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FLOOD RISK ASSESSMENT and SUDS STRATEGY

Station Road, Warnham, RH12 3SR

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This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

<i>Revision</i>	<i>V02</i>
Date	13/02/2026
Prepared by	A Wallace
Checked by	A Alsop
Authorised by	A Wallace

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1 EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) and drainage strategy reviews the existing drainage arrangement at the application site and proposes a surface water drainage strategy in line with Local Authority and Lead Local Flood Authority (LLFA) guidance.

We understand that the proposed development will involve the construction of a new residential development consisting of 24 new dwellings and associated external works.

This report assesses existing flood risk issues at the site and proposes mitigation where necessary to reduce the risk of flooding to occupant's post-development with no increased risk of flooding off-site.

The development area of the site is located in the Environment Agency's (EA) flood zone 1 (low risk), and at low risk of flooding from all other sources.

The sources of flooding assessed and proposed mitigation measures are listed in the table below.

Source	Risk Category (after mitigation)	Comments
Fluvial (Rivers and Sea)	Low	Site at low risk of flooding.
Coastal and tidal	Negligible	Not near coast or tidal waterbody
Groundwater	Very Low	Low due to local geology
Surface water	Very Low	Low due to natural topography and floor levels
Sewers	Very Low	Low due to natural topography and sewer location
Reservoirs	Negligible	Site not near reservoir and reservoir at very low danger of failure

Surface Water Drainage

The proposed strategy presented in detail in this report aims to restrict surface water discharge to less than the greenfield and the QBar rate and no greater than 2l/s in accordance with best practice. Attenuation and reduced discharge will be provided for all storm events up to and including the 1 in 100-year storm plus 40% allowance for climate change.

An additional 10% allowance for urban creep has been included in the sizing of surface water storage.

Attenuation is provided in below ground tanks with further SUDS measures including water butts and permeable paving.

Maintenance/management of all onsite drainage infrastructure has been considered within a separate maintenance plan appended to this report. This will be updated through the development process.

The proposed drainage strategy is entirely based on-site with a new sewer connection to the existing foul sewer proposed to the sewer company approval.

Overall, the proposals provide a high level of water treatment, runoff reduction and flooding protection for the proposed development and are in accordance with the NPPF and NPG as well as all requirements of the Lead Local Flood Authority (LLFA) and SUDS guidance.

Foul Drainage

It is proposed to discharge the foul drainage from the site into the existing Southern Water sewer within the site.

2 INTRODUCTION

- 2.1.1 Jomas was commissioned to undertake a Drainage Assessment for the proposed development of land located adjacent to Station Road, Warnham, RH12 3SR
- 2.1.2 We understand that the proposed development will involve the construction of a new residential development consisting of 24 new dwellings and associated external works.
- 2.1.3 This Flooding and Drainage Assessment has been produced in support of a planning application and should be read in conjunction with the other planning documents.

3 SITE DESCRIPTION

- 3.1.1 The site is approximately 8820 square metres in size and is greenfield.
- 3.1.2 Pre-development, the site is 0% impermeable (0 square metres). Post development, the impermeable area will increase to 55% (4820 square metres).
- 3.1.3 The site location information is as follows:
- Nearest Postcode: RH12 3SR.

3.2 Topography

Site Topography

- 3.2.1 The site survey is provided in appendix B. The site is greenfield and falls from north to the south and the existing road.

4 DESIGN PRINCIPLES AND POLICY REQUIREMENTS

4.1.1 Since April 2015, Lead Local Flood Authorities (LLFA's) have become a statutory consultee on surface water drainage for many planning applications. For this site, the following is considered to be the required level of detail required for planning approval:

4.1.2 Report to be prepared in accordance with the National Planning Policy Framework (NPPF), the accompanying Planning Practice Guidance (PPG), and the Local Strategic Flood Risk Assessment (SFRA), Preliminary Flood Risk Assessment (PFRA), Surface Water Management Plan (SWMP) and SUDS policies as the Lead Local Flood Authority (LLFA).

4.2 General Principles for Flooding

4.2.1 The National Planning Policy Framework (NPPF) states that when determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific FRA. This assessment is required for:

"Proposals of 1 hectare (ha) or greater in Flood Zone 1, all new development (including minor development and change of use) in Flood Zones 2 and 3 and an area within Flood Zone 1, which has critical drainage problems as notified to the local planning authority by the Environment Agency (EA)."

4.2.2 In accordance with the Planning Practice Guidance (PPG), which supports the NPPF, the objectives of this FRA are to establish:

- *Whether a proposed development is likely to be affected by current or future flooding from any source;*
- *Whether it will increase flood risk elsewhere;*
- *Whether the measures proposed to deal with these effects and risks are appropriate.*

4.3 General Principles for Surface Water Drainage

4.3.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems, National standards for sustainable drainage systems (SuDS) and Local Flood Risk Management Strategy require sustainable drainage systems in all development to reduce surface water runoff and provide water treatment on site. This includes but is not limited to addressing the following issues in order of preference:

- store rainwater for later use
- use infiltration techniques, such as porous surfaces in non-clay areas
- attenuate rainwater in ponds or open water features for gradual release
- attenuate rainwater by storing in tanks or sealed water features for gradual release
- discharge rainwater direct to a watercourse
- discharge rainwater to a surface water sewer/drain
- discharge rainwater to the combined sewer.

Consideration must be given to the direction of water flow across the site and where this may be dispersed and incorporating any features that will help reduce surface water run-off. All developments should achieve greenfield rates where possible, or at least a 50% reduction in surface water discharge and this needs to be demonstrated as part of the planning submission.

5 FLOODING INFORMATION

5.1 Flood Risk from Rivers (Fluvial)

- 5.1.1 As the site is within flood zone 1, there is a low risk of fluvial flooding to the site, the risk of flooding is considered to be Very Low.

5.2 Coastal and Tidal Flood Risk

- 5.2.1 The site is located inland and is not near any tidally influenced watercourses; therefore, there is negligible risk of flooding from this source.

5.3 Geology and Hydrogeology (Groundwater)

- 5.3.1 Information provided by the British Geological Survey indicates that the site is directly underlain by bedrock of:

Weald Clay: Dark grey thinly-bedded mudstones (shales) and mudstones with subordinate siltstones, fine- to medium-grained sandstones, including calcareous sandstone, shelly limestones and clay ironstones.

- 5.3.2 The MAGIC Map indicates the area is not of any note regarding ground conditions.
- 5.3.3 Onsite infiltration testing has been completed (See Appendix B) and confirmed that infiltration is not possible on this site.
- 5.3.4 As the geology indicates low permeability, it is unlikely that groundwater will rise above ground level, hence the risk of flooding from ground water is considered very low.

5.4 Surface Water Flood Risk (Overland Flows)

- 5.4.1 Surface water flooding occurs when the rainwater does not drain away through the normal drainage system or infiltrate the ground, but instead lies on or flows over the ground.
- 5.4.2 The EA produced a Risk of Flooding from Surface Water Map in December 2013. The maps were produced using 'direct rainfall' modelling. Although they consider local drainage capacity, non-surface water influences such as rivers, seas or groundwater are not considered. The map is based on LIDAR topographic data which is not suitable for site specific assessment and therefore, where available, topographic survey data should be used to provide a more accurate understanding of potential flow paths.
- 5.4.3 The map shows the entire country within four different risk categories, defined below in Table 1.

Table 1: EA Surface Water Flood Risk Categories

Risk Category	Definition
----------------------	-------------------

High	Each year, there is a chance of flooding of greater than 1 in 30 (3.3%)
Medium	Each year, there is a chance of flooding of between 1 in 30 (3.3%) and 1 in 100 (1%)
Low	Each year, there is a chance of flooding of between 1 in 100 (1%) and 1 in 1000 (0.1%)
Very Low	Each year, there is a chance of flooding of less than 1 in 1000 (0.1%)

- 5.4.4 An extract of the map, provided below, shows that the area is generally not susceptible to surface water flooding.

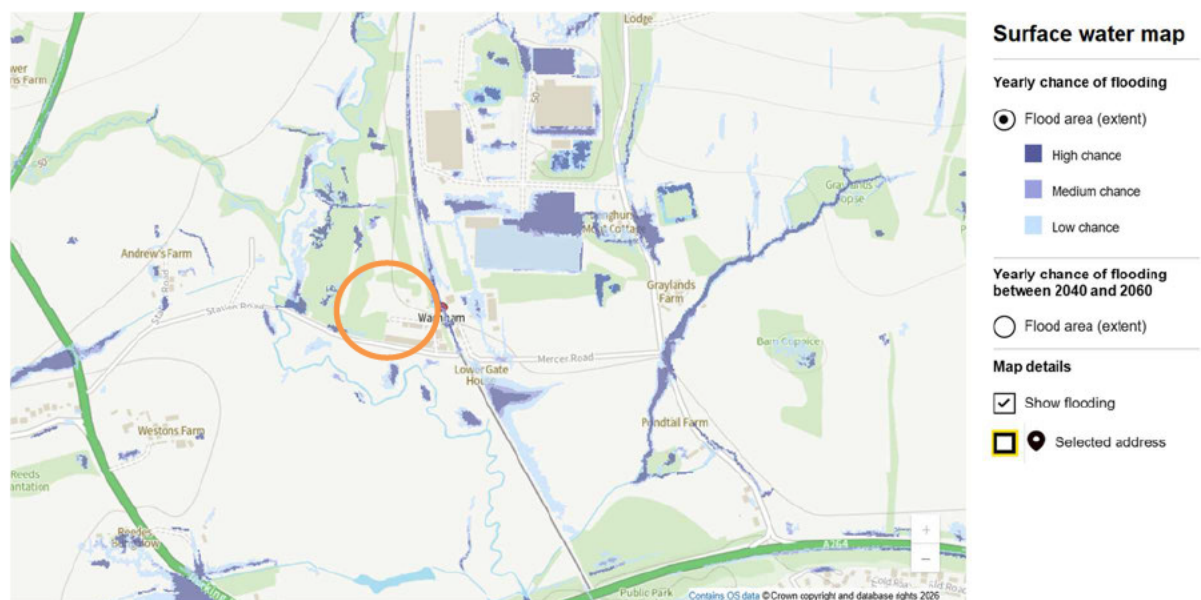


Figure 1: EA Flood Risk from Surface Water Map

- 5.4.5 There is no flooding shown within or near to the site.
- 5.4.6 Based on the EA's mapping, the local SFRA, historical data and local topography, the risk of surface water flooding to the site is considered to be very low.

5.5 Sewer/Drainage Flood Risk

- 5.5.1 Sewer flooding is often caused by excess surface water entering the drainage system when there is insufficient sewer capacity to cope with this excess water, but also due to 'one off' events such as blockages.

5.5.2 Southern Water is the statutory undertaker for the local public sewer network. The nearest Southern Water sewer to the site is a foul sewer running through the site.

5.5.3 As the natural topography of the site falls away towards the street, this indicates that the site is at very low risk of sewer flooding.

5.6 Reservoir Flood Risk

5.6.1 The EA has produced a Reservoir Flood Map that indicates a very low risk of reservoir flooding at the site.

5.6.2 It should be emphasised that the risk of flooding from reservoir breach is very small since the EA is the enforcement authority for the Reservoirs Act (1975) and all large raised reservoirs are inspected and supervised by reservoir panel engineers.

