

Drainage Technical Note

Proposed Residential Development at

Land adjacent to 52 The Crossways, Chandlers Ford, Eastleigh

On behalf of

Mr Duke Readings

April 2023

Document History and Status

Project Number 23803

Date	Version	Prepared By	Reviewed By	Approved By
28 April 2023	1.0	Kyanna Hodge MEng GMICE	Stuart Magowan IEng MICE	Stuart Magowan IEng MICE

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1 Non Technical Summary

- 1.1 This Drainage Technical Note has been undertaken on behalf of Mr Readings in support of a Planning Application for the construction of one residential dwelling with associated car parking and landscaping on Land adjacent to 52 The Crossways, Chandlers Ford, Eastleigh, Hampshire.
- 1.2 This Note is to be read in conjunction with all planning, architectural and other reports that accompany the Planning Application for the proposed development.
- 1.3 The proposed development will incorporate a sustainable drainage system which will discharge at a suitably restricted rate to the public surface water sewer located beneath The Crossways and provide storage for all storm return periods up to and including the 1:100 year rainfall event with an allowance for climate change.
- 1.4 Foul water will be discharged to the existing public foul sewer located beneath The Crossways.
- 1.5 This Note concludes that a suitable surface water and foul water drainage system can be designed to accommodate the anticipated flows from the proposed development.

2 Existing Site

2.1 Site Location

2.1.1 The development site is located on Land adjacent to 52 The Crossways, Chandlers Ford, Eastleigh at Ordnance Survey reference SU 433 199. The nearest postcode is SO53 3BU.



Image 1: Site Location

2.1.2 The site is bounded to the north, east and west by residential dwellings and the south by The Crossways.

2.1.3 A copy of the site location plan is located in Appendix 1 at the rear of this note.

2.2 Site Description

2.2.1 The site is approximately 0.03ha in area and currently comprises undeveloped garden land.

2.2.2 Existing ground levels are highest at the southern boundary of the site at approximately 33.0m AOD. The site falls towards the northeast corner to a level of approximately 30.9m AOD.

2.2.3 A copy of the existing site layout plan is located in Appendix 2 at the rear of this note.

2.3 Existing Drainage

- 2.3.1 The site currently has no positive surface water or foul water drainage infrastructure.
- 2.3.2 Rainfall currently discharges in part to ground and in part overland as a greenfield runoff to the northeast of the site.
- 2.3.3 Pre-developed greenfield runoff rates have been established using the HR Wallingford tool for Greenfield runoff estimation based on the FEH Statistical method for rainfall estimation.
- 2.3.4 The Hydrology of Soil Type (HOST) has been confirmed by the National Soil Resources Institute at Cranfield University as soil type 25 which is classified as *'Slowly permeable, seasonally waterlogged soils over impermeable clay substrates with no storage capacity.'*

Greenfield runoff rate estimation for sites

www.uknuts.com | Greenfield runoff tool

Calculated by: Kyanna Hodge

Site name: 23803 52 The Crossways

Site location: Chandlers Ford, Eastleigh

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.

Site Details

Latitude: 50.97685° N

Longitude: 1.3845° W

Reference: 375436433

Date: Apr 26 2023 14:32

Runoff estimation approach FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method: Calculate from BFI and SAAR

BFI and SPR method: Calculate from dominant

HOST class: HOST 25

BFI / BFIHOST: 0.209

Q_{MED} (l/s): 7.4

Q_{BAR} / Q_{MED} factor: 1.14

Hydrological characteristics

SAAR (mm): 785 785

Hydrological region: 7 7

Growth curve factor 1 year: 0.85 0.85

Growth curve factor 30 years: 2.3 2.3

Growth curve factor 100 years: 3.19 3.19

Growth curve factor 200 years: 3.74 3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q _{BAR} (l/s):	8.41	8.41
1 in 1 year (l/s):	7.15	7.15
1 in 30 years (l/s):	19.34	19.34
1 in 100 year (l/s):	26.83	26.83
1 in 200 years (l/s):	31.45	31.45

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uknuts.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uknuts.com/terms-and-conditions.htm. The outputs from this tool are estimates of 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, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Image 2: Greenfield Runoff Calculation

2.3.5 The pre-developed greenfield runoff rates are as follows:

- Q_{bar} 8.41 l/s/ha
- 1:30 year 19.34 l/s/ha
- 1:100 year 26.83 l/s/ha

2.3.6 There are public sewers located beneath The Crossways to the south of the site which include a 225mm diameter surface water sewer and a 150mm diameter foul water sewer.

2.3.7 A copy of the Southern Water sewer records is located in Appendix 3 at the rear of this note.

2.4 Geology and Groundwater

2.4.1 Ground Condition Consultants (GCC) Ltd undertook a site-specific ground investigation in February 2023.

2.4.2 The ground investigation confirms that the site is within an area underlain by a layer of silty slightly gravelly Clay to a depth of approximately 0.80m below ground level (Topsoil to a depth of 0.30m bgl and made ground to a depth of 0.80m). This gravelly Clay is overlying firm brown Clay substrata to a depth of approximately 1.0m overlying silty slightly gravelly Clay to at least 1.20m below ground level.

2.4.3 Infiltration testing was undertaken in accordance with BRE 365. The trial pit was filled with water and upon returning to check the periodic measurements of the water level, the water level remained the same as at the start of the test. It was therefore not possible to calculate or extrapolate infiltration rates for the test undertaken.

