

Project: 178 Bearwood Road, Wokingham

Subject: Discharge of Condition 6 - Drainage Design

Reference: 19721-TUM-TN-XXX-0001

Date	Details	Rev	Author	Checked by
30.01.26	Initial Issue	A	JJ	RP
11.03.26	Updated Site Layout	B	JJ	RP
12.03.26	Section 5 Updated	C	JJ	RP
12.05.26	Drainage Strategy Option Finalised	D	JJ	RP

1 Introduction

Tumu Consulting Ltd have been appointed by Joe Kay to undertake a Discharge of Condition 6 - Drainage Design for the proposed erection of 1 no. dwelling following demolition of the existing dwelling and garage at 178 Bearwood Road, Wokingham. The development gained full planning permission at appeal, with reference: APP/X0360/W/25/3363174.

Tumu Consulting Ltd provided a Drainage Strategy for this project in October 2023 with reference 19721-R01-B, this is shown in Appendix E. This technical note will refer back to the strategy as well as answer each sub-condition individually. The condition is written below in *blue italics*, with Tumu Consulting's response in black.

2 Condition 6 and Response

1. *Calculations indicating the existing runoff rate from the site.*

The Drainage Strategy previously outlined the site can be considered as brownfield with a catchment of 0.052ha which includes the existing dwelling and the driveway. The Modified Rational approach used average rainfall intensity data for the 15 minute storm, where the existing rates calculated were 4.1, 10.1 and 13.0l/s for the 1, 30 and 100 year rainfall events. Refer to Table 1 below which has been extracted from the strategy.

Parameter	Value	Units
Existing hardstanding area	0.052	ha
1-year rainfall intensity, i_1	28.418	mm/hr
30-year rainfall intensity, i_{30}	69.607	mm/hr
100-year rainfall intensity, i_{100}	90.056	mm/hr
Q_1	4.11	l/s
Q_{30}	10.06	l/s
Q_{100}	13.02	l/s

Table 1 Modified Rational Approach Calculation for Runoff from Existing Hardstanding Areas

2. *BRE 365 test results demonstrating whether infiltration is achievable or not.*

Soakaway testing to BRE365 methodology was completed in January 2025 by Ground Testing Ltd, REF 1315. This is attached in Appendix A. Neither of the soakaway test pits drained away during the testing, and groundwater ingress was experienced in both pits. Soakaways therefore cannot be used as a discharge receptor for surface water.

3. *Use of SuDS following the SuDS hierarchy, preferably infiltration.*

As above, soakaways will not be suitable for the site due to poor soakage rates and groundwater ingress during testing.

It is proposed primarily to discharge to the lake as set out in the Drainage Strategy, maintaining the existing surface water arrangement. The pond is groundwater influenced and fills up in accordance with the seasonal groundwater level. The existing hardstanding driveway will become permeable construction. The total contributing area will reduce from 0.052ha to 0.033ha as a result of the development, a 37% reduction in area and thus discharge rate. When 40% climate change is considered for the 100 year storm, the development provides a 12% reduction. See Table 2 for the pre and post-development discharge rates.

Rainfall Event	Brownfield Discharge Rate	Proposed Discharge Rate	Betterment
Q_1	4.11	2.59	37%
Q_{30}	10.06	6.33	37%
Q_{100}	13.02	8.20	37%
$Q_{100} + 40\%$	13.02	11.48	12%

Table 2 Pre and Post Development Discharge Rates

4. *Full calculations demonstrating the performance of soakaways or capacity of attenuation features to cater for 1 in 100-year flood event with a 40% allowance for climate change and runoff controlled at existing rates, or preferably better.*

As above, the extents of contributing area are reduced by 37% as a result of development. This provides a 37% betterment on flow rates on equivalent storms, and 12% betterment on the 100 year storm with 40% climate change. This equates to a rise in water level within the pond of 23mm in the 100 year storm with an allowance for climate change, based on the 6 hour rainfall event. As the existing ponds banks are in excess of 0.5m above the

static water level, there is surplus capacity within the pond to receive the 23mm depth of surface water from the proposed roofs.

5. *If connection to an existing surface water sewer is proposed, details of why other methods of the SuDS hierarchy cannot be implemented and confirmation from the utilities supplier that their system has got capacity, and the connection is acceptable.*

A connection into an existing surface water sewer is not proposed. A discharge into the existing pond is proposed instead. Discharging surface water to an above ground surface water body is higher in priority on the National Standards for SuDS (NSS) hierarchy than discharging to a surface water sewer.

Drainage priorities that sit above discharging to a surface water body on the NSS hierarchy are:

1. Collecting the surface water for non-potable use
2. Infiltrating to ground

The drainage strategy includes a water butt which fulfils the first drainage priority and, as discussed above, infiltrating to ground is not viable due to poor infiltration rates and the risk of groundwater ingress.

See Appendix B for the surface water drainage strategy layout and Appendix C showing hydraulic calculations for the proposed drainage strategy.

6. *Groundwater monitoring for a 12 month period using a monthly dip test confirming seasonal high groundwater levels in the area. If BRE 365 testing confirms poor infiltration rates, pursuance of the groundwater testing is not required*

As above in point 2. Soakaway testing was unsuccessful and therefore not a suitable receptor for surface water discharge. Therefore, there is no need to pursue groundwater monitoring.

7. *A drainage strategy plan indicating the location and sizing of SuDS features, with the base of any infiltrating SuDS features located at least 1m above the seasonal high water table level.*

Refer to Appendix B for the Proposed Drainage Strategy. Water Butts have been incorporated into the design to allow for water re-use and irrigation of planting on site. These will feature a high level overflow into the wider surface water network. As the network is only draining roof rainwater, the risk of pollutants is very low.

It is proposed to discharge into the groundwater influenced lake, to the east of the dwelling, as 178 Bearwood Road currently does.

8. *Details demonstrating how any SuDS for this development would be managed throughout the lifespan of the development and who will be responsible for maintenance. The approved scheme shall be implemented prior to the first occupation of the development and shall be maintained in the approved form for as long as the development remains on the site.*

Refer to Appendix E for the Surface Water Operation and Maintenance Manual.

Appendix A – Soakaway Testing Results

178 BEARWOOD ROAD,
WOKINGHAM

Soakaway Testing

Testing is accurate at the time and place of testing. No responsibility can be taken for variations in ground conditions beyond the locations of tests undertaken.

Contents

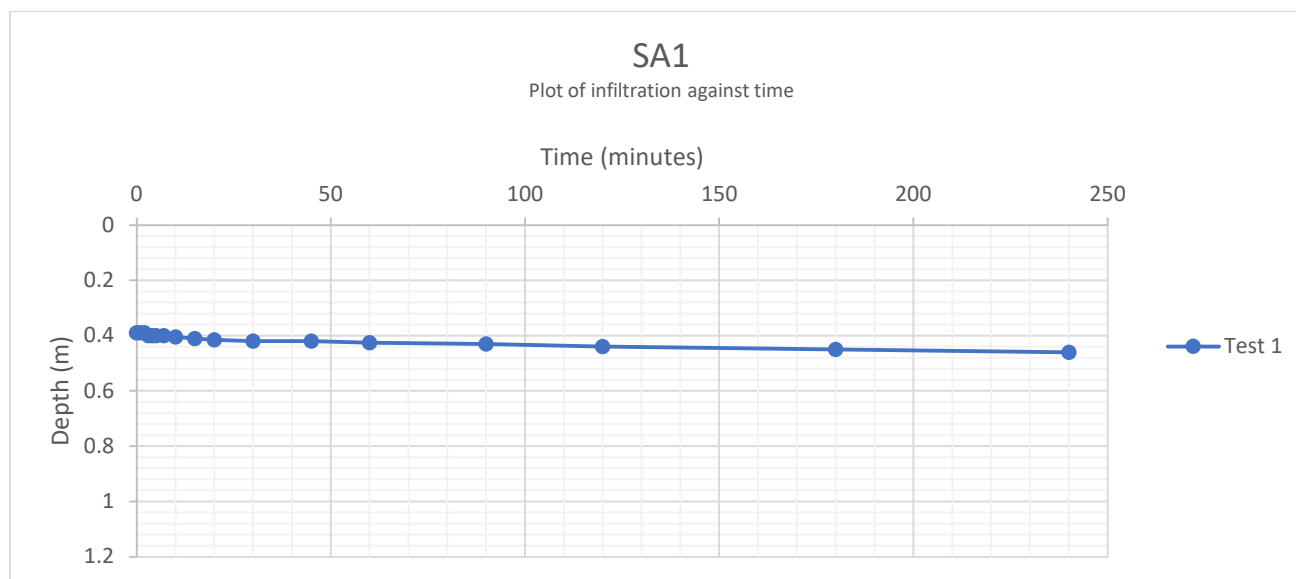
Pg, 1 - 2	Soakaway Test Graphs
Pg, 3 - 5	Soakaway Photo Plates

Testing and report completed by

Steven Philp BSc Hons, CRWM, M.I Soil Sci
Ground Testing Ltd

Report Number 1315

Testing undertaken on behalf of Artel31



	Test 1 (14.01.26)	Test 2	Test 3
	●	●	●
Total pit depth at start of test (m)	1.19	-	-
Total pit depth at end of test (m)	1.19	-	-
Effective Depth, D_e (m)	0.80	-	-
Effective Storage Volume, V_{p75-25} (m ³)	0.16	-	-
Surface Area, a_{p50} (m ²)	1.64	-	-
Time, t_{p75-25} (seconds)	NA	-	-
Infiltration rate, f (m/s)	NA	-	-

Depth	Soil Description
0.00 – 0.35m	Dark brown sandy gravelly CLAY many roots and rootlets (TOPSOIL)
0.35 – 1.19m	Dark brown sandy gravelly CLAY

Notes:

Ingress of water at the base.

