

## Brooklands Barn Garage, Bodicote Drainage Strategy

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 1669S

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 BBG-SOLID-XX-XX-RP-C-0001

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 31/07/2020

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CONTENTS				
<ul> <li>2.0 Site Assessment</li> <li>3.0 Flood Risk</li> <li>4.0 Sustainable Sur</li> <li>5.0 Foul Water Dro</li> <li>6.0 Conclusions</li> <li>Appendices</li> </ul>	t face Water S iinage Strateç	trategy 3y		
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#### 1 INTRODUCTION

#### Appointment and Brief

1.1 Solid Structures has been appointed by Rowland Bratt to undertake a Sustainable Drainage Strategy for Brooklands Barn Garage, Bodicote.

#### Objective and Scope of this report

- 1.2 The objective of this report is to identify the drainage regime of the site at a desk top level. Finally, the report proposes a Sustainable Drainage Systems (SuDS) that can be used on this site.
- 1.3 To achieve this objective the following documents have been consulted and/or referenced:
  - The National Planning Policy Framework (NPPF)
  - CIRIA C753 document The SuDS Manual, 2015
  - The CIRIA publication 'C635 Designing for exceedance in urban drainage— Good practice'
  - Aerial photographs and topographical survey of the site
  - British Geological Society Records
  - Environment Agency flood maps





#### 2 SITE ASSESSMENT

#### **Existing Site**

2.1 The proposed Barn is situated on the side of a valley along Church Street, post code OX15 4DR, coordinates X(Easting):446037; Y(Northing): 237195. The development is bordered on Fairholme House to the east. Access to the site is via Church Street. Refer to figure 1 for details.



Figure 1: Existing Site (Left). Proposed Site Location (right)

2.2 The existing site has a footprint of 1630m<sup>2</sup>. The distribution of permeable and impermeable area is as per Table 1. See **Appendix A** for further details.

#### Hydrogeology, Geology and Hydrology of the site

- 2.3 The ground conditions are based on soakaway test undertaken on site. An overview of the finding is shown below. Refer to appendix B for a copy of the report.
- 2.4 Hydrogeology

Aquifer	The development is outside of an aquifer zone.
Source Protection Zone	The site is not located within a Source Protection Zone.
Ground Water Levels	No Groundwater was recorded at 1.47m and 0.7m bgl.
Groundwater Flooding Incidents	No record.





#### 2.5 Geology

Bedrock & Superficial Deposits	Bedrock: Charmouth Mudstone Formation – Mudstone & Durham Formation – Siltstone and Mudstone Interbedded. Superficial Deposits: Alluvium – Clay, Silt Sand and Gravel.
Soakaway Potential	The soils are considered to be effectively permeable and likely to be conducive to infiltration systems. The two soakaway tests confirm this. The 2 soakaway test pits investigation was carried out by B C Coleman Contracting dated 03/07/19.
Contaminated Land	No records

#### 2.6 Hydrology

Surface Water	The Sor Brook is 140m from the Barn.
Existing Flood Defences	The site is not protected by flood defences.
Surface water drainage	No records
network	

#### Proposed Development

- 2.7 The proposed development comprises of one new building with an access road on the west of the existing barn. The whole site retains the same use class as per existing.
- 2.8 The estimated lifetime of the proposed development is likely to be between 50-100 years. The distribution of permeable and impermeable areas is as per Table 1. Refer to Appendix A for details.

Areas Description	Existing Site (Ha)	Redeveloped Site (Ha)
Total Site Area	0.028	0.028
Area Positively drained	0.000	0.012
Percentage of drained area that is impermeable	0%	100%
Percentage of drained area that is permeable	100%	0.0%

Table1: Existing and Proposed distribution of permeable and impermeable areas

The permeable areas are self-draining and not included in the positively drained areas The total site area doesn't represent the planning area





#### 3 FLOOD RISK ASSESSMENT

Table 2: Sources of flooding high leve	l assessment and mitigation
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Source of Flooding	Assessment	Flood Risk Reduction & Mitigation
Fluvial water (river flows)	Site is located within zone 1	None
Surface water (overland flows)	There are no records of the site flooding.	Based on the permeability tests the proposed SUDS will be able to reduce the post development surface water runoff.
Flooding from Groundwater	There are no records of flooding within the site.	No mitigation is required
Tidal/coastal	The site is not near the coast	Not applicable
Canals	The site is not near a canal	Not applicable
Reservoirs	There are no records of the reservoir flooding within the site.	No mitigation is required
Flooding from sewers	There are no records of sewer flooding within the site.	No mitigation is required





#### 4 SUSTAINABLE SURFACE WATER STRATEGY

4.1 The NPPF states that developers should "seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of SuDS". The surface water drainage is designed in accordance with the Environment Agency and CIRIA C753 SuDS manual.

#### Sustainable Drainage System (SuDS) Discharge Hierarchy Evaluation

- 4.2 The evaluation also takes into account the NPPF guidance and Building Regulations Section H3 which stipulates that 'rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following in order of priority:
  - An adequate soakaway or some other infiltration system,
  - o a watercourse, or where that is not practical,
  - o A sewer.'

Discharge Point	Assessment	Conclusion
Infiltrate to Ground	It is possible to infiltrate to ground at shallow and deep depth	Use as a main discharge system. See SuDS evaluation for more details
Discharge to watercourse	The watercourse id too far away for a sensible discharge.	N/A Infiltration is possible
Discharge to a Surface Water Sewer	There are not sewers in the proximity to site	N/A Infiltration is possible
Discharge to a combined sewer	There are not sewers in the proximity to site	N/A Infiltration is possible

Table 3: Discharge Hierarchy Evaluation

4.3 The SuDS techniques were evaluated in relation to the available site information and the discharge evaluation. The aim is to provide a sustainable design that could attenuate the flows produced by the proposed development and avoid increasing the flood risk to the properties downstream.





4.4 The potential SuDS options that could be used onsite are discussed as follow.

#### Living Roofs



Green roofs are a multi-layered system that covers the roof of a building with vegetation cover, landscaping or permeable drainage layer. They are designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.

#### **Basins and Ponds**



Detention basins and Ponds are vegetated depressions which are used to store runoff, gradually releasing it in a controlled manner and reducing peak flow rates. Basins are designed to provide attenuation, but have the added benefit of allowing settlement of suspended material.

