Flood Risk Assessment and Drainage Strategy

Capella House Car Park, Railway Approach, Worthing, BN11 1UR

Client

Architectus LTD

Ref: 13974

Date: October 2025

Consulting Engineers

GTA Civils & Transport Limited

Maple House

192-198 London Road

Burgess Hill

West Sussex

RH15 9RD

Tel: 01444 871444

Index

Schedule of Appendices

Issue	Issue date	Compiled	Checked
First Draft Issue	12/09/2025	NG	FVV
First Issue – for submission	18/09/2025	NG	FVV
Second Issue – for submission	02/10/2025	NG	FVV

1 Introduction

1.1 This report has been prepared for the Client in relation to the proposed development at Capella House Car Park, Railway Approach, Worthing, BN11 1UR. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.2 GTA Civils & Transport Limited was appointed by Architectus LTD to prepare a Flood Risk Assessment (FRA) report as required by Worthing Borough Council (WBC) in order to achieve Planning Permission at Capella House Car Park, Railway Approach, Worthing, BN11 1UR.

1.3 This report will take the form of a formal Flood Risk Assessment in accordance with the 2025 National Planning Policy Framework (NPPF) and the current Planning Practice Guidance (PPG).

2 Existing Site & Current Flood Risk

2.1 The application site lies to the north of Worthing local centre, immediately south of the existing railway line. It is bounded by Sandell House to the west, Railway Approach to the south and a vacant plot to the east. The site currently comprises a fully tarmacked car park, with a small strip of grass along the western boundary, adjacent to Sandell House. A site location map and aerial view are shown in Appendix A.

2.2 Hydrology: The site lies approximately 1.12km north of the English Channel. There is no ordinary watercourse at or near the site. The nearest Main River is the Teville Stream, approximately 1.9km to the east. Refer to the Main Rivers map in Appendix C.

2.3 Topography: The levels across the car park site range from approximately 6.70m Above Ordnance Datum (AOD) along the southern site boundary, to 7.30mAOD along the northern site boundary. The topographic survey is included in Appendix B.

2.4 Geology: The BGS's online geology map shows that the site is underlain by London Clay Formation with Superficial deposits of River Terrace Deposits.

2.5 A site investigation carried out on the 12th of August 2025 generally confirmed the published geology, with an additional stratum of Made Ground between 0.85m to 1.80m deep overlaying the site. Soil soakage testing was carried out on site within the River Terrace Deposits. The calculated infiltration rate was found to be $1.65x10^{-6}$ m/s – however, as the water level did not fall below 25% of the initial test depth within the trial pit over the duration of the test, this value is based on extrapolated results. The infiltration test report is included in Appendix D.

2.6 Groundwater levels on site were found to be a maximum of 3.4m below ground level during the site investigation. Further winder groundwater monitoring over a 6-month period is scheduled to start in October 2025.

2.7 The EA's Groundwater Vulnerability Zones (GWVZ) mapping shows the site overlay a "Low" vulnerability aquifer, with some soluble rock risks. The site is not within a Source Protection Zone (SPZ) – refer to the maps in Appendix C.

2.8 Fluvial/Tidal Flooding: The EA's Flood Map for Planning shows the Site lies within Flood Zone 1– Low Probability, having less than a 1 in 1,000 (0.1%) annual exceedance probability (AEP) of river flooding.

2.9 Surface Water Flooding: this can occur when excess rainwater does not infiltrate into the ground, or is not intercepted by urban drainage systems, and instead flows across

the surface. The EA's online Surface Water Flood Map indicates that the site is not affected by surface water flooding. There are areas of surface water flooding on the lower lying ground east and south of the site.

2.10 Climate Change: the site lies within the Adur and Ouse Management Catchment. The relevant peak river flow allowance for new residential developments is the Central Allowance, which is 37% in this catchment (2080s). The applicable peak rainfall allowances are 40% for the 1 in 30 AEP events, and 45% for the 1 in 100 AEP events.

2.11 A Climate Change (2070 to 2125) layer was added to the Flood Map for Planning by the EA on 27th of August 2025. This dataset is intended to show how the combined extent of Flood Zones 2 and 3 could increase with climate change over the next century, ignoring the benefits of any existing flood defences and assuming no changes to the flood defences or land-use during that time. The future Flood Zone extent borders the eastern and southern boundary of the site, but the site itself remains clear.

2.12 Similarly, the EA have published a Surface Water Flood Risk dataset which includes consideration of climate change. This indicates that the surface water flood risk in the vicinity of the site is unlikely to significantly change when climate change is taken into account. The Adur and Worthing Strategic Flood Risk Assessment (SFRA) also includes mapping of future Surface Water Flood Risk within the borough – the resolution of this map doesn't allow a precise review of the flood extent, however, it appears that the application site remains clear of flooding in both the 25% climate change and 45% climate change scenarios.

2.13 The flood extents, including the climate change extents, are mapped on the Flood Risk Constraint Plan, included in Appendix C.

2.14 Groundwater Flooding: Groundwater flooding can occur when groundwater rises up from the underlying aquifer to flood subsurface infrastructure or to emerge at the ground surface. Adur and Worthing SFRA include a mapped of expected groundwater levels within the borough. This indicates that the site is susceptible to shallow groundwater levels (0.025m to 0.5m below the ground surface) and therefore at low risk of groundwater flooding. However, the site levels being higher than the immediately adjacent surrounding grounds, and the observed groundwater level on site discussed earlier in this report, indicates that the likelihood of groundwater flooding at surface level is remote.

2.15 Artificial Sources: flooding from reservoirs, canals and docks. The EA's Reservoirs Flood Map in Appendix C shows the site to be removed from this source of flooding. There

are no docks or canals in this area.

2.16 Historical Flooding: A review of the available data and documents has not identified any records of flooding incidents at or close to the site. The EA's historical flood maps is also in Appendix D

2.17 In conclusion, the flood risk profile at the site is Low. No further mitigation is required.

2.18 Public Sewers Infrastructure: Southern Water sewer records indicate that the nearest public foul sewers to the site are a 450mm diameter sewer 60m east of the site, across Broadwater Road; and a 450mm diameter sewer approximately 80m south of the site.

2.19 Southern Water records also indicate an existing 225mm surface water sewer within Railway Approach. The sewer records are included in Appendix E.

2.20 A CCTV survey of the existing site drainage was carried out to confirm the existing apparatus and connections from the adjacent Sandell House. It confirms the presence of an existing private foul connection to the Southern Water sewer to the east, across the adjacent vacant plot. The surface water from Sandell House is routed to an existing soakaway, though this does not appear to function properly as the upstream surface water manholes are flooded.

2.21 There is no formal surface water drainage within the existing car park – based on levels, this is currently allowed to drain unrestricted towards the gullies on Railway Approach, which discharge to the existing Southern Water surface water sewer.

2.22 The runoff rates for the existing impermeable site area (0.079 ha) was calculated using the Modified Rational Method (MRM) on Causeway Flow. The corresponding greenfield rates for the site have been calculated based on FEH data on the UK SuDS tool. The calculates rates are summarised in Table 1 below (see Appendix G for calculations):

Table 1: Existing Runoff Rates

Event	Brownfield Flow Rate (l/s)	Greenfield Flow Rate (l/s)
1 in 2 yr	1.3	0.2
1 in 30 yrs	3.4	0.4
1 in 100 yrs	4.2	0.6

3 Proposed SuDS & Foul Water Drainage Strategy

3.1 Defra published the National Standards for SuDS ("NSS") on 19 June 2025. The key principles underpinning the NSS include a natural approach to managing water and an early and integrated design. The proposed SuDS strategy is illustrated in Appendix F and has been prepared in accordance with these key principles. There are 7 core standards set out in the NSS and these are discussed in turn as follows:

Standard 1: runoff destinations.

3.2 The NSS hierarchy sets the priority as collecting runoff for non-potable use. Rainwater harvesting (RwH) solutions need to be considered with the architectural and building services design. On residential blocks such as the one proposed, it is difficult to provide integrated greywater system due to metering and building services constraints. Onward discharge must therefore be considered.

3.3 The 2nd priority is to infiltrate runoff to ground. The ground conditions discussed in Section 2 indicate that the use of infiltration SuDS at the site is unlikely to be an effective way to solely manage the site runoff, due to the marginal infiltration rates found in the clayey ground. Infiltration features will be maximised where possible; however, it is evident that infiltration SuDS will not be provide a complete surface water management solution and an off-site discharge will be needed.

3.4 The 3rd priority is to discharge runoff to an above ground surface water body. There are none available within or at close proximity to the site.

3.5 The 4th priority is to discharge to a surface water sewer. The strategy for the development is therefore to discharge runoff to the existing Southern Water surface water sewer within Railway Approach, at an attenuated rate (refer to Standard 3). The new connection will be subject to an indirect S106 agreement with Southern Water, to be obtained in due course.

Standard 2: management of everyday rainfall (interception)

3.6 Green roofs shall be implemented at all intermediate roof levels, providing interception benefits for those roofs in line with the guidance.

3.7 A permeable subbase (infiltration blanket) shall be provided beneath the car park at ground level. As discussed above, this will have an onward outfall to the existing sewer but will remain unlined to maximise the infiltration benefits of the underlying soil.

Unlined permeable surfaces over all soil types are considered compliant with Standard 2 where the additional impermeable area is no greater than the permeable area.

3.8 The proposed drainage strategy is therefore compliant with Standard 2.

Standard 3: management of extreme rainfall and flooding

3.9 The NSS guidance sets out that the peak allowable discharge rate from the development to the watercourses should be limited to the 1 in 2 (50%) AEP greenfield runoff rate, or 3 l/s/ha (0.237 l/s for 0.079ha), whichever is the greater. As shown in Section 2 above, the 1 in 2 AEP greenfield runoff rate for the site is 0.2 l/s. The peak allowable discharge rate for the development would therefore be 0.237 l/s.

3.10 However, achieving such a low discharge rate would require an extremely small orifice size (3mm), which would be susceptible to blockages. To minimise this risk, the orifice size has been set to 25mm and will be protected through a mesh screen. The resulting peak flow rate from the site is 1.2 l/s.

3.11 Comparing this to the existing brownfield rates from the site (as per Table 1), it is evident that the runoff rates to the existing surface water sewer will be reduced in all storm events.

3.12 Attenuation storage is provided within the porous subbase, at ground floor level. Refer to the drainage strategy layout in Appendix F.

3.13 Hydraulic calculations are included in Appendix G based on FEH22 rainfall data and using a CV value of 1. As the proposals do not include sufficient external private permeable spaces, no urban creep uplift factor was applied.

3.14 Exceedance: Overland flow in the event of extreme storm events or failure of the drainage system will flow towards Railway Approach, in line with the existing overland flow from the car park area.