5.6.3 On the basis there is considered to be a negligible risk of reservoir flooding to the site.

5.7 Summary of risk levels

5.7.1 Pre-development, the risk of flooding is summarised below.

Table 2: Flood Risk Categories

Source	Risk Category
Fluvial (Rivers and Sea)	Very Low
Coastal and tidal	Negligible
Groundwater	Very low
Surface water	Very low
Sewers	Very low
Reservoirs	Negligible

6 SITE DRAINAGE INFORMATION

6.1.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems and the National standards for sustainable drainage systems (SuDS) states that the following options must be considered for disposal of surface water runoff in order of preference:

- Collect for non-potable use
- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

Collect for non-potable use

6.1.2 The potential for collection of surface water has been assessed through a review of the potential for reuse on this site.

As there are extensive green areas, it is proposed to install water butts to each dwelling for rainwater reuse.

Discharge to Ground

6.1.3 The potential for surface water to discharge to ground has been assessed through a review of the likely ground conditions and possible infiltration structures.

6.1.4 The surface geology of this site is within an area generally underlain by impermeable grounds and so not suitable for infiltration. Infiltration test results are provided in Appendix B.

Discharge to Surface Water Body

6.1.5 There are no watercourses near the site suitable for discharge of surface water.

Discharge to Surface Water Sewer/Combined Sewer

6.1.6 Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted.

6.1.7 It is proposed to connect to the sewer via the existing foul sewer running through the site. This is subject to Southern Water approval.

6.2 Sustainable Drainage Systems (SuDS)

6.2.1 To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 3 in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

Table 3: SuDS Selection Based on the SuDS Hierarchy

Component	Recommendation
Green/Blue roofs	Whilst the use of green and blue roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and orientation must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority. If feasible, depending on the roof design, a green/blue roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green/blue roof/s will offer some attenuation for run-off, reducing volumes of run-off and in higher frequency events (i.e. 1in2 year storms) will result in no run-off for the building. The roofs are pitched and not suitable for green roofs.
Basins and Ponds	Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value. There is no space for a pond within the site.
Filter Strips and Swales	Swales are linear vegetated drainage features, which provide overland conveyance and storage of surface water whilst trapping sediments and hydrocarbons within run-off. They also create biodiverse areas for planting and habitat. Swales are not considered suitable for this site due to the urban setting restricting the availability of space.
Infiltration Devices	Infiltration devices can provide treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel. Infiltration devices are not suitable for the main drainage system due to the impermeable nature of the existing ground.
Permeable Paving	Whilst incorporating attenuation storage, permeable paving also provides treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel. Tanked permeable paving is proposed for all driveways and the private road areas.
Tanked Systems	This is the least sustainable option in terms of the SuDS Hierarchy. However, the use of tanked systems would still be of benefit compared to traditional drainage systems as it does allow run-off to be slowed down to an acceptable discharge rate.

Component	Recommendation
	There are 2 tanks proposed for the site.
Other	Water Butts are proposed for each dwelling

7 SURFACE WATER DRAINAGE DESIGN

7.1 Site Areas

7.1.1 The development area currently comprises existing greenfield land. The existing and proposed areas are summarised below.

Table 4: Site Areas

Parameter	Existing (m2)	Existing (%)	Proposed (m2)	Proposed (%)
Impermeable area	0	0	4850	55
Permeable area	8820	100	3970	45
Total area	8820	100	8820	100

7.1.2 It is assumed that the surface water runoff from the site currently drains to ground.

7.2 Design Considerations

7.2.1 Consideration has been given to the following when calculating the proposed impermeable areas.

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. To include an allowance for urban creep, the impermeable area used in the drainage calculations has been increased by 10% in accordance with the recommendation made in SC030219.

7.2.2 The climate change allowance used in the Drainage Strategy is in line with updated EA guidance values published in February 2016 for increased rainfall intensities by 2115.

7.3 Greenfield Run-Off Rates

7.3.1 The greenfield runoff rates have been calculated using the Wallingford method and are summarised below with calculations provided in Appendix B.

7.3.2 The discharge rates for the existing and proposed site are summarised below.

Table 5: Existing Greenfield Run-off Rates

Parameter	Greenfield Discharge (l/s)	Proposed Discharge (l/s)
QBar	2.7	2
1 year	2.3	2
30 year	6.2	2

100 year	8.6	2
100 year +40%	NA	2

- 7.3.3 Site discharge should be as close to greenfield values as possible. In accordance with best practice, outflow controls will be set to discharge at less than the QBar rate and no more than 2litres/second for all storm events up to and including the 100 year +40% climate change storm.

7.4 Flood Risk Reduction

- 7.4.1 As infiltration is assumed not possible on this site, reducing the post development run-off discharge rate to 2l/s is achieved through attenuation. Site discharge is via gravity to the existing sewer in the street or nearest watercourse.
- 7.4.2 By controlling run-off rates to less than existing and providing attenuation for all storm events up to and including a 1 in 100-year storm plus 40% climate change allowance, the risk of downstream flooding will be minimised.
- 7.4.3 Details of the drainage system and attenuation structures are presented in the design drawings and calculations in Appendix B.
- 7.4.4 Attenuation is provided in a below ground tank with a hydrobrake outlet to the existing foul sewer on site. A total attenuation volume of approximately 453 cubic metres is proposed within a basin and oversized pipes to cater for the 100 year +40% storm event.
- 7.4.5 The calculations include an assessment of the attenuation for all storm events up to the 100-year storm +40% climate change.

7.5 Exceedance Flooding and Overland Flow

- 7.5.1 The area is not subject to overland flow routes or surface water flooding as discussed in the Flooding section above.
- 7.5.2 The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the overland flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site.
- 7.5.3 Due to the site levels falling away to the street, all overland flow will run through the site to the street or infiltrate into the ground. See overland flow plan in Appendix B.

7.6 Consents, Offsite Works and Diversions

- 7.6.1 The proposed surface water drainage strategy is accommodated totally on-site, with the only requirement for off-site works being the new connection to the foul sewer.
- 7.6.2 As it is proposed to connect both the foul and surface water discharge to the foul sewer, this will require approval from TW.

7.6.3 This is required as there are no surface water sewers in the area, infiltration is not possible and there are no watercourses near to the site.

7.7 Maintenance

7.7.1 A SuDS maintenance plan has been prepared to outline the management of the potential SuDS features. The maintenance plan is provided in Appendix D.

8 DRAINAGE DURING CONSTRUCTION

8.1 Construction Run-off Management

8.1.1 Installing the surface water and foul drainage system, whilst managing temporary run-off, are key aspects of the construction works involved in any development. The information provided below is in accordance with the 'C698 Site handbook for the construction of SuDS' (CIRIA, 2007).

8.1.2 Please note that the measures recommended below are recommendations only and need to be confirmed at the construction stage by the client and the contractor.

8.2 Management of Construction (Including Drainage)

8.2.1 Drainage is typically an early activity in the construction stage of a development, taking form during the earthworks phase. However, final construction i.e. piped drainage system connections to the SuDS devices, should not take place until the end of site development work, unless a robust strategy for silt-removal is implemented prior to occupation of the site.

8.2.2 A plan for the management of construction (including phasing of works, details of any offsite works etc.) cannot be provided at this early stage, as construction work plans are not yet known. However, the following key points are general construction issues associated with SuDS which will be addressed when these plans are complete:

- Silt-laden waters from construction sites represent a common form of waterborne pollution;
- These silt-laden waters cannot enter SuDS drainage systems unless specifically designed to accept this as it can clog the systems and pollute receiving waters. Therefore, piped drainage systems should not be connected to the attenuation SuDS devices until the late stages of construction.
- Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to the attenuation SuDS devices.

8.3 Temporary Drainage During Construction

8.3.1 The three principal aspects of drainage control during construction are trapping sediment, conveying run-off, and controlling run-off.

8.3.2 Sediment traps and barriers can include basin traps and sediment fences (with any necessary boundary controls). The principal basins are to be installed after the construction site is accessed. Sediment fences and barriers will then be installed as needed during grading.

8.3.3 Conveyance of run-off can be achieved through small ditches/stream, storm drains, channels and sloped drains with sufficient inlet/outlet protection.

8.3.4 Slope stability needs to be considered when using any channels to convey run-off across the site into any basins etc.

8.3.5 Run-off control measures will need to be implemented in order not overwhelm the temporary system and cause flooding issues. Run-off rates from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockage. Any additional conveyance measures are to be installed as needed during grading.

- 8.3.6 Run-off control to include provision of perimeter ditches or appropriate levels grading to direct any water from the construction site to remain on site.
- 8.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 8.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

8.4 Protection of Drainage Infrastructure during Construction

- 8.4.1 All drainage infrastructure should be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers, and storing construction materials away from the drainage infrastructure.

Appendix A: Proposed Development Details



Appendix B: Drainage Drawings and Calculations

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	10/02/2026
Calculated by	aw
Reference	
Model version	2.2.2

Location

Site name	
Site location	



Site easting (British National Grid)	516915
Site northing (British National Grid)	133993

Site details

Total site area (ha)	.485	ha
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Greenfield runoff

Method

Method	IH124	
IH124		
	<u>My value</u>	<u>Map value</u>
SAAR (mm)	789 mm	789
How should SPR be derived?	WRAP soil type	
WRAP soil type	4	4
SPR	0.47	
QBar (IH124) (l/s)	2.7 l/s	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
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	IH124	
Flow rate 1 year (l/s)	2.3 l/s	
Flow rate 2 year (l/s)	2.4 l/s	
Flow rate 10 years (l/s)	4.4 l/s	
Flow rate 30 years (l/s)	6.2 l/s	
Flow rate 100 years (l/s)	8.6 l/s	
Flow rate 200 years (l/s)	10.1 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/>). 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>). 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.

FFI

Proposed Level

Finished Floor Level

Finished Floor Level

Rev.

DRAINAGE NOTES

1. THIS DRAWING IS FOR PLANNING ONLY AND IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.
4. ANY DISCREPANCIES IN THE DETAILS SHOWN ARE TO BE REPORTED TO THE EMPLOYER'S REPRESENTATIVE/ENGINEER PRIOR TO CONSTRUCTION.
5. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF ANY WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
6. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIP FOR THE CONSTRUCTION OF THE ACCESS ROAD, FOOTPATHS AND OTHER AREAS OF HANDOVERING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1, SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
7. ALL LEVELS SHOWN ARE ASSUMED ONLY AND SUBJECT TO SURVEY AND DETAILED DESIGN.
8. ALL BUILDING DRAINAGE SHOWN IS INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT PRIOR TO DETAILED DESIGN.
9. NODE NUMBERS REFER TO DRAINAGE MODEL
10. UNLESS NOTED OTHERWISE, PIPES TO BE:
FOUL PIPES UNDER BUILDING @100mm/40,
FOUL PIPES EXTERNAL @100mm/50,
SURFACE WATER PIPES @150mm/100

Notes

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Key dimensions to be checked by engineer before major structural works commence on site.

1. This survey has been computed and drawn about O S National Grid.
2. All levels are in metres and relate to O S National Datum by GPS instruments.
3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.

