



ARCH
ASSOCIATES

APPENDIX 4

DRAINAGE STRATEGY FOR PLANNING



LAND OFF STOPHAM ROAD

Pulborough, West Sussex.

**Drainage Strategy and
Flood Risk Assessment
(For Submission)**

**Prepared on behalf of
Willowmead (Pulborough) Ltd**

**2015/D1074/D1.1
January 2016**

RGP Design Limited
Metro House, Northgate, Chichester, West Sussex. PO19 1BE

Registered in England No. 09674169 :: Registered office:
Shackelford Suite, Mill Pool House, Mill Lane, Godalming, Surrey GU7 1EY



DOCUMENT CONTROL

Project: Land off Stopham Road
Pulborough, West Sussex.

Document: Drainage Strategy and
Flood Risk Assessment

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Willowmead (Pulborough) Ltd

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PLANS and DRAWINGS

2015/D1074/SK501 Existing Drainage Regime
2015/D1074/SK502 Proposed Drainage Strategy
2015/D1074/SK503 Preliminary Drainage Layout, Network Rail Land

Southern Water Capacity Assessment



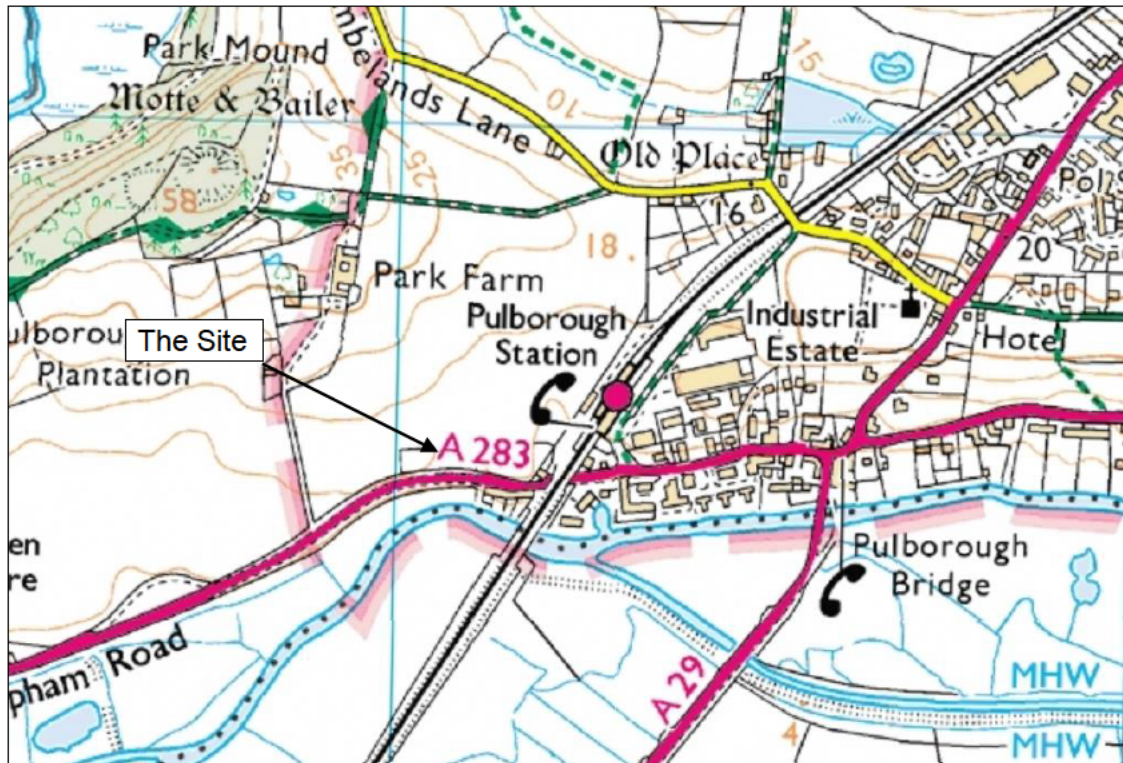
1 INTRODUCTION

- 1.1.1 Instructions were received from Willowmead (Pulborough) Ltd to prepare a drainage strategy for the development of a parcel of land off Stopham Road, Pulborough, West Sussex.
- 1.1.2 The strategy has been prepared to support a planning application for 28 No. new residential dwellings (mixed) together with a new access road and a car parking area.



2 DEVELOPMENT DESCRIPTION AND LOCATION

- 2.1.1 The site is situated on the western edge of Pulborough, just north of the A283 Stopham Road, west of the Railway station.



- 2.1.2 The part of the site that is to be developed for residential use is currently rough ground with an area of approximately 1.64Ha. It is understood that the site was previously used as a nursery but has been unused for approximately 10 years. The site that is to be developed for use as a car park was formerly a railway platform and is currently rough ground with some areas of tarmac.
- 2.1.3 The site is raised above Stopham Road by approximately 2 – 2.5m. The site falls from the east and the west to a central low point at a gradient of approximately 1:18. The levels on the site are between 7.4m and 15.3, AOD.
- 2.1.4 The recorded data on the BGS website suggests the local geology is as follows:

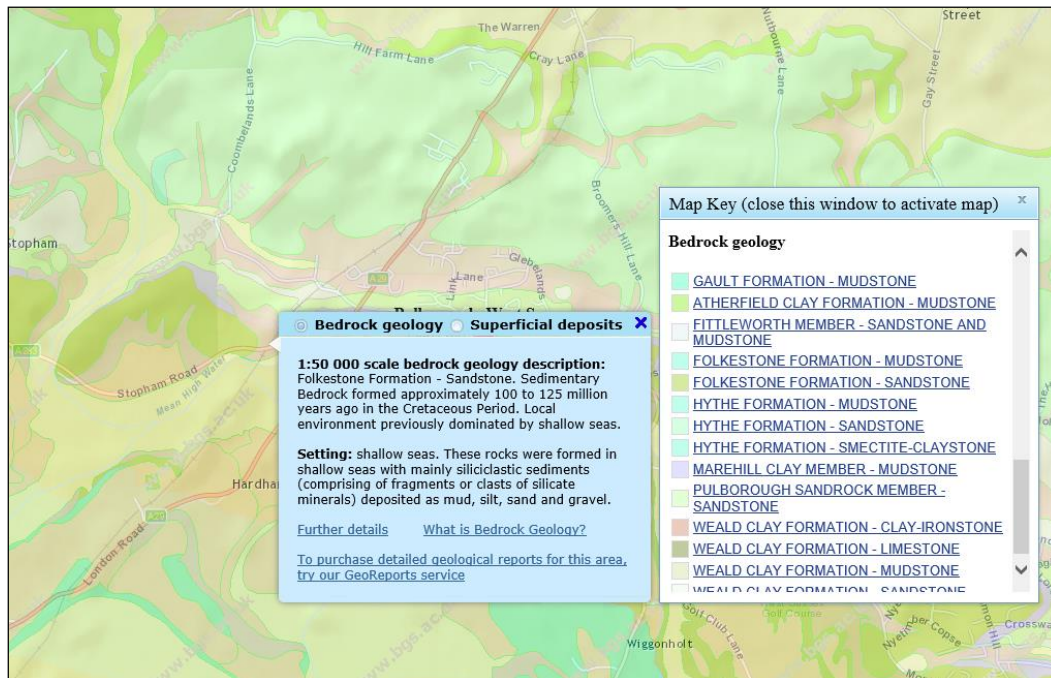
Bedrock

Folkestone Formation - Sandstone. Sedimentary Bedrock formed approximately 100 to 125 million years ago in the Cretaceous Period.



Superficial deposits

Head - Clay, Silt, Sand And Gravel. Superficial Deposits formed up to 3 million years ago in the Quaternary Period. Local environment previously dominated by subaerial slopes.



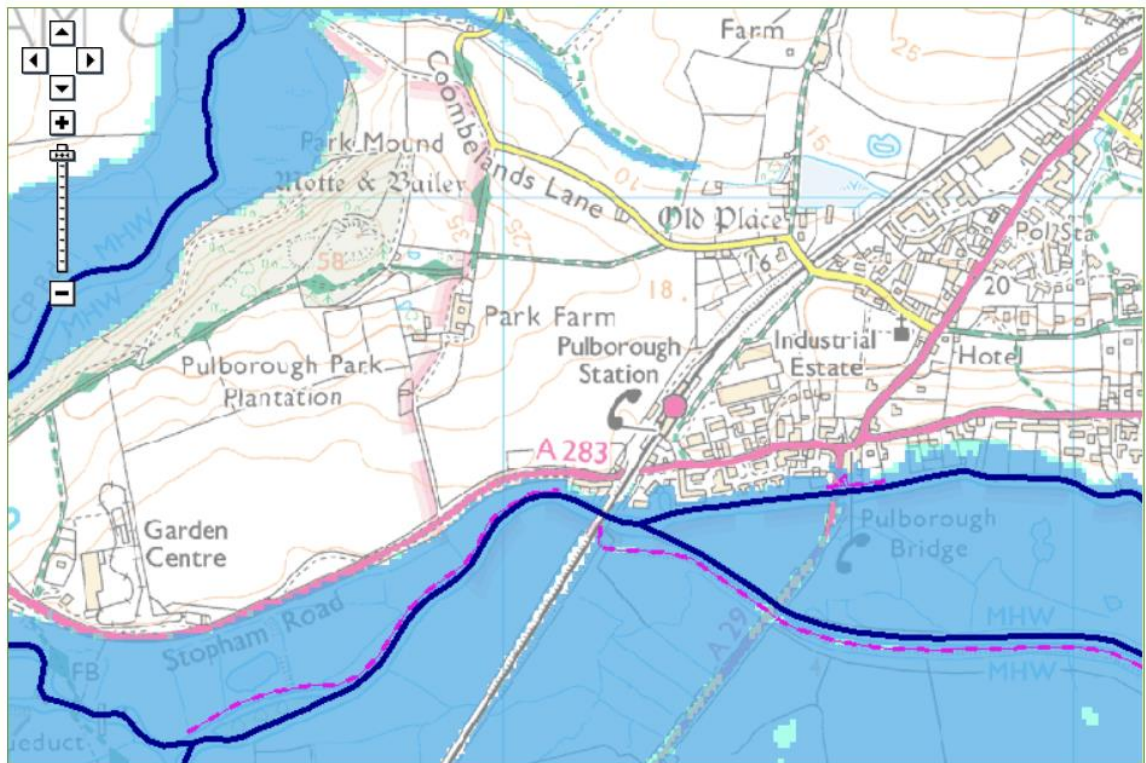
Extract from BGS Geology Map

- 2.1.5 The Environment Agency Flood maps for Planning show that the site is located in Zone 1. The nearest Zone 2 or 3 is on the southern side of Stopham Road (associated with the River Arun). As mentioned in 2.1.3, the site is raised above Stopham Road and therefore well above the flood level.



X: 504,129;Y: 118,667 at scale 1:10,000

[Other maps](#) [Data search](#) [Text only version](#)



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) has taken over the responsibilities of the Environment Agency in Wales.
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Extract from Environment Agency Flood Maps for Planning

- 2.1.6 Horsham District Council has a Strategic Flood Risk Assessment that was prepared by Scott Wilson Ltd in 2007. The site is not specifically referenced in the SFRA but the Coarse Assessment maps show that the site is located in Zone 1.
- 2.1.7 The Environment Agency Flood Maps for Planning refer to flood risk from rivers and the sea and the NPPF requires other sources of flooding to be considered, generally being sewers, groundwater, overland flows and artificial sources such as reservoirs. The current topography would allow flows occurring from any of these sources to pass through the site, over Stopham Road and onto the River Arun.
- 2.1.8 Based on the above, overall, the risk of the site flooding is concluded to be low.



