



**ARCH
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DRAINAGE TECHNICAL NOTE



STOPHAM ROAD
PULBOROUGH



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for

STOPHAM ROAD
PULBOROUGH

Client:

Stonewater
Suite C, Lancaster House
Grange Business Park
Enderby Road
Whetstone
Leicester LE8 6EP

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1.0 Executive Summary

As part of our wider appointment to develop the detailed drainage design for the proposed development at Stopham Road, Pulborough, Arch Associates Limited has been commissioned by Stonewater to prepare a Technical Note to discharge pre-commencement conditions 10 and 11 from the decision notice referenced DC/16/0728:

Pre-Commencement Condition 10: *Development shall not commence until a drainage strategy detailing the proposed means of foul sewerage disposal and an implementation timetable has been submitted to and approved in writing by the Local Planning Authority, in consultation with Southern Water. The development shall thereafter be carried out in accordance with the approved details.*

Reason: *To ensure sufficient provision is made for disposal of sewerage from the site in accordance with Policy 38 of the Horsham District Planning Framework (Adopted November 2015).*

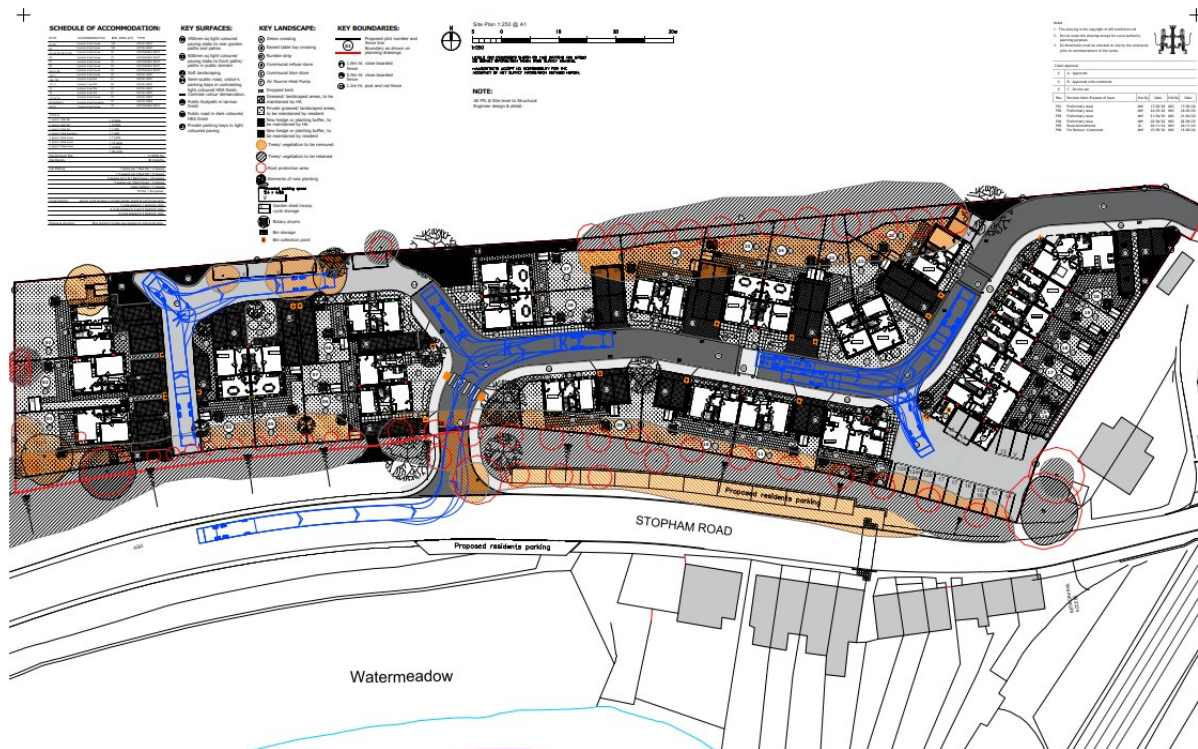
Pre-Commencement Condition 11: *Development shall not commence until details of surface water disposal, based on sustainable drainage principles, and a timetable for delivery has been submitted to and approved in writing by the Local Planning Authority in consultation with Southern Water. The submitted details shall include details of management and maintenance responsibilities for the lifetime of the development. The development shall thereafter be carried out in accordance with the approved details.*