Standard 4: water quality

3.15 The proposed SuDS strategy includes sufficient treatment to protect water quality in the receiving water environment.

3.16 Based on the Simple Index Approach described in CIRIA C753 (The SuDS Manual) the development's pollution hazard indices are outlined in Table 2 below along with the relevant SuDS mitigation indices for the proposed SuDS components.

Table 2: SuDS Treatment Train

Pollutant type	TSS	Metals	Hydrocarbons
Pollution hazard indices			
Residential roofs – Very low	0.2	0.2	0.05
Vehicular areas – Low	0.5	0.4	0.4
SuDS mitigation indices			
Permeable pavement	0.7	0.6	0.7

3.17 Table 2 demonstrates that the proposed SuDS treatment train will sufficiently protect the water environment.

Standard 5: amenity

3.18 The site is heavily constrained, and the use of permeable surfacing where possible at ground floor level ensure that the SuDS features have been integrated into the landscape proposals to ensure their amenity potential is realised, within the constraints of the site.

3.19 The integration of the green roofs within the proposed green infrastructure of the site will ensure a multi-functional landscape proposal.

Standard 6: biodiversity

3.20 The integration of green roofs contributes to the delivery of the local biodiversity strategy.

Standard 7: design of drainage for construction, operation, maintenance, decommissioning and structural integrity

3.21 Construction and Phasing: These topics are typically addressed by condition with Phasing Plans and Construction Environmental Management Plans (CEMP). Construction of the surface water drainage scheme will be carried out in line with best practice methods and controls

3.22 Ownership and maintenance: A draft Drainage Maintenance Plan (DMP) outlining ownership and maintenance responsibilities is included in Appendix H. This is a draft version based on the information currently available at this stage; the DMP will be updated as the design of each phase is developed and will remain a live document over the duration of the project.

3.23 The proposed drainage infrastructure will remain under the ownership of the site owner(s).

Foul Drainage Strategy

3.24 The proposed foul drainage from the new development shall be connected to the existing drain crossing the site. The new connection will be subject to an indirect S106 agreement with Southern Water, to be obtained in due course.

3.25 A capacity enquiry has been submitted to Southern Water to confirm the existing sewer network has capacity to accommodate the flows from the development. If any capacity issues do exist, this would be addressed and funded by Southern Water through Infrastructure Charges. The programme for modelling, design and construction will be agreed with the developer and delivered in good time to suit the occupation programme.

4 Conclusion

4.1 The site lies entirely within Flood zone 1 and flood risks from other sources are negligible. The development is therefore appropriate in terms of flood risk.

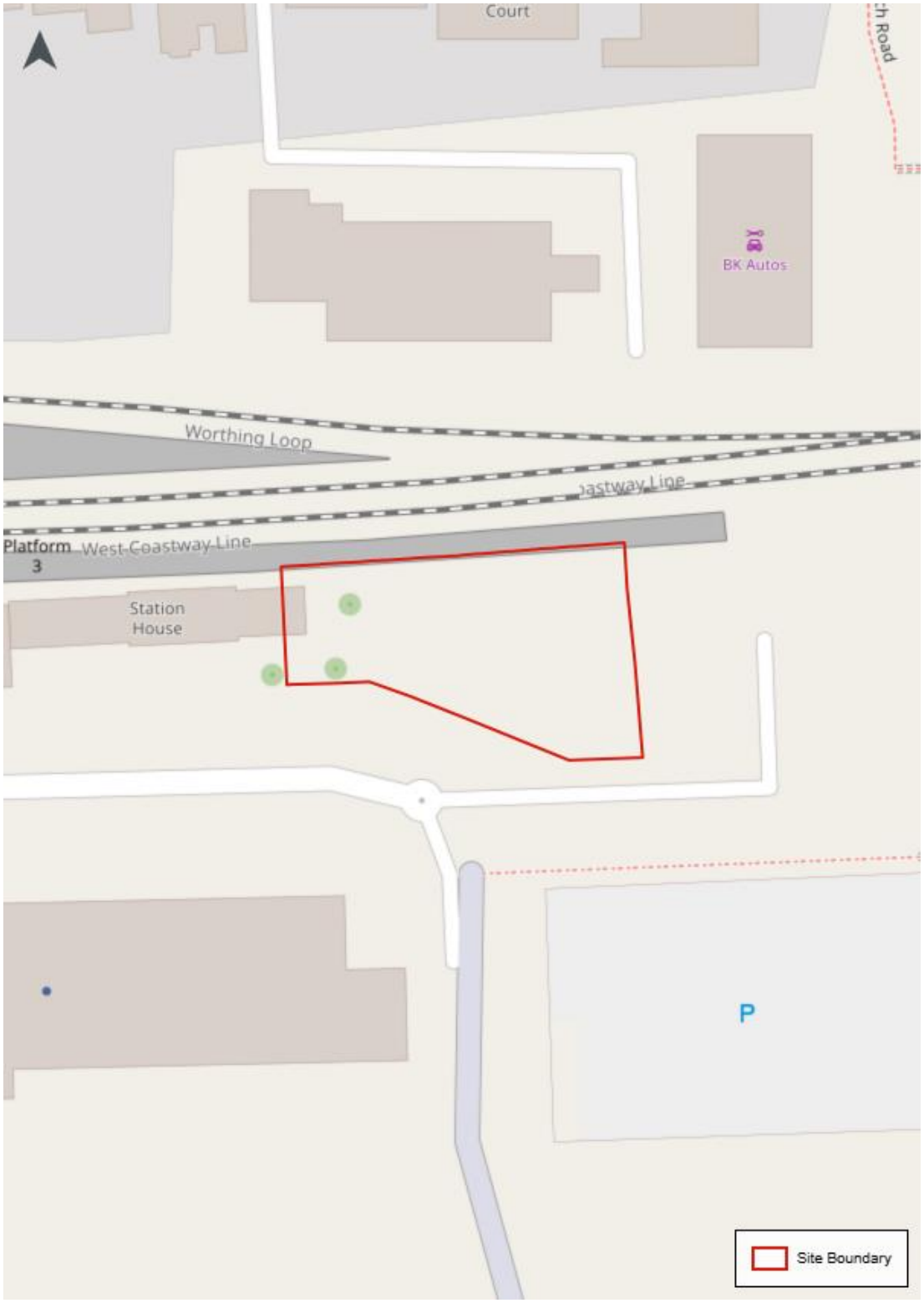
4.2 The proposed SuDS strategy has been developed in line with Defra's National standards for SuDS. The strategy includes on-plot source control, in the form of green roofs and permeable paving, and an attenuated discharge to the existing surface water network. This is a significant improvement over the existing site condition, which drains unrestricted and untreated to the downstream network.

4.3 A new foul connection to the existing Southern Water sewer will be required, to the east of the site. There is an existing private drainage route to the sewer network from the adjacent Sandell House, crossing the site, which will be utilised for this purpose. Any off-site upgrades required to serve the development will be delivered by Southern Water post-planning funded by its Infrastructure Charges.

4.4 The development complies with the NPPF and relevant planning practice guidance in terms of flood risk. The proposed SuDS and foul drainage strategies comply with the Local Plan Policies.

Appendix A

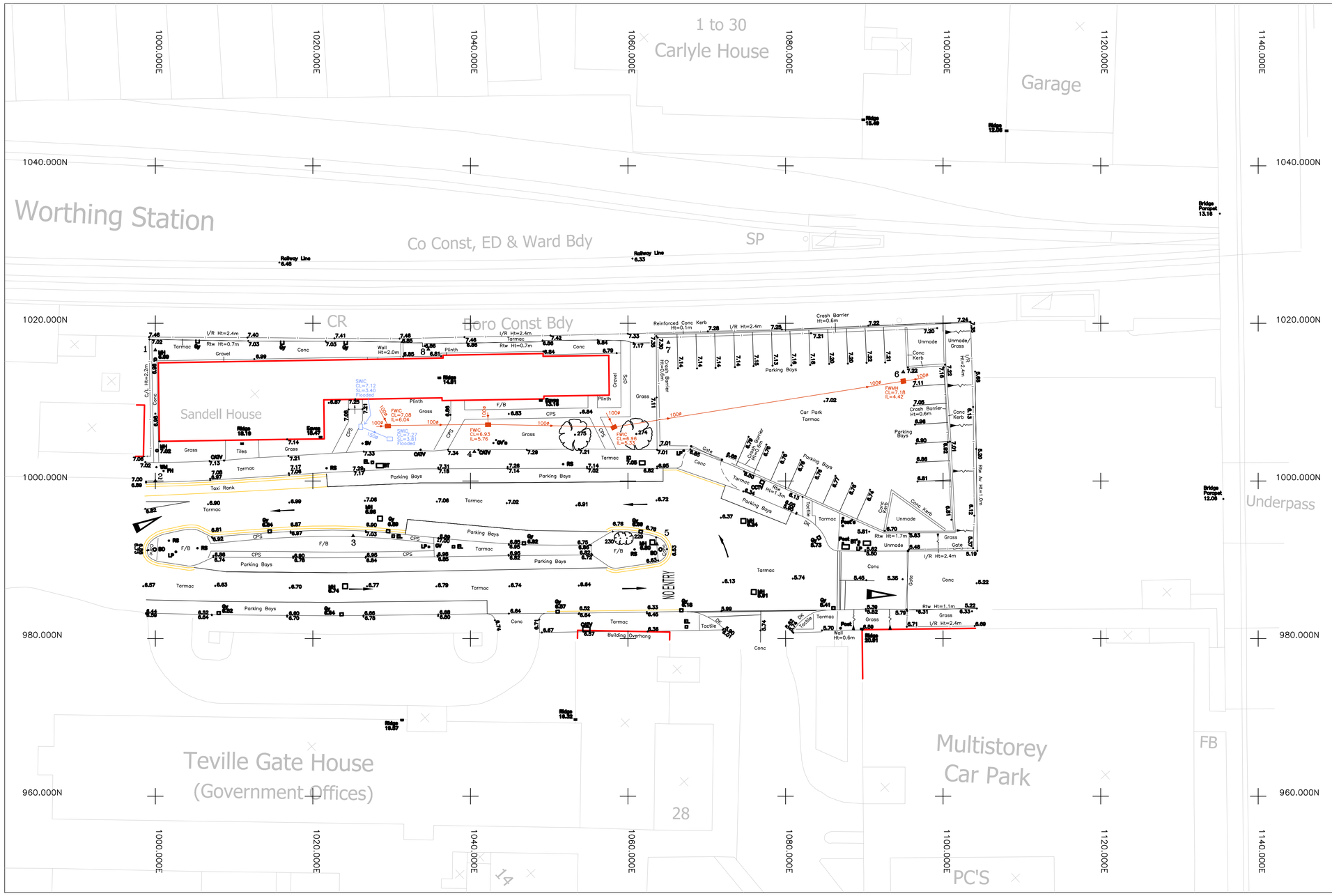
Location Plan



Aerial Photo

Appendix B

Topographic Survey



Notes

Whilst every effort has been made to correctly identify species of trees on the site, we advise that an arboralogist be consulted before any final decisions are made.

