Drainage Strategy Report

For

Mr Agron Nuzi

16 GENTIAN ROAD,

BLACKBIRD LEYS, OXFORD

OX4 6QE

Date: JANUARY 2024

Ref: **M18/SuDS/060/AUG23**

MODEL 18 LIMITED TOUCH OF ESTEEM 20-22 WENLOCK ROAD ISLINGTON LONDON N1 7GU	Project 16 GENTIAN ROAD, BLACKBIRD LEYS, OXFORD OX3 6QE			Job Ref. M18/SuDS/060/AUG23	
	Section SuDS Strategy Report			Sheet no./rev. 1	
	Calc. by SS	Date 08/09/2022	Chk'd by BC	Date	App'd by	Date

Revision:

Document Control

Purpose/Status	Date	Rev.	Comments	Rev. By	Chk'd By
-	-	-	-	-	-

Disclaimer

This document has been prepared in accordance with the scope of Model 18 Ltd appointment with its client and is subject to the terms of that appointment. It is addressed to and for the sole use and reliance of Model 18 Ltd client. Model 18 Ltd accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of a Director of Model 18 Ltd. Any advice, opinions or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document are not to be construed as providing legal, business or tax advice or opinion.

Contents

MODEL 18 LIMITED TOUCH OF ESTEEM 20-22 WENLOCK ROAD ISLINGTON LONDON N1 7GU	Project 16 GENTIAN ROAD, BLACKBIRD LEYS, OXFORD OX3 6QE				Job Ref. M18/SuDS/060/AUG23	
	Section SuDS Strategy Report				Sheet no./rev. 3	
	Calc. by SS	Date 08/09/2022	Chk'd by BC	Date	App'd by	Date

PROJECT DESCRIPTION

SUDS Strategy report for 16 Gentian Road, Blackbird Leys. Perforated Soakaway design in accordance with BRE Digest 365/SUDS. Also attached are pictures taken during infiltration test for the soakaway design values highlighted in yellow in the calculations section of the report. The soakaway location added to report shown on site plan attached.

Notes:

Architectural provided by others.

The dimensions used within these calculations are for design purposes only. Detailed measurements are to be taken from site by the building contractor. Should any inconsistencies occur inform the Engineer immediately.

Reference Drawings:

Dwg No.

1. Executive Summary

The site lies within the Northfield brook catchment, which in turn delivers into Littlemore brook which deliver into River Thames.

The design team have detailed a Soakaway as the primary SuDS strategy for the areas of new extension roof.

The use of SuDS techniques on site will treat and control the run-off rates and volumes to acceptable values whilst retaining the hydrological connectivity to the Northfield Brooke.

2. Introduction

The proposed development is at 16 Gentian Road, Blackbird Leys, Oxford OX4 6QE (see Figure 1).

Figure 1

Proposed scheme description

The proposal is for the "Erection of two storey building to create 2 X 1 bed flats (Use Class C3). Provision of parking, private amenity space, bin, and cycle stores". In plan, the extensions add approximately 68.0m² of additional roof (impermeable) area to the site.

Site geology

Reference to the BGS published mapping identifies the site to be underlain by Alluvium is a general term for clay, silt, sand, and gravel. The site has no identified superficial deposits. An extract of the BGS map is shown in Figure 2.