3 EXISTING DRAINAGE REGIME

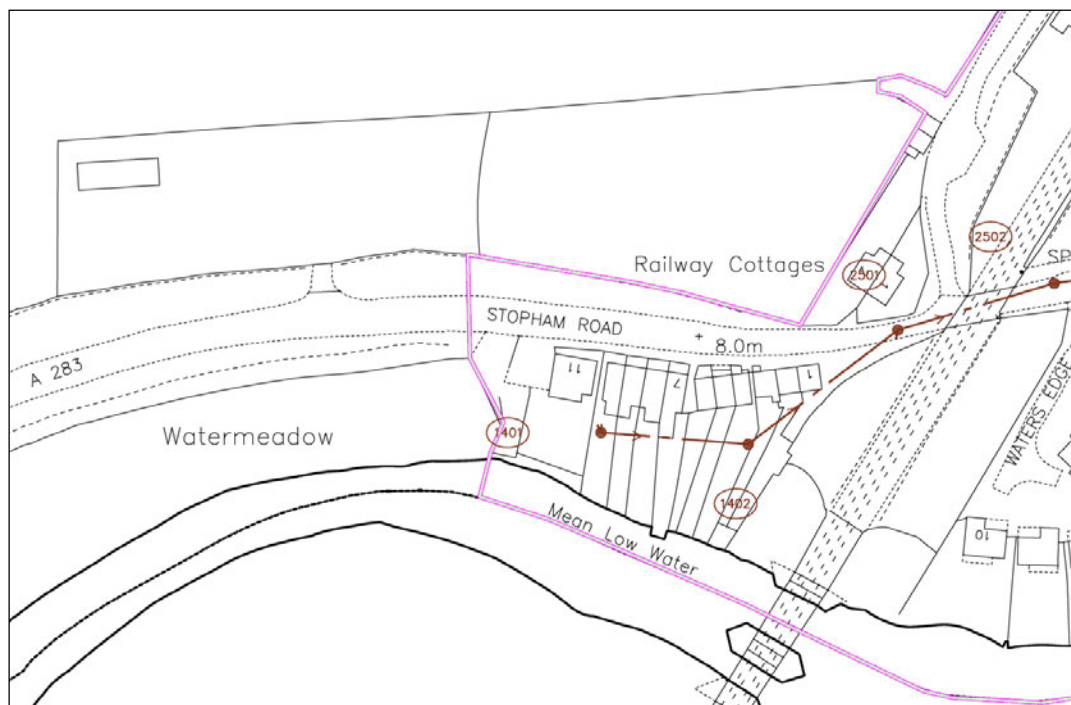
- 3.1.1 The subject site is not formally drained at present, being rough ground. Whilst the site is predominantly greenfield, it is believed that once the ground becomes saturated, overland flows will occur across Stopham Road to the south and towards the River Arun. It is understood from Policy Paper "Lower Tidal River Arun flood risk management scheme" that the River Arun water levels are tidally influenced in this location.
- 3.1.2 Greenfield Run-off: QBAR = 5.5l/s. Calculated using IH124 ICOP method (Microdrainge). The volume of run-off from the existing Greenfield site, during a 1 in 100 year, 360min rainfall event is 314.1m³.

<u>ICP SUDS Mean Annual Flood</u>				
Input				
Return Period (years)	100	Soil	0.450	
Area (ha)	0.940	Urban	0.000	
SAAR (mm)	898	Region Number	Region 7	
Results 1/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			



Greenfield Runoff Volume	
FSR Data	
Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.100
Ratio R	0.352
Areal Reduction Factor	1.00
Area (ha)	0.940
SAAR (mm)	900
CWI	121.952
Urban	0.000
SPR	47.000
Results	
Percentage Runoff (%)	50.64
Greenfield Runoff Volume (m ³)	314.095

- 3.1.3 The sewer record data indicates that there is a public foul sewer located to the rear of the residential properties on the Southern Side of Stopham Road and beneath Stopham Road near the railway bridge outside of Railway Cottages. This sewer is recorded as being 150mm diameter. There are no public surface water sewers recorded on the public sewer records.



Extract from Southern Water Sewer Records



- 3.1.4 There is an existing "culvert" from the car park site, although its exact size and route has not been confirmed it is believed to be 300mm diameter and to run along the bottom of the railway embankment, discharging in to the River Arun.
- 3.1.5 Historic flooding enquiries have been made to West Sussex County Council and Horsham District Council. Both responded that there are no recorded instances of flooding on the site.



4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

4.1.1 The Building Regulations approved document H provides a hierarchy of methods of disposal for surface water run-off as follows:

- a) Soakaway or Infiltration System
- b) To a watercourse
- c) To a sewer

An assessment of the above follows:

- a) The soils underlying the site are not considered to be suitable to infiltration.
- b) The River Arun is located to the south of the site.
- c) There is a no public surface sewer close to the site.

4.1.2 A review of the BGS data indicates that natural percolation rates are likely to be poor within the confines of the site. It may be possible to use partial infiltration methods of drainage, subject to testing, but conventional soakaways are not likely to operate satisfactorily given the low percolation rates anticipated.

4.1.3 Following the above hierarchy, surface water run-off will be disposed of to the River Arun to the south of the site.

4.1.4 The proposed impermeable area for the residential site is approximately 4575m².

4.1.5 It is proposed that the surface water from the impermeable area is discharged from the site at a rate not exceeding QBAR. This will be in accordance with the DEFRA recommendations (Non-statutory Technical Standards for Sustainable Drainage Systems).

4.1.6 The surface water drainage system will be designed to accommodate a 1 in 100 year critical storm. An increase in rainfall intensity of 30% will be applied to the design to allow for the effects of climate change.



Quick Storage Estimate

Variables

FSR Rainfall (dropdown)
Return Period (years): 100
Region: England and Wales (dropdown)
Map (button)
M5-60 (mm): 20,000
Ratio R: 0.351
Cv (Summer): 0.750
Cv (Winter): 0.840
Impervious Area (ha): 0.475
Maximum Allowable Discharge (l/s): 5.5
Infiltration Coefficient (m/hr): 0.00000
Safety Factor: 2.0
Climate Change (%): 30

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Results

Global Variables require approximate storage of between 231 m³ and 335 m³.
These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

- 4.1.7 A Hydrobrake or similar flow control device will restrict the rate of run-off leaving the site. It is recommended that infiltration testing is undertaken to determine if SUDS techniques can be used, which may take the form of porous paving.



- 4.1.8 Network Rail intend to develop the parcel of land to the north east of the site to form a car park. The proposed surface water drainage for the Network Rail land is likely to use the existing surface water "culvert" owned by Network Rail. The run-off from the Network Rail land will be limited to the equivalent of QBAR which is calculated to be 1.6l/s, with storage (approximately 230m³) provided within the Network Rail site boundary.
- 4.1.9 With regard to flood risk on the site, the proposed surface water drainage scheme will ensure that the proposed dwellings are protected against flooding during storms up to and including a 1 in 100 year +30% critical event. The rate of run-off leaving the site will be restricted so that it does not exceed predevelopment rates to ensure that flood risk off site is not increased.



