



Stage 2 Flood Risk Assessment

Land at 48-50 London Road, Northgate, Crawley

Client

Living Danish Developments Ltd

Ref: 12896

Date: November 2025

Consulting Engineers

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Index

Executive Summary

1	Introduction	2
2	Existing Site and Current Flood Conditions	3
3	Proposed Flood Risk Mitigation and Surface Water Drainage	5

Schedule of Appendices

A	Site Location Map
B	Topographic Survey
C	Infiltration Report
D	Sewer Records
E	Flood Maps and Constraints
F	Drainage Strategy Drawing
G	Drainage Calculations
H	Correspondence

Issue	Issue date	Compiled	Checked
First Issue	08 November 2024	FVV	MR
Second Issue	06 December 2024	FVV	MR
Third Issue – updated layout	11 November 2025	AW	FVV

1 Introduction

- 1.1 This report has been prepared for Living Danish Developments Ltd in relation to the land at 48-50 London Road, Northgate, Crawley.
- 1.2 The client's ultimate objective is to submit an application for Full Planning Permission to build a series of homes on this currently vacant plot. This Stage 2 Flood Risk Assessment (FRA) follows on from the pre-application discussions with the Lead Local Flood Authority (LLFA) and the Stage 1 FRA previously prepared (September 2024). The LLFA for this scheme is West Sussex County Council (WSSCC).
- 1.3 This Stage 2 FRA aims to demonstrate compliance with the 2024 National Planning Policy Framework (NPPF) and latest Planning Practice Guidance (PPG).
- 1.4 The third revision of this FRA has been prepared following some amendments to the proposed scheme, resulting from feedback from the local planning authority. The proposed flood risk mitigation and drainage strategy follow the same principles as previously submitted, only updated to reflect the latest layout.

2 Existing Site and Current Flood Conditions

- 2.1 The application site located to the north of Crawley, in an area situated just off London Road, to the south of the Tushmore Gyratory and the A2011-A23. It is centred on approximate Ordnance Survey grid reference 526970, 137640. The site is within the area administered by WSCC & Crawley Borough Council (CBC). A location plan is included in **Appendix A**.
- 2.2 The site measures approximately 0.22 hectares and is accessed from London Road. It currently comprises grassland, bordered by mature tree planting to the north and west and surrounded by residential properties.
- 2.3 Topography: The site topographical survey (see **Appendix B**) indicates an initial fall from the boundary with London Road (67.65m AOD) down to the larger grassland area at 66.49m AOD. The western half of the grassed area sits lower than the surrounding ground, with levels sitting approximately at 66.30m AOD and localised depressions down to 65.96m AOD. The eastern half of the grassed area on the other hand is raised roughly 400mm, with levels between 66.75 and 67.30, dropping back down to 66.16 to the north towards Bader Court car park.
- 2.4 Geology: The published geology for the site consists of Wealden Clay Formation with no superficial deposits. There is a band of Alluvium (clay, silt, sand and gravel) passing immediately east of the site. The site does not lie within a Source Protection Zone (SPZ).
- 2.5 Groundwater vulnerability: Groundwater vulnerability at the site is defined as “unproductive” for most of the site, with small extents to the east being defined as “Low”.
- 2.6 Infiltration testing to BRE365 was undertaken at the site in September 2024. This found the site is underlain by a thick layer of made ground, followed by clayey alluvium. Groundwater was observed in the trial pit at a depth of 1.17m below ground. During testing, whilst the water level was observed to fall in the first 60min, it then appeared to remain static at a depth of around 1.07m below ground. This seems to indicate the water table observed at the base of the pit may have been rising during the testing. For this reason, an infiltration rate could not be calculated in accordance with BRE365 digest. It was however estimated to be between 8.07×10^{-6} and 3.85×10^{-5} m/s. Further detail can be found in the infiltration report in **Appendix C**.
- 2.7 Hydrology: The nearest open watercourse is an opened section of the Crawter’s Brook

(EA Main River), located approximately 850m to the southeast of the site, within Northgate Playing Field. This flows northwards and eventually joins with the River Mole near Gatwick Airport. A stream also used to historically bisect the site, in line with the localised depressions identified on the topographic survey.

- 2.8 Sewers: Thames Water records (in **Appendix D**) indicate the presence of two main foul sewers and one surface water sewer within London Road, flowing northwards towards Tushmore Gyratory. There is also a separate main surface water sewer located adjacent to the site's eastern boundary. This a significant surface water sewer in terms of size, and it is likely that the historical stream discussed in section 2.7 has been directed to it.
- 2.9 Flood zone: The EA's Flood Map for Planning shows the entirety of the application site is within Flood Zone 1 – Low Probability, having less than a 1 in 1,000 (0.1%) AEP of river flooding (See **Appendix E**).
- 2.10 Surface Water Flooding: The EA data for surface water flooding is mapped on the Site Constraint Plan (12896-1000) in **Appendix E**. In the 1 in 30-year storm event (High Risk), the flooding is limited to the existing localised depression – in other words, the rainfall falling over the site area accumulates in the low point leading to ponding. The low velocities (<0.1 m/s) corroborate this assessment. Similarly, in the 1 in 100-year storm event (Medium Risk), ponding originates within the site itself local to the existing depressions.
- 2.11 However, in the 1 in 1000-year storm event (Low Risk), a more significant flow path issuing southwest of the site (behind House number 44 and 46) crosses through the centre of the site and continues on towards Five Acres to the northeast. Flood depths are below 300mm within the site, with velocities around 0.25-0.3 m/s. This corresponds to a Low hazard rating ("Danger for Some").
- 2.12 Historical Flooding: The EA's historical flood map shows the site to be removed from any such events.
- 2.13 Reservoir Flood Risk: The site is not located within the breach extent of any reservoir or artificial water body.

3 Proposed Flood Risk Mitigations

- 3.1 The assessment undertaken in Section 2 of this report indicates that the flood risk profile of the site is generally low, with the exception of the surface water flood risks.
- 3.2 The Local Planning Authority (CBC) has been consulted to confirm the requirements for a sequential test. They have confirmed the following (see correspondence in **Appendix H**):
- “There isn’t a practical way to apply the sequential test to non-fluvial sources. From our perspective a sequential test isn’t required, but we would want the flood risk and drainage strategy to pick up on how the site would be planned/designed to avoid/minimise surface water flood risk.”*
- 3.3 As discussed in Section 2, it is contended that the surface water flooding shown in the High and Medium risk scenarios is originating within the site as a result of the existing localised depressions. It is contended that the flooding in this scenario will therefore be adequately managed by carefully designing the site levels and through the proposed SuDS strategy for the scheme (see Section 4).
- 3.4 The predicted flood level in the Low-Risk scenario (1 in 1000 year event – equivalent to the 1 in 100 + climate change event), has been estimated at 66.5mAOD based on the flood extent within the site in relation to the existing contour lines (see Figure 1 below).



Figure 1: Risk of Flooding from Surface Water Flooding (1 in 1000 year event) from EA data, in relation to existing contours.

- 3.5 The proposed Finished Floor Levels shall therefore be set to minimum 300mm above

the predicted flood levels: 66.800. This is shown on the layout included in **Appendix F**.

- 3.6 The overland flow paths have been modelled using SCALGO Live in order to assess the impact of the proposals on the flow routes. This is a high-level volumetric model which enables the assessment of ponding locations and flow paths for a set rainfall depth, based on the terrain data. The SCALGO mapping is included in **Appendix E**.
- 3.7 The existing flow paths were first mapped for the existing scenario based on the topographic survey levels – with LIDAR levels retained beyond the topographic survey extent – to provide a baseline scenario (Map 1). The proposed building blocks were then added onto the model to assess their impact on the flow routes should no mitigations be proposed. This is shown on Map 2, which clearly illustrates a significant increase in ponding offsite, due to the main flow paths through the site being cut off by the buildings.
- 3.8 A localised depression has thus been added through the development in order to provide an alternate route for the overland flow and ensure any ponding off site is not exacerbated by the proposals. The proposed depression is mapped on the drainage layout in **Appendix F**, with the resulting overland flow mapping (Map 3) in **Appendix E**. A map showing both the existing flooding (in purple) and proposed flooding (in blue) is also included (Map 4); which illustrates that the proposed mitigation ensures that the flow patterns upstream of the site remain unchanged compared to the pre-development scenario.
- 3.9 The localised depression routing has been coordinated with the architect to ensure it does not create an increased risk to the proposed buildings, including retaining sufficient path widths to ensure a safe access/egress route from all buildings away from the main flow path.

4 Proposed Drainage Strategy

- 4.1 The proposed surface water drainage for the scheme follows the drainage hierarchy, as below:
- Store rainwater for later use
 - Infiltration to ground
 - Discharge to surface water body
 - Discharge to a surface water sewer or highway drain
 - Discharge to a combined sewer
- 4.2 A rainwater harvesting system shall be included for each of the proposed blocks, to meet some of their water demands in line with latest guidance. Indicative tank sizes and locations have been shown on the drainage layout in **Appendix F**, based on a preliminary assessment of likely water demand and roof areas. The systems themselves shall be designed by a specialist in due course. The rainwater harvesting tanks will have overflows to the main drainage network described below – for the purpose of this report, it is assumed the tanks are full at the start of the design storm event (i.e. all runoff overflow to the proposed drainage network).
- 4.3 As discussed in paragraph 2.6, the infiltration testing conducted at the site demonstrated good infiltration potential but also indicated a high groundwater table (approximately 1m below surface). On this basis, soakaways and other formal infiltration measures have been discarded for managing the roof runoff, as it would not be possible to maintain the required minimum buffer from the base of the soakaway to the groundwater table.
- 4.4 However, in order to minimise the runoff volumes directed to the existing surface water sewers, it is proposed that all hardstanding be permeably surfaced to allow for direct infiltration into the ground. This is achieved through a combination of permeable surfacing, as shown on the drainage layout (**Appendix F**) and within the separate landscaping report. These will effectively therefore function as landscaped (permeable) areas for the purpose of the drainage calculations.
- 4.5 Roof runoff in excess of the rainwater harvesting system (as described in paragraph 4.2) shall be directed to the existing Thames Water surface water system at a reduced rate. This corresponds to an impermeable catchment area of 850m² (0.085 ha). A pre-planning capacity enquiry has been submitted to Thames Water, who confirmed they have capacity in their network to accept the new flows (see **Appendix H**). It should be noted that existing House 48 (to be demolished as part of this application) currently

drains to Thames Water network unrestricted.

4.6 Greenfield rates for the site have been calculated in accordance using FEH statistical method (2025) as listed below. Calculations are included in **Appendix G**.

1 in 1 year	5.1 l/s/ha
QBAR	6.0 l/s/ha
1 in 30 years	13.7 l/s/ha
1 in 100 years	19.0 l/s/ha

The 1 in 1-year rate corresponding to the impermeable catchment area would therefore be 0.43 l/s. Due to the practical limitations of vortex flow controls and to minimise the risks of blockage, the discharge from the site shall be limited to 1 l/s.

4.7 The attenuation volume required to achieve this shall be provided through two attenuation tanks located beneath the landscaped areas. Green roofs shall also be provided on bin and cycle stores, as shown on the landscape proposals. Other forms of SuDS to manage the roof runoffs have been discarded due to the following two reasons:

- Pitched roofs would reduce the effectiveness of green roofs on the main blocks.
- Provision of raingardens/ponds/swales to manage roof runoff within the landscape feature is constrained by the overland flow route (see section 3.8) and would reduce the available amenity spaces for residents.

4.8 Drainage calculations using FEH2022 and CV values of 1 are included in **Appendix G**. These show that the proposed attenuation storage will offer sufficient volume to cater for the roof runoff in all events up to and including the 1 in 100-year + 40% climate change, in line with the latest climate change allowances for the area.

4.9 Water Quality: The SuDS Manual (CIRIA C753) Simple Index Approach is a method to estimate the efficiency of the proposed SuDS features in relation to the expected pollution levels at the site. The pollution hazard level for the hardstanding areas has been determined as Low, corresponding to low traffic roads/residential car parks. The corresponding indices are: 0.5 (TSS), 0.4 (Metals), and 0.4 (Hydrocarbons). As described in paragraph 4.4, these areas will drain directly to ground – thus mitigations indices in relation to discharging to groundwater shall be used. For permeable pavement, these are 0.7 (TSS), 0.6 (Metals), and 0.7 (Hydrocarbons). The water quality of the underlying groundwater will therefore be suitably protected.

4.10 The roof areas are considered to have a very low pollution hazard level according to CIRIA guidance. It is therefore considered acceptable to discharge them to the existing

surface water sewer with no additional stages of treatment.

- 4.11 Foul drainage: the nearest existing foul manhole to the site has an invert level of 65.93m AOD within London Road. As the site levels fall away from the road towards the East, the foul drainage for the proposed scheme will need to be pumped back up to the current location of House 48, before connecting into the existing sewer in London Road. This arrangement is shown on the drainage layout in **Appendix F**. The new connections to Thames Water network will be subject to a S106 New Sewer Connection Application in due course.