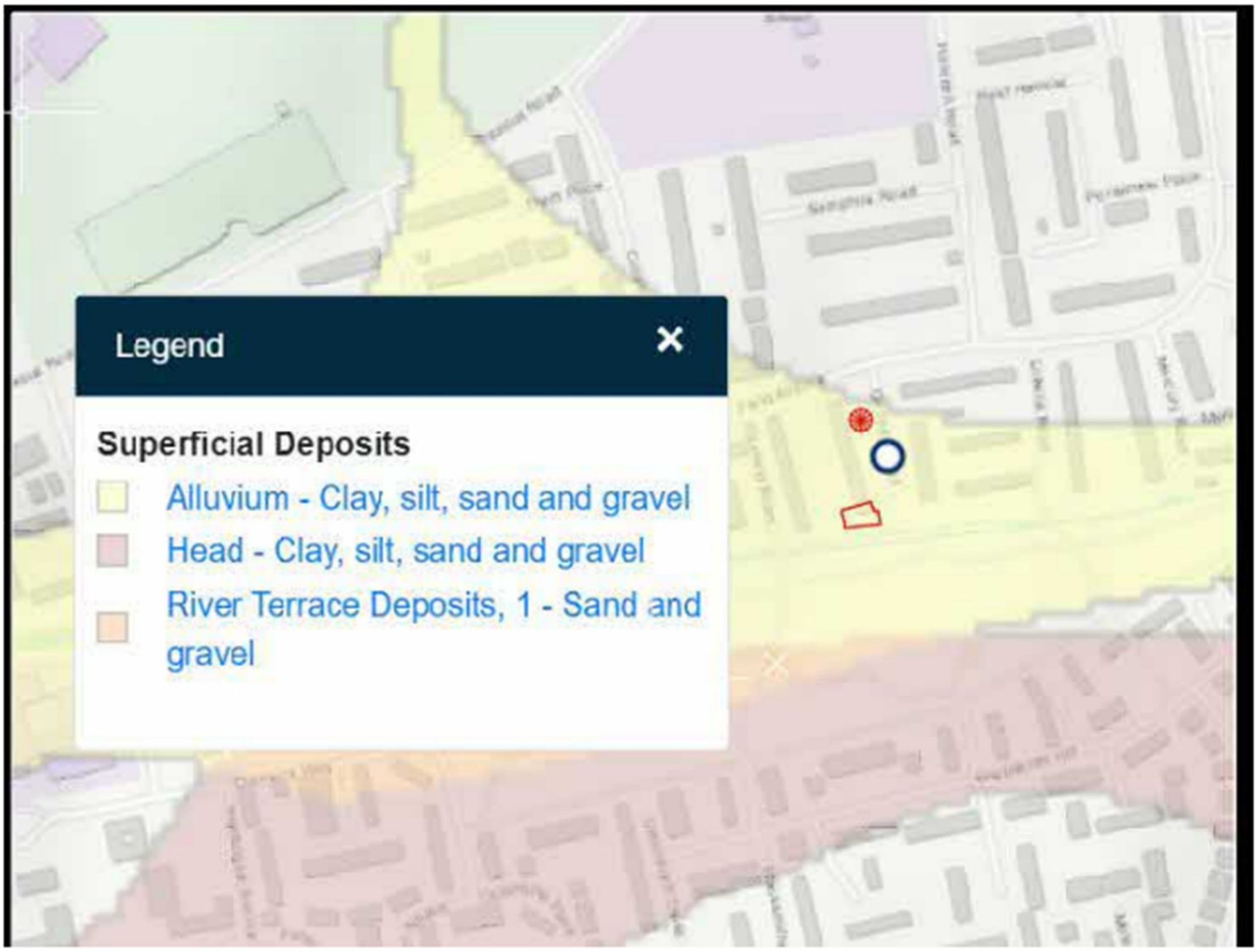


Figure 2

Infiltration rates

Permeability testing in line with the BRE365 methodology will be required to establish an in-situ permeability. For initial design a conservative value of 5.0 x 10-6ms-1is used. This is considered a very low and hence conservative value. On site percolation testing is expected to show the permeability is greater than the above value as used in this report, or alternatively the sizing will be adjusted accordingly.

Catchment Area

The site lies within the Northfield Brook catchment, which in turn delivers water to the Littlemore Brook, to River Thames. This is an area with sensitivity to local hydrology. The primary objective regarding hydrology in the area is to direct surface water back to the ground to maintain the hydrological connectivity to River Thames.

Existing Surface Water strategy

Currently it is noted by the owner that the surface water arising from the existing roof (and the water arising from the previous outbuilding) drains (and drained) to an existing utility company network sewer which is disconnected from the local hydrology and hence disconnected from the Northfield brook.

3. SuDS Principles

SuDS design philosophy

The CIRIA SuDS manual provides the design philosophy:
"SuDS design should, as much as possible, be based around the following:

- using surface water run-off as a resource
- managing rainwater close to where it falls
- managing run-off at the surface
- allowing rainwater to soak into the ground
- promoting evapotranspiration
- slowing and storing run-off to mimic natural run-off characteristics
- reducing contamination of run-off through pollution prevention and controlling the run-off at source
- treating run-off to reduce the risk of urban contaminants causing environmental pollution "

Source control

The following are widely recognised as source control SuDS.
Sedum roofing.

Infiltration devices. Typically, soakaways.
Rainwater harvesting.
Bio-retention planting, rain gardens.
Permeable paving, porous asphalt. These provide both infiltration and short-term storage volumes thus reducing overall un-mitigated run-off volumes.

Proposed Storm Water Drainage System

The proposed storm water drainage system is as shown on drawing No. A121
The storm water drainage system within the site has been designed to cater for a 100year storm return period with a 40% allowance for climate change. On site storage/attenuation has been provided within the SuDS components.
The SuDS system aims to manage the rainfall and control the flow and volume of water leaving the development.
The prevention of pollution will be achieved by adopting the healthy household habits for clean water.
The property owner will be responsible for the maintenance of the SuDS system.

SuDS on this Development

During rainfall events the surface water run-off from the building roof will be collected by gutter and downpipe and from the terrace area via gullies, both will then be conveyed through the site by below ground pipes into the soakaway.
The runoff will be contained on site within the attenuation tank for storm events up to and including the 100-year event will an allowance of 40% for climate change.

Managing SuDS

The SuDS have been designed for easy maintenance to comprise:

- Regular day to day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS feature.
- Occasional tasks – checking the SuDS feature and removing any silt that builds up in the SuDS feature.
- Remedial Work – repairing damage where necessary.

SuDS Scheme Checklist

The following lists the SuDS components and extra features which are found on site:

- The reinforced concrete attenuation tank, this will accept surface water runoff from the roof and terrace areas.
- Manholes, Inspection Chambers, and rodding eyes are used on bends or where pipes come together, they allow access and cleaning to the system if necessary.
- Inlet Structures such as rainwater down pipes and drainage gullies, these should be always free from obstruction to allow free flow through the drainage network.
- Below ground drainage pipes, these convey water into and out of the attenuation system, these should be always free from obstruction to allow free flow.

4. Sustainable Drainage Maintenance Specification

General Requirements

- Avoid use of weedkillers and pesticides to prevent chemical pollution
- Avoid de-icing agents wherever possible
- Protect all below ground drainage through careful selection and placement of hard and soft landscaping

GENERAL REQUIREMENTS	
General Requirements	**Frequency**

Litter: Collect all litter or other debris and remove it from site at each visit.	Monthly or as required

Perforated Soakaway Concrete Chamber

- Attenuation systems are designed to provide storage upstream of a flow control device.

SOAKAWAY SYSTEMS	
Regular Maintenance	**Frequency**
Inspect and identify any areas that are not operating correctly. Remove debris from the catchment surface (where it may cause risk to performance) Remove sediment from inlet structures and inspection chambers. Maintain vegetation to designed limits within the vicinity of below ground tanked systems to avoid damage to the system.	Monthly or as required
Remedial work	
Repair physical damage if necessary	As required
Monitoring	
inspect all inlets, outlets, and vents to ensure that they are in good condition and operating as designed.	Annually
Survey inside of tanks for sediment build up and remove if necessary.	Every 5 years or as required

Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should be always free from obstruction to allow free flow.

