LANMOR Consulting

Civil Engineers & Transport Planners

31 Barkham Ride, Finchampstead

Flood Risk Assessment & Drainage Strategy

September 2025

231641/DS/AG/RS/02

Rev E

LANMOR Consulting

Civil Engineers & Transport Planners

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APPENDICES

1 INTRODUCTION

1.1 General

1.1.1 Lanmor Consulting Ltd has been appointed to complete a Flood Risk Assessment and Drainage Strategy for the proposed residential development at 31 Barkham Ride, Finchampstead, Wokingham, RG40 4EX.

1.1.2 The location of the site is shown below in Figure 1.1.

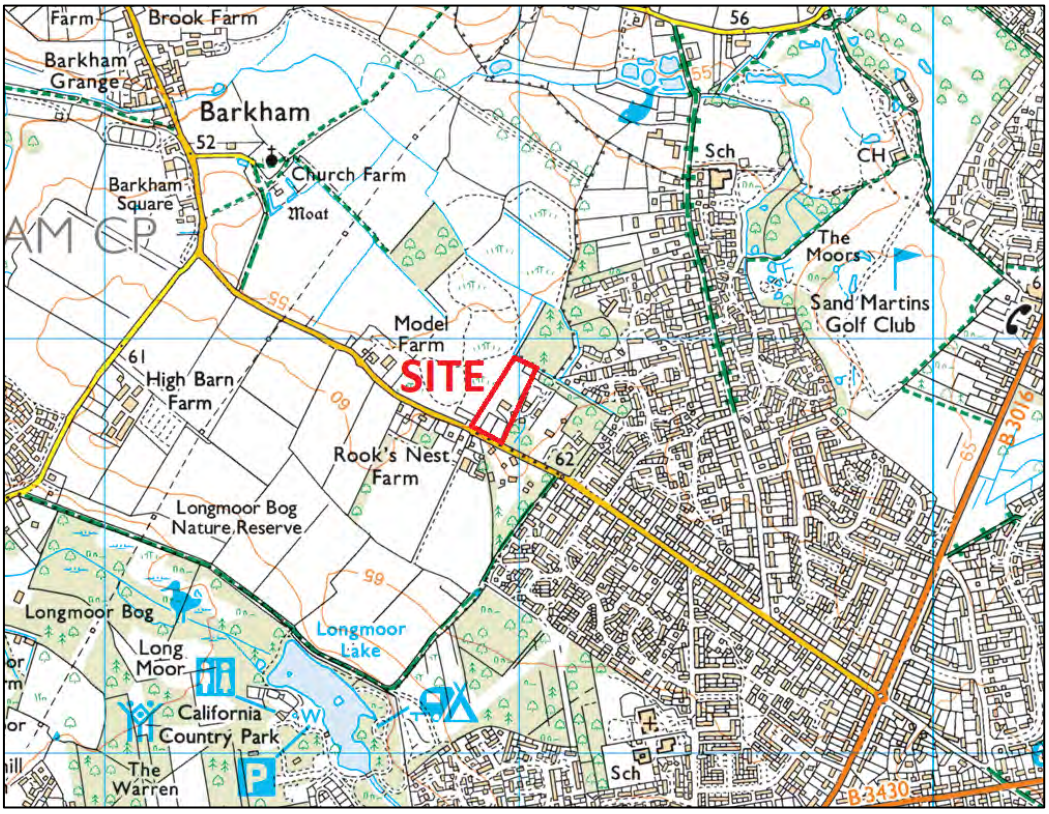

Figure 1.1 – Site Location Map

1.2 Scope

1.2.1 This report describes the existing site conditions, development proposals and implications of flooding on the site as described in the governments guidance document; National Planning Policy Framework (NPPF) and its technical guidance. This report will consider the following:

- Development proposals;
- Sources of flooding and flood defences;
- Flooding extents, depth and climate change predictions;

- Impact of flooding on the development;
- Dangers presented by flooding.

1.2.2 This report has been prepared in accordance with the requirements of the governments National Planning Policy Framework (NPPF) and its planning practice guidance and will demonstrate that the proposed development will be safe and will not increase the risk of flooding in the surrounding area.

1.2.3 This report will also consider the proposed drainage regime for the site. It will assess the site's current Greenfield runoff rate, suitable methods of discharging the runoff from the development and set the drainage strategy for the proposed development, including discharge rates and any requirements for attenuation.

2 BASELINE CONDITIONS

2.1 Existing Site

2.1.1 The site is located in an established residential area at 31 Barkham Ride, in north Finchampstead. The site is approximately 1.5 hectares and is located near to a highly developed residential area to its east and southeast, while the land to the north and west of the site is primarily classed as agricultural or greenfield land. The nearest source of fluvial flooding to the site is from the River Loddon and its tributaries, located approximately 1km to the northwest of the site.

2.2 Geology

2.2.1 The British Geological Survey (BGS) indicates that the location of the site is underlain by a mixture of Bagshot Formation – Sand, and London Clay Formation – Clay, silt, and sand. The sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period. There is no available information regarding the superficial geology of the site.

2.3 Proposed Development

2.3.1 The proposed development seeks to demolish the existing property on site to make way for 31 park homes and a community building. The park homes come in 3 different sizes but are all 2 bed, 4 person units.

2.3.2 The proposals include a road through the site and vehicular access will be provided via the adjacent Victoria Gardens estate. The community building will include offices, a hall, kitchen and bar, and toilets.

2.3.3 The proposed site plan for the development is included in Appendix A as drawing 2680-06.

3 SOURCES OF FLOODING

3.1 Fluvial/Tidal Flooding

3.1.1 Detailed flood information was not available from the Environment Agency (EA). Since the site is located within Flood Zone 1, the EA were unable to provide any flood level information for the site.

3.1.2 The NPPF and PPG define the Flood Zones as follows:

- Zone 1: 'Low Probability' This zone comprises land assessed as having a less than a 1 in 1000 annual probability of river or sea flooding (<0.1%) in any year.

- Zone 2: 'Medium Probability' – This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-0.1%) in any year.

- Zone 3a: 'High Probability' – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

- Zone 3b: 'The Functional Floodplain' – This zone comprises land where water has to flow or be stored in times of flood. SFRAs should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).

3.1.3 The application site is shown to be within Flood Zone 1. This is defined as land assessed as having a less than 1 in 1000 annual probability of river flooding or tidal flooding in any given year. Figure 3.1 below shows the location of the site with regards its proximity to the flood zones, as determined by the Environment Agency's flood map for planning.

Figure 3.1 – EA Fluvial Flood Map

3.1.4 The blue area shows the places at medium risk of flooding (Flood Zone 2) and the dark blue areas show the places at a high risk of flooding (Flood Zone 3). Figure 3.1 shows that the site sits securely within Flood Zone 1.

3.2 Surface Water Flooding

3.2.1 The surface water flood mapping provided by the EA is the best available source of national information on surface water flooding. It is a starting point for understanding patterns and probability of surface water flooding. The EA accept that the mapping has limitations and state that "*these maps cannot definitively show that an area of land or property is, or is not, at risk of flooding, and the maps are not suitable for use at an individual property level*."

3.2.2 Figure 3.2 below shows that the site has a "very low" probability of surface water flooding.

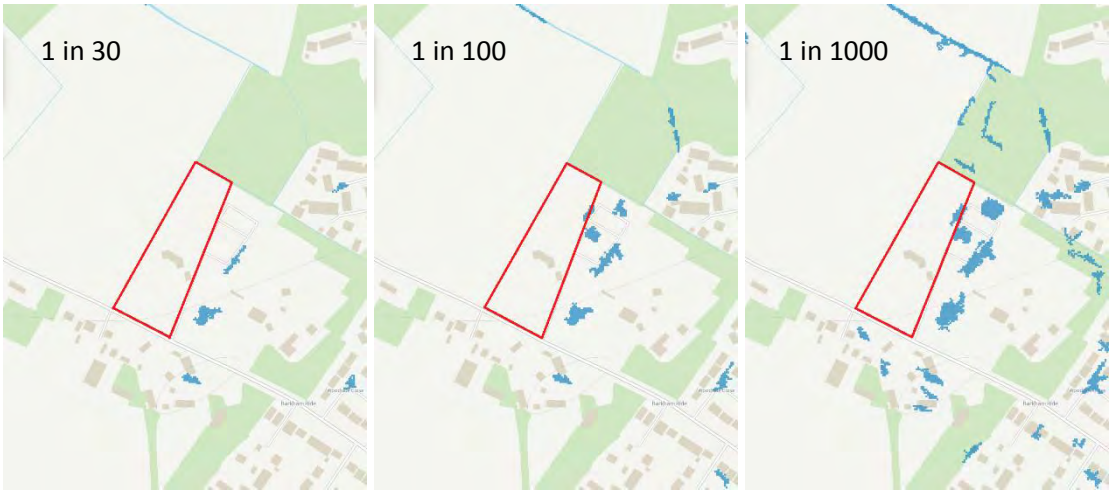

Figure 3.2 – EA Surface Water Flood Maps

3.2.3 According to the above map, the site is not susceptible to either 1 in 100 (1%) or 1 in 30 (3.3%) surface water flooding extents.

3.3 Groundwater Flooding

3.3.1 Although the Council indicates that the borough is susceptible to some degree of groundwater flooding, the map included within Wokingham Borough Council's SFRA (2011) indicates that the site is mostly at low risk of groundwater flooding. Few incidents of groundwater flooding have been reported across the borough.

3.4 Reservoir Flooding

3.4.1 The Environment Agency's flood map for reservoir flooding confirms that the site is not at risk from reservoir flooding, even in a scenario where the rivers are also in flood conditions.

4 MODELLED FLOOD EVENTS AND CLIMATE CHANGE

4.1 Modelled Flood Levels

4.1.1 The main source of flooding for the site is the River Loddon. The EA was unable to provide flood levels for the site given its distance from the flood risk area, but they were able to confirm that the site is in Flood Zone 1, as indicated on the Environment Agency (EA) flood mapping.

4.1.2 The site is therefore considered to have a risk of fluvial flooding with a probability of less than 0.1%.

4.2 Climate Change Allowances

4.2.1 New climate change allowances have been published by the EA, the allowances to be applied are based on the river basin district, the flood zone, and the site vulnerability. The site lies within the Thames River Basin District (the Loddon and Trib Catchment Area). The site is located within Flood Zone 1 and mobile home use is considered a highly vulnerable development. Based on the EA's guidance, no further allowance is required, however if the allowance for the central band was used to assess climate change allowances the flooding for a 1.0% AEP +CC event would not affect the site.

4.2.2 The application site will have a risk of flooding of less than 0.1% once climate change allowances are factored in.

4.3 Impact on Flood Waters

4.3.1 The proposed development involves the demolition of the existing buildings and construction of 31 park homes. The site is situated in a Flood Zone 1 area and has a probability of fluvial flooding of less than 0.1% (1 in 1000 years). There is no history of the site being subject to flooding from any other source.

4.3.2 The proposed development is in a low flood risk area outside of the 1 in 100 AEP +CC flood extent, therefore the proposals will not restrict the flow of flood waters during a flooding event.