Reason: *To ensure sufficient provision is made for disposal of surface water from the site in accordance with Policy 38 of the Horsham District Planning Framework (Adopted November 2015).*



2.0 The Site

The circa 0.76-hectare site is located off Stopham Road, Pulborough. It currently comprises unmanaged grassland and mature trees along the southern, western and eastern boundaries. The site is bound by Stopham Road to the south and existing fields to the north and west. Pulborough train station can be found to the north-east of the site, with an access track serving the train station running alongside the eastern boundary of the site. Under the new proposals, 28 dwellings will be erected with associated access, parking and landscaping. Refer to Appendix 1 for the proposed masterplan.



3.0 Existing Site Topography and Drainage

Existing topography comprises steep slopes falling toward a low spot located adjacent to the existing bellmouth access, located approximately at the centre of the southern boundary. Within the soft landscaping, a slight hump in levels can also be observed further east, where levels also begin to fall away toward the access track serving the train station. The highest point in the site is at circa 13.07mAOD and the lowest point is at circa 7.44mAOD, at the northeast of the site along the barbed wire fencing and at the bellmouth on the southern boundary respectively.

As indicated by the topographical survey showing a lack of drainage infrastructure and the Southern Water Asset Map, the site is not formally drained at present. The Drainage Strategy and Flood Risk Assessment prepared by RGP at the planning stage notes the assumption that overland flows from the site will fall toward the River Arun, which is located south of Stopham Road. Refer to Appendix 2 for the topographical survey, Appendix 3 for the Southern Water Asset Map and Appendix 4 for the Drainage Strategy and Flood Risk Assessment prepared by RGP.

Ground investigation undertaken by Albury SI Ltd at the proposed site has established that the ground conditions yield positive BRE365 test results. The results have established soil infiltration rates of between $1.01 \times 10^{-5} \text{m/s}$ and $3.87 \times 10^{-7} \text{m/s}$. Groundwater testing undertaken by Soils Limited as part of a Phase II site investigation revealed no groundwater encountered within 4no. exploratory holes ranging in depths from 3.40mbgl to 4.0mbgl. One monitoring well reading in WS4 recorded water at 3.6m BGL, but this is expected to be an anomalous reading resulting from water entering the well, as confirmed by Soils Ltd.



As such, drainage via infiltration is proposed for surface water discharge. Refer to Appendix 5 for the Phase II site investigation and Appendix 6 for the groundwater monitoring.

Table 3.3 Groundwater Monitoring

Hole No.	Depth to Water (m bgl)				
	26/01/2023 *	08/03/2023	24/03/2023	12/04/2023	12/05/2023
WS1	Dry	Dry	Dry	Dry	Dry
WS2	Dry	Dry	Dry	Dry	No reading. ²
WS3	Dry	Dry	Dry	Dry	Dry
WS4	Dry	Dry	Dry	3.60 ¹	No reading. ²

Notes: * Date of installation. ¹ Damp at base of trial hole, anticipated condensation within pipe. ² Monitoring well not possible to locate following extensive site strip, assumed to be destroyed.