BELOW GROUND DRAINAGE PIPES	
Regular Maintenance	**Frequency**

Inspect and identify any area that are not operating correctly. If required, take remedial action. Remove debris from catchment surface (where it may cause risk to performance) Remove sediment from pre-treatment inlet structures and inspection chambers. Maintain vegetation to designed limits within the vicinity of below ground pipes and tanks to avoid damage to system.	Monthly for 3 months then annually Annually or as required Monthly or as required
Remedial work	
Repair physical damages if necessary	As required
Monitoring	
Inspect all inlets, outlets, and vents to ensure that they are in good condition and operating as designed	Annually
Survey inside of pipe runs for sediment build up and remove if necessary	Every 5 years or as required

Spillage – Emergency Action

Most spillages on developments of this type are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of oil, milk or other known organic substances should be removed where possible using absorbent material.

5. Summary

The use of SuDS techniques on site, as detailed above, will treat, and control the run-off rates and volumes to acceptable values whilst retaining the hydrological connectivity to the Northfield brook.

See attached soakaway crate and drawing.

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area; Oxford

Impermeable area drained to the system; $A = \mathbf{77.3}\ m^2$

Return period; Period = **100** yr

Ratio 60 min to 2 day rainfall of 5 yr return period; $r = \mathbf{0.400}$

5-year return period rainfall of 60 minutes duration; M5_60min = **19.0** mm

Increase of rainfall intensity due to global warming; $p_{climate} = \mathbf{40}\ \%$

Soakaway / infiltration trench details

Soakaway type; Rectangular

Minimum depth of pit (below incoming invert); $d = \mathbf{1600}$ mm

Width of pit; $w = \mathbf{2500}$ mm

Length of pit; $l = \mathbf{2500}$ mm

Percentage free volume; $V_{free} = \mathbf{40}\ \%$

Soil infiltration rate (BRE digest 365)

Length of trial pit; $l_{trial} = \mathbf{300}$ mm

Width of trial pit; $b_{trial} = \mathbf{300}$ mm

Depth of trial pit (below invert); $d_{trial} = \mathbf{500}$ mm

Free volume (if fill used); $V_{trial} = \mathbf{100}\ \%$;

75% depth of pit; $d_{75} = (d_{trial} \times 0.75) = \mathbf{375.00}$ mm

50% depth of pit; $d_{50} = (d_{trial} \times 0.50) = \mathbf{250.00}$ mm

25% depth of pit; $d_{25} = (d_{trial} \times 0.25) = \mathbf{125.00}$ mm

Test 1 - time to fall from 75% depth to 25% depth; $T1 = \mathbf{20}$ min

Test 2 - time to fall from 75% depth to 25% depth; $T2 = \mathbf{32}$ min

Test 3 - time to fall from 75% depth to 25% depth; $T3 = \mathbf{45}$ min

Longest time to fall from 75% depth to 25% depth; $t_{lg} = \max(T1, T2, T3) = \mathbf{45}$ min

Storage volume from 75% to 25% depth; $V_{p75\_25} = (l_{trial} \times b_{trial} \times (d_{75} - d_{25})) \times V_{trial} = \mathbf{0.02}\ m^3$

Internal surface area to 50% depth; $a_{p50} = ((l_{trial} \times b_{trial}) + (l_{trial} + b_{trial}) \times 2 \times d_{50}) = \mathbf{0.39}\ m^2$

Surface area of soakaway to 50% storage depth; $A_{s50} = 2 \times (l_{trial} + b_{trial}) \times d_{trial} / 2 = \mathbf{0.300}\ m^2$

Soil infiltration rate; $f = V_{p75\_25} / (a_{p50} \times t_{lg})$ = **21.4×10^{-6}** m/s

Wetted area of pit 50% full; $a_{s50} = l \times d + w \times d$ = **8000000** mm²

Table equations

Inflow (cl.3.3.1); $I = M100 \times A$

Outflow (cl.3.3.2); $O = a_{s50} \times f \times D$

Storage (cl.3.3.3); $S = I - O$

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5;	0.37;	9.9;	1.91;	19.0;	1.46;	0.05;	1.41
10;	0.52;	13.9;	1.97;	27.5;	2.12;	0.10;	2.02
15;	0.63;	16.8;	2.00;	33.8;	2.61;	0.15;	2.46
30;	0.80;	21.4;	2.02;	43.3;	3.34;	0.31;	3.04
60;	1.00;	26.6;	2.00;	53.1;	4.11;	0.62;	3.49
120;	1.21;	32.1;	1.95;	62.7;	4.85;	1.23;	3.62
240;	1.45;	38.5;	1.90;	73.2;	5.66;	2.46;	3.20
360;	1.60;	42.6;	1.87;	79.7;	6.16;	3.69;	2.47
600;	1.79;	47.7;	1.83;	87.2;	6.74;	6.15;	0.59
1440;	2.24;	59.6;	1.74;	104.0;	8.04;	14.77;	0.00

Required storage volume; S_{req} = **3.62** m^3

Soakaway storage volume; $S_{act} = l \times d \times w \times V_{free}$ = **4.00** m^3