5 PROPOSED FOUL WATER DRAINAGE

- 5.1.1 It is proposed to connect the foul drainage from the development to the existing public foul sewer. This will involve constructing a new length of public sewer beneath Stopham Road and connecting to the existing manhole close to Railway Cottages (ref 2501).
- 5.1.2 Based on the residential design guidance provided in Sewers for Adoption, the proposed foul flow will be in the region of 1.4l/s.
- 5.1.3 A capacity check has been undertaken by Southern Water which concluded that off-site upgrades would be required to ensure that the existing public sewer network is not detrimentally affected by the proposed development.



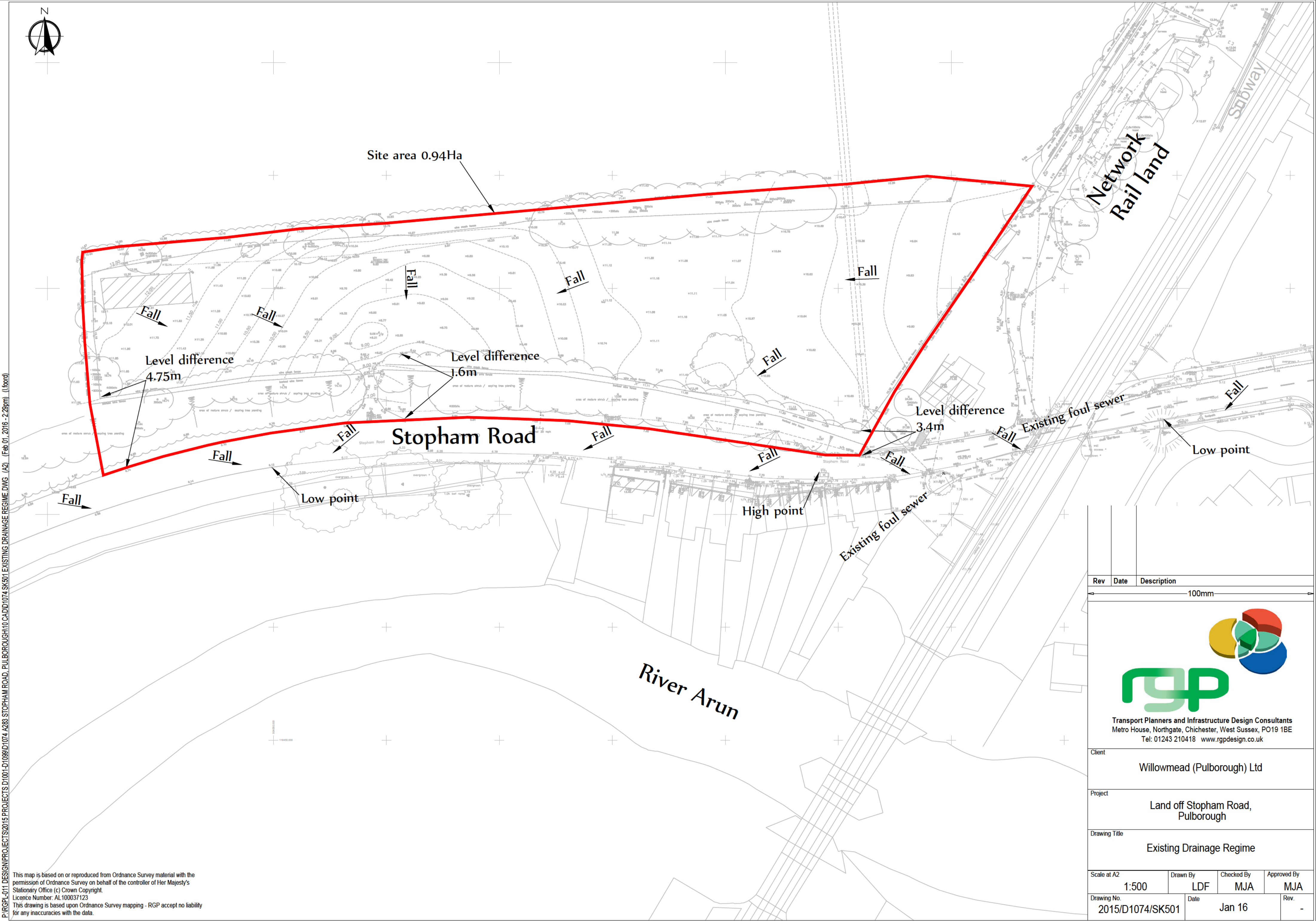
6 SUMMARY

- 6.1.1 The site is shown to lie wholly within Flood Zone 1 on the Environment Agency's Flood Map for Planning and the site area is 1.6Ha.
- 6.1.2 Surface water drainage from the proposed residential development will be limited to QBAR (5.5l/s) as the proposals represent an increase in impermeable area. This will ensure that there is no increase in the rate of run-off leaving the site following the proposed development.
- 6.1.3 Surface water drainage from the proposed car park development will be limited to QBAR (1.6l/s) as the proposals represent an increase in impermeable area. This will ensure that there is no increase in the rate of run-off leaving the site following the proposed development.
- 6.1.4 The surface water drainage system should be sustainable and where possible utilise SUDS techniques.
- 6.1.5 The proposed surface water drainage system will be designed to accommodate a 1 in 100 year +30% critical storm.
- 6.1.6 The site is at low risk of flooding and will continue to be at low risk of flooding following the development. Flood risk off site will not be increased as a result of the development.
- 6.1.7 Foul water drainage will be discharged to the existing public foul sewer located close to Railway Cottages, with new section of public sewer constructed beneath Stopham Road.
- 6.1.8 The proposed foul flow will be in the region of 1.4l/s when calculated in accordance with Sewers for Adoption.
- 6.1.9 Southern Water has advised that off-site improvements to the existing foul sewer network will be required to ensure capacity exists within their infrastructure to serve the proposed development.



