3 Coordinate:		Lining Type:		Division/District:	
Lat. Inspection Start Point:				Type of Drain:	A	Inspection Stage:	A
Longitudinal Location of Start of Lateral:		Circumreferential Location of Start if Lateral:		Year Constructed:		Critical Drain Sewer:	A

		Video Image		Photographic Image		Client Defined	
Pipe Length Ref:	EOTX	Storage Media	PHD	Photographic Image Storage Format:	E	Client Def. 1	
Inspection Method:	B	Location System	B			Client Def. 2	
Inspection Purpose:	A	Format	AVI			Client Def. 3	
Standard:	BS EN 13508-2:2003+A1:2011	Filename	MH01 (x) - MH02 141347.avi	Photographic Volume Reference		Client Def. 4	
Pipe Unit Length:						Client Def. 5	
Weather:	D						
Temperature:		Volume Ref					

General Remarks

Position	Code	Description	CD	Pic	Video Ref
00.0	MH	Start node type, manhole			0:00:00
00.0	WL	Water level 0%		2_1	0:00:00
00.1	JDM	Joint displaced medium		2_2	0:00:00
00.1	LR	Line of drain/sewer deviates right		2_3	0:00:00
01.5	JDM	Joint displaced medium		2_4	0:00:07
02.1	JDM	Joint displaced medium		2_5	0:00:11
02.8	OBI	Other obstacle, protruding through wall 11-12 60%		2_6	0:00:26
07.3	FM	S1 Fracture multiple 12-12	S1	2_7	0:00:42
08.2	B	Broken pipe 11-01		2_8	0:00:46
08.2	H	Hole in drain/sewer 11-01		2_9	0:00:46
08.2	FM	Fracture multiple 05-07		2_1	0:00:46
09.1	WL	Water level 0%		2_1	0:01:39
09.2	FM	F1 Fracture multiple 12-12	F1	2_-	0:00:42
09.2	SC	Shape and/or size drain/sewer changes		2_1	0:01:32
09.2	SA	Survey abandoned		2_9	



Total Defects for section

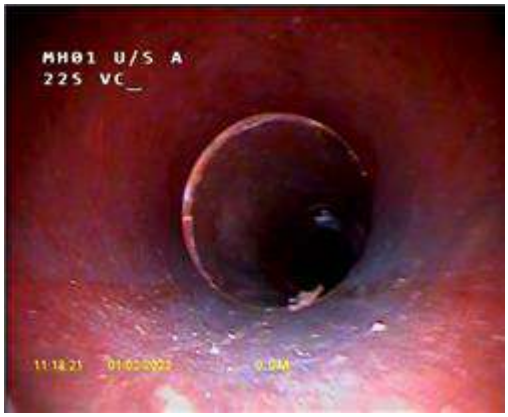
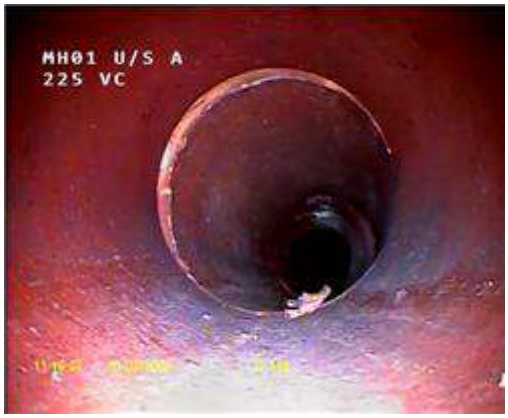
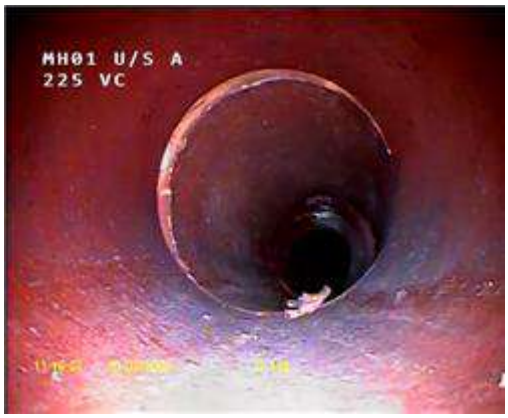
0	3	1	5	0

DRB Grade for Section

C

Descriptive Report with Remarks and Observation Images

Section 2

Pos	Video Ref	Code	Cont.	Description	Image
00.0m	0:00:00	MH		Start node type, manhole, reference MH01 (a) MH01 (a)	
00.0m	0:00:00	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 2_1 
00.1m	0:00:00	JDM		Joint displaced medium - Severity 2	Image Provided - Ref: 2_2 
00.1m	0:00:00	LR		Line of drain/sewer deviates right	Image Provided - Ref: 2_3 

Total Defects for section

0 | 3 | 1 | 5 | 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
01.5m	0:00:07	JDM		Joint displaced medium - Severity 2	Image Provided - Ref: 2_4
02.1m	0:00:11	JDM		Joint displaced medium - Severity 2	Image Provided - Ref: 2_5
02.8m	0:00:26	OBI		Other obstacle, protruding through wall from 11 o'clock to 12 o'clock: 60% cross-sectional area loss - Severity 4	Image Provided - Ref: 2_6

Total Defects for section

0 3 1 5 0

DRB Grade for Section

C

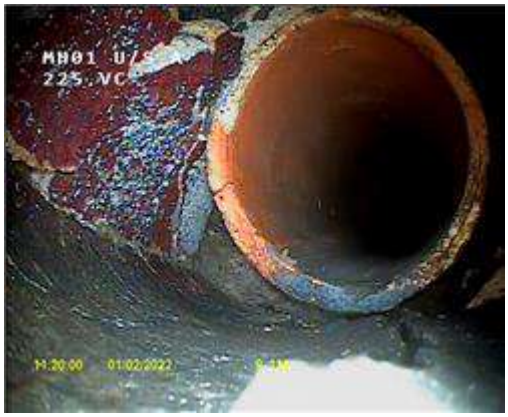
Pos	Video Ref	Code	Cont.	Description	Image
07.3m	0:00:42	FM	S1	Fracture multiple 7.3m - 9.2m from 12 o'clock to 12 o'clock - Severity 4	Image Provided - Ref: 2_7
08.2m	0:00:46	B		Broken pipe from 11 o'clock to 01 o'clock - Severity 4	Image Provided - Ref: 2_8
08.2m	0:00:46	H		Hole in drain/sewer from 11 o'clock to 01 o'clock - Severity 3	Image Provided - Ref: 2_9

Total Defects for section

0 3 1 5 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
08.2m	0:00:46	FM		Fracture multiple from 05 o'clock to 07 o'clock - Severity 4	Image Provided - Ref: 2_10
09.1m	0:01:39	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 2_12 
09.2m	0:00:42	FM	F1	Fracture multiple Defect End from 12 o'clock to 12 o'clock - Severity 4	
09.2m	0:01:32	SC		Shape and/or size drain/sewer changes: Shape Changes To: 150mm Diameter	Image Provided - Ref: 2_11

Total Defects for section

0 3 1 5 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
09.2m		SA		Survey abandoned EOT	Image Provided - Ref: 2_9999

Total Defects for section

0	3	1	5	0

DRB Grade for Section

C

Section 3 - From MH02 (x) Downstream To MAIN CONNECTION

04-02-2022

Client:	Location (Street Name):	City/Town/Village	Location Type:	Land Ownership	Cust Job Ref.	Contr. Job Ref.	Surveyors Name:	Date:	Time:
Liam Booth			RD	PU				04/02/2022	13:55

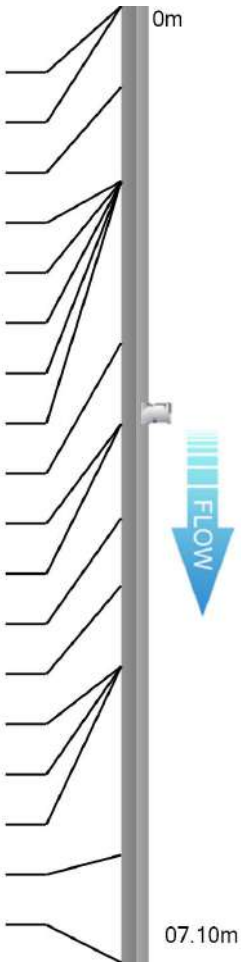
Start Node Ref:	MH02 (x)	Finish Node (2) Ref:	MAIN CONNECTION	Direction:	D	Height/Dia:	225	Cleaned:	N
Start Node Depth:	0.00	Finish Node Depth:	0.00	Use:	S	Width:	0	Flow Control:	N
Start Node Coordinate:		Finish Node Coordinate:		Material:	VC	Shape	C	Length:	14

Node 1 Ref:	Node 3 Ref:	Lining Material:	Drainage Area:
Node 1 Coordinate:	Node 3 Coordinate:	Lining Type:	Division/District:
Lat. Inspection Start Point:		Type of Drain: A	Inspection Stage: A
Longitudinal Location of Start of Lateral:	Circumreferential Location of Start if Lateral:	Year Constructed:	Critical Drain Sewer: A

		Video Image		Photographic Image		Client Defined	
Pipe Length Ref:	MH02 (x)X	Storage Media	PHD	Photographic Image Storage Format:	E	Client Def. 1	
Inspection Method:	B	Location System	B			Client Def. 2	
Inspection Purpose:	A	Format	AVI			Client Def. 3	
Standard:	BS EN 13508-2:2003+A1:2011	Filename	MH01 (x) - MH02 141347.avi	Photographic Volume Reference		Client Def. 4	
Pipe Unit Length:		Volume Ref				Client Def. 5	
Weather:	D						
Temperature:							

General Remarks

Position	Code	Description	CD	Pic	Video Ref
00.0	MH	Start node type, manhole			0:00:00
00.0	WL	Water level 0%		1_1	0:00:00
00.6	DEE	Attached deposits, encrustation 02-08 10% at joint		1_2	0:00:09
01.3	CC	Crack, circumferential 12-03		1_3	0:00:24
01.3	CC	Crack, circumferential 10-01		1_4	0:00:24
01.3	OJM	Open joint medium		1_5	0:00:24
01.3	DEE	Attached deposits, encrustation 10-01 5% at joint		1_6	0:00:26
01.3	DEE	Attached deposits, encrustation 07-09 10% at joint		1_7	0:00:31
02.5	DEE	Attached deposits, encrustation 10-02 5% at joint		1_8	0:00:36
03.1	DEE	Attached deposits, encrustation 11-09 10% at joint		1_9	0:00:41
03.1	JN	Junction 11 : 150mm Diameter		1_1	0:00:41
03.8	DEE	Attached deposits, encrustation 07-10 5% at joint		1_1	0:00:46
04.3	DEE	Attached deposits, encrustation 01-09 5% at joint		1_1	0:00:51
04.9	DEE	Attached deposits, encrustation 10-12 5% at joint		1_1	0:00:55
04.9	DEE	Attached deposits, encrustation 03-09 5% at joint		1_1	0:00:55
04.9	RF	Roots fine		1_1	0:00:55
06.3	DEE	Attached deposits, encrustation 12-05 5% at joint		1_1	0:01:06
07.1	RM	Roots mass 20%		1_1	0:01:13



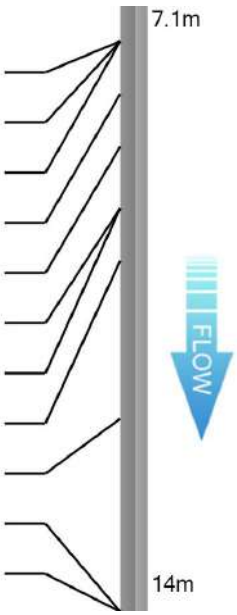
Total Defects for section

1	6	16	1	0

DRB Grade for Section

C

Position	Code	Description	CD	Pic	Video Ref
07.5	JDM	Joint displaced medium		1_1	0:01:16
07.5	DEE	Attached deposits, encrustation 03-05 5% at joint		1_1	0:01:16
07.5	DEE	Attached deposits, encrustation 06-11 5% at joint		1_2	0:01:16
08.1	DER	Settled deposits coarse 5%		1_2	0:01:21
08.7	DEE	Attached deposits, encrustation 03-05 10% at joint		1_2	0:01:26
09.4	JDM	Joint displaced medium		1_2	0:01:32
09.4	DEE	Attached deposits, encrustation 07-10 5% at joint		1_2	0:01:32
10.0	DES	Settled deposits fine 5%		1_2	0:01:37
11.8	DEE	Attached deposits, encrustation 06-09 10%		1_2	0:01:50
14.0	WL	Water level 0%		1_2	0:02:13
14.0	BRF	Finish node type, major connection without			



Total Defects for section

1	6	16	1	0

DRB Grade for Section

C

Descriptive Report with Remarks and Observation Images

Section 3

Pos	Video Ref	Code	Cont.	Description	Image
00.0m	0:00:00	MH		Start node type, manhole, reference MH02 (x) MH02 (x)	
00.0m	0:00:00	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 1_1
00.6m	0:00:09	DEE		Attached deposits, encrustation from 02 o'clock to 08 o'clock: 10% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_2
01.3m	0:00:24	CC		Crack, circumferential from 12 o'clock to 03 o'clock - Severity 2	Image Provided - Ref: 1_3