#### Filter Strips and Swales



Filter strips are uniformly graded and gently sloping strips of grass or other dense vegetation. Strips are designed to allow runoff from adjacent impermeable areas to flow across its surface at a sufficiently low velocity so that sediment and associated pollutants are filtered out.

Swales are vegetated, trapezoidal shallow depressions, which can be designed to attenuate runoff, convey runoff and can also be used to provide water quality improvements by filtering

pollutants.



#### Infiltration



Soakaways are excavations filled with rubble or lined with brickwork, precast concrete, modular plastic geocellular systems, or perforated pipe system surrounded by granular backfill. Infiltration/Filtration Trenches are shallow excavations filled with rubble or stone that create temporary subsurface storage for either infiltration or filtration.

#### Site Application

Not applicable as roof does not allow for living roofs.

#### Site Application

Basin and ponds are not recommended due to limited available space.

#### Site Application

These systems are not recommended due to limited available space onsite.

#### Site Application

Infiltration works on this site, a permeable surface is more appropriate.





#### Permeable / Bio-retention Surfaces



Pervious pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and underlying layers. The water is temporarily stored before infiltration to the ground, reuse or being discharged to a watercourse or other drainage system

#### **Tanked Systems**



Oversized pipes, water harvesting tanks or modular plastic geocellular systems wrapped in impermeable membrane are systems with a high void ratio that can be used to create a below ground storage structure. The discharge flow is controlled via a hydrobrake or similar flow control device. The storage systems can be installed beneath trafficked and soft landscaped areas but produce limited water treatment.

#### Site Application

Permeable materials are being used for open areas as infiltration and attenuation.

#### Site Application

Tanked systems are not recommended as it is possible to infiltrate the flow produced by the development.

#### Climate Change Allowance

4.5 Following the climate change allowances guidance given by the Environment Agency, both the central and upper end allowances have been considered for the assumed 50-year lifespan of the design. See Table 4 below. Due to the location and importance of the development a 40% climate change allowance should be accommodated within the drainage design for the site.

Table 4: Peak rainfall intensity climate change allowances

Applies across all of England	Total potential change anticipated for 2015 to 2039	Total potential change anticipated for 2040 to 2069	Total potential change anticipated for 2070 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%





#### SuDS design and Capacity

- 4.6 Infiltration can be achieved on this site as confirmed by the permeability tests; therefore the surface strategy will be as follow:
  - Attenuation of all flows from the new roof and infiltrate them into the ground by using the permeable access road and parking area in front of the garage.
- 4.7 As the proposed development area is less than 50ha, the Micro Drainage ICP SUDS (FSR Method) has been used to estimate the existing site peak flow rates. The results for this development are summarised within Table 5. Full calculations can be found within Appendix C.
- 4.8 The Design Suite for Micro Drainage has been used to calculate the size of the attenuation and infiltration system for all events up to the 1 in 100 rainfall event including an allowance for climate change. The results are summarised within Table 5. Calculations can be found in Appendix C.

Return Period Event	Existing Peak Discharge Rate (I/s)	Proposed Peak Discharge Rate or Infiltration rate (m/s)	Anticipated attenuation volume (m3)
QBAR (1 in 2)	0.1	6.78 x 10^-5	
30	0.1	6.78 x 10^-5	
100	0.2	6.78 x 10^-5	
100+40%CC	N/A	6.78 x 10^-5	15.1

Table 5: Peak discharge rates and anticipated attenuation volumes for SuDS

4.9 The attenuation and infiltration storage can be provided by the permeable paving sub-base.See Table 6 and Appendix D for locations and details of the SuDS used in the site.

Table 6: Storage Volume Distribution within Su	JDS
Sustainable Drainage Systems	Volume (m³)
Bio-retention areas with 350mm subbase	15.2
TOTAL STORAGE VOLUME PROVIDED	15.2





- 4.10 The surface water drainage strategy is prepared in outline only to demonstrate that the proposed development can meet national and local requirements. Further development of the strategy will be undertaken at the detailed design.
- 4.11 It should be noted that the above presents one possible solution to demonstrate that the development can be sustainably drained and comply with the requirements of the NPPF. Other solutions may be feasible that would meet these criteria and may prove to be better suited for the site. These will become apparent during the detailed design stage. The strategy above should therefore not be interpreted as the definitive scheme solution

#### Maintenance of Drainage System

4.12 Maintenance and Management Plan Guidance from the SuDS Manual, CIRIA C753 (CIRIA, 2015) is to be followed for the effective maintenance of the proposed SuDS techniques outlined throughout Section 4. Maintenance activities will be dependent on the drainage scheme installed following detailed design. A detailed maintenance manual should be provided during the detailed design of the project.

#### Management of Exceedance

- 4.13 The drainage network has been designed to attenuate surface runoff for all events up to and including the 1% AEP (1 in 100 years), plus 40% climate change allowance event. However consideration has been given to what may happen when the design capacity of the surface water drainage network is exceeded.
- 4.14 Surface water will flow to the lowest points within the site located to the south of the site resulting in flows moving away from the buildings and into natural permeable open field. The flood risk to the buildings would therefore remain very low.





#### 5 CONCLUSIONS

- 5.1 This drainage strategy demonstrates that the proposed development site can be drained in a sustainable manner without increasing flood risk to other parties or contaminating the environment. This design aims to attenuate the surface water runoff within the gravel sub-base of permeable areas.
- 5.2 The proposed drainage strategy does not attempt to present a final design of the foul and surface water system nor the most value engineered design. This procedure is left until the detailed design stage where other systems will be evaluated following the completion of the site investigation.





### APPENDICES

Appendix A: Existing and Proposed Development Areas Appendix B: Soil Infiltration Rate Appendix C: Run off Model Results Appendix D: Proposed Surface Drainage Strategy





# Appendix A: Existing and Proposed Development Area





## NOTES

1. All Structural Engineer's drawings are to be read in conjunction with all relevant Architect's & Services Engineer's drawings and specifications.