2.4.4 Groundwater was not encountered in the infiltration trial-pit excavated.

2.4.5 The online "Magic Map" available from Defra confirms that the site is located above a minor aquifer classified as having a medium vulnerability.

2.4.6 A copy of the GCC Ltd site investigation is located in Appendix 4 at the rear of this note.

3 Development Proposals

3.1 Description

3.1.1 The development proposals are for the construction of one residential dwelling with associated car parking and landscaping on Land adjacent to 52 The Crossways, Chandlers Ford, Eastleigh, Hampshire.

3.1.2 The areas of the various positively drained elements of the development are summarised as follows:

- Roof Areas 109m²
- Driveway 56m²

3.1.3 A copy of the proposed site layout plan together with a drained areas plan is located in Appendix 5 at the rear of this note.

3.2 Surface Water Drainage

3.2.1 CIRIA report C753 The SuDS Manual-v6 provides guidance on surface water drainage. The aim for surface water runoff is to match greenfield runoff rates and volumes where reasonably achievable.

3.2.2 For surface water discharge, the drainage hierarchy notes the following list of drainage options in order of preference:

- 1 Infiltration to ground
- 2 Discharge to a watercourse
- 3 Discharge to a surface water sewer
- 4 Discharge to a foul water sewer

3.2.3 The preferred surface water drainage strategy should where possible be based on infiltration to ground, however, the site is underlain by Clay and infiltration is not a practical method of discharging surface water runoff from this site.

3.2.4 There are no watercourses near the vicinity of the site.

3.2.5 The proposed surface water drainage strategy will be based on a restricted discharge to the public surface water sewer beneath The Crossways at the south of the site.

- 3.2.6 The total impermeable area of the site will be approximately 165m² and the equivalent Q_{bar} greenfield runoff at 8.41 l/s/ha is 0.14 l/s.
- 3.2.7 Such low levels of restriction are impractical and HR Wallingford guidance recommends a maximum restriction of 5l/s. Rates of 2l/s are however now achievable.
- 3.2.8 Preliminary calculations have been prepared in order to demonstrate that surface water drainage can be adequately accommodated within the site.
- 3.2.9 An additional 10% of roof area has been included within the calculations to account for potential future urban creep amounting to a total potential impermeable site area of 176.m².
- 3.2.10 The proposed permeable paving drainage system serves the dwelling and its associated driveway area.
- 3.2.11 A proposed permeable paving system with a 30% voided subbase 300mm thick, requires a minimum storage of 5.2m³ to accommodate a 1:100 year storm event including an additional 45% to account for the predicted effects of future climate change.
- 3.3 Foul Drainage
- 3.3.1 Foul water will be discharged to the existing public foul sewer located beneath The Crossways.
- 3.3.2 A copy of the preliminary drainage strategy plan together with calculations is located in Appendix 6 at the rear of this note.
- 3.4 Water Quality
- 3.4.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is classified as between very low and low depending on the use / area of the site.
- 3.4.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated and any pollution risk adequately managed prior to discharge.
- 3.4.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads	Low	0.5	0.4	0.4

Table 1: Pollution Hazard Indices

3.4.4 The use of permeable paving will meet the target treatment level required as follows:

Private Areas	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7

Table 2: Pollution Mitigation Provision

3.4.5 An outline drainage maintenance schedule is located in Appendix 7 at the rear of this note.

3.5 Risk to Others

3.5.1 The proposed surface water drainage system will be designed to current standards incorporating SuDS elements providing treatment, attenuation and storage which will minimise runoff leaving the site during times of heavy rain.

3.5.2 Allowance has been made for a 45% increase in rainfall intensities which accords with the latest figures published by the Environment Agency and in accordance with the requirements under the National Planning Policy Framework.

3.5.3 The proposed drainage system will incorporate sufficient treatment prior to final discharge thus mitigating the risk of pollution from the site.

3.5.4 The risk of surface water flooding to others due to the development proposal is reduced and the resultant risk is negligible.

3.5.5 Sewerage undertakers have an obligation to upgrade the existing networks if a connection to an equivalent or larger sized public sewer is technically achievable.