Drawing 2015/D1074/SK501

Existing Drainage Regime



P:\RGPL-011 DESIGN\PROJECTS\2016 PROJECTS\1001-D1099\1074_A283 STOPHAM ROAD, PULBOROUGH\10 CAD\1074 SK501 EXISTING DRAINAGE REGIME.DWG (A2) (Feb 01, 2016 - 2:28pm) (Lford)

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Rev	Date	Description
100mm		
		
Transport Planners and Infrastructure Design Consultants Metro House, Northgate, Chichester, West Sussex, PO19 1BE Tel: 01243 210418 www.rgpdesign.co.uk		
Client Willowmead (Pulborough) Ltd		
Project Land off Stopham Road, Pulborough		
Drawing Title Existing Drainage Regime		
Scale at A2 1:500	Drawn By LDF	Checked By MJA
Drawing No. 2015/D1074/SK501	Date Jan 16	Approved By MJA
		Rev. -



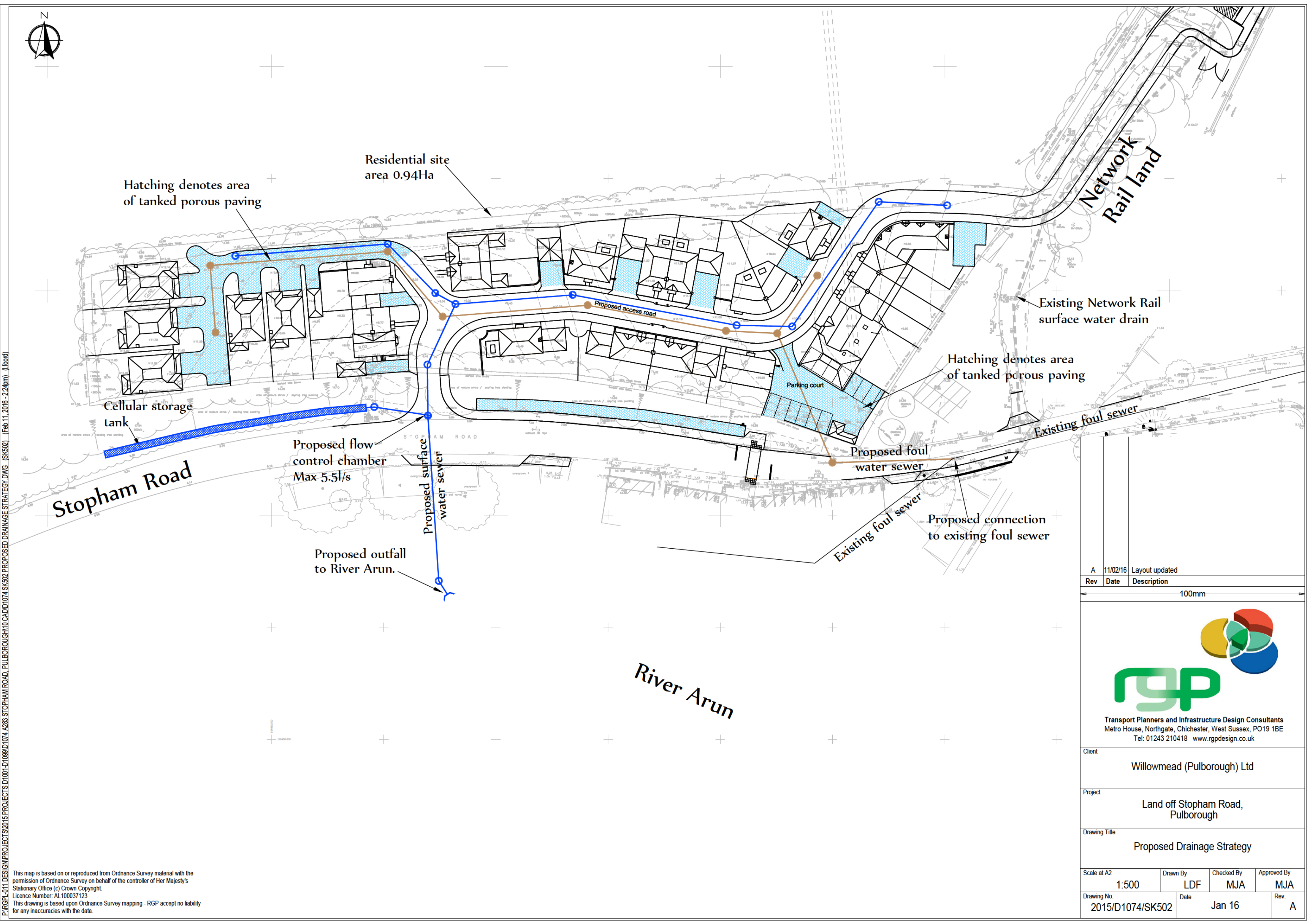
Drawing 2015/D1074/SK502

Proposed Drainage Strategy



P:\RGP\11 DESIGN\PROJECTS\2016 PROJECTS\1001-D1099\1074 A283 STOPHAM ROAD, PULBOROUGH\10 CAD\1074 SK502 PROPOSED DRAINAGE STRATEGY.DWG (SK502) (Feb 11, 2016 - 2:24pm) (1:00m)

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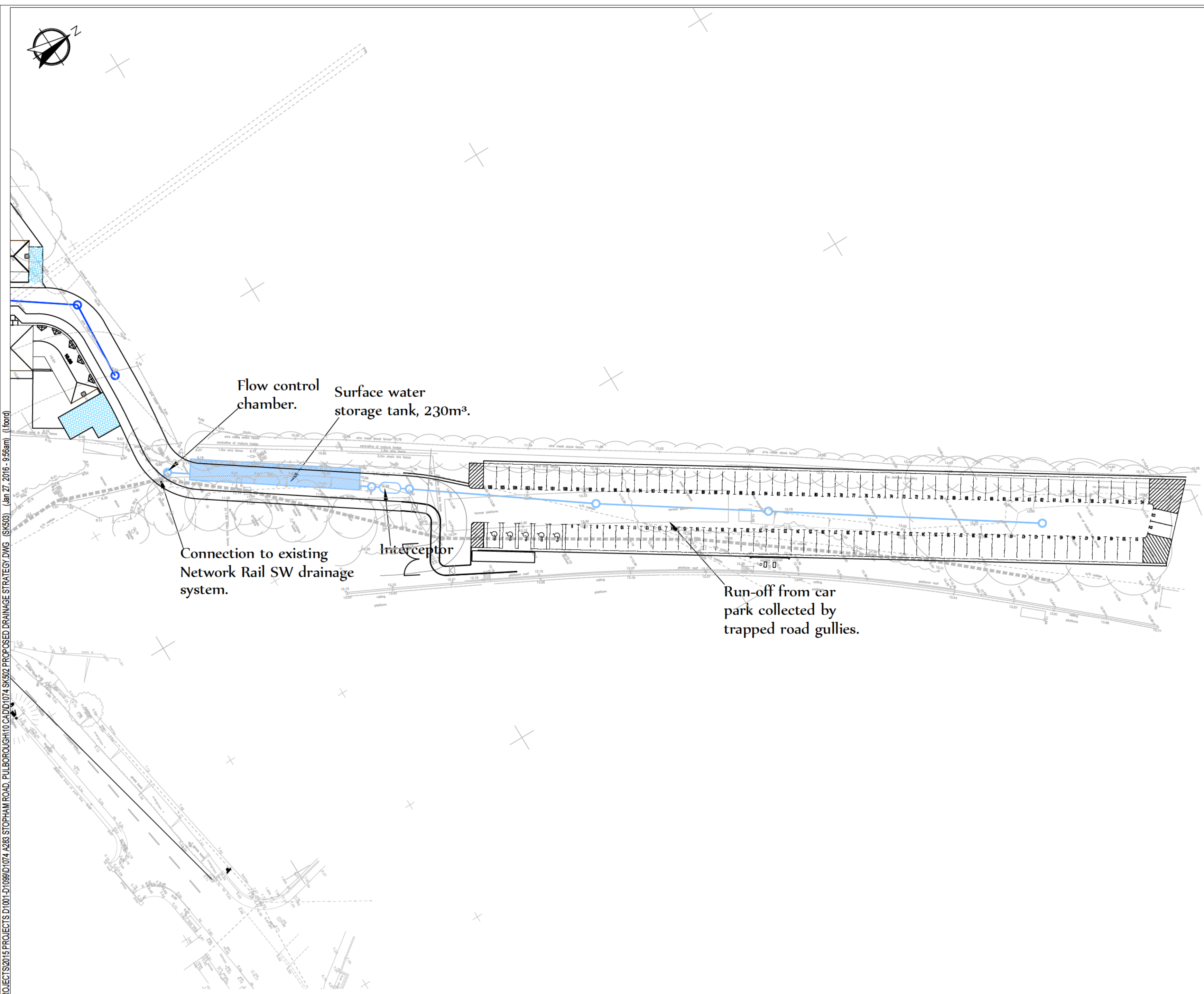