Total Defects for section

1 | 6 | 16 | 1 | 0

DRB Grade for Section

C

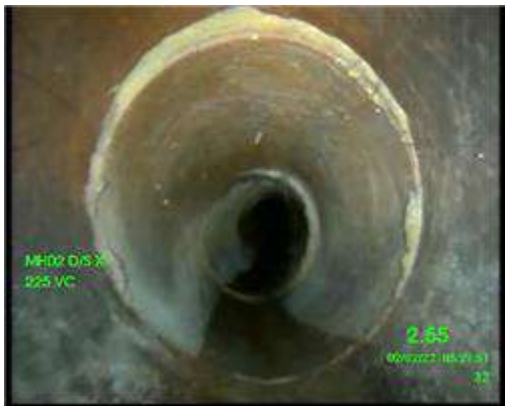
Pos	Video Ref	Code	Cont.	Description	Image
01.3m	0:00:24	CC		Crack, circumferential from 10 o'clock to 01 o'clock - Severity 2	Image Provided - Ref: 1_4
01.3m	0:00:24	OJM		Open joint medium - Severity 2	Image Provided - Ref: 1_5
01.3m	0:00:26	DEE		Attached deposits, encrustation from 10 o'clock to 01 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_6

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
01.3m	0:00:31	DEE		Attached deposits, encrustation from 07 o'clock to 09 o'clock: 10% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_7
02.5m	0:00:36	DEE		Attached deposits, encrustation from 10 o'clock to 02 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_8 
03.1m	0:00:41	DEE		Attached deposits, encrustation from 11 o'clock to 09 o'clock: 10% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_9

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
03.1m	0:00:41	JN		Junction at 11 o'clock: 150mm Diameter	Image Provided - Ref: 1_10
03.8m	0:00:46	DEE		Attached deposits, encrustation from 07 o'clock to 10 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_11
04.3m	0:00:51	DEE		Attached deposits, encrustation from 01 o'clock to 09 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_12

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
04.9m	0:00:55	DEE		Attached deposits, encrustation from 10 o'clock to 12 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_13
04.9m	0:00:55	DEE		Attached deposits, encrustation from 03 o'clock to 09 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_14
04.9m	0:00:55	RF		Roots fine - Severity 1	Image Provided - Ref: 1_15

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
06.3m	0:01:06	DEE		Attached deposits, encrustation from 12 o'clock to 05 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_16
07.1m	0:01:13	RM		Roots mass: 20% cross-sectional area loss - Severity 4	Image Provided - Ref: 1_17
07.5m	0:01:16	JDM		Joint displaced medium - Severity 2	Image Provided - Ref: 1_18

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
07.5m	0:01:16	DEE		Attached deposits, encrustation from 03 o'clock to 05 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_19
07.5m	0:01:16	DEE		Attached deposits, encrustation from 06 o'clock to 11 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_20
08.1m	0:01:21	DER		Settled deposits coarse: 5% cross-sectional area loss - Severity 3	Image Provided - Ref: 1_21

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

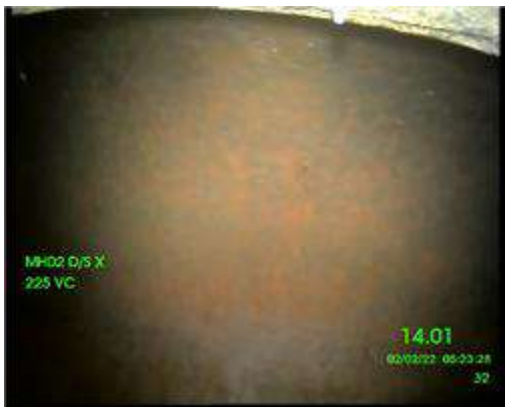
Pos	Video Ref	Code	Cont.	Description	Image
08.7m	0:01:26	DEE		Attached deposits, encrustation from 03 o'clock to 05 o'clock: 10% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_22
09.4m	0:01:32	JDM		Joint displaced medium - Severity 2	Image Provided - Ref: 1_23
09.4m	0:01:32	DEE		Attached deposits, encrustation from 07 o'clock to 10 o'clock: 5% cross-sectional area loss at joint - Severity 3	Image Provided - Ref: 1_24

Total Defects for section

1 6 16 1 0

DRB Grade for Section

C

Pos	Video Ref	Code	Cont.	Description	Image
10.0m	0:01:37	DES		Settled deposits fine: 5% cross-sectional area loss - Severity 2	Image Provided - Ref: 1_25
11.8m	0:01:50	DEE		Attached deposits, encrustation from 06 o'clock to 09 o'clock: 10% cross-sectional area loss - Severity 3	Image Provided - Ref: 1_26
14.0m	0:02:13	WL		Water level: 0% Height/Diameter	Image Provided - Ref: 1_27 
14.0m		BRF		Finish node type, major connection without manhole, reference MAIN CONNECTION MAIN CONNECTION	

Surveyor Certificate

Aquatech Drain Services Ltd
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WEB PROJECT
CLICK TO OPEN THIS PROJECT

Project

Project Name:	Milksey Lane
Project Description:	CCTV Survey, Trace & Map
Project Status:	Complete
Project Date:	11/21/2024
Inspection Standard:	MSCC5 Sewers & Drainage GB (SRM5 Scoring)

AQUATECH DRAIN SERVICES

Aquatech Drain Services Ltd
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Milksey Lane		11/21/2024

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Project Information

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Client

Company: MEC Consulting Group
Department: The Old Chapel
Street: Station Road
Town or City: Hugglescote
County: Leicestershire
Post Code: LE67 2GB
Phone: 01530 264753

Site

Street: Milksey Lane
Town or City: Graveley
County: Hertfordshire
Post Code: SG4

Contractor

Company: Aquatech Drain Services Ltd
Description: Drainage Contracor
Contact: Connor
Street: Holmbush Lane
Town or City: Woodmancote
County: East Sussex
Post Code: BN5 9TL
Phone: 01273 933705
Email: contact@aquatechdrains.co.uk

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Scoring Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Structural Defects

Section	PLR	Grade	Description
All inspected pipes are in an acceptable structural condition (< grade 3).			

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
3	SW3X	3	Multiple defects
4	SW4X	4	Roots, tap at joint, finish
5	SW3X	3	Roots, mass at joint, 60% cross-sectional area loss, finish

Abandoned Surveys

Section	PLR	Description
3	SW3X	Survey abandoned
5	SW3X	Survey abandoned

Information

These scoring summaries are based on the SRM grading from the WRc.

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Project Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Pipe Summary

No.	Type	PLR	Upstream Node	Downstream Node	Road	Town	Use	Mat.	Profile	Length
1	SEC	SW2X	SW2	SW1	Milksey Lane	Graveley	S	CO	Circular 375mm	45.30 m
2	SEC	SW2X	SW2	SW1	Milksey Lane	Graveley	S	CO	Circular 375mm	31.30 m
3	SEC	SW3X	SW3	SW2	Milksey Lane	Graveley	S	VC	Circular 300mm	28.90 m
4	SEC	SW4X	SW4	SW3	Milksey Lane	Graveley	S	CO	Circular 300mm	55.90 m
5	SEC	SW3X	SW3	SW2	Milksey Lane	Graveley	S	VC	Circular 300mm	14.10 m
									Total:	**175.50 m**

Pipe Levels

No.	PLR	Upstream Node	Upstream C.L.	Upstream I.L.	Upstream I.D.	Downstream Node	Downstream C.L.	Downstream I.L.	Downstream I.D.
1	SW2X	SW2			1,530.000 m	SW1			1,240.000 m
2	SW2X	SW2			1,530.000 m	SW1			1,240.000 m
3	SW3X	SW3			1,660.000 m	SW2			1,530.000 m
4	SW4X	SW4			1,790.000 m	SW3			1,660.000 m
5	SW3X	SW3			1,660.000 m	SW2			1,530.000 m

Pipe Summary by Profile

Profile		Total Length	No. Pipes
Circular 300mm Circular 300mm Circular 300mm		28.90 m 55.90 m 14.10 m	
Circular 300mm	=	98.90 m	3
Circular 375mm Circular 375mm		45.30 m 31.30 m	
Circular 375mm	=	76.60 m	2
Total	**=**	**175.50 m**	**5**

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Project Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Inspection Summary

Pipe No.	Insp. No.	Upstream Node	Downstream Node	Dir.	Operator	Insp. Date	Insp. Time	Str	Ser	Final Observation	Length
1	1	SW2	SW1	DS	Gg	29/11/2024	8:06	1	2	OCF, Unable to push rod further	45.30 m
2	1	SW2	SW1	US	Gg	29/11/2024	8:18	1	2	OCF, Cross over point from section 1	31.30 m
3	**1**	**SW3**	**SW2**	**US**	**Gg**	**29/11/2024**	**8:26**	**1**	**4**	**SA, Unable to proceed.**	**28.90 m**
4	1	SW4	SW3	DS	Gg	29/11/2024	8:48	1	4	ICF	55.90 m
5	**1**	**SW3**	**SW2**	**DS**	**Gg**	**29/11/2024**	**8:38**	**1**	**4**	**SA, Unable to proceed.**	**14.10 m**
										Total:	**175.50 m**

Inspection Summary by Profile

Profile		Total Length	No. Inspections
Circular 300mm Circular 300mm Circular 300mm		28.90 m 55.90 m 14.10 m	
Circular 300mm	=	98.90 m	3
Circular 375mm Circular 375mm		45.30 m 31.30 m	
Circular 375mm	=	76.60 m	2
Total	**=**	**175.50 m**	**5**

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Project Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Defect Summary

				CCTV Drainage Survey Observation Count																					
				General				Structural Condition									Service Condition						Misc	
Sect. No.	Insp. No.	Upstream Node	Downstream Node	Insp. Length (m)	No. Grade 4/5 Obs.	Survey Abandoned	Camera Under Water	Cracks	Fractures	Broken	Deformed	Collapsed	Holes	Surface Damage	Displaced Joints	Open Joints	Roots	Infiltration	Encrustation	Silt	Grease	Obstruction	Water Level	Line Deviates
1	1	SW2	SW1	45.3													7						1	
2	1	SW2	SW1	31.3													2						1	
3	**1**	**SW3**	**SW2**	**28.9**		**1**											**8**						**1**	
4	1	SW4	SW3	55.9	1										1		19						1	1
5	**1**	**SW3**	**SW2**	**14.1**		**1**											**4**						**1**	
			Total:	**175.5**	**1**	**2**											**40**						**5**	**1**

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Cleaning Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Pipe Summary

No.	Type	PLR	Upstream Node	Downstream Node	Road	Town	Use	Mat.	Profile	Length
1	SEC	SW2X	SW2	SW1	Milksey Lane	Graveley	S	CO	Circular 375mm	45.30 m
2	SEC	SW2X	SW2	SW1	Milksey Lane	Graveley	S	CO	Circular 375mm	31.30 m
3	SEC	SW3X	SW3	SW2	Milksey Lane	Graveley	S	VC	Circular 300mm	28.90 m
4	SEC	SW4X	SW4	SW3	Milksey Lane	Graveley	S	CO	Circular 300mm	55.90 m
5	SEC	SW3X	SW3	SW2	Milksey Lane	Graveley	S	VC	Circular 300mm	14.10 m
									Total:	**175.50 m**

Pipe Summary by Profile

Profile		Total Length	No. Pipes
Circular 300mm Circular 300mm Circular 300mm		28.90 m 55.90 m 14.10 m	
Circular 300mm	=	98.90 m	3
Circular 375mm Circular 375mm		45.30 m 31.30 m	
Circular 375mm	=	76.60 m	2
Total	**=**	**175.50 m**	**5**

Cleaning Summary

Pipe No.	Cln. No.	Dir.	Operator	Cln. Date	Cln. Time	Method	Contamination	Scale	No. Clns	Complete	Comments	Cln. Length
1	1	DS	Gg	29/11/2024	8:06	N				Yes		45.30 m
2	1	US	Gg	29/11/2024	8:18	N				Yes		31.30 m
3	**1**	**US**	**Gg**	**29/11/2024**	**8:26**	**N**				**No**		**28.90 m**
4	1	DS	Gg	29/11/2024	8:48	N				Yes		55.90 m
5	**1**	**DS**	**Gg**	**29/11/2024**	**8:38**	**N**				**No**		**14.10 m**
											Total:	**175.50 m**

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Cleaning Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Cleaning Summary by Profile

Profile		Total Length	No. Cleans
Circular 300mm Circular 300mm Circular 300mm		28.90 m 55.90 m 14.10 m	
Circular 300mm	=	98.90 m	3
Circular 375mm Circular 375mm		45.30 m 31.30 m	
Circular 375mm	=	76.60 m	2
Total	**=**	**175.50 m**	**5**

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Defect Grade Description (Section)