3.5.6 The residual risk of sewer flooding from this development for the foreseeable future is therefore negligible.

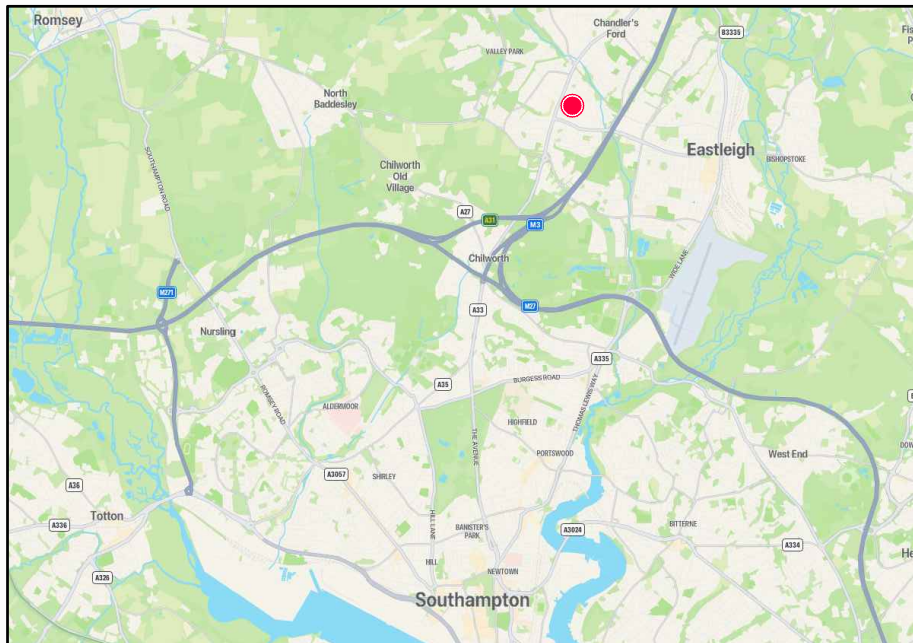
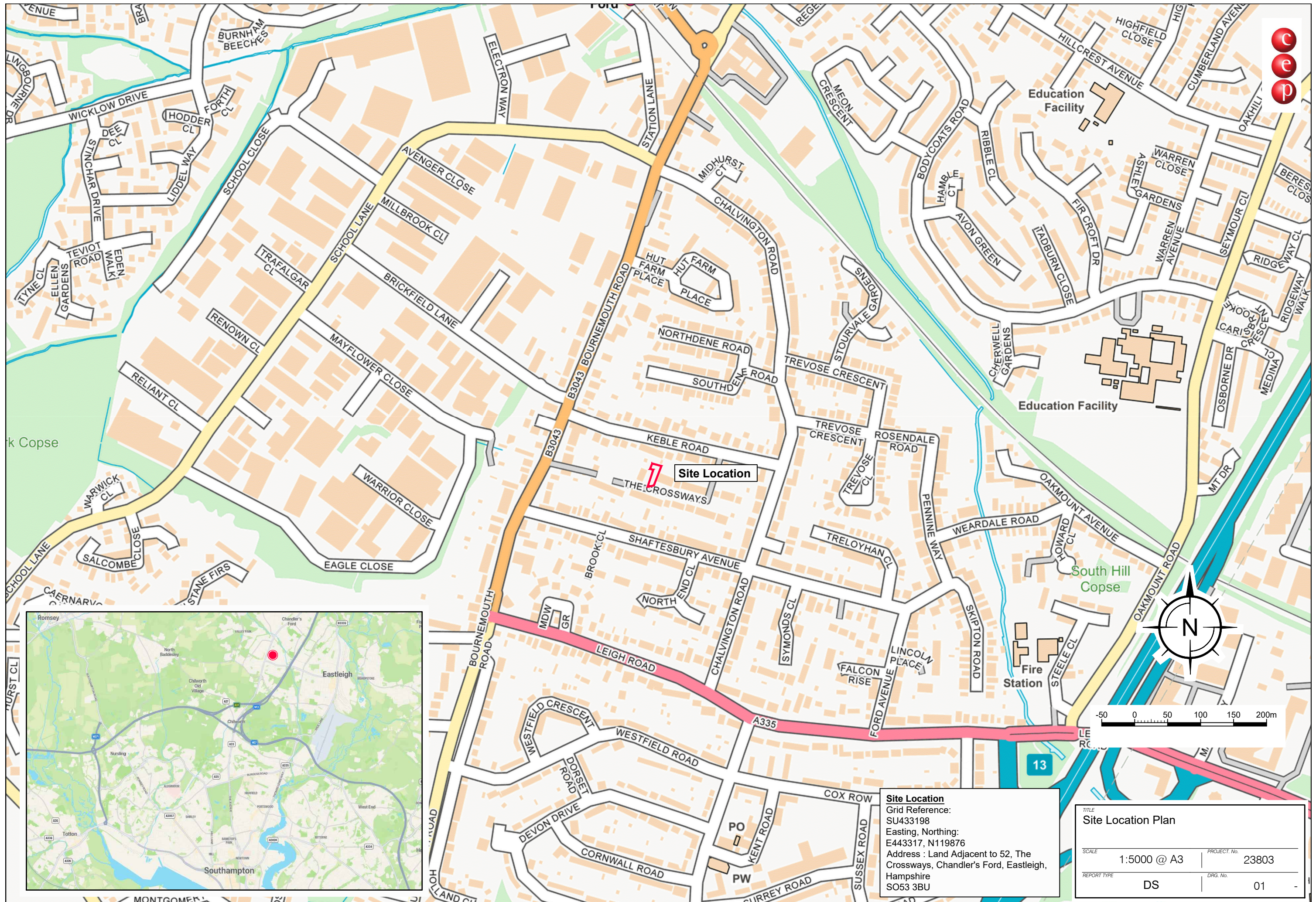
4 Conclusions

- 5.1 The geology of the area is predominantly Clay and is not suitable to accommodate an infiltration drainage system.
- 5.2 A suitable SuDS drainage system is proposed which accords with the requirements of National and Local Policy.
- 5.3 Surface water will be discharged at a restricted rate to the existing public surface water sewer beneath Ifield Avenue.
- 5.4 Preliminary calculations confirm that surface water runoff generated by the proposed development can be attenuated on site for all rainfall events up to the 1:100 year event including an allowance for climate change.
- 5.5 Water quality improvement will be provided to mitigate against any risk to any receiving waterbody.
- 5.6 Foul water will be discharged to the existing public foul sewer located beneath The Crossways.
- 5.7 A suitable surface water and foul water drainage system can be designed to accommodate the anticipated flows from the proposed development and in terms of drainage the development proposals are suitable at this location.