Amendments

Rev	Date		By	Chk

JOMAS
ENGINEERING
ENVIRONMENTAL

Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Client	
--------	--

Weinerberger Limited

Project

Station Rd, Warnham

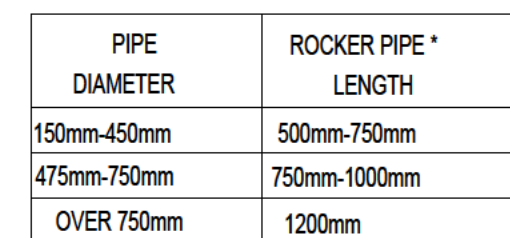
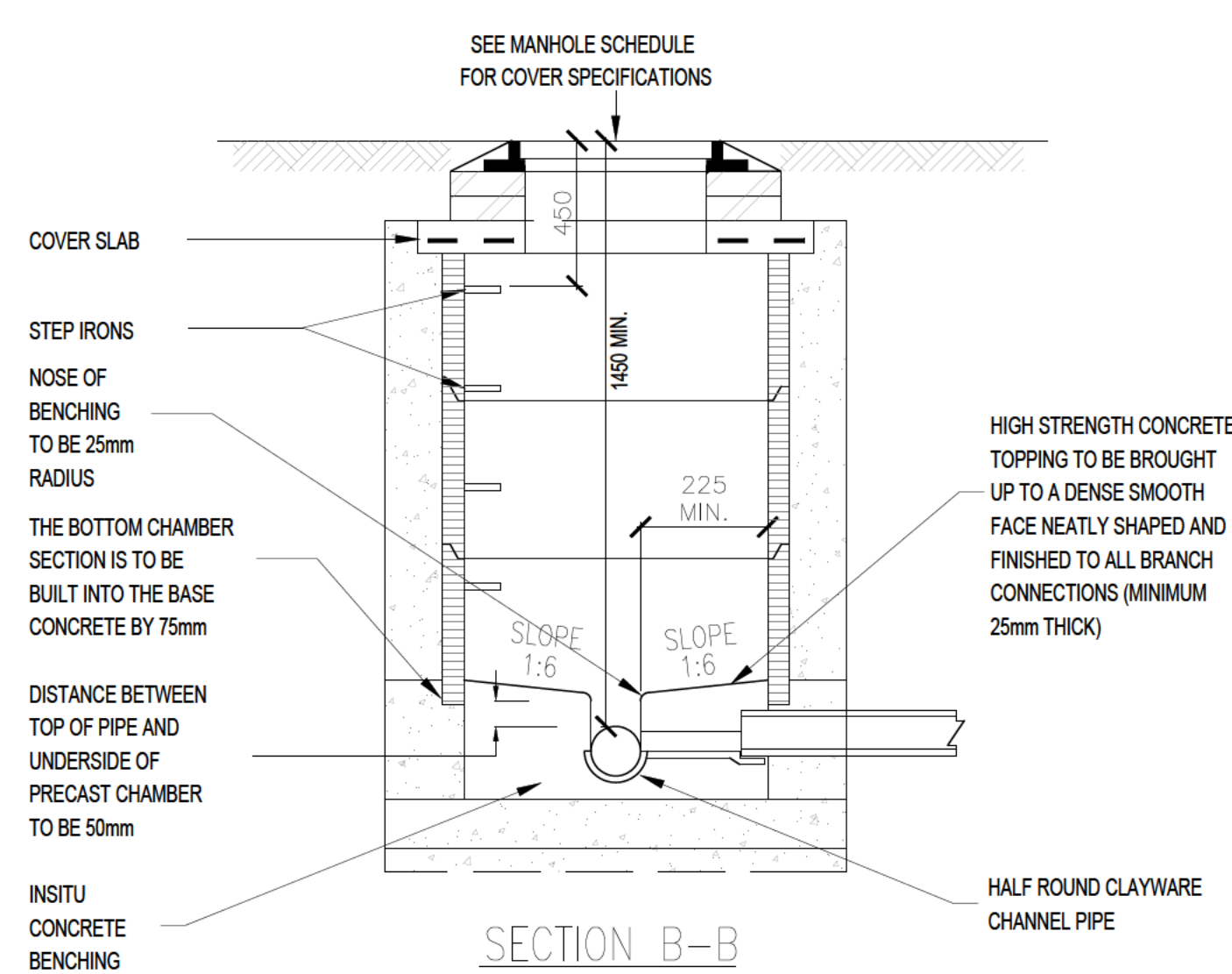
Drawing

Proposed Drainage Plan

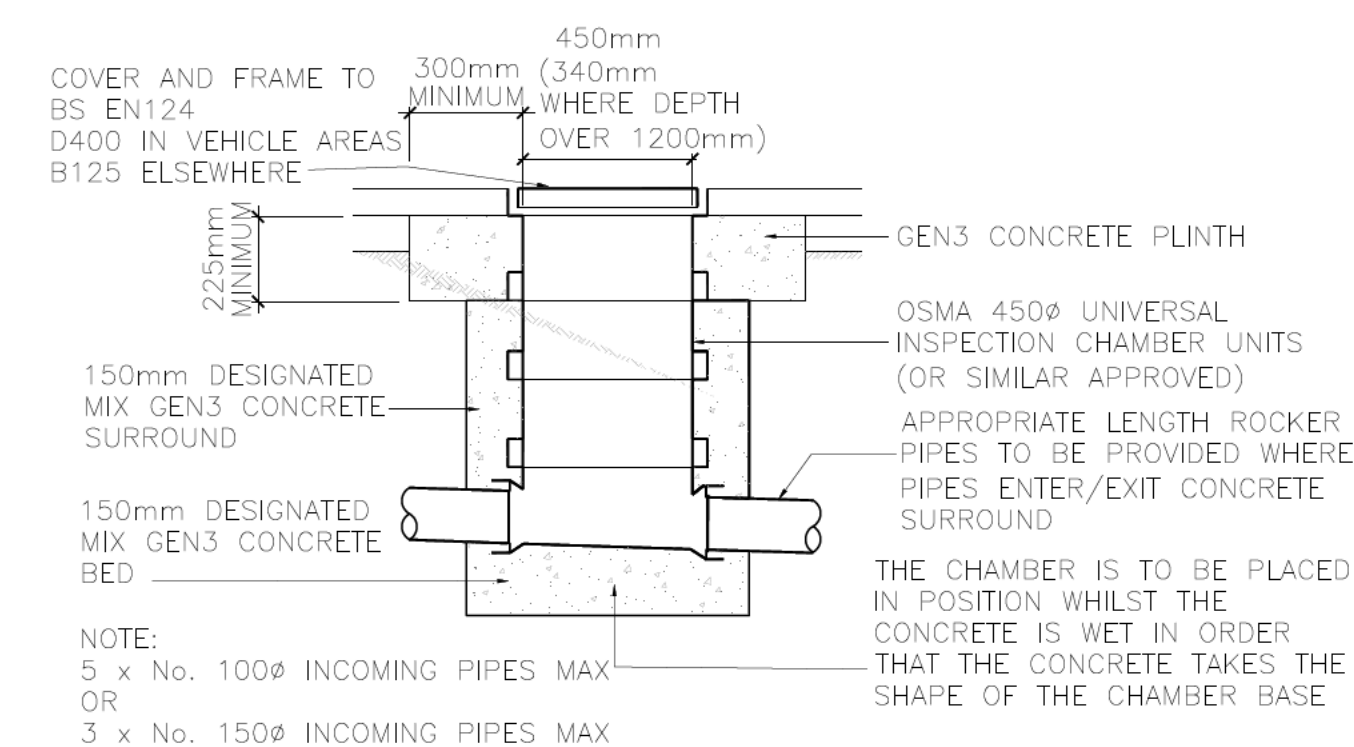
Dwg no	Checked	Surveyor
C01	AW	NA
Date 11.02.26	Scale 1:250 @ A1	

Job No.	P6420J3172	Rev	-
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Grid	Contours	Level Datum
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NOTES:
CHAMBERS WITH OUTGOING PIPES
GREATER THAN 500mm DIAMETER
SHALL BE FITTED WITH GUARD BARS
SAFETY CHAINS OR OTHER SAFETY
DEVICES. TOE HOLES TO BE
PROVIDED IN BENCHING OF SEWERS
GREATER THAN 450mm DIAMETER
FOR ACCESS TO INVERT. WHERE
INTERNAL HEIGHT EXCEEDS 1800mm
MANHOLE MAY BE PROVIDED WITH
REDUCING COVER AND SHAFT.
SHAFT DIAMETER TO BE 600mm
DIAMETER OR 900mm DIAMETER IF
LONGER THAN 900mm.



GENERAL PIPE BEDDING DETAIL

PIPE BEDDING DETAIL FOR ALL PIPES THAT PASS BELOW OR NEAR FOUNDATIONS. PIPES WITH LESS THAN 600mm COVER IN ALL EXTERNAL AREAS AND PIPES WITH LESS THAN 1200mm COVER BELOW ROADS AND DRIVEWAYS

NOTE:
PIPES LESS THAN 1200mm BELOW ROADS
AND LESS THAN 600mm BELOW OTHER
EXTERNAL AREAS SHALL HAVE A 150mm
GEN 1 CONCRETE SURROUND. OTHER THAN
PIPES CAST WITHIN PILECAPS ALL PIPES
BELOW SUSPENDED SLAB SHALL HAVE
GRANULAR SURROUND AS SHOWN.

Job. No.	P6420J3172	Rev.
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4. ALL EXISTING SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF WORKS. THE CONTRACTOR MUST NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT WITH THE PROPOSED WORKS.
5. FOR GRAVITY SEWERS, ALL DRAINAGE AND FITTINGS ARE TO BE FLEXIBLY JOINED UPVC TO BS EN 1401-1 OR CLAYWARE TO BS EN295 OR CONCRETE TO BS5911 PART 100
6. CHAMBER WALLS 225 THICK TO BE CONSTRUCTED IN CLASS B ENGINEERING BRICKS TO SHW SERIES 2400 IN DESIGNATION (I) MORTAR OR IN-SITU STRENGTH CLASS C16/20 CONCRETE TO CLAUSE 2602
7. CHAMBER WALLS AND COVER SLAB TO BE CONSTRUCTED IN PRECAST CONCRETE TO BS EN 1917 AND BS 5911-3.
8. CONCRETE MIXES INDICATED ON THIS DRAWING ARE DESIGNATED MIXES IN ACCORDANCE WITH BS5500-1:2006. ALL CONCRETE TO BE SULPHATE RESISTANT
9. BACKFILL, TO ALL TRENCHES UNDER CARRIAGEWAYS TO BE TYPE 1 SUB-BASE MATERIAL, ELSEWHERE BACKFILL TO BE IN ACCORDANCE WITH THE SPECIFICATION, FREE DRAINING READILY COMPACTABLE MATERIAL, FREE FROM RUBBISH AND ORGANIC MATTER, FROZEN SOIL, CLAY LUMPS AND LARGE STONES. TO BE COMPACTED IN LAYERS NOT EXCEEDING 150mm THICK.
10. A FLEXIBLE JOINT SHALL BE PROVIDED AS CLOSE AS IS FEASIBLE TO OUTSIDE FACE OF ANY STRUCTURE INTO WHICH A PIPE IS BUILT IN, IN ACCORDANCE WITH THE DETAIL.
11. THE GENERAL SPECIFICATION OF MATERIALS AND WORKMANSHIPS FOR THE CONSTRUCTION OF THE ACCESS ROAD FOOTWAY AND OTHER AREAS OF HARDSTANDING SHALL BE THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOLUME 1: SPECIFICATION OF HIGHWAY WORKS (SHW) PUBLISHED BY THE STATIONARY OFFICE.
12. ALL PIPES TO BE LAID SOFFIT TO SOFFIT UNLESS NOTED OTHERWISE.
13. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH BS EN124 AND SHALL BE OF A NON-ROCKING DESIGN WHICH DOES NOT RELY ON THE USE OF CUSHION INSERTS. CLASS C COVERS SHALL BE USED IN CARRIAGEWAYS, HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPE OF ROAD VEHICLES. CLASS C SHALL BE USED IN FOOTWAYS, PEDESTRIAN AREAS AND ALL COMPARABLE LOCATIONS.