A	11/02/16	Layout updated
Rev	Date	Description
100mm		
		
Transport Planners and Infrastructure Design Consultants Metro House, Northgate, Chichester, West Sussex, PO19 1BE Tel: 01243 210418 www.rgpdesign.co.uk		
Client Willowmead (Pulborough) Ltd		
Project Land off Stopham Road, Pulborough		
Drawing Title Proposed Drainage Strategy		
Scale at A2 1:500	Drawn By LDF	Checked By MJA
Approved By MJA		
Drawing No. 2015/D1074/SK502	Date Jan 16	Rev. A



Drawing 2015/D1074/SK503

Preliminary Drainage Layout, Network Rail Land.



P:\RGPL-011 DESIGN\PROJECTS\2016 PROJECTS D1001-D1099\D1074 A283 STOPHAM ROAD, PULBOROUGH\10 CAD\1074 SK503 PROPOSED DRAINAGE STRATEGY DWG (SK503) (Jan 27, 2016 - 9:56am) (1:floor)

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Rev	Date	Description
100mm		
 Transport Planners and Infrastructure Design Consultants Metro House, Northgate, Chichester, West Sussex, PO19 1BE Tel: 01243 210418 www.rgpdesign.co.uk		
Client Willowmead (Pulborough) Ltd		
Project Land off Stopham Road, Pulborough		
Drawing Title Preliminary Drainage Layout Network Rail Land		
Scale at A2 1:500	Drawn By LDF	Checked By MJA
Drawing No. 2015/D1074/SK503	Date Jan 16	Approved By MJA Rev. -



Southern Water Foul Capacity Assessment



I-Civil Infrastructure Consultants Ltd
51 Terringes Avenue
Worthing
West Sussex
BN13 1JF

Developer Services
Southern Water
Sparrowgrove House
Sparrowgrove
Otterbourne
Hampshire
SO21 2SW

Tel: **0330 303 0119**

Email: **developerservices@southernwater.co.uk**

Your Ref:

Our Ref:
CC-SUSS-00121

Date:
18 September 2015

F.A.O: Liam Foord,

Site: Land off Stopham Road, Pulborough, West Sussex, RH20 1DP.

Dear Sirs,

Further to your recent application for a level 2 enquiry regarding the above development site.

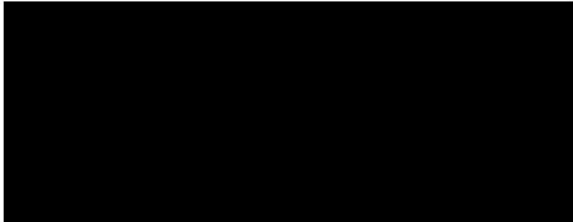
FOUL WATER

Please find enclosed the report which details the extent of works required in order for your proposed development site to be accommodated within the local sewerage infrastructure. It should be noted that the report is only a hydraulic solution to provide capacity for the proposed development site. There are other options available to you / your client in discharging your proposed flows from the site such as making a connection application/requisition to a sewer at a point where capacity is currently available. Section 98 of the Water Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

As you are aware the owner or occupier of the premises or private sewer or drain must give the sewerage undertaker notice of the proposed works. Upon receipt of the notice the undertaker may, within 21 days, refuse to allow him to make the connection if it considers

that the mode of construction or the condition of the connecting sewer or drain either does not satisfy the standards reasonably required by the undertaker, or is such that the making of the communication would be prejudicial to its sewerage system.

The right of refusal is limited to these criteria alone and the undertaker cannot refuse to allow the connection on the grounds that the sewerage system is inadequate to take the extra liquid that the connection will discharge into it. This is a matter that should be dealt with at the planning stage.



Developer Services

Please note: -

The information provided above does not grant approval for any designs/drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.