Although every effort has been made to confirm type, run and size of drainage it is advisable to check these details against statutory authority records before proceeding with any design.

All information contained in this drawing (including digital data) should be checked and verified prior to any fabrication or construction.

Grid coordinates are based on an arbitrary system.

Detail in half-tone (grey) denotes OS data relating to survey as a 'Best Mean Fit'.

INDICATIVE

Tree Schedule

Tree No.	Dia. Spread	Dia. Bole	Height	Species
229	0.00	0.00	0.00	SAPLING 4.0m
230	0.00	0.00	0.00	SAPLING 4.0m
274	4.00	0.15	6.00	SYCAMORE
275	4.00	0.15	6.00	SYCAMORE

Coordinate Table

Stn	Easting	Northing	Level
1	1000.000	1016.804	7.007
2	1000.000	1000.000	7.011
3	1025.103	983.034	7.023
4	1040.500	1003.721	7.325
5	1063.689	991.974	6.716
6	1094.933	1013.843	7.178
7	1065.125	1017.568	7.257
8	1034.653	1016.713	6.859

Rev. Suffix	Date	Initial	Revision Details

Cad Operator	MLB	Approved By	AMF	Surveyor	AF	Date	14.01.04

Levelling OSBM Datum Newlyn

SW Corner of Railway Station
Value Used : 7.69m

Client
ARCHITECTUS

Location
Land at Railway Appoach Worthing

Drawing Title
Detail Survey

Job No. 40102	Old Job No.
Drawing Number *Arch/40102*	Revision Suffix
Scale *1:200m*	Date *January 2004*

CD SURVEYS LTD.
LAND SURVEYING & SITE ENGINEERING
UNIT 10C WOODSIDE PARK
CATTESHALL LANE
GODALMING, SURREY
GU7 1LG
Tel (01483) 416113
Fax (01483) 418875
mail@cdsurveys.com
Visit us at www.cdsurveys.com

Appendix C

Flood Maps

Environment Agency Main Rivers Map

N

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 like. 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.

7. If viewing this drawing as an Autocad file (.dwg) in digital format then it is done so with this Disclaimer due to the fact that it can be altered and manipulated following its issue by GTA Civils & Transport and therefore, any alteration or modification of DWG data files provided by GTA Civils & Transport, by you or a third party, without GTA Civils and Transport's express written approval, is done so entirely at your own risk. Modification includes (but is not limited to) turning layers on and off, unfreezing layers and reloading, turning on and off print functions and unloading x-refs.

8. Your attention is also drawn to the fact that the information contained within this file may be subject to alteration at any time, pending technical approval from an approving authority or at the client's instruction. It is therefore strongly recommended that multiple and regular cross checks are made against the current contract drawings. It is your responsibility to ensure that the correct issue or revision of the DWG data file is being used and requests for updated information made accordingly.

9. 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.

LEGEND

GEOLOGY

Bedrock Geology: London Clay Formation - From British Geological Society records
Superficial Deposits: River Terrace - Sand Silt and Clay - From British Geological Society records

FLUVIAL FLOOD RISK

- 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

SURFACE WATER FLOOD RISK - Climate Change

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

FLUVIAL FLOOD RISK - Climate Change

- Future Fluvial Flood Risk - High
- Future Fluvial Flood Risk - Medium
- Future Fluvial Flood Risk - Low

FLUVIAL FLOOD RISK + Climate Change

- Combined Flood Zone 2&3 extent plus climate change increase

SPECIAL DESIGNATIONS

Site is NOT within a Source Protection Zone
Site Extents Groundwater Vulnerability: Low

SITE

- Site Boundary
- 0.5m Ground Level Contours (from topographical survey within site)
- TP — Trial Pit - Soakage testing conducted 6/08/2026

NOTE
Test failed to soak to 25% effective depth, and therefore a negligible infiltration rate has been assumed

TP01
ExFMH
MP 10.5
ExSMH 6350
ExSMH 6351
ExSMH 6353
ExSMH 6352
ExSWD 2250
ExSWD 2250
ExSWD 3000
Station House
RAILWAY APPROACH
Carlyle House
Garage
Car Park
Multistorey
Car Park
Underpass
NO ENTRY

P1	INITIAL ISSUE	11/09/25	NG	FVV
Rev	Amendments	Date	Dsn	Chk

Status: PRELIMINARY

Client: ARCHITECTUS LTD

Architect:

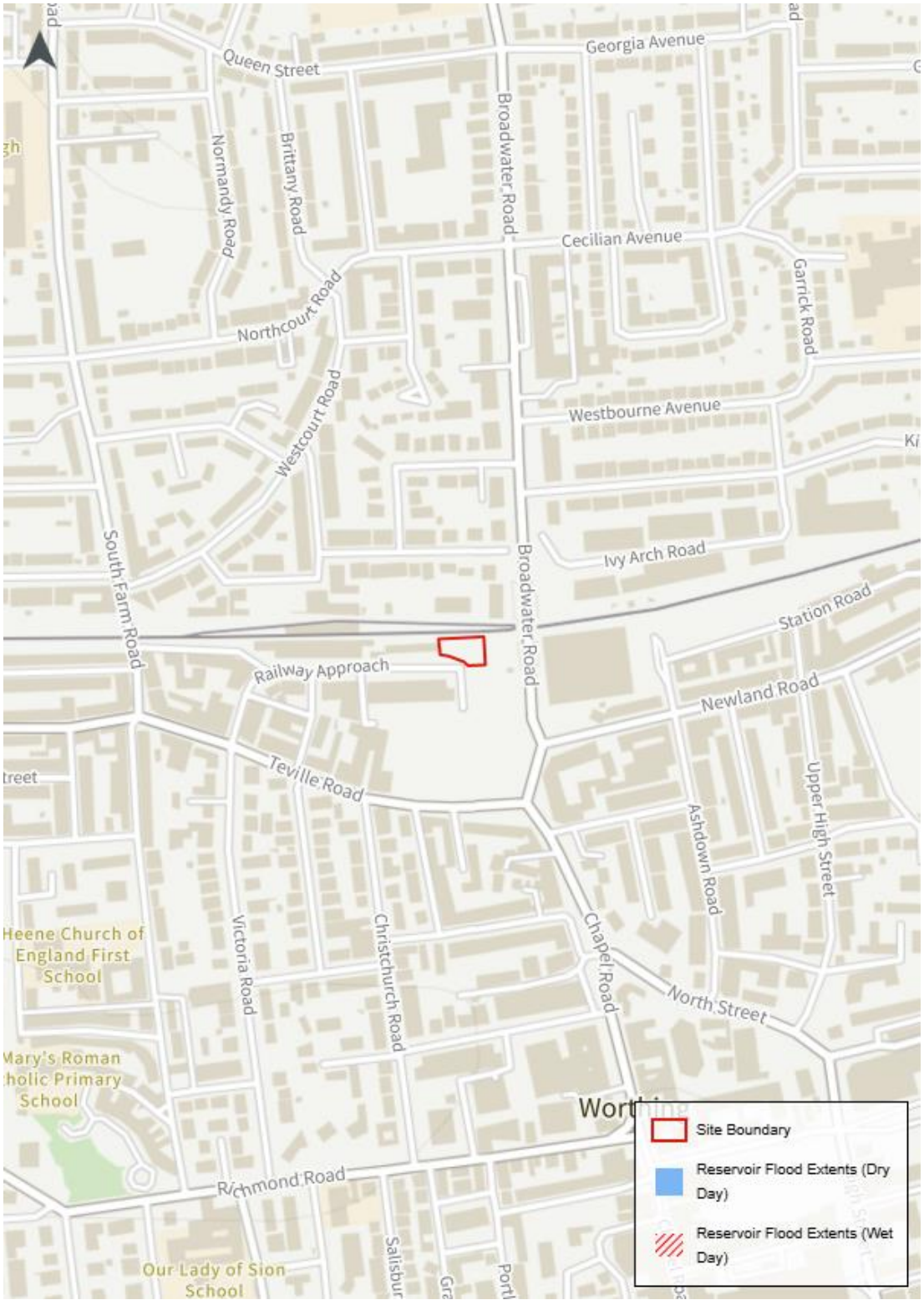
Project: RAILWAY APPROACH WORTHING

Title: FLOOD RISK CONSTRAINT PLAN

Date	Scale @ A1
SEPTEMBER 2025	1:200
Clients Ref.	Project Ref. 13974

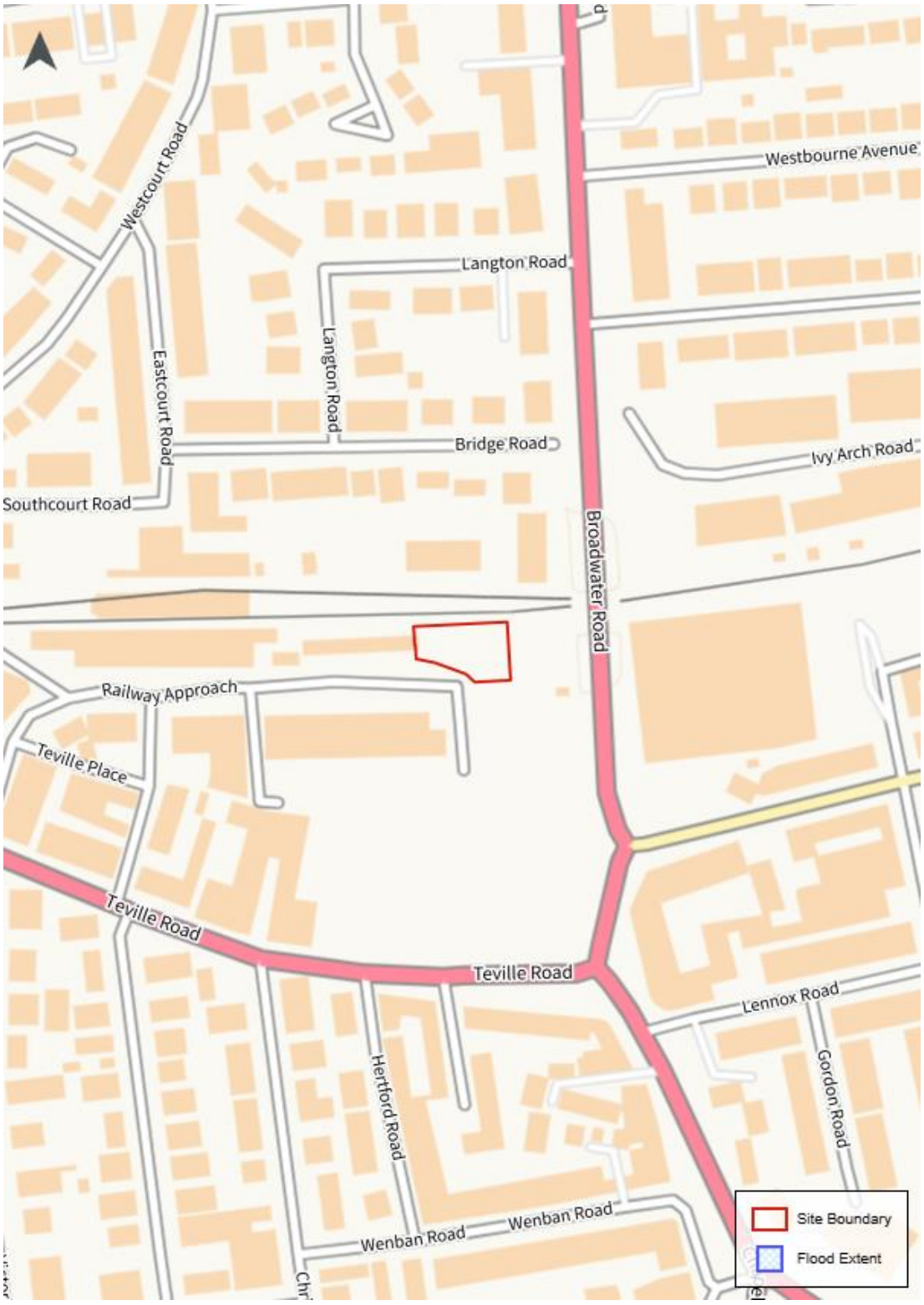
gta Civils & Transport
Maple House, 192-198 London Road,
Burgess Hill, West Sussex, RH15 9RD
Tel.01444 871444 Web: www.gtacivils.co.uk