Key dimensions to be checked by engineer before major structural works commence on site.

- ## Amendments

Rev	Date		By	Chkd

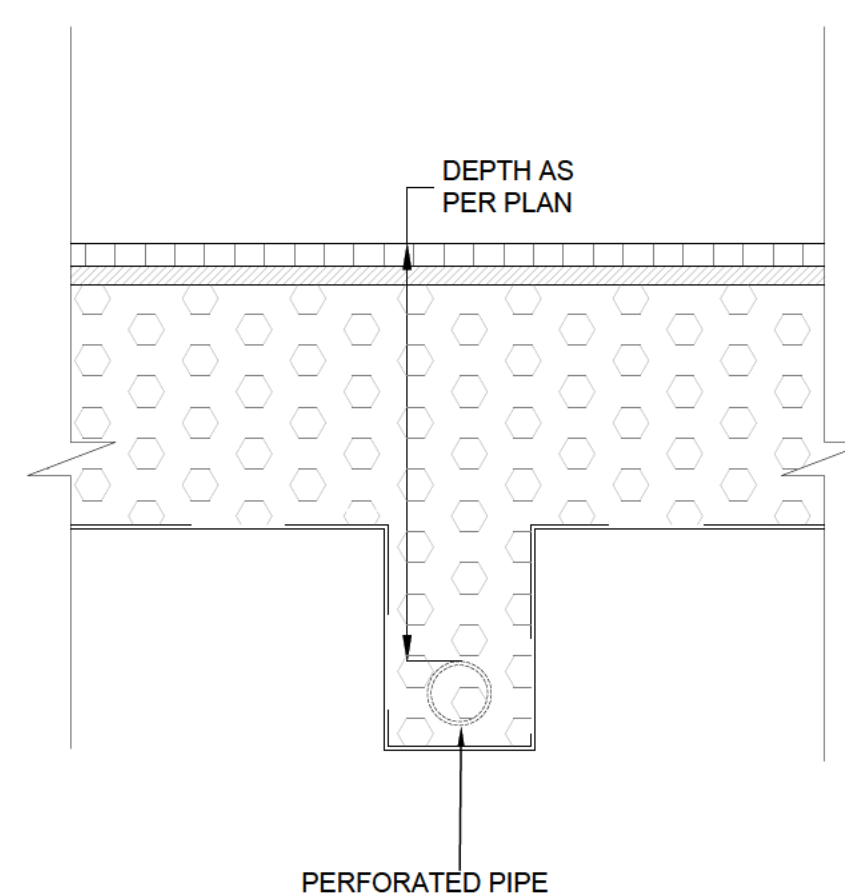
Jomas Associates Ltd.
Unit 24 Sarum Complex,
Salisbury Road,
Uxbridge, UB8 2RZ

Weinerberger Limited

Station Rd, Warnham

Proposed Drainage Details

Dwg no	Checked	Surveyor
C02	AW	NA
Date	11.02.26	Scale AS SHOWN
Job No.	P6420J3172	
		Rev. -
Grid	Contours	Level Datum



PAVED AREA

PERMEABLE BLOCK PAVING TO ARCHITECTS SPECIFICATION

TERRAM 1000 OR SIMILAR APPROVED PERMEABLE GEOTEXTILE

50mm THICK 5mm CLEAN STONE OR AS SPECIFIED BY BLOCK MANUFACTURER

VARIES

OUTLET TO CHAMBER

GRANULAR FREE DRAINING SUB BASE CONSISTING OF OPEN GRADED UNBOUND MATERIAL TO CL805 OF THE MCHW THICKNESS BASED ON ASSUMED AT FORMATION/SUBGRADE CBR OF 5%

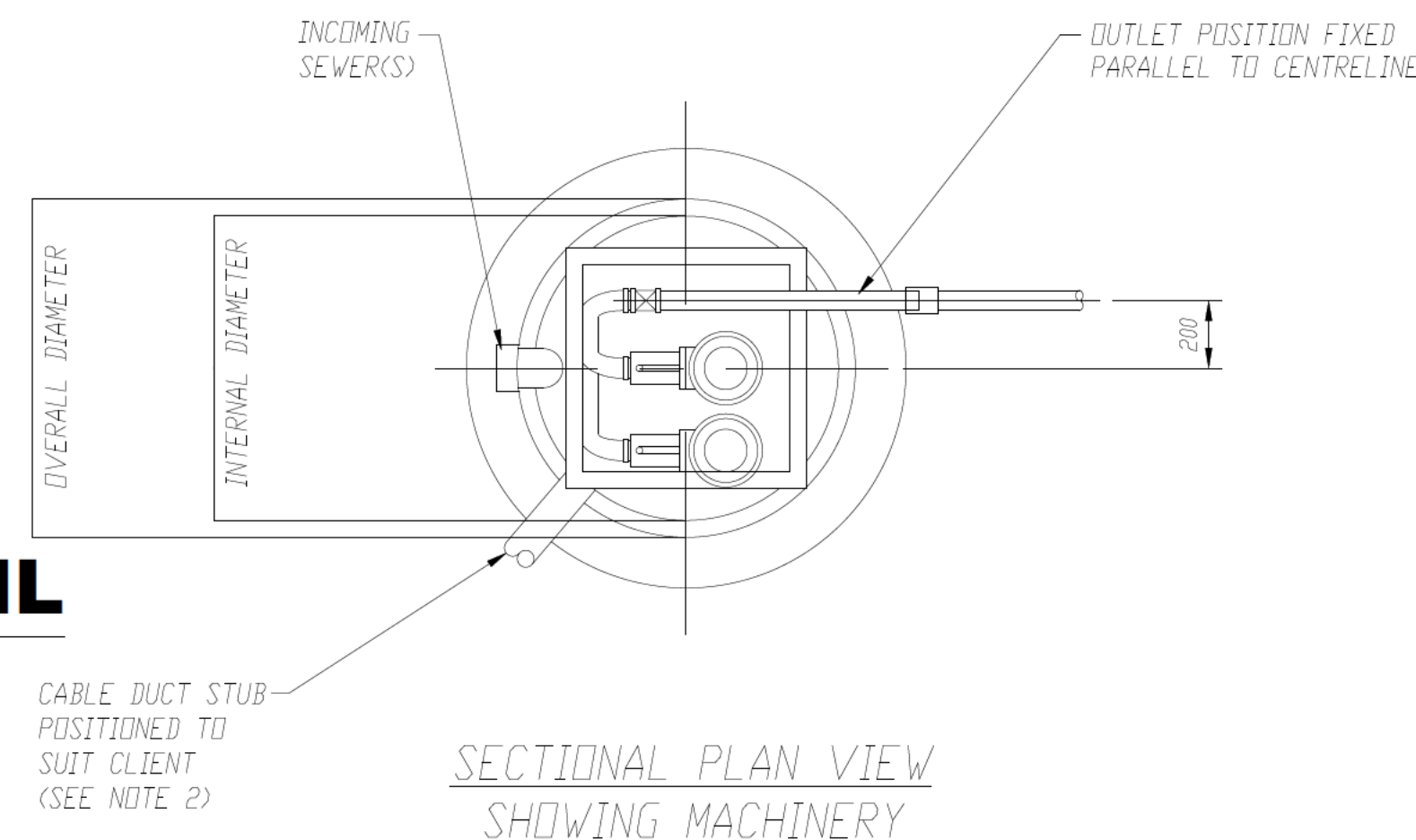
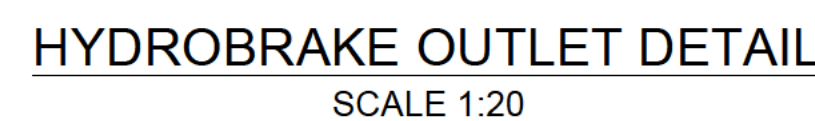
PAVING SUBBASE SURROUNDED WITH MIN. 2000 GAUGE IMPERMEABLE MEMBRANE PROTECTED WITH NON WOVEN PERMEABLE GEOTEXTILE TERRAM 1000 OR SIMILAR

PERFORATED PIPE

SELECTED GRANULAR MATERIAL CLASS 6F2 TO SERIES 600 (SHW) AS CAPPING LAYER WHERE REQUIRED TO BRING SUBGRADE UP TO REQUIRED LEVEL. ENSURE FALL AWAY FROM BUILDING

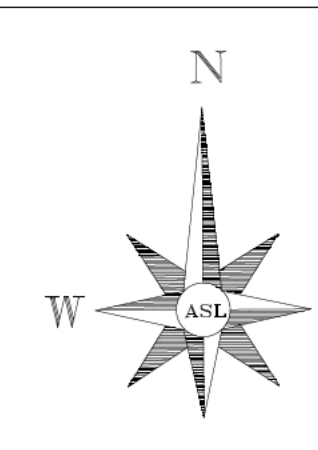
TANKED PERMEABLE PAVING DETAIL

SCALE 1:20



SCALE 1:20
NOTE: PUMP DETAILS SHOWN INDICATIVELY ONLY
AND DETAILED DESIGN SHOULD BE BY A
SPECIALIST PUMP ORGANISATION SUCH AS DUTY
POINT PUMPS

Job No.	P6420J3172		Rev.
NOTES			
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3. This survey was measured for a scale of 1:100, any subsequent enlargements should be verified on site.			
Amendments			
Rev	Date	By	Chkd
 Jomas Associates Ltd. Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ			
Client			
Weinerberger Limited			
Project			
Station Rd, Warrham			
Drawing			
Proposed Drainage Details 2			
Dwg no	Checked	Surveyor	
C03	AW	NA	
Date	11.02.26	Scale	AS SHOWN
Job No.	P6420J3172		Rev. -
Grid	Contours	Level Datum	



Job. No.	P6420J3172	Rev.	
DRAINAGE NOTES			
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3. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES ABOVE LOCAL DATUM.			
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8. UNLESS NOTED OTHERWISE, PIPES TO BE: FOUL PIPES UNDER BUILDING #100@1:40; FOUL PIPES EXTERNAL #100@1:80; SURFACE WATER PIPES #150@1:100			
STORMWATER CONCEPT LEGEND			
 Overland flow			
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JOMAS			
ENGINEERING ENVIRONMENTAL			
Jomas Associates Ltd. Unit 24 Sarum Complex, Salisbury Road, Uxbridge, UB8 2RZ			
Client			
Weinerberger Limited			
Project			
Station Rd, Warnham			
Drawing			
Proposed Overland Flow			
Dwg no	Checked	Surveyor	
C04	AW	NA	
Date	11.02.26	Scale	1:250 @ A1
Job No.	P6420J3172		Rev.
Grid	Contours	Level Datum	-