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

1:	Brick: Minor structural defects. Other: Minor structural defects, i.e. open or displaced joints without additional characteristics. **Acceptable structural condition.**
2:	Brick: Circumferential cracking. Single longitudinal crack. Surface mortar loss (depth missing < 15 mm). Surface damage - spalling slight (breaking away of small fragments from the surface). Surface damage - wear slight (increased roughness). Other: Circumferential cracking. Surface damage - spalling slight (breaking away of small fragments from the surface). Surface damage - wear slight (increased roughness). **Minimal collapse likelihood in the short term but potential for further deterioration.**
3:	Brick: Total mortar loss (depth missing > 50 mm) without other defects. More than one longitudinal crack (at a single location). Multiple cracking. Single bricks displaced. Deformation < 5%, no fracture and only moderate mortar loss. Surface damage - spalling medium (large areas of chipped brick). Surface damage - wear medium (entire surface of brick is missing). Other: Fracture with no deformation or deformation < 5%. Longitudinal cracking or multiple cracking. Minor loss of level. Severe joint defects i.e. Surface damage - spalling medium. Surface damage - wear medium. **Collapse unlikely in the near future but further deterioration likely.**
4:	Brick: Total mortar loss (depth missing > 50mm) with deformation > 10%; deformation up to 10% and fractured; displaced or hanging brickwork; small number of missing bricks; dropped invert (drop > 20mm); moderate loss of level; surface damage - large spalling (entire surface of brick is missing); surface damage - large wear (entire surface of brick is missing). Other: Broken; deformation up to 10% and broken; fracture with deformation 5-10%; multiple fractures; serious loss of level; serious joint defects with voids or soil visible (open joint with > 50mm soil or void visible or joint displacement > 25% of diameter); surface damage - entire area of pipe surface is missing or severly worn. **Collapse likely in the foreseeable future.**
5:	Brick: Already collapsed; missing Invert; deformation > 10% and fractured; displaced or hanging brickwork and deformation < 10%; extensive areas of missing brickwork. Other: Already collapsed; deformation > 10% and broken; extensive areas of pipe fabric missing; fractures with deformation > 10% **Collapsed or collapse imminent.**

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Section Profile - 11/29/2024 - SW2X

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Circular, 300 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
3	SW3	SW2	11/29/2024	Milksey Lane	Vitrified clay	28.90 m	28.90 m
4	SW4	SW3	11/29/2024	Milksey Lane	Concrete	55.90 m	55.90 m
5	SW3	SW2	11/29/2024	Milksey Lane	Vitrified clay	14.10 m	14.10 m

Total: 3 Inspections x Circular 300 mm, 0 mm = 98.90 m Total Length and 98.90 m Inspected Length

Circular, 375 mm

Item No.	Upstream Node	Downstream Node	Date	Road	Material	Total Length	Inspected Length
1	SW2	SW1	11/29/2024	Milksey Lane	Concrete	45.30 m	45.30 m
2	SW2	SW1	11/29/2024	Milksey Lane	Concrete	31.30 m	31.30 m

Total: 2 Inspections x Circular 375 mm, 0 mm = 76.60 m Total Length and 76.60 m Inspected Length

Total: 5 Inspections = 175.50 m Total Length and 175.50 m Inspected Length

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Section Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Number of sections	5
Total length of sections	175.50 m
Total length of inspected sections	175.50 m
Total length of not inspected sections	0.00 m
Number of abandoned inspections	2
Number of section inspection photos	61
Number of section inspection videos	5
Number of section inspection scans	0
Number of section inclination measurements	0

PLR:	SW2X	**Upstream Node:**	SW2
Inspection Direction:	Downstream	**Downstream Node:**	SW1
Inspected Length:	45.30 m	**Dia/Height:**	375 mm
Total Length:	45.30 m	**Material:**	Concrete

No.	m+	Code	Observation
1	0.00	IC	Start node, inspection chamber, reference: SW2
2	0.00	WL	Water level, 5% of the vertical dimension
3	18.20	RFJ	Roots, fine at joint, start
4	25.50	RFJ	Roots, fine at joint, finish
5	28.00	RFJ	Roots, fine at joint
6	32.00	RFJ	Roots, fine at joint, start
7	33.50	RFJ	Roots, fine at joint, finish
8	34.00	RFJ	Roots, fine at joint, start
9	35.00	JN	Junction at 2 o'clock, 250mm dia
10	36.60	RFJ	Roots, fine at joint, finish
11	45.30	OCF	Finish node, other special chamber, reference: SW1

PLR:	SW2X	**Upstream Node:**	SW2
Inspection Direction:	Upstream	**Downstream Node:**	SW1
Inspected Length:	31.30 m	**Dia/Height:**	375 mm
Total Length:	31.30 m	**Material:**	Concrete

No.	m+	Code	Observation
1	0.00	IC	Start node, inspection chamber, reference: SW1
2	0.00	WL	Water level, 5% of the vertical dimension
3	19.00	JN	Junction at 2 o'clock, 150mm dia
4	21.60	JN	Junction at 2 o'clock, 150mm dia
5	22.40	CN	Connection other than junction at 1 o'clock, 150mm dia

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Section Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

No.	m+	Code	Observation
6	23.10	RFJ	Roots, fine at joint
7	30.30	RFJ	Roots, fine at joint
8	31.00	JN	Junction at 10 o'clock, 150mm dia
9	31.30	OCF	Finish node, other special chamber, reference: SW2

PLR:	SW3X	**Upstream Node:**	SW3
Inspection Direction:	Upstream	**Downstream Node:**	SW2
Inspected Length:	28.90 m	**Dia/Height:**	300 mm
Total Length:	28.90 m	**Material:**	Vitrified clay

No.	m+	Code	Observation
1	0.00	IC	Start node, inspection chamber, reference: SW2
2	0.00	WL	Water level, 5% of the vertical dimension
3	3.10	JN	Junction at 1 o'clock, 150mm dia
4	7.40	RFJ	Roots, fine at joint
5	8.90	CXD	Connection defective, connecting pipe is damaged at 1 o'clock, 150mm dia
6	8.90	RMJ	Roots, mass at joint, 10% cross-sectional area loss
7	9.20	DEX	Settled deposits, other, 10% cross-sectional area loss
8	13.20	JN	Junction at 10 o'clock, 150mm dia
9	15.00	RFJ	Roots, fine at joint
10	23.80	RM	Roots, mass, 10% cross-sectional area loss, start
11	26.80	RM	Roots, mass, 20% cross-sectional area loss, change
12	28.10	RM	Roots, mass, 40% cross-sectional area loss, change
13	28.70	CXI	Connection defective, connecting pipe is intruding at 9 o'clock, 150mm dia, intrusion: 5%
14	28.80	RM	Roots, mass, 50% cross-sectional area loss, change
15	28.90	RM	Roots, mass, 50% cross-sectional area loss, finish
16	28.90	SA	Survey abandoned

PLR:	SW4X	**Upstream Node:**	SW4
Inspection Direction:	Downstream	**Downstream Node:**	SW3
Inspected Length:	55.90 m	**Dia/Height:**	300 mm
Total Length:	55.90 m	**Material:**	Concrete

No.	m+	Code	Observation
1	0.00	IC	Start node, inspection chamber, reference: SW4
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.80	RFJ	Roots, fine at joint
4	2.60	RFJ	Roots, fine at joint
5	4.30	RFJ	Roots, fine at joint
6	7.50	MCVC	Pipe material changes to vitrified clay at this point
7	7.50	JDM	Joint displaced, medium
8	7.50	LL	Line deviates left
9	7.50	RFJ	Roots, fine at joint
10	15.80	RFJ	Roots, fine at joint
11	16.90	JN	Junction at 10 o'clock, 150mm dia
12	16.90	RF	Roots, fine, start
13	20.00	JN	Junction at 10 o'clock, 150mm dia

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Section Summary

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

No.	m+	Code	Observation
14	23.70	RF	Roots, fine, finish
15	31.30	RFJ	Roots, fine at joint
16	32.80	RFJ	Roots, fine at joint
17	33.50	RFJ	Roots, fine at joint
18	44.50	RTJ	Roots, tap at joint, start
19	45.30	RTJ	Roots, tap at joint, finish
20	45.30	RMJ	Roots, mass at joint, 15% cross-sectional area loss, start
21	45.70	RMJ	Roots, mass at joint, 5% cross-sectional area loss, change
22	46.90	RMJ	Roots, mass at joint, 20% cross-sectional area loss, change
23	47.50	RMJ	Roots, mass at joint, 10% cross-sectional area loss, change
24	52.10	RMJ	Roots, mass at joint, 10% cross-sectional area loss, finish
25	52.60	RFJ	Roots, fine at joint
26	55.20	RFJ	Roots, fine at joint
27	55.90	ICF	Finish node, inspection chamber, reference: SW3

PLR:	SW3X	**Upstream Node:**	SW3
Inspection Direction:	Downstream	**Downstream Node:**	SW2
Inspected Length:	14.10 m	**Dia/Height:**	300 mm
Total Length:	14.10 m	**Material:**	Vitrified clay

No.	m+	Code	Observation
1	0.00	IC	Start node, inspection chamber, reference: SW3
2	0.00	WL	Water level, 0% of the vertical dimension
3	0.50	RMJ	Roots, mass at joint, 10% cross-sectional area loss, start
4	3.50	RMJ	Roots, mass at joint, 30% cross-sectional area loss, change
5	7.10	RMJ	Roots, mass at joint, 60% cross-sectional area loss, change
6	10.30	JN	Junction at 9 o'clock, 225mm dia
7	14.10	RMJ	Roots, mass at joint, 60% cross-sectional area loss, finish
8	14.10	SA	Survey abandoned

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Defect Grade Description (Node)

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

1:	Brick: No structural defects. Other Materials: No structural defects. **Acceptable structural condition.**
2:	Brick: Circumferential cracking; single longitudinal crack; surface mortar loss (depth missing < 15mm); surface damage - slight spalling (breaking away of small fragments from the surface); surface damage - slight wear (increased roughness). Other Materials: Circumferential crack; moderate joint defects (i.e. medium open joint or medium displaced joint); surface damage - slight spalling (breaking away of small fragments from the surface) or slight wear (increased roughness). **Minimal collapse likelihood in the short term but potential for further deterioration.**
3:	Brick: Medium mortar loss (depth missing 15-50mm) without other defects; more than one longitudinal crack (at a single location); multiple cracking; single bricks displaced; deformation < 5%; no fracture and only moderate mortar loss; surface damage - medium spalling (large areas of chipped brick); surface damage - medium wear (large area of brick surface is missing). Other Materials: Fracture with no deformation or deformation < 5%; longitudinal cracking or multiple cracking; minor loss of level; severe joint defects (i.e. large open joint or large displaced joint); surface damage - partial area of pipe surface is missing or worn. **Collapse unlikely in the near future but further deterioration likely**
4:	Brick: Total mortar loss (depth missing > 50mm) with deformation > 10%; deformation up to 10% and fractured; displaced or hanging brickwork; small number of missing bricks; dropped invert (drop > 20mm); moderate loss of level; surface damage - large spalling (entire surface of brick is missing); surface damage - large wear (entire surface of brick is missing). Other Materials: Broken; deformation up to 10% and broken; fracture with deformation 5-10%; multiple fractures; serious loss of level; serious joint defects with voids or soil visible (open joint with > 50mm soil or void visible or joint displacement > 25% of diameter); surface damage - entire area of pipe surface is missing or severly worn. **Collapse likely in the foreseeable future**
5:	Brick: Already collapsed; missing Invert; deformation > 10% and fractured; displaced or hanging brickwork and deformation < 10%; extensive areas of missing brickwork. Other Materials: Already collapsed; deformation > 10% and broken; extensive areas of pipe fabric missing; fractures with deformation > 10% **Collapsed or collapse imminent**

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Node Profile

Project Name	Project Number	Project Date
Milksey Lane		11/21/2024

Node No.	Node ID	Town or Village	Road	Node Depth	Date
1	SW2				11/29/2024
2	SW1				11/29/2024
3	SW3				11/29/2024
4	SW4				11/29/2024

Total: 4 Nodes

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Completed section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
1	1	29/11/24	8:06	Not Specified	No Rain Or Snow	No	SW2X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

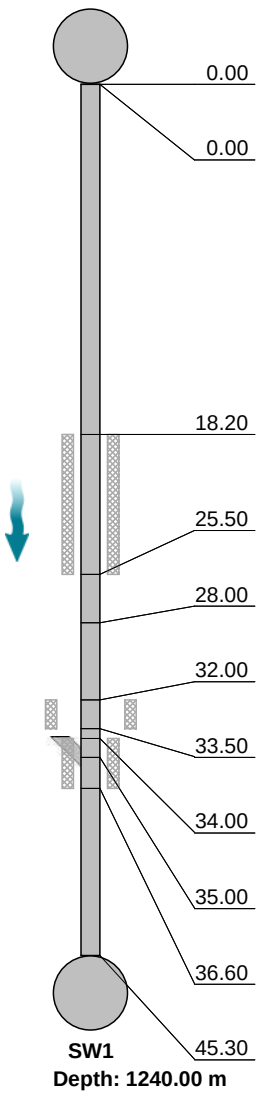
Town or Village:	Graveley	**Inspection Direction:**	Downstream	**Upstream Node:**	SW2
Road:	Milksey Lane	**Inspected Length:**	45.30 m	**Upstream Pipe Depth:**	1530.000 m
Location:	Footway	**Total Length:**	45.30 m	**Downstream Node:**	SW1
Surface Type:	Asphalt Footway	**Joint Length:**		**Downstream Pipe Depth:**	1240.000 m