Drawing Number	Rev.
13974-1000	P1



Environment Agency Flood Risk from Reservoirs

The site is clear from the risk of flooding from this source

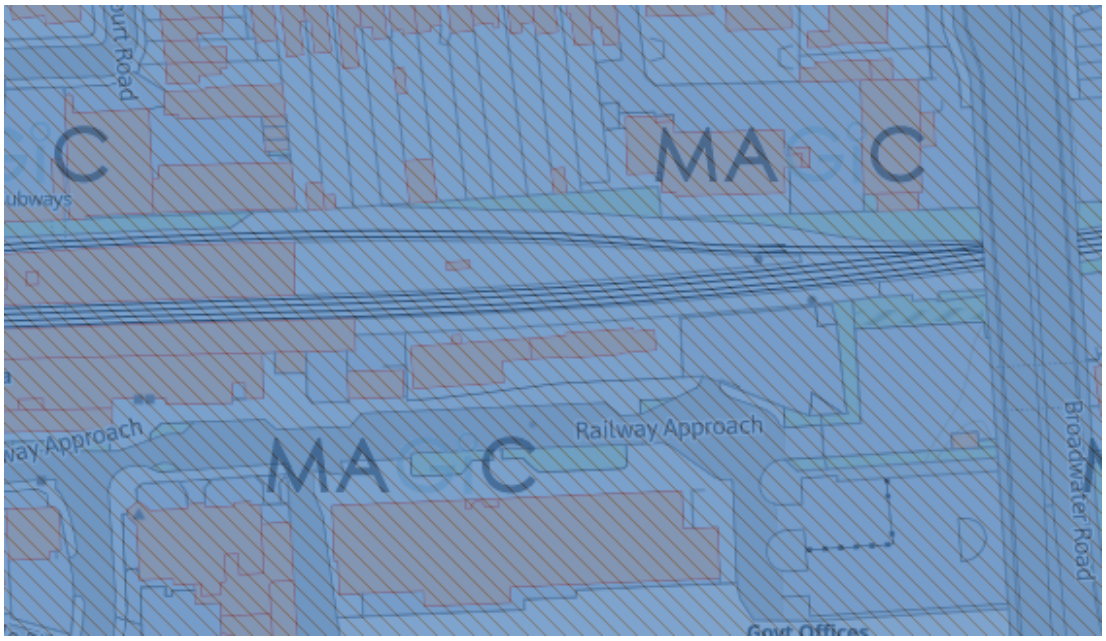


DEFRA Historical Flooding Map

Neither this site nor anywhere in the vicinity has been affected by flooding in the past

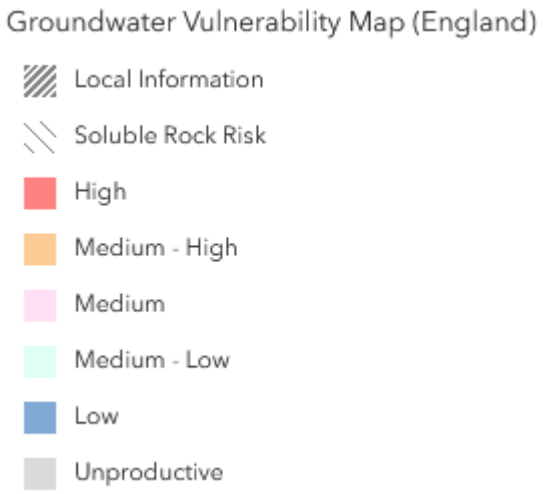
Environment Agency Groundwater Source Protection Zones Map

The site is not situated within a Source Protection Zone



Environment Agency Online Groundwater Vulnerability Zones Map

The site overlies a Low Groundwater Vulnerability Zone with soluble rock risk.



Appendix D

Soil Soakage Test Report

ASHDOWN
SITE INVESTIGATION

IN SITU INFILTRATION TEST REPORT

RAILWAY APPROACH
WORTHING
WEST SUSSEX

PROJECT REFERENCE: P17323

REPORT REFERENCE: R16818

Report Beneficiary: Architectus Ltd

Document Control				
Issue No.	**Status**	**Issue Date**	**Notes**	
1	Final	27th August 2025		
Report Section			**Prepared By**	**Approved By**
In Situ Infiltration Test Report			Adam Cormack HNC FGS	Steven McSwiney BA Mod. Geol. MSc FGS

Limitations

This report was prepared specifically for the Client's project and may not be appropriate to alternative schemes. The copyright for the report and licence for its use shall remain vested in Ashdown Site Investigation Limited (the Company) who disclaim all responsibility or liability (whether at common law or under the express or implied terms of the Contract between the Company and the Client) for any loss or damage of whatever nature in the event that this report is relied on by a third party, or is issued in circumstances or for projects for which it was not originally commissioned.

Head Office:
Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG

Telephone:
01273 483119
Email:
contact@ashdownsi.co.uk

Company Registration No.
242 6786

TABLE OF CONTENTS

FIGURES AND APPENDICES

1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ infiltration testing and groundwater monitoring at Railway Approach, Worthing, West Sussex. The groundwater monitoring standpipes were installed in conjunction with the infiltration testing works, with the monitoring period scheduled to take place between October 2025 and March 2026.

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 Q15236/Rev1, dated 6th August 2025. The instruction to proceed was received from the client, Architectus Ltd.

The specific objectives of the works were to:

a) Establish the expected geology and hydrogeology at the site;
b) Investigate the shallow ground and groundwater conditions broadly in the specified areas across the site;
c) Provide advice/parameters to assist others in undertaking design of soakaways; and
d) Install standpipes to facilitate future winter groundwater monitoring.

2. SITE CONTEXT

2.1 Site Location

The site is located at Railway Approach, Worthing, West Sussex, and is centred on the approximate Ordnance Survey national grid reference 514658, 103368. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological Setting

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	River Terrace Deposits	Secondary B Aquifer
Bedrock	London Clay Formation	Unproductive Stratum

The River Terrace Deposits generally comprise well graded sandy fine to coarse gravel. Locally sand or gravel strata may predominate. Lenses of clay, silt and localised peat may be present. Gravels normally include a high proportion of subangular flint.

The London Clay Formation forms part of the Thames Group. The formation is of Ypresian age (47.8 to 56 million years old; Early Eocene). The London Clay Formation mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions ('cementstone nodules') and disseminated pyrite. It also includes a few thin beds of shells and fine sand

partings or pockets of sand, which commonly increase towards the base and towards the top of the formation. At the base, and at some other levels, thin beds of black rounded flint gravel occur in places. Glauconite is present in some of the sands and in some clay beds, and white mica occurs at some levels. The formation is recorded by the BGS to range in thickness up to 150m.

2.3 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 the drilling of two boreholes, denoted WS01 and WS02, and the machine excavation of a single trial pit, denoted TP01. The intrusive work was carried out on the 12th August 2025. The exploratory hole locations are shown on Figure 2.

Falling head soakage testing was undertaken within the trial pit in general accordance with the test methodology given by BRE guidance[1], other than the pit was filled only once rather than the three times suggested by the digest due to the slow infiltration of water into the surrounding soils. The results of the testing along with the infiltration rate calculations are included in the appendices to this report.

Groundwater monitoring standpipes were installed to a depth of 4.00m within each of borehole WS01 and WS02. Descriptions of the installations are shown on the exploratory hole records. Dataloggers are due to be installed at a later date to capture the winter groundwater monitoring period between Autumn/Winter 2025 into Spring 2026.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the appended exploratory hole records. Explanatory notes to assist in their interpretation are also appended.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 Surface Covering

Borehole WS02 and trial pit TP01 were initially excavated through a surface covering of pea shingle, some 30mm to 100mm in thickness. Borehole WS01 was excavated through a 70mm thick layer of topsoil.

4.1.2 Made Ground

Made Ground was encountered in all three exploratory hole positions to depths of between 0.85m and 1.80m below ground level. Generally, coarse-grained sands and gravels were encountered beneath the pea shingle surfacing at exploratory holes WS02 and TP01, to depths of 0.60m and 0.20m respectively,

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

with varying amounts of crystalline rock, flint, concrete, charcoal and brick. Beneath the coarse-grained material, and beneath the topsoil at the position of borehole WS01, a gravelly clay was identified persisting to the base of the made ground; the gravel content comprised predominately the same material as that found in the coarse-grained soils, but locally with fragments of chalk.

4.1.3 River Terrace Deposits

Underlying the made ground the investigation progressed into undisturbed clay with varying amounts of gravel and sand, which extended to the base of the trial pit and to depths of 4.00m and 3.85m in boreholes WS01 and WS02, respectively; the gravel content comprised fine to coarse chalk and flint. The boreholes then progressed into a gravelly sand deposit at the base of the clay stratum, which continued to a depth of 4.60m below ground level in each case. The gravel content was made up of flint.

These deposits are considered to represent the River Terrace Deposits indicated to underlie the site on BGS geological maps.