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	10	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.600
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1			47.700	1200	100.000	100.000	1.750
2	0.095	2.00	47.700	1200	100.000	105.000	1.700
3	0.095	2.00	48.900	1200	110.000	150.000	1.900
4	0.095	2.00	49.300	1200	120.000	160.000	2.150
5	0.095	2.00	49.800	1200	170.000	135.000	1.300
6	0.035	2.00	46.000	1200	94.000	80.000	1.000
7	0.035	2.00	48.500	1200	112.000	124.000	1.500
8	0.035	2.00	49.000	1200	197.000	111.000	1.500

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)
1.003	2	1	5.000	0.600	46.000	45.950	0.050	100.0	150	30.00	32.8
1.002	3	2	46.098	0.600	47.000	46.000	1.000	46.1	450	2.66	50.0
1.001	4	3	14.142	0.600	47.150	47.000	0.150	94.3	450	2.41	50.0
1.000	5	4	55.902	0.600	48.500	47.150	1.350	41.4	450	2.29	50.0
3.000	6	2	25.710	0.600	45.000	46.000	-1.000	-25.7	150	30.00	32.8
2.001	7	2	22.472	0.600	47.000	46.000	1.000	22.5	150	4.05	50.0
2.000	8	7	85.988	0.600	47.500	47.000	0.500	172.0	150	3.88	50.0

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)
1.003	1.005	17.8	43.2	1.550	1.600	0.485	0.0	150	1.023
1.002	3.000	477.1	38.6	1.450	1.250	0.285	0.0	86	1.835
1.001	2.094	333.0	25.7	1.700	1.450	0.190	0.0	84	1.264
1.000	3.166	503.5	12.9	0.850	1.700	0.095	0.0	49	1.380
3.000	0.007	0.1	3.1	0.850	1.550	0.035	0.0	150	0.000
2.001	2.133	37.7	9.5	1.350	1.550	0.070	0.0	51	1.782
2.000	0.763	13.5	4.7	1.350	1.350	0.035	0.0	61	0.696

Pipeline Schedule

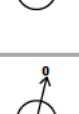
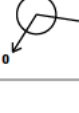
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.003	5.000	100.0	150	Circular	47.700	46.000	1.550	47.700	45.950	1.600
1.002	46.098	46.1	450	Circular	48.900	47.000	1.450	47.700	46.000	1.250
1.001	14.142	94.3	450	Circular	49.300	47.150	1.700	48.900	47.000	1.450
1.000	55.902	41.4	450	Circular	49.800	48.500	0.850	49.300	47.150	1.700
3.000	25.710	-25.7	150	Circular	46.000	45.000	0.850	47.700	46.000	1.550
2.001	22.472	22.5	150	Circular	48.500	47.000	1.350	47.700	46.000	1.550
2.000	85.988	172.0	150	Circular	49.000	47.500	1.350	48.500	47.000	1.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.003	2	1200	Manhole	Adoptable	1	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	4	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.000	5	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
3.000	6	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
2.001	7	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
2.000	8	1200	Manhole	Adoptable	7	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	MH Type	Connections	Link	IL (m)	Dia (mm)	
1	100.000	100.000	47.700	1.750	1200	Adoptable		1	1.003	45.950	150
2	100.000	105.000	47.700	1.700	1200	Adoptable		1 2 3 0	3.000 2.001 1.002 1.003	46.000 46.000 46.000 46.000	150 150 450 150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	MH Type	Connections	Link	IL (m)	Dia (mm)	
3	110.000	150.000	48.900	1.900	1200	Adoptable		1	1.001	47.000	450
								0	1.002	47.000	450
4	120.000	160.000	49.300	2.150	1200	Adoptable		1	1.000	47.150	450
								0	1.001	47.150	450
5	170.000	135.000	49.800	1.300	1200	Adoptable					
								0	1.000	48.500	450
6	94.000	80.000	46.000	1.000	1200	Adoptable					
								0	3.000	45.000	150
7	112.000	124.000	48.500	1.500	1200	Adoptable		1	2.000	47.000	150
								0	2.001	47.000	150
8	197.000	111.000	49.000	1.500	1200	Adoptable					
								0	2.000	47.500	150

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	0.750	Drain Down Time (mins)	240	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0
30	0	10	0
100	0	10	0
100	40	10	0

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	46.000	Product Number	CTL-SHE-0067-2000-1000-2000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node 6 Online Depth/Flow Control

Flap Valve x | Replaces Downstream Link ✓ | Invert Level (m) 45.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	20.000	2.000	20.000

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000 | Safety Factor 2.0 | Invert Level (m) 46.200
Side Inf Coefficient (m/hr) 0.00000 | Porosity 0.95 | Time to half empty (mins)

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	300.0	0.0	0.800	300.0	0.0	0.801	0.1	0.0

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr) 0.00000 | Safety Factor 2.0 | Invert Level (m) 47.200
Side Inf Coefficient (m/hr) 0.00000 | Porosity 0.95 | Time to half empty (mins) 150

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	220.0	0.0	0.800	220.0	0.0	0.801	0.1	0.0

Approval Settings

Node Size	x	Proportional Velocity	x
Node Losses	x	Surcharged Depth	✓
Link Size	x	Return Period (years)	10
Link Length	x	Maximum Surcharged Depth (m)	0.100
Coordinates	x	Flooding	x
Crossings	x	Time to Half Empty	✓
Cover Depth	x	Return Period (years)	100
Backdrops	x	Discharge Rates	✓
Full Bore Velocity	x	Discharge Volume	x

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year +10% A 15 minute summer	64.487	18.248
1 year +10% A 15 minute winter	45.254	18.248
1 year +10% A 30 minute summer	41.108	11.632
1 year +10% A 30 minute winter	28.848	11.632
1 year +10% A 60 minute summer	27.306	7.216
1 year +10% A 60 minute winter	18.141	7.216
1 year +10% A 120 minute summer	21.645	5.720
1 year +10% A 120 minute winter	14.380	5.720
1 year +10% A 180 minute summer	18.098	4.657
1 year +10% A 180 minute winter	11.764	4.657
1 year +10% A 240 minute summer	14.875	3.931
1 year +10% A 240 minute winter	9.883	3.931
1 year +10% A 360 minute summer	11.674	3.004
1 year +10% A 360 minute winter	7.588	3.004

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year +10% A 480 minute summer	9.218	2.436
1 year +10% A 480 minute winter	6.124	2.436
1 year +10% A 600 minute summer	7.522	2.057
1 year +10% A 600 minute winter	5.139	2.057
1 year +10% A 720 minute summer	6.666	1.787
1 year +10% A 720 minute winter	4.480	1.787
1 year +10% A 960 minute summer	5.414	1.426
1 year +10% A 960 minute winter	3.586	1.426
1 year +10% A 1440 minute summer	3.859	1.034
1 year +10% A 1440 minute winter	2.594	1.034
1 year +10% A 2160 minute summer	2.739	0.757
1 year +10% A 2160 minute winter	1.888	0.757
1 year +10% A 2880 minute summer	2.286	0.613
1 year +10% A 2880 minute winter	1.536	0.613
1 year +10% A 4320 minute summer	1.778	0.465
1 year +10% A 4320 minute winter	1.171	0.465
1 year +10% A 5760 minute summer	1.518	0.389
1 year +10% A 5760 minute winter	0.983	0.389
1 year +10% A 7200 minute summer	1.342	0.342
1 year +10% A 7200 minute winter	0.866	0.342
1 year +10% A 8640 minute summer	1.219	0.311
1 year +10% A 8640 minute winter	0.787	0.311
1 year +10% A 10080 minute summer	1.132	0.289
1 year +10% A 10080 minute winter	0.731	0.289
30 year +10% A 15 minute summer	253.641	71.772
30 year +10% A 15 minute winter	177.994	71.772
30 year +10% A 30 minute summer	165.360	46.791
30 year +10% A 30 minute winter	116.042	46.791
30 year +10% A 60 minute summer	110.300	29.149
30 year +10% A 60 minute winter	73.280	29.149
30 year +10% A 120 minute summer	69.870	18.464
30 year +10% A 120 minute winter	46.420	18.464
30 year +10% A 180 minute summer	53.663	13.809
30 year +10% A 180 minute winter	34.883	13.809
30 year +10% A 240 minute summer	42.092	11.124
30 year +10% A 240 minute winter	27.965	11.124
30 year +10% A 360 minute summer	31.407	8.082
30 year +10% A 360 minute winter	20.415	8.082
30 year +10% A 480 minute summer	24.147	6.381
30 year +10% A 480 minute winter	16.043	6.381
30 year +10% A 600 minute summer	19.344	5.291
30 year +10% A 600 minute winter	13.217	5.291
30 year +10% A 720 minute summer	16.902	4.530
30 year +10% A 720 minute winter	11.359	4.530
30 year +10% A 960 minute summer	13.413	3.532
30 year +10% A 960 minute winter	8.885	3.532
30 year +10% A 1440 minute summer	9.280	2.487
30 year +10% A 1440 minute winter	6.237	2.487
30 year +10% A 2160 minute summer	6.356	1.756
30 year +10% A 2160 minute winter	4.379	1.756
30 year +10% A 2880 minute summer	5.148	1.380
30 year +10% A 2880 minute winter	3.459	1.380

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +10% A 4320 minute summer	3.814	0.997
30 year +10% A 4320 minute winter	2.511	0.997
30 year +10% A 5760 minute summer	3.131	0.801
30 year +10% A 5760 minute winter	2.026	0.801
30 year +10% A 7200 minute summer	2.676	0.683
30 year +10% A 7200 minute winter	1.727	0.683
30 year +10% A 8640 minute summer	2.363	0.603
30 year +10% A 8640 minute winter	1.525	0.603
30 year +10% A 10080 minute summer	2.137	0.545
30 year +10% A 10080 minute winter	1.379	0.545
100 year +10% A 15 minute summer	320.546	90.703
100 year +10% A 15 minute winter	224.945	90.703
100 year +10% A 30 minute summer	211.163	59.752
100 year +10% A 30 minute winter	148.184	59.752
100 year +10% A 60 minute summer	141.717	37.452
100 year +10% A 60 minute winter	94.154	37.452
100 year +10% A 120 minute summer	88.806	23.469
100 year +10% A 120 minute winter	59.001	23.469
100 year +10% A 180 minute summer	68.256	17.565
100 year +10% A 180 minute winter	44.368	17.565
100 year +10% A 240 minute summer	53.687	14.188
100 year +10% A 240 minute winter	35.668	14.188
100 year +10% A 360 minute summer	40.309	10.373
100 year +10% A 360 minute winter	26.202	10.373
100 year +10% A 480 minute summer	31.170	8.237
100 year +10% A 480 minute winter	20.709	8.237
100 year +10% A 600 minute summer	25.067	6.856
100 year +10% A 600 minute winter	17.127	6.856
100 year +10% A 720 minute summer	21.959	5.885
100 year +10% A 720 minute winter	14.758	5.885
100 year +10% A 960 minute summer	17.468	4.600
100 year +10% A 960 minute winter	11.571	4.600
100 year +10% A 1440 minute summer	12.058	3.232
100 year +10% A 1440 minute winter	8.104	3.232
100 year +10% A 2160 minute summer	8.185	2.262
100 year +10% A 2160 minute winter	5.640	2.262
100 year +10% A 2880 minute summer	6.564	1.759
100 year +10% A 2880 minute winter	4.411	1.759
100 year +10% A 4320 minute summer	4.758	1.244
100 year +10% A 4320 minute winter	3.133	1.244
100 year +10% A 5760 minute summer	3.830	0.981
100 year +10% A 5760 minute winter	2.479	0.981
100 year +10% A 7200 minute summer	3.224	0.823
100 year +10% A 7200 minute winter	2.081	0.823
100 year +10% A 8640 minute summer	2.810	0.717
100 year +10% A 8640 minute winter	1.814	0.717
100 year +10% A 10080 minute summer	2.514	0.641
100 year +10% A 10080 minute winter	1.622	0.641
100 year +40% CC +10% A 15 minute summer	448.764	126.985
100 year +40% CC +10% A 15 minute winter	314.922	126.985
100 year +40% CC +10% A 30 minute summer	295.628	83.652
100 year +40% CC +10% A 30 minute winter	207.458	83.652