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	375 mm
Flow Control:	No flow control	**Material:**	Concrete
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Routine inspection	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:393

Depth: 1530.00 m
SW2



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		IC	Start node, inspection chamber, reference: SW2	00:00:00		
0.00		WL	Water level, 5% of the vertical dimension: Running live	00:00:01		
18.20	S01	RFJ	Roots, fine at joint, start	00:00:51		
25.50	F01	RFJ	Roots, fine at joint, finish	00:01:30		2
28.00		RFJ	Roots, fine at joint	00:01:50		2
32.00	S02	RFJ	Roots, fine at joint, start	00:02:21		
33.50	F02	RFJ	Roots, fine at joint, finish	00:02:48		2
34.00	S03	RFJ	Roots, fine at joint, start	00:03:00		
35.00		JN	Junction at 2 o'clock, 250mm dia	00:03:10		
36.60	F03	RFJ	Roots, fine at joint, finish	00:03:41		2
45.30		OCF	Finish node, other special chamber, reference: SW1: Unable to push rod further	00:05:22		

SW1
Depth: 1240.00 m

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	1.0	0.3	14.0	2.0

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Section Pictures - 11/29/2024 - SW2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	SW2X		

SW2.JPG, 00:00:00, 0.00 m
Start node, inspection chamber, reference: SW2

71a36dd9-3d53-40b7-b06d-b984787a84b6.png, 00:00:01, 0.00 m
Water level, 5% of the vertical dimension, Running live

b2a526c9-151c-40f6-809e-3401277c87f8.png, 00:00:51, 18.20 m
Roots, fine at joint, start

7b70e5a9-b297-4289-a504-2282be5e6a94.png, 00:01:30, 25.50 m
Roots, fine at joint, finish

29270812-47d4-47e3-94d8-0189b74d66e6.png, 00:01:50, 28.00 m
Roots, fine at joint

f2520338-991b-4d49-a4b7-b083027dddd3.png, 00:02:21, 32.00 m
Roots, fine at joint, start

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Section Pictures - 11/29/2024 - SW2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
1	Downstream	SW2X		

93e7a674-413d-43cd-a0ed-10f057f7ce26.png, 00:02:48, 33.50 m
Roots, fine at joint, finish

d3dc2325-8fee-4084-b3ff-8aad911865d1.png, 00:03:00, 34.00 m
Roots, fine at joint, start

f539d5c1-cff1-4d3c-b9ef-aa45644b736d.png, 00:03:10, 35.00 m
Junction at 2 o'clock, 250mm dia

ebeb8eaf-11ce-49ac-99d1-1b747c865bb6.png, 00:03:41, 36.60 m
Roots, fine at joint, finish

c820a393-d13f-4672-aaae-d84b78635713.png, 00:05:22, 45.30 m
Finish node, other special chamber, reference: SW1, Unable

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Completed section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
2	1	29/11/24	8:18	Not Specified	No Rain Or Snow	No	SW2X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

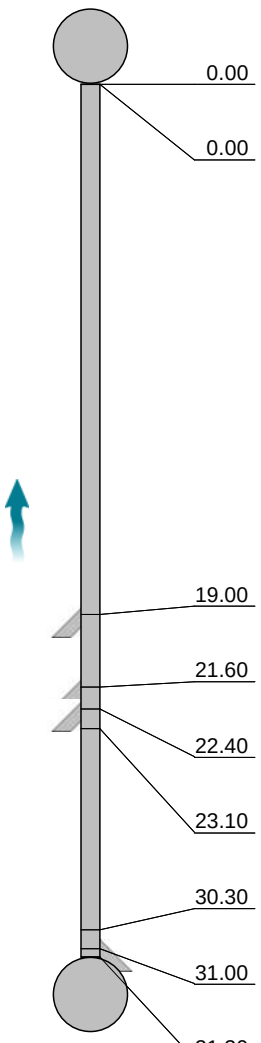
Town or Village:	Graveley	**Inspection Direction:**	Upstream	**Upstream Node:**	SW2
Road:	Milksey Lane	**Inspected Length:**	31.30 m	**Upstream Pipe Depth:**	1530.000 m
Location:	Footway	**Total Length:**	31.30 m	**Downstream Node:**	SW1
Surface Type:	Asphalt Footway	**Joint Length:**		**Downstream Pipe Depth:**	1240.000 m

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	375 mm
Flow Control:	No flow control	**Material:**	Concrete
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Routine inspection	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:271

Depth: 1240.00 m
SW1



Position [m]	Code	Observation	MPEG	Photo	Grade
0.00	IC	Start node, inspection chamber, reference: SW1	00:00:01		
0.00	WL	Water level, 5% of the vertical dimension: Running live	00:00:01		
19.00	JN	Junction at 2 o'clock, 150mm dia	00:01:20		
21.60	JN	Junction at 2 o'clock, 150mm dia	00:01:34		
22.40	CN	Connection other than junction at 1 o'clock, 150mm dia	00:01:43		
23.10	RFJ	Roots, fine at joint	00:01:48		2
30.30	RFJ	Roots, fine at joint	00:02:26		2
31.00	JN	Junction at 10 o'clock, 150mm dia	00:02:32		
31.30	OCF	Finish node, other special chamber, reference: SW2: Cross over point from section 1	00:02:45		

SW2
Depth: 1530.00 m

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	1.0	0.1	2.0	2.0

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Section Pictures - 11/29/2024 - SW2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
2	Upstream	SW2X		

SW1.JPG, 00:00:01, 0.00 m
Start node, inspection chamber, reference: SW1

bbc34e50-7b20-4962-8c3e-7d5df5e63530.png, 00:00:01, 0.00 m
Water level, 5% of the vertical dimension, Running live

cc336df9-275d-4a12-b918-de934bef365d.png, 00:01:20, 19.00 m
Junction at 2 o'clock, 150mm dia

078cccda-603a-4452-89f4-d46438b8e00f.png, 00:01:34, 21.60 m
Junction at 2 o'clock, 150mm dia

1a8d78c2-db60-4994-8570-c8d9b8ef25bd.png, 00:01:43, 22.40 m
Connection other than junction at 1 o'clock, 150mm dia

6d8b6261-9768-4338-a8de-f9a113c922da.png, 00:01:48, 23.10 m
Roots, fine at joint

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Section Pictures - 11/29/2024 - SW2X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
2	Upstream	SW2X		

22677a1c-9702-415a-b762-6022f4cc53ea.png, 00:02:26, 30.30 m
Roots, fine at joint

a02fb6f8-db22-495e-b60a-9fe1844e9d07.png, 00:02:32, 31.00 m
Junction at 10 o'clock, 150mm dia

6587682b-d075-46d0-bbc0-423006ded360.jpg, 00:02:45, 31.30 m
Finish node, other special chamber, reference: SW2, Cross

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Abandoned section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	1	29/11/24	8:26	Not Specified	No Rain Or Snow	No	SW3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

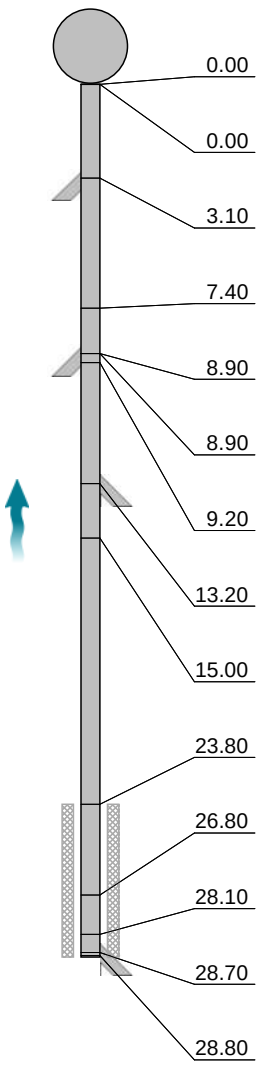
Town or Village:	Graveley	**Inspection Direction:**	Upstream	**Upstream Node:**	SW3
Road:	Milksey Lane	**Inspected Length:**	28.90 m	**Upstream Pipe Depth:**	1660.000 m
Location:	Footway	**Total Length:**	28.90 m	**Downstream Node:**	SW2
Surface Type:	Asphalt Footway	**Joint Length:**		**Downstream Pipe Depth:**	1530.000 m

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Flow Control:	No flow control	**Material:**	Vitrified clay
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Routine inspection	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:250

Depth: 1530.00 m
SW2



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		IC	Start node, inspection chamber, reference: SW2	00:00:00		
0.00		WL	Water level, 5% of the vertical dimension: Running live	00:00:00		
3.10		JN	Junction at 1 o'clock, 150mm dia	00:00:33		
7.40		RFJ	Roots, fine at joint	00:00:53		2
8.90		CXD	Connection defective, connecting pipe is damaged at 1 o'clock, 150mm dia	00:01:07		
8.90		RMJ	Roots, mass at joint, 10% cross-sectional area loss	00:01:10		3
9.20		DEX	Settled deposits, other, 10% cross-sectional area loss: Leaves	00:01:16		3
13.20		JN	Junction at 10 o'clock, 150mm dia	00:01:38		
15.00		RFJ	Roots, fine at joint	00:01:50		2
23.80	S01	RM	Roots, mass, 10% cross-sectional area loss, start	00:02:37		
26.80	C01	RM	Roots, mass, 20% cross-sectional area loss, change	00:03:05		
28.10	C01	RM	Roots, mass, 40% cross-sectional area loss, change	00:03:26		
28.70		CXI	Connection defective, connecting pipe is intruding at 9 o'clock, 150mm dia, intrusion: 5%	00:03:34		3
28.80	C01	RM	Roots, mass, 50% cross-sectional area loss, change	00:03:43		

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Abandoned section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
3	1	29/11/24	8:26	Not Specified	No Rain Or Snow	No	SW3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

Scale: 1:250

Position [m]		Code	Observation	MPEG	Photo	Grade
28.90	F01	RM	Roots, mass, 50% cross-sectional area loss, finish	00:03:43		3
28.90		SA	Survey abandoned: Unable to proceed.	00:03:43		

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	6	6.0	1.2	34.0	4.0

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Section Pictures - 11/29/2024 - SW3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Upstream	SW3X		

99624c56-6d41-4af9-ad73-06a8ec7e4514.png, 00:00:00, 0.00 m
Water level, 5% of the vertical dimension, Running live

401ab29a-4c70-4d57-8003-c0800992f88c.png, 00:00:33, 3.10 m
Junction at 1 o'clock, 150mm dia

185b37ec-0349-4d34-8897-50f622d61a30.png, 00:00:53, 7.40 m
Roots, fine at joint

b65f7ef7-e37d-4f68-8e9d-51e517b19886.png, 00:01:07, 8.90 m
Connection defective, connecting pipe is damaged at 1 o'clock,

a74bc132-76af-4b72-b59a-9b0d10c1e1bd.png, 00:01:10, 8.90 m
Roots, mass at joint, 10% cross-sectional area loss

035ad4f6-410a-4705-9adf-9434a6787c09.png, 00:01:16, 9.20 m
Settled deposits, other, 10% cross-sectional area loss, Leaves

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Section Pictures - 11/29/2024 - SW3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Upstream	SW3X		

ced530b9-5c45-4fb0-bd8a-c44cf9934782.png, 00:01:38, 13.20 m
Junction at 10 o'clock, 150mm dia

76ad6ec8-b119-4354-9085-b3d31c6acbea.png, 00:01:50, 15.00 m
Roots, fine at joint

f4683594-3657-44ac-96e9-ee69abbc467a.png, 00:02:37, 23.80 m
Roots, mass, 10% cross-sectional area loss, start

834ecfe2-25ef-439e-99da-13f364f33e35.png, 00:03:05, 26.80 m
Roots, mass, 20% cross-sectional area loss, change

17d09909-7178-4815-81a0-ae1a1d9967ac.png, 00:03:26, 28.10 m
Roots, mass, 40% cross-sectional area loss, change

c149e879-bbbf-4cb7-8b94-35e5cef6f891.png, 00:03:34, 28.70 m
Connection defective, connecting pipe is intruding at 9 o'clock,

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Section Pictures - 11/29/2024 - SW3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
3	Upstream	SW3X		

60fcfc24-6691-4d58-9d84-d8bf17bcf9fa.png, 00:03:43, 28.90 m
Roots, mass, 50% cross-sectional area loss, finish

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Completed section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
4	1	29/11/24	8:48	Not Specified	No Rain Or Snow	No	SW4X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

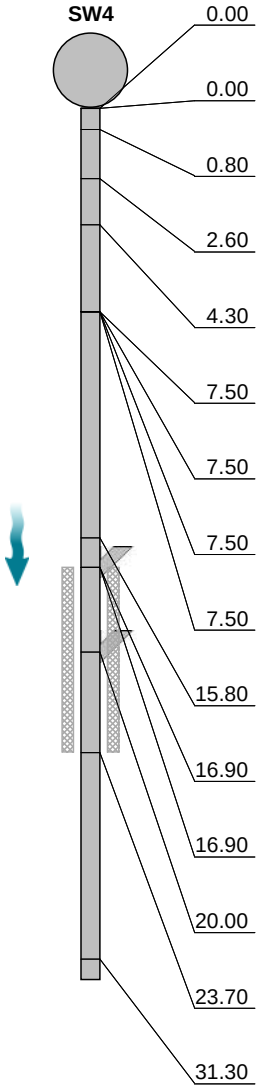
Town or Village:	Graveley	**Inspection Direction:**	Downstream	**Upstream Node:**	SW4
Road:	Milksey Lane	**Inspected Length:**	55.90 m	**Upstream Pipe Depth:**	1790.000 m
Location:	Woodland	**Total Length:**	55.90 m	**Downstream Node:**	SW3
Surface Type:	Overgrown	**Joint Length:**		**Downstream Pipe Depth:**	1660.000 m