4.4 Impact on Storage Volumes

4.4.1 The total footprint of the proposed buildings will be larger than the footprint of the existing building on the site, but as the site is located in a Flood Zone 1 area this will not reduce the flood storage volumes for storm events up to the 1.0% probability. This is also true when climate change allowances have been factored in.

4.5 Impact of Flood on Development

4.5.1 The flood mapping shows that the application site is in Flood Zone 1 and has a probability of flooding of less than 0.1%. Given the site is a significant distance from the nearest source of fluvial flooding and will not be subject to flooding with a probability of 1.0% AEP +CC the proposed development will therefore be safe and will not be subject to damage from flooding.

4.6 Safe Access

4.6.1 Since the site is in Flood Zone 1, dry access can be provided to and from the site at all times.

5 SEQUENTIAL TEST AND EXCEPTION TEST

5.1 Development Vulnerability Classification

5.1.1 The proposed development seeks to construct 31 park homes and a community building. Under Table 2 in the Planning Practical Guidance (PPG) of the NPPF, the proposed development would therefore be classed as a "Highly Vulnerable" proposed use.

5.2 Sequential Test

5.2.1 The aim of the Sequential Test is to ensure that a sequential approach is used to steer new developments to areas with the lowest probability of flooding, as set out in the NPPF and PPG.

5.2.2 Strategic Flood Risk Assessments (SFRA) refine information on the probability of flooding, taking other sources of flooding and the impacts of climate change into account. They provide the basis for applying the sequential test.

5.2.3 The proposed use is classified as "Highly Vulnerable". The application site is also identified as being in Flood Zone 1 on the Environment Agency's flood maps for planning. The proposal therefore meets the requirements of the Sequential Test to allocate developments to low flood risk areas.

5.2.4 The PPG advises that changes of use can increase the vulnerability of a site and that site-specific flood risk assessments should therefore be undertaken where appropriate. The NPPF advises that the sequential test does not need to be undertaken for change of use applications *"except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate."*

5.2.5 By "*applied as appropriate*", the NPPF suggests that, where a site-specific flood risk assessment shows the site to be within either Flood Zone 2 or 3, a Sequential Test should subsequently be undertaken for changes of use to mobile home / park home sites, due to the high vulnerability of these developments.

5.2.6 Since the site is securely within Flood Zone 1, a Sequential Test is not required. Furthermore, it would not be possible to locate the development in a sequentially better flood risk zone as the site is already in Flood Zone 1. And so even if a Sequential Test were to be undertaken, the application site would either equal or surpass any other site brought forward as part of the test.

5.2.7 Table 2 of the PPG shows that highly vulnerable developments in Flood Zone 1 are appropriate, which means the Exception Test is not required.

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

Table 5.1 – Flood Risk Vulnerability and Flood Zone 'Incompatibility'

5.2.8 Given the proposed dwellings will be located in Flood Zone 1, it is considered that the development meets the requirements of the Sequential Test as the proposed development has been allocated to an area at less risk of flooding.

6 ONSITE DRAINAGE

6.1 Existing Drainage

6.1.1 The application site is currently comprised of 1 residential property (which is to be demolished) and the surrounding land belonging to this dwelling.

6.1.2 Thames Water sewer records were obtained as part of the investigation into the drainage regime for the site. The records indicate that there is a 450mm diameter adopted foul sewer running to the north of the site, flowing to the north-west. The topographical survey shows manholes by the house and on the northern boundary, so it has been assumed that the current property is connected to the public sewer, however a CCTV survey will be required to confirm whether this is the case.

6.1.3 The only surface water sewers in the local area are to the north-east, one of which discharges into the existing ditch that runs just outside the northern boundary of the site. Other surface water sewers to the north also discharge to the local network of ditches. A copy of the Thames Water sewer records has been included in Appendix C.

6.2 Proposed Foul Drainage

6.2.1 The application site will be provided with a new foul water drainage network to serve the proposed 31 park homes. The preferred option would be to discharge into the existing public foul sewer located to the north of the site via the existing connection, subject to a Section 106 application with Thames Water. Falls across the site mean the connection point would be at a lower level than the houses so any discharge from the properties would not need to be pumped into the connecting foul sewer, and a simple gravity-fed connection could be exploited.

6.3 Proposed Surface Water Drainage

6.3.1 Sustainable Drainage Systems (SuDS) were considered as part of this assessment for the disposal of surface water runoff from the development. The proposed homes are to have pitched roofs, so the use of green or blue roofs is not a viable option for this development and has therefore been discounted.

6.3.2 Rainwater harvesting was also considered to reuse surface water runoff within the dwellings. These systems require a separate network of pipes in the property, tanks and pumps to store the rainwater and distribute it throughout the building. Rainwater harvesting is suitable for large scale developments where the uptake matches the runoff.

6.3.3 Furthermore, if there were consecutive storms the harvesting tank would be full at the start of the storm and all the runoff would discharge via the overflow, so the attenuation would need to be sized ignoring the harvesting facility. Given that rainwater harvesting cannot be relied upon to reduce the rate of runoff from the site and considering the additional costs of the infrastructure necessary to its implementation, rainwater harvesting has been discounted.

6.3.4 Next on the sustainable drainage hierarchy is the use of ground infiltration techniques, such as soakaways and infiltration basins. Percolation testing was undertaken at the site by the client's company A1 UK Drains Ltd on the 31st of January 2023 and the completed report is included in Appendix B. Four separate tests revealed that the ground is unsuitable for infiltration techniques, which is likely due to the large presence of London Clay which underlays the site (as recorded by the British Geological Survey). It is therefore expected that any soakaways designed for the site would not achieve a half drain time of less than 24 hours and therefore would not comply with Building Regulations. It is for this reason that infiltration techniques have been discounted.

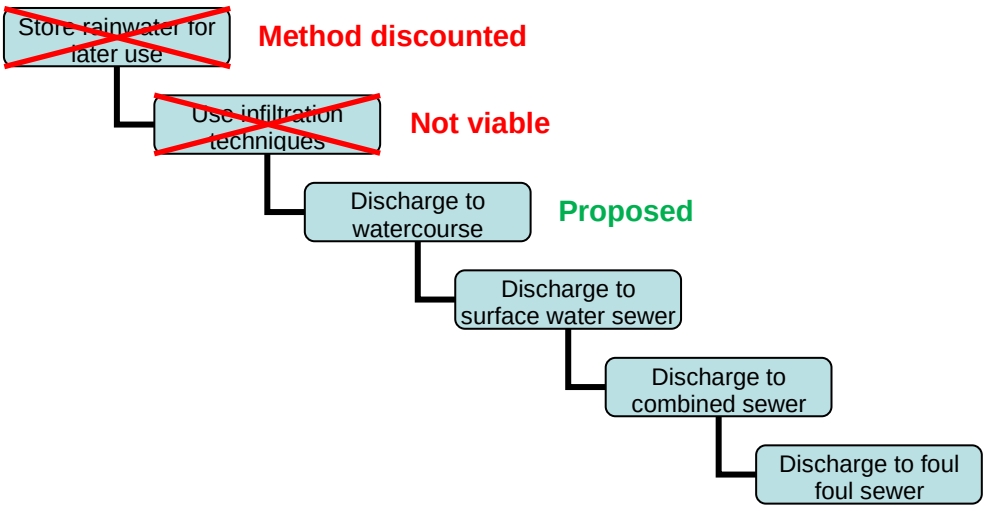

Figure 6.1 – Sustainable Drainage Hierarchy

6.3.5 Next on the hierarchy is discharging to a watercourse. Although there are no main watercourses directly adjacent to the site, there is a ditch which runs just outside the northern border of the site. Photographs of the ditch have been included in Appendix F. It is therefore proposed to discharge surface water runoff to this ditch via a box culvert / cellular storage tank, attenuation basin and control chamber with 2 Hydro-Brakes.

FEH22 Drainage Calculations

6.3.6 Calculations have been undertaken to determine the existing Greenfield runoff rate from the site to set the proposed discharge rates. Additional calculations have been completed using the FEH22 method to check the proposed discharge rates and maximum water levels. The results are tabulated below in Table 6.1 and are also included in Appendix E.

Return Period (Years)	Greenfield Rate (l/s)	Proposed Rate (l/s)	% Reduction	Max Water Level (mAOD)
1	5.5	4.5	18%	55.908
2	5.8	5.5	5%	56.043
5	8.4	5.5	35%	56.209
10	10.6	5.6	47%	56.336
30	14.8	6.0	59%	56.489
100	20.8	6.0	71%	56.640
100 +40% CC	-	6.0	-	56.905

Table 6.1 – Existing and Proposed Flow Rates

6.3.7 The proposed discharge rate from the site to the ditch will be restricted through the use of a Hydro-Brake device which is located in the flow control chamber. The Hydro-Brake has a design flow of 5.5 l/s (the 1-year Greenfield rate) with a design head of 0.35m and invert level of 55.700m.

6.3.8 The control device has been set so that the peak proposed discharge is limited to below the Greenfield rate for all return periods. The reduction in peak flow rate ranges from 5% for a 1 in 2-year event to 71% for a 1 in 100-year event.

Attenuation Basin

6.3.9 The drained area on site has increased. Therefore, in order to restrict the peak discharge rate from the site to greenfield rates attenuation storage must be provided. The use of a swale was considered for the surface water drainage but was discounted for various reasons. Tree root protections zones prevent the excavation of a swale around the perimeter of the site. The number of driveways off the main access road would require any swale through the middle of the site to be regularly culverted, reducing the overall effectiveness of the swale. Also, the presents of a swale so close to the access road would present a safety risk to the residents from falls or drowning, particularly young children, and the necessary safety fencing would present regular barriers throughout the site, both visual and physical. Due to these reasons, the use of a swale was not considered and effective SuDS feature on this particular site.

6.3.10 Therefore, attenuation storage will be provided in the form of an attenuation basin (to be situated at the northern corner of the site) and a box culvert / cellular storage tank (to be situated under the proposed access road). The basin will collect runoff from the culvert / tank to reduce the peak discharge rate. The final discharge will not need to be pumped and can rely on a gravity connection from the attenuation basin to the ditch.

6.3.11 The culvert / tank has been sized at 2m wide x 0.4m deep x 110m long and the base of the attenuation basin will be sized at 170m^2. The culvert / tank and subsequently the attenuation basin will collect surface water runoff from the roofs and access road via gullies and pipes and store it before discharging it to the control chamber, where the flow will be further restricted through the Hydro-Brake flow control into the nearby ditch.

6.3.12 A box culvert is the preferred solution for this development due to the high vehicle loading from refuse vehicles and the limited cover over the structure. However, there may be other products, such as a crate system, that may be more suitable in this particular scenario, and this can be further investigated during the detailed design stage.

6.3.13 Drawing 231641/DS/02 included in Appendix D sets out the proposed drainage strategy for the site, with the box culvert running beneath the access road before the water flows out towards the attenuation basin and control chamber at the north of the site. This also shows the proposed foul connection to the nearby public sewer, subject to S106 approval. This drainage assessment has therefore found that discharging surface water to a nearby watercourse/ditch is the most sustainable way to dispose of surface water runoff from the development.