4.1.4 London Clay Formation

Beneath the River Terrace Deposits, boreholes WS01 and WS02 penetrated, a dark grey clay which continued to the full extent of the investigation at 5.00m below ground level.

These deposits are considered to represent the London Clay Formation indicated to underlie the River Terrace Deposits on the BGS geological maps.

4.2 Stability

Both boreholes WS01 and WS02 collapsed to respective depths of 4.18m and 4.10m below ground level on completion of the drilling works; the trial pit remained stable.

4.3 Groundwater Conditions

Groundwater was recorded at a depth of 3.40m only within borehole WS01; exploratory holes WS02 and TP01 remained dry.

It should be noted that water levels within the exploratory holes may not have equilibrated with the groundwater table at the time the readings were recorded and that groundwater levels should be expected to fluctuate seasonally.

5. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing[2] was carried out in trial pit TP01. From the test results a calculation was made to determine the infiltration rate that could be expected for infiltration systems constructed into the underlying Made Ground/River Terrace Deposits.

During the test performed within the trial pit, the water level did not fall below 25% of the initial test depth and calculation of the soil infiltration rate in accordance with the BRE digest was not possible. The soil

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

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 following infiltration rate was derived from the test:

Table 2. Calculated Infiltration Rates

Exploratory Hole	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)	Stratum	Infiltration Rate (f) (m/sec)
TP01	0.34	1.98*	Made Ground / River Terrace Deposits	1.65×10^{-6}

*Average pit depth

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

The result from the infiltration test should be provided to engineers responsible for the design of the drainage system.

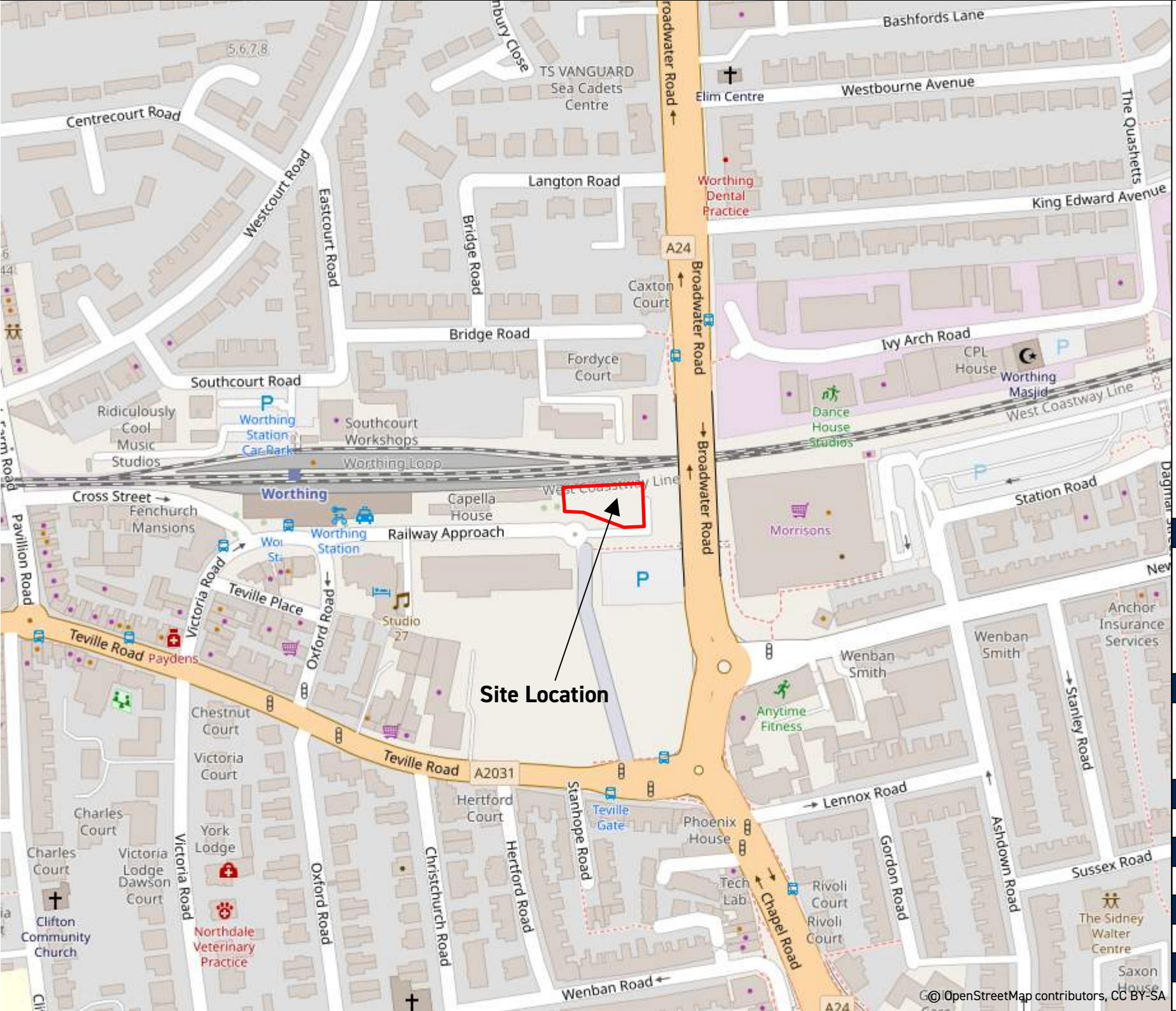
To comply with building regulations[3], point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings.

The infiltration testing conducted in the trial pits is intended to provide calculated soil infiltration rates to assist in the preliminary design of infiltration systems at the site. However, it should be noted that Regulators/Local Authorities may require further testing to be undertaken at a later stage in accordance with the BRE365 guidance. This guidance states the testing should be carried out at the locations and depths of the proposed soakaways, which will not be known until preliminary drainage design has been undertaken.

Monitoring of groundwater levels during the worst annual case (winter period) is due to be undertaken as part of the quantum of works and is likely to commence in October 2025 for 6 months. Local Authorities and the BRE365 guidance suggest this should be undertaken prior to finalising design of infiltration systems.

[3] The Building Regulations 2010; Part H; Drainage and Waste Disposal

FIGURES & APPENDICES



N

ASHDOWN
SITE INVESTIGATION

Head Office

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
contact@ashdownsi.co.uk

Site

Railway Approach
Worthing
West Sussex

Project Ref

P17323

Figure No

1

Drawing Title

Site Location Plan

Scale

Not To Scale

Reinforced Conc Kerb
Ht=0.1m

I/R Ht=2.4m

Crash Barrier
Ht=0.6m

Parking Bays

Unmade

Conc Kerb

TP01

Unmade/
Grass

I/R
Ht=2.4m

WS01

Grass

Crash Barrier
Ht=0.6m

100ø

FWMH
CL=7.18
IL=4.42

Car Park
Tarmac

Crash Barrier
Ht=0.6m

Conc Kerb

Parking Bays

Gate

LP

Conc

Tarmac

CCTV

Rtw
Ht=1.3m

Parking Bays

Tactile

DK

Tarmac

Post's

Conc Kerb

Conc Kerb

Unmade

WS02

Rtw Ht=1.7m

Grass

Gate

Post

BT's

LP

Unmade

I/R Ht=2.4m

Rtw Av Ht=1.0m

MH
6.80

BO

Conc

MH
6.24

Gy
5.73

Tarmac

Conc

Gate

Conc

ENTRY

N

ASHDOWN
SITE INVESTIGATION

Head Office

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
contact@ashdownsi.co.uk

Site

Railway Approach
Worthing
West Sussex

Project Ref

P17323

Figure No

2

Drawing Title

Site Plan

Scale

Not To Scale

ASHDOWN
SITE INVESTIGATION

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.
L	Liner sample cut to length indicated.
D	Disturbed Sample
B	Bulk Disturbed Sample
W	Water Sample
ES	Environmental Suite (on older records may be referenced J T)

In Situ Testing

SPT	Standard penetration test (SPT): Using the split spoon sampler.
SPT(C)	Standard Penetration Test (SPT): Using a solid cone instead of the sampler – conducted usually in coarse grained soils or weak rocks.
HV	Shear Vane Test: Undrained shear strength (cohesion).
PP	Hand penetrometer Test: Undrained shear strength (cohesion).
P	Perth Penetrometer Test: Number of blows for 300mm penetration shown under remarks section.

Excavation Method

CP	Cable Percussion Borehole
RC/RO	Rotary Cored Borehole/Rotary Open Hole Borehole
WLS	Dynamic Sampler Borehole using windowless sampler tubes
WS	Dynamic Sampler Borehole using window sampler tubes
TP	Trial Pit excavated using mechanic excavator
HP	Trial Pit excavated using hand tools
HA	Hand Auger borehole

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 (where undertaken)

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.

Dynamic (Windowless) Sampler

WS01
Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:25

Project Name	Project No.	Start Date	End Date
Railway Approach, Worthing, West Sussex	P17323	2025-08-12	2025-08-12

Client | **Consultant** | **Contractor**

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.07) 0.07		Topsoil.
								MADE GROUND: Brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse brick, chalk, crystalline rock and charcoal-like material.
		0.70	D			(1.03)		
						1.10		
		1.20	D			(0.15) 1.25		Orange brown gravelly SAND. Gravel is subangular to subrounded fine to coarse flint. [River Terrace Deposits]
								Brown silty CLAY. [River Terrace Deposits]
		1.60	D			(0.50)		
						1.75		Light brown and yellow brown gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk. [River Terrace Deposits]
		2.70	D			(2.25)		*with increasing chalk gravel content with depth. (3.00m)*
		3.80	D			4.00		Grey brown gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to coarse flnt. [River Terrace Deposits]
						(0.60)		
						4.60		Dark grey CLAY. [London Clay Formation]
		4.90	D			(0.40)		
						5.00		*End of Borehole at 5.00m*

Remarks
Groundwater recorded at 3.40m depth on completion.
Standpipe installed to 4.00m depth; 4.00m to 1.00m slotted pipe with gravel surround; 1.00m to ground level plain pipe with bentonite seal; completed with end cap and security cover conceted flush with ground surface.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS
Borehole collapsed to 4.18m depth on completion.