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Flow Control:	No flow control	**Material:**	Concrete
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Routine inspection	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:278

Depth: 1790.00 m



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		IC	Start node, inspection chamber, reference: SW4	00:00:01		
0.00		WL	Water level, 5% of the vertical dimension: Running live	00:00:01		
0.80		RFJ	Roots, fine at joint	00:00:19		2
2.60		RFJ	Roots, fine at joint	00:00:31		2
4.30		RFJ	Roots, fine at joint	00:00:40		2
7.50		MCVC	Pipe material changes to vitrified clay at this point	00:00:52		
7.50		JDM	Joint displaced, medium	00:00:52		1 / 3
7.50		LL	Line deviates left	00:00:52		
7.50		RFJ	Roots, fine at joint	00:00:56		2
15.80		RFJ	Roots, fine at joint	00:01:27		2
16.90		JN	Junction at 10 o'clock, 150mm dia	00:01:31		
16.90	S01	RF	Roots, fine, start	00:01:31		
20.00		JN	Junction at 10 o'clock, 150mm dia	00:01:47		
23.70	F01	RF	Roots, fine, finish	00:01:59		2
31.30		RFJ	Roots, fine at joint	00:02:30		2

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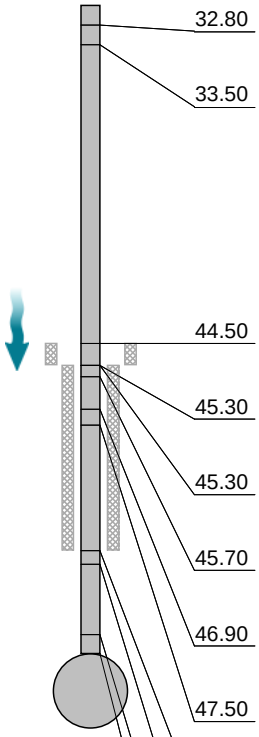
Completed section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
4	1	29/11/24	8:48	Not Specified	No Rain Or Snow	No	SW4X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

Scale: 1:278



Position [m]		Code	Observation	MPEG	Photo	Grade
32.80		RFJ	Roots, fine at joint	00:02:35		2
33.50		RFJ	Roots, fine at joint	00:02:38		2
44.50	S02	RTJ	Roots, tap at joint, start	00:03:57		
45.30	F02	RTJ	Roots, tap at joint, finish	00:04:03		4
45.30	S03	RMJ	Roots, mass at joint, 15% cross-sectional area loss, start	00:04:03		
45.70	C03	RMJ	Roots, mass at joint, 5% cross-sectional area loss, change	00:04:17		
46.90	C03	RMJ	Roots, mass at joint, 20% cross-sectional area loss, change	00:04:52		
47.50	C03	RMJ	Roots, mass at joint, 10% cross-sectional area loss, change	00:05:12		
52.10	F03	RMJ	Roots, mass at joint, 10% cross-sectional area loss, finish	00:06:21		3
52.60		RFJ	Roots, fine at joint	00:06:21		2
55.20		RFJ	Roots, fine at joint	00:07:05		2
55.90		ICF	Finish node, inspection chamber, reference: SW3	00:07:20		

Depth: 1660.00 m

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	1.0	0.0	1.0	1.0	14	9.0	0.9	52.0	4.0

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Section Pictures - 11/29/2024 - SW4X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
4	Downstream	SW4X		

SW4.JPG, 00:00:01, 0.00 m
Start node, inspection chamber, reference: SW4

b08ece61-0da9-461a-8232-b92f97f60bf7.png, 00:00:01, 0.00 m
Water level, 5% of the vertical dimension, Running live

56f930ac-49f6-4b96-ada8-41c19fa769e6.png, 00:00:19, 0.80 m
Roots, fine at joint

072a555f-51a2-4a4f-8c8c-0cdd0f3fb631.png, 00:00:31, 2.60 m
Roots, fine at joint

16363fe1-2ee0-4494-bdf9-0540b0de48e2.png, 00:00:40, 4.30 m
Roots, fine at joint

901fc6c2-b364-4fae-8fd9-338f3b128fc0.png, 00:00:52, 7.50 m
Line deviates left

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Section Pictures - 11/29/2024 - SW4X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
4	Downstream	SW4X		

a0bce399-a450-4d3d-a9e2-3ac84516f48a.png, 00:01:27, 15.80 m
Roots, fine at joint

777f24de-9b4a-467c-a4c1-97b24560e6a4.png, 00:01:31, 16.90 m
Junction at 10 o'clock, 150mm dia

2f2d61b5-d4e9-458a-92f8-9caf123dfb0f.png, 00:01:47, 20.00 m
Junction at 10 o'clock, 150mm dia

1961e4e5-49af-4402-9bc2-7fe234b19399.png, 00:01:59, 23.70 m
Roots, fine, finish

630009ea-0182-45c2-8f0f-673835fbabb3.png, 00:02:30, 31.30 m
Roots, fine at joint

ced64048-de0d-4066-a821-b95732ef483e.png, 00:02:35, 32.80 m
Roots, fine at joint

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Section Pictures - 11/29/2024 - SW4X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
4	Downstream	SW4X		

bafb911b-6cbc-4a8f-9351-8adddeb6f59d.png, 00:02:38, 33.50 m
Roots, fine at joint

e6347e56-5449-4c1b-87a2-0c68d97f732a.png, 00:03:57, 44.50 m
Roots, tap at joint, start

2ac8cc72-35a9-48b6-8983-1817bcbaa44d.png, 00:04:03, 45.30 m
Roots, mass at joint, 15% cross-sectional area loss, start

79ca1f7a-4d21-486e-864e-0eff7670a4b5.png, 00:04:17, 45.70 m
Roots, mass at joint, 5% cross-sectional area loss, change

5aaf0228-9991-490b-b1c3-98dcc6b319a3.png, 00:04:52, 46.90 m
Roots, mass at joint, 20% cross-sectional area loss, change

6d0965e6-bcb2-4139-864b-f7b8d1967d73.png, 00:05:12, 47.50 m
Roots, mass at joint, 10% cross-sectional area loss, change

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Section Pictures - 11/29/2024 - SW4X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
4	Downstream	SW4X		

e827a749-dd39-424b-93f7-14ef3a2b5b4b.png, 00:06:21, 52.60 m
Roots, fine at joint

b464b4d0-19c6-4f8d-9bc6-851798832103.png, 00:07:05, 55.20 m
Roots, fine at joint

37a45ecf-ce0b-435f-bd45-ba3228d86827.png, 00:07:20, 55.90 m
Finish node, inspection chamber, reference: SW3

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Abandoned section inspection

WEB PROJECT CLICK TO OPEN THIS SECTION

Item No.	Insp. No.	Date	Time	Client`s Job Ref	Weather	Pre Cleaned	PLR
5	1	29/11/24	8:38	Not Specified	No Rain Or Snow	No	SW3X

Operator	Vehicle	Camera	Preset Length	Legal Status	Alternative ID
GG	Not Specified	Pearpoint P340	Not Specified	Highways Drainage	Not Specified

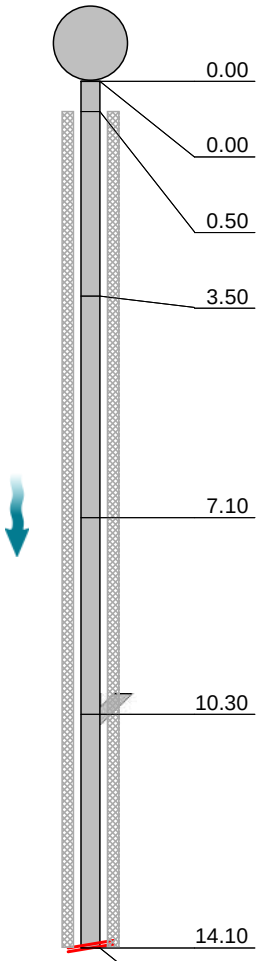
Town or Village:	Graveley	**Inspection Direction:**	Downstream	**Upstream Node:**	SW3
Road:	Milksey Lane	**Inspected Length:**	14.10 m	**Upstream Pipe Depth:**	1660.000 m
Location:	Woodland	**Total Length:**	14.10 m	**Downstream Node:**	SW2
Surface Type:	Overgrown	**Joint Length:**		**Downstream Pipe Depth:**	1530.000 m

Use:	Surface water	**Pipe Shape:**	Circular
Type of Pipe:	Gravity drain/sewer	**Dia/Height:**	300 mm
Flow Control:	No flow control	**Material:**	Vitrified clay
Year Constructed:	Not Specified	**Lining Type:**	No Lining
Inspection Purpose:	Routine inspection	**Lining Material:**	No Lining

Comments:
Recommendations:

Scale: 1:123

Depth: 1660.00 m
SW3



Position [m]		Code	Observation	MPEG	Photo	Grade
0.00		IC	Start node, inspection chamber, reference: SW3	00:00:01		
0.00		WL	Water level, 0% of the vertical dimension	00:00:01		
0.50	S01	RMJ	Roots, mass at joint, 10% cross-sectional area loss, start	00:00:08		
3.50	C01	RMJ	Roots, mass at joint, 30% cross-sectional area loss, change	00:00:35		
7.10	C01	RMJ	Roots, mass at joint, 60% cross-sectional area loss, change	00:01:04		
10.30		JN	Junction at 9 o'clock, 225mm dia	00:01:40		
14.10	F01	RMJ	Roots, mass at joint, 60% cross-sectional area loss, finish	00:02:25		3
14.10		SA	Survey abandoned: Unable to proceed.	00:02:25		

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	4.0	4.0	56.0	4.0

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Section Pictures - 11/29/2024 - SW3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
5	Downstream	SW3X		

SW3.JPG, 00:00:01, 0.00 m
Start node, inspection chamber, reference: SW3

9de1fb91-efca-4e0c-b9ff-25405ad3fe57.png, 00:00:01, 0.00 m
Water level, 0% of the vertical dimension

d75d1e6c-e1ee-4a24-8fba-f6bf955d0141.png, 00:00:08, 0.50 m
Roots, mass at joint, 10% cross-sectional area loss, start

03c760a4-c011-424d-a0e7-884292924b45.png, 00:00:35, 3.50 m
Roots, mass at joint, 30% cross-sectional area loss, change

eb2e7dfa-f1ef-47fd-8f0b-1463f61647f4.png, 00:01:04, 7.10 m
Roots, mass at joint, 60% cross-sectional area loss, change

4eba2138-032a-41ca-878b-b013038afdcf.png, 00:01:40, 10.30 m
Junction at 9 o'clock, 225mm dia

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Section Pictures - 11/29/2024 - SW3X

Item No.	Inspection Direction	PLR	Client`s Job Ref	Contractor`s Job Ref
5	Downstream	SW3X		

27453663-1dad-437a-b28e-5b72162ce29a.png, 00:02:25, 14.10 m
Survey abandoned, Unable to proceed.

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Disclaimer

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THE DATA PRESENTED IN THIS DRAWING HAS BEEN COLLECTED USING A COMBINATION OF THE FOLLOWING: CONSULTATION OF UTILITY ASSET INFORMATION, VISUAL SURVEY & INSPECTION OF MANHOLES AND INSPECTION CHAMBERS; ELECTROMAGNETIC LOCATION TECHNIQUES; GROUND PENETRATING RADAR, AND, WHERE APPLICABLE, TRIAL HOLE EXCAVATIONS. THESE TECHNIQUES HAVE BEEN DEPLOYED IN ACCORDANCE WITH THE BSI PAS128 SPECIFICATION FOR UNDERGROUND UTILITY DETECTION, VERIFICATION AND LOCATION USING THE SEARCH METHODOLOGIES DEEMED APPLICABLE AT TIME OF SITE VISIT.

UNLESS OTHERWISE STATED, ALL UTILITIES SHOWN ON THIS PLAN HAVE BEEN SURVEYED USING APPROVED DETECTORS AND THE CONNECTIONS BETWEEN INSPECTION CHAMBERS, IF UNABLE TO BE DETECTED, ARE GENERALLY ASSUMED TO BE DIRECT UNLESS THERE ARE INDICATIONS TO THE CONTRARY. THE DETECTION CONFIDENCE FOR EACH UTILITY SEGMENT IS DEPICTED IN LINE WITH THE PAS128 SCHEME OUTLINED BELOW. INFORMATION DEPICTED AS QL-C OR QL-D CANNOT BE GUARANTEED AS IT IS BASED ON HISTORIC UTILITY RECORDS WHICH CAN BE INACCURATE AND INCOMPLETE. PIPE SIZES NOT OBTAINED BY VISUAL SURVEY WILL HAVE BEEN OBTAINED FROM RECORD DRAWINGS OR MARKER PLATES WHERE AVAILABLE, WHERE SPECIFIED, DEPTH ESTIMATIONS ARE GENERALLY TO THE TOP OF THE SERVICE. DEPTHS TO GRAVITY SEWERS AND DRAINS ARE GENERALLY TO INVERT LEVELS UNLESS OTHERWISE STATED.