Ordinary Watercourse

6.3.14 This report has found that discharge to a ditch (ordinary watercourse) is the most sustainable method of discharge of surface water runoff from the site. There is an existing ditch running from east to west through Rooks Nest Wood, just outside the northern boundary of the site. The watercourse does not pass into the site at any point. It is owned and maintained by the council, and is not the responsibility of the developer, as it is outside of the site boundary.

6.3.15 Water in the ditch has an orange colour, as indicated on the photographs in Appendix F. This indicates the presence of iron-loving bacteria feeding on iron dissolved in the water and is not a result of contamination. This is noted on signs in the wood.

7 SURFACE WATER / SUDS MAINTENANCE

7.1.1 Regularly inspecting the surface water drainage network for blockages and clearing unwanted debris / silt from the system should improve the performance of the surface water network and decrease the need for future repairs. In the event that road gullies become blocked, high pressure water jets can be used to clear the gully and ensure they are functioning correctly, this should be undertaken by certified trained professionals.

7.1.2 The level and frequency of maintenance required on site is dependent on the type of facility. The type of maintenance will fall into one of three categories "regular maintenance", "occasional maintenance" and "remedial maintenance".

7.1.3 Regular maintenance of the drainage and SuDS features will include, inspections, removal of litter / debris and sweeping of the surfaces. Occasional maintenance will include removal of sediment etc. and remedial maintenance may include structural repairs and infiltration reconditioning if required.

7.1.4 The drainage and SuDS elements after an initial inspection following construction should be inspected on a monthly basis for the first 12 months and after large storms, thereafter the following maintenance regime should be applied and adjusted if the 12-month monitoring process has identified any issues.

7.1.5 Following completion of the development a Management Company will be set up to maintain all the communal areas, including the drainage. It will be their responsibility to maintain the drainage network, including the SuDS elements.

7.1.6 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained.

7.1.7 Pipes are intended to be the main conveyance across the development. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

7.1.8 For manholes and pipes, the following maintenance will be required.

Manhole / Pipe Maintenance Schedule		
	Required Action	**Typical Frequency**
Regular maintenance	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
	Remove sediment from structures.	Annually or as required
Remedial Actions	Rod through poorly performing runs as initial remediation.	As required
	If continued poor performance jet and CCTV survey poorly performing runs.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of pipe manholes for sediment build-up and remove if necessary	Every 5 years or as required

Table 7.1 – Manhole, Catchpit and Pipe Maintenance Schedule

7.1.9 For ponds and wetlands, the following maintenance is recommended.

Ponds and Wetlands Maintenance Schedule		
	Required Action	**Typical Frequency**
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public area	Monthly (During growing season)
	Cute the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as require)

	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May-October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal	Half Early
	Check any mechanical devices, e.g. penstocks	Half early
	Hand cut submerged and emergent aquatic plants (at minimum of 1.0m above pond and base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5, or as required
	Remove sediment and planting from one quadrant of the main body of ponds	Every 5 years, or as required
Remedial Actions	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Monitoring	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate inlets outlets and overflows	As required

Table 7.2 – Pond Maintenance Schedule

7.1.10 For specialist pieces of equipment such as the Hydro-Brakes, maintenance brochures will be provided by the manufacturers. These will set out the frequency of inspections and correct methods of cleaning etc. that should be followed. It is recommended that once installed the facility should be inspected monthly for the first three months and thereafter at six monthly intervals or as advised in the maintenance brochure.

7.1.11 The above information is only intended as guidance in standard maintenance practise for surface water drainage and SuDS features. The above measures should be reviewed regularly and modified to suit the site conditions.

8 SUMMARY AND CONCLUSION

8.1.1 The site is located on the northern outskirts of Finchampstead in Wokingham, near to other residential areas. The planning application is for the demolition of the existing dwelling and the erection of 31 park homes, community building and access road.

8.1.2 The proposed development site is located in fluvial Flood Zone 1 and is at very low risk of surface water flooding, or from any other sources. The development will therefore not increase the risk of flooding in or around the site and will not be at risk of damage from flood waters for a 1 in 100-year AEP event, including allowances for climate change. Safe and dry access routes can always be provided to and from the site during a flooding event and therefore the proposals are considered NPPF compliant.

8.1.3 Foul drainage from the proposed development will be discharged to the Thames Water sewer running along the northern boundary of the site, subject to an S106 application. Surface water runoff from the new homes, roads and other hard surfaces will drain into an underground box culvert or cellular storage tank (located below the access road) and subsequently to an attenuation basin, and these will store the water before it is finally discharged at a restricted rate via Hydro-Brake into the nearby ditch. A SuDS assessment has been completed for the development and has found that a discharge to a watercourse/ditch is the most sustainable method of discharge.

8.1.4 For the reasons outlined in this report we see no reason to refuse planning permission on the grounds of flood risk, or there being insufficient capacity to discharge runoff from the development.

APPENDIX A

2680-06 – Proposed Site Layout

LOCATION PLAN 1:2500

CYCLE STORAGE LOCKER - AMAZON ECO 2 L1900xW900xH1400

CYCLE STORE

Notes

All dimensions and levels on site are to be checked prior to commencement of work.

SCALE 0 5 10 15 20 30 40 50

SITE AREA = 1·501ha = 3·710 acres

Accommodation

6 N° Omar Heritage units
15 N° Omar Ikon units
10 N° Omar Image units
31 N° TOTAL

Residents community building with 6 N° parking spaces and 2 N° Sheffield cycle stands

EXISTING RETAINED TREES WITH ROOT PROTECTION AREA.
EXISTING HEDGE SCREENING.
PROPOSED HEDGING.
PROPOSED SHRUB LANDSCAPE PLANTING.
PROPOSED GRASSED AREAS.
POSITION ON AMAZON ECO TWO CYCLE SECURE STORAGE LOCKER OR SIMILAR.
POSITION OF EV CHARGING POINTS.

F : SURFACE WATER POND INCREASED TO ACCORD WITH DRAINAGE CONSULTANTS DRAWINGS & REPORT. 30:6:25
E : PLOTS 1-3 MOVED TO ALLOW INCREASE OF TREE PLANTING AND LANDSCAPING TO ENTRANCE. 9:6:25
D : FURTHER UNIT OMITTED AND AREA USED FOR ADDITIONAL POCKET LANDSCAPE 20:05:25
C : UNIT NUMBERS REDUCED AREAS OF LANDSCAPE PLANTING AND EV POINTS AND CYCLE STORAGE ADDED. 8:5:25
B : REDRAWN TO SHOW EXISTING MOBILES ON VICTORIA GARDENS TO SITE PLAN AND LOCATION PLAN 25:02:25

Project: Proposed mobile homes Victoria Gardens extension 31 Barkham Ride FINCHAMPSTEAD Berks

Client: Mr T. Roberts

Drawing: SITE PLAN

Scale: 1:500 at A1 | Date: February 2025

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Job 2680 Dwg. 06F

APPENDIX B

Infiltration Test Results

A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
Tel: 0118 973 0999 Email: info@a1ukdrains.co.uk

A1 Roberts Properties Ltd

31 Barkham Ride

Finchamsptead

RG40 4EX

31st January 2023

Percolation Testing conducted at 31 Barkham Ride on 30th January 2023

Trench 1 = 1.2m Length, 0.4m Wide, 1.5m Deep (Front Garden)

Measurements every 5 mins for the first hour

Minutes	cm
5	99
10	98
15	98
20	98
25	98
30	98
35	98
40	97
45	97
50	97
55	97
60	97

Measurements every 15 mins for next 3 hours

Minutes	cm
15	97
30	97
45	97
60	97
75	97
90	97
105	97
120	97
135	97
150	97
165	97
180	97

Trench 2 = 1.2m Length, 0.4m Wide, 1.5m Deep (Back Garden)

Measurements every 5 mins for the first hour

Minutes	cm
5	100
10	100
15	100
20	100
25	99
30	99
35	99
40	99
45	99
50	99
55	99
60	99

Measurements every 15 mins for next 3 hours

Minutes	cm
15	99
30	98
45	98
60	98
75	98
90	98
105	98
120	98
135	98
150	98
165	98
180	98

A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
Tel: 0118 973 0999 Email: info@a1ukdrains.co.uk

Trench 3 = 1.2m Length, 0.3m Wide, 1.5m Deep (Play Area)

Measurements every 5 mins for the first hour

Minutes	cm
5	100
10	100
15	99
20	99
25	99
30	98
35	98
40	98
45	97
50	97
55	97
60	96

Measurements every 15 mins for next 3 hours

Minutes	cm
15	96
30	96
45	96
60	96
75	96
90	96
105	96
120	96
135	95
150	95
165	93
180	92

Trench 4 = 1.2m Length, 0.3m Wide, 1.5m Deep (Rear of Menage)

Measurements every 5 mins for the first hour

Minutes	cm
5	100
10	98
15	98
20	97
25	95
30	95
35	94
40	93
45	90
50	88
55	86
60	85

Measurements every 15 mins for next 3 hours

Minutes	cm
15	80
30	78
45	75
60	74
75	72
90	70
105	70
120	67
135	67
150	66
165	66
180	64

Monitoring will continue every 3-4 days for the next month.

A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
Tel: 0118 973 0999 Email: info@a1ukdrains.co.uk

A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
Tel: 0118 973 0999 Email: info@a1ukdrains.co.uk

A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
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A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
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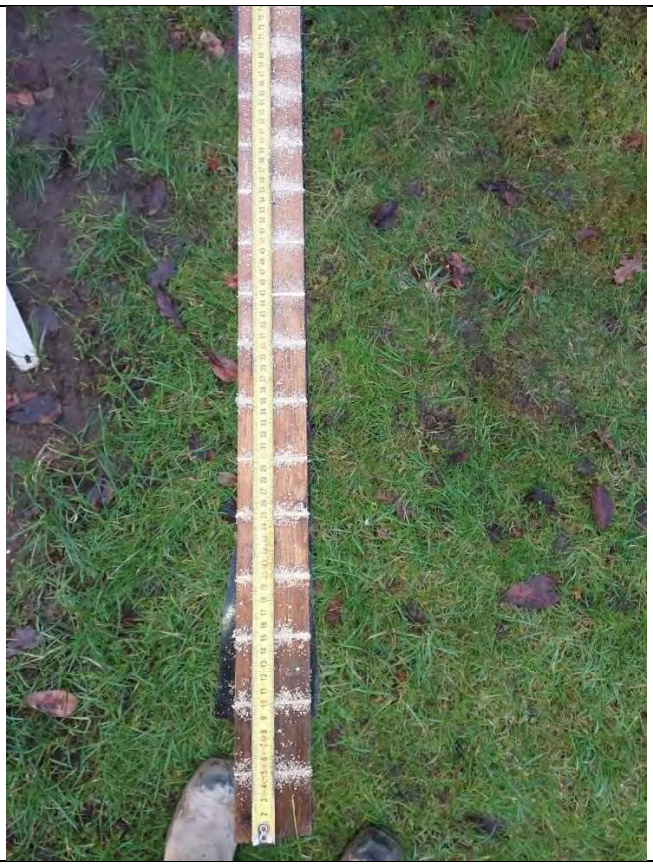
A1 UK DRAINS LTD, 31 Barkham Ride, Finchampstead, Berkshire, RG40 4EX
Tel: 0118 973 0999 Email: info@a1ukdrains.co.uk



LOCATION PLAN 1:2500

CYCLE STORAGE LOCKER - AMAZON ECO 2 L1900×W900×H1400

CYCLE STORE

Notes

All dimensions and levels on site are to be checked prior to commencement of work.