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## Appendix B: Soil Infiltration Rate



# Soil Infiltration Rate: calculations for Brooklands Barn Garage, Bodicote

Solid Job No: Solid Doc Ref: Date:

1669S 1669S-BBC-SOLID-XX-XX-RP-C-0002 30/07/2019

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PROJECT DETAILS	
Title:Soil Infiltration Rate calculations repor	t
Solid Job No: 1669S	Solid Doc Ref: 1669S-BBC-SOLID-XX-XX-RP-C-0002
<b>Date:</b> 30/07/2019	Status: S4 - Building Regs
<b>Rev:</b> P01	Issued by: ARD

### CONTENTS

#### APPROVAL

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Diane Ochse	Argemiro Rivera	Argemiro Rivera

#### **REVISION HISTORY**

Rev:	Comment:	Approved by:
Rev:	Comment:	Approved by:
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Test 2			Mean Surface Area 3.06 m2
			Time at 25% or at <b>307.3</b> mm of water
Time Since Start	Water Level from GL	Depth of water	Interpolating Values Time Water Depth
min	mm	mm	45 446
0	241	1229	60 296
15	617	853	t: <b>58.88</b> min. From interpolating values
30	841	<b>629</b>	
45	1024	446	Time at 75% or at 921.8 mm of water
60	1174	<b>296</b>	Interpolating Values
75	1323	147	Time Water Depth
90	1470	0	0 1229 15 853
			t: <b>12.26</b> min. From interpolating values
	Volume of te	st Pit betwe	een 25% and 75% of water depth: <b>0.481</b> m3
Ti	me Taken to a	drain betwe	een 25% and 75% of water depth: 46.62 min or 0.777 hr
			Test 2 - Soil Infiltration rate:5.62E-05m/s0.202153m/hr