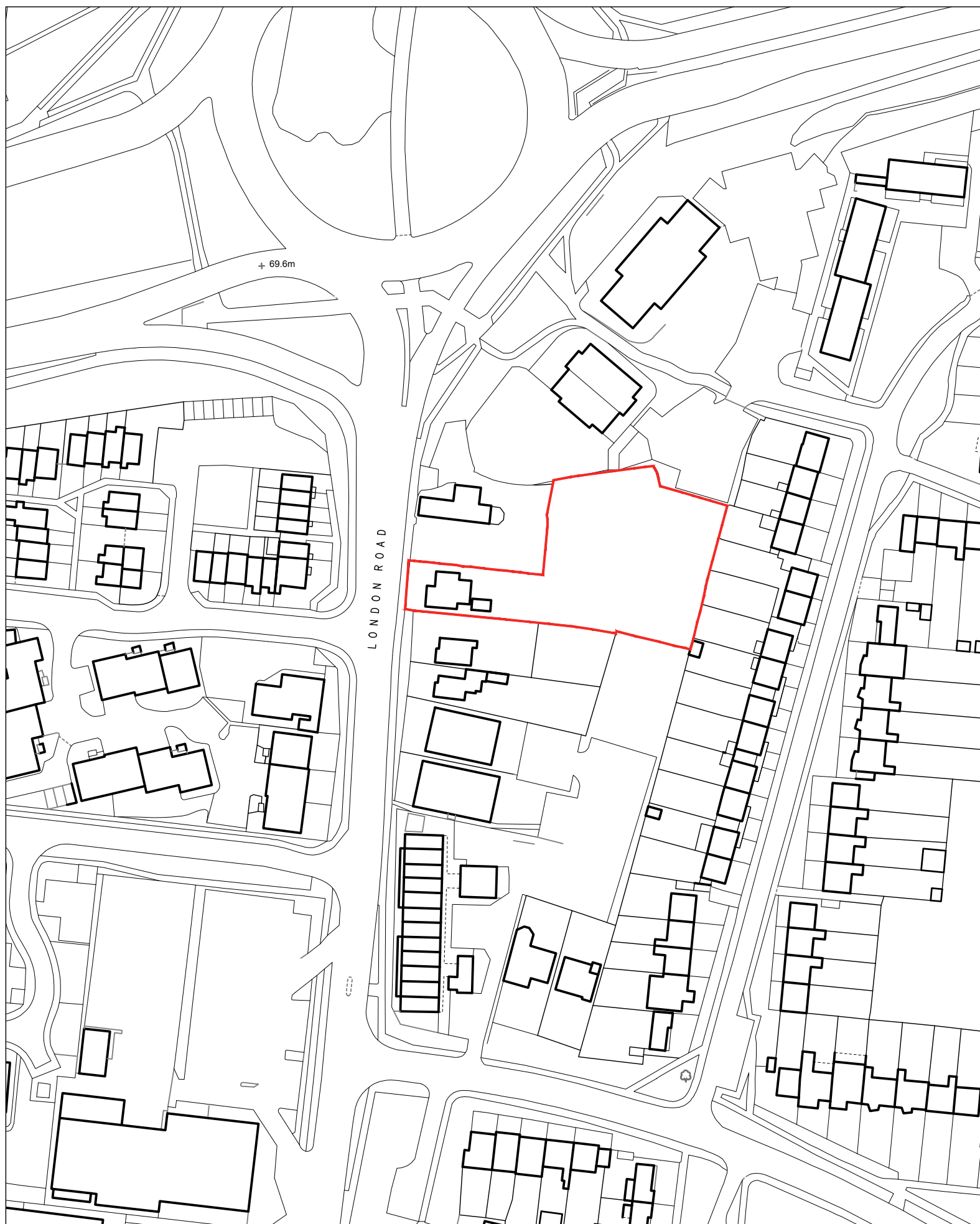
- End of Report -

Appendix A

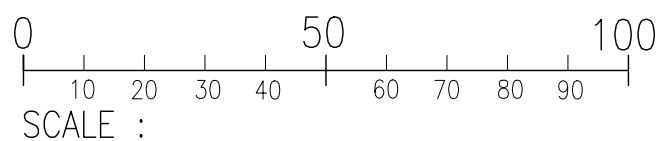
Site Location Map

NOTES

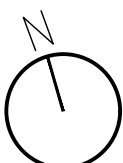
1. WINDOW MULLION / PATIO GLAZING ARRANGEMENT INDICATIVE SUBJECT TO DETAIL DESIGN
2. SITE FOOTPRINT TAKEN FROM SURVEY. REST OF EXISTING PLAN, ELEVATION RIDGE AND EAVES HEIGHT OF IMMEDIATE NEIGHBOURING BUILDINGS FROM OS & APPROXIMATE
3. DO NOT SCALE OFF THIS DRAWING. FOR CONSTRUCTION ALL DIMENSIONS TO BE CHECKED ON SITE.
4. EXISTING TREES SHOWN INDICATIVELY, PLEASE REFER TO XXX
5. PROPOSED TREE LOCATIONS SHOWN INDICATIVELY
6. INFORM ARCHITECT OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION



SITE BOUNDARY :



SCALE :



P02 20.09.24 PLANNING	DG
P01 15.02.24 FIRST DRAFT	DC
REV DATE DESCRIPTION	DRN

Gouldstone
and Co.

CLIENT
LIVING DANISH
PROJECT
LONDON ROAD
CRAWLEY

DRAWING TITLE
SITE LOCATION PLAN

SCALE 1:1250@A3 A2 SHEET

STATUS
PLANNING

DRAWING NO
LR_P_050 REV
P02

Appendix B

Topographic Survey

Appendix C

Infiltration Report



**48-50 London Road
Crawley
West Sussex**

In Situ Infiltration Test Report

Report Beneficiary:
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Tunbridge Wells
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Project Reference: P16797

Report Reference: R16355

Document Control			
Issue No.	Status	Issue Date	Notes
1	Final	17 th September 2024	
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TABLE OF CONTENTS

1.	INTRODUCTION	1
2.	SITE CONTEXT	1
2.1	Site Location	1
2.2	Geological Setting	1
3.	SITE WORKS	2
4.	STORMWATER INFILTRATION SYSTEMS	2

FIGURES AND APPENDICES

Figure 1	Site Location Plan
Figure 2	Site Plan
	Proposed Development Layout
	Explanatory Notes
	Exploratory Hole Record
	Trial Pit In Situ Infiltration Test Results

1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ infiltration testing at 48-50 London Road, Crawley, West Sussex to assist others with the design of a sustainable drainage system for the proposed development. A copy of the proposed development layout is presented in the appendices.

The specific objectives of the works were to:

- a) Investigate the shallow ground and groundwater conditions at the specified test location; and
- b) Undertake in situ infiltration testing and provide calculated infiltration rates to assist others with the drainage design.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q14415Rev2, dated 6th September 2024. The instruction to proceed was received from the client.

2. SITE CONTEXT

2.1 Site Location

The site is located at 48-50 London Road, Crawley, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 526970, 137640. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological Setting

2.2.1 Expected Geology and Aquifer Designation

The stratigraphic succession that may be expected to underlie the site has been established by reference to British Geological Survey (BGS) mapping and the BGS Lexicon of Named Rock Units. The expected stratigraphy is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Superficial	Alluvium	Secondary A Aquifer
Bedrock	Weald Clay Formation	Unproductive Stratum

2.2.2 Groundwater Source Protection Zones (SPZ)

The Environment Agency defines SPZs as those areas where groundwater supplies are at risk from potentially polluting activities and accidental releases of pollutants. SPZs are primarily a policy tool used to control activities close to water supplies intended for human consumption.

The site does not lie within a SPZ.

3. SITE WORKS

The intrusive site works comprised a single hand dug trial pit, designated TP01, which was excavated to an average depth of 1.22m below ground level. The exploratory hole location is shown on Figure 2.

Falling head soakage testing was undertaken in the trial pit in general accordance with the test methodology given by BRE guidance¹.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the appended exploratory hole record, together with explanatory notes to assist in its interpretation.

4. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing² was carried out in trial pit TP01.

It is noted that prior to the start of the in situ infiltration testing, groundwater was recorded at the base of the trial pit at a depth of 1.17m below ground level. During the first test, whilst the water level was observed to fall initially, after a period of some 60 minutes the water level appeared to remain static at a depth of around 1.07m below ground level. A similar observation was also made during the second fill. It is considered likely therefore that the groundwater noted at the base of the pit on completion of its excavation was not the equalised water table, and that the water table may have been rising during the soakage testing.

Given the presence of shallow groundwater within the test pit, calculation of the soil infiltration rates in accordance with the BRE digest was not possible. For each test, the soil infiltration rate has therefore been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds.

The infiltration rates derived from the tests are summarised in the following table.

Table 2. Calculated Infiltration Rates

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (f) (m/sec)
	Top	Bottom		
TP01 Test 1	0.72	1.22	Made Ground and Alluvium	8.07×10^{-6}
TP01 Test 2	0.73	1.22	Made Ground and Alluvium	1.20×10^{-5}
TP01 Test 3	0.71	1.22	Made Ground and Alluvium	3.85×10^{-5}

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system. It is noted that the presence of a high groundwater table may restrict the storage capacity of the system.

¹ Section 3.2.3 of Building Research Establishment (BRE) Digest 365, 2016.

² Conducted in general accordance with the requirements of BRE 365, Soakaway Design.

To comply with building regulations³, point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings.

Ashdown Site Investigation Ltd.

FIGURES AND APPENDICES

Figure 1 Site Location Plan

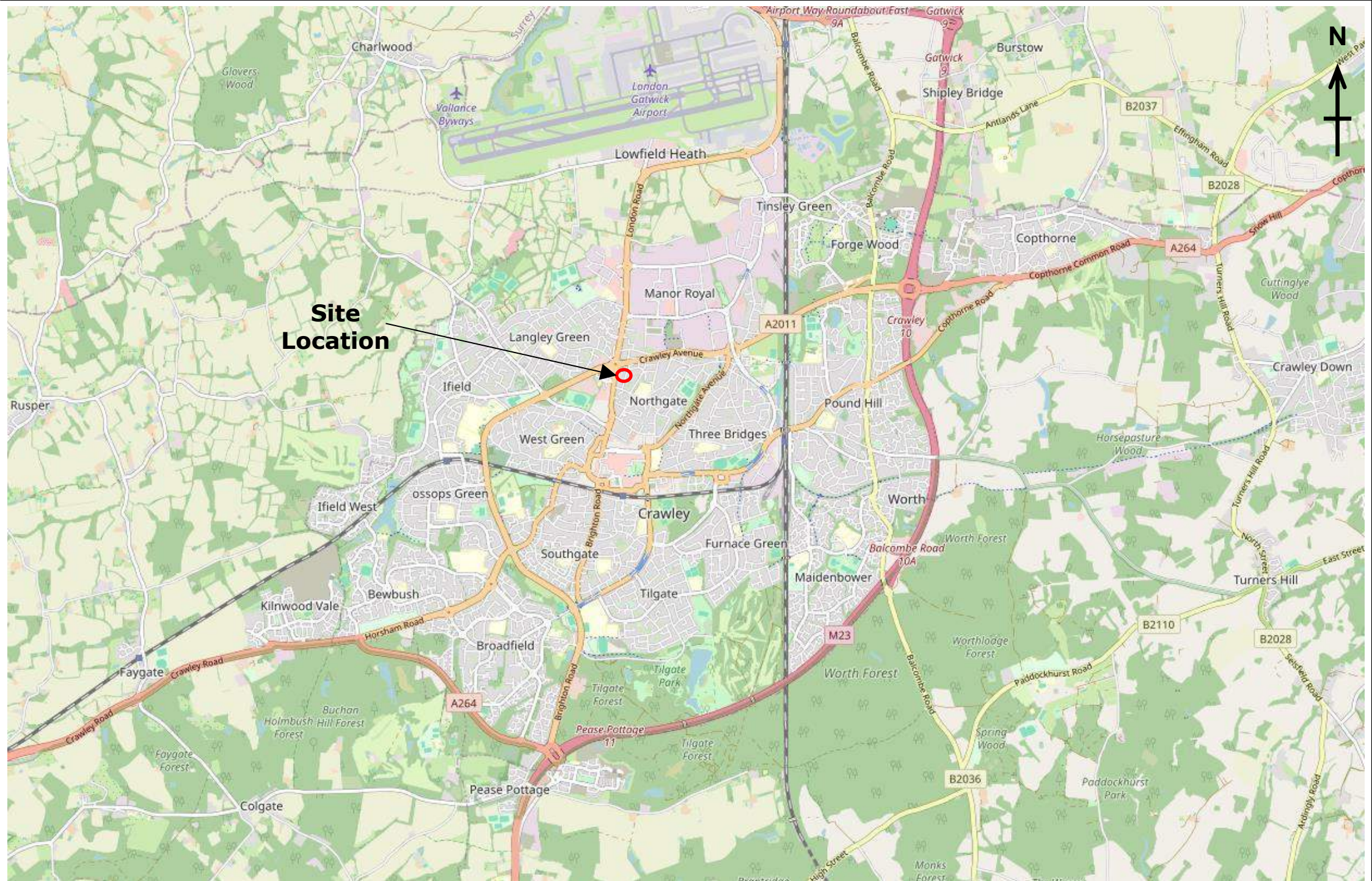
Figure 2 Site Plan

Proposed Development Layout

Explanatory Notes

Exploratory Hole Record

Trial Pit In Situ Infiltration Test Results



© OpenStreetMap contributors, CC BY-SA



Explanatory Notes

Symbols and abbreviations on Exploratory Hole Records

Samples

- U 'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
- Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
- D Disturbed Sample
- R Root Sample
- B Bulk Disturbed Sample
- W Water Sample
- ES Environmental Suite (on older records may be referenced J T)

In Situ Testing

- S Standard penetration test (SPT): Using the split spoon sampler.
- C Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
- V Shear Vane Test: Undrained shear strength (cohesion) (kN/m²) shown within the Vane/Pen Test and N Value column.
- H Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m²) shown within the Vane/Pen Test and N Value column.
- P Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

- CP Cable Percussion Borehole
- RC Rotary Cored Borehole
- WLS Dynamic Sampler Borehole using windowless sampler tubes
- WS Dynamic Sampler Borehole using window sampler tubes
- TP Trial Pit excavated using mechanic excavator
- HDP Trial Pit excavated using hand tools

Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

In Situ Strength Testing

Standard penetration testing (SPT) carried out in accordance with BS EN ISO 22476-3:2005.