This drawing is the copyright of Paul Edwards Architecture

SCALE
0 5 10 15 20 30 40 50

SITE AREA = 1·501ha = 3·710 acres

Accommodation

6N° Omar Heritage units
15N° Omar Ikon units
10N° Omar Image units
31N° TOTAL

Residents community building with 6N° parking spaces and 2N° Sheffield cycle stands

EXISTING RETAINED TREES WITH ROOT PROTECTION AREA.

EXISTING HEDGE SCREENING.

PROPOSED HEDGING.

PROPOSED SHRUB LANDSCAPE PLANTING.

PROPOSED GRASSED AREAS.

POSITION ON AMAZON ECO TWO CYCLE SECURE STORAGE LOCKER OR SIMILAR.

POSITION OF EV CHARGING POINTS.

F : SURFACE WATER POND INCREASED TO ACCORD WITH DRAINAGE CONSULTANTS DRAWINGS & REPORT. 30:6:25
E : PLOTS 1-3 MOVED TO ALLOW INCREASE OF TREE PLANTING AND LANDSCAPING TO ENTRANCE. 9:6:25
D : FURTHER UNIT OMITTED AND AREA USED FOR ADDITIONAL POCKET LANDSCAPE 20:05:25
C : UNIT NUMBERS REDUCED AREAS OF LANDSCAPE PLANTING AND EV POINTS AND CYCLE STORAGE ADDED. 8:5:25
B : REDRAWN TO SHOW EXISTING MOBILES ON VICTORIA GARDENS TO SITE PLAN AND LOCATION PLAN 25:02:25

Project
Proposed mobile homes
Victoria Gardens extension
31 Barkham Ride
FINCHAMPSTEAD
Berks

Client
Mr T. Roberts

Drawing
SITE PLAN

Scale 1:500 at A1 | Date February 2025

Paul Edwards Architecture
12 Sandy Lane, Barkham, Wokingham, Berks RG41 4DE

Job 2680 Dwg. 06F

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: 31 Barkham Ride, Finchampstead, Wokingham
Client: A1 Roberts Properties Ltd

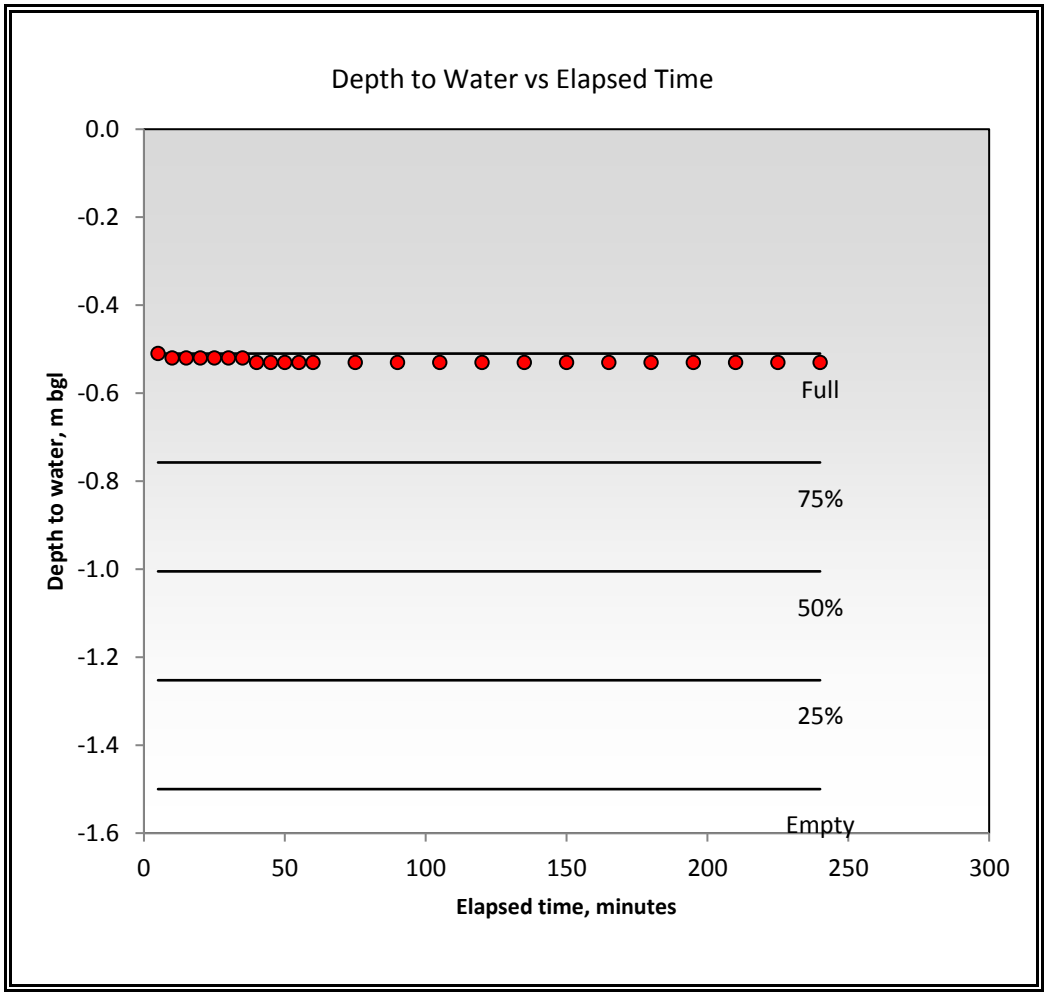
Project No: 231641
Sheet No: 1 of 4

Trial Pit:	1
Test No:	1
Depth, m	1.50
Length, m	1.20
Width, m	0.40

Description of stratum under test
-

Depth of water prior to test, m bgl
0.5

Elapsed Time min	Depth to Water m
5	0.51
10	0.52
15	0.52
20	0.52
25	0.52
30	0.52
35	0.52
40	0.53
45	0.53
50	0.53
55	0.53
60	0.53
75	0.53
90	0.53
105	0.53
120	0.53
135	0.53
150	0.53
165	0.53
180	0.53
195	0.53
210	0.53
225	0.53
240	0.53



f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.24 m^3

A50 = 2.08 m^2

T75-T25 = indeterminate min

f = indeterminate m/s

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: 31 Barkham Ride, Finchampstead, Wokingham
Client: A1 Roberts Properties Ltd

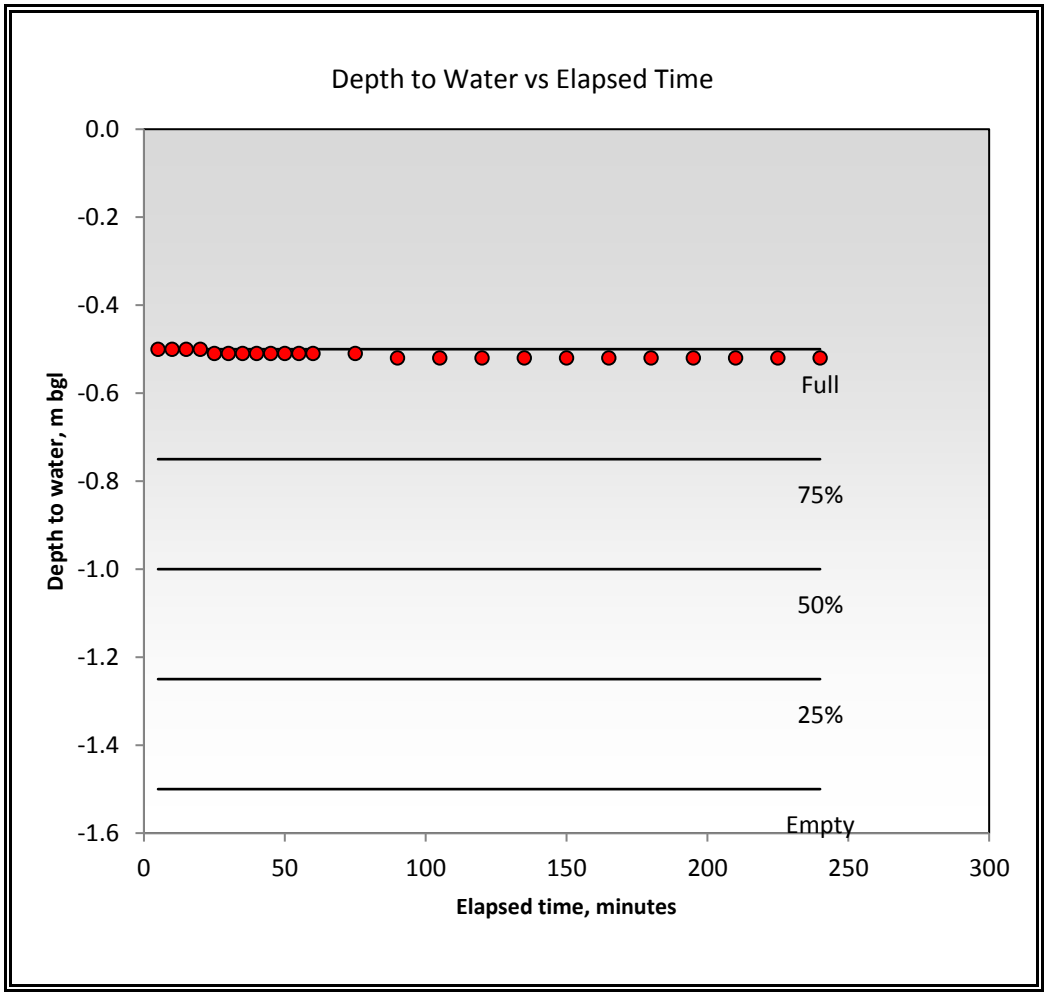
Project No: 231641
Sheet No: 2 of 4

Trial Pit:	2
Test No:	1
Depth, m	1.50
Length, m	1.20
Width, m	0.40

Description of stratum under test
-

Depth of water prior to test, m bgl
0.5

Elapsed Time min	Depth to Water m
5	0.50
10	0.50
15	0.50
20	0.50
25	0.51
30	0.51
35	0.51
40	0.51
45	0.51
50	0.51
55	0.51
60	0.51
75	0.51
90	0.52
105	0.52
120	0.52
135	0.52
150	0.52
165	0.52
180	0.52
195	0.52
210	0.52
225	0.52
240	0.52



f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.24 m^3

A50 = 2.08 m^2

T75-T25 = indeterminate min

f = indeterminate m/s

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: 31 Barkham Ride, Finchampstead, Wokingham
Client: A1 Roberts Properties Ltd