PASS - Soakaway storage volume

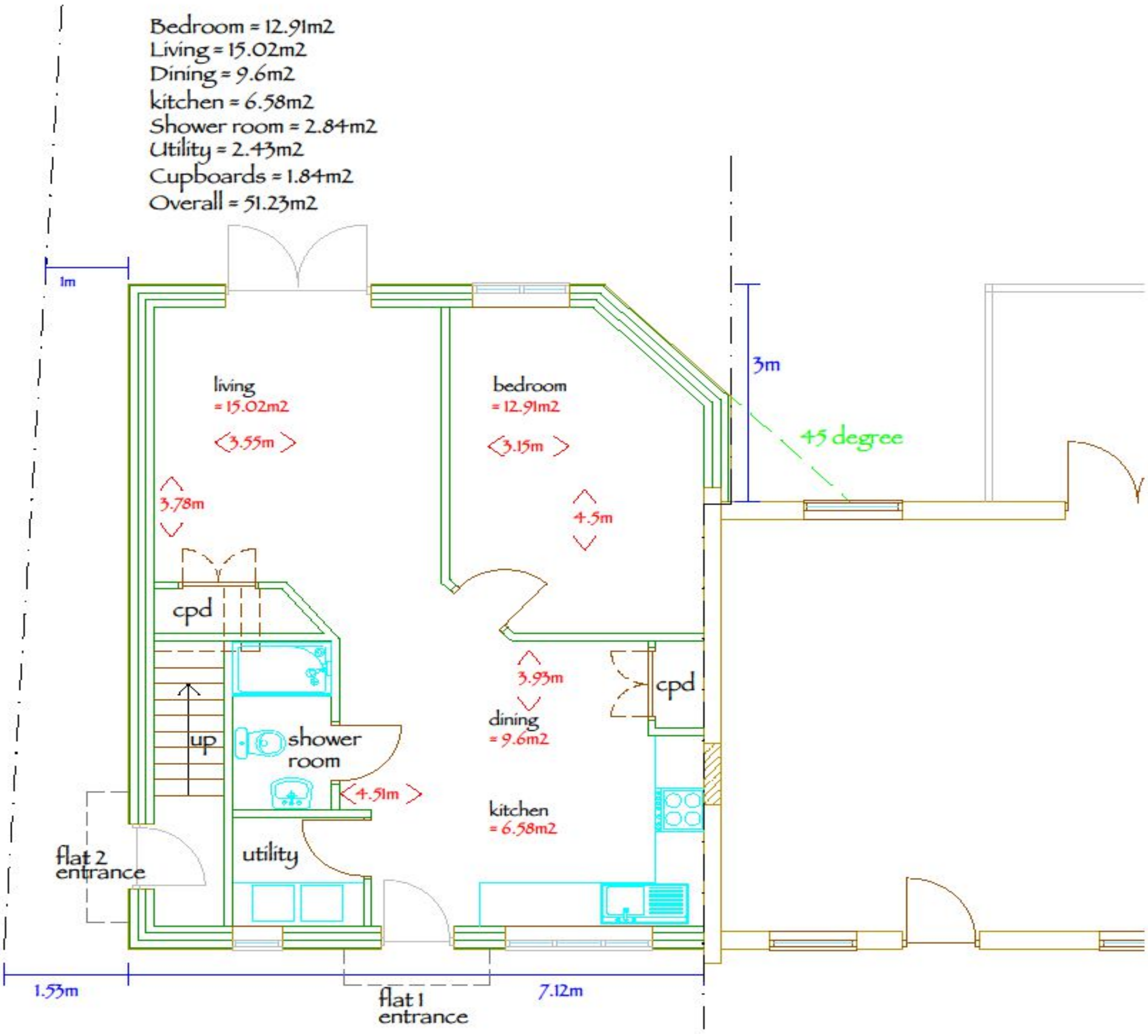
Time for emptying soakaway to half volume; $t_{s50} = S_{req} \times 0.5 / (a_{s50} \times f)$; = 2hr 56min 29s

PASS - Soakaway discharge time less than or equal to 24 hours

Provide 2500mm (w) x 2500mm (l) Crates Soakaway.

MODEL 18 LIMITED TOUCH OF ESTEEM	Project			Job Ref.	
	16 GENTIAN ROAD, BLACKBIRD LEYS, OXFORD OX3 6QE			M18/SuDS/060/AUG23	
20-22 WENLOCK ROAD ISLINGTON LONDON N1 7GU	Section			Sheet no./rev.	
	SuDS Strategy Report			15	
	Calc. by	Date	Chk'd by	Date	App'd by	Date
	SS	08/09/2022	BC			