Continuous dynamic probe testing conducted using a super heavy DPSH-B (As defined by BS EN ISO 22476-2:2005) probing geometry. The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

Perth penetrometer tests carried out in accordance with Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes; no equivalent European or British Standard having been published to date.

Undrained shear strength determinations made in-situ using a Geonor hand shear vane or a hand penetrometer.

Testing to determine the in-situ California Bearing Ratio (CBR) of soils conducted at shallow depths using a hand-held Transport Research Laboratory (TRL) cone penetrometer.

Samples and In Situ Testing			Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result		
				0.00	Topsoil over,
D	0.30			0.20	MADE GROUND: Dark brown slightly gravelly silty clay. Gravel is subangular to subrounded fine to coarse brick, flint and charcoal-like material.
D	0.50			0.50	MADE GROUND: Dark brown and brown mottled slightly gravelly slightly sandy clay with occasional bands/veins/pockets of light brown slightly sandy clay. Gravel is subangular to subrounded fine to coarse brick and flint with rare metal, charcoal-like material and aerated stone.
D	0.75			0.70	MADE GROUND: Light brown, grey and red brown clay.
				0.90	MADE GROUND: Brown and dark brown mottled gravelly clay. Gravel is subangular to rounded fine to coarse flint with occasional brick and glass.
D	1.00				Brown and dark brown mottled gravelly CLAY. Gravel is subangular to rounded fine to coarse flint. (Alluvium)
				1.22	End of trial pit at 1.22m

<p>Remarks</p> <p>Groundwater: Groundwater recorded at 1.17m depth on completion of trial pit.</p> <p>Stability: Trial pit stable on completion.</p> <p>Notes: n/a</p>	<p>Excavation Method: HDP</p>
	<p>Pit Length: 1.00m</p>
	<p>Pit Width: 0.33m</p>
	<p>Made By: GRD</p>

Infiltration Test Results

Test Position TP01
 Test No. 1
 Project No. P16797
 Project Name 48-50 London Road, Crawley, West Sussex

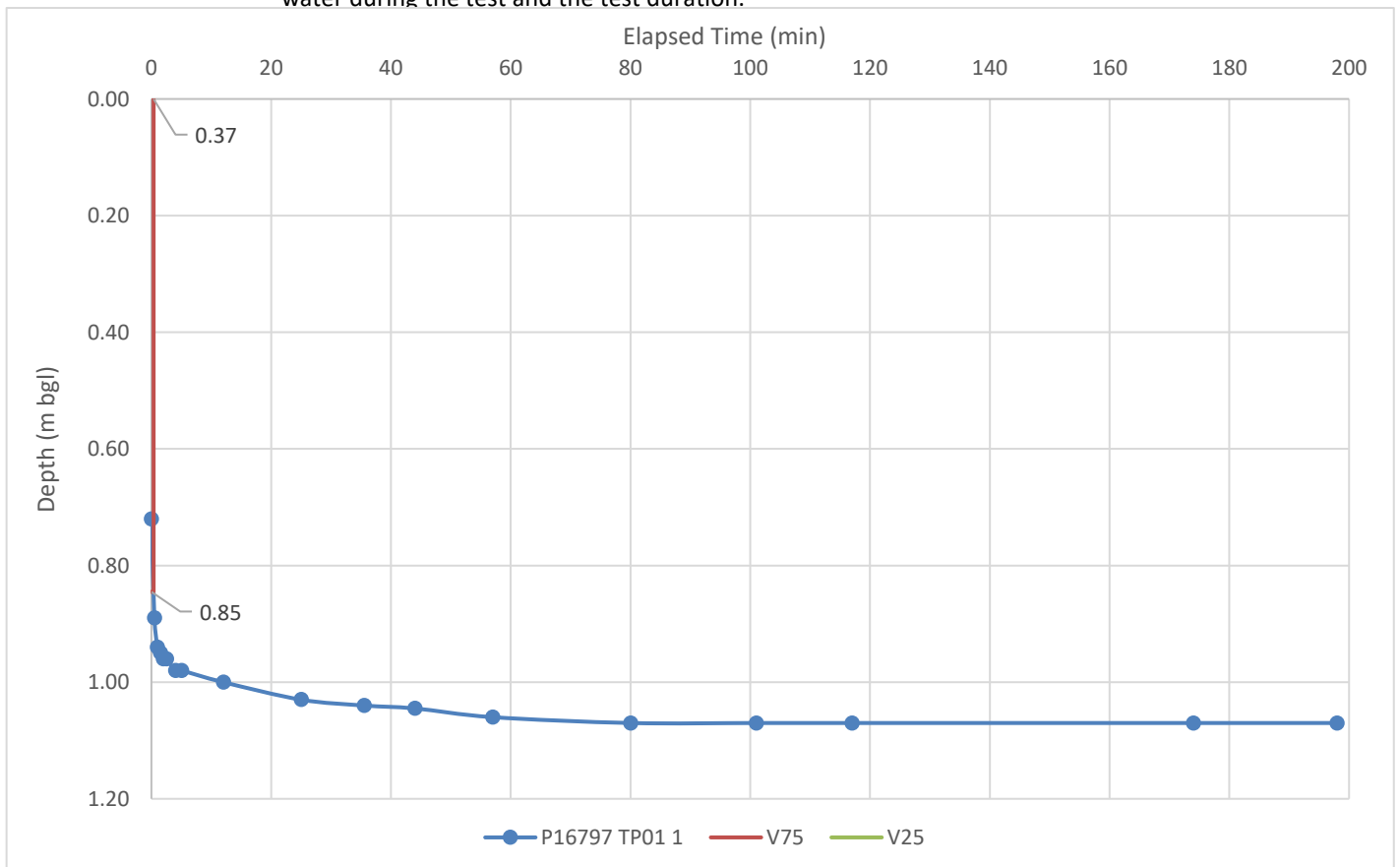
Width of Pit	0.33 m	W
Length of Pit	1.00 m	L
Depth of Pit	1.22 m	D
Pit type	Open	

Volume of water introduced into pit	0.163 m ³	
Initial head of water	0.50 m	h _o
Water level at start of test	0.72 m	
Water level at end of test	1.07 m	
Volume of water discharged from pit	0.114 m ³	
Duration of test	198 min	
Average soaked surface area	1.19 m ²	
Time for water level to fall to 75% of initial head	0.37 min	t _{p75}
Time for water level to fall to 25% of initial head	Not reached min	t _{p25}
Depth to water at 75% of initial head	0.85 m	d ₇₅
Depth to water at 25% of initial head	Not reached m	d ₂₅
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t _{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V _{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	0.99 m ²	a _{s50}

Infiltration rate

8.07E-06 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.



Infiltration Test Results

Test Position TP01
 Test No. 2
 Project No. P16797
 Project Name 48-50 London Road, Crawley, West Sussex

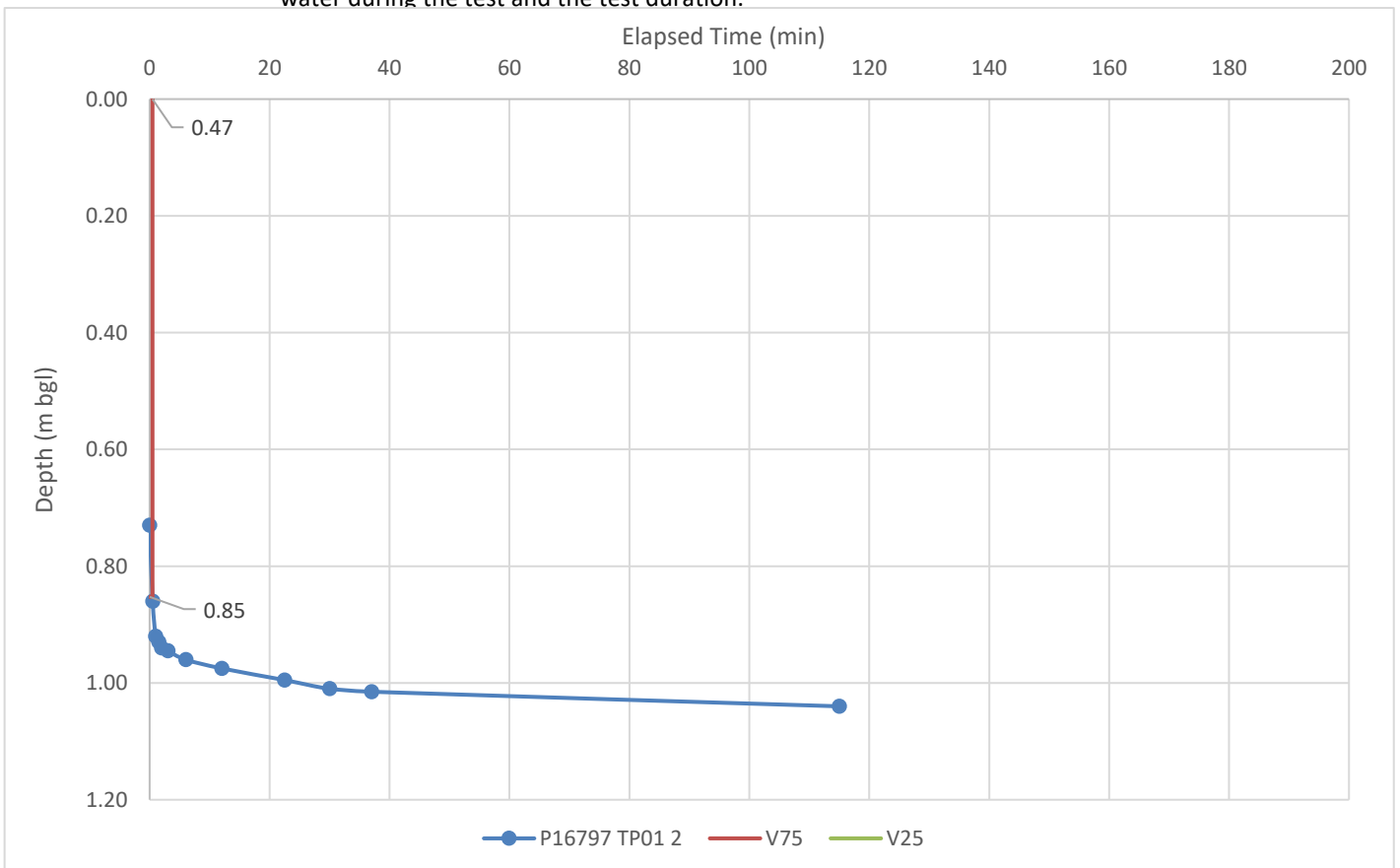
Width of Pit	0.33 m	W
Length of Pit	1.00 m	L
Depth of Pit	1.22 m	D
Pit type	Open	

Volume of water introduced into pit	0.159 m ³	
Initial head of water	0.49 m	h _o
Water level at start of test	0.73 m	
Water level at end of test	1.04 m	
Volume of water discharged from pit	0.101 m ³	
Duration of test	115 min	
Average soaked surface area	1.21 m ²	
Time for water level to fall to 75% of initial head	0.47 min	t _{p75}
Time for water level to fall to 25% of initial head	Not reached min	t _{p25}
Depth to water at 75% of initial head	0.85 m	d ₇₅
Depth to water at 25% of initial head	Not reached m	d ₂₅
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t _{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V _{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	0.97 m ²	a _{s50}

Infiltration rate

1.20E-05 m/sec f

Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.