5 List of Appendices, Images and Tables

Appendix 1	Site Location Plan
Appendix 2	Existing Site Layout Plan
Appendix 3	Southern Water Sewer Records
Appendix 4	GCC Ltd Site Investigation
Appendix 5	Proposed Site Layout Plan and Drained Areas Plan
Appendix 6	Preliminary Drainage Strategy Plan and Calculations
Appendix 7	Drainage Maintenance Schedule
Image 1	Site Location
Image 2	Greenfield Runoff Calculation
Table 1	Pollution Hazard Indices
Table 2	Pollution Mitigation Provision

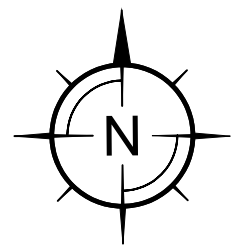
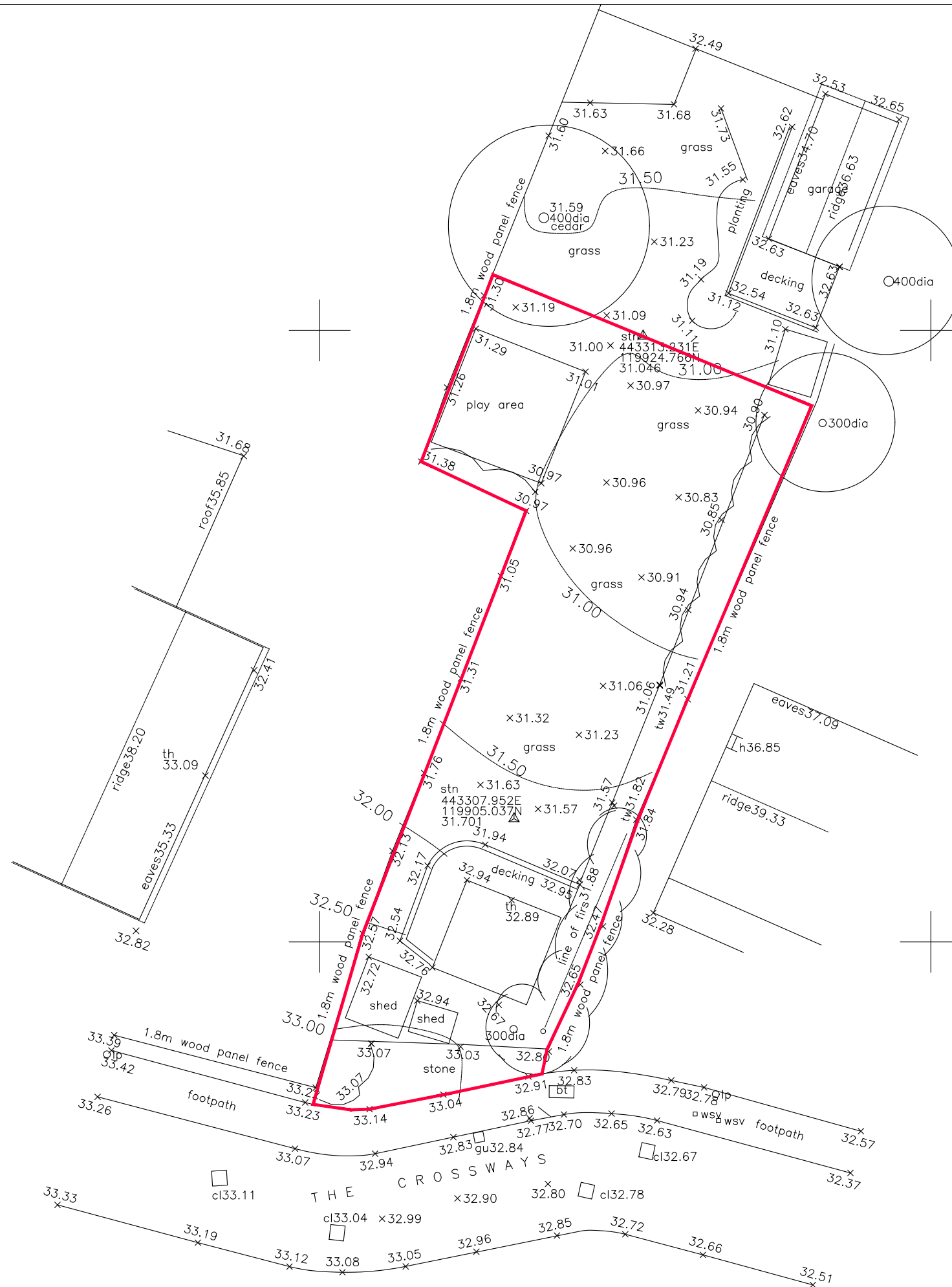
Appendix 1
Site Location Plan



Site Location
Grid Reference:
SU433198
Easting, Northing:
E443317, N119876
Address : Land Adjacent to 52, The
Crossways, Chandler's Ford, Eastleigh,
Hampshire
SO53 3BU

TITLE Site Location Plan	
SCALE 1:5000 @ A3	PROJECT No. 23803
REPORT TYPE DS	DRG. No. 01