Geology

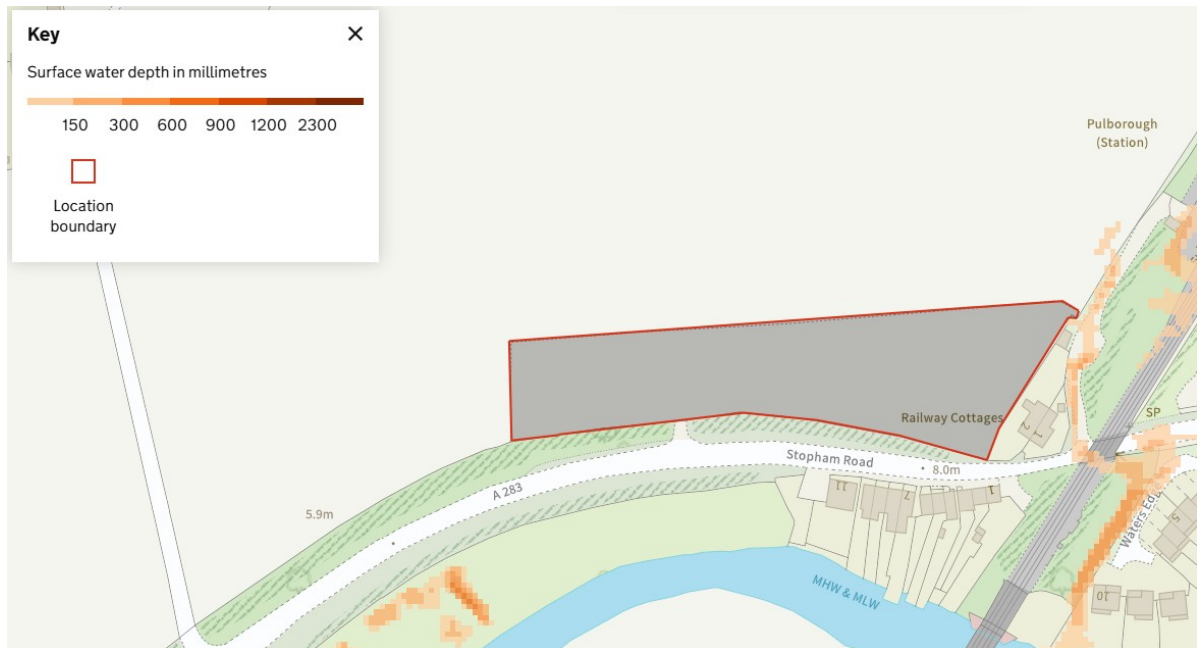
An intrusive Phase II site investigation has been provided by Albury SI Ltd, which confirms British Geological Survey (BGS) mapping indications of Folkestone Formation geology. This is overlain by Head Deposits towards the eastern boundary of the site.

4.0 Flood Risk Assessment

A review of the UK Government's Flood-Warning Information Services mapping online indicates that the site is entirely within Flood Zone 1 and therefore is at very low risk of flooding from tidal and fluvial sources, in both the present day and 2070 to 2125 climate change scenarios. Refer to the image below.



Flood Map for Planning



A review of the UK Government's surface water flood risk map indicates that the site is not subject to flooding in the 1:30, 1:100 or 1:1000 year events, in both the present day and 2070 to 2125 climate change scenario, with the worst case (1:1000 year event, 2070 to 2125 climate change scenario) shown in the image above. The buildings would remain safe due to the FFLs being set at a minimum of 150mm above the proposed external ground levels. The site is not located nearby to any reservoirs and so is not subject to flooding from this source.

5.0 Proposed Foul and Surface Water Drainage

5.1 Foul Water

The proposed foul water system will discharge to the existing Southern Water manhole, ref. 2501, residing within Stopham Road. Due to the position of this manhole relative to the proposed site and to facilitate the connection, a short length of sewer will be put forward for adoption to Southern Water, subject to a S104 agreement. Refer to Appendix 3 for the Southern Water Asset Map.

The proposed foul water drainage has been designed in accordance with the Sewerage Sector Guidance – Appendix C – Design and Construction Guidance and Part H of the Building Regulations. Refer to Appendix 7 for the drainage drawings.

The hydraulic design for the discharge rate for the foul wastewater design has been calculated in accordance with Sewerage Sector Guidance – Appendix C which states design flow rates for dwellings should be 4000l/day. Therefore, the peak foul discharge rate for the 28 proposed dwellings equates to approximately 1.30 litres/second.

5.2 Surface Water

Given that the Phase II site investigation undertaken at the proposed site has established that the ground conditions are suitable for drainage by infiltration due to positive BRE365 test results and deep groundwater readings, drainage via infiltration is proposed where feasible within the site constraints.

