



Civil Engineers & Transport Planners

22a-22b
Barkham Ride

Flood Risk Assessment & Drainage Strategy

October 2024

241868/FRA&DS/LB/RS/01



Civil Engineers & Transport Planners

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1 INTRODUCTION

1.1 General

1.1.1 Lanmor Consulting Ltd has been appointed to complete a Flood Risk Assessment and Drainage Strategy report for the proposed residential development at 22a-22b Barkham Ride, Finchhampstead, Wokingham, RG40 4EU.

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 a residential area at 22a-22b Barkham Ride, in north Finchampstead. The site is approximately 0.119 hectares and is located to the east of a highly developed residential area. Land to the north and west of the site is classed primarily as agricultural or greenfield land, with some residential buildings.
- 2.1.2 The site is roughly triangular in shape and is located on the southern side of Barkham Ride. It includes a single storey timber frames building that is currently used as a pair of semi-detached dwellings. The site also includes a storage yard for cars, caravans and building materials.
- 2.1.3 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 layer of Bagshot Formation – Sand, a sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period. This in turn is underlain by London Clay – Clay, Silt and Sand. Local boreholes indicate the Bagshot Formation could be up to 12m thick, but there is a high perched water table, with water strikes around 2m bgl. There are no superficial deposits shown in the vicinity of the site.

2.3 Proposed Development

- 2.3.1 The proposed development seeks to demolish the existing timber-framed building on site, as well as removal of the associated storage yard to make way for 2 detached cottages.
- 2.3.2 The cottages will be 2 x 3-bedroom and will each comprise of 2-storeys with their own car port and parking space. The proposed site plan for the development is included in Appendix A as drawing 2596-15.

3 SOURCES OF FLOODING

3.1 Fluvial/Tidal Flooding

3.1.1 Detailed flood information was not available for 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 10 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 to 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 mapping above shows that the site sits securely within Flood Zone 1 which is the unshaded area on the map.

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.