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC +10% A 60 minute summer	198.404	52.432
100 year +40% CC +10% A 60 minute winter	131.815	52.432
100 year +40% CC +10% A 120 minute summer	124.329	32.856
100 year +40% CC +10% A 120 minute winter	82.601	32.856
100 year +40% CC +10% A 180 minute summer	95.559	24.590
100 year +40% CC +10% A 180 minute winter	62.116	24.590
100 year +40% CC +10% A 240 minute summer	75.162	19.863
100 year +40% CC +10% A 240 minute winter	49.936	19.863
100 year +40% CC +10% A 360 minute summer	56.433	14.522
100 year +40% CC +10% A 360 minute winter	36.683	14.522
100 year +40% CC +10% A 480 minute summer	43.638	11.532
100 year +40% CC +10% A 480 minute winter	28.992	11.532
100 year +40% CC +10% A 600 minute summer	35.094	9.599
100 year +40% CC +10% A 600 minute winter	23.978	9.599
100 year +40% CC +10% A 720 minute summer	30.742	8.239
100 year +40% CC +10% A 720 minute winter	20.661	8.239
100 year +40% CC +10% A 960 minute summer	24.455	6.440
100 year +40% CC +10% A 960 minute winter	16.199	6.440
100 year +40% CC +10% A 1440 minute summer	16.882	4.524
100 year +40% CC +10% A 1440 minute winter	11.345	4.524
100 year +40% CC +10% A 2160 minute summer	11.459	3.167
100 year +40% CC +10% A 2160 minute winter	7.896	3.167
100 year +40% CC +10% A 2880 minute summer	9.190	2.463
100 year +40% CC +10% A 2880 minute winter	6.176	2.463
100 year +40% CC +10% A 4320 minute summer	6.661	1.742
100 year +40% CC +10% A 4320 minute winter	4.387	1.742
100 year +40% CC +10% A 5760 minute summer	5.362	1.373
100 year +40% CC +10% A 5760 minute winter	3.471	1.373
100 year +40% CC +10% A 7200 minute summer	4.514	1.152
100 year +40% CC +10% A 7200 minute winter	2.913	1.152
100 year +40% CC +10% A 8640 minute summer	3.934	1.004
100 year +40% CC +10% A 8640 minute winter	2.539	1.004
100 year +40% CC +10% A 10080 minute summer	3.519	0.898
100 year +40% CC +10% A 10080 minute winter	2.271	0.898

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.55%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	45.950	0.000	1.9	0.0000	0.0000	OK
360 minute winter	2	288	46.345	0.345	9.7	41.8424	0.0000	SURCHARGED
15 minute summer	3	9	47.064	0.064	21.8	0.0726	0.0000	OK
15 minute winter	4	11	47.209	0.059	20.6	2.0296	0.0000	OK
15 minute summer	5	9	48.547	0.047	11.5	0.0526	0.0000	OK
15 minute summer	6	9	45.022	0.021	4.3	0.0243	0.0000	OK
15 minute summer	7	9	47.045	0.045	8.0	0.0511	0.0000	OK
15 minute summer	8	9	47.556	0.056	4.3	0.0632	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	2	Hydro-Brake®	1	2.0				65.6
15 minute summer	3	1.002	2	21.4	0.510	0.045	2.2144	
15 minute winter	4	1.001	3	11.5	0.989	0.035	0.1766	
15 minute summer	5	1.000	4	11.5	1.169	0.023	0.5507	
15 minute summer	6	Depth/Flow	2	4.3				
15 minute summer	7	2.001	2	7.4	0.560	0.196	0.2480	
15 minute summer	8	2.000	7	3.7	0.723	0.272	0.4490	

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.15%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	45.950	0.000	2.0	0.0000	0.0000	OK
360 minute winter	2	360	46.803	0.803	24.8	172.8910	0.0000	SURCHARGED
15 minute summer	3	9	47.116	0.116	72.9	0.1313	0.0000	OK
15 minute winter	4	11	47.264	0.114	80.9	13.6367	0.0000	OK
15 minute summer	5	9	48.592	0.092	45.4	0.1041	0.0000	OK
15 minute summer	6	9	45.084	0.083	16.7	0.0944	0.0000	OK
15 minute summer	7	9	47.104	0.104	30.7	0.1174	0.0000	OK
15 minute summer	8	9	47.653	0.153	16.7	0.1727	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	2	Hydro-Brake®	1	2.0				63.4
15 minute summer	3	1.002	2	71.2	1.053	0.149	3.7785	
15 minute winter	4	1.001	3	40.7	1.404	0.122	0.4350	
15 minute summer	5	1.000	4	46.1	1.989	0.092	1.3235	
15 minute summer	6	Depth/Flow	2	16.7				
15 minute summer	7	2.001	2	29.4	1.766	0.780	0.3439	
15 minute summer	8	2.000	7	14.0	1.002	1.038	1.3160	

Results for 100 year +10% A Critical Storm Duration. Lowest mass balance: 98.94%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	45.950	0.000	2.0	0.0000	0.0000	OK
480 minute winter	2	472	47.157	1.157	25.5	229.6080	0.0000	SURCHARGED
480 minute winter	3	472	47.157	0.157	14.8	0.1772	0.0000	OK
15 minute winter	4	11	47.283	0.133	102.1	17.5128	0.0000	OK
15 minute summer	5	9	48.603	0.103	57.4	0.1167	0.0000	OK
15 minute summer	6	9	45.155	0.155	21.1	0.1758	0.0000	SURCHARGED
15 minute summer	7	10	47.159	0.159	36.7	0.1796	0.0000	SURCHARGED
15 minute summer	8	10	47.887	0.387	21.1	0.4381	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
480 minute winter	2	Hydro-Brake®	1	2.1				81.7
480 minute winter	3	1.002	2	14.8	0.188	0.031	4.7825	
15 minute winter	4	1.001	3	53.5	1.507	0.161	0.5290	
15 minute summer	5	1.000	4	58.3	2.123	0.116	1.5927	
15 minute summer	6	Depth/Flow	2	20.0				
15 minute summer	7	2.001	2	34.3	1.949	0.909	0.3956	
15 minute summer	8	2.000	7	15.6	1.057	1.159	1.5138	

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 98.39%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	45.950	0.000	2.0	0.0000	0.0000	OK
600 minute winter	2	585	47.683	1.683	29.7	230.2529	0.0000	FLOOD RISK
600 minute winter	3	585	47.683	0.683	17.3	0.7721	0.0000	SURCHARGED
600 minute winter	4	585	47.683	0.533	19.6	101.5951	0.0000	SURCHARGED
15 minute summer	5	8	48.622	0.122	80.3	0.1381	0.0000	OK
15 minute summer	6	10	45.994	0.994	29.6	1.1243	0.0000	FLOOD RISK
15 minute summer	7	10	47.785	0.785	46.7	0.8874	0.0000	SURCHARGED
15 minute summer	8	10	48.909	1.409	29.6	1.5937	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	2	Hydro-Brake®	1	2.5				109.4
600 minute winter	3	1.002	2	17.3	0.170	0.036	7.3039	
600 minute winter	4	1.001	3	11.6	0.957	0.035	2.2407	
15 minute summer	5	1.000	4	81.4	2.313	0.162	2.0979	
15 minute summer	6	Depth/Flow	2	20.0				
15 minute summer	7	2.001	2	40.6	2.305	1.076	0.3956	
15 minute summer	8	2.000	7	19.3	1.094	1.428	1.5138	

Martin Rose
Wienerberger Ltd

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26 September 2025
Our Ref: P6420J3172/YAB/SC

Dear Martin,

STATION ROAD, WARNHAM, RH12 3SR

SOIL INFILTRATION TESTING

Introduction

We write to present the results of the soakage testing undertaken at the above site on 22nd September 2025. The work was undertaken broadly in accordance with BRE Digest 365 'Soakaway Design' BRE, 2016 and BS:5930:2015+A1:2020 'Code of Practice for Ground Investigations'.

To undertake soil infiltration testing, 2No. trial pits (STP1 and STP2) were excavated using a mechanical excavator to depths of between 1.6m bgl and 2.1m below ground level (bgl). STP1 and STP2 were filled with water from a water bowser, with the water level monitored over time.

Trial pit locations were positioned by Jomas, with regards to the location of the proposed open attenuation basins/swales on site. The locations were excavated using a mechanical excavator, under supervision of a Jomas engineer.

The exploratory hole locations are presented in Figure 2 of Appendix 1, along with a site location plan as Figure 1.

Ground Conditions

With reference to British Geological Survey (BGS) mapping, the ground conditions underlying the site were anticipated to comprise solid deposits of Weald Clay Formation - Mudstone. The deposit was anticipated to be overlain by a mantle of Topsoil or Made Ground.

The BGS describes the Weald Clay Formation as follows:

Dark grey thinly-bedded mudstones (shales) and mudstones with subordinate siltstones, fine- to medium-grained sandstones, including calcareous sandstone, shelly limestones and clay ironstones.

A summary of the ground conditions encountered during Jomas' site works is provided in Table 1 overleaf.

Table 1: Summary of Ground Conditions Encountered

Stratum and Description	Encountered from (mbgl)	Base of strata (mbgl)	Thickness (m)
Grass over blackish grey gravelly sand with medium rootlet content. Sand is fine to coarse. Gravel consists of fine to medium, sub-angular flint, brick, and plastic. (MADE GROUND)	0.00	0.40 - 0.50	0.40 - 0.50
Light brown/greyish brown sandy gravelly CLAY. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to sub-rounded mudstone fragments and occasional limestone fragments. (WEALD CLAY FORMATION)	0.40 - 0.50	>1.60 - >2.10 (base not proven)	>1.10 – >1.70 (thickness not proven)

As shown in the table above, the ground conditions encountered were consistent with those anticipated. For further details of the ground conditions, reference should be made to the logs presented in Appendix 2.

Groundwater was not encountered throughout the course of the investigation.

BRE 365 Soakage Tests

Table 2 summarises the infiltration rates, which were calculated based on the results of the soakage testing:

Table 2: Summary of BRE 365 Soakage Test Results

Position	Geology	Calculated Infiltration Rates (m/s)		
		1 st cycle	2 nd Cycle	3 rd Cycle
STP1	Weald Clay Formation	N/D	N/A	N/A
STP2	Weald Clay Formation	N/D	N/A	N/A

N/D: Not available due to insufficient fall in head.

N/A: Not attempted due to slow rate of drainage in 1st cycle

The soakage rate could not be determined within STP1 and STP2 due to lack of infiltration. The ground conditions are therefore considered to be “practically impermeable” (after Carter and Bentley, 2016). It is considered that conventional soakaways are not suitable for discharging storm water run-off to the ground and an alternative form of storm water disposal should be sought.

All drainage for the site should be designed by a suitably qualified and experienced specialist in accordance with the recommendations provided in BRE 365 (2016).