Infiltration Test Results

Test Position TP01
 Test No. 3
 Project No. P16797
 Project Name 48-50 London Road, Crawley, West Sussex

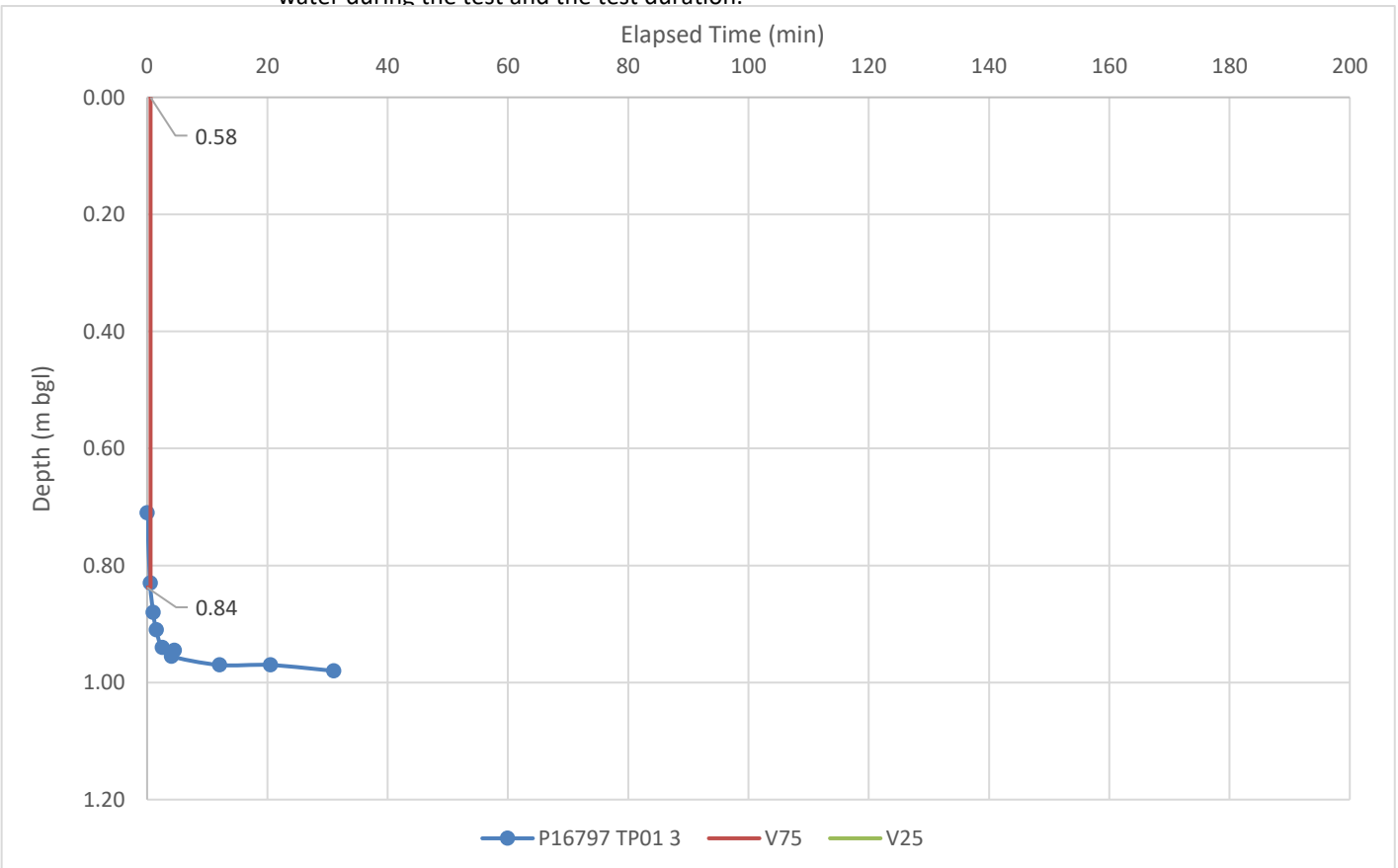
Width of Pit	0.33 m	W
Length of Pit	1.00 m	L
Depth of Pit	1.22 m	D
Pit type	Open	

Volume of water introduced into pit	0.166 m ³	
Initial head of water	0.51 m	h _o
Water level at start of test	0.71 m	
Water level at end of test	0.98 m	
Volume of water discharged from pit	0.088 m ³	
Duration of test	31 min	
Average soaked surface area	1.32 m ²	
Time for water level to fall to 75% of initial head	0.58 min	t _{p75}
Time for water level to fall to 25% of initial head	Not reached min	t _{p25}
Depth to water at 75% of initial head	0.84 m	d ₇₅
Depth to water at 25% of initial head	Not reached m	d ₂₅
Time for the water level to fall from 75% to 25% of initial head	Not reached min	t _{p75-25}
Effective storage volume of water in the soakage trial pit between 75% and 25% of initial head	Not reached m ³	V _{p75-25}
Internal surface area of the soakage trial pit up to 50% of initial head and including the base area	1.00 m ²	a _{s50}

Infiltration rate

3.58E-05 m/sec f

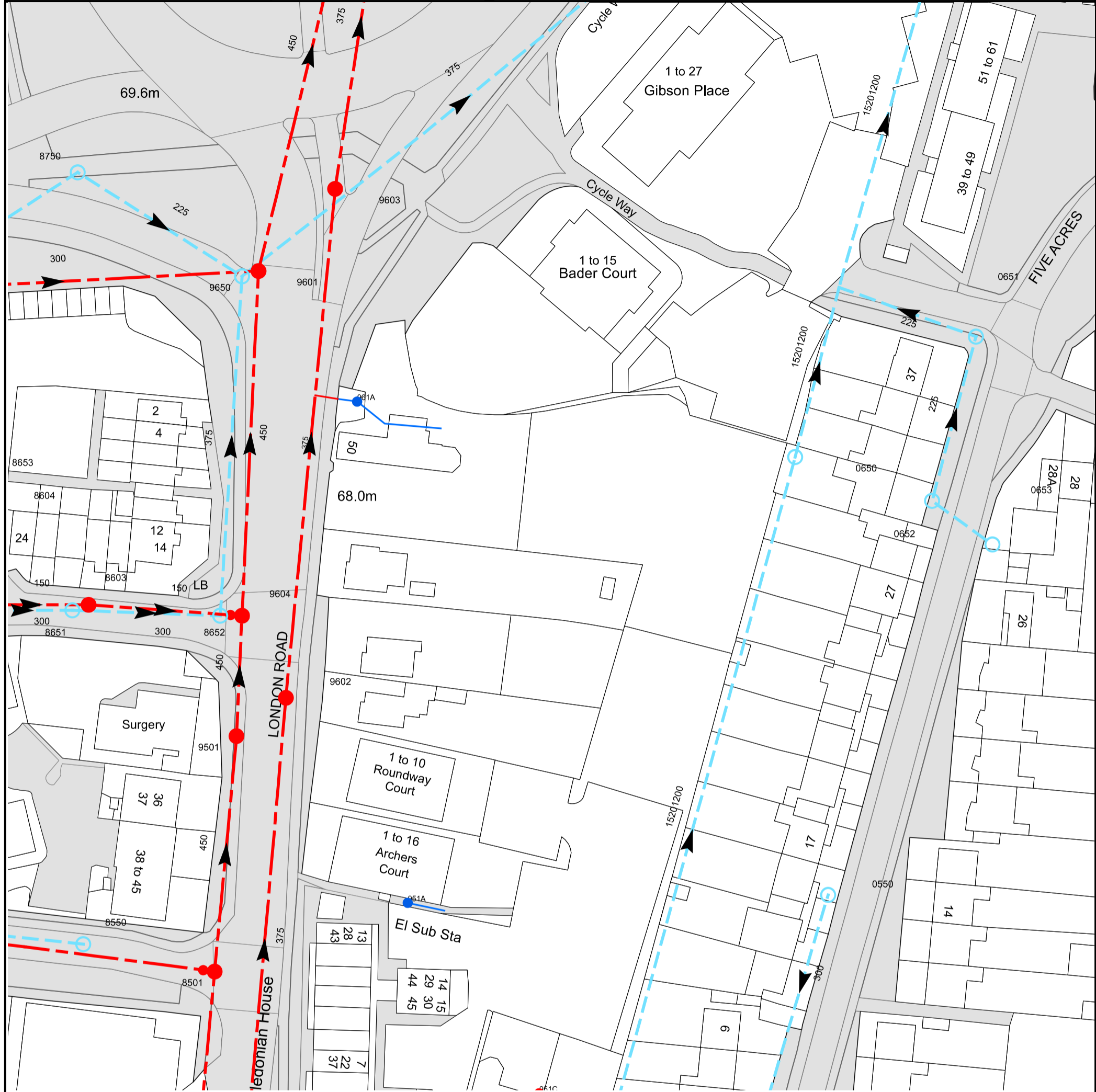
Calculation method: The water level did not fall below 25% of the effective storage depth. 'f' has been calculated by dividing the volume of water lost during the test by the product of the average surface area in contact with water during the test and the test duration.



Appendix D

Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2022_4658425



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 526959,137634

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available
















Manhole Reference	Manhole Cover Level	Manhole Invert Level
0652	66	64.72
0651	65.8	64.65
0653	65.98	64.78
8651	68.13	66.28
8750	69.98	67.52
8603	68.11	65.99
8652	67.56	65.8
9501	67.64	63.04
9604	67.56	62.97
9650	68.34	65
9601	68.13	62.79
9602	67.51	65.93
9603	n/a	n/a
961A	n/a	n/a
0650	66.28	63.66
8550	67.79	66.07
8501	67.41	63.07
951A	n/a	n/a
0550	66.18	65.11

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.









Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

-  **Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
-  **Surface Water Sewer:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
-  **Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
-  Storm Sewer
-  Sludge Sewer
-  Foul Trunk Sewer
-  Surface Trunk Sewer
-  Combined Trunk Sewer
-  Foul Rising Main
-  Surface Water Rising Main
-  Combined Rising Main
-  Vacuum
-  Thames Water Proposed
-  Vent Pipe
-  Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

-  Sewer
-  Culverted Watercourse
-  Proposed
-  Decommissioned Sewer
-  Content of this drainage network is currently unknown
-  Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

-  Air Valve
-  Dam Chase
-  Fitting
-  Meter
-  Vent

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

-  Ancillary
-  Control Valve
-  Drop Pipe
-  Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

-  Inlet
-  Undefined End
-  Outfall




Other Symbols

Symbols used on maps which do not fall under other general categories.





-  Change of Characteristic Indicator
-  Invert Level
-  Public / Private Pumping Station
-  Summit

Areas

Lines denoting areas of underground surveys, etc.

-  Agreement
-  Chamber
-  Operational Site

Ducts or Crossings

-  Casement
 -  Conduit Bridge
 -  Subway
 -  Tunnel
- Ducts may contain high voltage cables. Please check with Thames Water.

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newtyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Appendix E