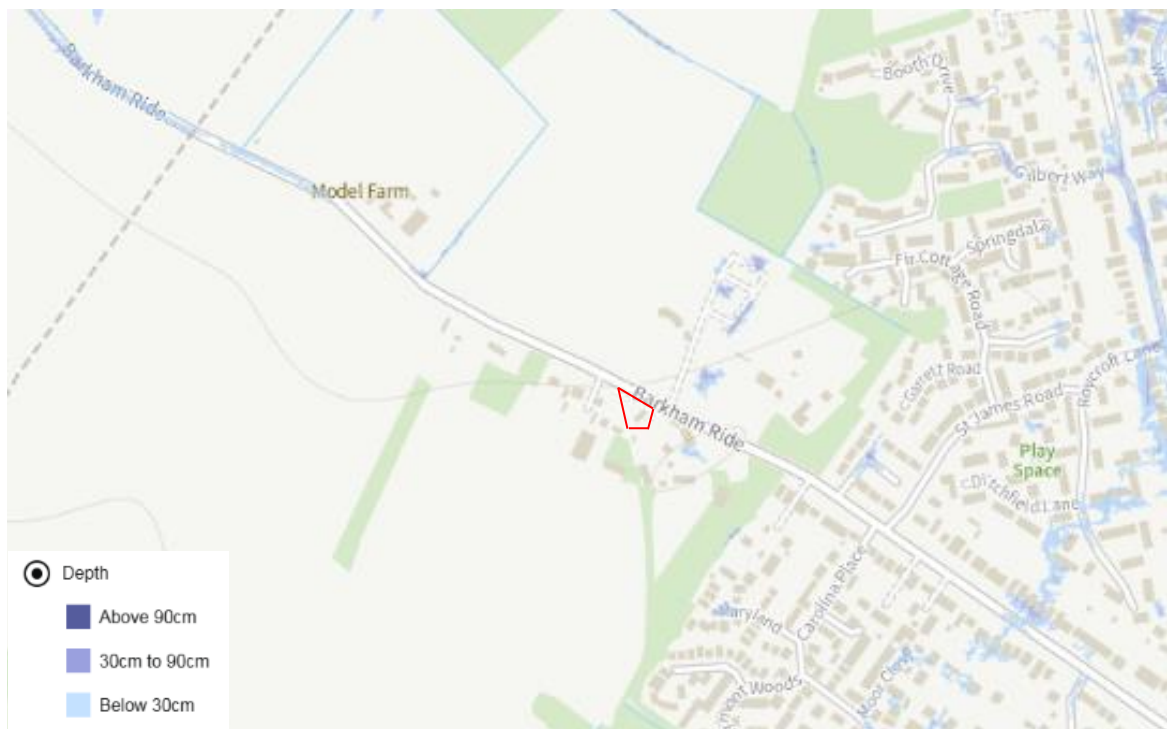


Figure 3.2 – EA Surface Water Flood Map

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 within 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 Management Catchment area, the flood zone, and the sites vulnerability. The site lies within the Loddon and Trib Management Catchment Area. The site is located within Flood Zone 1 and residential use is considered a more 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% AEP even when 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 2 new residential dwellings. 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 event, 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 development will be larger than the footprint of the current building on the site, but as the site is located in a Flood Zone 1 area it will not reduce the flood storage volumes for storm events up to 1.0% probability. This is also true when future 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, safe and dry access can be provided to and from the site at all times during a flooding event.

5 SEQUENTIAL TEST AND EXCEPTION TEST

5.1 Development Vulnerability Classification

- 5.1.1 The proposed development seeks to construct 2 new detached dwellings. Under Table 2 in the Planning Practical Guidance (PPG) of the NPPF, the proposed development would therefore be classed as a “more vulnerable” 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 “more 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. Table 2 of the PPG shows that more 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’

5.2.4 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 DRAINAGE STRATEGY

6.1 Existing Drainage

- 6.1.1 It is understood that the current wastewater from the dwellings is collected in an existing septic tank to the northwest corner of the site. This tank will be removed as part of the development.

6.2 Proposed Foul Water Drainage

- 6.2.1 Thames Water sewer records have shown that there is no existing foul sewer on Barkham Ride or in the local area that could be connected to without crossing private land. The ground conditions on site are not suitable for infiltration, so a treatment plant discharging to a drainage field would not be viable. There are also no ditches or watercourses in the area that a treatment plant could discharge to. Therefore, the only option available to the site is collection of wastewater in a cesspool to be removed from site by tanker. The use of cesspools is considered a last resort, but all other options have been exhausted. Therefore, wastewater from the proposed dwellings will be collected in individual cesspools to the north of each property.

6.3 Proposed Surface Water Drainage

- 6.3.1 The Sustainable Drainage Systems (SuDS) hierarchy has been used to set the drainage strategy for the development. The SuDS considered as part of this assessment for the disposal of surface water runoff include various source control methods.
- 6.3.2 Rainwater harvesting was considered, as a means of reusing surface water runoff within the dwellings. However, these systems require a separate network of pipes within the property, as well as tanks and pumps to store the rainwater and distribute it throughout. It was considered impractical to implement rainwater harvesting systems on the site due to site constraints and excessive cost for the development.

- 6.3.3 In addition, for these systems to be successfully implemented there must be sufficient demand for water reuse otherwise this may lead to water quality issues. Furthermore, rainwater harvesting tanks should not be included in the assessment of attenuation required to store runoff from a development as there is no guarantee that the tank will be sufficiently empty to receive another storm.
- 6.3.4 Should the rainwater harvesting tank be full at the start of the storm, it will not be able to receive any more runoff, therefore additional storage of a similar size would be required to cater for all storm events and the rainwater harvesting tank will provide no benefit in terms of attenuation. For those reasons, and the excessive cost of providing the system, this method has been discounted.
- 6.3.5 Next on the SuDS Hierarchy is use of infiltration techniques. Soakaways provide storage for runoff in an underground chamber whilst the water drains away into the ground. Local borehole records indicate the geology to be Sand underlain by Clay, and with a high perched water table. The use of traditional soakaways will not be viable due to the high groundwater level, meaning that a 1m separation will not be achievable between the base of the soakaway and the groundwater level. However, the London Clay stratum is underlain at depth by Chalk which would provide a suitable discharge point for runoff. Therefore, the use of deep-bore soakaways would be viable, discharging into the Chalk stratum. There will be 2 deep-bore soakaways implemented, one in the back garden of each property.