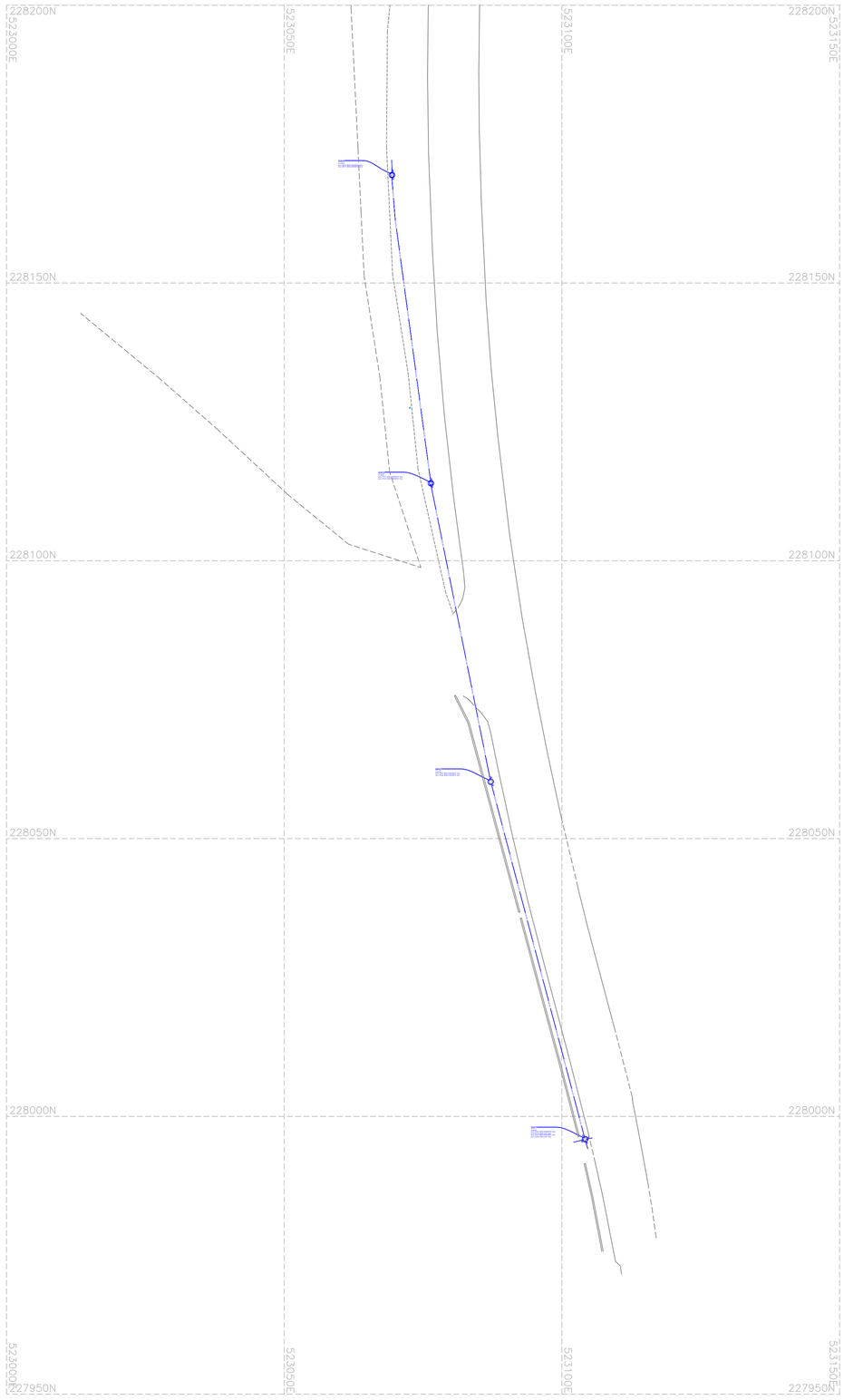
THE UTILITY ROUTES DEPICTED MAY REFLECT THE ROUTES OF MULTIPLE CABLES OR PIPES. IT IS NOT ALWAYS POSSIBLE TO DIFFERENTIATE BETWEEN BURIED CONSTRUCTION FEATURES, UTILITIES AND OTHER SUBSURFACE LINEAR FEATURES. THEREFORE, IT IS POSSIBLE THAT SOME FEATURES SHOWN ARE NOT UTILITY RELATED, AND DUE TO THE LIMITATIONS OF ELECTROMAGNETIC TECHNIQUES ALL UTILITY IDENTIFICATIONS SHOULD BE TREATED WITH CAUTION AND VERIFIED PRIOR TO USE DURING DESIGN/BUILDING WORKS.

IF THE LOCATION OR DEPTH OF UTILITIES AND FEATURES IS OF PARTICULAR IMPORTANCE TO A PROJECT THEN IT IS RECOMMENDED THAT DISCUSSIONS ARE HELD WITH MEC CONSULTING GROUP REGARDING ANY POSSIBLE LIMITATIONS OR ANOMALIES.

PLEASE NOTE THAT NOT ALL BURIED PIPES, CABLES AND DUCTS CAN BE DETECTED AND MAPPED IN CONSIDERATION OF THEIR DEPTH, LOCATION, MATERIAL TYPE, GEOLOGY AND PROXIMITY TO OTHER UTILITIES. EVEN AN APPROPRIATE AND PROFESSIONALLY EXECUTED SURVEY MAY NOT BE ABLE TO ACHIEVE A 100% DETECTION RATE. WHERE AN AREA OF UTILITIES IS LIKELY TO AFFECT CLIENT PROJECT REQUIREMENTS, IT IS STRONGLY RECOMMENDED THAT A PAS128 QUALITY LEVEL A VERIFICATION SURVEY IS CARRIED OUT.

NO UTILITY MAPPING SURVEY CAN BE CONSIDERED A 100% ACCURATE DEPICTION OF THE SUB-SURFACE ENVIRONMENT, AND THE USE OF THESE DRAWINGS DOES NOT REMOVE THE REQUIREMENT FOR THE USE OF SAFE DIGGING TECHNIQUES AT ALL TIMES, IN LINE WITH THE REQUIREMENTS OF HSG47 AND CURRENT CDM REGULATIONS.

BOUNDARIES SHOWN ARE PHYSICAL SITE FEATURES AND MAY NOT REPRESENT LEGAL OWNERSHIP.



N

UTILITY MAPPING LEGEND

AC	ASBESTOS CEMENT	LP	LAMP POST
AR	ASSUMED ROUTE	MH	MANHOLE
AV	AIR VALVE	MKR	UTILITY MARKER POST
BL	BED LEVEL	MW	MONITORING WELL
BB	BASE BEND	OH	OVERHEAD
BD	BACK DROP	OSA	OFF SURVEY AREA
BH	BOREHOLE	PE	POLYETHYLENE
BR	BRICK	PL	PLASTIC
BT	BT INSPECTION CHAMBER	PM	PARKING METER
CI	CAST IRON	PR	PIPE RISER
CL	COVER LEVEL	PVC	POLYVINYL CHLORIDE
CR	CABLE RISER	RE	RODDING EYE
CTV	CABLE TV INSPECTION CHAMBER	RWP	RAIN WATER PIPE
CP	CATCHPIT	S/A	SOAKAWAY
d	DEPTH	SI	SPUN IRON
DI	DUCTILE	ST	STOP TAP
DP	DOWN PIPE	SV	SLUICE VALVE
ED	EMPTY DUCT	SVP	SOIL VENT PIPE
EOSC	END OF TRENCH SCAR	TE	TRAPPED EXIT
EOT	END OF TRACE	TFR	TAKEN FROM RECORD
EP	ELECTRIC POST	TL	TRAFFIC LIGHT
ER	EARTH ROD	TP	TELEGRAPH POST
FH	FIRE HYDRANT	UTCCTV	UNABLE TO CCTV
FL	FLOOD LIGHT	UTF	UNABLE TO FIND
GPR	GROUND PENETRATING RADAR	UTL	UNABLE TO LIFT
GRP	GLASS REINFORCED PLASTIC	UTS	UNABLE TO SURVEY
GV	GAS VALVE	UTT	UNABLE TO TRACE
GY	GULLY	VC	VITRIFIED CLAY
HL	HIGH LEVEL	VP	VENT PIPE
HOR	HEAD OF RUN	VR	VAPOUR RECOVERY
IB	ILLUMINATION BOLLARD	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT VALVE
JB	JUNCTION BOX	WSC	WATER SERVICE COVER

SEWER IDENTIFICATION

- CWS B2>> — COMBINED WATER SEWER
- FWS B2>> — FOUL WATER SEWER
- SWS B2>> — SURFACE WATER SEWER
- UWS B2>> — UNKNOWN WATER SEWER

SUB-SURFACE KEY

- ELEC B2 — ELECTRIC CABLE
- HV B2 — ELECTRIC HIGH VOLTAGE
- LV B2 — ELECTRIC LOW VOLTAGE
- BT B2 — TELECOMMS CABLE
- CATV B2 — CABLE TELEVISION
- COMM B2 — COMMUNICATION CABLE
- FO B2 — FIBRE OPTIC
- WATER B2 — WATER PIPE
- GAS B2 — GAS PIPE
- FWS B2>> — FOUL WATER DRAINAGE
- SWS B2>> — SURFACE WATER DRAINAGE
- CWS B2>> — COMBINED DRAINAGE
- UWS B2>> — UNIDENTIFIED DRAINAGE
- FU B2 — FUEL PIPE
- UN B2 — UNIDENTIFIED SERVICE
- GPR B2 — GPR LINEAR FEATURE
- GPR AREA ANOMALY
- GPR AREA ANOMALY - REBAR
- OVERHEAD CABLE
- CABLE/PIPE RISER
- BACKDROP/TRAPPED EXIT
- ANOMALY FOUND WITH GPR
- Ø PIPE DIAMETER (mm)
- END OF TRACE
- CHANGE IN QUALITY
- START OF RUN
- BLOCKED RUN
- SURVEY BOUNDARY — SURVEY BOUNDARY
- GPR SURVEY AREA
- VEGETATED AREA

UTILITY CONFIDENCE LEVELS

QL-A	HORIZONTAL AND VERTICAL POSITION VERIFIED VISUALLY HA +/-25MM VA +/-50MM.
QL-B1	HORIZONTAL AND VERTICAL POSITION DETECTED BY MULTIPLE METHODS HA +/-150MM OR +/-15% OF DEPTH.
QL-B2	HORIZONTAL AND VERTICAL POSITION DETECTED BY A SINGLE METHOD HA +/-250MM OR +/-40% OF DETECTED DEPTH.
QL-B3	HORIZONTAL POSITION DETECTED BY A SINGLE METHOD HA +/-500MM DEPTH UNDEFINED.
QL-B4	UTILITY IS SUSPECTED TO EXIST BUT HAS NOT BEEN DETECTED. ASSUMED ROUTE HORIZONTAL & DEPTH UNDEFINED.
QL-C	UNDERGROUND UTILITY PLOTTED FROM UTILITY RECORD DATA ONLY, BUT WITH SITE RECONNAISSANCE TO MATCH UTILITY RECORD WITH PHYSICAL UTILITY STREET FURNITURE AS A BEST FIT.
QL-D	DESKTOP UTILITY RECORD SEARCH. THOROUGH DESKTOP SEARCH OF ALL STATUTORY ASSET OWNERS TO SUPPLY THEIR RECORD DATA.
QL-S	SEWER CONNECTION CONFIRMED VIA ACOUSTIC TESTING ONLY. HORIZONTAL AND VERTICAL POSITION ASSUMED TO BE MOST DIRECT ROUTE.

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
*	FIRST ISSUE	GS	JD	RC	22.11.24

PROJECT:

MILKSEY LANE
GRAVELEY

DRAWING TITLE:

DRAINAGE CCTV SURVEY

CLIENT:

GADE HOMES LTD

DRAWING NUMBER: 29161_06_200_01

REVISION:	SHEET SIZE:	SCALE:
–	A1	1:500

STATUS: FOR INFORMATION

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APPENDICES

APPENDIX G

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MEC Consulting Group

Doc. Ref.	29161-CALC-0101
Sheet	1 of 9
Engineer	Z. Jordan
Date	19 Dec 24
Revision	-

DESIGN CALCULATIONS FRONT SHEET

SCHEME	Milksey Lane, Graveley
CLIENT	Gade Homes
ASPECTS OF SCHEME TO BE DESIGNED	Surface Water Sewer Design Surface water attenuation design and simulation results for the 50%AEP, 3.3%AEP35CC and 1%AEP40CC event for the development site.
CODES OF PRACTICE, DESIGN SPECIFICATIONS & BRITISH STANDARDS	• Design and analysis of urban storm drainage. Wallingford Procedure Vol.1 • Sustainable Drainage Systems- Non-Statutory technical standards for Sustainable drainage systems- 2015 • The SuDS Manual – CIRIA C753
NOTES	Existing runoff conditions have been calculated using Flow Causeway to calculate the Greenfield Discharge rate for the impermeable area of 0.59ha, the QBAR Greenfield rate has been calculated at 0.6l/s. As this is a low rate that could cause blockages in the system, surface water from the site will discharge at a maximum discharge rate of 2.0l/s. The strategy involves conveying surface water flows to a series of attenuation features, which will then discharge into the existing highways surface water sewer within High Street, at a controlled discharge rate of 2.0l/s. The calculations for the attenuation storage have been carried out using Flow Causeway.