Weather was sunny.

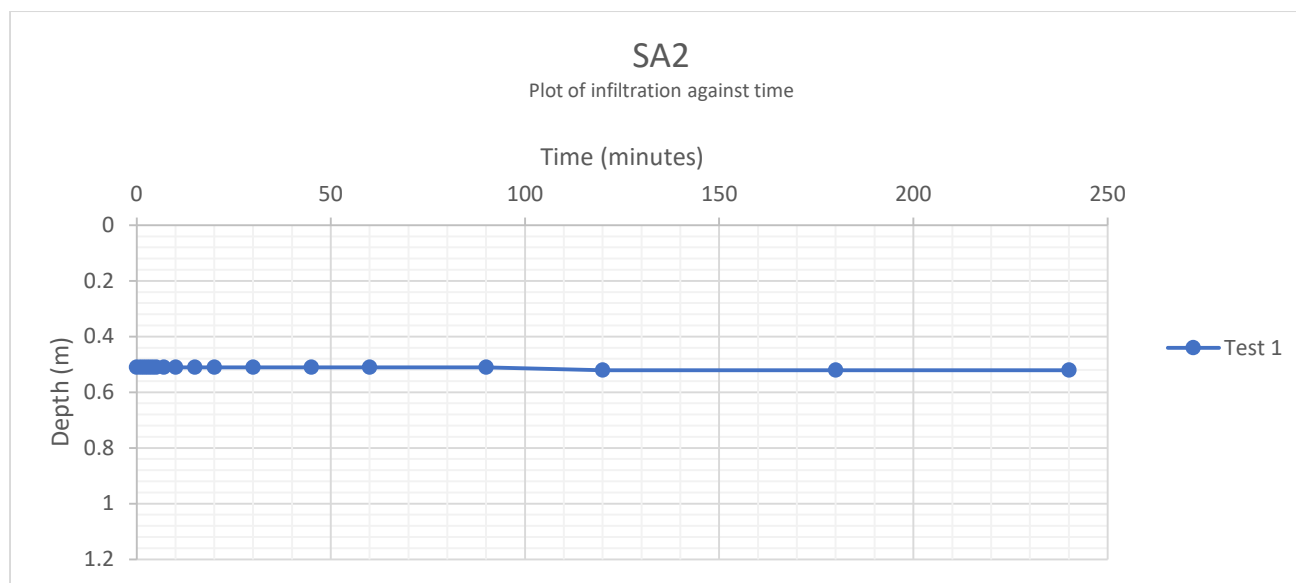
Pit was dug with a 8T Excavator.

Pit was filled using a 1000Ltr bowser.

Pit dimensions: **L 1.35m x W 0.33m x D 1.20m**

NGR: **SU 78370 68606**

Unable to calculate an infiltration rate due to insufficient drainage.



	Test 1 (14.01.26)	Test 2	Test 3
	●	●	●
Total pit depth at start of test (m)	1.20	-	-
Total pit depth at end of test (m)	1.20	-	-
Effective Depth, D_e (m)	0.69	-	-
Effective Storage Volume, V_{p75-25} (m ³)	0.15	-	-
Surface Area, a_{p50} (m ²)	1.60	-	-
Time, t_{p75-25} (seconds)	NA	-	-
Infiltration rate, f (m/s)	NA	-	-

Depth	Soil Description
0.00 – 0.45m	Dark brown sandy gravelly CLAY many roots and rootlets (TOPSOIL)
0.45 – 1.20m	Dark brown sandy gravelly CLAY

Notes:

Ingress of water at the base.

Weather was sunny.

Pit was dug with a 8T Excavator.

Pit was filled using a 1000Ltr bowser.

Pit dimensions: **L 1.35m x W 0.33m x D 1.20m**

NGR: **SU 78361 68606**

Unable to calculate an infiltration rate due to insufficient drainage.



Comment SA1	Project 178 Bearwood Road, Wokingham
	Photo Plate 1
	Date 14/01/26
	Originator S.Philp
	 Ground Testing Ltd ask@groundtesting.co.uk www.groundtesting.co.uk VAT: 332931414 Reg: 12200980



Comment SA2	Project 178 Bearwood Road, Wokingham
	Photo Plate 2
	Date 14/01/26
	Originator S.Philp
	 GROUND TESTING LTD Ground Testing Ltd ask@groundtesting.co.uk www.groundtesting.co.uk VAT: 332931414 Reg: 12200980



Comment Ground Water Pit NGR: SU 78375 68602 Ingress of water from 0.8m to 2.2m 0.00 - 0.45m Dark brown sandy gravelly CLAY many rootlets and roots.(TOPSOIL) 0.45 - 0.8m Dark greyish brown sandy gravelly CLAY 0.8 - 2.2m Orangish brown very sandy very gravelly CLAY.	Project 178 Bearwood Road, Wokingham
	Photo Plate 3
	Date 14/01/26
	Originator S.Philp
	 Ground Testing Ltd ask@groundtesting.co.uk www.groundtesting.co.uk VAT: 332931414 Reg: 12200980

Appendix B – Proposed Surface Water Drainage Layout & Details



KEY - PROPOSED PRIVATE SURFACE WATER DRAINAGE

SURFACE WATER DRAIN

PPIC

RODDING EYE

SLOTTED DRAIN

RAINWATER PIPE

WATER BUTT

PROPOSED SHARED PRIVATE FOUL DRAIN

PROPOSED SHARED PRIVATE SURFACE WATER DRAIN

FLOOD EXCEEDANCE ROUTING

DRAINAGE NOTES- PRIVATE DRAINAGE

1. ALL PRIVATE DRAINAGE WORKS TO BE CARRIED OUT IN ACCORDANCE WITH BUILDING REGULATIONS PART H.

2. WHERE CHAMBERS ARE LOCATED WITHIN VEHICULAR TRAFFICKED ACCESS, TO BE GRAD00 LOADING CLASS. WHERE WITHIN SOFT LANDSCAPE, TO BE B125 LOADING CLASS.

3. ALL DRAINAGE ARRANGEMENTS ARE TO BE CARRIED OUT TO THE SATISFACTION OF THE LOCAL AUTHORITY BUILDING INSPECTOR ONSITE.

4. PRIVATE FOUL WATER DRAIN ROUTE UNDER SLAB IS INDICATIVE ONLY. BEDDING, PIPE MATERIAL AND PENETRATION OF PROPERTY WALL DETAILS BY OTHERS.

5. CONTRACTOR TO REVIEW ALL BELOW SLAB PRIVATE DRAINAGE AND ENSURE, WHERE REQUIRED, FOUNDATION PENETRATIONS/PLINTHS ARE PROVIDED IN ACCORDANCE WITH STRUCTURAL ENGINEER REQUIREMENTS.

5. ***IMPORTANT NOTE *** WHERE RETAINING WALLS AND PLOT/GARAGE FOUNDATIONS ARE IN THE CLOSE VICINITY OF PRIVATE (AND ADOPTABLE) DRAINAGE, ALL FOUNDATIONS ARE TO BE BELOW INVERT LEVELS OF PIPES / TANKS AS NOT TO CAUSE LOADING ONTO DRAINAGE.

6. DRAINAGE TO BE CONSTRUCTED FROM THE DOWNSTREAM END FIRST AND INVERT LEVEL OF EXISTING DRAIN TO BE VERIFIED IN THE FIRST INSTANCE, AND PRIOR TO ANY UPSTREAM CONSTRUCTION.

7. ALL RAINWATER PIPE LOCATIONS ARE INDICATIVE AND SUBJECT TO SETTING OUT BY ARTEL31 AT DWTAILED DESIGN STAGE.

C	DRAINAGE STRATEGY OPTION FINALISED	12/05/26	JJ	RP
B	UPDATED SITE LAYOUT	11/03/26	JJ	RP
A	FIRST ISSUE	30/01/26	JJ	RP
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

tumu

CLIENT:

JOE KAY

DRAWING STATUS:

DISCHARGE OF PLANNING CONDITIONS

SCALE @ A1:

01:1005

metres

PROJECT:

BEARWOOD ROAD, WOKINGHAM

TITLE:

SURFACE WATER DRAINAGE LAYOUT

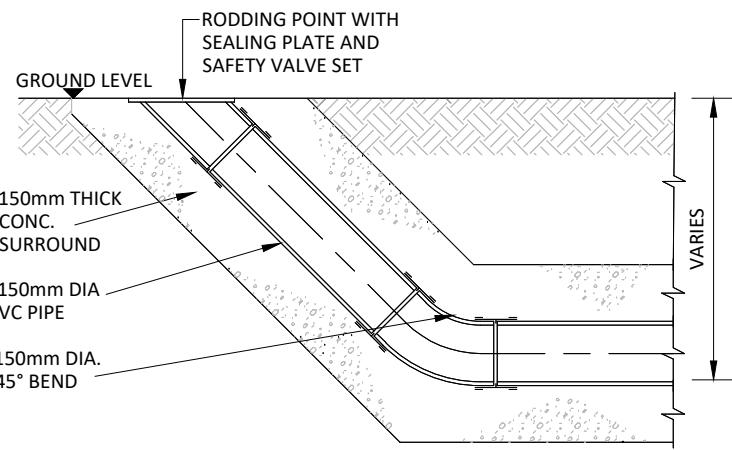
PROJECT No: 19721

DRAWING No: TUM-DD-XXX-3000

REV: C

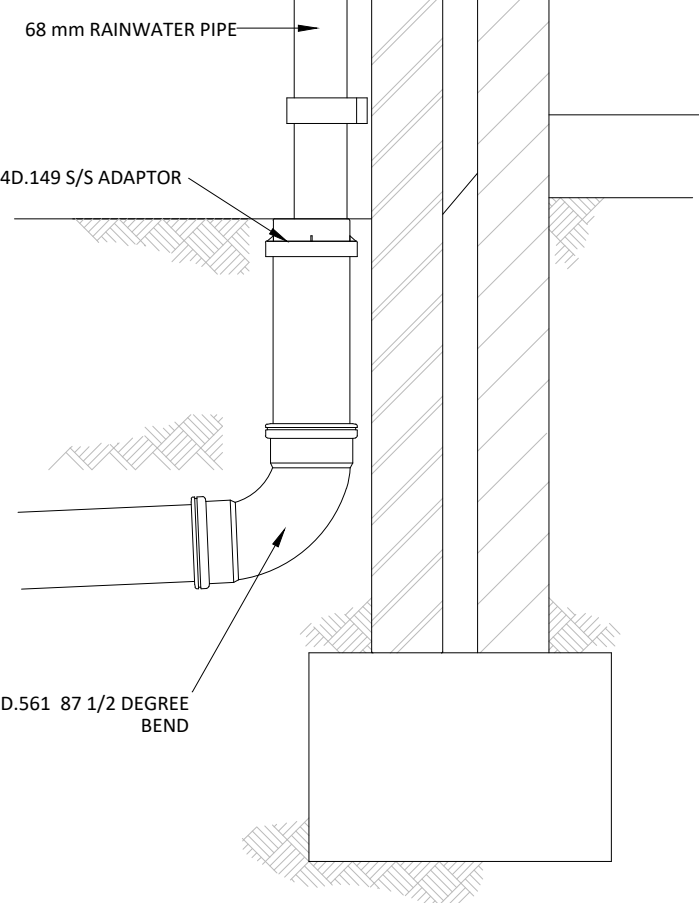
RODDING EYE DETAIL

SCALE 1:20



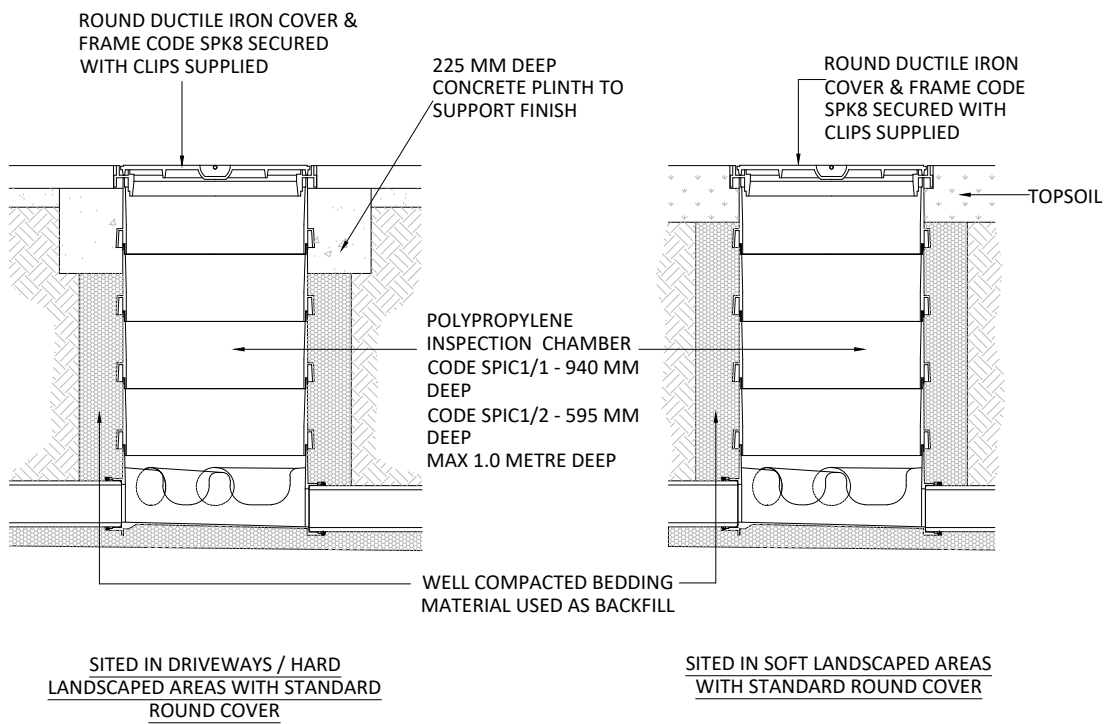
EXTERNAL R.W.P. TO DRAIN

SCALE 1:20



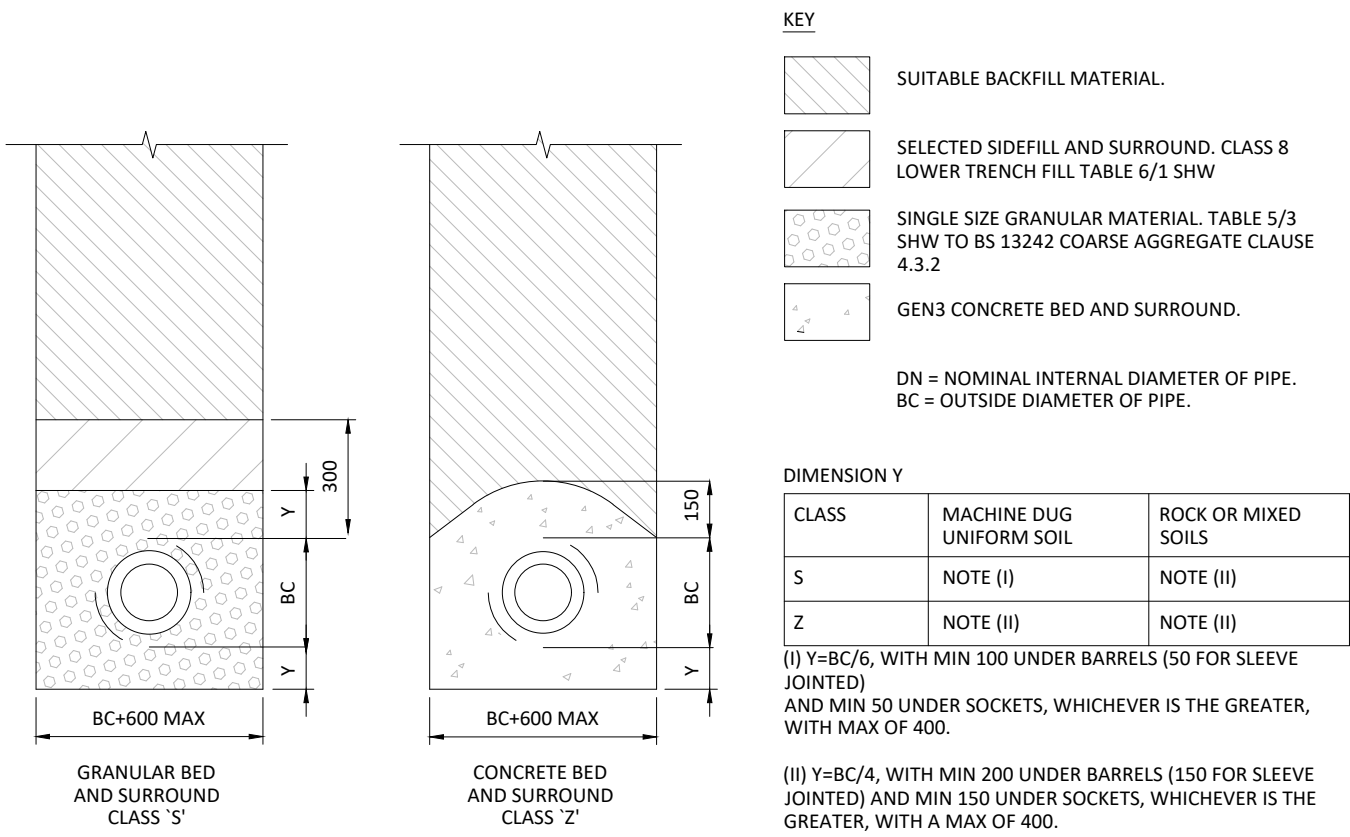
POLYPROPYLENE INSPECTION CHAMBER

SCALE 1:20



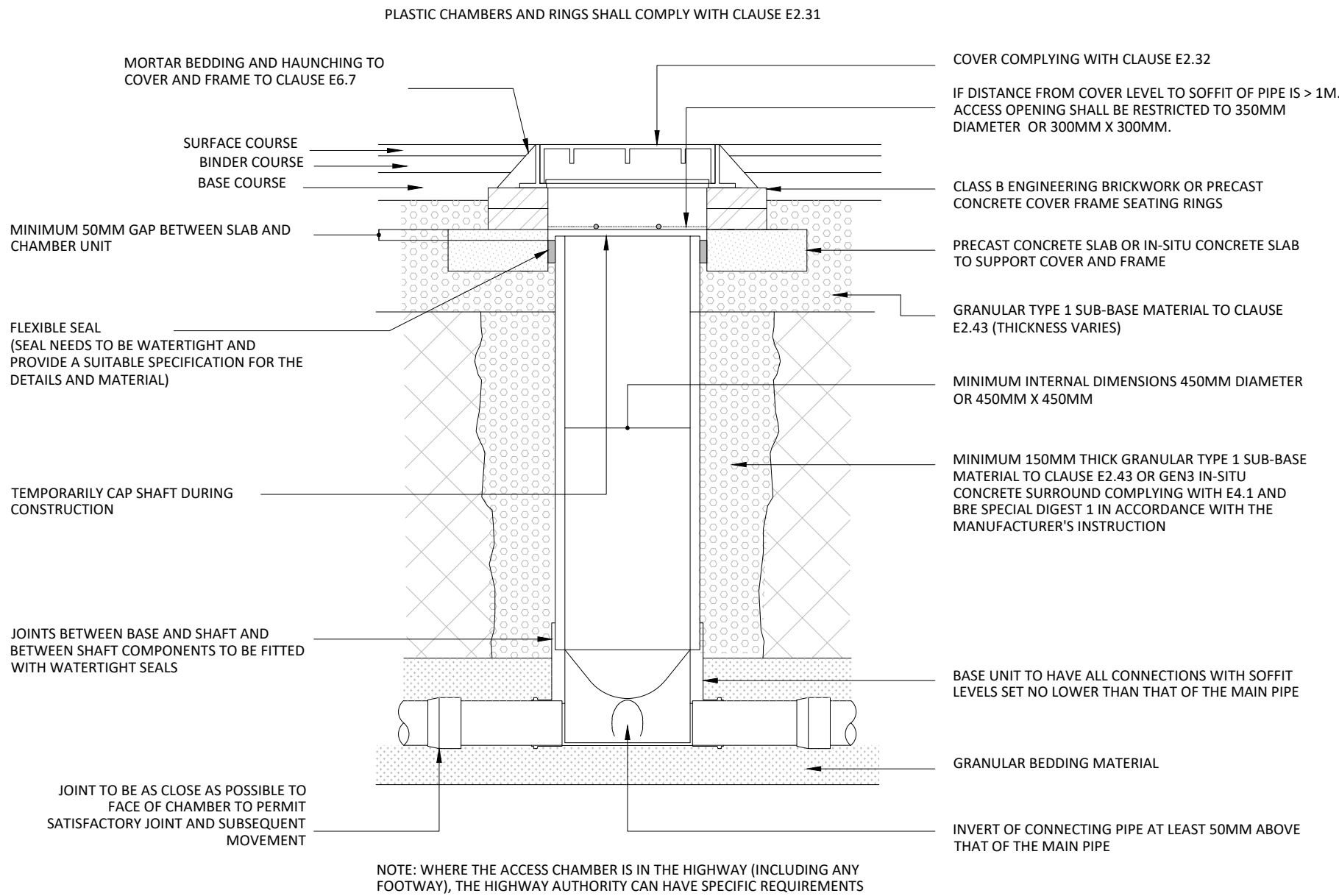
PIPE BEDDING DETAILS

SCALE 1:20



TYPICAL INSPECTOR CHAMBER DETAIL

DEPTH FROM COVER TO SOFFIT OF PIPE UP TO 2m
FLEXIBLE MATERIAL CONSTRUCTION FOR USE IN AREAS SUBJECT TO VEHICLE LOADING
(SCALE 1:20)



B	ATTENUATION CRATES REMOVED	12.05.26	JJ	RP
A	FIRST ISSUE	30.01.26	JJ	RP
REV.	DESCRIPTION	Date	BY	CHK
DESIGN BY:				
				
CLIENT:				
JOE KAY				
DRAWING STATUS:				
DISCHARGE OF PLANNING CONDITIONS				
SCALE @ A1:				
AS SHOWN				
PROJECT:				
178 BEARWOOD ROAD, WOKINGHAM				
TITLE:				
DRAINAGE DETAILS				
Project Ref: Originator: Stage: Phase: Number:				REV:
19721-TUM-DD-XXX-3050				B

Appendix C – Surface Water Calculations

Design Settings

Rainfall Methodology FEH-22 Return Period (years) 100 Additional Flow (%) 0 CV 1.000 Time of Entry (mins) 5.00 Maximum Time of Concentration (mins) 30.00 Maximum Rainfall (mm/hr) 50.0	Minimum Velocity (m/s) 1.00 Connection Type Level Soffits Minimum Backdrop Height (m) 0.200 Preferred Cover Depth (m) 1.200 Include Intermediate Ground ✓ Enforce best practice design rules x
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Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
SW4	0.014	5.00	82.800	450	478383.604	168605.586	0.700	82.100
SW1	0.013	5.00	83.350	450	478367.855	168585.326	0.600	82.750
SW5	0.002	5.00	83.350	450	478388.076	168594.496	1.330	82.020
SW3	0.000	5.00	83.350	450	478387.857	168587.586	0.850	82.500
SW2	0.006	5.00	83.350	450	478376.745	168583.080	0.700	82.650
OUTFALL	0.000	5.00	82.000		478395.334	168595.574	0.300	81.700

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)
1.000	SW1	SW2	9.169	82.750	82.650	0.100	91.7	150	Circular	5.15
1.001	SW2	SW3	11.991	82.650	82.500	0.150	79.9	150	Circular	5.32
1.002	SW3	SW5	6.913	82.500	82.020	0.480	14.4	150	Circular	5.37
2.000	SW4	SW5	11.958	82.100	82.020	0.080	149.5	150	Circular	5.24
1.003	SW5	OUTFALL	7.338	82.020	81.700	0.320	22.9	150	Circular	5.42

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.050	18.5	2.3	0.450	0.550	0.013	0.0	36	0.721
1.001	1.125	19.9	3.4	0.550	0.700	0.019	0.0	42	0.842
1.002	2.668	47.1	3.4	0.700	1.180	0.019	0.0	27	1.557
2.000	0.819	14.5	2.5	0.550	1.180	0.014	0.0	42	0.617
1.003	2.112	37.3	6.3	1.180	0.150	0.035	0.0	42	1.583