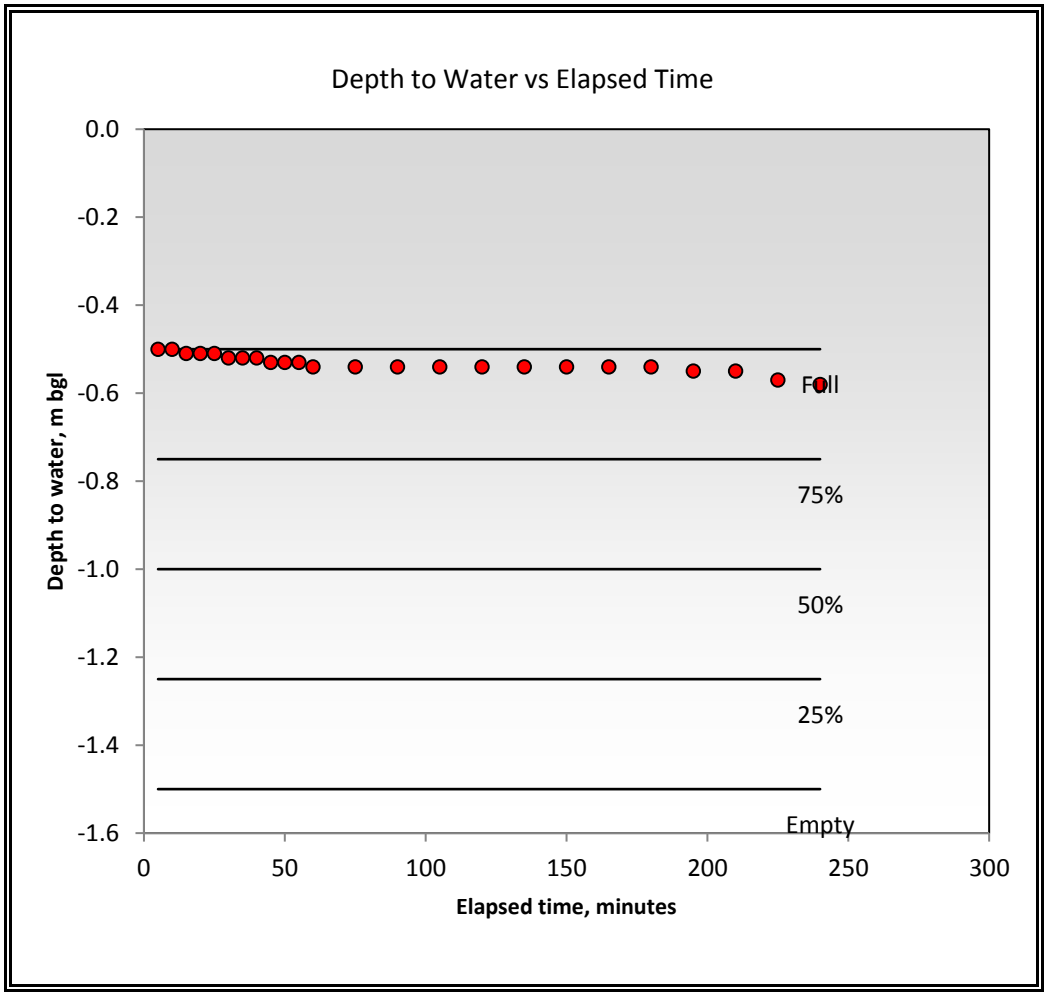
Project No: 231641
Sheet No: 3 of 4

Trial Pit:	3
Test No:	1
Depth, m	1.50
Length, m	1.20
Width, m	0.30

Description of stratum under test
-

Depth of water prior to test, m bgl
0.5

Elapsed Time min	Depth to Water m
5	0.50
10	0.50
15	0.51
20	0.51
25	0.51
30	0.52
35	0.52
40	0.52
45	0.53
50	0.53
55	0.53
60	0.54
75	0.54
90	0.54
105	0.54
120	0.54
135	0.54
150	0.54
165	0.54
180	0.54
195	0.55
210	0.55
225	0.57
240	0.58



f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.18 m^3

A50 = 1.86 m^2

T75-T25 = indeterminate min

f = indeterminate m/s

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: 31 Barkham Ride, Finchampstead, Wokingham
Client: A1 Roberts Properties Ltd

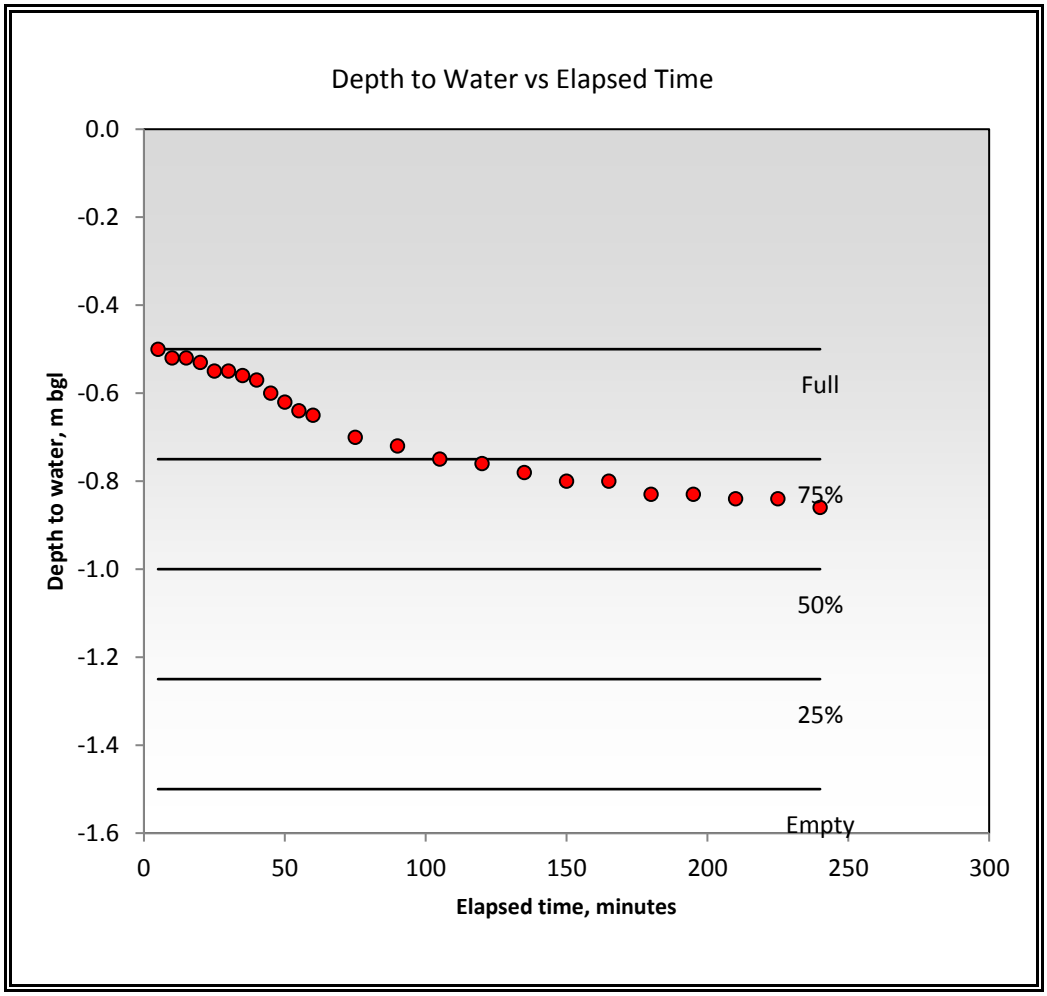
Project No: 231641
Sheet No: 4 of 4

Trial Pit:	4
Test No:	1
Depth, m	1.50
Length, m	1.20
Width, m	0.30

Description of stratum under test
-

Depth of water prior to test, m bgl
0.5

Elapsed Time min	Depth to Water m
5	0.50
10	0.52
15	0.52
20	0.53
25	0.55
30	0.55
35	0.56
40	0.57
45	0.60
50	0.62
55	0.64
60	0.65
75	0.70
90	0.72
105	0.75
120	0.76
135	0.78
150	0.80
165	0.80
180	0.83
195	0.83
210	0.84
225	0.84
240	0.86



f = (V75-V25)/A50(T75-T25)

V75-V25 = 0.18 m^3

A50 = 1.86 m^2

T75-T25 = indeterminate min

f = indeterminate m/s

APPENDIX C

Thames Water Asset Records

Asset Location Search Sewer Map - ALS/ALS Standard/2023_4793456

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 478964,165854

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
8001	55.11	52.41
1002	57.14	55.5
1006	57.65	n/a
1005	57.73	55.95
1001	57.14	55.89
1604	61.94	60.43
1603	61.93	60.46
1601	61.97	60.53
1602	61.69	60.68
1605	62.27	60.27
9001	n/a	n/a
9901	n/a	n/a
0901	n/a	n/a
1901	56.89	55.28
1955	57.11	55.66
1953	57.03	55.23
1801	57.81	54.76
1959	57.41	55.8
1952	57.18	55.39
1802	n/a	n/a
1951	57.75	55.62
1803	58.48	55.53
1902	58.41	56.8
1950	58.32	57.27
1851	58.49	56.74
2964	58.36	55.79

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or divects the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

APPENDIX D

231641/DS/02 – Proposed Drainage Strategy

31 Barkham Ride
Finchampstead

Drainage Strategy

SCALE	DRAWN BY	JOB No.	DWG No.
1:750	RS	231641	231641/DS/02 Rev B

LANMOR Consulting
Civil Engineers & Transport Planning

Thorogood House, 34 Tolworth Close, Surbiton, Surrey, KT6 7EP
Telephone: 0208 339 7899 Fax: 0208 339 7898
E-mail: info@lanmor.co.uk
www.lanmor.co.uk

APPENDIX E

Greenfield Runoff Calculations

Box Culvert & Basin Calculations [FEH22]

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 700 Urban 0.000
Area (ha) 1.486 Soil 0.450 Region Number Region 6

Results l/s

QBAR Rural 6.5
QBAR Urban 6.5

Q100 years 20.8

Q1 year 5.5
Q30 years 14.8
Q100 years 20.8

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
S1	0.000	1.350	Type C	58.000	56.590	1.260	478932.078	165811.650
S2	0.500	1.350	Type C	58.000	56.360	1.490	478947.583	165828.622
S3	0.000	1.350	Type C	57.000	55.813	0.687	479003.564	165922.601
S4	0.000	1.350	Type C	57.000	55.782	1.068	478998.836	165926.698
S5	0.000	1.350	Type C	56.700	55.750	0.825	478998.269	165951.633
S6	0.000	1.350	Type C	57.200	55.700	1.375	478997.032	165955.689
S7	0.000	1.350	Type C	57.100	55.507	1.293	478997.031	165975.780

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	S1	56.590	S2	56.360	Circ	0.15mØ	22.987	100.0	0.600	1.260	1.490
1.001	S2	56.360	S3	55.813	Rect	2mx0.5m	109.389	200.0	0.600	1.140	0.687
1.002	S3	55.813	S4	55.782	Rect	2mx0.5m	6.256	200.0	0.600	0.687	0.718
1.003	S4	55.782	S5	55.750	Circ	0.15mØ	24.940	784.3	0.600	1.068	0.800
1.004	S5	55.750	S6	55.700	Circ	0.125mØ	4.242	84.8	0.600	0.825	1.375
1.005	S6	55.700	S7	55.507	Circ	0.3mØ	20.091	104.1	0.600	1.200	1.293