INDEX

Pages	Calculations	Checked by	Date
2 - 9	Surface Water Sewer design details for the 50%, 3.3%AEP35CC and 1%AEP40CC simulation results	RC	19.12.2024

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	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)	5.00	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)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Tank 1	0.082	5.00	108.500	1200	522992.237	228259.170	1.600
HydroBrake 1			108.500	1200	522993.913	228252.540	1.700
Tank 2	0.125	5.00	108.000	1200	523052.792	228228.742	1.600
HydroBrake 2			108.000	1200	523051.486	228209.993	1.700
Pipe 1			106.840	1200	522992.975	228208.108	1.840
Pipe 2			105.890	1200	522995.284	228186.776	1.740
Tank 3	0.144	5.00	105.860	1200	523016.920	228166.335	2.200
HydroBrake 3			105.860	1200	523009.392	228159.034	2.300
Basin	0.300	5.00	101.500	1200	523059.503	228115.433	1.700
HydroBrake 4			101.500	1200	523067.096	228112.747	2.505
Outfall			100.550	1200	523076.400	228114.062	3.230

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	Tank 1	HydroBrake 1	6.839	0.600	106.900	106.800	0.100	68.4	225	5.07	100.0
1.001	HydroBrake 1	Pipe 1	44.442	0.600	106.800	105.000	1.800	24.7	225	5.35	100.0
2.000	Tank 2	HydroBrake 2	18.794	0.600	106.400	106.300	0.100	187.9	225	5.33	100.0
2.001	HydroBrake 2	Pipe 1	58.541	0.600	106.300	105.000	1.300	45.0	225	5.83	100.0
1.002	Pipe 1	Pipe 2	21.457	0.600	105.000	104.150	0.850	25.2	225	5.97	100.0
1.003	Pipe 2	HydroBrake 3	31.123	0.600	104.150	103.560	0.590	52.8	225	6.25	100.0
3.000	Tank 3	HydroBrake 3	10.487	0.600	103.660	103.560	0.100	104.9	225	5.14	100.0
1.004	HydroBrake 3	Basin	66.424	0.600	103.560	99.800	3.760	17.7	225	6.61	100.0
1.005	Basin	HydroBrake 4	8.054	0.600	99.800	98.995	0.805	10.0	450	6.63	100.0
1.006	HydroBrake 4	Outfall	9.396	0.600	98.995	97.320	1.675	5.6	225	6.66	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)
1.000	1.583	63.0	29.6	1.375	1.475	0.082	0.0
1.001	2.644	105.1	29.6	1.475	1.615	0.082	0.0
2.000	0.950	37.8	45.2	1.375	1.475	0.125	0.0
2.001	1.954	77.7	45.2	1.475	1.615	0.125	0.0
1.002	2.614	103.9	74.8	1.615	1.515	0.207	0.0
1.003	1.805	71.7	74.8	1.515	2.075	0.207	0.0
3.000	1.276	50.7	52.0	1.975	2.075	0.144	0.0
1.004	3.128	124.4	126.9	2.075	1.475	0.351	0.0
1.005	6.456	1026.8	235.3	1.250	2.055	0.651	0.0
1.006	5.561	221.1	235.3	2.280	3.005	0.651	0.0

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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	6.839	68.4	225	Circular	108.500	106.900	1.375	108.500	106.800	1.475
1.001	44.442	24.7	225	Circular	108.500	106.800	1.475	106.840	105.000	1.615
2.000	18.794	187.9	225	Circular	108.000	106.400	1.375	108.000	106.300	1.475
2.001	58.541	45.0	225	Circular	108.000	106.300	1.475	106.840	105.000	1.615
1.002	21.457	25.2	225	Circular	106.840	105.000	1.615	105.890	104.150	1.515
1.003	31.123	52.8	225	Circular	105.890	104.150	1.515	105.860	103.560	2.075
3.000	10.487	104.9	225	Circular	105.860	103.660	1.975	105.860	103.560	2.075
1.004	66.424	17.7	225	Circular	105.860	103.560	2.075	101.500	99.800	1.475
1.005	8.054	10.0	450	Circular	101.500	99.800	1.250	101.500	98.995	2.055
1.006	9.396	5.6	225	Circular	101.500	98.995	2.280	100.550	97.320	3.005

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	Tank 1	1200	Manhole	Adoptable	HydroBrake 1	1200	Manhole	Adoptable
1.001	HydroBrake 1	1200	Manhole	Adoptable	Pipe 1	1200	Manhole	Adoptable
2.000	Tank 2	1200	Manhole	Adoptable	HydroBrake 2	1200	Manhole	Adoptable
2.001	HydroBrake 2	1200	Manhole	Adoptable	Pipe 1	1200	Manhole	Adoptable
1.002	Pipe 1	1200	Manhole	Adoptable	Pipe 2	1200	Manhole	Adoptable
1.003	Pipe 2	1200	Manhole	Adoptable	HydroBrake 3	1200	Manhole	Adoptable
3.000	Tank 3	1200	Manhole	Adoptable	HydroBrake 3	1200	Manhole	Adoptable
1.004	HydroBrake 3	1200	Manhole	Adoptable	Basin	1200	Manhole	Adoptable
1.005	Basin	1200	Manhole	Adoptable	HydroBrake 4	1200	Manhole	Adoptable
1.006	HydroBrake 4	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
Tank 1	522992.237	228259.170	108.500	1.600	1200		0	1.000	106.900	225
HydroBrake 1	522993.913	228252.540	108.500	1.700	1200		1	1.000	106.800	225
							0	1.001	106.800	225
Tank 2	523052.792	228228.742	108.000	1.600	1200		0	2.000	106.400	225
HydroBrake 2	523051.486	228209.993	108.000	1.700	1200		1	2.000	106.300	225
							0	2.001	106.300	225
Pipe 1	522992.975	228208.108	106.840	1.840	1200		1	1.001	105.000	225
							2	2.001	105.000	225
							0	1.002	105.000	225
Pipe 2	522995.284	228186.776	105.890	1.740	1200		1	1.002	104.150	225
							0	1.003	104.150	225
Tank 3	523016.920	228166.335	105.860	2.200	1200		0	3.000	103.660	225

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
HydroBrake 3	523009.392	228159.034	105.860	2.300	1200		1	3.000	103.560	225
							2	1.003	103.560	225
							0	1.004	103.560	225
Basin	523059.503	228115.433	101.500	1.700	1200		1	1.004	99.800	225
							0	1.005	99.800	450
HydroBrake 4	523067.096	228112.747	101.500	2.505	1200		1	1.005	98.995	450
							0	1.006	98.995	225
Outfall	523076.400	228114.062	100.550	3.230	1200		1	1.006	97.320	225

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	2 year (l/s)	0.6
Summer CV	1.000	Drain Down Time (mins)	240	30 year (l/s)	1.3
Winter CV	1.000	Additional Storage (m³/ha)	0.0	100 year (l/s)	1.7
Analysis Speed	Normal	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	40	0	0
30	35	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	Region	1	QMed	0.6
Greenfield Method	FEH	QBar/QMed conversion factor	1.111	QBar	0.7
Positively Drained Area (ha)	0.637	Growth Factor 2 year	0.90	Q 2 year (l/s)	0.6
SAAR (mm)	610	Growth Factor 30 year	1.95	Q 30 year (l/s)	1.3
Host	1	Growth Factor 100 year	2.48	Q 100 year (l/s)	1.7
BFIHost	0.693	Betterment (%)	0		

Node HydroBrake 1 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	106.800	Product Number	CTL-SHE-0069-2000-0900-2000
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node HydroBrake 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	106.300	Product Number	CTL-SHE-0069-2000-0900-2000
Design Depth (m)	0.900	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

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Node HydroBrake 3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	103.560	Product Number	CTL-SHE-0073-3000-1700-3000
Design Depth (m)	1.700	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node HydroBrake 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.995	Product Number	CTL-SHE-0054-2000-2505-2000
Design Depth (m)	2.505	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node Tank 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	106.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	200

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	0.0	0.800	60.0	0.0	0.801	0.0	0.0

Node Tank 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	106.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	0.800	100.0	0.0	0.801	0.0	0.0

Node Tank 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	103.660
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	115.0	0.0	1.600	115.0	0.0	1.601	0.0	0.0

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	99.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	149.9	0.0	0.500	244.1	0.0	1.000	353.2	0.0	1.500	476.5	0.0
0.100	167.1	0.0	0.600	264.8	0.0	1.100	376.7	0.0	1.600	502.9	0.0
0.200	185.5	0.0	0.700	286.1	0.0	1.200	400.8	0.0	1.700	529.8	0.0
0.300	204.5	0.0	0.800	307.9	0.0	1.300	425.5	0.0			
0.400	224.0	0.0	0.900	330.3	0.0	1.400	450.7	0.0			

Approval Settings

Node Size	✓	Coordinates	✓
Node Losses	✓	Accuracy (m)	1.000
Link Size	✓	Crossings	✓
Minimum Diameter (mm)	150	Cover Depth	✓
Link Length	✓	Minimum Cover Depth (m)	
Maximum Length (m)	100.000	Maximum Cover Depth (m)	3.000

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Approval Settings

Backdrops	✓	Surcharged Depth	✓
Minimum Backdrop Height (m)		Return Period (years)	
Maximum Backdrop Height (m)	1.500	Maximum Surcharged Depth (m)	0.100
Full Bore Velocity	✓	Flooding	✓
Minimum Full Bore Velocity (m/s)		Return Period (years)	30
Maximum Full Bore Velocity (m/s)	3.000	Time to Half Empty	x
Proportional Velocity	✓	Discharge Rates	✓
Return Period (years)		Discharge Volume	✓
Minimum Proportional Velocity (m/s)	0.750	100 year 360 minute (m^3)	
Maximum Proportional Velocity (m/s)	3.000		

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	Tank 1	80	107.005	0.105	8.5	6.0968	0.0000	OK
180 minute summer	HydroBrake 1	112	107.017	0.217	5.7	0.2459	0.0000	OK
180 minute summer	Tank 2	124	106.530	0.130	8.4	12.4678	0.0000	OK
180 minute summer	HydroBrake 2	124	106.531	0.231	2.9	0.2611	0.0000	SURCHARGED
120 minute summer	Pipe 1	90	105.030	0.030	4.0	0.0339	0.0000	OK
120 minute summer	Pipe 2	82	104.186	0.036	4.0	0.0405	0.0000	OK
360 minute winter	Tank 3	352	104.039	0.379	5.5	41.8317	0.0000	SURCHARGED
360 minute winter	HydroBrake 3	352	104.039	0.479	3.8	0.5417	0.0000	SURCHARGED
960 minute winter	Basin	975	100.380	0.580	6.4	118.6217	0.0000	SURCHARGED
960 minute winter	HydroBrake 4	990	100.380	1.385	2.7	1.5664	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.320	0.000	1.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute summer	Tank 1	1.000	HydroBrake 1	7.2	0.392	0.114	0.1905	
180 minute summer	HydroBrake 1	Hydro-Brake®	Pipe 1	2.0				
180 minute summer	Tank 2	2.000	HydroBrake 2	2.9	0.222	0.077	0.5963	
180 minute summer	HydroBrake 2	Hydro-Brake®	Pipe 1	2.0				
120 minute summer	Pipe 1	1.002	Pipe 2	4.0	1.108	0.038	0.0770	
120 minute summer	Pipe 2	1.003	HydroBrake 3	4.0	0.228	0.055	0.6819	
360 minute winter	Tank 3	3.000	HydroBrake 3	2.3	0.203	0.045	0.4171	
360 minute winter	HydroBrake 3	Hydro-Brake®	Basin	2.4				
960 minute winter	Basin	1.005	HydroBrake 4	2.7	0.157	0.003	1.2761	
960 minute winter	HydroBrake 4	Hydro-Brake®	Outfall	1.5				93.0