0.633 hr





## Appendix C: Micro Drainage Run off



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Solid Studio, Chipping Norton			
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	Results I/s		
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Instant       S       S       Add Flow / Climate Change (%)       0         Ratio R       0.413       Minimum Backdrop Height (m)       0.200         Maximum Rainfall (mm/hr)       500       Minimum Backdrop Height (m)       1.500         Maximum Time of Concentration (mins)       30       Min Design Depth for Optimisation (m)       0.600         Poul Sewage (is/ha)       0.00       Min Vel for Auto Design only (m/s)       1.00         Volumetric Runoff Coeff.       0.750       Min Slope for Optimisation (1.X)       500         Designed with Level Inverts         Network Design Table for Storm         PN       Length       Fall Slope IArea       T.E.       Base       k       HYD       DIA Section Type Auto       Design         1.001       5.000       0.085       5.88       0.000       0.0       0.00       Pipe/Conduit       €         Network Results Table         PN       Rain       T.C.       US/L Σ LArea       Σ Base       Foul (Vs) (Vs) (Vs) (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)       (Vs)	FSR Rainfa	Il Model - England and Wales									
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Maximum Rainfall (mm/h)       50       Maximum Backdrop Height (m) 1.500         Maximum Time of Concentration (mins)       0.000       Min Vel for Auto Design only (m/s)       1.00         Volumetric Rundf Coeff.       0.750       Min Stope for Optimisation (11.X)       500         Designed with Level Inverts         Network Design Table for Storm         Network Design Table for Storm         Network Design Table for Storm         Network Results Table         Network Results Table         Network Results Table         Network Results Table         N Rain T.C. US/L Z LAree Z Base Foul Add Flow Vel Cap Flow         Network Results Table         PN Rain T.C. US/L Z LAree Z Base Foul Add Flow Vel Cap Flow         Out fail Outfail C Level 1. Level Min DL W         Out of 0.00 0.00 0.012 0.00 0.00 0.01.01 7.9 1.6         1.000 50.00 6.87 99.400 0.012 0.00 0.00 0.00 0.01.01 7.9 1.6         Design Outfail Outfail C Level Min DL W         Piere Flowing Outfail Details for Storm         Outfail Outfail C. Level 1. Level Min DL W         Piere Reduction Factor 100         Molop Bactor 1000 MADD Factor 10000         Addit	Ratio	R 0.413 Minimum Backdrop Height (m) 0.200									
Maximum Time of Goldsmarkading (USMa)       0.000       Min Stope for Optimisation (113)       500         Designed with Level Inverts       End Several (USMa)       0.000       Min Stope for Optimisation (113)       500         Designed with Level Inverts       End Several (USMa)       0.000       0.00	Maximum Rainfall (mm/hr Maximum Time of Concentration (mins	) 50 Maximum Backdrop Height (m) 1.500									
Volumetric Runoff Coeff.       0.750       Min Slope for Optimisation (1:X)       500         Designed with Level Inverts         Network Design Table for Storm         PN       Length       Fall       Slope       I.Area       T.E.       Base       k       HYD       DIA       Section Type       Auto         0.00       5.000       0.085       58.8       0.012       6.00       0.0       0.600       o       100       Pipe/Conduit       Image: Conduit	Foul Sewage (I/s/ha	) 0.000 Min Vel for Auto Design only (m/s) 1.00									
Designed with Level Inverts         Detwork Design Table for Storm         PN       Length       Fall       Stope       LArea       T.E.       Base       k       HYD       DIA       Section Type       Auto         1.000       5.000       0.085       58.8       0.012       6.00       0.0       0.800       0       Pipe/Conduit       Image: Conduit       Image: Con	Volumetric Runoff Coef	f. 0.750 Min Slope for Optimisation (1:X) 500									
Network Design Table for Storm         PN       Length       Fall       Slope       LArea       T.E.       Base       hYD       DIA       Section Type       Auto         0.00       5.000       0.085       58.8       0.000       0.0       0.00       0.00       0.00       Pipe/Conduit       Image: Conduit Conduit         0.00       5.000       0.085       58.8       0.000       0.00       0.0       0.00       0.00       Pipe/Conduit       Image: Conduit Conduit       Image: Conduit Conduit Conduit       Image: Conduit Con	Desid	gned with Level Inverts									
Detwork Design Table for Storm         PN       Length       Fail       Slope       LArea       T.E.       Base       k       HYD       DIA       Section Type       Auto         1000       5.000       0.085       58.8       0.000       0.0       0.0       0.00       0.0       Pipe/Conduit       Image: Conduit		-									
N         Length         Fail         Slope         LArea         T.E.         Base         k         HYD         DIA         Section Type         Auto Design           1.000         5.000         0.085         58.8         0.012         6.00         0.0         0.600         o         100         Pipe/Conduit         Image: Conduit         Image:	Netword										
PN         Length (m)         Fail (m)         Slope (1:X)         I.Area (mins)         T.E. (mins)         Base (mins)         k (ms)         HYD (ms)         DIA SECT         Section Type (mm)         Auto Design           1.000         5.000         0.085         58.8         0.012         6.00         0.0         0.600         o         100         Pipe/Conduit         Image: Conduit           1.001         5.000         0.085         58.8         0.000         0.	<u>INETWORk</u>	C Design Table for Sform									
1.000       5.000       0.085       58.8       0.000       0.00	PN Length Fall Slope I.Area T.I (m) (m) (1:X) (ha) (min	E. Base k HYD DIA Section Type Auto ns) Flow (I/s) (mm) SECT (mm) Design									
Network Results Table         Network Results Table         PN       Rain       T.C.       US/IL       X LArea       X Base       Foul       Add Flow       Vel       Cap       Flow         1.000       50.00       6.08       99.400       0.012       0.0       0.0       1.01       7.9       1.6         1.001       50.00       6.17       99.315       0.012       0.0       0.0       1.01       7.9       1.6         Outfall Outfall Details for Storm         Outfall       Outfall       C. Level I. Level       Min       D.L       W         Pipe Number       Name       (m)       (m)       Level (mm)       0       0         1.001       100.000       99.230       0.000       0       0       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.50       Additional Flow -% of Total Flow       0.000         Areal Reduction Factor       1.000       MADD Factor * 10m <sup>3</sup> /ha Storage       2.000         Hot Start (mins)       0         Flow were Person per Day (//per/day)       0.000         Manhote Headloss Coeff (Global)       0.500       Run Tim	1.000 5.000 0.085 58.8 0.012 6. 1.001 5.000 0.085 58.8 0.000 0	.00 0.0 0.600 o 100 Pipe/Conduit 💣 .00 0.0 0.600 o 100 Pipe/Conduit 💣									
PN         Rain (mm/hr)         T.C. (mins)         US/IL (m)         E LArea (ha)         E Base Flow (U/s)         Flow (U/s) (U/s)         Cap (U/s)         Flow (U/s)           1.000         50.00         6.08         99.400         0.012         0.0         0.0         1.01         7.9         1.6           1.001         50.00         6.17         99.315         0.012         0.0         0.0         1.01         7.9         1.6           Incertain Outfall Details for Storm           Outfall Outfall C. Level I. Level Min D,L W Pipe Number Name (m) (m)         Nm         Nm           1.001         100.000         99.230         0.000         0         0           Simulation Criteria for Storm           Volumetric Runoff Coeff         0.750         Additional Flow -% of Total Flow 0.000           Areal Reduction Factor         1.000         MADD Factor* 10m <sup>3</sup> /ha Storage 2.000         1.40 Start Level (mm)         0         Flow Way         0.000         Run Time (mins)         60           Hot Start Inviso         0         Inlet Coefficcient 0.800         Run Time (mins)         60         Foul Sewage per hectare (l/s)         0.000         Run Time (mins)         1            0         Number of On	Ne	twork Results Table									