Logger
GRD

Dynamic (Windowless) Sampler

WS02

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WLS				1:25

Project Name	Project No.	Start Date	End Date
Railway Approach, Worthing, West Sussex	P17323	2025-08-12	2025-08-12

Client | **Consultant** | **Contractor**

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.03) 0.03		Pea shingle gravel.
						(0.07) 0.10		MADE GROUND: Dark grey sandy subangular to subrounded fine to coarse gravel of flint, concrete and charcoal-like material.
						(0.05) 0.15		MADE GROUND: Orange brown medium to coarse sand.
		0.40	D			(0.45)		MADE GROUND: Brown sandy clayey subangular to subrounded fine to coarse gravel of flint, crystalline rock, slate and charcoal-like material.
						0.60		
		0.80	D			(0.25)		MADE GROUND: Dark brown slightly gravelly clay. Gravel is subangular to subrounded fine to coarse flint with rare chalk and charcoal-like material.
						0.85		Brown silty CLAY with rare subangular to subrounded fine to medium gravel of flint. [River Terrace Deposits]
		1.10	D					*with no gravel content below 1.00m depth. (1.00m)*
						(0.85)		
						1.70		Light brown gravelly slightly sandy silty CLAY with occasional orange staining. Gravel is subangular to subrounded fine to coarse chalk and flint. [River Terrace Deposits]
		1.80	D					
		2.50	D					
						(2.15)		
		3.20	D					
						3.85		Brown slightly gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to medium flint. [River Terrace Deposits]
		4.30	D			(0.75)		
						4.60		Dark grey CLAY with rare gravel of flint. [London Clay Formation]
		4.80	D			(0.40)		
						5.00		*End of Borehole at 5.00m*

Remarks

Borehole dry on completion.

Standpipe installed to 4.00m depth; 4.00m to 1.00m slotted pipe with gravel surround; 1.00m to ground level plain pipe with bentonite seal; completed with end cap and security cover conceted flush with ground surface.

Method, Plant, Stability, Dimensions | **Logger**

0.00 - 5.00m WLS — GRD

Borehole collapsed to 4.10m depth on completion.

Trial Pit

TP01

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Railway Approach, Worthing, West Sussex	P17323	2025-08-12	2025-08-12

Client | **Consultant** | **Contractor**

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10) 0.10		Pea shingle gravel.
						(0.10) 0.20		MADE GROUND: Pink grey subangular to subrounded fine to medium gravel of crushed rock.
		0.35	D			(0.20) 0.40		MADE GROUND: Dark brown gravelly clay. Gravel is subangular to subrounded fine to medium flint, crushed rock and breeze block.
						(1.40)		MADE GROUND: Light brown and brown gravelly clay. Gravel is subangular to subrounded fine to coarse chalk and flint.
		1.50	D					*with a cobble of flint at 1.60m depth. (1.60m)*
								with whole bricks between 1.60m and 1.70m depth. (1.60 - 1.70m)
		1.90	D			1.80 (0.18) 1.98		Brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium chalk and rare flint. [River Terrace Deposits]
								End of Trial Pit at 1.98m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks

Trial pit depth varied between 1.91m and 2.01, averaging a depth of 1.98m.
Trial pit dry on completion.

Method, Plant, Stability, Dimensions

0.00 - 1.98m TP
Trial pit stable on completion.
L = 1.97m
W = 0.41m

Logger
ON

TRIAL PIT INFILTRATION TEST RESULTS

Site: Railway Approach, Worthing, West Sussex **Project Ref:** P17323

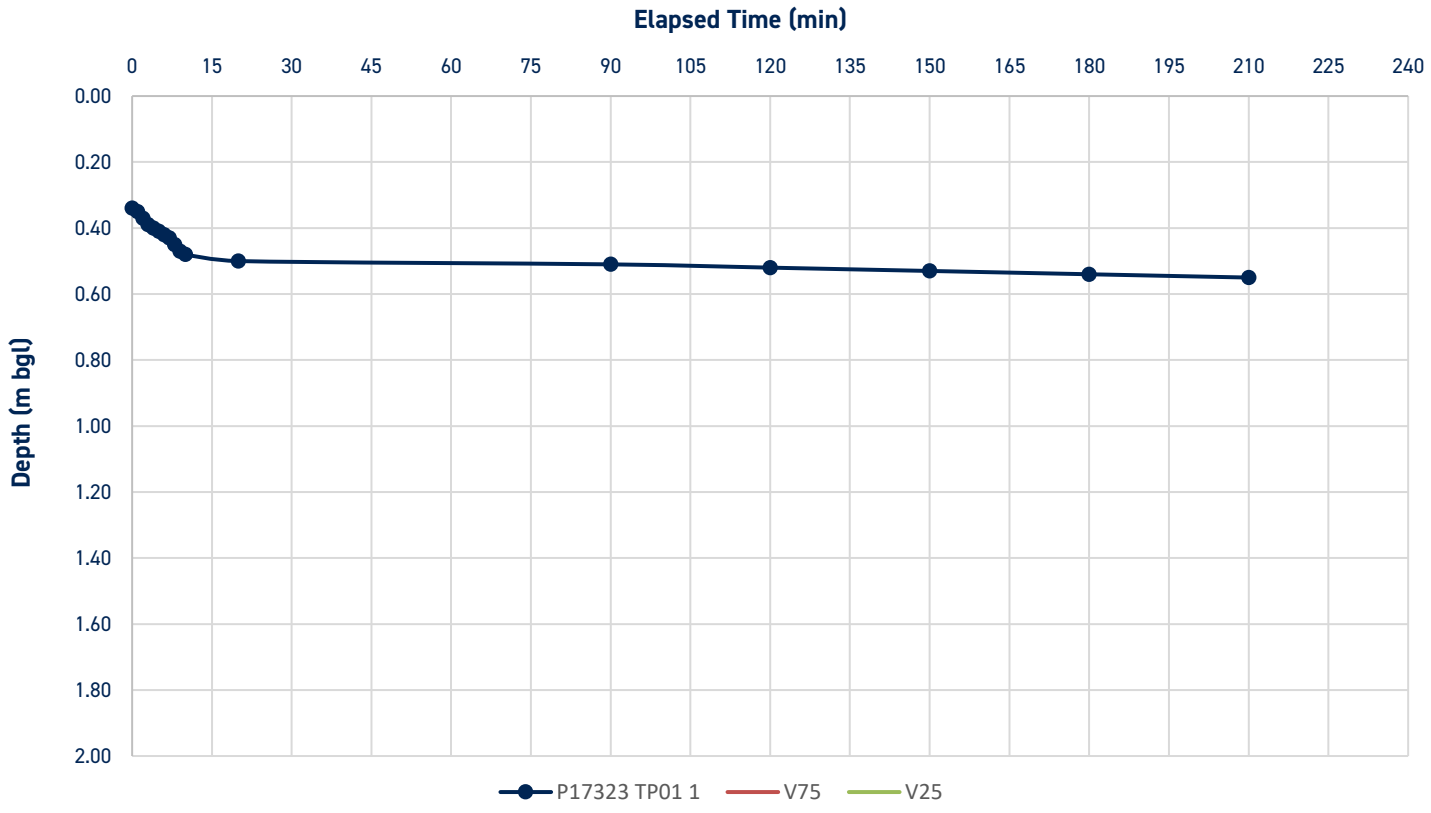
Test Location Reference	**TP01**
Test Number	**1**

Width of Pit	0.41	m	W
Length of Pit	1.97	m	L
Depth of Pit	1.98	m	D
Pit type	Open		

Volume of water introduced into pit	1.301	m^3	
Initial head of water	1.64	m	h_o
Water level at start of test	0.34	m	
Water level at end of test	0.55	m	
Volume of water discharged from pit	0.167	m^3	
Duration of test	210	min	
Average soaked surface area	8.05	m^2	
Time for water level to fall to 75% of initial head	Not reached	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	Not reached	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	4.67	m^2	a_{s50}

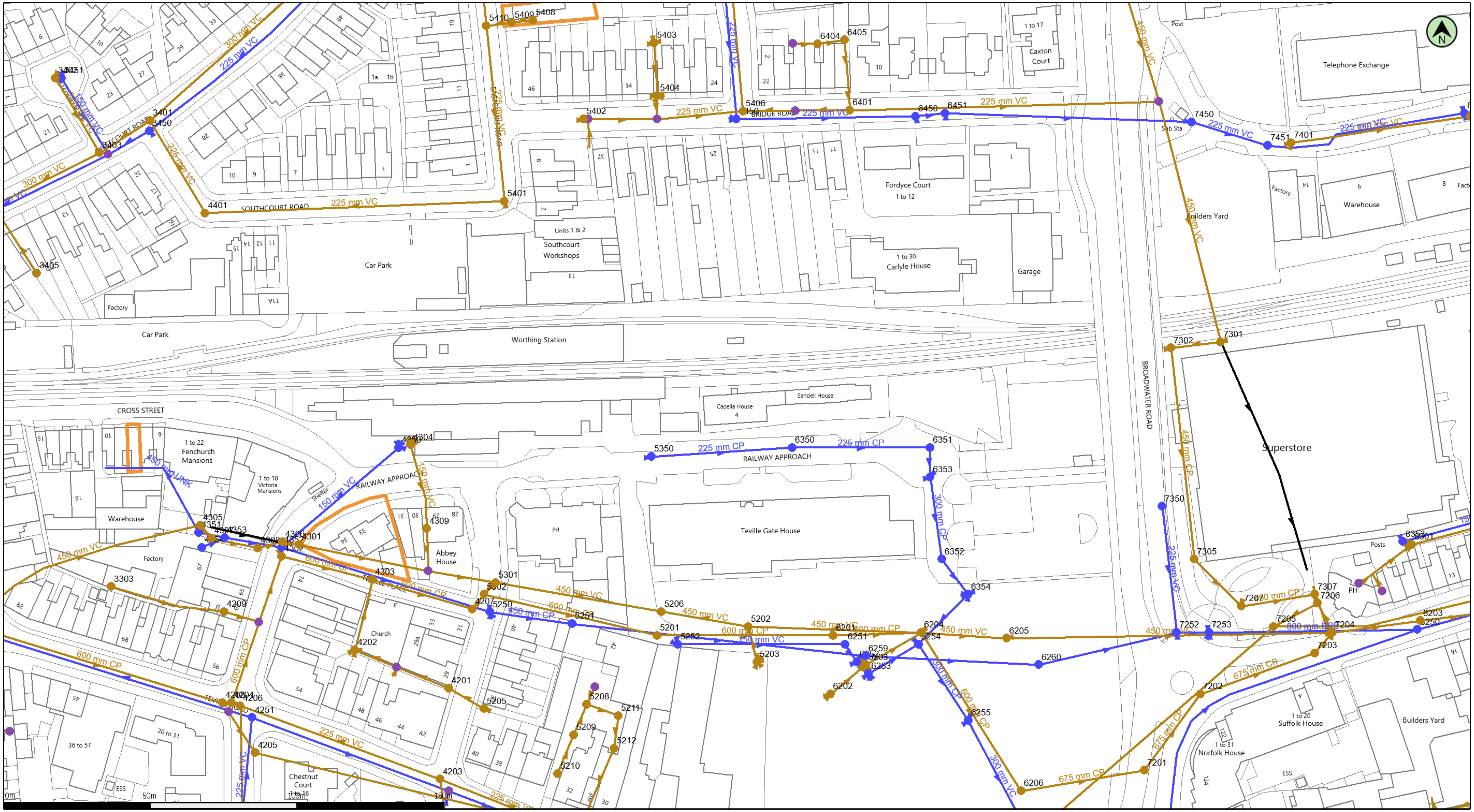
Infiltration rate **1.65E-06 m/sec f**

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.