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Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	Tank 1	118	107.438	0.538	15.1	31.2876	0.0000	SURCHARGED
120 minute winter	HydroBrake 1	118	107.438	0.638	7.4	0.7217	0.0000	SURCHARGED
180 minute winter	Tank 2	176	106.983	0.582	17.2	55.9949	0.0000	SURCHARGED
180 minute winter	HydroBrake 2	176	106.982	0.682	2.5	0.7716	0.0000	SURCHARGED
60 minute winter	Pipe 1	30	105.030	0.030	4.0	0.0341	0.0000	OK
720 minute winter	Pipe 2	720	104.943	0.793	4.0	0.8965	0.0000	SURCHARGED
720 minute winter	Tank 3	720	104.942	1.282	7.8	141.5009	0.0000	SURCHARGED
720 minute winter	HydroBrake 3	720	104.942	1.382	4.0	1.5629	0.0000	SURCHARGED
1440 minute winter	Basin	1680	100.970	1.170	9.5	311.2747	0.0000	SURCHARGED
1440 minute winter	HydroBrake 4	1680	100.971	1.976	3.5	2.2346	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.320	0.000	1.5	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)
120 minute winter	Tank 1	1.000	HydroBrake 1	7.4	0.383	0.118	0.2720	
120 minute winter	HydroBrake 1	Hydro-Brake®	Pipe 1	2.0				
180 minute winter	Tank 2	2.000	HydroBrake 2	2.5	0.256	0.067	0.7475	
180 minute winter	HydroBrake 2	Hydro-Brake®	Pipe 1	2.0				
60 minute winter	Pipe 1	1.002	Pipe 2	4.0	1.110	0.039	0.4602	
720 minute winter	Pipe 2	1.003	HydroBrake 3	4.0	0.186	0.055	1.2378	
720 minute winter	Tank 3	3.000	HydroBrake 3	-1.6	0.123	-0.031	0.4171	
720 minute winter	HydroBrake 3	Hydro-Brake®	Basin	2.7				
1440 minute winter	Basin	1.005	HydroBrake 4	3.5	0.158	0.003	1.2761	
1440 minute winter	HydroBrake 4	Hydro-Brake®	Outfall	1.8				151.1

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Tank 1	176	107.648	0.748	14.5	43.4993	0.0000	SURCHARGED
180 minute winter	HydroBrake 1	176	107.648	0.848	6.8	0.9592	0.0000	SURCHARGED
240 minute winter	Tank 2	236	107.194	0.794	17.9	76.3556	0.0000	SURCHARGED
240 minute winter	HydroBrake 2	236	107.194	0.894	2.5	1.0110	0.0000	SURCHARGED
960 minute winter	Pipe 1	930	105.257	0.257	4.0	0.2902	0.0000	SURCHARGED
960 minute winter	Pipe 2	930	105.256	1.106	4.0	1.2509	0.0000	SURCHARGED
960 minute winter	Tank 3	930	105.255	1.595	8.1	176.0921	0.0000	SURCHARGED
960 minute winter	HydroBrake 3	930	105.255	1.695	3.9	1.9173	0.0000	SURCHARGED
1440 minute winter	Basin	1680	101.179	1.379	11.6	399.3290	0.0000	SURCHARGED
1440 minute winter	HydroBrake 4	1680	101.179	2.184	2.8	2.4699	0.0000	SURCHARGED
15 minute summer	Outfall	1	97.320	0.000	1.5	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)
180 minute winter	Tank 1	1.000	HydroBrake 1	6.8	0.368	0.108	0.2720	
180 minute winter	HydroBrake 1	Hydro-Brake®	Pipe 1	2.0				
240 minute winter	Tank 2	2.000	HydroBrake 2	2.5	0.255	0.067	0.7475	
240 minute winter	HydroBrake 2	Hydro-Brake®	Pipe 1	2.0				
960 minute winter	Pipe 1	1.002	Pipe 2	4.0	1.108	0.038	0.8534	
960 minute winter	Pipe 2	1.003	HydroBrake 3	3.9	0.179	0.055	1.2378	
960 minute winter	Tank 3	3.000	HydroBrake 3	-1.6	0.140	-0.031	0.4171	
960 minute winter	HydroBrake 3	Hydro-Brake®	Basin	3.0				
1440 minute winter	Basin	1.005	HydroBrake 4	2.8	0.166	0.003	1.2761	
1440 minute winter	HydroBrake 4	Hydro-Brake®	Outfall	1.9				157.6

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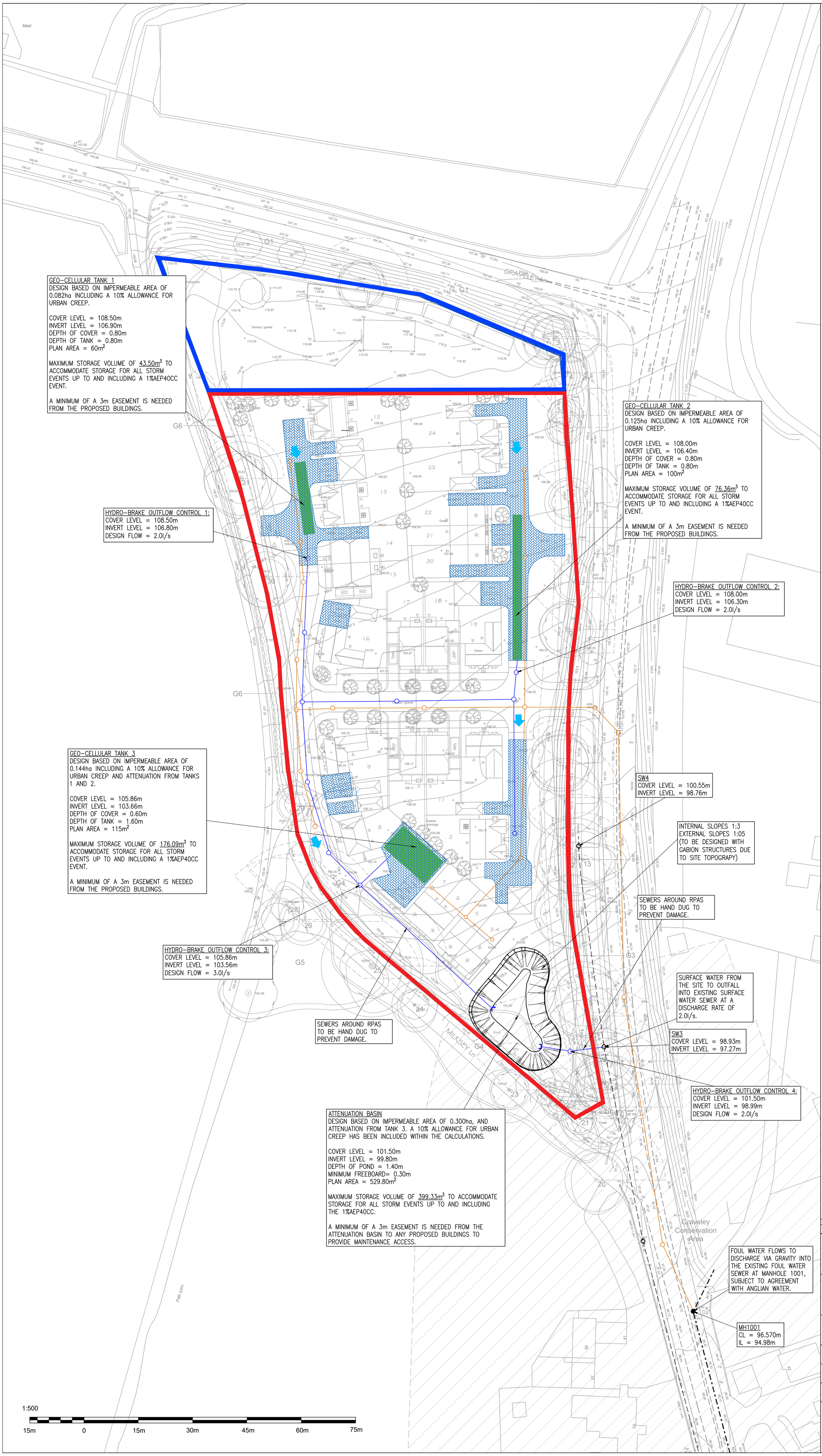
APPENDICES

APPENDIX H



NOTES:

1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALIST DESIGN DRAWINGS AND DETAILS.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE. ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
4. THIS DRAWING IS FOR STRATEGY PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.
5. DESIGN BASED ON EXISTING LEVELS AND SUBJECT TO CHANGE WITH EXTERNAL WORKS DESIGN / CONFIRMATION OF FFLS.
6. DRAINAGE STRATEGY IS SUBJECT TO AGREEMENT WITH RELEVANT THIRD PARTIES, INCLUDING ENVIRONMENT AGENCY, LOCAL PLANNING AUTHORITY, LEAD LOCAL FLOOD AUTHORITY AND WATER AUTHORITY.
7. CONCRETE PROTECTION TO BE PROVIDED TO ANY PIPES WITH LOW COVER.
8. THE DRAINAGE STRATEGY WILL NEED UPDATING IF THE LAYOUT IS REVISED.
9. SURFACE WATER FLOWS FROM THE SITE WILL DISCHARGE INTO THE EXISTING HIGHWAYS SURFACE WATER SEWER NETWORK THAT HAS BEEN PROVEN TO OUTFALL INTO SURFACE WATER PONDS LOCATED ADJACENT TO PONDSIDE, SOUTH OF OAK LANE.
10. FOUL WATER FROM THE SITE WILL DISCHARGE VIA GRAVITY INTO THE FOUL WATER SEWER WITHIN HIGH STREET, AT MANHOLE 1001.

KEY

- SITE BOUNDARY
- LAND UNDER APPLICANTS CONTROL
- PROPOSED SURFACE WATER SEWER
- PROPOSED FOUL WATER SEWER
- EXISTING HIGHWAYS SURFACE WATER SEWER
- EXISTING PUBLIC FOUL WATER SEWER
- PROPOSED ATTENUATION BASIN
- PROPOSED ATTENUATION TANK
- PROPOSED PERMEABLE PAVING
- PROPOSED OVERLAND FLOW ROUTES

REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
-	FIRST ISSUE	ZJ	RC	TR	19.12.24

PROJECT: MILKSEY LANE, GRAVELEY

DRAWING TITLE: DRAINAGE STRATEGY

CLIENT: GADE HOMES LTD

DRAWING NUMBER: 29161_01_230_01

REVISION:	SHEET SIZE:	SCALE:
-	A1	1:500

STATUS: FOR INFORMATION / APPROVAL

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APPENDICES

APPENDIX I

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MAINTENANCE AND MANAGEMENT

A proposed maintenance plan is shown in the table below and breaks down the maintenance requirements of the various proposed assets in accordance with the CIRIA C753 SuDS Manual guidance.

Table 1.1: Proposed Maintenance Regime

Drainage Asset	Responsible Organisation	Maintenance Work	Frequency
Pipework / Manholes	Private Ownership / Management Company	Inspect pipework and clear blockages	Annually or after severe storms.
		Inspect manholes and clear blockages	
		Repair any defects in the network	
		Inspect flow control, ensure operating freely and pivoting bypass door and penstock valve operating correctly	
Headwalls	Private Ownership / Management Company	Inspect the structure and remove any debris/litter on the structure.	Annually or after severe storms
		Replace malfunctioning parts or structures	As required
Flow Control Chamber	Private Ownership / Management Company	Inspect structure and remove excessive silt build-up	Monthly during construction and then annually or after severe storms
		Inspect pipework and manholes also clear blockages	Annually or after severe storms
		Inspect manholes and clear blockages	
		Inspect flow control, ensure operating freely and pivoting bypass door and penstock valve operating correctly	
		Replace malfunctioning parts or structures	
		Inspect for evidence of poor operation	6 monthly
		Inspect sediment accumulation rates and establish appropriate removal frequencies	
		Test control structure to ensure operating as per original design	5 yearly
Trees	Private Ownership / Management Company	Remove litter and debris	Monthly or as required
		Manage other vegetation and remove nuisance plants	
		Inspect inlets and outlets	Monthly
		Check tree health and manage tree appropriately	Annually or as required
		Remove silt build-up from inlets and surface and replace mulch as necessary	
		Water	
		Inspect silt accumulation rates and establish appropriate removal frequencies	Half-yearly

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Permeable Pavements	Private Ownership / Management Company	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging of manufacturer's recommendations.
		Stabilise and mow contributing and adjacent areas	As required
		Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than sweeping	
		Remediate any landscaping which, through vegetation maintenance of soil slip, has been raised to within 50 mm of the level of the paving	
		Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material	
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
		Initial inspection	Monthly for 3 months after installation
		Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	3 monthly, 48 hours after large storms in first 6 months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	
Attenuation Storage Tanks	Private Ownership / Management Company	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months then annually
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		For systems where rainfall infiltrates into the tank from above, check the surface of the filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
		Remove the sediment from pre-treatment structures and/or internal forebays	
		Repair/rehabilitate inlets, outlets, overflows and vents	As required
		Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
		Survey inside of the tank for sediment build-up and remove if necessary	Every 5 years or as required

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Attenuation Basins	Private Ownership / Management Company	Remove litter and debris	Monthly
		Cut grass – for spillways and access routes	
		Cut grass – meadow grass in and around the basin	
		Manage other vegetation and remove nuisance plants	
		Inspect inlets, outlets and overflows for blockages, and clean if required	
		Inspect banksides, structures for silt accumulation. Establish appropriate silt removal frequencies	
		Check any penstocks and other mechanical devices	Annually
		Tidy all dead growth before the start of the growing season	
		Remove the sediment from inlets, outlets and forebay	
		Manage wetland plants in outlet pool – where provided	

- CIVIL ENGINEERING
- TRANSPORT
- FLOOD RISK & DRAINAGE
- STRUCTURES
- GEO-ENVIRONMENTAL
- ACOUSTIC AIR
- UTILITIES
- GEOMATICS
- LIGHTING
- EXPERT WITNESS

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