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW4	10	82.142	0.042	2.4	0.0067	0.0000	OK
15 minute summer	SW1	10	82.785	0.035	2.2	0.0056	0.0000	OK
15 minute summer	SW5	10	82.061	0.041	5.8	0.0066	0.0000	OK
15 minute summer	SW3	10	82.526	0.026	3.2	0.0042	0.0000	OK
15 minute summer	SW2	10	82.694	0.044	3.2	0.0070	0.0000	OK
15 minute summer	OUTFALL	10	81.740	0.040	5.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW4	2.000	SW5	2.4	0.595	0.164	0.0478	
15 minute summer	SW1	1.000	SW2	2.2	0.587	0.118	0.0342	
15 minute summer	SW5	1.003	OUTFALL	5.8	1.510	0.156	0.0282	2.6
15 minute summer	SW3	1.002	SW5	3.2	1.066	0.067	0.0207	
15 minute summer	SW2	1.001	SW3	3.2	1.005	0.159	0.0383	

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW4	10	82.195	0.095	9.5	0.0151	0.0000	OK
15 minute summer	SW1	10	82.829	0.079	8.8	0.0126	0.0000	OK
15 minute summer	SW5	10	82.112	0.092	23.6	0.0147	0.0000	OK
15 minute summer	SW3	10	82.553	0.053	12.8	0.0085	0.0000	OK
15 minute summer	SW2	10	82.747	0.097	12.8	0.0154	0.0000	OK
15 minute summer	OUTFALL	10	81.786	0.086	23.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW4	2.000	SW5	9.4	0.818	0.652	0.1381	
15 minute summer	SW1	1.000	SW2	8.8	0.814	0.472	0.0985	
15 minute summer	SW5	1.003	OUTFALL	23.5	2.147	0.629	0.0802	10.3
15 minute summer	SW3	1.002	SW5	12.7	1.502	0.270	0.0587	
15 minute summer	SW2	1.001	SW3	12.8	1.444	0.642	0.1059	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW4	10	82.220	0.120	12.7	0.0190	0.0000	OK
15 minute summer	SW1	10	82.846	0.096	11.8	0.0153	0.0000	OK
15 minute summer	SW5	10	82.135	0.115	31.4	0.0183	0.0000	OK
15 minute summer	SW3	10	82.562	0.062	17.0	0.0099	0.0000	OK
15 minute summer	SW2	10	82.770	0.120	17.1	0.0190	0.0000	OK
15 minute summer	OUTFALL	10	81.805	0.105	31.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	SW4	2.000	SW5	12.6	0.853	0.870	0.1765	
15 minute summer	SW1	1.000	SW2	11.7	0.864	0.632	0.1238	
15 minute summer	SW5	1.003	OUTFALL	31.2	2.258	0.836	0.1013	13.7
15 minute summer	SW3	1.002	SW5	17.0	1.568	0.360	0.0739	
15 minute summer	SW2	1.001	SW3	17.0	1.523	0.855	0.1317	

Appendix D – Pre-Application Enquiry Approval



Mr Joe Kay
178 Bearwood Road
WOKINGHAM
RG41 4SH



13 February 2026

Pre-planning enquiry: Confirmation of sufficient capacity

Site address: 178 Bearwood Road, Wokingham RG41 4SH

Dear Mr Kay,

Thank you for providing information on your proposed development of 4 houses with:

- foul water discharge via gravity to the 150 mm Ø foul water sewer via manhole ref. SU7868651B; and
- surface water discharge via gravity at 1.21 l/s to the 150 mm Ø surface water sewer via manhole ref. SU78686550.