Appendix 2
Existing Site Layout Plan



TITLE Existing Site Layout			
SCALE 1:200 @ A3		PROJECT No. 23803	
REPORT TYPE DS		DRG. No. 02	

Appendix 3
Southern Water Sewer Records



(c) Crown copyright and database rights 2023 Ordnance Survey 100031673

Date: 26/04/23

Scale: 1:1250

Map Centre: 443301,119907

Data updated: 21/03/23

Our Ref: 1154835 - 1

Wastewater Plan A3

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2023 Ordnance Survey 100031673. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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

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

mat@civil.co.uk

52 The Crossways



Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0801	F	37.05	34.75	
0901	F	35.79	0.00	
1002	F	0.00	0.00	
1801	F	37.68	0.00	
1803	F	0.00	0.00	
1804	F	0.00	0.00	
1805	F	0.00	0.00	
1901	F	34.59	33.69	
2701	F	0.00	0.00	
2801	F	36.67	0.00	
2802	F	0.00	0.00	
2803	F	0.00	0.00	
2901	F	35.02	0.00	
2902	F	34.38	32.33	
3002	F	38.27	36.71	
3701	F	34.58	0.00	
3704	F	34.87	33.27	
3801	F	0.00	0.00	
3802	F	0.00	0.00	
3803	F	0.00	0.00	
3804	F	0.00	0.00	
3901	F	34.12	31.57	
4801	F	26.68	24.41	
4802	F	29.57	26.42	
4803	F	0.00	0.00	
4804	F	0.00	0.00	
4805	F	0.00	0.00	
4901	F	0.00	0.00	
5802	F	0.00	0.00	
5803	F	0.00	0.00	
5901	F	34.27	0.00	
5902	F	31.91	0.00	
5903	F	33.61	33.11	
1850	S	37.64	36.52	
2850	S	36.68	35.68	
2851	S	0.00	0.00	
2950	S	0.00	0.00	
2951	S	0.00	0.00	
3750	S	34.61	0.00	
3755	S	34.82	33.32	
3850	S	0.00	0.00	
3851	S	0.00	0.00	
3852	S	0.00	0.00	
3950	S	34.20	0.00	
4052	S	38.43	36.05	
4850	S	26.75	0.00	
4851	S	27.00	25.22	
4852	S	0.00	0.00	
4853	S	0.00	0.00	
4854	S	0.00	0.00	

[illegible][illegible]

Appendix 4

GCC Ltd Site Investigation



Ref: J23-008-R01

Date: 16th February 2023

FAO: Mr Duke Readings

22 Keble Road
Chandler's Ford
Eastleigh
Hampshire
SO53 3DS

Dear Duke,

Re: Infiltration Testing – Land adjacent to 52 The Crossways, Chandlers Ford

GCC was commissioned by Wessex Planning on behalf of Mr Readings in February 2023 to undertake infiltration testing to support the drainage design for the proposed residential development at the site.

Available geological maps for the area shows the site/area to be directly overlying the Wittering Formation (sand, silt and clay).

A trial-pit (SA101) was excavated by hand (as per our proposal, P23-022, dated 7th February 2023) on the 16th February 2023 at the site (location shown on Figure 1). The ground conditions encountered were as follows:

SA101

0.00-0.30m – Grass over brown silty slightly gravelly CLAY with rootlets. Gravel is fine angular to rounded flint. (TOPSOIL)

0.30-0.80m – Soft to firm brown and light brown silty slightly gravelly CLAY with occasional brick fragments. Gravel is fine to coarse angular to rounded flint. (MADE GROUND)