FN       FAIL       1.0.       USIL       21.4464       2.5ase       Four (Vs)       (Vs) <td></td> <td></td> <td></td>											
1.000       50.00       6.08       99.400       0.012       0.0       0.0       1.01       7.9       1.6         1.001       50.00       6.17       99.315       0.012       0.0       0.0       1.01       7.9       1.6         Image: Free Flowing Outfall Details for Storm         Outfall Outfall C. Level I. Level Min D,L W         Pipe Number       Name       (m)       (m)       1. Level (mm) (mm)         1.001       100.000       99.230       0.000       0       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow       0.000         Areal Reduction Factor       1.000       MADD Factor * 10m <sup>3</sup> /ha Storage 2.000       Inlet Coefficeient       0.800         Hot Start Level (mm)       0       Flow per Person per Day (//per/day)       0.000       Inlet Coefficeient       0.800         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       1         Number of Input Hydrographs       0       Number of Offline Controls       0       Number of Real Time Controls       0         Synthetic Rainfall Details	(mm/hr) (mins) (m)	(ha) Flow (l/s) (l/s) (l/s) (m/s) (l/s) (l/s)									
Eree Flowing Outfall Details for Storm         Outfall Pipe Number       Outfall Name       C. Level (m)       Min (m)       D,L       W         1.001       100.000       99.230       0.000       0       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow 0.000         Areal Reduction Factor       1.000       MADD Factor * 10m³/ha Storage 2.000         Hot Start (mins)       0       Inlet Coefficcient       0.800         Hot Start Level (mm)       0       Flow per Person per Day (//per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (//s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details       Synthetic Rainfall Details       Synthetic Rainfall Details       Synthetic Rainfall Details	1.00050.006.0899.4001.00150.006.1799.315	0.012         0.0         0.0         0.0         1.01         7.9         1.6           0.012         0.0         0.0         0.0         1.01         7.9         1.6									
Outfall Pipe Number       Outfall Name       C. Level (m)       I. Level (m)       Min Level (m)       D, L (m)       W (mm) (mm)         1.001       100.000       99.230       0.000       0       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow       0.000         Areal Reduction Factor       1.000       MADD Factor * 10m³/ha Storage       2.000         Hot Start (mins)       0       Inlet Coefficcient       0.800         Hot Start Level (mm)       0 Flow per Person per Day (l/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (l/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details       Synthetic Rainfall Details       Sinthetic Rainfall Details       Sinthetic Rainfall Details	Free Flowir	ng Outfall Details for Storm									
Pripe Number Name       (m)       (m)       Level (mm) (mm) (mm)         1.001       100.000       99.230       0.000       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow 0.000         Areal Reduction Factor       1.000       MADD Factor * 10m³/ha Storage 2.000         Hot Start (mins)       0       Inlet Coefficient       0.800         Hot Start Level (mm)       0 Flow per Person per Day (//per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (I/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details               ©1982-2019 Innovyze	Outfall Outfall	C. Level I. Level Min D,L W									
1.001       100.000       99.230       0.000       0         Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow       0.000         Areal Reduction Factor 1.000       MADD Factor * 10m³/ha Storage 2.000         Hot Start (mins)       0       Inlet Coefficient       0.800         Hot Start Level (mm)       0       Flow per Person per Day (I/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (I/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details		(m) (m) (mm) (mm)									
Simulation Criteria for Storm         Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow       0.000         Areal Reduction Factor       1.000       MADD Factor * 10m³/ha Storage       2.000         Hot Start (mins)       0       Inlet Coefficient       0.800         Hot Start Level (mm)       0       Flow per Person per Day (I/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (I/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details       Senthetic Rainfall Details       Senthetic Rainfall Details       1	1.001	100.000 99.230 0.000 0 0									
Volumetric Runoff Coeff       0.750       Additional Flow - % of Total Flow       0.000         Areal Reduction Factor       1.000       MADD Factor * 10m³/ha Storage       2.000         Hot Start (mins)       0       Inlet Coefficient       0.800         Hot Start Level (mm)       0       Flow per Person per Day (I/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (I/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details       Signthetic Rainfall Details       Signthetic Rainfall Details       0	Simulo	ation Criteria for Storm									
Hear Reduction Factor Floor       INADO Factor Formation Formation Floor         Hot Start (mins)       0         Inlet Coefficient 0.800         Hot Start Level (mm)       0         Floor Person per Day (l/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500         Run Time (mins)       60         Foul Sewage per hectare (l/s)       0.000         Output Interval (mins)       1         Number of Input Hydrographs       0         Number of Online Controls       1         Number of Online Controls       1         Number of Online Controls       1         Number of Real Time Controls       0         Synthetic Rainfall Details	Volumetric Runoff Coeff	0.750 Additional Flow - % of Total Flow 0.000									
Hot Start Level (mm)       0 Flow per Person per Day (l/per/day)       0.000         Manhole Headloss Coeff (Global)       0.500       Run Time (mins)       60         Foul Sewage per hectare (l/s)       0.000       Output Interval (mins)       1         Number of Input Hydrographs       0       Number of Offline Controls       0       Number of Time/Area Diagrams       0         Number of Online Controls       1       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details              ©1982-2019 Innovyze	Hot Start (mins)	0 Inlet Coefficcient 0.800									
Foul Sewage per hectare (I/s)       0.000       Output Interval (mins)       00         Number of Input Hydrographs       0       Number of Offline Controls       0       Number of Time/Area Diagrams       0         Number of Online Controls       1       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details       0       0       0       0       0	Hot Start Level (mm)	0 Flow per Person per Day (l/per/day) 0.000									
Number of Input Hydrographs       0       Number of Offline Controls       0       Number of Time/Area Diagrams       0         Number of Online Controls       1       Number of Storage Structures       1       Number of Real Time Controls       0         Synthetic Rainfall Details	Foul Sewage per hectare (I/s)	0.000 Run Lime (mins) 60 0.000 Output Interval (mins) 1									
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 Synthetic Rainfall Details ©1982-2019 Innovyze	Number of Input Hydrographs 0 Numb	per of Offline Controls 0 Number of Time/Area Diagrams 0									
<u>Synthetic Rainfall Details</u> ©1982-2019 Innovyze	Number of Online Controls 1 Number	of Storage Structures 1 Number of Real Time Controls 0									
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Solid Structures		Page 2
Solid Studio, Chipping Norton		
Oxfordshire		
OX7 5BJ		Mirro
Date 31/07/2020 12:40	Designed by Argemiro	Drainago
File PROPOSED.MDX	Checked by ARD	Diamage
Innovyze	Network 2019.1	
<u>Sy</u>	<u>nthetic Rainfall Details</u>	
Bainfall Model	ESB Profile Type Summer	
Return Period (years)	5 Cv (Summer) 0.750	
Region Eng	and and Wales Cv (Winter) 0.840	
Ratio R	0.413	
-		
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Solid Structures		Page 3
Solid Studio, Chipping Norton		Construction of the second
Oxfordshire		The second
OX7 5BJ		Micro
Date 31/07/2020 12:40	Designed by Argemiro	Drainado
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Innovyze	Network 2019.1	