We have completed the assessment of the foul water and surface water flows based on the information submitted in your application with the purpose of identifying sewerage capacity within the existing Thames Water sewer network.

As the development is located on a brownfield site there may be existing sewers or rising mains crossing the site. Where these are to become redundant or to be diverted, the full cost of administering and undertaking the works shall be financed by the developer.

Foul Water

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient sewerage capacity in the nearby foul water sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, up to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number/density of units. Such changes could mean that there is no longer sufficient capacity.



Surface Water

In accordance with the Building Act 2000 Clause H3.3, positive connection of surface water to a public sewer will only be consented when it can be demonstrated that the hierarchy of disposal methods have been examined and proven to be impracticable.

Discharges shall be attenuated to reduce the likelihood of flooding downstream of the point of connection. A discharge rate of 2 l/s/ha will be applied unless otherwise stated above. The system shall not show signs of flooding above ground for the worst 1 in 30-year storm and shall be tested for exceedance in a 1 in 100-year storm to demonstrate that any potential flooding will not flood properties.

In order for us to consider any potential surface water needs, you'll need [written approval from the lead local flood authority](#) that you have followed the sequential approach to the disposal of surface water and considered all practical means, as per the below hierarchy.

- 1) Storage and reuse (rainwater harvesting, blue roofs for irrigation, ...).
- 2) Infiltration to ground at or close to source.
- 3) Attenuation in green infrastructure features for gradual release (green roof, rain garden, ...).
- 4) Discharge direct to a watercourse (unless not appropriate).
- 5) Controlled discharge to a surface water sewer.
- 6) Controlled discharge to a combined water sewer.

Providing the above requirements are met, we're pleased to confirm that there will be sufficient sewerage capacity in the nearby [surface water](#) sewer network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, up to a maximum of three years.

[You'll need to keep us informed of any changes to your design – for example, an increase of the impermeable area. Such changes could mean that there is no longer sufficient capacity.](#)

What happens next?

Please make sure to submit your sewer connection application, giving us at least 21 days' notice of the date you wish to make your new connection(s).

If you have any queries, please give me a call on 07747 644 979 (9am to 5pm, Monday to Friday) or email developer.services@thameswater.co.uk.

Yours sincerely,

A handwritten signature in blue ink, appearing to read "Nicholas Short", with a long horizontal line extending to the right.

Nicholas Short BSc (Hons)

Adoption & Pre-planning Engineer

Waste Adoptions Thames Valley & Home Counties

Service Delivery

Appendix E – Operation and Maintenance Manual

Project: 178 Bearwood Road

Subject: Operation and Maintenance Manual

Reference: 19721-TUM-TN-XXX-0002

Prepared by: JJ

Issue date: 12/05/2026

Checked by: RP

1 Introduction

The purpose of this Operation & Maintenance Manual is to detail the operation and maintenance requirements for the surface water drainage features shown in the Tumu Consulting drawings: Surface Water Drainage Layout Ref: 19721-TUM-DD-XXX-3000 A.

2 Description of Proposed Surface Water Drainage

The proposed surface water drainage will include the following key elements:

- Inlets, Outlets, Pipework, and Inspection Chambers

It is proposed to drain the proposed roofs areas into a below-ground drainage network and then discharge to the lake located directly eastwards of 178 Bearwood road.

3 Ownership Responsibility

The operation and maintenance responsibilities for the proposed drainage serving 178 Bearwood road are the responsibility of the owner.

4 SuDS Maintenance Regime

Maintenance for all elements of the surface water drainage strategy is outlined in more detail in the following sections. These include activity categories as defined below:

4.1 Regular Maintenance

Regular maintenance consists of basic tasks carried out to a frequent schedule, including inspections/monitoring, silt removal, vegetation management, and debris removal.

It is recommended that initially these activities for all elements of the drainage system are undertaken regularly until an appropriate frequency can be identified.

4.2 Occasional Maintenance

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than regular tasks such as vegetation management.

4.3 Remedial Maintenance

Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system. The likelihood of faults can be minimised by good design, construction and regular maintenance being carried out.

Where remedial works are found to be necessary, it is likely due to site-specific characteristics or unforeseen events, therefore, timings are difficult to predict. Remedial maintenance can comprise activities such as:

- Erosion repairs.
- Infiltration surface rehabilitation.
- Replacement of blocked filter materials/fabrics.
- Construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract).
- System rehabilitation immediately following a pollution event

5 Operation and Maintenance Requirements

Tables 1 and 2 below show the operation and maintenance requirements for drainage components within the drainage system.

5.1 Operation and Maintenance Requirements for Inlets, Outlets, and Inspection Chambers

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
	Remove cover and inspect, ensuring water is flowing freely and that the exit route for water is unobstructed. Remove any debris and silt	Annually
	Undertake inspection after leaf fall in autumn.	
	Jet the pipes leading from overflow structures and check water is going through the overflow	Annually
Remedial Actions	Repair physical damage	As required

5.2 Operation and Maintenance Requirements for Ponds

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove litter and debris.	Monthly (or as required)
	Cut the grass	Monthly (during growing season)
	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 building has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices eg penstocks	Half yearly
	Hand cut submerged and emerged aquatic plants (at minimum of 0.1m above pond 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	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
Occasional Maintenance	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
	Remove sediment from the main body of big ponds when the pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, every 25-50 years
	Repair erosion or other damage	As required
Remedial actions	Replant, where necessary	As required
	Aerate pond when the signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/ rehabilitate inlets, outlets and overflows.	As required

Appendix F – Drainage Strategy for Planning



Joe Kay & Jenny Williams

178 Bearwood Road, Wokingham

Drainage Strategy

Drainage Strategy

Issue/Revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Draft Issue	Planning Issue		
Date	19.10.23	19.12.23		
Prepared by	Robbie Parnham	Robbie Parnham		
Checked by	Stuart Williamson	Stuart Williamson		
File reference	19721-R01-A	19721-R01-B		

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EXECUTIVE SUMMARY

Tumu Consulting Ltd have been appointed by Joe Kay & Jenny Williams to undertake a Drainage Strategy for the demolition of an existing dwelling and construction of a replacement dwelling, at 178 Bearwood Road, Wokingham.

Item	Response
Site location	The site is located at 178 Bearwood Road, Wokingham, RG41 4SG. The grid reference is 478390, 168580.
Size and Current Land Use	The site is part of a wider family owned woodland estate which consists a small number of separate dwellings in a rural setting. The area under consideration is a 0.9ha parcel containing an existing dwelling, driveway, garage and large ponds.
Fluvial (rivers) Flood Risk	Low risk.
Tidal Flood Risk	Low risk.
Surface Water Flood Risk	Very low risk.
Groundwater Flood Risk	Low risk.
Reservoirs, canals & other artificial sources	Low risk.
Proposed Development	The existing dwelling and garages are to be demolished. A replacement dwelling is to be constructed just north of the existing.
NPPF Flood Risk Vulnerability	More Vulnerable

The risk of flooding to the proposed development has been assessed in accordance with the NPPF. It is concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the proposed development.

1 INTRODUCTION

Tumu Consulting Ltd have been appointed by Joe Kay and Jenny Williams to undertake a Drainage Strategy for an existing dwelling which is to be demolished and redeveloped, at 178 Bearwood Road, Wokingham. The report has been compiled to accompany a planning application for the construction of the replacement dwelling.

1.1 Site Location

The site is located at 178 Bearwood Road, Wokingham. The postcode for the site is RG41 4SG and the grid reference for the site is 478390, 168580. The local planning authority for the area is Wokingham Borough Council.



Figure 1-1 Site Location Plan

1.2 Existing Site Usage

The existing site is a parcel of land owned by the applicants that forms part a larger family owned rural estate. The site currently contains a dwelling with a shared driveway to the west and a garage to the north. There are also two ponds within the applicants ownership area to the east. An annex adjoins the existing dwelling to the south but this is outside the applicants ownership and is thus outside of the development boundary and scope of this report. It will however be

retained as a separate detached dwelling. 178 Bearwood Road is the focus of this drainage strategy, and its area is outlined in the ownership area drawing in appendix A.

1.3 Topography

A topographic survey (dated June 2022) has been undertaken of the site and its' surrounding areas; see Appendix B drawing reference 641-PA-02. The survey shows that the site generally falls from west to east, towards the ponds. Then beyond the pond to the east, the site continues to fall away towards the adjoining land.

The existing dwellings finished floor level (FFL) is shown to be approximately 83.50mAOD. The current impermeable hardstanding area of the dwelling, garages and drive within the applicants ownership boundary is 0.052ha.

1.4 Geology & Hydrogeology

According to the BGS viewer, the bedrock geology consists of Bagshot formation, a series of sands and clays. The BGS viewer also highlights superficial deposits of head, made of a mix of gravel, sand, silt and clay.

According to the residents the dwelling sits on a very clayey band of strata.