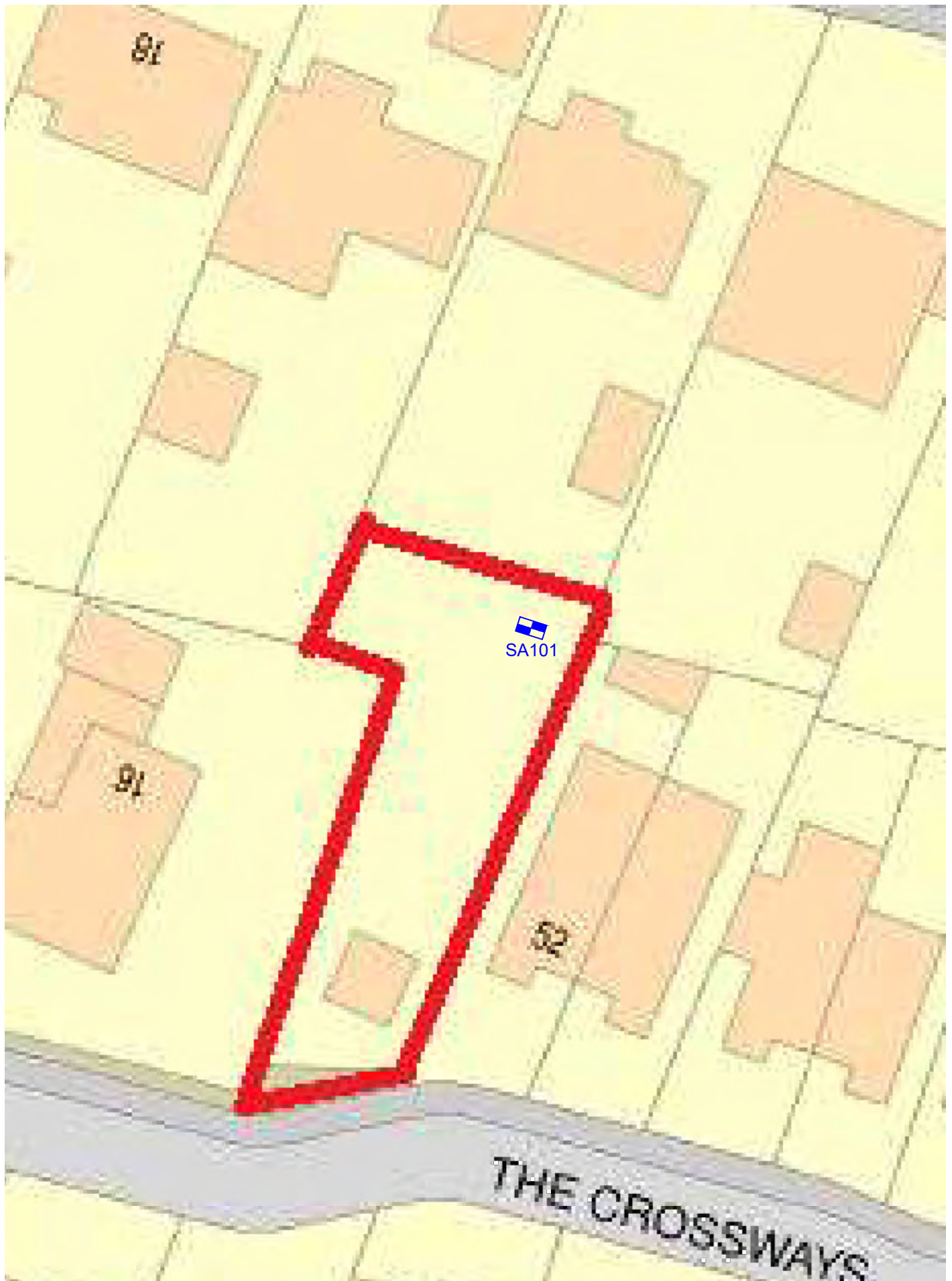
0.80-1.00m – Soft to firm brown CLAY with abundant brick fragments and cobbles. (MADE GROUND)

1.00-1.20m – Firm to stiff grey brown silty slightly gravelly CLAY. Gravel is fine angular to rounded flint.

Infiltration testing was conducted in accordance with the procedures detailed in BRE DG365 and comprised rapidly pouring water into an open trial hole, the drop in measured head over time was then recorded to give an indication of soakage potential. BRE DG365, 2016 states that for an accurate infiltration rate to be obtained, a soakage pit needs to be filled three times in quick succession. Each test is completed once 75% of the water present has drained away.

The trial pit SA101 was filled to 0.9mbgl with water. The test was left to run for an hour with periodic measurements of the water level but the water level in the trial pit remained at 0.9mbgl. It was therefore not possible to calculate or extrapolate infiltration rates for the test undertaken.

Groundwater was not encountered in the infiltration trial-pits excavated.



Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

client MR READINGS

site LAND ADJACENT 52 THE CROSSWAYS,
CHANDLERS FORD

title SITE INVESTIGATION PLAN

scale NTS | drawn by DP | checked by RP

date 16 FEB 2023 | job no J23-008

drawing number | rev. -
FIGURE 1

Appendix 5

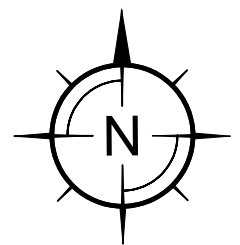
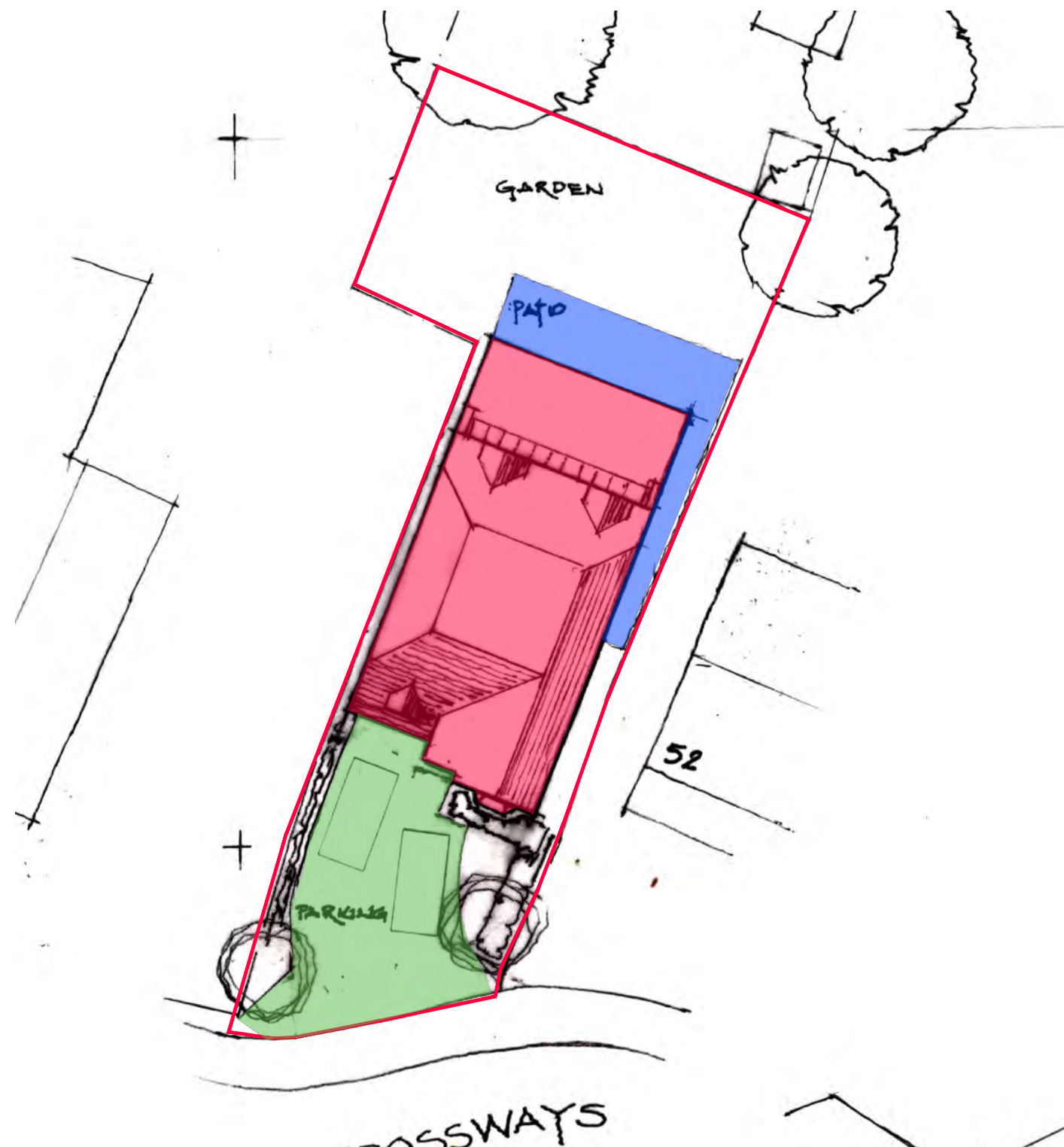
Proposed Site Layout Plan and Drained Areas Plan

Site Area = 327m²

Roof Area = 109m²

Driveway Area = 56m²

Patio Area = 28m²

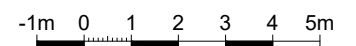
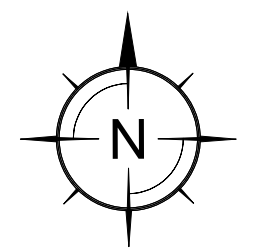
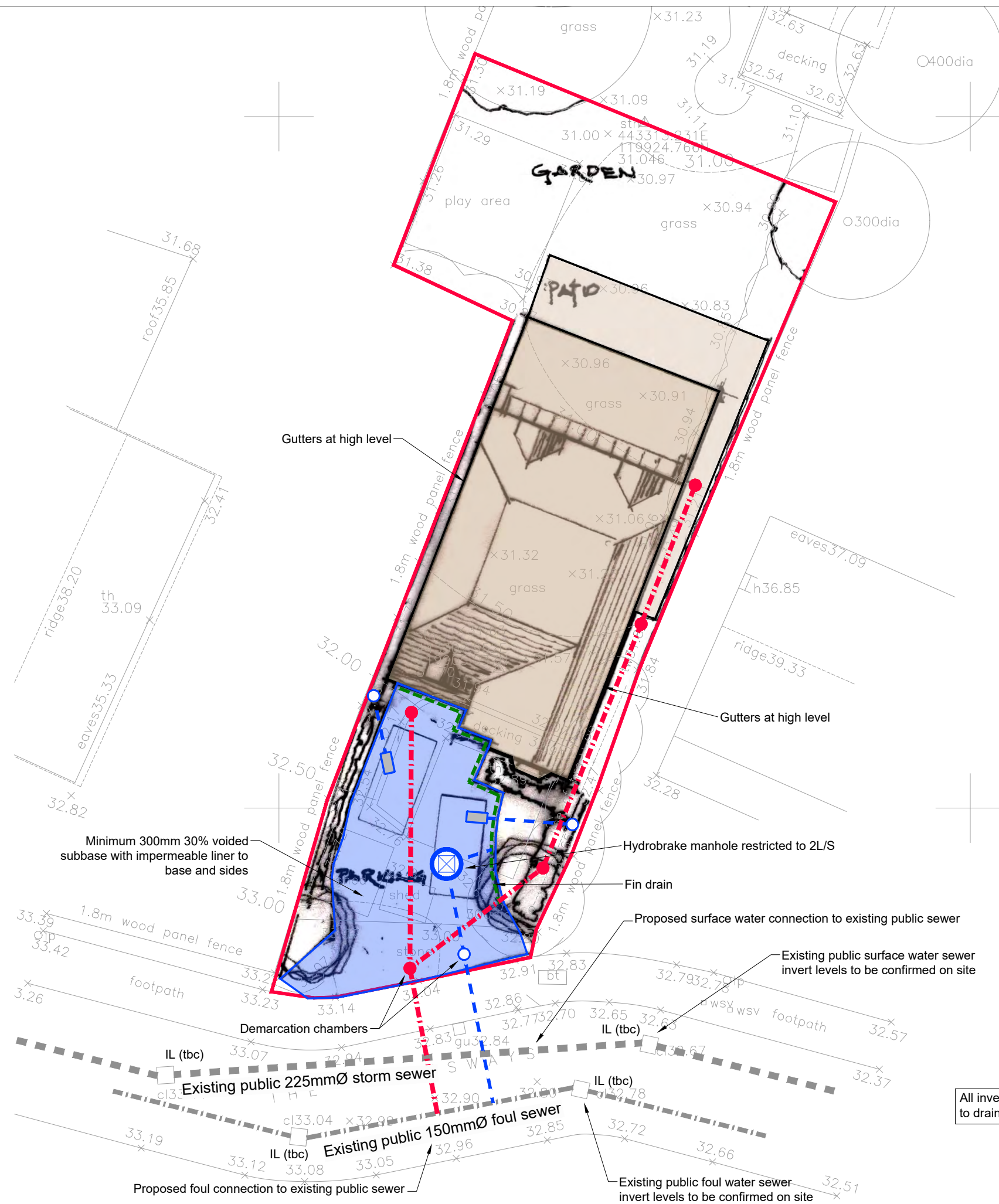