Online Controls for Storm

Pump Manhole: 2, DS/PN: 1.001, Volume (m<sup>3</sup>): 0.1

Invert Level (m) 99.315

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Solid Studio, Chipping Norton Oxfordshire OX7 58J Data 31/07/2020 12:40 Innovyre Network 2019.1 <u>Porous Car Park Manhole: 2, D5/PN: 1.001</u> <u>Mar Percolation (Ws)</u> 40.0 <u>Solidey Tractor</u> 2.0 Depression Storge (mm) 12.0 <u>Mar Percolation (Ws)</u> 40.0 <u>Solidey Factor</u> 2.0 Depression Storge (mm) 3 <u>Porosity</u> 0.30 <u>Evaporation (mm/day)</u> 3 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300	Solid Structures		Page 4	
Oxfordshine Ox7 S8J Doils 31/07/2020 12:40 File PROPOSED.MDX Innovyze Network 2019.1 Checked by ARD Network 2019.1 Storage Structures for Storm Parcial Car Park Manhole: 2, DS/PN: 1.001 Infiltration Coefficient Base (mhr) 0.24420 Was Percolation (mmhr) 1000 Statey Factor 2.0 Depression Storage (mm) 5 Statey Factor 2.0 Depression Storage (mm) 5 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300	Solid Studio, Chipping Norton			
OX7 58J       Designed by Argemiro       Microcold Checked by ARD         Date 31/07/2020 12:40       Checked by ARD       Microcold Checked by ARD         Innovyze       Network 2019.1       Microcold Checked by ARD         Storage Structures for Storm         Porous Car Park Manhole: 2, DS/PN: 1 001         Innovyze         Microcold Checked by ARD         Microcold	Oxfordshire			
Date 31/07/2020 12:40       Designed by Argemiro         File PROPOSED.MDX       Checked by ARD         Innovyze       Network 2019.1         Date 31/07/2020 12:40         Methods 2019.1         Date 31/07/2020 12:40         Methods 2019.1         Date 31/07/2020 12:40         Methods 2019.1         Date 31/07/2020 12:00         Methods 2019.1         Date 31/07/2020 12:00         Methods colspan= 10:00         Methods colspan= 10:00         Network 2019.1         Methods colspan= 10:00         Safety Factor 2:00 Depression Storage (mm) 3         Invert Level (m) 99:400         Colspan= 10:00         Date 30:00         Date 30:00         Date 30:00         Date 30:00         Date 30:00 <td c<="" td=""><td>OX7 5BJ</td><td></td><td>Micro</td></td>	<td>OX7 5BJ</td> <td></td> <td>Micro</td>	OX7 5BJ		Micro
File PROPOSED MDX       Checked by ARD       Contraction         Storage Structures for Storm         Porous Cor Park Manhole: 2, DS/PN: 1,001         Initiation Coefficient Base (mhn) 0.2420       With (m) 12.0         Membrane Percolation (mmhn) 1000       Length (m) 12.0         Max Percolation (mmhn) 1000       Length (m) 12.0         Max Percolation (%)       40.0       Storage (mn) 5         Porous Cor Park Manhole: 2, DS/PN: 1,001         Max Percolation (%)       40.0       Length (m) 12.0         Max Percolation (%)       40.0       Storage (mn) 5         Porous Cor Park Manhole: 2, DS/PN: 1,001         Max Percolation (%)       40.0       Storage (mn) 5         Porous Cor Park Manhole: 2, DS/PN: 1,001         Max Percolation (%)         Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2"         Max Percolation (%)       40.0         Colspan="2"         Max Porous Colspan="2"	Date 31/07/2020 12:40	Designed by Argemiro	Drainage	
Innovyze Network 2019.1 Storage Structures for Storm Porous Car Park Manhole: 2, D5/PN: 1,001 Membrane Percolation (mmhr) 1000 Length (m) 12.0 Max Percolation (lis) 40.0 Slope (1X) 0.0 Safety Factor 2, 0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300 (mm/day) 200 Part Level (m) 99.400 Cap Volume Depth (m) 0.300 (mm/day) 200 Part Level (m) 200 Pa	File PROPOSED.MDX	Checked by ARD	Dramacje	
Storage Structures for Storm         Persons Car Park Manholes 2, DS/PN: 1.001         Infiltration Coefficient Base (m/hr) 024420       Width (m) 120         Membrane Persolation (mm/hr) 000       Length (m) 200         Safety Factor 2.0 Depression Storage (mm) 5       Singer (13.0)         Infiltration Coefficient Base (m/hr) 024420       Width (m) 120         Max Persolation (mm/hr) 000       Length (m) 200         Safety Factor 2.0 Depression Storage (mm) 5       Singer (13.0)         Invert Level (m) 99400       Cap Volume Depth (m) 0.300	Innovyze	Network 2019.1		
Deruge uncouse to John         Porous Car Park Manhole: 2, DS/PN: 1.001         Infittration Coefficient Base (m/h)       0.00       Length (m)       12.0         Membrane Percolation (mm/h)       100       Length (m)       12.0         Max Percolation (%)       40.0       Stope (13%)       0.0         Stafety Factor       2.0       Depression Storage (mm)       5         Porosity       0.30       Evaporation (mm/dhy)       0.00       Cap Volume Depth (m)       0.300	Stora	as Structures for Storm		
Porcus Car Park Manhole: 2, DS/PN: 1.001 Infiltration Coefficient Base (m/hr) 0.24420 Vidth (m) 12.0 Mex Percolation (m/hr) 0.00 Slope (1X) 0.0 Porcsity 0.30 Eveporation (mm/day) 3 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300	<u></u>			
Porous Car Park Manhole: 2, DS/PN: 1.001				
Infiltration Coefficient Base (m/hr) 0.24420 Width (m) 12.0 Membrane Percolation (ms) 1000 Length (m) 12.0 Max Percolation (ms) 40.0 Slope (11X) 0.0 Slope (11X) 0.0 Porosity 0.0 Evaporation (mm/day) 3 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300 Provember 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000 Part (ms) 2000	Porous Car Pa	ark Manhole: 2, DS/PN: 1.001		
(P1982-2019 Innovvre	Infiltration Coofficient Pass (n	a/br) 0.24420 \\/idth (m) 12.0		
Max Percolation (I(s) 40.0 Slope (1X) 0.0 Safety Factor 2.0 Depression Storage (mm) 5 Porosity 0.30 Evaporation (mm/day) 3 Invert Level (m) 99.400 Cap Volume Depth (m) 0.300	Membrane Percolation (mn	n/hr) 1000 Length (m) 12.0		
©1982-2019 Innovvze	Max Percolation	(I/s) 40.0 Slope (1:X) 0.0		
Invert Level (m) 99.400 Cap Volume Depth (m) 0.300	Porcession Parallel Safety Fa	actor 2.0 Depression Storage (mm) 5 osity 0.30 Evaporation (mm/day) 3		
©1982-2019 Innovze	Invert Level	(m) 99.400 Cap Volume Depth (m) 0.300		
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Solid Structures		Page 5
Solid Studio, Chipping Norton		
Oxfordshire		The second
OX7 5BJ		Micro
Date 31/0//2020 12:40	Designed by Argemiro	Drainage
	Checked by ARD	
Innovyze	Network 2019.1	
<u>1 year Return Period Summary of </u>	Critical Results by Maximum Level (Ro	ank 1) for Storm
Areal Reduction Facto	Simulation Criteria or 1.000 Additional Flow - % of Total	Flow 0.000
Hot Start (mins	s) 0 MADD Factor * 10m <sup>3</sup> /ha Sto	rage 2.000
Hot Start Level (mm Manhole Headloss Coeff (Globa Foul Sewage per hectare (I/s	n) 0 Inlet Coeffie I) 0.500 Flow per Person per Day (l/per. s) 0.000	cient 0.800 /day) 0.000
Number of Input Hydrographs 0 Nun	nber of Offline Controls 0 Number of Tir	ne/Area Diagrams 0
Number of Online Controls 1 Numbe	r of Storage Structures 1 Number of F	teal time Controls 0
Sy Rainfall Model Region England and N	<u>/nthetic Rainfall Details</u> FSR M5-60 (mm) 19.900 Cv (Summe Wales Ratio R 0.413 Cv (Winte	er) 0.750 er) 0.840
Margin for Flood Risk	Warning (mm) 150.0 DVD Status OF	F
Ana	DTS Status ON	F
Profile(s	s) Summer and Win s) 15 30 60 120 240 360 480 960 14	ter 40
Return Period(s) (years	s) 1, 30, 120, 240, 300, 400, 300, 1 (1, 30, 1	00
Climate Change (%	b) 0, 0,	40
US/MH Return Climate PN Name Storm Period Change	First (X) First (Y) First (Z) Ove Surcharge Flood Overflow A	Water Surcharged rflow Level Depth ct. (m) (m)
1.000 1 15 Winter 1 +0% 10 1.001 2 15 Winter 1 +0% 10	00/15 Summer 30/15 Summer	99.432 -0.068 99.409 -0.006
		00.400 0.000
Flooded US/MH Volume	Pipe Flow / Overflow Flow Lev	el
PN Name (m³)	Cap. (I/s) (I/s) Status Excee	eded
1.000 1 0.000	0.22 1.6 OK	
1.001 2 0.000	0.00 0.0 OK	