SEE DRAWINGS



G. SOAME PLANNING & DEVT LTD
Acre Cottage, Chapel Road, South Leigh
Witney, Oxon, OX29 6UP
Tel. No: 01993 772799

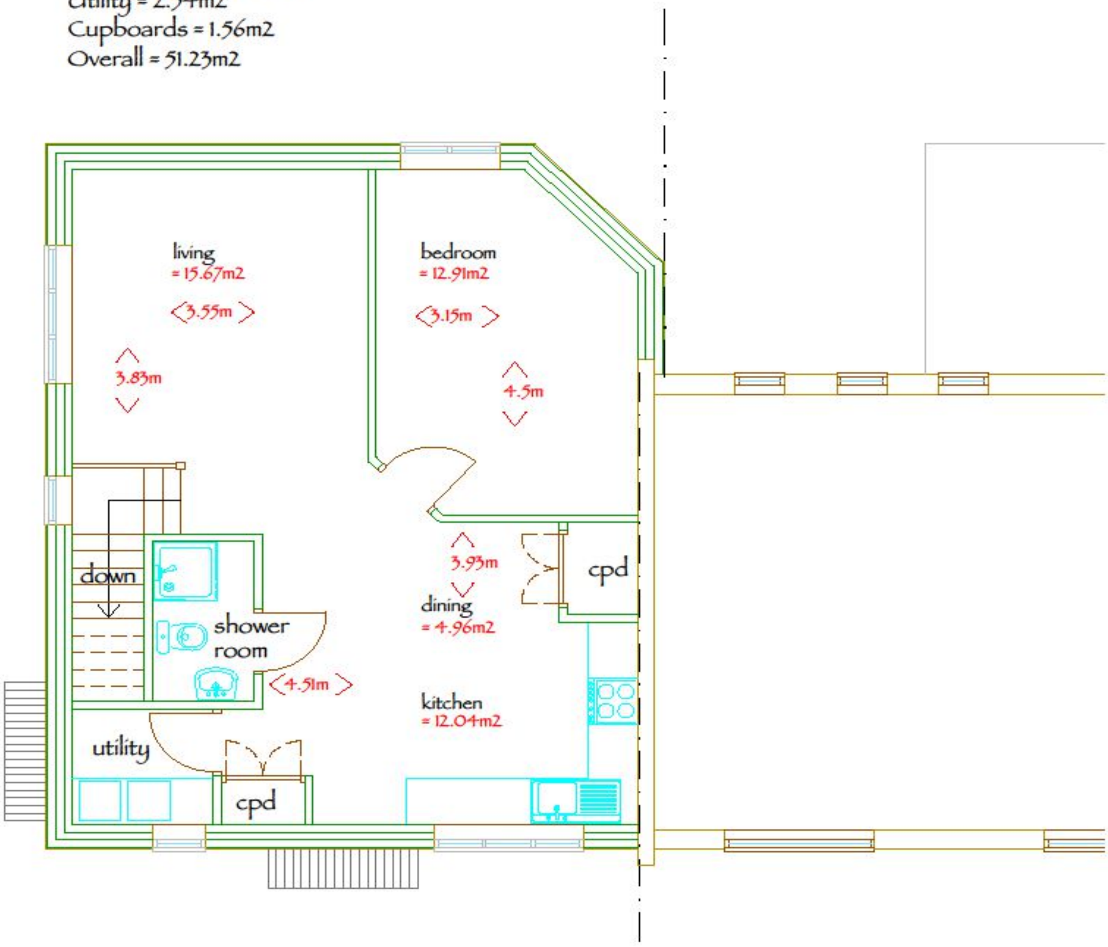
Client: Nuzi
Scale: 1:50
Date: 09/03/2022
Ref: 21029.7R

Proposal: Erection of Two 1 Bed Flats
with Off Street Parking
at 16 Gentian Road
Blackbird Leys, OX4 6QE
(Proposed Ground Floor Plan)

0 1 2 3m
Scale - 1:50 @ A3

MODEL 18 LIMITED TOUCH OF ESTEEM 20-22 WENLOCK ROAD ISLINGTON LONDON N1 7GU	Project 16 GENTIAN ROAD, BLACKBIRD LEYS, OXFORD OX3 6QE				Job Ref. M18/SuDS/060/AUG23	
	Section SuDS Strategy Report				Sheet no./rev. 16	
	Calc. by SS	Date 08/09/2022	Chk'd by BC	Date	App'd by	Date

Bedroom = 12.91m2
Living = 15.67m2
Dining = 4.66m2
kitchen = 11.93m2
Shower room = 2.54m2
Utility = 2.54m2
Cupboards = 1.56m2
Overall = 51.23m2



G. SOAME PLANNING & DEVT LTD
Acre Cottage, Chapel Road, South Leigh
Witney, Oxon, OX29 6UP
Tel. No: 01993 772799

Proposal: Erection of Two 1 Bed Flats
with Off Street Parking
at 16 Gentian Road
Blackbird Leys, OX4 6QE
(Proposed First Floor Plan)