The site is not located within an Environment Agency (EA) Source Protection Zone (SPZ) for groundwater.

1.5 Hydrology

There are two private ponds to the east of the dwelling, which according to the residents are formed in old gravel pits. The southern one is kept as a pond (static water level) for amenity value whilst the other, to the north, dries up/ fills up depending on the season. In the time the family has occupied this premises, since the 1950s, they have advised that this pond has never filled up past the banks.

The nearest EA main river is Emm Brook, approximately 1.5km to the east of the site.

Bearwood Lakes are present to the west of the site (part of the Bearwood lakes Golf Club complex).

1.6 Existing Drainage

Surface water from the dwellings roof is collected in gutters and taken to a series of rainwater downpipes. On the north, east and south sides of the dwelling these downpipes discharge onto the ground where runoff informally either soaks into landscaping or runs overland following the site's topography and into the ponds. Along the western face of the building the downpipes can be seen to drop into the ground. It is understood (via the applicant's father, who used to live in the dwelling as a family home that's been passed through the generations) to discharge to soakaways to the west of the building. These soakaways are thought to be simple gravel pits, however there are no access points so exact positions are unknown. The gullies which drain the access road also are believed to discharge to these soakaways. The garage to the north discharges freely onto the ground, straight off the pitched roof.

The foul from this property discharges to an old makeshift sewage treatment plant, which was previously just a septic tank. The septic tank was split into 2 chambers, where water would rise through a connecting pipe from the first chamber to the second, before it is infiltrated in drainage fields. The residual foul sludge is then intermittently collected. This is located in the western front lawn of the property.

There are a number of old wells on the site, which have been noted to fill up in line with the water level in the northern pond. These however are now disused.

There are no known sewers in the immediate vicinity of the site.

1.7 Existing Surface Water Runoff Rates

Runoff rates for the existing site have been estimated in accordance with current best practice and with consideration to the existing hard surfacing, identified in the topographic survey.

Brownfield Runoff Rates

The existing site has a hardstanding catchment area of 0.052ha. The brownfield runoff rate has been calculated using the Modified Rational Approach (Wallingford Procedure). This has been based upon the average rainfall intensity derived from a 15-minute storm for each return period, which is appropriate given the time of concentration that would be anticipated for the area associated with the site. The parameters used in the calculation and results are summarised in Table 1-1.

Parameter	Value	Units
Existing hardstanding area	0.052	ha
1-year rainfall intensity, i_1	28.418	mm/hr
30-year rainfall intensity, i_{30}	69.607	mm/hr
100-year rainfall intensity, i_{100}	90.056	mm/hr
Q_1	4.11	l/s
Q_{30}	10.06	l/s
Q_{100}	13.02	l/s

Table 1-1 Modified Rational Approach Calculation for Runoff from Existing Hardstanding Areas

The calculation shows that the total pre-development runoff response for a 100-year return period storm event would be approximately 13.02 litres/second.

2 DEVELOPMENT PROPOSALS

2.1 Description of the Proposed Works

It is proposed to demolish the existing dwelling and associated garages and replace with a new dwelling constructed just to the north of where the existing dwelling is located. The area of the proposed hardstanding development is 0.029ha in comparison with the existing developments 0.054ha. The existing driveway will also be reconfigured as part of the development, with a gravel permeable finish.

Refer to Appendix C for the Proposed Site Plan.

2.2 Flood Risk Vulnerability Classification

In accordance with table D2 of the NPPF, the development is classified as 'more vulnerable' as figure 2-1 shows below.

More vulnerable

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Figure 2-1 Annex 3 of the NPPF Flood Risk Vulnerability Classification

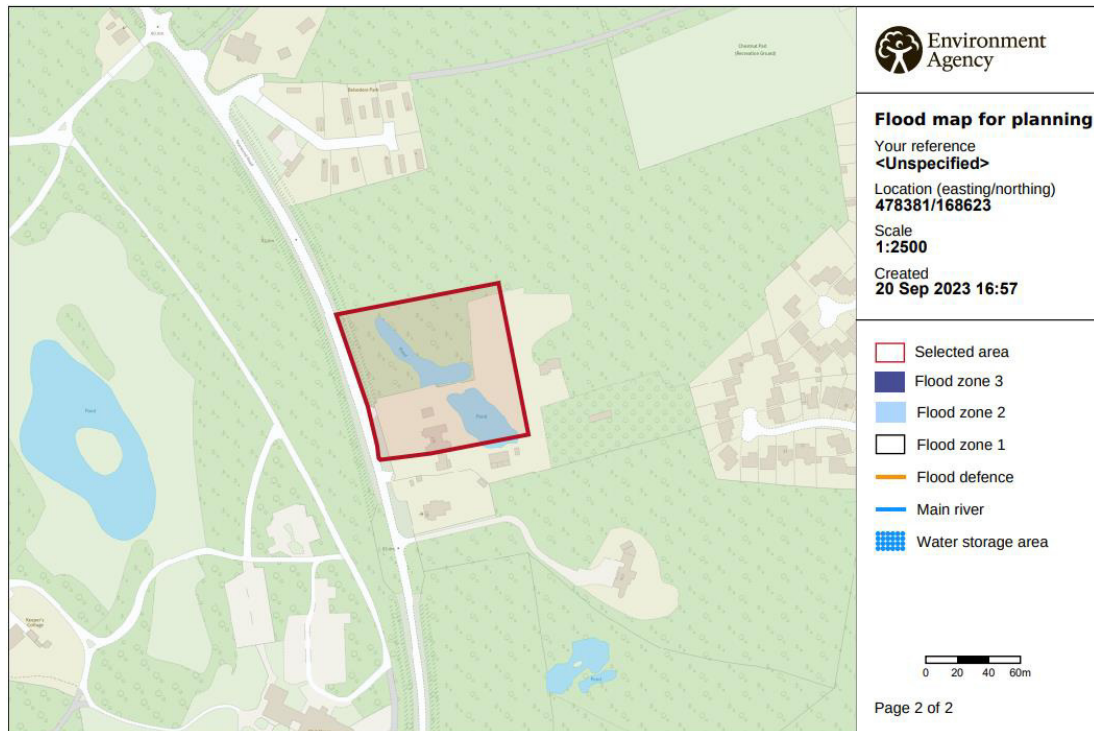
2.3 Design Life

As the nature of the redevelopment is a dwelling it is anticipated that the design life will be approximately 100 years.

3 ASSESSMENT OF FLOOD RISK

3.1 Flood Map for Planning

Figure 3-1, the EA's Flood Map for Planning, shows the risk of fluvial (rivers) and tidal (flooding) for the development. As is shown in the below figure, the site is located in Flood Zone 1. This is the lowest classification of flood risk, and describes the developments probability of flooding from tidal and fluvial sources, of less than 0.1%.



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Figure 3-1 Flood Map for Planning

Considering the site is in Flood Zone 1, it can be concluded the site is at **low** risk of flooding from fluvial and tidal sources.

As per government guidance, as the site is less than 1.0ha and in Flood Zone 1, a Flood Risk Assessment is not required. However, this section will briefly discuss common sources of flood risk.

3.2 Surface Water Flood Risk

The UK Government's Surface Water Flood Risk Mapping, available online, identifies the site to be at a very low risk (corresponding to a chance of flooding of <0.1%) for the building and external areas.

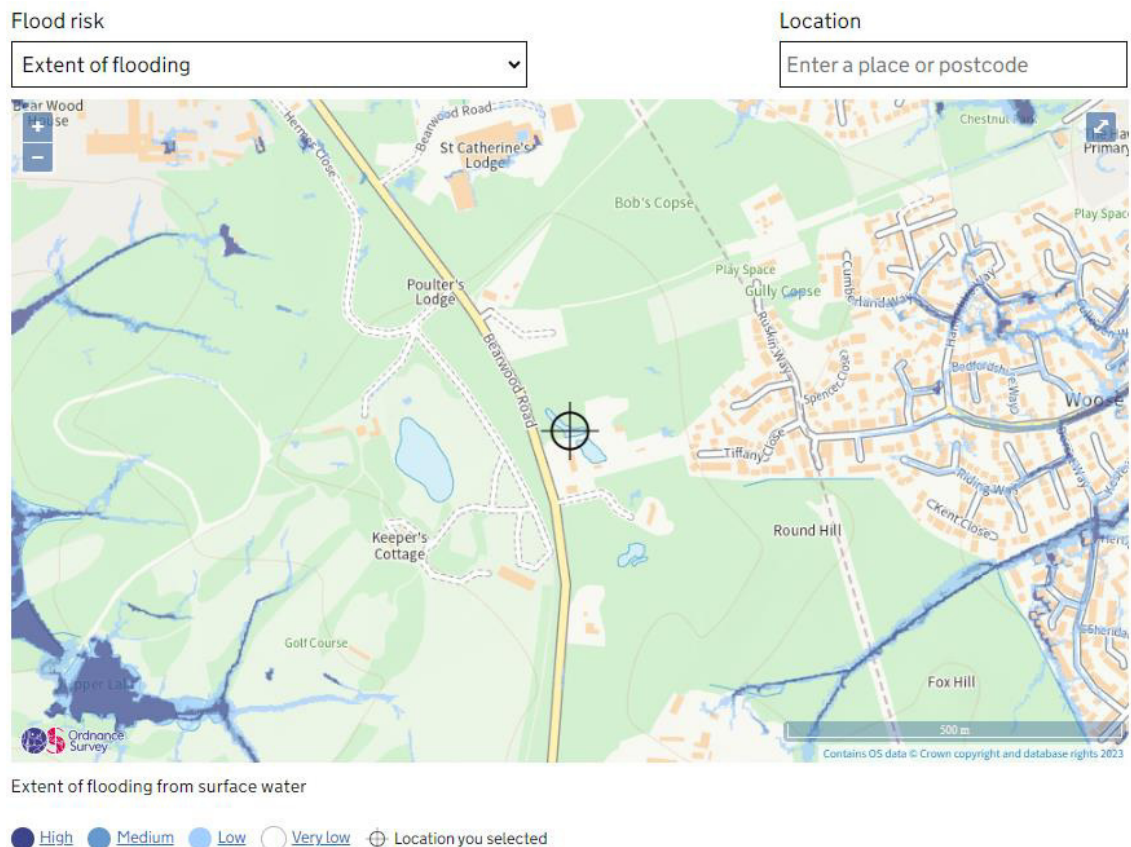


Figure 3-2 Surface Water Flood Risk Map

Using the surface water flood mapping above, the risk of the site flooding from surface water sources is **very low**.