Solid Str	uctures									ŀ	Page 6
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Date 31,	/07/202	20 12:40			D	esigned b	y Argemir	0			Drainage
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Innovyze					N	efwork 20	19.1				
	<u>30 ye</u>	ar Return	Period S	Summary	of Cri	tical Resu	lts by Max	kimum Lev	<u>el (Rank</u>	1) for Ste	orm_
		Manhole F Foul S	Areal Rea H Hot Sta leadloss sewage pe	duction Fa ot Start (n art Level ( Coeff (Glo er hectare	<u>Sir</u> actor 1 nins) mm) obal) 0 (I/s) 0	nulation Cr .000 A 0 N 0 .500 Flow .000	<u>iteria</u> dditional F IADD Fact per Persc	low - % of <sup>-</sup> or * 10m³/h Inlet Co n per Day (	Total Flow a Storage peffiecient (I/per/day)	0.000 2.000 0.800 0.000	
	Number Numb	of Input Hy er of Onlin	/drograph ie Control	ls 0 1 Is 1 Nun	Number ober of	of Offline Storage St	Controls ( ructures	) Number 1 Numbe	of Time/Ar r of Real T	ea Diagra ïme Cont	ams 0 trols 0
		Rainfall I	Model Region E	England a	<u>Synthe</u> FS nd Wale	etic Rainfa R M5-60 es Ra	<u>I Details</u> (mm) 19.9 itio R 0.4	900 Cv (Si 413 Cv (	ummer) 0 Winter) 0	.750 .840	
			Margin fo	or Flood R /	isk Wai Analysis E	ning (mm) Timestep TS Status	150.0 Fine In ON	DVD Status ertia Status	s OFF s OFF		
		F	Dura Return Pe Climat	Profi ation(s) (n riod(s) (ye e Change	le(s) hins) 1 ears) e (%)	5, 30, 60, <sup>-</sup>	S 20, 240, 3	Summer and 60, 480, 96 1,	d Winter 60, 1440 30, 100 0, 0, 40		
PN	US/MH Name	Storm	Return Period	Climate Change	Fi Su	rst (X) rcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000 1.001	1 2	15 Winte 15 Winte	r 30 r 30	+0% +0%	100/1 30/1	5 Summer 5 Summer				99.453 99.422	-0.047 0.007
		PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Overflow (I/s)	Pipe Flow (I/s)	Status	Leve Excee	el ded	
		1.000	1	0.000	0.55		3.8	C	Ж		
		1.000 1.001	1 2	0.000 0.000	0.55 0.00		3.8 0.0 SU	C RCHARGE	DK ED		
		1.000 1.001	1 2	0.000 0.000	0.55 0.00		3.8 0.0 SU	C RCHARGE	DK ED		
		1.000 1.001	1 2	0.000 0.000	0.55 0.00		3.8 0.0 SU	C RCHARGE	DK ED		
		1.000 1.001	1 2	0.000	0.55 0.00		3.8 0.0 SU	C RCHARGE	DK ED		
		1.000 1.001	1 2	0.000	0.55		3.8 0.0 SU	( RCHARGE	DK ED		
		1.000 1.001	1 2	0.000	0.55		3.8 0.0 SU	C RCHARGE	DK ED		
		1.000	1 2	0.000	0.55		3.8 0.0 SU	( RCHARGE	DK ED		
		1.000	12	0.000	0.55		3.8 0.0 SU	( RCHARGE	DK ED		

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Date 31/07/2020 12:40 Designed by Argemiro	ainade
File PROPOSED.MDX Checked by ARD	uniuge
Innovyze Network 2019.1	
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm	<u>n</u>
Simulation CriteriaAreal Reduction Factor1.000Additional Flow - % of Total Flow0.000Hot Start (mins)0MADD Factor * 10m³/ha Storage2.000Hot Start Level (mm)0Inlet Coefficcient0.800Manhole Headloss Coeff (Global)0.500Flow per Person per Day (l/per/day)0.000Foul Sewage per hectare (l/s)0.0000.000	
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls	s 0 s 0
Synthetic Rainfall DetailsRainfall ModelFSR M5-60 (mm) 19.900 Cv (Summer) 0.750RegionEngland and WalesRatio R0.413 Cv (Winter) 0.840	
Margin for Flood Risk Warning (mm) 150.0 DVD Status OFF Analysis Timestep Fine Inertia Status OFF DTS Status ON	
Profile(s)         Summer and Winter           Duration(s) (mins)         15, 30, 60, 120, 240, 360, 480, 960, 1440           Return Period(s) (years)         1, 30, 100           Climate Change (%)         0, 0, 40	
Water Sur US/MH Return Climate First (X) First (Y) First (Z) Overflow Level PN Name Storm Period Change Surcharge Flood Overflow Act. (m)	rcharged Depth (m)
1.000115 Winter100+40%100/15 Summer99.5161.001215 Winter100+40%30/15 Summer99.440	0.016 0.025
Flooded Pipe US/MH Volume Flow / Overflow Flow Level PN Name (m³) Cap. (l/s) (l/s) Status Exceeded	
1.00010.0000.996.9SURCHARGED1.00120.0000.000.0SURCHARGED	
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# Appendix D: Proposed Drainage Strategy





1

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NOTES 1. All dimensions are in millimetres and levels in m AOD unless stated otherwise.