Flood Maps and Constraints

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
526959/137638

Created
3 Sep 2024 10:35

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

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

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

Notes

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

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

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

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>







Flood map for planning


Your reference
<Unspecified>

Location (easting/northing)
526959/137638

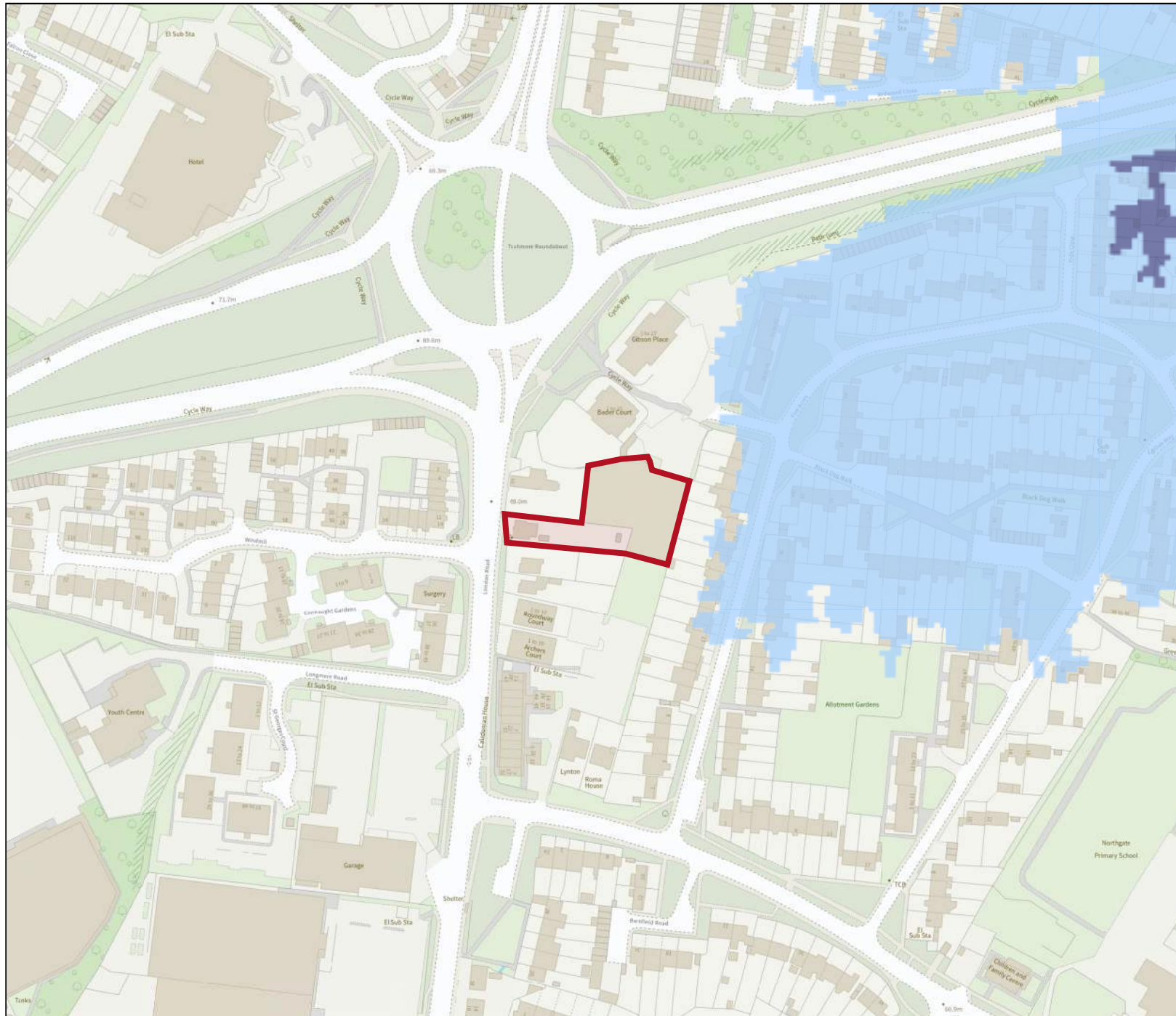
Scale
1:2500

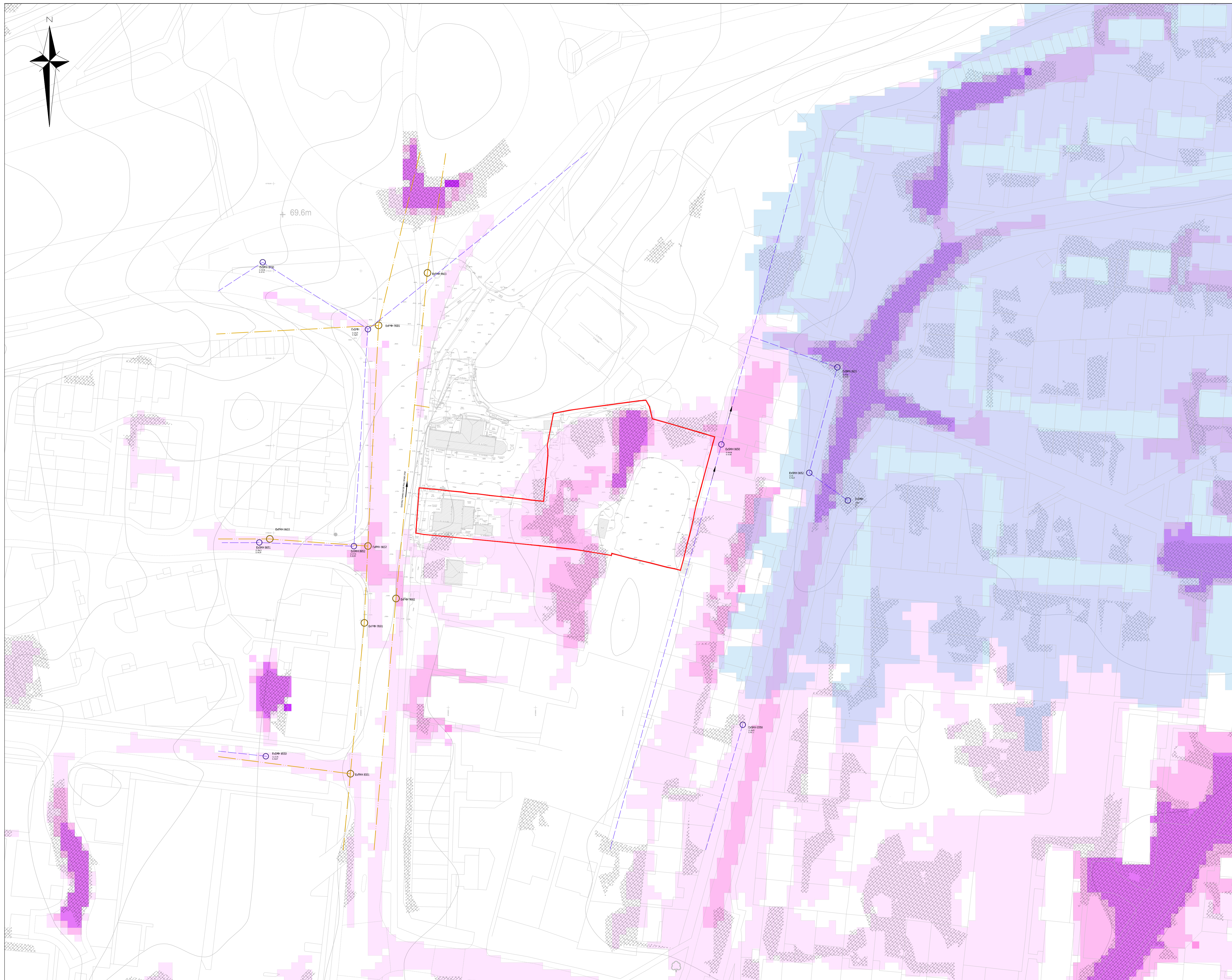
Created
3 Sep 2024 10:35

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



0 20 40 60m





- GENERAL NOTES**
1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the file. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.
 2. Tender or billing drawings shall not be used for construction or the ordering of materials.
 3. Do not scale. All dimensions and levels to be site confirmed.
 4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
 5. Copyright : This drawing must not be copied, amended nor reproduced without the prior written agreement of gta.
 6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.
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LEGEND

Flood zone

- Flood Zone 2
- Flood Zone 3

Surface water flood risk

- Surface Water Flood Risk - 1 in 30yr
- Surface Water Flood Risk - 1 in 100yr
- Surface Water Flood Risk - 1 in 1000yr

Site

- Ground level depressions - Gathered from LIDAR data
- Surface Contours - Gathered from LIDAR data
- Proposed Site Area
- Existing Foul Drainage
- Existing Storm Drainage

P3	PROPOSED SITE LAYOUT REMOVED	08/11/24	NG	FVW
P2	UPDATED TO LATEST SITE LAYOUT	24/09/24	NG	FVW
P1	INITIAL ISSUE	05/09/24	NG	FVW
Rev	Amendments	Date	Dsn	Chk

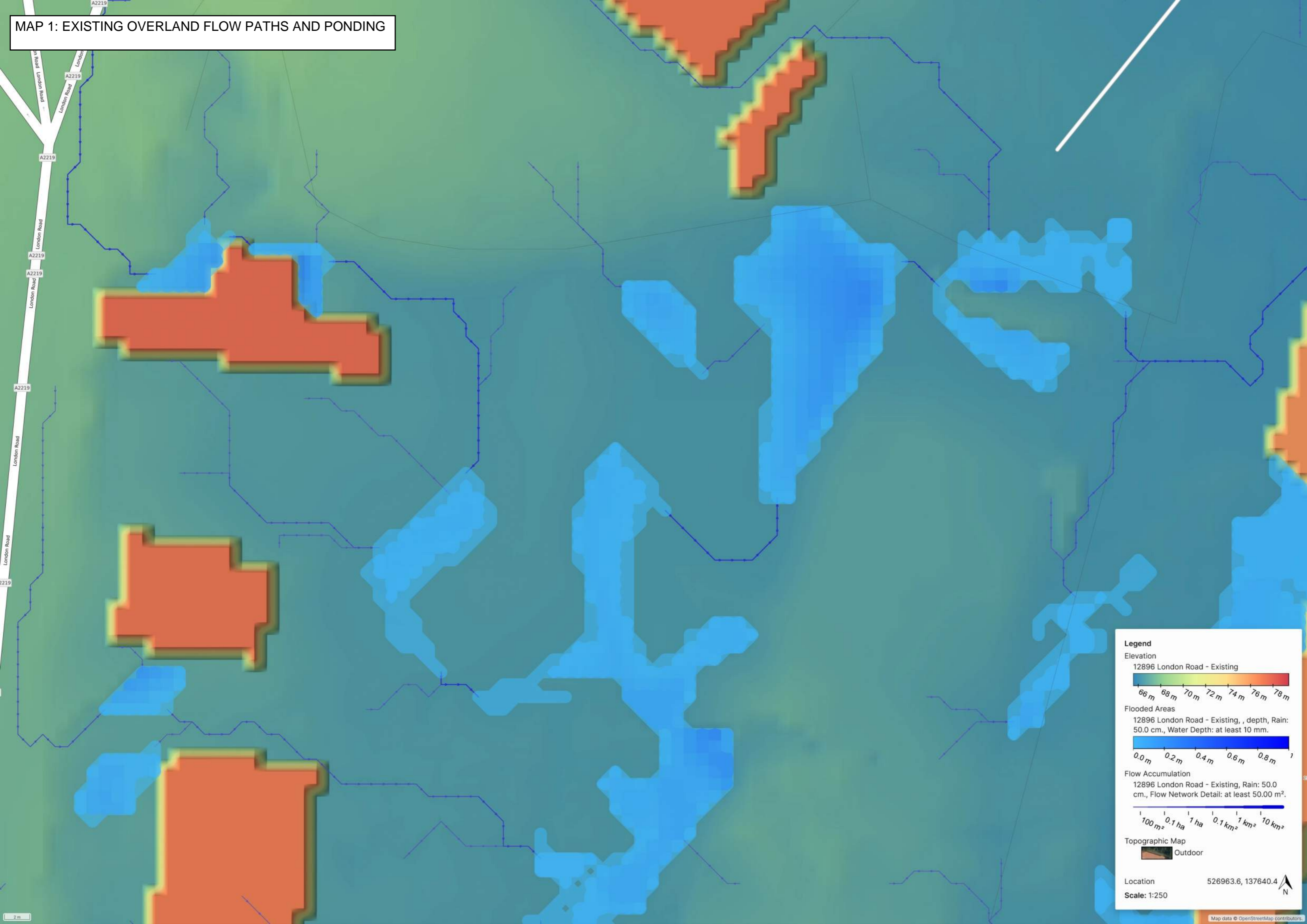
Status	FOR INFORMATION			
Client	LIVING DANISH			
Architect				
Project	LONDON ROAD CRAWLEY			
Title	SITE CONSTRAINT PLAN			
Date	SEPTEMBER 2024	Scale @ A1	1:500	
Clients Ref	Project Ref.		12896	

gta Civils & Transport

Maple House, 192-198 London Road,
Burgess Hill, West Sussex, RH15 9RD
Tel: 01444 871444 Web: www.gtacivils.co.uk

Drawing Number	12896-1000	Rev.	P3
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MAP 1: EXISTING OVERLAND FLOW PATHS AND PONDING



Legend

Elevation
12896 London Road - Existing
66 m 68 m 70 m 72 m 74 m 76 m 78 m

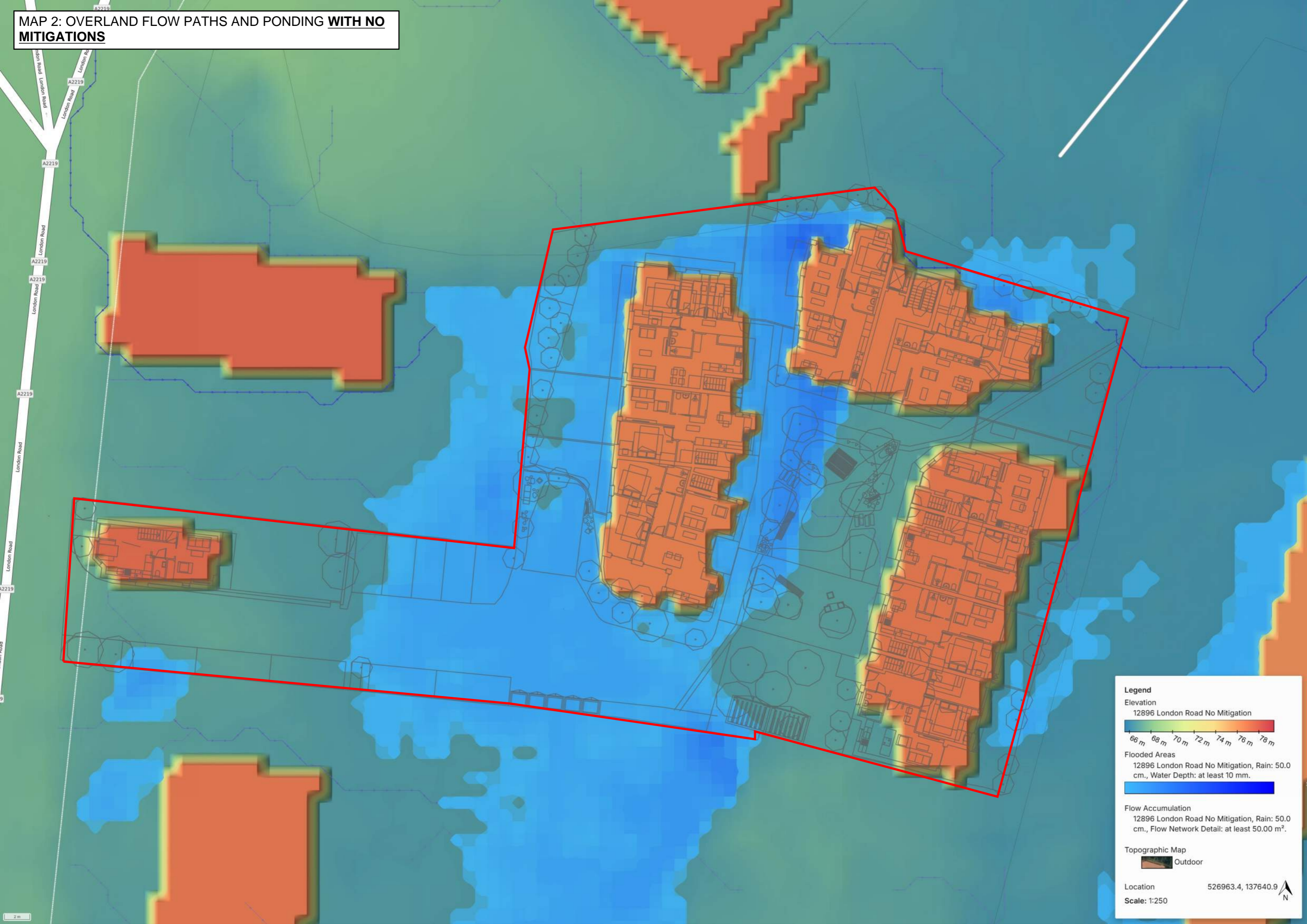
Flooded Areas
12896 London Road - Existing, , depth, Rain: 50.0 cm., Water Depth: at least 10 mm.
0.0 m 0.2 m 0.4 m 0.6 m 0.8 m

Flow Accumulation
12896 London Road - Existing, Rain: 50.0 cm., Flow Network Detail: at least 50.00 m².
100 m² 0.1 ha 1 ha 0.1 km² 1 km² 10 km²

Topographic Map
Outdoor

Location 526963.6, 137640.4
Scale: 1:250

MAP 2: OVERLAND FLOW PATHS AND PONDING WITH NO MITIGATIONS



Legend

Elevation
12896 London Road No Mitigation

66 m 68 m 70 m 72 m 74 m 76 m 78 m

Flooded Areas
12896 London Road No Mitigation, Rain: 50.0 cm., Water Depth: at least 10 mm.