Client: Nuzi
Scale: 1:50
Date: 09/03/2022
Ref: 21029.8R

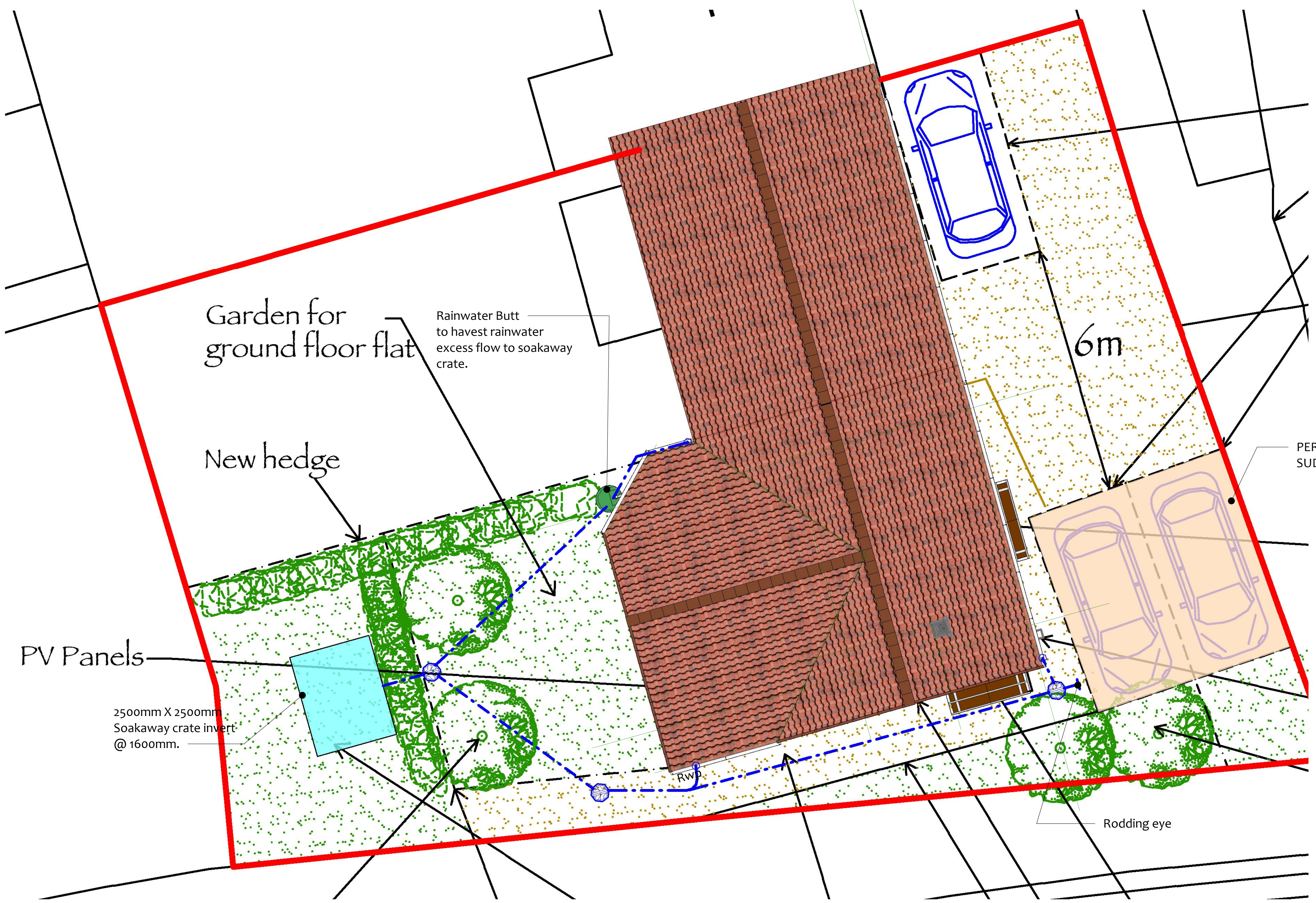
0 1 2 3m
Scale - 1:50 @ A3

MODEL 18 LIMITED TOUCH OF ESTEEM **20-22 WENLOCK ROAD** **ISLINGTON** **LONDON N1 7GU**	Project **16 GENTIAN ROAD, BLACKBIRD LEYS, OXFORD OX3 6QE**				Job Ref. **M18/SuDS/060/AUG23**	
	Section SuDS Strategy Report				Sheet no./rev. 17	
	Calc. by SS	Date 08/09/2022	Chk'd by BC	Date	App'd by	Date

Appendix – A (Test Pictures)