Outfall Details

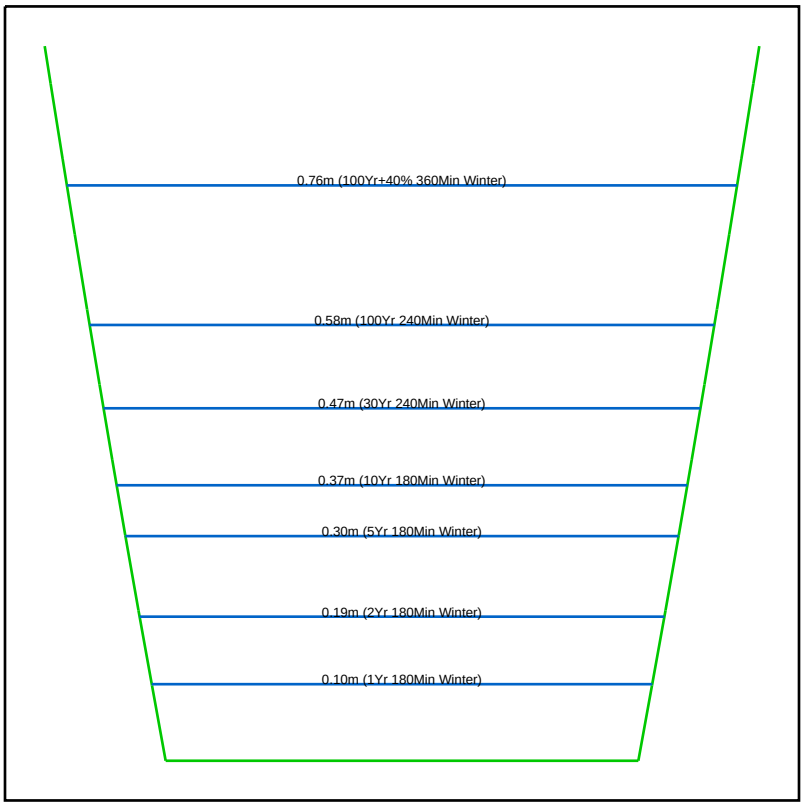
Outfall Manhole S7 : Free Discharge

Flow Control Details

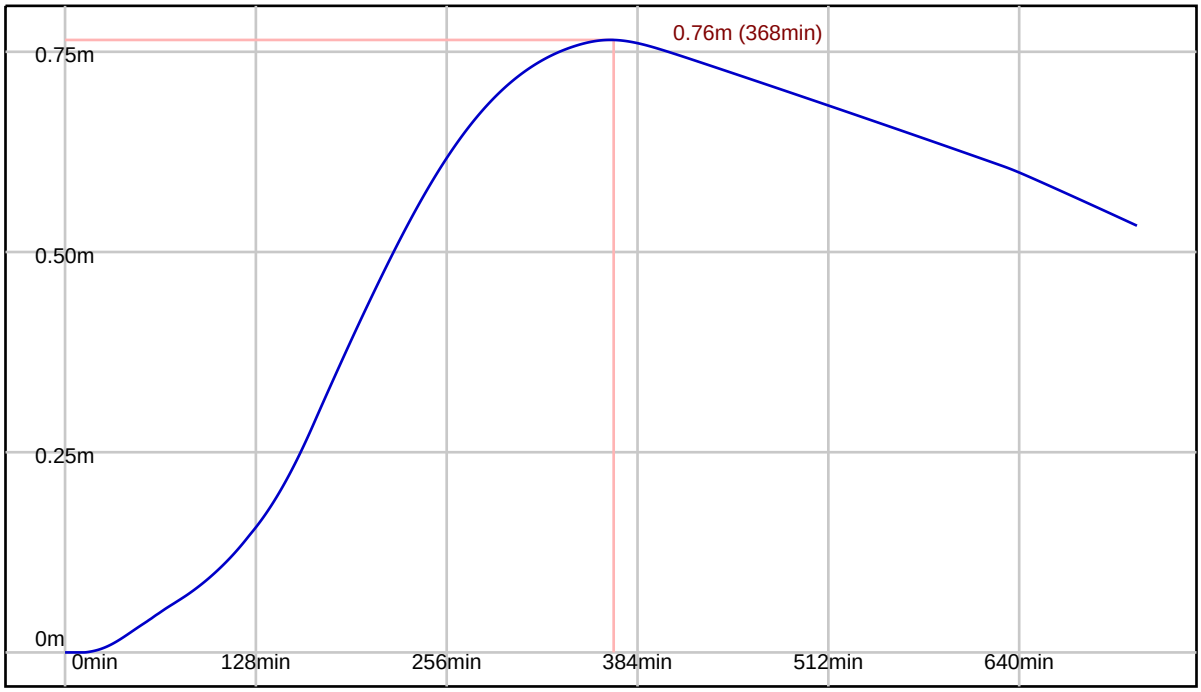
Pond Structure at Manhole S5

Pond Invert (m)	Max Depth (m)	Volume To Water Level (m3)	Water Level (m)	Freeboard (m)	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
55.750	0.950	156.438	56.400	0.300	0.00000000	0.00000000	2.00

Pond Depth/Area Diagram at S5



Pond at S5 (100Yr+40% 360Min Winter)

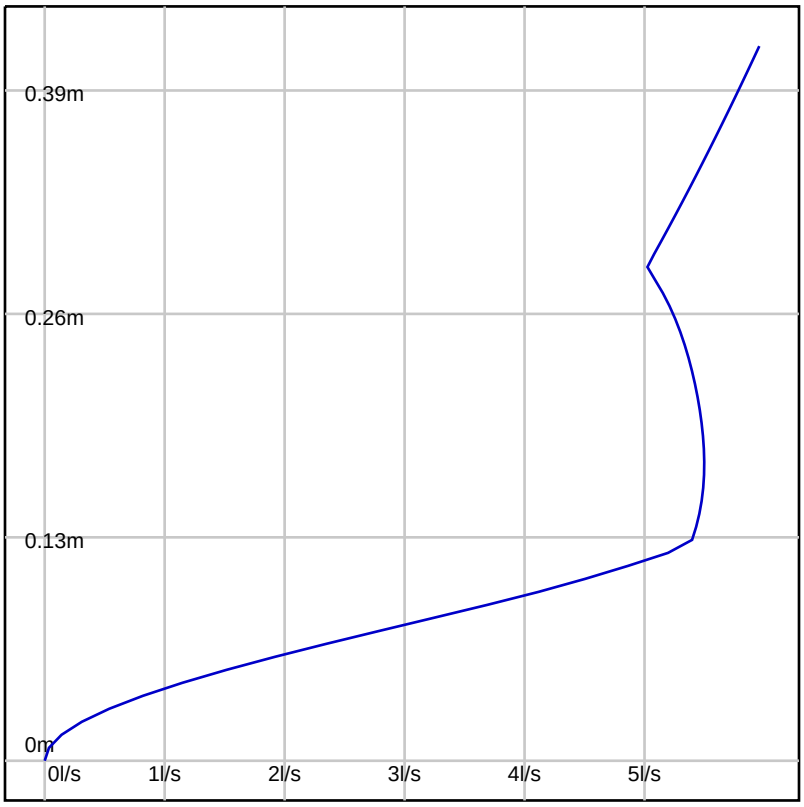


Controls within Manhole S6

Hydro-Brake® Optimum Control at Manhole S6

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0119-5500-0350-5500	0.350	5.500	0.000	0.173	5.498	0.287	5.016

Hydro-Brake® Optimum Control at S6



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_479018_165735_v5_0_1.xml

Summer (Cv: 0.75), Winter (Cv: 0.84)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Periods (yrs) + Climate Change: (1, +0%), (2, +0%), (5, +0%), (10, +0%), (30, +0%), (100, +0%), (100, +40%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
1Yr 15Min Winter	11.618	0.00	-1.02	10Yr 720Min Winter	4.160	0.00	0.00
1Yr 15Min Summer	11.618	0.00	-1.60	10Yr 960Min Summer	3.257	0.00	0.00
1Yr 30Min Winter	7.674	0.00	-0.32	10Yr 960Min Winter	3.257	0.00	0.00
1Yr 30Min Summer	7.674	0.00	-0.83	10Yr 1440Min Summer	2.307	0.00	0.00
1Yr 60Min Winter	4.714	0.00	0.00	10Yr 1440Min Winter	2.307	0.00	0.02
1Yr 60Min Summer	4.714	0.00	-0.43	10Yr 2160Min Summer	1.644	0.00	0.02
1Yr 120Min Winter	4.198	0.00	0.00	10Yr 2160Min Winter	1.644	0.00	0.02
1Yr 120Min Summer	4.198	0.00	-0.13	10Yr 2880Min Summer	1.302	0.00	0.02
1Yr 180Min Winter	3.687	0.00	0.00	10Yr 2880Min Winter	1.302	0.00	0.03
1Yr 180Min Summer	3.687	0.00	0.00	10Yr 4320Min Summer	0.954	0.00	0.03
1Yr 240Min Winter	3.089	0.00	0.00	10Yr 4320Min Winter	0.954	0.00	0.05
1Yr 240Min Summer	3.089	0.00	0.00	10Yr 5760Min Summer	0.777	0.00	0.04
1Yr 360Min Winter	2.445	0.00	0.00	10Yr 5760Min Winter	0.777	0.00	0.01
1Yr 360Min Summer	2.445	0.00	0.00	10Yr 7200Min Summer	0.669	0.00	0.03
1Yr 480Min Winter	2.044	0.00	0.00	10Yr 7200Min Winter	0.669	0.00	0.00
1Yr 480Min Summer	2.044	0.00	0.00	10Yr 8640Min Summer	0.596	0.00	0.01
1Yr 600Min Summer	1.740	0.00	0.00	10Yr 8640Min Winter	0.596	0.00	0.00
1Yr 600Min Winter	1.740	0.00	0.00	10Yr 10080Min Summer	0.544	0.00	0.00
1Yr 720Min Winter	1.511	0.00	0.04	10Yr 10080Min Winter	0.544	0.00	0.00
1Yr 720Min Summer	1.511	0.00	0.00	30Yr 15Min Summer	88.246	0.00	0.24
1Yr 960Min Summer	1.220	0.00	0.04	30Yr 15Min Winter	88.246	0.00	0.33
1Yr 960Min Winter	1.220	0.00	0.07	30Yr 30Min Summer	57.492	0.00	0.36
1Yr 1440Min Summer	0.902	0.00	0.05	30Yr 30Min Winter	57.492	0.00	0.41
1Yr 1440Min Winter	0.902	0.00	0.04	30Yr 60Min Summer	35.791	0.00	0.35
1Yr 2160Min Summer	0.672	0.00	0.00	30Yr 60Min Winter	35.791	0.00	0.32
1Yr 2160Min Winter	0.672	0.00	0.00	30Yr 120Min Summer	21.954	0.00	0.21
1Yr 2880Min Winter	0.553	0.00	0.00	30Yr 120Min Winter	21.954	0.00	0.22
1Yr 2880Min Summer	0.553	0.00	0.00	30Yr 180Min Summer	16.287	0.00	0.06
1Yr 4320Min Summer	0.430	0.00	0.00	30Yr 180Min Winter	16.287	0.00	0.14
1Yr 4320Min Winter	0.430	0.00	0.00	30Yr 240Min Summer	12.987	0.00	0.00
1Yr 5760Min Summer	0.367	0.00	0.00	30Yr 240Min Winter	12.987	0.00	0.08
1Yr 5760Min Winter	0.367	0.00	0.00	30Yr 360Min Summer	9.359	0.00	-0.02
1Yr 7200Min Winter	0.329	0.00	0.00	30Yr 360Min Winter	9.359	0.00	-0.01
1Yr 7200Min Summer	0.329	0.00	0.00	30Yr 480Min Summer	7.377	0.00	0.00
1Yr 8640Min Summer	0.303	0.00	0.00	30Yr 480Min Winter	7.377	0.00	0.00
1Yr 8640Min Winter	0.303	0.00	0.00	30Yr 600Min Summer	6.100	0.00	0.00
1Yr 10080Min Winter	0.284	0.00	0.00	30Yr 600Min Winter	6.100	0.00	0.00
1Yr 10080Min Summer	0.284	0.00	0.00	30Yr 720Min Summer	5.206	0.00	0.00
2Yr 15Min Winter	30.582	0.00	-0.14	30Yr 720Min Winter	5.206	0.00	0.00
2Yr 15Min Summer	30.582	0.00	-0.18	30Yr 960Min Summer	4.055	0.00	0.00
2Yr 30Min Winter	19.624	0.00	-0.28	30Yr 960Min Winter	4.055	0.00	0.00
2Yr 30Min Summer	19.624	0.00	-0.11	30Yr 1440Min Summer	2.853	0.00	0.00
2Yr 60Min Summer	12.057	0.00	-0.41	30Yr 1440Min Winter	2.853	0.00	0.01
2Yr 60Min Winter	12.057	0.00	-0.08	30Yr 2160Min Summer	2.016	0.00	0.01
2Yr 120Min Summer	8.692	0.00	-0.14	30Yr 2160Min Winter	2.016	0.00	0.01
2Yr 120Min Winter	8.692	0.00	0.00	30Yr 2880Min Summer	1.583	0.00	0.01
2Yr 180Min Summer	6.971	0.00	0.00	30Yr 2880Min Winter	1.583	0.00	0.02
2Yr 180Min Winter	6.971	0.00	0.00	30Yr 4320Min Summer	1.145	0.00	0.02
2Yr 240Min Winter	5.671	0.00	0.00	30Yr 4320Min Winter	1.145	0.00	0.06
2Yr 240Min Summer	5.671	0.00	0.00	30Yr 5760Min Summer	0.924	0.00	0.03
2Yr 360Min Summer	4.264	0.00	0.00	30Yr 5760Min Winter	0.924	0.00	0.05
2Yr 360Min Winter	4.264	0.00	0.00	30Yr 7200Min Summer	0.789	0.00	0.04
2Yr 480Min Summer	3.460	0.00	0.00	30Yr 7200Min Winter	0.789	0.00	0.02
2Yr 480Min Winter	3.460	0.00	0.00	30Yr 8640Min Summer	0.698	0.00	0.03
2Yr 600Min Summer	2.904	0.00	0.00	30Yr 8640Min Winter	0.698	0.00	0.00