Flow Accumulation
12896 London Road No Mitigation, Rain: 50.0 cm., Flow Network Detail: at least 50.00 m².

Topographic Map
 Outdoor

Location 526963.4, 137640.9

Scale: 1:250

2 m

MAP 3: OVERLAND FLOW PATHS AND PONDING WITH MITIGATIONS IN PLACE



Legend

Elevation
12896 London Road - Updated scheme
66 m 68 m 70 m 72 m 74 m 76 m 78 m

Flooded Areas
12896 London Road - Updated scheme, Rain: 50.0 cm., Water Depth: at least 10 mm.
0.0 m 0.2 m 0.4 m 0.6 m 0.8 m 1.0 m

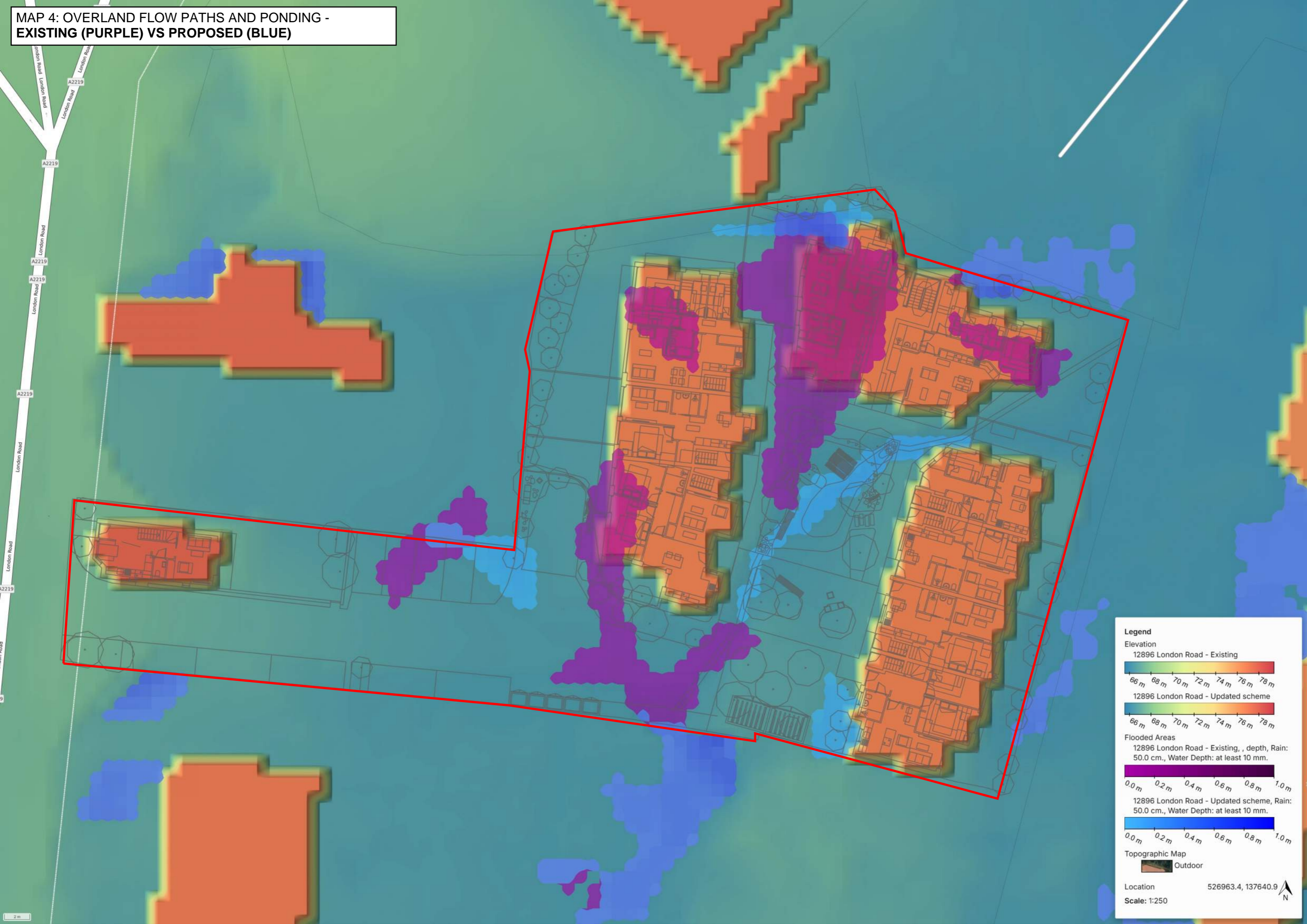
Flow Accumulation
12896 London Road - Updated scheme, Rain: 50.0 cm., Flow Network Detail: at least 50.00 m².
100 m² 1 ha 1 km² 100 km² 10000 km² 100000 km²

Topographic Map
Outdoor

Location 526963.4, 137640.9

Scale: 1:250

MAP 4: OVERLAND FLOW PATHS AND PONDING - EXISTING (PURPLE) VS PROPOSED (BLUE)



Legend

Elevation

12896 London Road - Existing

66 m 68 m 70 m 72 m 74 m 76 m 78 m

12896 London Road - Updated scheme

66 m 68 m 70 m 72 m 74 m 76 m 78 m

Flooded Areas

12896 London Road - Existing, , depth, Rain: 50.0 cm., Water Depth: at least 10 mm.

0.0 m 0.2 m 0.4 m 0.6 m 0.8 m 1.0 m

12896 London Road - Updated scheme, Rain: 50.0 cm., Water Depth: at least 10 mm.

0.0 m 0.2 m 0.4 m 0.6 m 0.8 m 1.0 m

Topographic Map

Outdoor

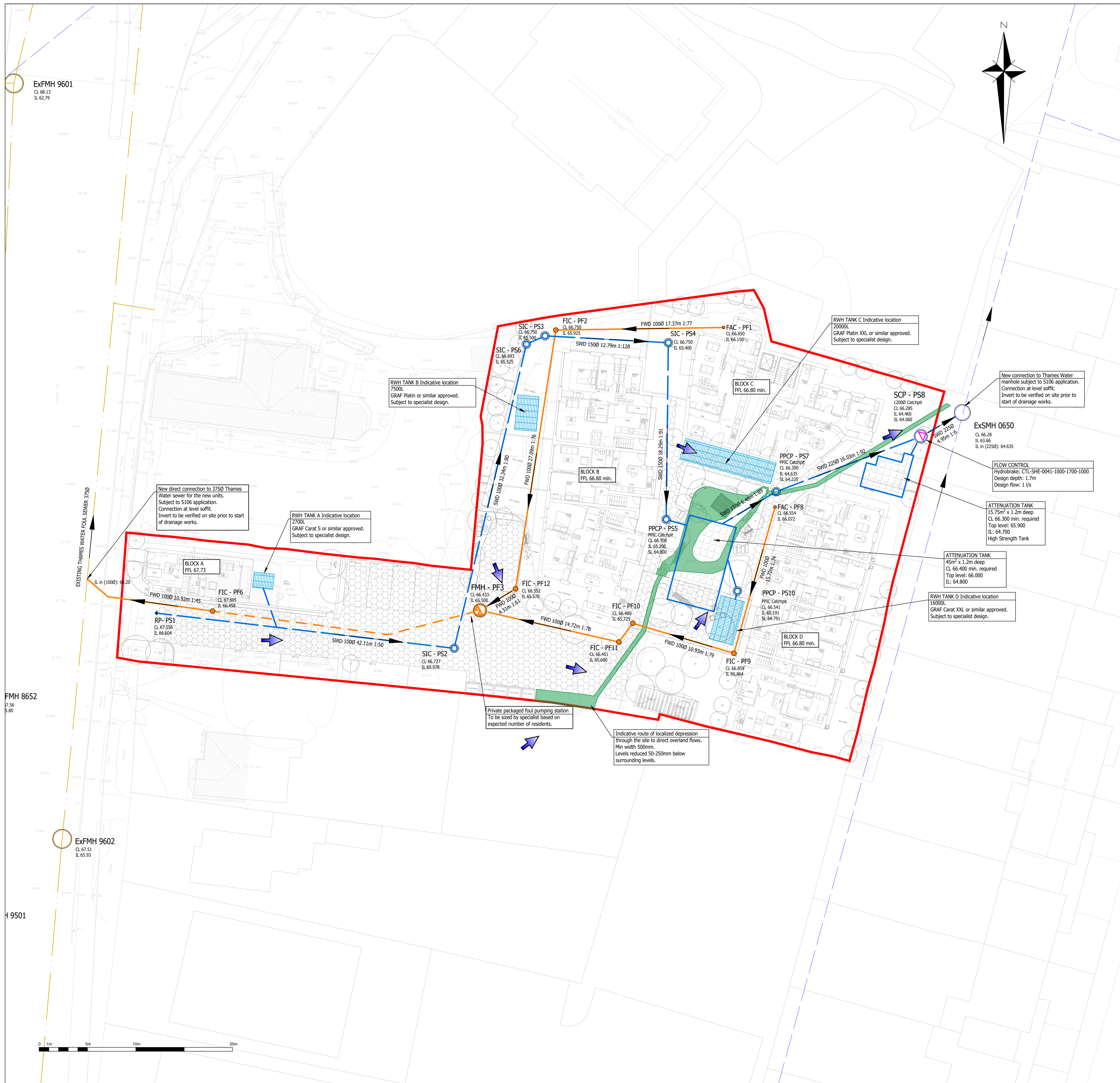
Location 526963.4, 137640.9

Scale: 1:250

Flood Risk Assessment: Land at 48-50 London Road, Northgate, Crawley

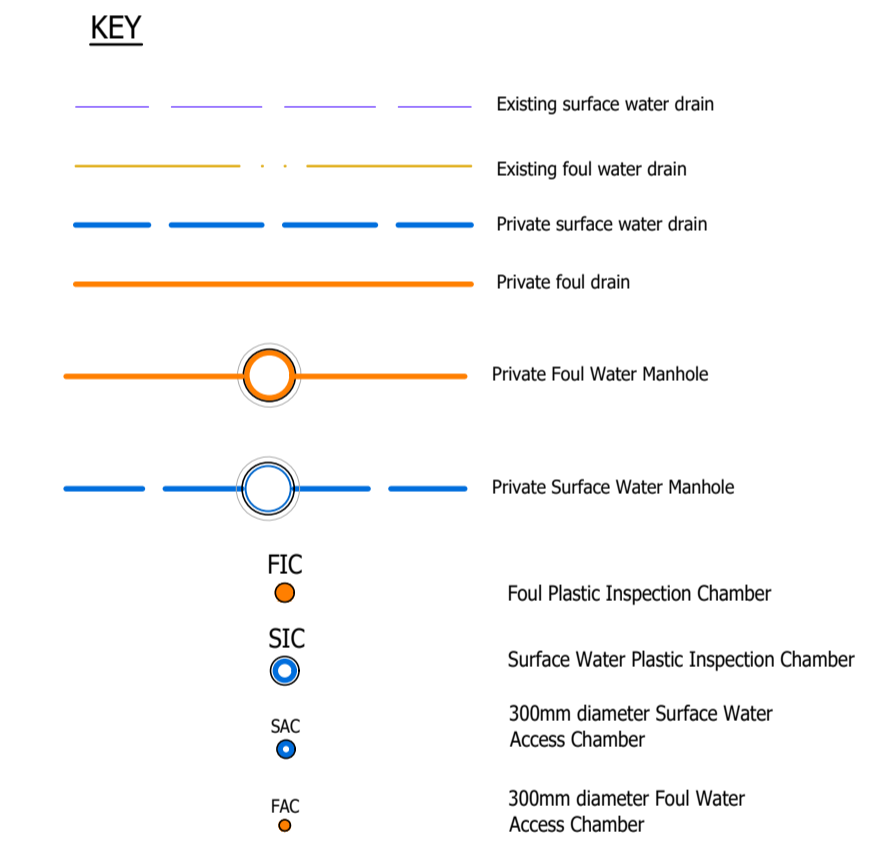
Appendix F

Drainage Strategy Drawing



- DESIGN NOTES**
- STORAGE DESIGN BASED ON 1 IN 100 YR STORM + 40 %.
 - DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT. ALL LEVELS SUBJECT TO DETAILED DESIGN.
 - ALL HARDSTANDING TO BE PERMEABLY SURFACED AS SHOWN, WITH DIRECT INFILTRATION TO THE GROUND (DESIGN RATE 8.0x10⁻⁶ m/s BASED ON BRE365 TESTING CONDUCTED SEPTEMBER 2024). NO POINT INFLOWS.
 - DISCHARGE TO EXISTING SURFACE WATER SEWER LIMITED TO 1l/s (PRACTICAL LIMIT TO REDUCE RISK OF BLOCKAGE). ONLY TAKING ROOF RUNOFFS.
 - RAINWATER HARVESTING TANK LOCATIONS SHOWN INDICATIVELY. SUBJECT TO DETAILED DESIGN BY SPECIALIST.
 - EXISTING TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.
 - APPROVAL TO BE GAINED FROM THAMES WATER FOR CONNECTIONS TO SEWERS AND DISCHARGE RATES

- SPECIFICATION NOTES**
- All drainage shall be constructed and commissioned in accordance with BS EN 295 & BS EN752, Building Regulations Doc. H and any particular requirements of the Building Control Officer.
- Drainage pipelines shall be in PVC-U below ground as Marley or similar approved, or vitrified clay.
All sewer pipelines to be VC only.
- This drawing shall be read in conjunction with all other relevant drainage drawings, architectural drawings and structural drawings.
- For manhole details, gully details, bedding etc, refer to gta detail sheets.
- All foul water drain runs shall have a fall of 1:40 or steeper, unless noted otherwise.
- All cement used for concrete drainage installations shall be sulphate resistant to class 3 of BRE Digest 363. (Grade S15)
- The use of short radius or 90° bends for changes in direction is not permitted, only long or medium radius 45° bends shall be used. All junctions shall be 45°.
- All drains shall have granular bed and surround as class 'S' bedding, unless noted otherwise.
- All drainage works shall commence from the downstream end first unless agreed otherwise. Outfall level to be checked by contractor prior to any works commencing and any discrepancy identified to engineer prior to laying and drainage.