We trust that this is satisfactory for your current needs, however if you should require any further assistance with regard to this or other projects please do not hesitate to contact the undersigned.

Yours sincerely,



Yanish Balaghee BEng (Hons), MSc
Graduate Geotechnical Engineer

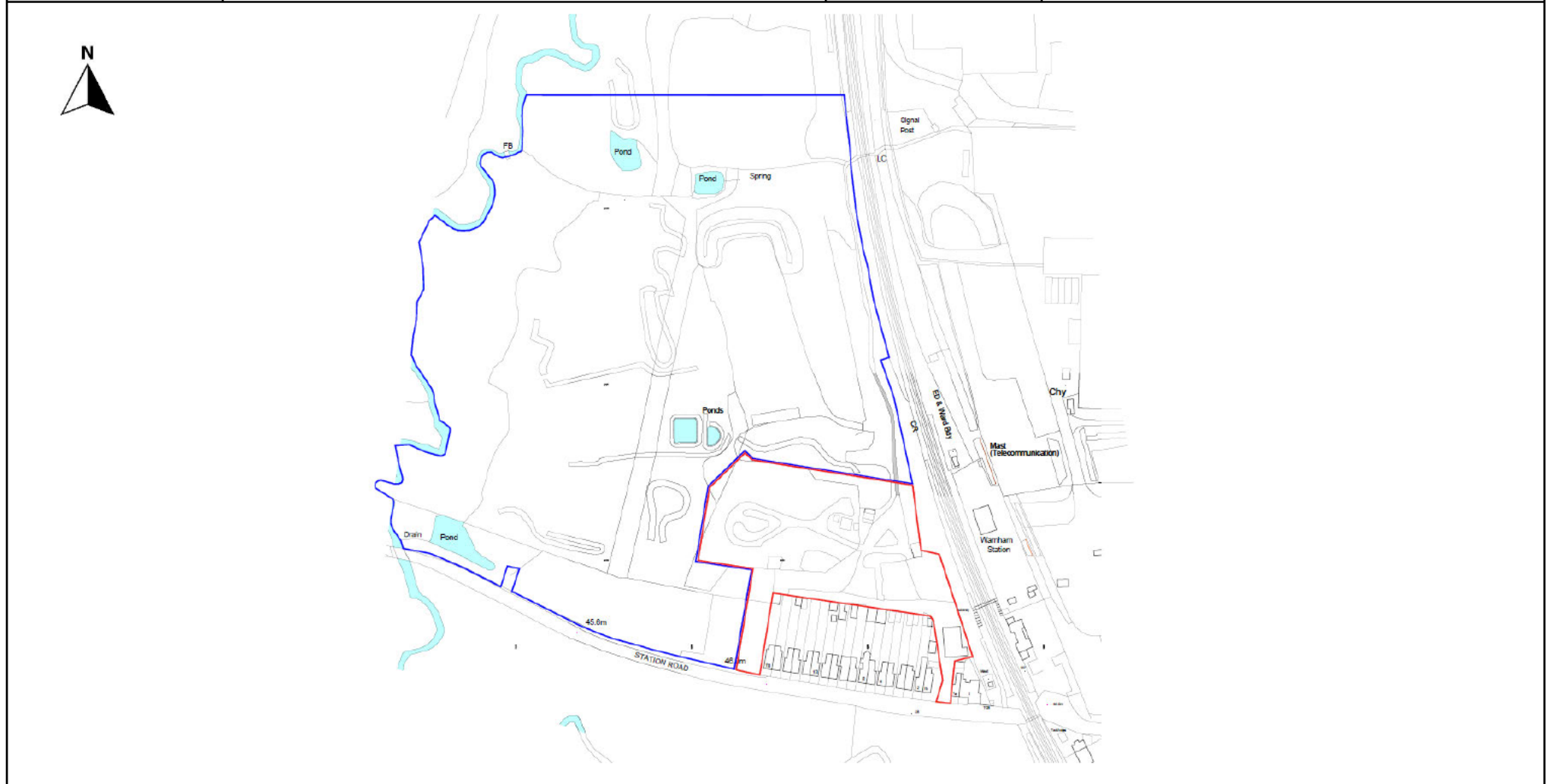
Approved by,



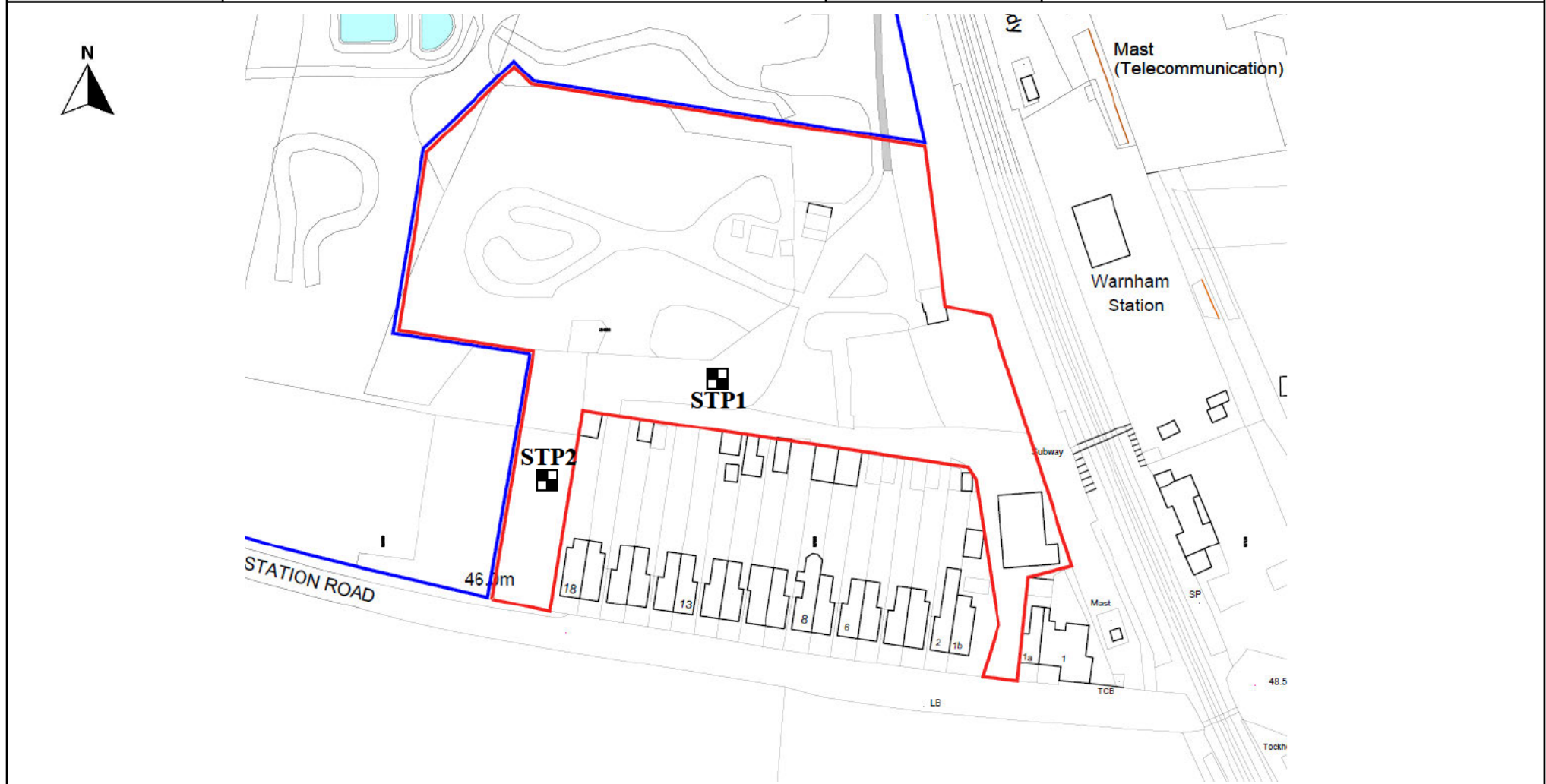
Shaw Carter BSc (Hons), CGeol, FGS
Principal Geotechnical Engineer

APPENDIX 1 – FIGURES

PROJECT NAME	Station Road, Warnham, RH12 3SR	CLIENT	Wienerberger Ltd
TITLE	Site Location Plan	PROJECT NO.	P6420J3172
DATE	September 2025	FIGURE NO.	1

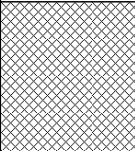
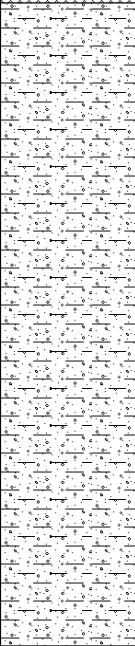


PROJECT NAME	Station Road, Warnham, RH12 3SR	CLIENT	Wienerberger Ltd
TITLE	Completed Exploratory Hole Plan	PROJECT NO.	P6420J3172
DATE	September 2025	FIGURE NO.	2





APPENDIX 2 – EXPLORATORY HOLE LOGS

		TRIAL PIT RECORD				Pit ID STP1					
Project Name: Station Road, Warnham			Client: Wienerberger Ltd			Date: 22/09/2025					
Location: Station Road, Warnham, RH12 3SR			Logged by: BKS			Co-ords: E516972.45 N133986.17					
Project No. : P6420J3172			Crew Name: RA			Equipment: Excavator					
Log Status FINAL		Location Type TP		Level 48.49m AoD		Approved By SC		Scale 1:20		Page Number Sheet 1 of 1	
Legend	Water Strikes	Sample and In Situ Testing			Stratum Description	Depth (m)	Level (m)				
		Depth (m)	Type	Results							
					Grass over blackish grey gravelly sand with medium rootlet content. Sand is fine to coarse. Gravel consists of fine to medium, sub-angular flint with brick and plastic. (MADE GROUND)	0.40	48.09				
					Light brown sandy gravelly CLAY. Sand is fine to medium. Gravel consists of fine to coarse, sub-angular to sub-rounded mudstone fragments and occasional limestone fragments. (WEALD CLAY FORMATION)						
						2.10	46.39				
					End of Trial Pit at 2.10m						
Dimensions		Trench Support and Comment				Key:					
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks		ES - Environmental Sample D - Small Disturbed Sample B - Bulk Disturbed Sample PID - Photo-ionisation Detector					
1.50	1.10										
Remarks: Soil infiltration test conducted within											
JOMAS ASSOCIATES LTD Unit 24 Sarum Complex, Salisbury Road, Uxbridge UB8 2RZ www.jomasassociates.com 0333-305-9054 info@jomasassociates.com Jomas Associates Ltd Registered in England and Wales No. 7095350											

APPENDIX 3 – INFILTRATION TEST RESULTS

BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Station Road, Warnham, RH12 3SR

CALCULATING ENGINEER: BKS

DATE: 23 September 2025

Notes:

APPROVED BY: SC

DATE: 25 September 2025

JOMAS JOB NO.: P6420J3172

TEST LOCATION: STP1

DATE OF TEST: 22 September 2025

Pit Details

Length 1.5 m

Breadth 1.1 m

Depth 2.1 m

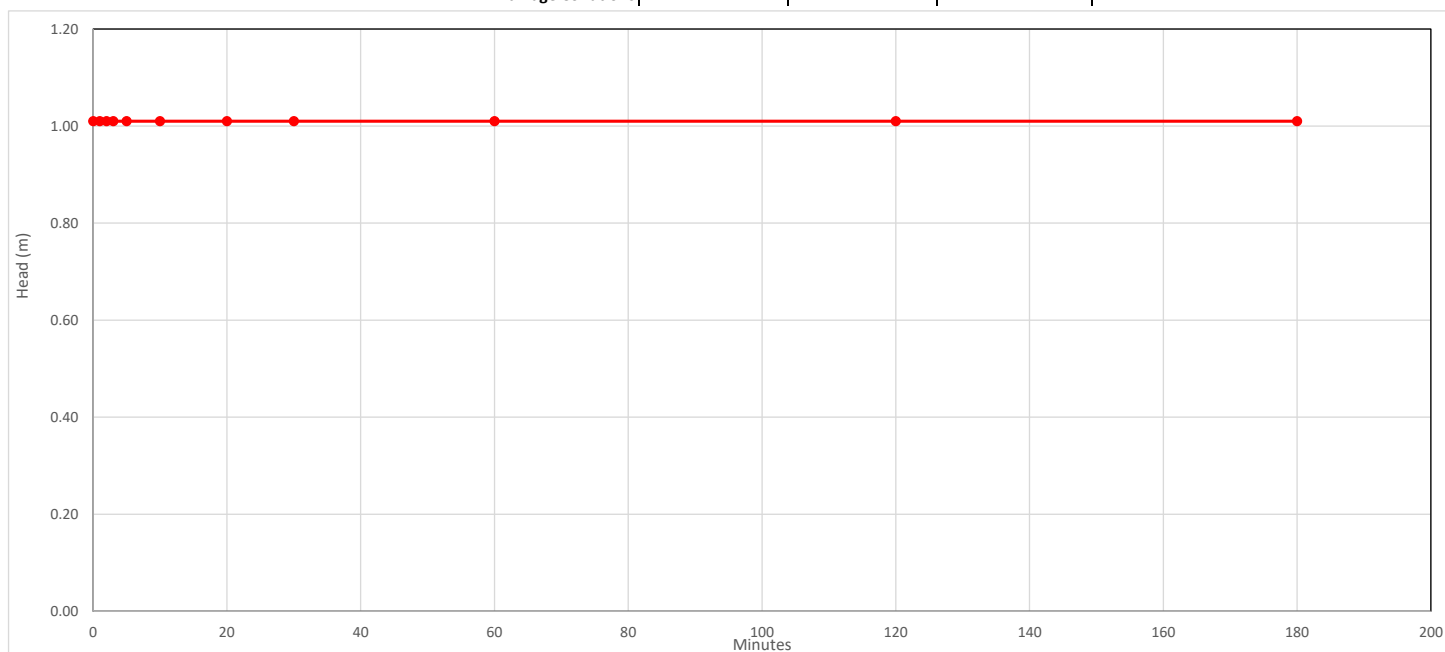
Groundwater? N

Filled With Gravel?	N
---------------------	---

	STP1 - Test 1	STP1 - Test 2	STP1 - Test 3
Dg 75% (m)	0.76		
Tp 75%			
Dg 25%	0.25		
Tp 25%			
Vp75% - Vp25% (m ³)	0.83		
ap50% (m ²)	4.28		
Tp75-Tp25 (min)			
Soil infiltration rate (m/sec)	Inuff. Drain		
Permeability Description			
Drainage Conditions			

Dw = depth to water

D_g = head of water in the pit

[illegible]

BRE 365 INFILTRATION TESTS

JOMAS JOB NAME: Station Road, Warnham, RH12 3SR

CALCULATING ENGINEER: BKS **DATE:** 23 September 2025

DATE: 23 September 2025

Notes:

JOMAS JOB NO.: P6420J3172

TEST LOCATION: STP2

DATE OF TEST: 22 September 2025

Pit Details

Length 1.6 m

Breadth 1.0 m

Depth 1.6 m

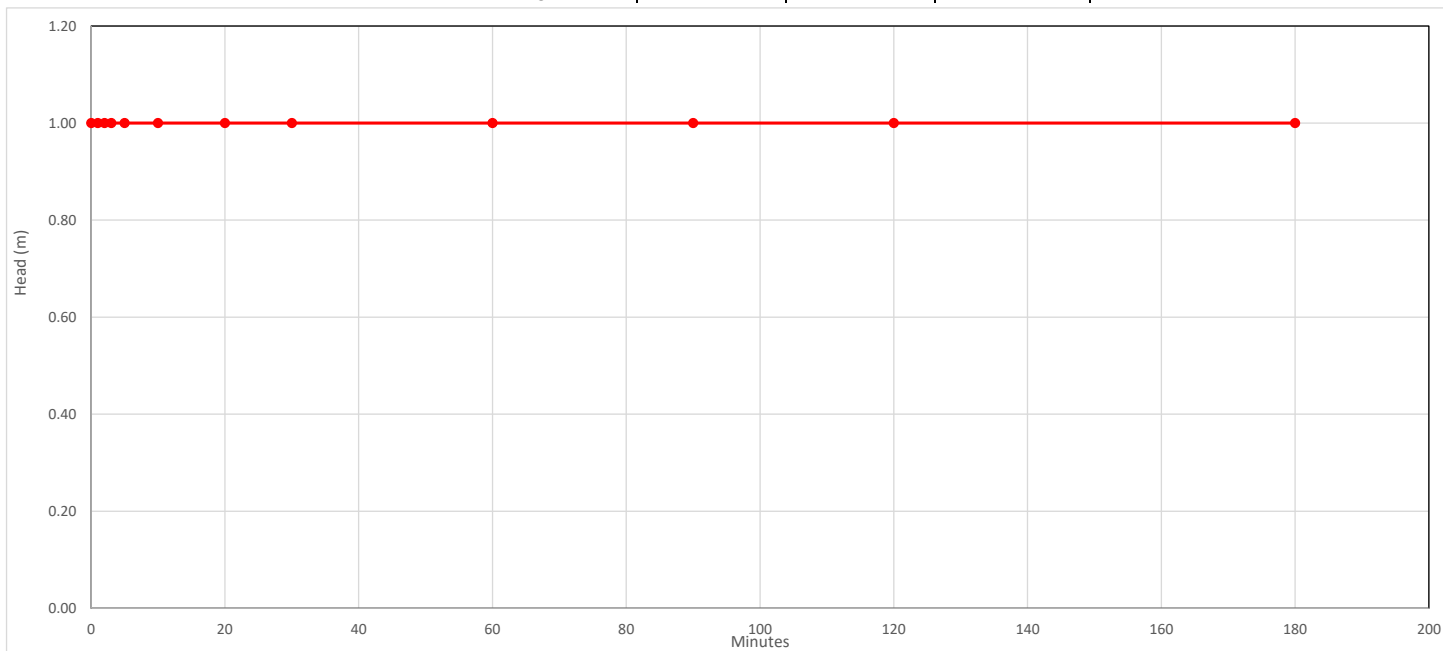
Groundwater? N

Filled With Gravel?	N
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	STP2 - Test 1	STP2 - Test 2	STP2 - Test 3
Dg 75% (m)	0.75		
Tp 75%			
Dg 25%	0.25		
Tp 25%			
Vp75% - Vp25% (m ³)	0.80		
ap50% (m ²)	4.20		
Tp75-Tp25 (min)			
Soil infiltration rate (m/sec)	Insuff. Drain		
Permeability Description			
Drainage Conditions			

Dw = depth to water

D_g = head of water in the pit

[illegible]

Appendix C: Maintenance Report

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK

DRAINAGE MAINTENANCE PLAN

Station Road, Warnham, RH12 3SR

Report Title: Drainage Maintenance Report for Station Road, Warnham, RH12 3SR

Report Status: Final

Job No: P6420J3172

Date: February 2026

Control: Previous Release

Version	Date	Issued By
V1.0	11/02/2026	A Wallace

Prepared by: **JOMAS ASSOCIATES LTD** For: **Weinerberger Ltd**

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1.1 General

1.1.1 Sustainable Drainage Systems (SuDS) are an environmentally friendly approach to managing rainfall. SuDS techniques use landscape features to deal with surface water with the aim to:

- Control the flow, volume and frequency of water leaving a development.
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
- Provide attractive surroundings for the community.

1.1.2 The surface water drainage strategy for this development utilises below ground tanks and permeable paving as the main SUDS features. The following sections provides a brief description of these features and outlines the maintenance programme that should be adopted.

1.2 Cleaning of the Drainage System

1.2.1 Drainage systems should be inspected at regular intervals and where necessary, thoroughly cleaned out at the same time. Any defects discovered should be made good.

1.2.2 The following operations should be carried out during the periodic cleaning of a drainage system.

Table 1: Drainage Maintenance

Product Type	Period	Responsibility	Maintenance Methods
Silt Trap	As necessary and before wet season	Maintenance Company	• Sediment and debris that accumulated during summer needs to be removed before the wet season. • Inspect and clean out routinely prior to inlet pipework to minimise debris reaching the tank. • Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.
Standard Manholes/ Inspection Chambers	As necessary	Maintenance Company	• Remove and clean any soil and vegetation that covers the manhole cover to prevent blockage of the drainage system at the manhole. • Renew/replace any damaged/missing bolts and damaged/missing manhole covers.
Drainage Pipes	Six monthly interval	Maintenance Company	• Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.

Product Type	Period	Responsibility	Maintenance Methods
Attenuation Tank			• Inspection/check of all inlets to ensure that they are in good condition and operating as designed. • Debris removal from catchment surface (where may cause risks to performance). • Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.
Flow Control	As required	Maintenance Company	• Inspection/check of all inlets to ensure that they are in good condition and operating as designed. • Debris removal from catchment surface (where may cause risks to performance). • Renew/replace any damaged/missing bolts and damaged/missing manhole covers. • Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.
Pumps	As required	Maintenance Company	• Inspection/check of all inlets to ensure that they are in good condition and operating as designed. • Debris removal from catchment surface (where may cause risks to performance). • Renew/replace any damaged/missing bolts and damaged/missing manhole covers. • Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed. • Regular pump maintenance as recommended by pump manufacturer
Permeable Paving	As required	Maintenance Company	• Inspect the roof after any precipitation to ensure no displacement of any debris onto the surface.
	As Required		• Inspect the paving after any precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
	Six monthly		• Agitate (e.g. brush, vacuum, etc.) the block paving to ensure no vegetation of any sort is allowed to grow and develop in the joints (where may affect performance).

1.3 Sketches and Plans

- 1.3.1 The locations of the above features can be found by examining Drawing P6420J3172-C01

1.4 Maintenance Checklist

1.4.1 As well as the above checklist, the below Inspection Regime should be completed on a 6 monthly basis and the above inspection checklist table updated as required.

Inspection date								
	Details	Y/N	Action required	Date completed	Details	Y/N	Action required	Date Completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (eg rutting, spreading of blocks or signs of ponding water)?								
Silt/sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent.								

Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (eg underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
System blockages and litter build-up								
Is there evidence of litter accumulation in the								
Is there any evidence of any other clogging or								
Vegetation								
Is the vegetation condition satisfactory								
Does any part of the system require weeding, pruning or mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species								
Infrastructure								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (eg wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								

Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
Other observations								
Information appended (eg photos)								
Suitability of current maintenance regime								
Continue as current								
Increase maintenance								
Next inspection								
Proposed date for next inspection								

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