PLANNING APPLICATION

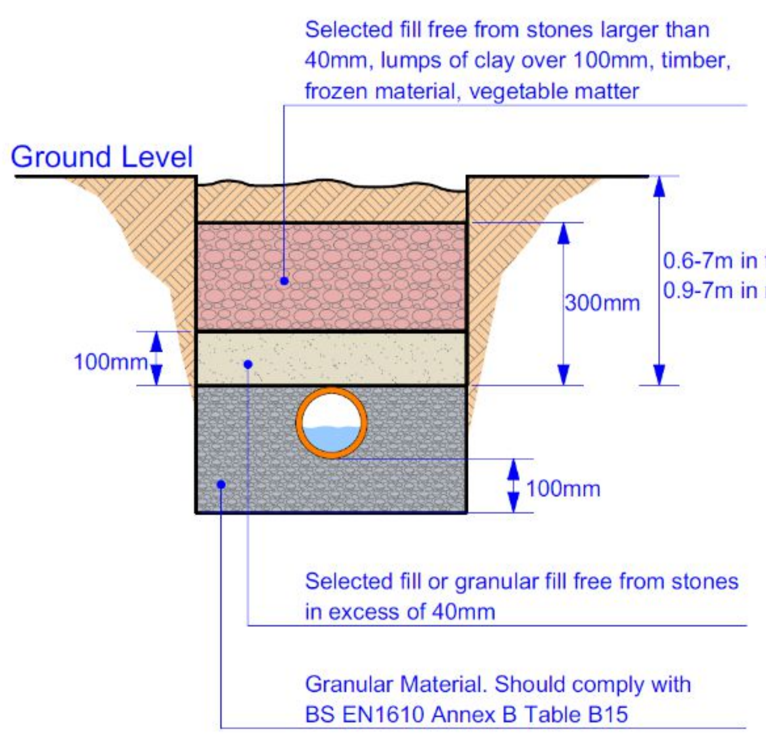
MODEL 18 LIMITED
TOUCH OF ESTEEM



1 SITE

SCALE 1 : 100

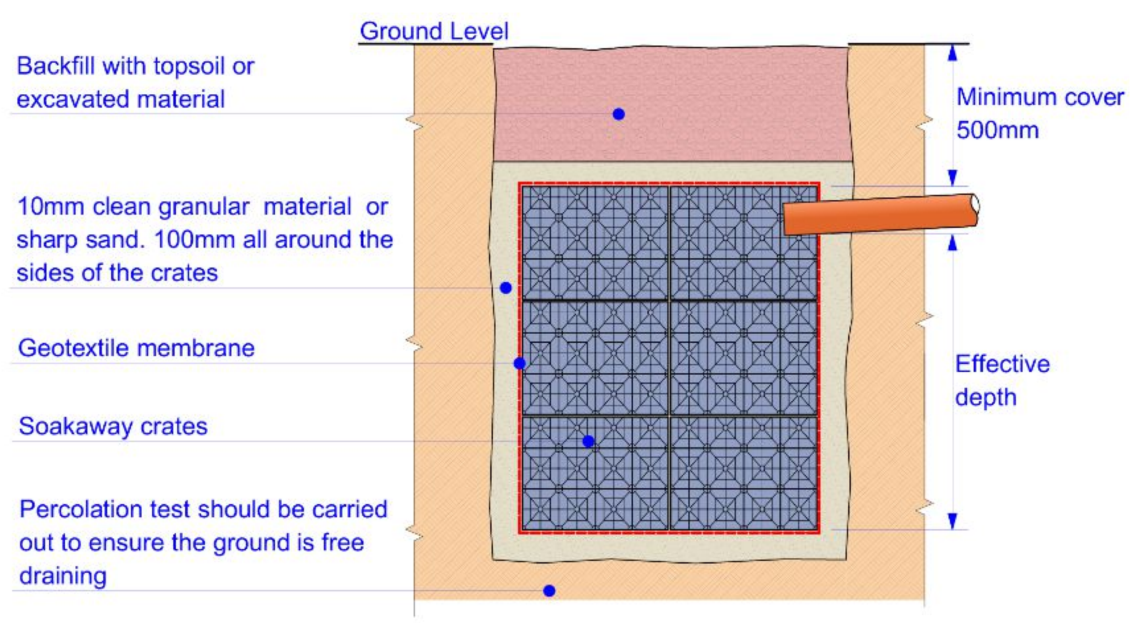
All drainage system carried in Osma drain by Wavin Building Products Ltd. or equal approved system. New drains and components in UPVC to BS 4660 and BS 5481. Nominal size of drains 100mm diameter unless otherwise shown. Falls for foul drainage are 1:40 you can go to 1:80 for surface water if required. Falls given are absolute minimum's and shallower gradients must not be used. Surrounded in granular material min. 100mm pea shingle (size 5-10mm) or alternative fill to BS 882:1983 Table 4 or BS 8301:1985 Appendix D.
Minimum depth of pipe cover 600mm in fields and 900mm in drives.
Where pipes have less than the minimum recommended cover, the pipes should, where necessary, be protected from damage by a 100mm reinforced concrete cover slab.

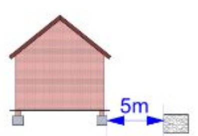


2 BELOW GROUND DRAINAGE

SCALE 1 : 50

Form soakaways a minimum of 5.0 metres from buildings and 2.5m from the boundary in free draining granular type sub soils.
Size of soakaways to be subject of ground condition. Minimum of 1m3 below the incoming pipe. Excavate pit slightly larger than designed size. A 100mm base layer of sharp sand should be laid in the base of the excavation. All outer faces of the crates should be wrapped in non-woven geotextile membrane. Install crates in accordance with the manufacturer's details, The soakaway should be backfilled using 100mm of pea shingle all around the sides and above the top of the crates. A further 400mm of the soil that was excavated can then be filled back in and firmly tamped down.
Minimum ground cover:
500mm for non-traffic areas
600mm for car parks (less than 2500kg)
800mm for car parks (more than 2500kg)





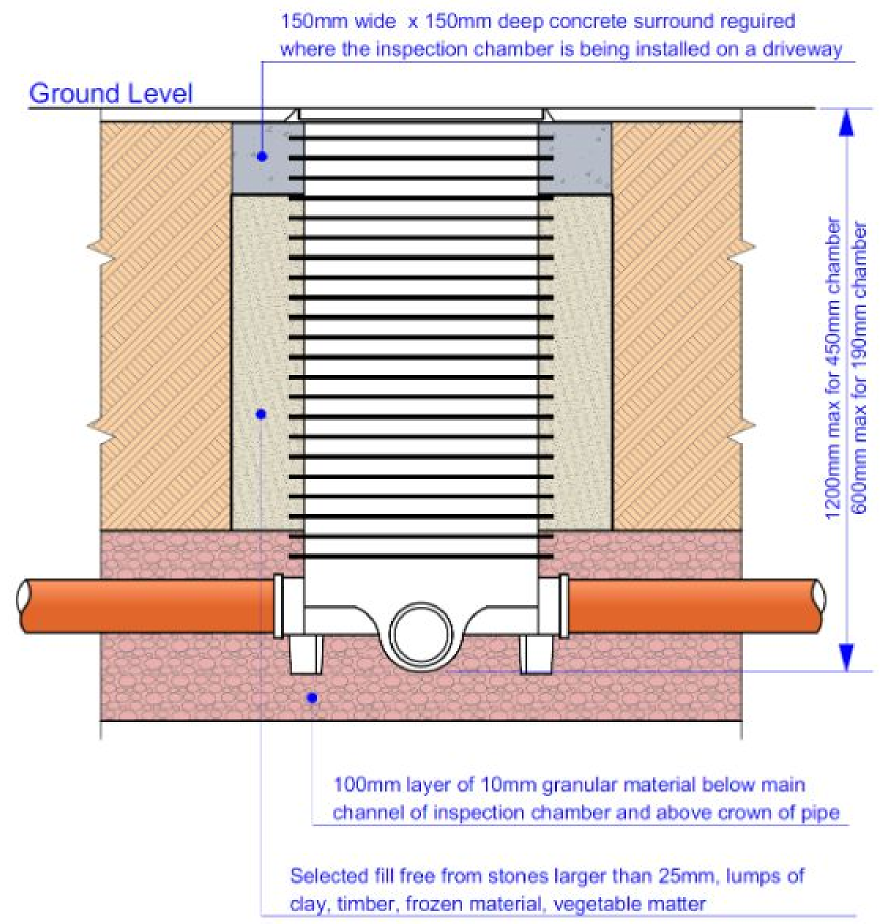
Soakaways to be located a minimum of 5m from a foundation of the buildings and 2.5m from the boundary. Have a minimum capacity of $1m^3$ per $25m^2$ of area to be drained as agreed with Building Control