-2m 0 2m 4m 6m 8m

TITLE Impermeable Areas Plan			
SCALE 1:200 @ A3		PROJECT No. 23803	
REPORT TYPE DS		DRG. No. 03	

Appendix 6

Preliminary Drainage Strategy Plan and Calculations



All invert levels to be confirmed prior to drainage construction

TITLE	
Proposed Drainage Strategy Plan	
SCALE	PROJECT No.
NTS	23803
REPORT TYPE	DRG. No.
DS	04

Appendix 7
Drainage Maintenance Schedule

Drainage Maintenance Schedule



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishersgate
Sussex
BN41 1RA
01273 424424
reception@civil.co.uk
www.civil.co.uk

Project	Land adjacent to 52 The Crossways, Chandlers Ford, Eastleigh
Project Number	23803

By Kyanna Hodge MEng GMICE

Date 28 April 2023

1 Schedule of Maintenance

- 1.1 Once appointed the Contractor will prepare a site specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532, Control of water pollution from construction sites, provides further guidance on this.
- 1.2 The Contractor will maintain the proposed drainage system during construction and until the handing over of the site.
- 1.3 Upon completion the Principal Contractor will collate the data sheets, operation and maintenance details of all materials used in the construction of the site drainage system.
- 1.4 These details will be issued to the Management Company for their records.
- 1.5 Upon completion management of shared drainage facilities (where not adopted by a Statutory Undertaker) will be passed on to a Management Company appointed by the Developer on behalf of the property owner.
- 1.6 In the event that the Management Company becomes unable to discharge its duties within two years of first appointment the Developer will endeavour to appoint an alternative on behalf of the property owner.
- 1.7 Maintenance of individual property drainage connections is the responsibility of the individual property owner.
- 1.8 The following maintenance schedule details the typical tasks to be undertaken at different intervals.

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Manage vegetation and remove nuisance plants – aesthetics	As required
	Litter and debris removal – catchpits	Monthly or as required
	Cleaning of gutters and any filters on downpipes	3 Monthly



Maintenance Schedule	Required Action	Frequency
	Remove sediment and debris from silt trap chambers and inlet chambers	6 monthly
	Visual inspection of permeable paving for defects and settlement	Annually
	Sweeping / brushing of permeable paving	Every 2 years
	Surface and foul water pipework – jetting / rodding	Every 2 years or as required
Corrective Maintenance	Remove debris / blockages to silt traps	As required
	Repairs to access chambers / manhole covers	As required
	Replace any broken permeable blocks / surface, remedial works to any depressions or rutting	As required
	Inspect inlet, outlet from downpipes for blockages, standing water and clear	As required
Monitoring	Inspect silt traps and note the rate sediment has accumulated	Monthly in the first year and then annually

Indicative Schedule of Maintenance for the Proposed Drainage System

- 1.9 Any parts, materials or products that require replacement or come to the end of the manufacture's recommended design life will be replaced by the individual property owner as required.

Component	Inspection Frequency				
	1 Month	3 Months	1 Year	After leaf fall in Autumn	2 Years
Gutters		✓		✓	
Catchpits	✓			✓	
Surface and Foul Water Pipework					✓
Permeable Paving			✓		

Inspection Frequency Summary

2 Design Life

- 2.1 The design life of the development is likely to exceed the design life of the components within the SuDS network. During the routine drainage inspections it may be determined that some components have reached the end of their functional life cycle.
- 2.2 Where possible repairs should be the first option considered however if repairs are unviable it will be necessary for the property owner to replace the faulty component.

3 Emergency Plan

- 3.1 Potential flood and maintenance indicators:

- Manholes or inspections chambers overflowing
- Other visual indicators of the drainage system not performing as it should

3.2 Should any of the items above occur then immediate action as outlined below should be undertaken:

- Inspect for blockages in the problem area
- Should the problem not be identified via an initial inspection:
 - o For unadopted onsite drainage the Management Company should appoint a suitable drainage engineer to inspect and survey the system and jet any blockages
 - o For adopted onsite drainage the relevant statutory undertaker should be alerted
 - o Where it is suspected that there is a problem with the downstream drainage network the Owner or relevant statutory undertaker of that system should be alerted



TITLE	
Exceedance Flow Plan	
SCALE	PROJECT. No.
1:200 @ A3	23803
REPORT TYPE	DRG. No.
DS	05 -