- GENERAL NOTES**
- The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations, record drawings or the file. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. Any discrepancies shall be notified to gta prior to works commencing.
 - Tender or billing drawings shall not be used for construction or the ordering of materials.
 - Do not scale. All dimensions and levels to be site confirmed.
 - This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements.
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 - Should any apparent discrepancies between the data contained within the DWG file and the current contract drawings become evident, it must be reported back to GTA Civils & Transport as soon as reasonably practicable. Precedence should be given to the current contract drawings (PDF) unless advised otherwise.

ABBREVIATIONS

D307.0	DETAIL NUMBER - SEE DRAINAGE DETAIL SHEET
FD	FOUL DRAIN
SWD	SURFACE WATER DRAIN
FWS	ADOPTABLE FOUL WATER SEWER
SWS	ADOPTABLE SURFACE WATER SEWER
MH	MANHOLE
IC	INSPECTION CHAMBER
SA	SOAKAWAY
FIC	450mm DIA. FOUL INSPECTION CHAMBER - D202.6
SIC	450mm DIA. SURFACE WATER INSPECTION CHAMBER - D202.6
FAC	300mm DIA. FOUL ACCESS CHAMBER - D202.18
SAC	300mm DIA. SURFACE WATER ACCESS CHAMBER - D202.18
CI	CAST IRON
VC	VITRIFIED CLAY
CONC	CONCRETE
PVC-U	POLYVINYL CHLORIDE - UNPLASTICISED
G	SHALL GULLY - D209.0
YG	YARD GULLY - D209.2
RG	ROAD GULLY - D208.1
CPG	CAR PARK GULLY - D208.2
DR	BELOW GROUND DRAIN POINT
SVP	SOIL VENT PIPE DROP
SS	STUB STACK OR DIRECT DRAIN CONNECTION
RP	EXTERNAL RODDING POINT - D213.1
DT	SURFACE WATER DISTRIBUTION TANK
FFL	FINISHED FLOOR LEVEL
SSL	STRUCTURAL SLAB LEVEL
GL	GROUND LEVEL
CL	COVER LEVEL
IL	INVERT LEVEL
SL	SUMP LEVEL
HL	HIGH LEVEL
BL	BASE LEVEL
HL	HIGH LEVEL
BD	BACKDROP
CBS	CONCRETE BED & SURROUND
CLASS S	GRANULAR BED & SURROUND
CLASS B	GRANULAR BED

NOT FOR CONSTRUCTION

Rev	Amendments	Date	Dsn	Chk
P4	UPDATED TO LATEST LAYOUT	10/11/25	AW	FVW
P3	TO LLFA COMMENT	07/03/25	FVW	MR
P2	UPDATED TO LATEST LAYOUT	05/12/24	FVW	MR
P1	INITIAL ISSUE	07/11/24	FVW	MR

FOR INFORMATION

Status	FOR INFORMATION			
Client	LIVING DANISH			
Architect				
Project	LONDON ROAD CRAWLEY			
Title	DRAINAGE LAYOUT			
Date	NOVEMBER 2024	Scale @ A1	1:200	
Clients Ref	Project Ref.		12896	

gta Civils & Transport
 Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD
 Tel: 01444 871444 Web: www.gtacivils.co.uk

Drawing Number: **12896-1600** Rev: **P4**

Flood Risk Assessment: Land at 48-50 London Road, Northgate, Crawley

Appendix G

Drainage Calculations



Greenfield runoff rate estimation tool



www.uksuds.com | Greenfield runoff rate estimation tool (<https://www.uksuds.com/>)

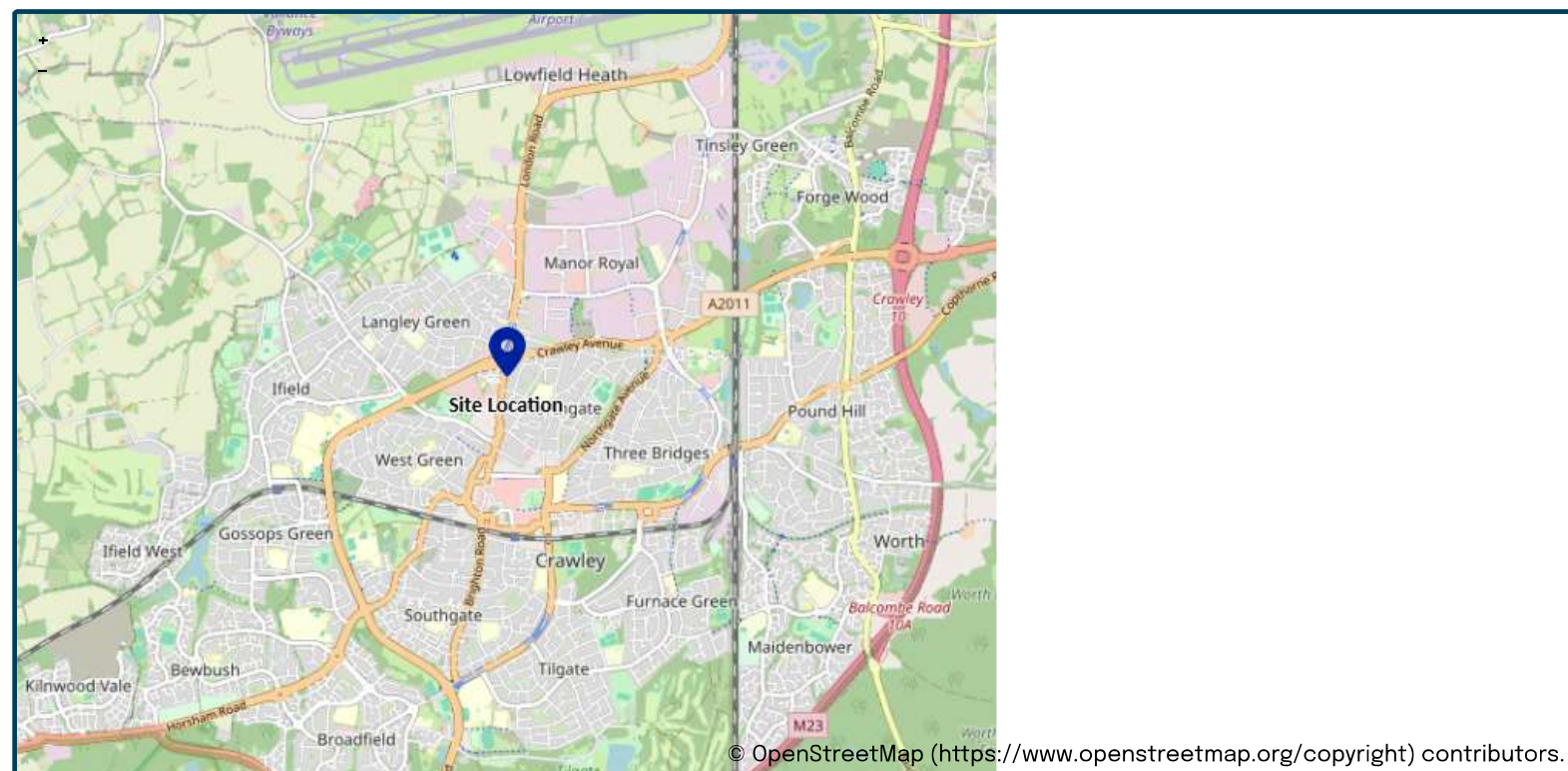
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	<input type="text" value="07/11/2025"/>
Calculated by	<input type="text" value="Abbie Webb"/>
Reference	<input type="text" value="12896"/>
Model version	<input type="text" value="2.2.2"/>

Location

Site name	<input type="text" value="London Road"/>
Site location	<input type="text" value="Crawley"/>



Site easting (British National Grid)	<input type="text" value="526937"/>
Site northing (British National Grid)	<input type="text" value="137441"/>

Site details

Total site area (ha)	<input type="text" value="1"/>	ha
----------------------	--------------------------------	----

Greenfield runoff

Method

Method

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	<input type="text" value="834"/> mm	
BFIHOST19scaled	<input type="text" value="0.418"/>	
QMed-QBar conversion	<input type="text" value="1.136"/>	<input checked="" type="radio"/> <input type="text" value="1.136"/>
QMed (l/s)	<input type="text" value="5.2"/> l/s	
QBar (FEH statistical 2025) (l/s)	<input type="text" value="6"/> l/s	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	<input type="text" value="6"/>	<input checked="" type="radio"/> <input type="text" value="6"/>
1 year growth factor	<input type="text" value="0.85"/>	
2 year growth factor	<input type="text" value="0.88"/>	
10 year growth factor	<input type="text" value="1.62"/>	
30 year growth factor	<input type="text" value="2.3"/>	
100 year growth factor	<input type="text" value="3.19"/>	
200 year growth factor	<input type="text" value="3.74"/>	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	5.1	l/s
Flow rate 2 year (l/s)	5.2	l/s
Flow rate 10 years (l/s)	9.6	l/s
Flow rate 30 years (l/s)	13.7	l/s
Flow rate 100 years (l/s)	19.0	l/s
Flow rate 200 years (l/s)	22.3	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com/) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
PS1	0.005	5.00	67.519	180	526919.797	137629.565	0.915	66.604
PS2	0.001	5.00	66.727	450	526951.463	137625.888	0.749	65.978
PS6	0.032	5.00	66.693	450	526954.924	137656.284	1.168	65.525
PS3			66.750	450	526958.563	137658.332	1.250	65.500
PS4	0.020	5.00	66.750	450	526972.754	137657.539	1.350	65.400
PS5			66.700	600	526972.536	137639.253	1.500	65.200
PS10	0.027	5.00	66.541	600	526980.625	137630.498	1.350	65.191
TANK 1			66.400	1200	526977.009	137638.010	1.600	64.800
PS7	0.001	5.00	66.300	600	526983.911	137642.131	1.665	64.635
PS8			66.285	1200	526998.956	137647.854	1.825	64.460
ExSMH0650			66.280	1200	527003.185	137650.310	2.620	63.660

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	PS1	PS2	31.879	0.600	66.604	65.978	0.626	50.9	100	5.49	0.0
1.001	PS2	PS6	32.300	0.600	65.978	65.575	0.403	80.1	100	6.12	0.0
1.002_1	PS6	PS3	2.100	0.600	65.525	65.500	0.025	84.0	150	6.15	0.0
1.002	PS3	PS4	14.213	0.600	65.500	65.400	0.100	142.1	150	6.43	0.0
1.003	PS4	PS5	18.287	0.600	65.400	65.200	0.200	91.4	150	6.72	0.0
1.004	PS5	TANK 1	4.643	0.600	65.200	64.800	0.400	11.6	150	6.75	0.0
2.000	PS10	TANK 1	8.337	0.600	65.191	64.800	0.391	21.3	150	5.06	0.0
1.005	TANK 1	PS7	8.039	0.600	64.800	64.710	0.090	89.3	150	6.87	0.0
1.006	PS7	PS8	16.097	0.600	64.635	64.460	0.175	92.0	225	7.07	0.0
1.007	PS8	ExSMH0650	4.891	0.600	64.460	63.660	0.800	6.1	225	7.08	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.082	8.5	0.0	0.815	0.649	0.005	0.0	0	0.000
1.001	0.860	6.8	0.0	0.649	1.018	0.006	0.0	0	0.000
1.002_1	1.097	19.4	0.0	1.018	1.100	0.038	0.0	0	0.000
1.002	0.841	14.9	0.0	1.100	1.200	0.038	0.0	0	0.000
1.003	1.051	18.6	0.0	1.200	1.350	0.058	0.0	0	0.000
1.004	2.973	52.5	0.0	1.350	1.450	0.058	0.0	0	0.000
2.000	2.190	38.7	0.0	1.200	1.450	0.027	0.0	0	0.000
1.005	1.064	18.8	0.0	1.450	1.440	0.085	0.0	0	0.000
1.006	1.363	54.2	0.0	1.440	1.600	0.085	0.0	0	0.000
1.007	5.326	211.8	0.0	1.600	2.395	0.085	0.0	0	0.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m ³ /ha)	0.0		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node PS8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	64.460	Product Number	CTL-SHE-0041-1000-1700-1000
Design Depth (m)	1.700	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	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)	64.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	45.0	0.0	1.200	45.0	0.0	1.201	0.0	0.0