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
2Yr 600Min Winter	2.904	0.00	0.00	30Yr 10080Min Summer	0.633	0.00	0.02
2Yr 720Min Winter	2.501	0.00	0.00	30Yr 10080Min Winter	0.633	0.00	0.00
2Yr 720Min Summer	2.501	0.00	0.00	100Yr 15Min Summer	113.351	0.00	0.36
2Yr 960Min Summer	1.984	0.00	0.00	100Yr 15Min Winter	113.351	0.00	0.41
2Yr 960Min Winter	1.984	0.00	0.00	100Yr 30Min Summer	74.652	0.00	0.42
2Yr 1440Min Summer	1.435	0.00	0.00	100Yr 30Min Winter	74.652	0.00	0.47
2Yr 1440Min Winter	1.435	0.00	0.03	100Yr 60Min Summer	46.672	0.00	0.41
2Yr 2160Min Summer	1.045	0.00	0.03	100Yr 60Min Winter	46.672	0.00	0.38
2Yr 2160Min Winter	1.045	0.00	0.06	100Yr 120Min Summer	27.946	0.00	0.25
2Yr 2880Min Summer	0.843	0.00	0.04	100Yr 120Min Winter	27.946	0.00	0.26
2Yr 2880Min Winter	0.843	0.00	0.03	100Yr 180Min Summer	20.453	0.00	0.11
2Yr 4320Min Summer	0.635	0.00	0.02	100Yr 180Min Winter	20.453	0.00	0.20
2Yr 4320Min Winter	0.635	0.00	0.00	100Yr 240Min Summer	16.293	0.00	0.08
2Yr 5760Min Summer	0.528	0.00	0.00	100Yr 240Min Winter	16.293	0.00	0.14
2Yr 5760Min Winter	0.528	0.00	0.00	100Yr 360Min Summer	11.686	0.00	0.00
2Yr 7200Min Summer	0.463	0.00	0.00	100Yr 360Min Winter	11.686	0.00	0.05
2Yr 7200Min Winter	0.463	0.00	0.00	100Yr 480Min Summer	9.178	0.00	0.00
2Yr 8640Min Summer	0.420	0.00	0.00	100Yr 480Min Winter	9.178	0.00	-0.01
2Yr 8640Min Winter	0.420	0.00	0.00	100Yr 600Min Summer	7.580	0.00	0.00
2Yr 10080Min Summer	0.388	0.00	0.00	100Yr 600Min Winter	7.580	0.00	0.00
2Yr 10080Min Winter	0.388	0.00	0.00	100Yr 720Min Summer	6.465	0.00	0.00
5Yr 15Min Summer	51.812	0.00	-0.07	100Yr 720Min Winter	6.465	0.00	0.00
5Yr 15Min Winter	51.812	0.00	0.00	100Yr 960Min Summer	5.019	0.00	0.00
5Yr 30Min Summer	33.136	0.00	0.06	100Yr 960Min Winter	5.019	0.00	0.00
5Yr 30Min Winter	33.136	0.00	-0.07	100Yr 1440Min Summer	3.505	0.00	0.00
5Yr 60Min Summer	20.530	0.00	0.11	100Yr 1440Min Winter	3.505	0.00	0.00
5Yr 60Min Winter	20.530	0.00	0.13	100Yr 2160Min Summer	2.455	0.00	0.01
5Yr 120Min Summer	13.497	0.00	-0.09	100Yr 2160Min Winter	2.455	0.00	0.01
5Yr 120Min Winter	13.497	0.00	0.06	100Yr 2880Min Summer	1.913	0.00	0.01
5Yr 180Min Summer	10.405	0.00	-0.04	100Yr 2880Min Winter	1.913	0.00	0.01
5Yr 180Min Winter	10.405	0.00	0.00	100Yr 4320Min Summer	1.364	0.00	0.02
5Yr 240Min Summer	8.379	0.00	0.00	100Yr 4320Min Winter	1.364	0.00	0.03
5Yr 240Min Winter	8.379	0.00	0.00	100Yr 5760Min Summer	1.088	0.00	0.02
5Yr 360Min Winter	6.142	0.00	0.00	100Yr 5760Min Winter	1.088	0.00	0.06
5Yr 360Min Summer	6.142	0.00	0.00	100Yr 7200Min Summer	0.921	0.00	0.03
5Yr 480Min Summer	4.902	0.00	0.00	100Yr 7200Min Winter	0.921	0.00	0.05
5Yr 480Min Winter	4.902	0.00	0.00	100Yr 8640Min Summer	0.809	0.00	0.04
5Yr 600Min Summer	4.085	0.00	0.00	100Yr 8640Min Winter	0.809	0.00	0.02
5Yr 600Min Winter	4.085	0.00	0.00	100Yr 10080Min Summer	0.728	0.00	0.03
5Yr 720Min Summer	3.505	0.00	0.00	100Yr 10080Min Winter	0.728	0.00	0.00
5Yr 720Min Winter	3.505	0.00	0.00	100Yr+40% 15Min Summer	158.691	0.00	0.45
5Yr 960Min Summer	2.756	0.00	0.00	100Yr+40% 15Min Winter	158.691	0.00	0.77
5Yr 960Min Winter	2.756	0.00	0.00	100Yr+40% 30Min Summer	104.513	0.00	4.72
5Yr 1440Min Winter	1.964	0.00	0.02	100Yr+40% 30Min Winter	104.513	0.00	8.24
5Yr 1440Min Summer	1.964	0.00	0.00	100Yr+40% 60Min Summer	65.340	0.00	7.26
5Yr 2160Min Summer	1.409	0.00	0.02	100Yr+40% 60Min Winter	65.340	0.00	9.86
5Yr 2160Min Winter	1.409	0.00	0.03	100Yr+40% 120Min Summer	39.124	0.00	2.98
5Yr 2880Min Summer	1.123	0.00	0.02	100Yr+40% 120Min Winter	39.124	0.00	4.98
5Yr 2880Min Winter	1.123	0.00	0.06	100Yr+40% 180Min Summer	28.634	0.00	1.81
5Yr 4320Min Summer	0.830	0.00	0.04	100Yr+40% 180Min Winter	28.634	0.00	4.04
5Yr 4320Min Winter	0.830	0.00	0.03	100Yr+40% 240Min Summer	22.810	0.00	0.20
5Yr 5760Min Summer	0.681	0.00	0.03	100Yr+40% 240Min Winter	22.810	0.00	2.83
5Yr 5760Min Winter	0.681	0.00	0.00	100Yr+40% 360Min Summer	16.360	0.00	0.10
5Yr 7200Min Summer	0.590	0.00	0.01	100Yr+40% 360Min Winter	16.360	0.00	0.15
5Yr 7200Min Winter	0.590	0.00	0.00	100Yr+40% 480Min Summer	12.849	0.00	0.04
5Yr 8640Min Summer	0.529	0.00	0.00	100Yr+40% 480Min Winter	12.849	0.00	0.08
5Yr 8640Min Winter	0.529	0.00	0.00	100Yr+40% 600Min Summer	10.612	0.00	-0.01
5Yr 10080Min Summer	0.485	0.00	0.00	100Yr+40% 600Min Winter	10.612	0.00	0.02
5Yr 10080Min Winter	0.485	0.00	0.00	100Yr+40% 720Min Summer	9.051	0.00	0.00
10Yr 15Min Summer	66.230	0.00	0.06	100Yr+40% 720Min Winter	9.051	0.00	0.00
10Yr 15Min Winter	66.230	0.00	0.14	100Yr+40% 960Min Summer	7.027	0.00	0.01
10Yr 30Min Summer	42.567	0.00	0.21	100Yr+40% 960Min Winter	7.027	0.00	0.00
10Yr 30Min Winter	42.567	0.00	0.30	100Yr+40% 1440Min Summer	4.908	0.00	0.01
10Yr 60Min Summer	26.383	0.00	0.25	100Yr+40% 1440Min Winter	4.908	0.00	0.01
10Yr 60Min Winter	26.383	0.00	0.25	100Yr+40% 2160Min Summer	3.437	0.00	0.01
10Yr 120Min Summer	16.789	0.00	0.14	100Yr+40% 2160Min Winter	3.437	0.00	0.01
10Yr 120Min Winter	16.789	0.00	0.16	100Yr+40% 2880Min Summer	2.678	0.00	0.01
10Yr 180Min Summer	12.706	0.00	-0.03	100Yr+40% 2880Min Winter	2.678	0.00	0.01