3.3 Groundwater Flood Risk

Groundwater flooding is caused when the underlying water table gets so high that it flows above the ground level. The EA long term flood risk data suggests that groundwater flooding is unlikely. The groundwater flood risk for the site can be considered **low**.

3.4 Reservoirs, Canals & Other Artificial Sources

According to the governments long term flood risk maps, as shown in figure 3-3, the site is not in an area at risk of flooding from reservoirs, canals and other artificial sources. The flood risk can therefore be considered **low**.

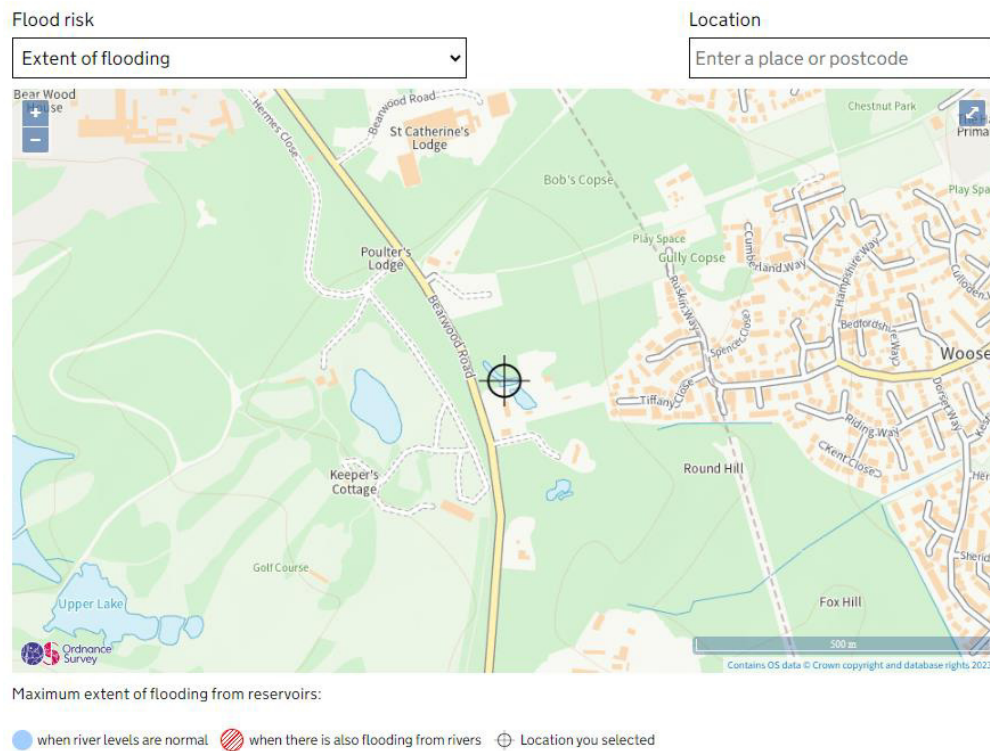


Figure 3-3 Reservoir Flood Risk Map

3.5 Sequential and Exception Test

In accordance with table 3 of the Technical Guidance to the NPPF, the development vulnerability is compatible with the flood risk as figure 3-4 shows below. The site is therefore considered sequentially preferable and no exception test is required.

Table 3: Flood risk vulnerability and flood zone ‘compatibility’

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Figure 3-4 Table 3 of the Technical Guidance to the NPPF – Flood Risk Vulnerability and Flood Zone Compatibility

4 SURFACE WATER DRAINAGE STRATEGY

The surface water drainage strategy has been developed up in accordance with the relevant design standard and guidance, including but not limited to; CIRIA C753 The SuDS Manual, The Approved Documents: Building Regulations 2010 Part H: Drainage and Waste Disposal, and the Non-Statutory Technical Standards for SuDS (NTSS).

The NTSS states that for a previously developed site, the rate of discharge should never exceed the rate pre redevelopment. The NTSS also states that flooding should not occur to any part of the site in the 1 in 30 year event, and no flooding to buildings or utility plant should occur in the 1 in 100 year event.

4.1 Surface Water Discharge

In line with the surface water discharge hierarchy surface water should be discharged to Soakaways/Infiltrating Drainage System; Waterbody; Public Surface Water Sewer; then finally, Public Combined Sewer, in order of preferability.

The current development has little formal surface water drainage. It appears to discharge mainly onto the ground or utilises informal and inaccessible soakaways. Although some natural infiltration occurs, in heavier events surface water runs overland into the pond east of the buildings.

It is proposed that the redeveloped site discharges direct into the same pond but via a formal system of surface water drainage. The pond as a water body will act as a natural form of SUDS treatment and also as a storage/attenuation system for the surface water runoff.

As the site's usage is a dwelling, a lifespan of 100 years should be considered. Therefore, when developed (approximately 2025), the end of life can be estimated as 2125. According to government guidance, a building with a lifespan beyond 2100 should use a 'upper end' allowance for a 2070s epoch when considering rainfall climate change allowances. For the Loddon and Tributaries Management Catchment area, the climate change allowance to consider should be 40% for a 1% AEP event, and 35% for a 3.3% AEP event, as shown in Figure 4-1 below.

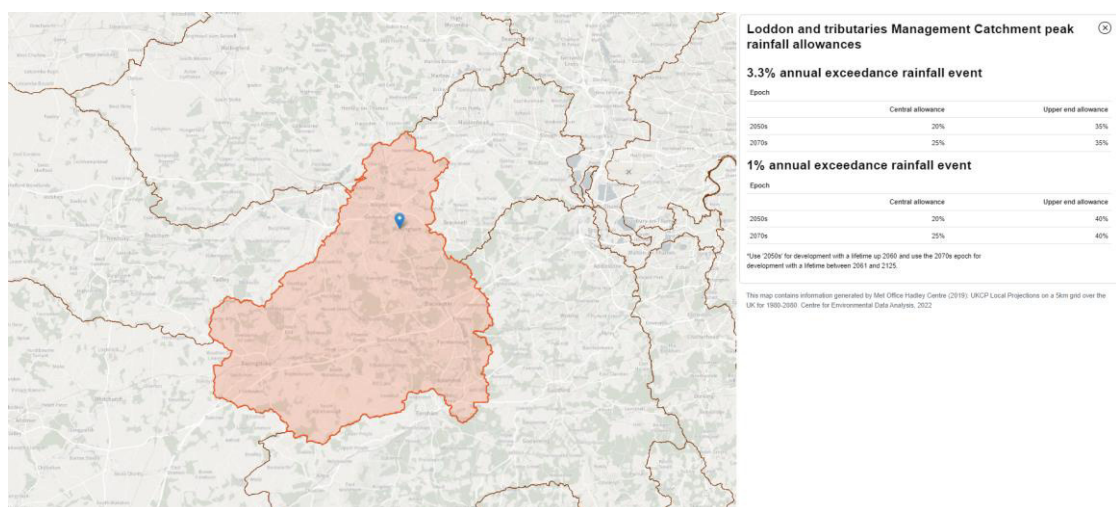


Figure 4-1 Loddon and Tributaries Management Catchment Rainfall Allowances

4.2 Surface Water Discharge Rates & Volumes

The impermeable area of the site is being reduced by the redevelopment proposals, refer to the catchment areas drawing in Appendix D. The existing catchment is 0.052ha whilst the proposed is 0.029ha, which represents a 44.2% reduction.

As such the proposed runoff will be lower in comparison to pre-development rates. In line with local guidance, a 44% betterment on all rates should be provided as part of the development for all storms up to and including the 1% AEP rainfall event.

Table 4-1 below shows the achieved betterment for each storm duration, using the rates from Table 1-1.

Rainfall Event	Brownfield Discharge Rate	Proposed Discharge Rate	Betterment
Q ₁	4.11	2.29	44%
Q ₃₀	10.06	5.61	44%
Q ₁₀₀	13.02	7.26	44%
Q _{100 40%}	13.02	10.16	22%

Table 4-1 Post Development Betterment Percentages

As there is a natural betterment in discharge rate because of the reduced hardstanding area no formal attenuation and flow control will be required to limit the discharge rate from the proposed drainage system. However, the pond will itself act as a storage and attenuation feature. The volume of surface water for the 6 hour storm event is calculated to be 18.9m³. The surface area of the pond is approximately 830 m². This would mean a depth of only 23mm is needed to fully store the 6 hour storm event, whilst the height of the banks above the static water level are in excess of 0.5m. The pond is therefore excessive for the needs of the redevelopment.