Node PS8 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	64.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	15.8	0.0	1.200	15.8	0.0	1.201	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	PS1	11	66.625	0.021	0.8	0.0005	0.0000	OK
15 minute summer	PS2	11	66.004	0.026	1.0	0.0041	0.0000	OK
15 minute summer	PS6	10	65.599	0.074	6.7	0.0118	0.0000	OK
15 minute summer	PS3	10	65.572	0.072	6.6	0.0115	0.0000	OK
15 minute summer	PS4	11	65.487	0.087	10.3	0.0138	0.0000	OK
15 minute summer	PS5	10	65.248	0.048	10.1	0.0135	0.0000	OK
15 minute summer	PS10	9	65.227	0.036	4.8	0.0101	0.0000	OK
360 minute summer	TANK 1	264	64.963	0.163	4.1	7.1422	0.0000	SURCHARGED
360 minute summer	PS7	264	64.963	0.328	3.1	0.0927	0.0000	SURCHARGED
360 minute summer	PS8	264	64.963	0.503	2.9	4.7257	0.0000	SURCHARGED
1440 minute winter	ExSMH0650	1290	63.669	0.009	0.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	PS1	1.000	PS2	0.8	0.645	0.094	0.0440	
15 minute summer	PS2	1.001	PS6	1.0	0.608	0.142	0.0510	
15 minute summer	PS6	1.002_1	PS3	6.6	0.775	0.342	0.0179	
15 minute summer	PS3	1.002	PS4	6.6	0.693	0.441	0.1345	
15 minute summer	PS4	1.003	PS5	10.1	1.342	0.545	0.1406	
15 minute summer	PS5	1.004	TANK 1	10.2	2.205	0.194	0.0295	
15 minute summer	PS10	2.000	TANK 1	4.8	1.501	0.124	0.0471	
360 minute summer	TANK 1	1.005	PS7	3.1	0.673	0.163	0.1415	
360 minute summer	PS7	1.006	PS8	2.9	0.237	0.053	0.6402	
360 minute summer	PS8	1.007	ExSMH0650	0.6	1.178	0.003	0.0025	17.8

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 98.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	PS1	10	66.644	0.040	2.9	0.0010	0.0000	OK
15 minute summer	PS2	12	66.276	0.298	3.4	0.0473	0.0000	SURCHARGED
15 minute summer	PS6	12	66.207	0.682	21.7	0.1084	0.0000	SURCHARGED
15 minute summer	PS3	12	66.155	0.655	18.9	0.1041	0.0000	SURCHARGED
15 minute summer	PS4	12	65.954	0.554	29.4	0.0881	0.0000	SURCHARGED
360 minute summer	PS5	360	65.507	0.307	7.5	0.0868	0.0000	SURCHARGED
360 minute summer	PS10	360	65.507	0.316	3.5	0.0893	0.0000	SURCHARGED
360 minute summer	TANK 1	360	65.507	0.707	11.0	31.0088	0.0000	SURCHARGED
360 minute summer	PS7	360	65.506	0.871	3.6	0.2466	0.0000	SURCHARGED
360 minute summer	PS8	360	65.506	1.046	3.5	13.9318	0.0000	SURCHARGED
360 minute summer	ExSMH0650	360	63.670	0.010	0.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	PS1	1.000	PS2	2.9	0.862	0.339	0.1708	
15 minute summer	PS2	1.001	PS6	4.2	0.625	0.629	0.2527	
15 minute summer	PS6	1.002_1	PS3	18.9	1.073	0.974	0.0370	
15 minute summer	PS3	1.002	PS4	18.8	1.067	1.264	0.2502	
15 minute summer	PS4	1.003	PS5	29.2	1.790	1.570	0.2713	
360 minute summer	PS5	1.004	TANK 1	7.5	1.284	0.143	0.0817	
360 minute summer	PS10	2.000	TANK 1	3.5	0.740	0.090	0.1468	
360 minute summer	TANK 1	1.005	PS7	3.5	0.596	0.188	0.1415	
360 minute summer	PS7	1.006	PS8	3.5	0.336	0.064	0.6402	
360 minute summer	PS8	1.007	ExSMH0650	0.8	1.267	0.004	0.0031	24.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.49%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	PS1	13	66.724	0.120	3.8	0.0030	0.0000	SURCHARGED
15 minute summer	PS2	12	66.671	0.693	5.1	0.1102	0.0000	FLOOD RISK
15 minute summer	PS6	12	66.624	1.099	26.0	0.1747	0.0000	FLOOD RISK
15 minute summer	PS3	12	66.544	1.044	23.5	0.1660	0.0000	FLOOD RISK
15 minute summer	PS4	12	66.246	0.846	36.9	0.1345	0.0000	SURCHARGED
720 minute winter	PS5	675	65.773	0.573	3.8	0.1621	0.0000	SURCHARGED
720 minute winter	PS10	675	65.773	0.582	1.7	0.1647	0.0000	SURCHARGED
720 minute winter	TANK 1	675	65.773	0.973	5.4	42.6903	0.0000	SURCHARGED
720 minute winter	PS7	675	65.773	1.138	2.1	0.3219	0.0000	SURCHARGED
720 minute winter	PS8	675	65.773	1.313	2.0	18.4385	0.0000	SURCHARGED
720 minute winter	ExSMH0650	675	63.671	0.011	0.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute summer	PS1	1.000	PS2	3.8	0.896	0.443	0.2494	
15 minute summer	PS2	1.001	PS6	5.6	0.718	0.828	0.2527	
15 minute summer	PS6	1.002_1	PS3	23.5	1.336	1.213	0.0370	
15 minute summer	PS3	1.002	PS4	22.9	1.303	1.544	0.2502	
15 minute summer	PS4	1.003	PS5	36.0	2.045	1.938	0.3219	
720 minute winter	PS5	1.004	TANK 1	3.7	0.942	0.071	0.0817	
720 minute winter	PS10	2.000	TANK 1	1.6	0.684	0.042	0.1468	
720 minute winter	TANK 1	1.005	PS7	2.1	0.558	0.111	0.1415	
720 minute winter	PS7	1.006	PS8	2.0	0.260	0.037	0.6402	
720 minute winter	PS8	1.007	ExSMH0650	0.9	1.303	0.004	0.0033	41.9

Flood Risk Assessment: Land at 48-50 London Road, Northgate, Crawley

Appendix H

Correspondence

Florence Van Vaerenbergh
GTA Civils & Transport Ltd

Lars Graabek
Living Danish Developments Limited

6th November 2024

Dear Florence and Lars,

LLFA/PLAN/PREAPP/24/006-Land Adjacent to 48-50 London Road, Northgate, Crawley, RH10 8JQ

WSSC Flood Risk Management Team Level 2 Pre-Application Advice has been sought for a 0.22ha site in Northgate, Crawley. Following a MS Teams meeting on Thursday 17th September we have the following comments to make following discussions of the current proposals:

1. The application may need a sequential test due to the surface water flow path through the site as described in paragraph 2.10 to 2.11. It is recommended this is discussed with the Local Planning Authority who are responsible for this.
2. For this site SCALGO modelling is appropriate and detailed hydraulic modelling is not needed. We support the proposals in paragraph 3.3, in particular maintaining flow paths, as long as they are safe and don't prevent safe access and egress when using Flood Hazard Rating ([Microsoft Word - Sub-Guidance of Safe Access and Exit](#)).
3. As the application progresses we'd expect full winter groundwater monitoring and potentially shallow infiltration testing depending on what the full winter monitoring results show.
4. It is good to see rainwater harvesting and open SuDS being proposed.
5. It is strongly suggested where connecting to a surface water sewer, the responsible authority is contacted for a capacity check to ensure they are ok with proposals to discharge into their system. It is recommended to do this as soon as possible in the planning process to reduce issues with draining the site later on.
6. The contaminated land strip will need to be considered water quality wise when designing the SuDS scheme.
7. For surface water plus climate change mapping, this should be within the Crawley Strategic Flood Risk Assessment.

A surface water drainage strategy/layout has not been included as part of the submission. I'm happy to review this and any final documents as part of the pre-app service, before the application is submitted to Crawley Borough Council. Please email me directly with them.

For the drainage layout, we strongly suggest using open, source control SuDS features where possible. This includes features such as filter strips, swales, permeable paving, rain gardens, bioretention areas, rainwater harvesting and green roofs. This is because open features are easier to maintain than traditional piped systems and helps meet the 4 pillars of SuDS design (water quality, water quantity, amenity and biodiversity). For design criteria please follow guidance in the SuDS Manual.

Please note we are only statutory consultee for surface water/drainage, therefore have no comments to make in relation to foul drainage or water neutrality.

We strongly recommend SuDS proforma and validation checklist are used before submitting the application: [Flood Risk Management: Pre-application advice - West Sussex County Council](#). Please note the LPA might have separate validation lists, although they should be similar.

Yours sincerely,

Ellie Read

Flood Risk Management Team

Documents reviewed:

Stage 1 Flood Risk Assessment by GTA Civils & Transport Limited, September 2024

Pre-App letter from Crawley BC

Completed Application Form

Illustrative Masterplan by Match Landscape Architects, 30th August 2024

Florence Van Vaerenbergh

From: [REDACTED]
Sent: 04 November 2024 08:48
To: Florence Van Vaerenbergh
Cc: 'Jonathan Buckwell'; 'David Gouldstone'; 'Lauren Sinden'
Subject: FW: 48-50 London Road, Crawley - 1 of 2

Good morning Florence

I hope you had a lovely weekend

Below is the comments from Crawley on sequential test, which all seems good.

Jonathan – thanks for checking

Many thanks

Lars Graabek

Director

Email: [REDACTED]

Mobile [REDACTED]

From: Sanders, Alex <[REDACTED]>
Sent: 04 November 2024 08:39
To: Jonathan Buckwell <j[REDACTED]>
Cc: Lauren Sinden <[REDACTED]>; Lars Graabek <[REDACTED]>
Subject: RE: 48-50 London Road, Crawley - 1 of 2

Hi Jonathan

I have received the below from our policy team:

The 2021 update to the NPPF requires that the sequential test considers the risk of flooding from all sources, as opposed to just fluvial and tidal flood risks, though there is no national guidance detailing how the sequential test should be applied for non-fluvial and tidal flood risk sources. The 2023 SFRA advises that for surface water flooding, the 1 in 1000 surface water flood extent should be used to define the areas at highest risk, with development directed to lower risk areas. The SFRA recognises that the surface water flood maps are conceptually different to the fluvial flood extents, as they are more 'dendritic' (i.e. along defined flow corridors) rather than the 'blanket' extents associated with fluvial flooding. Due to the nature of surface water flooding, it is not anticipated that the Sequential Test for surface water would normally require the consideration of alternative sites at lower risk, as in practical terms it is unlikely to be a primary factor that demonstrates that the principle of development could not be supported.

There isn't a practical way to apply the sequential test to non-fluvial sources. From our perspective a sequential test isn't required, but we would want the flood risk and drainage strategy to pick up on how the site would be planned/designed to avoid/minimise surface water flood risk.

I trust this answers your query.

Thanks

Alex

Alex Sanders



Florence Van Vaerenbergh

GTA Civils & Transport Ltd
192-198 London Road
Burgess Hill
RH15 9RD



25 November 2024

Pre-planning enquiry: Confirmation of sufficient capacity

Site address: Land at 48-50 London Road, Northgate, Crawley RH10 8JQ

Dear Florence,

Thank you for providing information on your development.

Proposed site: 27 residential units (flats). Proposed foul water pumped at 1.25l/s from the site low point to the location of existing plot 48. From that point it will discharge via gravity into 375mm in dia foul water sewer in London Road. Proposed surface water connection into a surface water sewer located to the east of the development at restricted max 1l/s.

We have completed the assessment of the foul water flows and surface water run-off based on the information submitted in your application with the purpose of assessing sewerage capacity within the existing Thames Water sewer network.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the adjacent foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable. Before we can consider your surface water needs, you'll need written approval from the lead local flood authority that you have followed the sequential approach to the disposal of surface water and considered all practical means.

When developing a site, policy SI 13 of the London Plan states “Development proposals should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible. There should also be a preference for green over grey features, in line with the following drainage hierarchy:”.

The disposal hierarchy being:

- 1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- 2) rainwater infiltration to ground at or close to source
- 3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- 4) rainwater discharge direct to a watercourse (unless not appropriate)
- 5) controlled rainwater discharge to a surface water sewer or drain
- 6) controlled rainwater discharge to a combined sewer.

Where connection to the public sewerage network is required to manage surface water flows we will accept these flows at a discharge rate in line with CIRIA’s best practice guide on SuDS or that stated within the sites planning approval.

If the above surface water hierarchy has been followed and if the flows are restricted to a total of 1 l/s then Thames Water would not have any objections to the proposal.

Consider slowly emptying the tank before storms for better rainwater storage. There are some automatic sensors that talk to the met office telemetry for efficiency.

Please see our [FAQ’s leaflet](#) for additional information.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days’ notice of the date you wish to make your new connection/s.

If you’ve any further questions, please contact me on number below

Yours sincerely

Natalya Bacon
Adoption & Pre-planning Engineer
Waste Adoptions London
Service Delivery
T: +44 800 009 3921
E: developer.services@thameswater.co.uk
W: <https://www.thameswater.co.uk/developers>
Thames Water Utilities Ltd, Clearwater Court, Vastern Road, Reading RG1 8DB



Civil Engineering - Transport Planning - Flood Risk

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