STUDY INTO THE OPTIONS FOR
FOUL DRAINAGE PROVISION AT

LAND OFF STOPHAM ROAD

PULBOROUGH

WEST SUSSEX

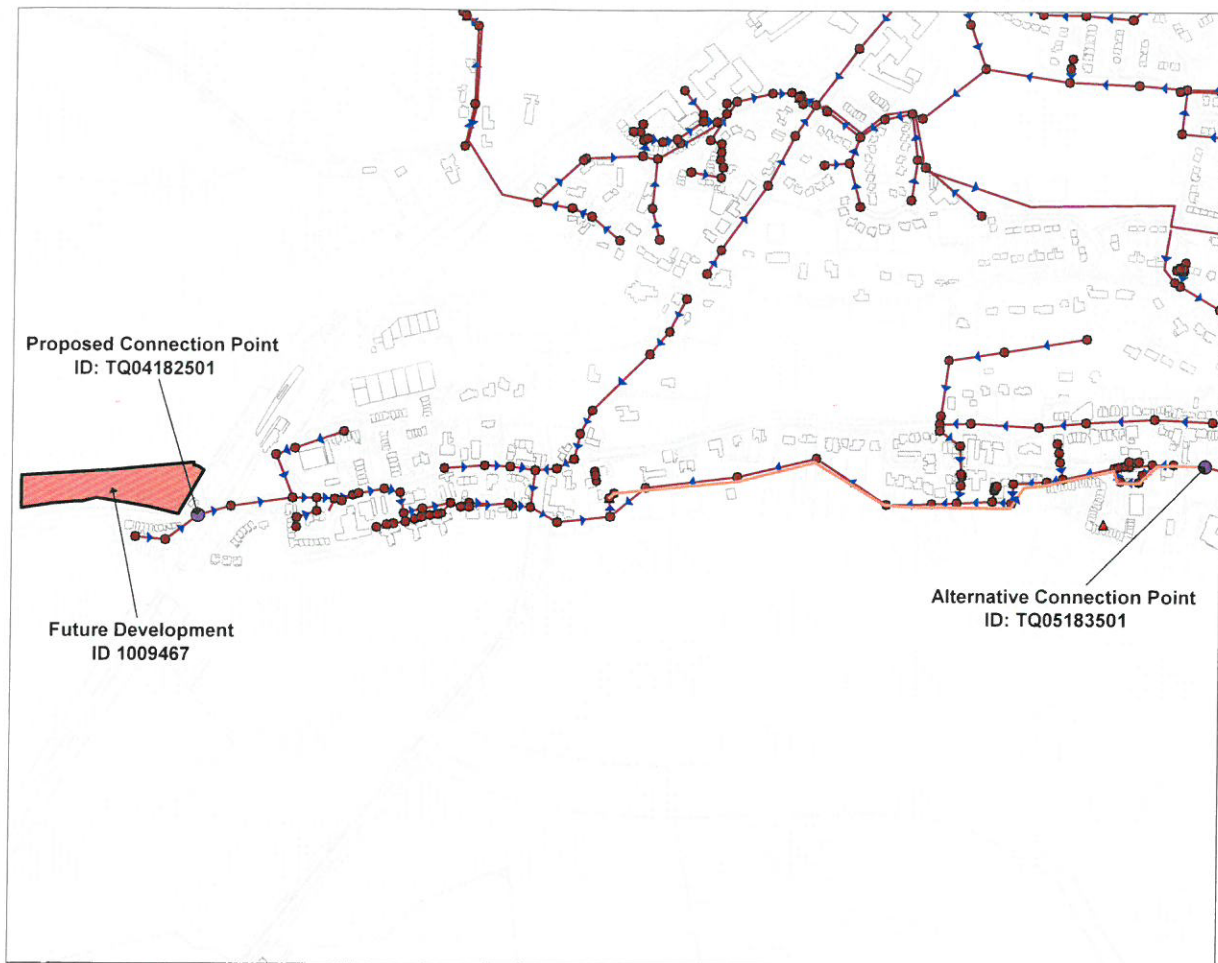
18th September 2015

REQUESTED:
I-CIVIL INFRASTRUCTURE CONSULTANTS LTD

I. Development Details:

The proposal is to discharge foul flow from the proposed development site to the local foul sewerage system at the manhole reference TQ04182501 which is located in Stopham Road.

Figure 1 - Proposed Development



II. Results and Conclusions:

Foul Water:

There is currently inadequate capacity within the local foul sewerage network to accommodate the additional flows into the existing manhole TQ04182501. The proposed development would increase flows to the local network and as a result existing properties and land may be subject to a greater risk of flooding. The upgrade works required are detailed in Table 1 and shown in Figure 2.

The nearest point where capacity is currently available is at MH TQ05183501 located approximately 1200m east of the proposed development site. Section 98 of the Water Industry Act 1991 provides a legal mechanism through which the appropriate infrastructure can be requested (by the developer) and provided to drain a specific location.

Surface Water:

Study into the Options for Foul Water Drainage Provision at Land off Stopham Road, Pulborough

As a surface water capacity check has not been requested it is assumed that Surface Water will be disposed of by alternative means i.e. via soakaway or local drainage watercourses, subject to approval from all interested parties.