2. Do not scale. If in any doubt, consult Engineer.

3. Read in conjunction with the architects and engineers schedule drawings.

4. Check inverts and sizes of existing pipes prior to the commencement of any work. Report any discrepancies to the engineer and await instructions.

5. The location of services is shown as indicative. This drawing should be read in conjunction with the utilities drawings. No warranty to their accuracy can be given. The contractor shall take all necessary measures to satisfy himself as to the location of the existing services and connection points. Excavation should be undertaken in compliance with HSG47.

6. Surface water Pipework to be 110mm Thermoplastics U-PVC (Polypipe or similar) installed at 1:100 slopes minimum. Pipe bedding should be class Z in pipes within 1.5m of the building or shallower than 700mm below ground level. For all other areas the pipe bedding should be class S.

7. Joints and fittings for gravity sewers shall comply with the relevant provisions of BS EN 1401-1, BS EN 1852 and BS EN 12666-1. Pipes shall have a limit of 6% deformation. Pipes shall be SN8 ring stiffness and stamped accordingly.

Pipe sections shall not be longer than 3m.

8. Plastic chambers and rings, including demarcation chambers, shall comply with BS EN 3598-1 or BS EN 13598-2 as appropriate.

9. Inspection chamber covers and frames shall comply with the relevant provisions of BS EN 124 and should be double sealed.

10. All inspection chamber covers shall be the non-ventilating type and shall have closed keyways.

11. Testing of pipelines should be as follow:

Gravity Pipework: Air pipe testing. Pipework should withstand a pressure of 100mm water gauge and this should not fall by more than 25mm in a 5minute period. However where traps or gullies are connected they should withstand a pressure of 50mm water gauge and this should not fall by more than 12mm in a 5minute period. It is recommended that pipework installations are tested in sections rather than waiting to complete in one operation.

12. Concrete structures design sulphate class and ACEC concrete class unknown.

13. Manhole covers to be set square to the building. Covers of existing manholes to be adjusted to match final ground levels.

14. Granular Bedding for pipes shall be constructed by spreading and compacting granular bedding material over the full width of the pipe trench. After the pipes have been laid, additional granular material shall, if required, be placed and compacted equally on each side of the pipes and, where practicable, this shall be done in sequence with the removal of the trench supports.

P02	Site Layout updated	31.07.20	ARD	ARD
P01	Issued for Planning Approval	30.07.19	DO	ARD
Rev	Description	Date	Ву	Chkd

# Solid **FRUCTURES**

Solid Studio 12 Albion Street Chipping Norton OX7 5BJ

Project

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Brooklands Barn Garage Bodicote

Drawing Title

#### PROPOSED DRAINAGE NETWORK SKETCH

Scale							
						1:100	) @ A1
Role							
							Civil
Status / Stage							
			S4	- For l	Plann	ing App	oroval
Job No							
							1669S
Ref	Org	Zone	Level	Туре	Role	Number	Rev
BBG	SOLID	хх	UD	DR	С	6100	P02

KEY:

External Permeable Surface Rain water Dispersion unit Proposed Surface Water Sewer

Overland Flows



8005 - Silt Trap Plastic

BS EN 13598-2 and BS EN 13598-2 or have equivalent independent approval. Mortar bedding and haunching to cover and frame to clause E6.7 NN Precast concrete slab or insitu concrete slab to support cover and frame Ø or 300x300mm. Flexible seal-Temporary cap manhole during construction. or 450mm x 450mm. Joints between base and shaft and between shaft components to be fitted with watertight seals. Joint to be as close as possible to Granular bedding material. face of chamber to permitt satisfactory joint and subsequent movement. Typical Section in areas subject to vehicle loading -Cover complying with BS EN124 Mortar bedding and haunchingto cover and frame to clause E6.7 150mm deep concrete collar-Temporary cap shaft during construction Min. internal dimensions 450mm Ø\_

r			and Landscaping Areas			
			Access opening restricted refer to manhole schedule			
			Flexible Seal.			
Sited in domestic driveways or footways						

for details

#### Mortar bedding and haunching to cover and frame to clause E6.7 Temporary cap shaft during\_ construction Min. internal dimensions 450mm Ø or 450mm x 450mm.

Sited in private garden - No loading

Notes: 1. Refer to drawing 8193 for base layouts.

8190 - Chamber Type 3 - Flexible Material



×100 150mm Gen 3 concrete surround to required depth

NOTES:

Notes: 1. Refer to drawing 8193 for base layouts.

1. This details shows the standard generic arrangement.

2. The pipe and connector details will be different for each manufacturer of the components. They are to be in installed in accordance with the manufacturers recommendations.

8250 - External Rainwater (High Level)



SD064 - Sump and Dispersion Unit



## -Manhole cover to suit BS EN124 loading.

Class D400 - For Highways

-Class B engineering brickwork, concrete blocks or precast concrete

cover frame seating rings. Access opening restricted to 350mm

Min. internal dimensions 450mm Ø

-100mm GEN 3 Concrete surround Base unit to have all connections

-with soffit levels set no lower than that of the main pipe.

Class B125 - For Driveways, Footways ng Areas

estricted

-Cover and frame to BS EN124 Class A15 - For Gardens

-Access opening restricted.

Refer to manhole schedule



8193 - Chamber Type 3 Base Layouts



8230 - External Rodding Eye Detail



PERMEABLE SURFACE DETAIL AGAINST BUILDING



8061 - Pipe Bedding Detail Type Z

#### NOTES

1. All Structural Engineer's drawings are to be read in conjunction with all relevant Architect's & Services Engineer's drawings and specifications.

P01	Issued for Planning Approval	18.07.19	DO	ARI
Rev	Description	Date	Ву	Chk



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Project

Brooklands Barn Garage Bodicote

Drawing Title

### DRAINAGE STANDARD DETAILS

Scale						
						NTS @ A1
Role						
						Civil
Status / Stage						
			Ś	S4 Fo	<sup>r</sup> Plan	ning Approval
Job No						
						1669/M
Ref	Org	Zone	Level	Туре	Role	Number Rev
BBC	SOLID	ХХ	DT	DR	С	3400 P01