Appendix E

Sewer Records



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122	Date: 24/04/25	Scale: 1:1250	Map Centre: 514587,103365	Data updated: 20/03/25	Our Ref: 1752684 - 2	Wastewater Plan A3 Powered by digdat

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000808122 .This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

Foul Gravity Sewer
Combined Gravity Sewer
Culverted Water Course or Treated Effluent
Surface Water Gravity Sewer
Rising Main, Vacuum or Syphon
Combined Outfall
Surface Water Outfall
Foul Outfall
Surface Water Inlet
Combined Pumping Station
Surface Water Pumping Station
Foul Pumping Station
Water Treatment Works
Section 104 Area
Building Over Agreement Area
Foul Manhole
Combined Manhole
Surface Water Manhole
Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway

jez.rippon@architectus.co.uk

CAPELLA HOUSE

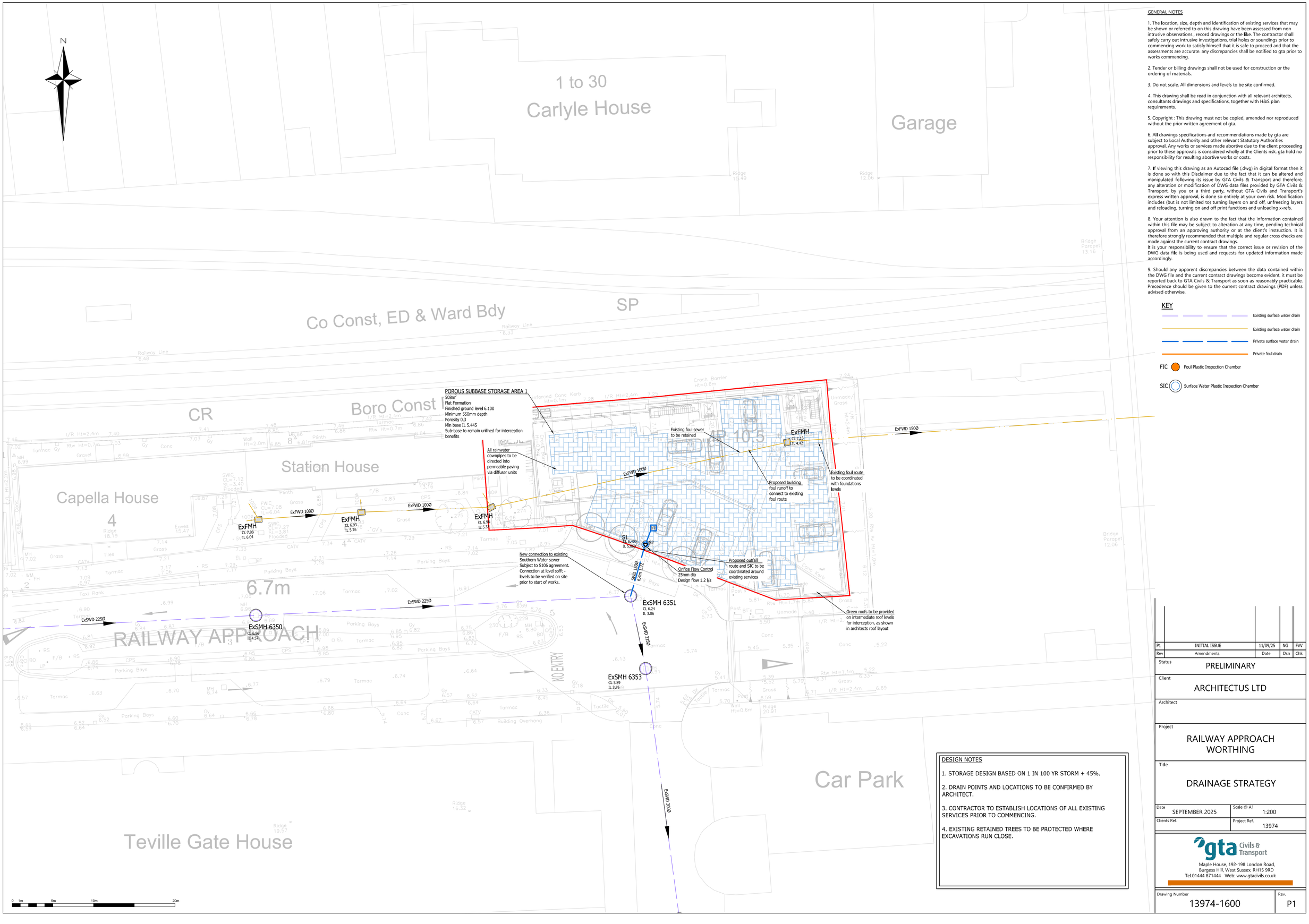
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
3303	F	0.00	0.00	
3401	F	7.77	0.00	
3402	F	7.75	0.00	
3403	F	7.58	0.00	
3405	F	0.00	0.00	
4201	F	5.03	0.00	
4202	F	5.10	3.39	
4203	F	5.17	2.79	
4204	F	5.47	1.99	
4205	F	5.50	-2.60	
4206	F	5.46	0.00	
4207	F	4.97	1.68	
4208	F	0.00	0.00	
4209	F	0.00	0.00	
4301	F	5.40	0.00	
4302	F	5.37	1.88	
4303	F	5.10	0.00	
4304	F	6.84	0.00	
4305	F	5.61	1.96	
4306	F	5.25	1.55	
4307	F	5.50	1.95	
4308	F	5.21	1.66	
4309	F	0.00	0.00	
4401	F	7.23	0.00	
5201	F	5.60	1.52	
5202	F	5.59	0.00	
5203	F	5.11	0.00	
5205	F	5.05	3.70	
5206	F	0.00	0.00	
5208	F	0.00	0.00	
5209	F	0.00	0.00	
5210	F	0.00	0.00	
5211	F	0.00	0.00	
5212	F	0.00	0.00	
5301	F	5.33	0.00	
5302	F	5.15	1.62	
5401	F	7.25	5.65	
5402	F	7.43	5.67	
5403	F	7.45	6.28	
5404	F	7.39	5.91	
5406	F	7.42	0.00	
5408	F	0.00	0.00	
5409	F	0.00	0.00	
5410	F	0.00	0.00	
6201	F	5.04	1.52	
6202	F	4.79	2.90	
6203	F	4.88	2.58	
6204	F	4.92	1.46	
6205	F	4.37	1.23	
6206	F	4.48	1.27	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
6401	F	7.44	4.77	
6404	F	0.00	0.00	
6405	F	0.00	0.00	
7201	F	5.57	1.17	
7202	F	6.36	1.12	
7203	F	0.00	0.00	
7204	F	5.22	0.86	
7205	F	5.61	0.00	
7206	F	5.27	0.82	
7207	F	5.81	1.10	
7301	F	6.09	1.62	
7302	F	6.12	1.54	
7305	F	5.79	1.21	
7307	F	5.30	0.96	
7401	F	6.77	5.65	
8203	F	4.92	0.81	
8301	F	5.12	3.06	
8401	F	6.26	4.61	
3450	S	7.76	6.24	
3451	S	7.75	6.42	
4251	S	5.41	2.80	
4350	S	6.80	4.92	
4351	S	5.71	0.00	
4352	S	5.36	0.00	
4353	S	5.50	4.12	
4354	S	0.00	0.00	
5250	S	5.08	3.86	
5251	S	0.00	0.00	
5252	S	5.63	4.81	
5350	S	6.68	5.19	
5450	S	7.32	6.35	
6251	S	4.99	0.00	
6252	S	4.87	3.70	
6253	S	4.78	3.51	
6254	S	4.73	3.09	
6255	S	4.34	0.00	
6259	S	0.00	0.00	
6260	S	0.00	0.00	
6350	S	6.96	4.57	
6351	S	6.22	3.86	
6352	S	5.31	3.46	
6353	S	5.89	3.76	
6354	S	4.94	3.25	
6450	S	7.52	6.24	
6451	S	7.63	6.23	
7252	S	7.09	2.99	
7253	S	7.00	3.06	
7350	S	9.16	0.00	
7450	S	7.14	5.52	
7451	S	6.80	5.02	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
8250	S	4.94	1.49	
8353	S	5.23	3.94	
8450	S	6.35	0.00	

Appendix F

Scheme Drawings



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 like. 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.

7. If viewing this drawing as an Autocad file (.dwg) in digital format then it is done so with this Disclaimer due to the fact that it can be altered and manipulated following its issue by GTA Civils & Transport and therefore, any alteration or modification of DWG data files provided by GTA Civils & Transport, by you or a third party, without GTA Civils and Transport's express written approval, is done so entirely at your own risk. Modification includes (but is not limited to) turning layers on and off, unfreezing layers and reloading, turning on and off print functions and unloading x-refs.

8. Your attention is also drawn to the fact that the information contained within this file may be subject to alteration at any time, pending technical approval from an approving authority or at the client's instruction. It is therefore strongly recommended that multiple and regular cross checks are made against the current contract drawings.
It is your responsibility to ensure that the correct issue or revision of the DWG data file is being used and requests for updated information made accordingly.

9. 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.