Figure 2- Proposed Improvements – Foul system

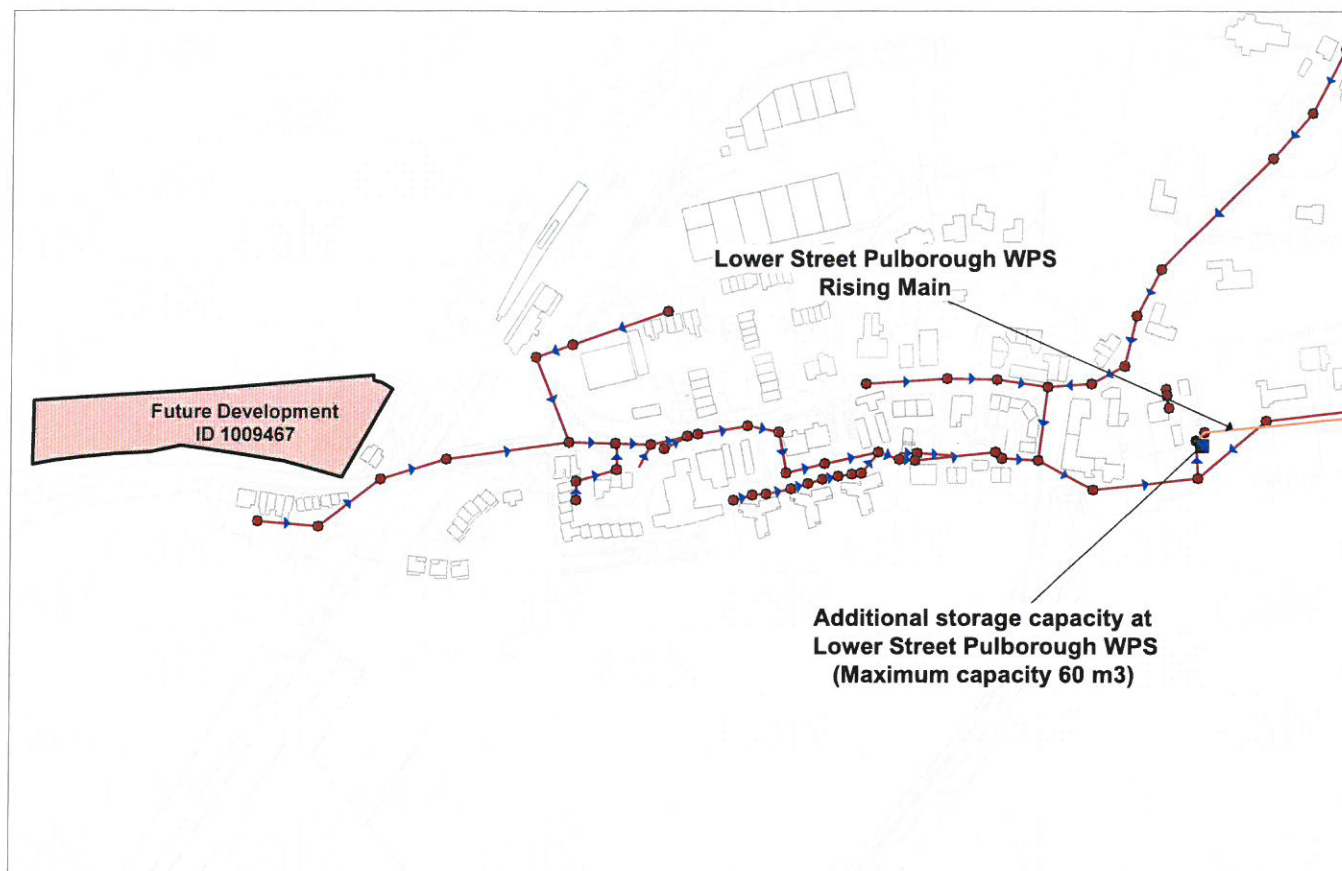


Table 1 - Proposed Improvements Schedule

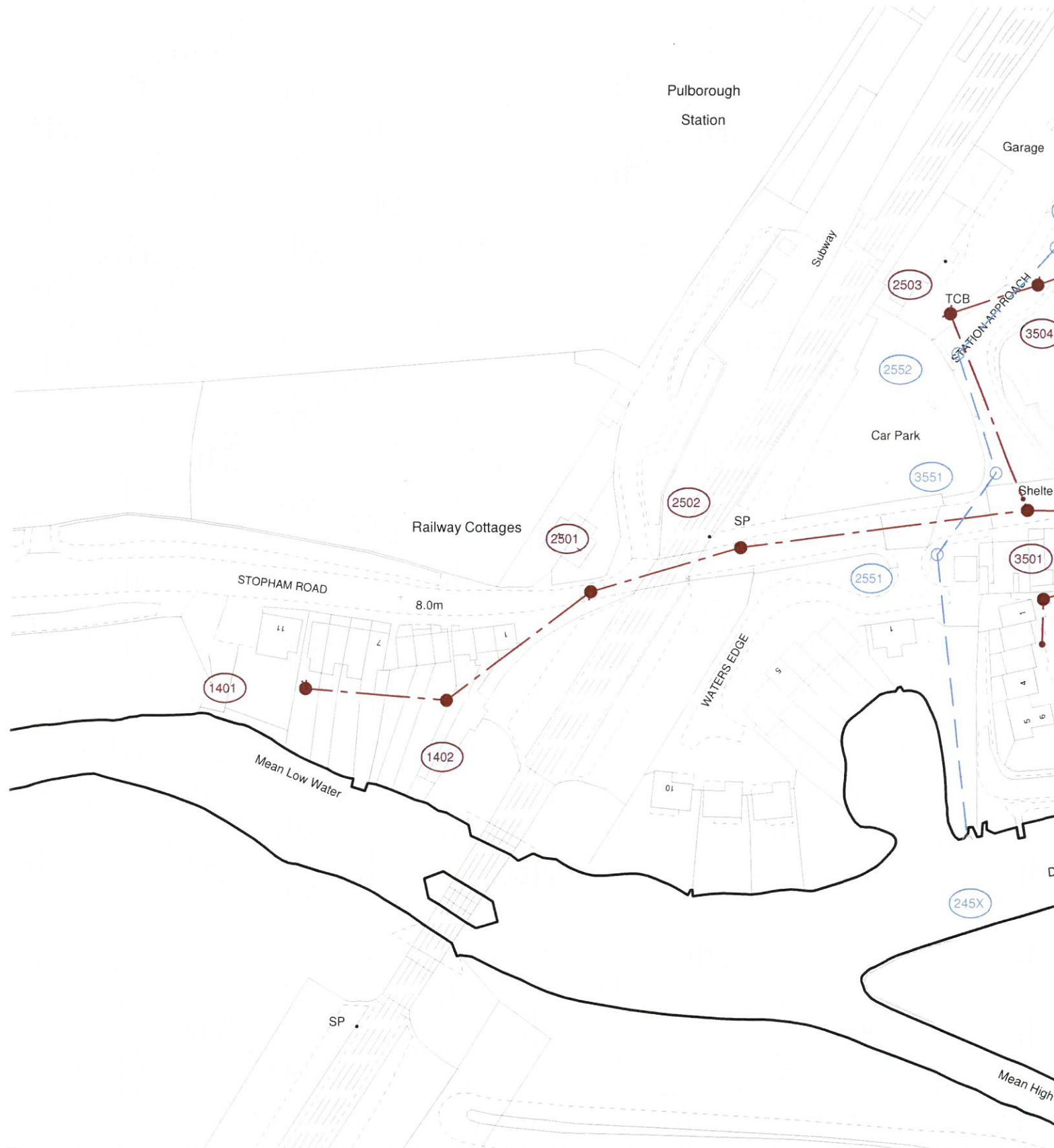
Additional storage, to be provided at the wet well of Lower Street Pulborough Water Pumping Station (WPS), is required to prevent flooding detriment within the existing waste water system.

Total Storage (m ³)
60

Before any connections are made, an application form needs to be completed and approved by Southern Water Services.

Please note: - The information provided above does not grant approval for any designs /drawings submitted for the capacity analysis. The results quoted above are only valid for 12 months from the date of issue of this letter.

PUBLIC SEWER RECORD



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.

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O.S. REF: TQ0418SW

Scale: 1:1250

Sewer Plot

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

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