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
10Yr 180Min Winter	12.706	0.00	0.07	100Yr+40% 4320Min Summer	1.910	0.00	0.01
10Yr 240Min Summer	10.169	0.00	-0.03	100Yr+40% 4320Min Winter	1.910	0.00	0.01
10Yr 240Min Winter	10.169	0.00	0.00	100Yr+40% 5760Min Summer	1.523	0.00	0.01
10Yr 360Min Summer	7.389	0.00	0.00	100Yr+40% 5760Min Winter	1.523	0.00	0.02
10Yr 360Min Winter	7.389	0.00	0.00	100Yr+40% 7200Min Summer	1.289	0.00	0.02
10Yr 480Min Summer	5.860	0.00	0.00	100Yr+40% 7200Min Winter	1.289	0.00	0.03
10Yr 480Min Winter	5.860	0.00	0.00	100Yr+40% 8640Min Summer	1.133	0.00	0.02
10Yr 600Min Summer	4.863	0.00	0.00	100Yr+40% 8640Min Winter	1.133	0.00	0.06
10Yr 600Min Winter	4.863	0.00	0.00	100Yr+40% 10080Min Winter	1.020	0.00	0.06
10Yr 720Min Summer	4.160	0.00	0.00	100Yr+40% 10080Min Summer	1.020	0.00	0.03

Simulation Results

Return Period Yrs: 1.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	-	0	56.590	0.000	0.000		OK
S2	15 min Winter	9	56.384	0.024	25.335		OK
S3	180 min Summer	105	55.908	0.095	8.291		OK
S4	180 min Summer	105	55.908	0.126	8.356		OK
S5	180 min Winter	145	55.852	0.102	4.520		OK
S6	180 min Winter	145	55.848	0.148	4.531		OK
S7	180 min Winter	145	55.548	0.041	4.530		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	S1	S2	0.012	0.000	0.000	0.000	OK
1.001	180 min Summer	103	S2	S3	0.054	0.182	14.448	0.000	OK
1.002	180 min Summer	105	S3	S4	0.110	0.047	9.858	0.000	OK
1.003	180 min Winter	123	S4	S5	0.106	0.823	7.940	1.284	OK
1.004	180 min Winter	145	S5	S6	0.113	0.512	4.565	0.385	OK
1.005	180 min Winter	145	S6	S7	0.041	0.774	4.530	0.042	OK

Return Period Yrs: 2.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	-	0	56.590	0.000	0.000		OK
S2	15 min Winter	9	56.404	0.044	66.721		OK
S3	120 min Winter	79	56.031	0.218	23.441		OK
S4	120 min Winter	75	56.043	0.261	10.269		Surcharged
S5	180 min Winter	157	55.942	0.192	5.543		Surcharged
S6	180 min Winter	157	55.931	0.231	5.491		OK
S7	180 min Winter	135	55.552	0.045	5.498		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	S1	S2	0.022	0.000	0.000	0.000	OK
1.001	120 min Winter	78	S2	S3	0.118	0.259	25.014	0.000	OK
1.002	120 min Winter	77	S3	S4	0.236	0.128	54.179	0.000	OK
1.003	120 min Winter	92	S4	S5	0.150	1.029	14.961	2.419	Surcharged
1.004	180 min Winter	129	S5	S6	0.125	0.514	5.533	0.466	Surcharged
1.005	180 min Winter	135	S6	S7	0.045	0.820	5.498	0.051	OK

Return Period Yrs: 5.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	-	0	56.590	0.000	0.000		OK
S2	15 min Winter	9	56.421	0.061	112.890		OK
S3	60 min Winter	46	56.202	0.389	17.825		OK
S4	60 min Winter	44	56.209	0.427	4.953		Surcharged
S5	180 min Winter	178	56.049	0.299	5.070		Surcharged
S6	180 min Winter	178	56.040	0.340	5.090		Surcharged
S7	480 min Summer	447	55.552	0.045	5.498		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	S1	S2	0.030	0.000	0.000	0.000	OK
1.001	60 min Winter	43	S2	S3	0.206	0.370	57.648	0.000	Surcharged
1.002	60 min Winter	45	S3	S4	0.408	0.113	43.139	0.000	Surcharged
1.003	60 min Winter	53	S4	S5	0.150	1.303	20.551	3.323	Surcharged
1.004	120 min Winter	81	S5	S6	0.125	0.511	5.593	0.471	Surcharged
1.005	30 min Winter	81	S6	S7	0.045	0.820	5.498	0.051	OK

Return Period Yrs: 10.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	-	0	56.590	0.000	0.000		OK
S2	15 min Winter	9	56.430	0.070	144.149		OK
S3	60 min Winter	45	56.336	0.523	25.486		Surcharged
S4	60 min Winter	45	56.336	0.555	24.385		Surcharged
S5	180 min Winter	183	56.116	0.366	5.598		Surcharged
S6	180 min Winter	183	56.105	0.405	5.571		Surcharged
S7	180 min Winter	183	55.553	0.045	5.571		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	S1	S2	0.035	0.000	0.000	0.000	OK
1.001	60 min Winter	41	S2	S3	0.266	0.405	74.172	0.000	Surcharged
1.002	120 min Winter	81	S3	S4	0.500	0.121	54.543	0.000	Surcharged
1.003	60 min Winter	48	S4	S5	0.150	1.442	24.597	3.977	Surcharged
1.004	60 min Winter	52	S5	S6	0.125	0.518	5.622	0.474	Surcharged
1.005	180 min Winter	183	S6	S7	0.046	0.824	5.571	0.051	OK

Return Period Yrs: 30.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	-	0	56.590	0.000	0.000		OK
S2	60 min Winter	45	56.490	0.130	30.273		OK
S3	60 min Winter	47	56.489	0.675	13.976		Surcharged
S4	60 min Winter	47	56.489	0.707	28.432		Surcharged
S5	240 min Winter	237	56.219	0.469	5.894		Surcharged
S6	240 min Winter	237	56.206	0.506	5.957		Surcharged
S7	240 min Winter	189	55.554	0.047	5.957		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	60 min Winter	45	S1	S2	0.065	0.000	0.000	0.000	OK
1.001	60 min Winter	45	S2	S3	0.315	0.446	100.729	0.000	Surcharged
1.002	240 min Winter	134	S3	S4	0.500	0.181	89.230	0.000	Surcharged
1.003	60 min Winter	44	S4	S5	0.150	1.621	27.791	4.494	Surcharged
1.004	180 min Winter	158	S5	S6	0.125	0.518	6.011	0.506	Surcharged
1.005	240 min Winter	189	S6	S7	0.047	0.840	5.957	0.055	OK

Return Period Yrs: 100.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	60 min Winter	47	56.652	0.063	0.712		OK
S2	60 min Winter	47	56.639	0.279	31.466		OK
S3	60 min Winter	48	56.640	0.827	43.093		Surcharged
S4	60 min Winter	48	56.640	0.858	30.186		Surcharged
S5	240 min Winter	257	56.329	0.579	5.990		Surcharged
S6	240 min Winter	257	56.317	0.617	5.957		Surcharged
S7	180 min Summer	148	55.554	0.047	5.957		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	60 min Winter	51	S1	S2	0.106	0.179	2.009	0.113	OK
1.001	60 min Winter	47	S2	S3	0.389	0.478	131.444	0.000	Surcharged
1.002	240 min Summer	122	S3	S4	0.500	0.183	80.641	0.000	Surcharged
1.003	60 min Winter	41	S4	S5	0.150	1.735	30.464	4.926	Surcharged
1.004	120 min Winter	114	S5	S6	0.125	0.493	6.048	0.509	Surcharged
1.005	180 min Summer	148	S6	S7	0.047	0.840	5.957	0.055	OK

Return Period Yrs: 100.0

Climate Change %: 40

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
S1	60 min Winter	50	56.914	0.324	0.098		Surcharged
S2	60 min Winter	50	56.908	0.548	34.066		Surcharged
S3	60 min Winter	51	56.904	1.091	58.821		Flood Risk
S4	60 min Winter	51	56.905	1.123	39.507		Flood Risk
S5	360 min Winter	366	56.515	0.765	5.899		Flood Risk
S6	360 min Winter	366	56.503	0.803	5.957		Surcharged
S7	180 min Winter	122	55.554	0.047	5.957		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	30 min Summer	22	S1	S2	0.150	0.304	3.908	0.220	Surcharged
1.001	120 min Winter	82	S2	S3	0.500	0.426	108.424	0.000	Surcharged
1.002	180 min Summer	84	S3	S4	0.500	0.191	95.274	0.000	Surcharged
1.003	30 min Winter	28	S4	S5	0.150	2.127	34.848	5.635	Surcharged
1.004	120 min Winter	98	S5	S6	0.125	0.500	6.096	0.513	Surcharged
1.005	180 min Winter	122	S6	S7	0.047	0.840	5.957	0.055	OK

APPENDIX F

Ditch Photographs


Why are these streams orange?
WOKINGHAM BOROUGH COUNCIL
There are many orange streams in this area and although they can look polluted, with a petrol-like film on the surface, they are a result of natural processes. The orange colouration indicates the presence of iron-loving bacteria feeding on iron dissolved in the water.
Where does the iron come from?
The geology of the area as well as more recent processes gives rise to the landscapes we see today. The oldest bedrock here is London Clay. It is a marine clay, 56-50 million years old, formed when the area was under the sea and contains fossils of bivalves, gastropods and shark teeth. It gives rise to a flat landscape with poorly-drained soils. About 49 million years ago the sea became shallower and sand deposits were formed. These are the sands of the Bagshot Formation and they lie on top of the London Clay. These free-draining sediments give rise to nutrient-poor acidic soils which support characteristic local vegetation types such as oak-beech woodland and heathland. The yellow-brown sands contain iron. Groundwater moves easily through the sands, dissolving the iron salts as it goes, and emerging as springs when it gets to a clay layer which it cannot penetrate. The spring water is colourless at first, but on exposure to air the iron salts are oxidised (a process rather like rusting), colouring the water orange. These particles dissolve less easily and tend to make the water cloudy. They are deposited on surfaces, staining stream beds and adjacent plants orange.
Life in the orange streams
Iron-rich water supports the growth of 'iron-loving' bacteria such as Leptothrix ochracea and Gallionella ferruginea which form clearly visible orange cushions or 'mats' and produce an oily film which you may see on the surface of still water. These bacteria provide support for other wetland species.
The Barkham iron-rich streams of Rook's Nest Wood are designated as a Local Geological Site.
Find out more on the Berkshire Geoconservation Group website:
berksgeoconservation.org.uk