KEY

- Existing surface water drain
- Existing surface water drain
- Private surface water drain
- Private foul drain
- FIC — Foul Plastic Inspection Chamber
- SIC — Surface Water Plastic Inspection Chamber

DESIGN NOTES

1. STORAGE DESIGN BASED ON 1 IN 100 YR STORM + 45%.

2. DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT.

3. CONTRACTOR TO ESTABLISH LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCING.

4. EXISTING RETAINED TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.

Rev		Date	Dsn	Chk
P1	INITIAL ISSUE	11/09/25	NG	FVV

Status: PRELIMINARY

Client: ARCHITECTUS LTD

Architect:

Project: RAILWAY APPROACH WORTHING

Title: DRAINAGE STRATEGY

Date	Scale @ A1
SEPTEMBER 2025	1:200
Clients Ref.	Project Ref. 13974

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	Rev.
13974-1600	P1

Appendix G

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	12/09/2025
Calculated by	FVV
Reference	13974
Model version	2.1.2

Location

Site name	Capella House
Site location	Worthing

Site easting (British National Grid)	514666
Site northing (British National Grid)	103358

Site details

Total site area (ha)	0.079 ha

Greenfield runoff

Method

Method	FEH statistical

FEH statistical

	My value		Map value
SAAR (mm)	715 mm		715
BFIHOST	0.605		
QMed-QBar conversion	1.136		1.136
QMed (l/s)	0.17 l/s		
QBar (FEH statistical) (l/s)	0.19 l/s		

Growth curve factors

	My value		Map value
Hydrological region	7		7
1 year growth factor	0.85		
2 year growth factor	0.88		
10 year growth factor	1.62		
30 year growth factor	2.3		
100 year growth factor	3.19		
200 year growth factor	3.74		

Results

Method	FEH statistical
Flow rate 1 year (l/s)	0.2 l/s
Flow rate 2 year (l/s)	0.2 l/s
Flow rate 10 years (l/s)	0.3 l/s
Flow rate 30 years (l/s)	0.4 l/s
Flow rate 100 years (l/s)	0.6 l/s
Flow rate 200 years (l/s)	0.7 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

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Depth (m)
S2	0.075	5.00	6.100	Manhole	0.655
S1			6.412	Manhole	1.350
ExSMH 6351			6.260	Manhole	1.350

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)
1.000	S2	S1	5.880	0.600	5.445	5.062	0.383	15.4	150	5.04
1.001	S1	ExSMH 6351	5.195	0.600	5.062	4.910	0.152	34.2	150	5.09

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.584	45.7	0.0	0.505	1.200	0.075	0	0.000
1.001	1.727	30.5	0.0	1.200	1.200	0.075	0	0.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	4.2
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	1.000	Drain Down Time (mins)	240	2 year (l/s)	1.3		
Winter CV	1.000	Additional Storage (m³/ha)	0.0	30 year (l/s)	3.4		

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	45	0	0
30	40	0	0				

Pre-development Discharge Rate

Site Makeup	Brownfield	PIMP (%)	100	Betterment (%)	0	Q 100 year (l/s)	4.2
Brownfield Method	MRM	CV	1.000	Q 2 year (l/s)	1.3		
Contributing Area (ha)	0.079	Time of Concentration (mins)	5.00	Q 30 year (l/s)	3.4		

Node S1 Online Orifice Control

Flap Valve	x	Invert Level (m)	5.062	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.025		

Node S2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Width (m)	10.000	Depth (m)	0.550
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	5.445	Length (m)	50.800	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)		Slope (1:X)	150.0		

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	S2	132	5.637	0.192	5.6	8.3467	0.0000	SURCHARGED
180 minute summer	S1	132	5.637	0.575	1.1	0.0914	0.0000	SURCHARGED
180 minute summer	ExSMH 6351	132	4.928	0.018	1.0	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)
180 minute summer	S2	1.000	S1	1.1	0.246	0.024	0.1035
180 minute summer	S1	1.001	ExSMH 6351	1.0	0.772	0.032	0.0065

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	S2	232	5.884	0.439	9.8	41.1031	0.0000	FLOOD RISK
240 minute winter	S1	232	5.883	0.821	1.5	0.1306	0.0000	SURCHARGED
240 minute winter	ExSMH 6351	236	4.930	0.020	1.2	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)
240 minute winter	S2	1.000	S1	1.5	0.310	0.032	0.1035
240 minute winter	S1	1.001	ExSMH 6351	1.2	0.815	0.038	0.0074

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	S2	236	5.983	0.538	12.6	56.3195	0.0000	FLOOD RISK
240 minute winter	S1	236	5.983	0.921	1.8	0.1464	0.0000	SURCHARGED
240 minute winter	ExSMH 6351	236	4.931	0.021	1.2	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)
240 minute winter	S2	1.000	S1	1.8	0.276	0.039	0.1035
240 minute winter	S1	1.001	ExSMH 6351	1.2	0.828	0.041	0.0078

Appendix H

Draft Drainage Maintenance Plan

Railway Approach, Worthing
Drainage Maintenance Plan

Contents

Issue	Issue date	Compiled	Checked
First Draft Issue	12.09.25	NG	FVV

1 Introduction

1.1 This report has been prepared by GTA Civils & Transport Ltd for Architectus Ltd in relation to the proposed development at Railway Approach, Worthing. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.2 This Drainage Maintenance Plan (DMP) has been prepared for inclusion as an Appendix to the Flood Risk Assessment (FRA) submitted to Worthing Borough Council in order to support the planning application.

1.3 The DMP sets out the framework for the management of the proposed sustainable drainage systems (SuDS) within the development. The DMP remains a draft version during the design stage; it will be updated with final construction information prior to Handover and will remain a live document over the duration of the project. At this stage, what is set out herein is intended to be sufficient to demonstrate the viability of the proposed SuDS maintenance regime for planning purposes.

2 Ownership & Maintenance Responsibilities

2.1 A summary of the ownership and maintenance responsibilities for the development is as follows:

- The private drainage will be cared for by a Management Company.
- The developer will be responsible for maintaining completed SuDS components in advance of transfer to / adoption by the relevant party.

2.2 The DMP is intended to comprise a useful handbook for the Management Company to assist with arranging regular and appropriate maintenance activities for the assets under its control. Hence, the DMP only includes the maintenance activities for which the Management Company will be responsible.

2.3 The following sections set out schedules detailing the maintenance requirements for each of the main drainage items used within the scheme. The Management Company will undertake the inspections and maintenance activities in accordance with these schedules. Public bodies will maintain adopted features in line with their established procedures.

2.4 The Management Company will seek financial contributions (in the form of service charges), at regular intervals, from the leaseholders/owners of the development to include for the regular costs of the maintenance of the site drainage.

2.5 Additional reference should be made to currently established best practice and guidance documents such as The SuDS Manual (CIRIA C753, 2015) and other resources available at the susdrain website (www.susdrain.org).

2.6 This DMP should be considered a live document. The frequency of maintenance intervals may need to be increased or decreased based on the observed performance of the drainage systems over time. Changes should be agreed with the drainage authority and recorded and dated in the DMP.

2.7 Important safety information is set out in the next section.

3 Health and Safety

3.1 All those responsible for and involved in the maintenance of the site drainage systems should be safety-conscious and comply with the relevant health and safety legislation. This includes:

- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Work Regulations 1999
- The Workplace (Health, Safety and Welfare) Regulations 1992

3.2 The Building Management Company is responsible for suitable risk assessment and management to ensure safe working conditions and practices. Measures to protect potential visitors also need to be considered.

3.3 Specialist contractors used should work to industry guidelines and be able to demonstrate safe working practices.

3.4 Employers have a duty to employees to inform them about the risks of their work environment and to decrease the risk as far as reasonably practicable. Appropriate personal protective equipment (PPE) should be provided and policies implemented based on risk assessment.

3.5 Operatives should be trained for working near water. Risks of contaminated water should be considered. Checking for open cuts and using nitrile gloves, waterproof plasters etc is advised.

3.6 Entry of pipes, chambers, tanks and culverts should be avoided. Work should be carried out from the surface using appropriate equipment. In the event that entry cannot be avoided to perform a critical task, the required safety training, protection measures and precautions must be implemented prior to entry. Lone working should never be attempted.

3.7 For further information refer to Section 36 of The SuDS Manual (CIRIA C753).

4 Schedule A – Sewers, Manholes & Gullies

4.1 Regular inspection and maintenance is required to ensure the effective long-term operation of private drains, manholes, gullies & channel drains.

4.2 Prior to construction: a CCTV survey to be carried out on all receiving existing public sewer systems prior to connection with adopted sewers.

4.3 Post Completion: a CCTV survey to be carried out on all new and retained existing drainage systems and any downstream receiving systems, prior to connection with adopted sewers.

4.4 The report will be used to prove the integrity of the as-built drainage system prior to issue of practical completion certificate and will be handed over to the Client & Management Company for future reference.

4.5 Ongoing maintenance responsibility for all adopted sewers is by the sewerage authority and for adoptable highway drainage is by West Sussex County Council. All other private gullies and drainage marked on the layouts to be maintained by the Building Management Company. Operation and maintenance requirements for all sewers, manholes and gullies are described in the following table:

Schedule	Action	Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action. Common yard & car park & other hard standing areas to be swept clear of debris, to prevent possibility of blockages to the receiving drainage systems. Debris removal from gullies (where may cause risks to performance). Lift and inspect receiving manholes to check for any blockages.	6 Monthly intervals. Monthly. 6 Monthly intervals, after autumn leaf fall, or as required based on specific observations. Monthly.
Remedial Actions	Repair any damaged gully gratings.	As required.
Monitoring	Carry out full CCTV survey to confirm ongoing integrity of all drains. Inspect all gullies and silt pits during the survey.	10-yearly intervals.

4.6 Where appropriate refer also to specialist drainage manufacturer's information and maintenance requirements.

4.7 In all instances, inspection and cleaning should be carried out only by a specialist contractor and in accordance with the guidelines given in `Safe Working in Sewers and

at Sewage Works' published by National Joint Health and Safety Committee for the Water Services.

4.8 Further information on safety is set out in Section 3.

5 Schedule B – Permeable Pavement

5.1 Inspection Frequency and Maintenance Requirements: as per table below.

Schedule	Action	Frequency
Regular Maintenance	Machine sweeper (push- or scarab-type).	Annually after autumn leaf fall
Occasional Maintenance	Weed removal	Annually
Remedial Actions	Remediate adjacent landscaping to original levels Paving repairs including replenishment of lost jointing material Rehabilitation of surface and upper substructure by remedial sweeping	As required As required Every 10 to 15 years or as required if infiltration is reduced by clogging
Monitoring	Initial inspection Inspection for evidence of poor operation and/or weed growth Inspection for silt accumulation to establish sweeping frequencies Monitor inspection chambers	Monthly for first three months Quarterly, 48 hrs after large storms in first six months Annually Annually

5.2 Further information on safety is set out in Section 3.

6 Contamination or Dilution of Spillage

6.1 In the event of a spillage it is the responsibility of the landowner to clear up any spillage before it enters the drainage system. The primary method of dealing with any spillage of hydrocarbons should be using sand to soak up the leak and prevent any hydrocarbons entering the drainage system. Once sand has been contaminated it should not be washed into the drainage system but disposed of by a Licensed Contractor.

6.2 Environment Agency – Emergency Contact Number

In the event of a spillage the Environment Agency should be contacted to notify the event and seek advice. The Environment Agency Incident Hotline is **0800 80 70 60** (Freephone 24hrs).

Appendix A

Site Drainage Layouts

[Refer to the FRA, Appendix F, for Drainage Layouts]

Civil Engineering - Transport Planning - Flood Risk

GTA Civils & Transport, Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD
T: 01444 871444 E: enquiries@gtacivils.co.uk www: gtacivils.co.uk
GTA Civils & Transport Limited, Registered in England No. 11917461. VAT Registration No. 319 2609 02

Citation ISO Certification Quality management ISO 9001: 2015 REGISTERED
Certificate No:89542021

Smas Registered

We are a Living Wage Employer