4 SOAKAWAY

SCALE 1 : 50

Access should be provided at the following points:
- on or near the head of each drain run
- at a bend and at a change of gradient
- at a change of pipe size (but see below if it is at a junction)
- at a junction unless each run can be cleared from an access point (some junctions can only be rodded through from one direction)
- at 45m maximum spacing in straight runs up to 1.2m in depth

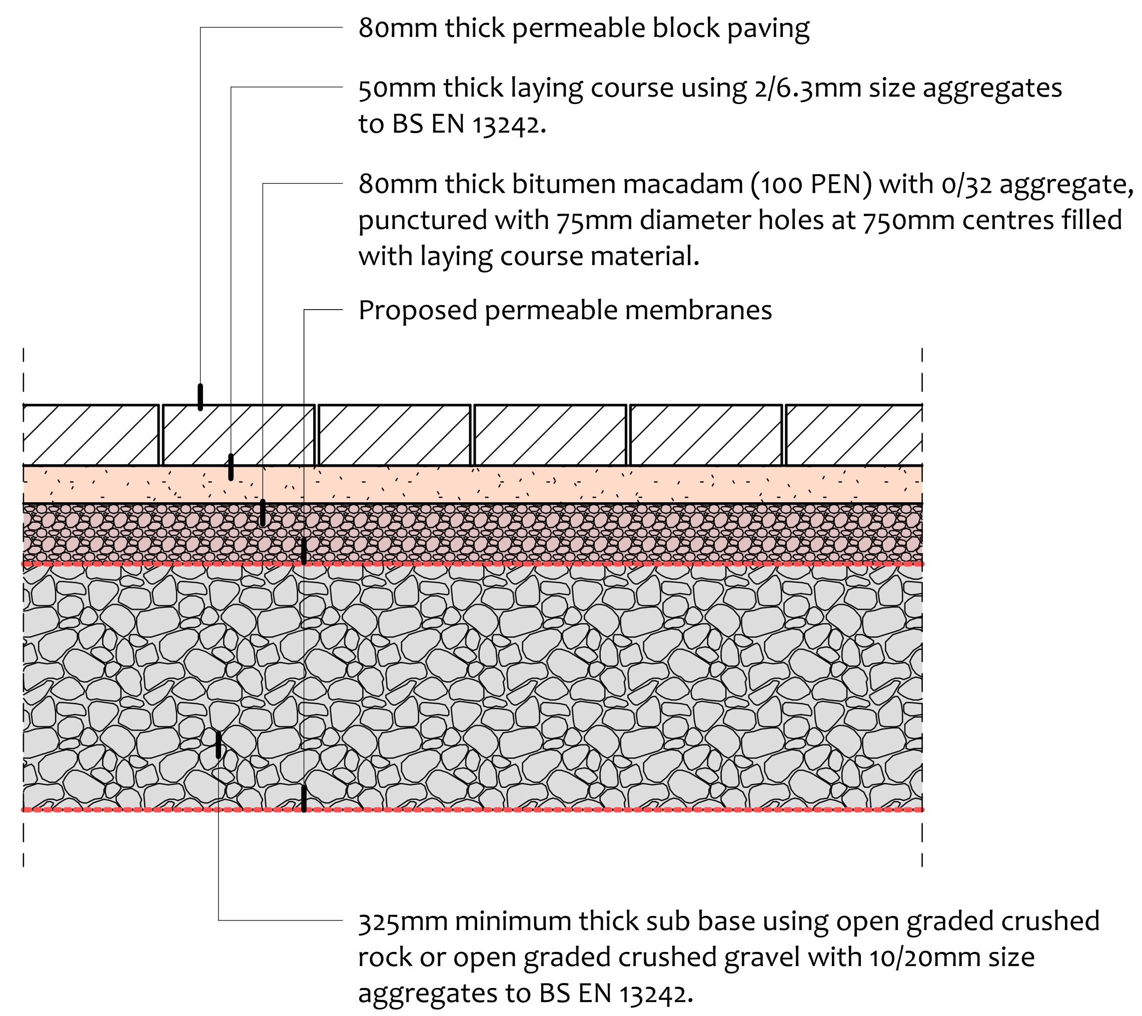
Form manholes with uPVC round or 50 precast concrete units backed with 150 concrete. uPVC manholes to be surrounded with 150 pea shingle. Manhole bases to be 150 concrete on 150 granular material if concrete. Encase drains below building in concrete under building.
Trapped rainwater gullies to have pea shingle surround as before and have rodding eye for cleansing.
Inspection chambers Polypropylene Hepworth or similar approved. Dimensions to BS 8301:1985.
Depth to invert: 0.6m or less - 190mm diameter; 1.2m or less - 450mm diameter.
Manholes: 1200 x 750mm int. 215mm brick unless otherwise indicated; 450x600mm clear cover size.
Inspection chambers or manhole covers are to be mechanically fixed and suitable for vehicular loads. where located internally to the building covers are to have double seal and bolt down covers. To be fully accessible after floor coverings are installed.



3 MANHOES

SCALE 1 : 50

Scale 1:50
1m
5m



5 TYP. PERMEABLE PAVING CONSTRUCTION DETAIL

SCALE 1 : 10

CLIENT: AGRON NUZI

ADDRESS: 16 GENTIAN ROAD BLACKBIRD LEYS OX4 6QE

Project No. M18/B.REG/060/AUG'23

01/31/24

Revisions

Notes

Project North

Scale As indicated

SURFACE WATER DRAINAGE LAYOUT

A121

Sheet No. ©2021