Soakaways are proposed as the primary means of draining roof catchments to ground. However, where maintaining a 5m offset from dwellings for soakaway is not possible, permeable paving is proposed as a blanket infiltration system for those roof catchments and for areas of hardstanding. Runoff from the spine road catchment is collected by one of two surface water gravity systems. The catchment draining toward the low spot at the bellmouth along the southern boundary is directed to a soakaway beneath the road extents, where the offset and unsaturated depth of soil to groundwater requirements are met. The spine road catchment that falls toward the east discharges at a restricted rate to an existing surface water network that outfalls into the nearby River Arun behind the railway embankment. Greenfield run-off QBAR was established as 5.5l/s by RGP at the



planning stage utilising the IH124 ICOP methodology. Discharge is proposed to be restricted to 5.0l/s for the network discharging to the existing surface water sewers.

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.940	Urban	0.000
SAAR (mm)	898	Region Number	Region 7

Results l/s

QBAR Rural	5.5
QBAR Urban	5.5

Q100 years 17.6

Q1 year	4.7
Q30 years	12.5
Q100 years	17.6

The results of the infiltration testing undertaken by the Albury SI Ltd (Appendix 5) are utilised within the hydraulic model and the relevant values have been applied to the permeable paving and soakaways, with the 1.0m depth of unsaturated soil below the infiltration features requirement also being satisfied when measured against the groundwater monitoring readings. Noting that only a singular result was established at SA2, which yielded the lowest recorded rate of $3.87 \times 10^{-7} \text{m/s}$, this result has been discounted from the hydraulic design and the next lowest value, $6.82 \times 10^{-6} \text{m/s}$ established within the tests at SA4, has been utilised within the design of infiltration features.

The total site area is circa 76350m², comprising soft landscaping only. Therefore, the existing impermeable area equates to 0m². The post-development impermeable area will be 4625m², resulting in an increase of surface water volume leaving the site.

The infiltration features have been designed to accommodate the 1 in 100 year rainfall event including a 45% allowance for climate change and a 10% allowance for urban creep. The depths of permeable subbase storage and soakaways have been confirmed within the hydraulic model. Refer to Appendix 8 for surface water drainage calculations.

Overland/surface exceedance flows due to extreme events or blockage of drainage systems would naturally flow towards the south of the site and onto Stopham Road, or to the east and onto the access track serving the train station, mirroring the existing exceedance conditions. The buildings would remain safe due to the FFLs being set at a minimum of 150mm above the proposed external ground levels.

SuDS Treatment Train Components

Based on the guidance in CIRIA C753, the following analysis has been undertaken with the relative mitigation indices for the proposed levels of treatment taken from CIRIA C753 Tables 26.3 (surface waters) and Table 26.4. The resultant assessment is summarised within the Table below.

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Low Traffic Roads	Low	0.5	0.4	0.4

	Pollution Mitigation Indices			
Downstream Defender		0.5	0.4	0.8
Sufficiency		Sufficient	Sufficient	Sufficient

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Roofing*	Very Low	0.2	0.2	0.05
	Pollution Mitigation Indices			
Soakaway (with 300mm depth of soil below)		0.4	0.3	0.3
Sufficiency		Sufficient	Sufficient	Sufficient

Element	Pollution Hazard Indices			
	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential Parking*	Low	0.5	0.4	0.4
	Pollution Mitigation Indices			
Permeable Paving		0.7	0.6	0.7
Sufficiency		Sufficient	Sufficient	Sufficient

*Given the varied land use across the runoff area, the land use type with the highest pollution index is selected for the assessment.

6.0 SuDS Maintenance

The maintenance regime of the surface water drainage system and its components is outlined within the accompanying Arch Associates Limited SuDS Maintenance Manual.

7.0 Protection of the Drainage System During Construction

All building materials on site shall be stored on a flat surface, and the manufacturer's recommendations for storage shall be followed which may include avoid extended exposure to sunlight, protection from damage etc.

Runoff shall be prevented from entering the constructed pipe systems during the construction with measures including capping off the pipe openings.