Refer to Appendix E for the Proposed Drainage Strategy.

4.3 Flood Exceedance Flow Routing

In the event that the surface water drainage system is overwhelmed by surface water past the 100 year return period storm with a 40% allowance for climate change, or if the drainage system fails, the exceedance routes generally flow from west to east, towards the pond. If the ponds capacity was to be exceeded the elevations east of the pond are lower resulting in surface water flowing away from the building.

4.4 Maintenance Arrangements

All surface water drainage pipework will be privately managed and maintained by the maintenance company of Mr Kay & Mrs Williams. Operation and maintenance will be undertaken in accordance with the recommendations outlined in the SuDS Manual (CIRIA C753), provided in tables 4-2 and 4-3.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
	Remove cover and inspect, ensuring water is flowing freely and that the exit route for water is unobstructed. Remove any debris and silt.	Annually
	Undertake inspection after leaf fall in autumn.	
	Jet the pipes leading from overflow structures and check water is going through the overflow	Annually
Remedial actions	Repair physical damage	As required

Table 4-2 Maintenance Requirements for Inlets, Outlets, Controls and Inspection Chambers

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove litter and debris.	Monthly (or as required)
	Cut the grass	Monthly (during growing season)
	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 options	Half yearly
	Check any mechanical devices eg penstocks	Half yearly
	Hand cut submerged and emerged aquatic plants (at minimum of 0.1m above pond 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	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
Occasional Maintenance	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
	Remove sediment from the main body of big ponds when the pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, every 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when the 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 4-3 Maintenance Requirements for Ponds

5 FOUL WATER DRAINAGE STRATEGY

As previously mentioned, the dwelling currently discharges foul flows to a sewage treatment tank to the west of the site. Where, once separated, the treated water infiltrates through drainage fields beneath the western front lawn.

With the development of the site, this foul drainage strategy will be maintained. As much of the existing drainage infrastructure will be retained as possible, with the new foul connecting onto the existing.

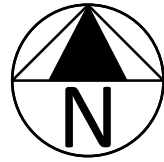
Refer to Appendix E for the Proposed Drainage Strategy

6 CONCLUSION

- The site is located in a Flood Zone 1 designation, therefore the annual risk of flooding from fluvial and tidal sources is <0.1%, the lowest classification of fluvial and tidal flood risk.
- The site is shown to be for the majority at a very low risk of surface water flooding.
- The site is considered to be at low risk from groundwater and reservoir flooding.
- The site currently has little formal surface water drainage with surface water eventually flowing into the adjacent pond. This strategy will be maintained but with a formal drainage network.
- As a result of the development, a betterment will be provided on existing surface water discharge rates by at least 44% on all storm events up to and including the 1% AEP; 7.76litres/second. The 1% AEP with a 40% allowance for climate change event will also offer a betterment of a 22% reduction in discharge rate.
- The existing pond acts as a SuDS treatment for the surface water runoff.
- The existing foul strategy will be continued, with existing foul drainage being retained where possible.

It is concluded that the development can be undertaken in a sustainable manner without increasing the flood risk to the proposed development or to existing properties/systems.

Development Site Areas



AREAS SHOWN ARE
PLANNING APPLICATION
PARCELS . ALL AREAS ARE PART OF
THE FAMILY OWNED ESTATE.

B	UPDATED FOLLOWING NEW SITE PLAN	19.12.23	RJP	SW
A	DRAFT ISSUE	19.10.23	RJP	SW
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:



CLIENT:

JOE KAY & JENNY WILLIAMS

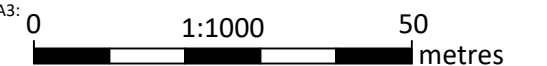
ARCHITECT:

ARTEL31

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A3:



PROJECT:

178 BEARWOOD ROAD

TITLE:

DEVELOPMENT SITE AREAS

PROJECT No:

19721

DRAWING No:

SK01

REV:

B

Appendix B

Topographic Survey

Appendix C

Proposed Site Plan

640 Bearwood Road

PLANNING

CLIENT
Mr Kay & Mrs Williams
ADDRESS
178 Bearwood Road
Wokingham
RG41 4SH

FOR COMMENT

REMOVED EXISTING BUILDING

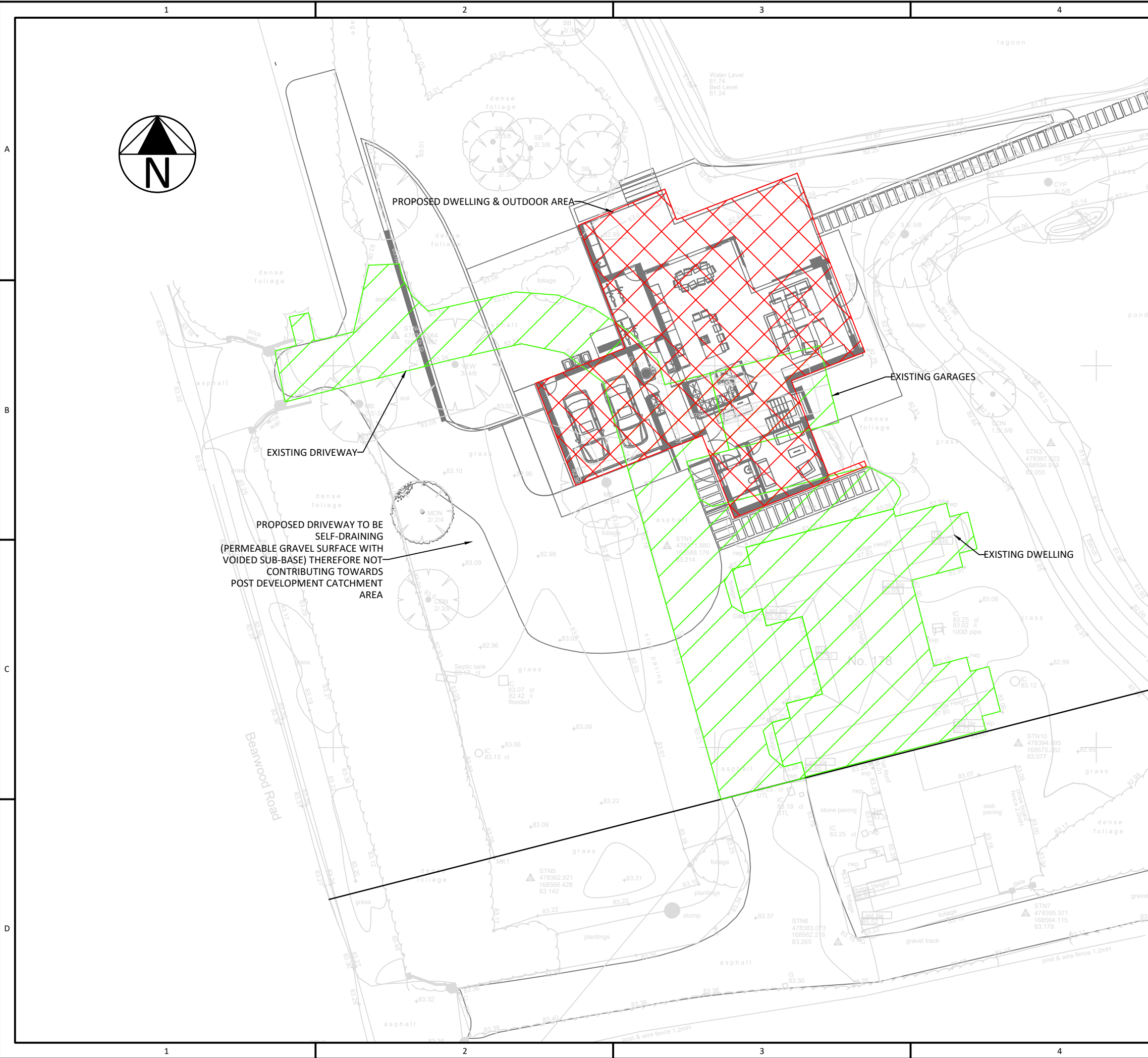


PR site plan

PROJECT	STAGE	DRAWING	REV	DRAWN
640	PL	12		HG
SCALE	SIZE	CREATION		
1:200	@ A3 L	NOV 2023		

ARTEL³¹
architects that build
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Drainage Catchment Areas



KEY

CATCHMENT AREAS PRE DEVELOPMENT 0.052ha

CATCHMENT AREAS POST DEVELOPMENT 0.029ha

B	UPDATED FOLLOWING NEW SITE PLAN	19.12.23	RJP	SW
A	DRAFT ISSUE	19.10.23	RJP	SW
REV.	DESCRIPTION	Date	BY	CHK

DESIGN BY:

土木

tumu

CLIENT:

JOE KAY AND JENNY WILLIAMS

ARCHITECT:

ARTEL31

DRAWING STATUS:

PLANNING APPLICATION

SCALE @ A3:

0125012.5metres

PROJECT:

178 BEARWOOD ROAD

TITLE:

DRAINAGE CATCHMENT AREAS

PROJECT No:

19721

DRAWING No:

D02

REV:

B

Appendix E

Proposed Drainage Strategy