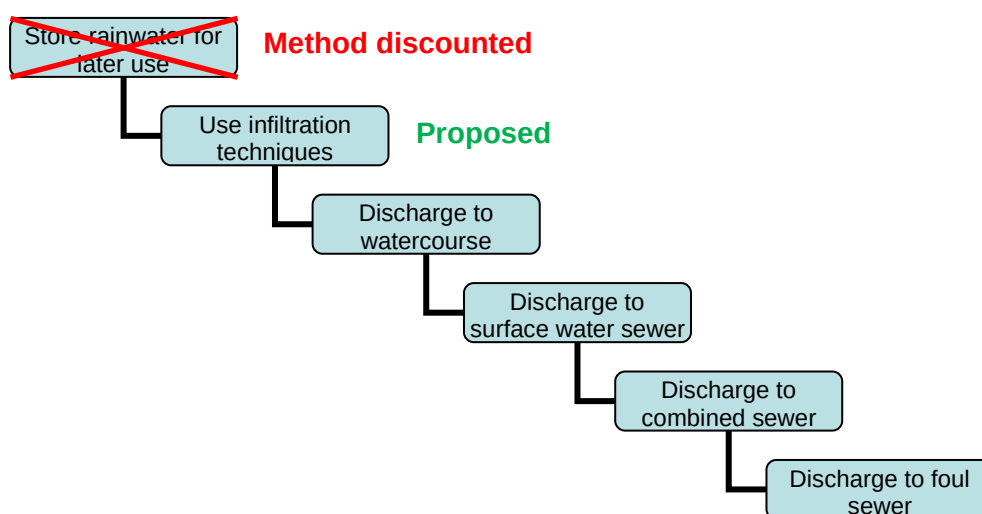


Figure 6.1 – SuDS Hierarchy

- 6.3.6 The final discharge rates achieved by the deep-bore soakaways will not be known until they are installed and tested. However, there is ample space within the rear gardens of the properties to provide below ground attenuation tanks to storage surface water runoff from the site. These tanks will be sized sufficiently to ensure no flooding occurs on site for the 1 in 100 year event plus 40% allowance for future climate change. Therefore, the proposed development will not increase the risk of flooding on site, or in the surrounding area.
- 6.3.7 The development proposal involves the demolition of the existing building and the construction of 2 replacement dwellings with vehicle access. There is an opportunity to use permeable paving on the shared driveway and parking spaces of the properties and this will be adopted in the final design to provide water quality benefits to the site. Depending on the groundwater level encountered on site, the permeable paving could discharge to ground, or it may have to be tanked and discharged to the deep-bore soakaways along with runoff from the roofs.

7 SURFACE WATER/SUDS MAINTENANCE AND TREATMENT

7.1 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.
- 7.1.2 The level and frequency of maintenance 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 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, therefore the following maintenance regime should be applied and adjusted if the 12-month monitoring process has identified any issues.
- 7.1.5 Each property will be provided with their own foul and surface water drainage systems, and the homeowners will each be responsible for the maintenance of their own drainage, including cesspool and SuDS (permeable paving, attenuation tank and deep-bore soakaway).
- 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.

Pipes and Manholes

7.1.7 For drainage pipes and manholes, the following maintenance is recommended.

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 / Pipe Maintenance Schedule

Soakaways

7.1.8 For soakaways, the following maintenance is recommended.

Soakaway Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect for sediment debris in pre-treatment components and floor of inspection tube / chamber and inside soakaway	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube / chamber and inside soakaway	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 7.2 – Soakaway Maintenance Schedule

8 SURFACE WATER TREATMENT

8.1.1 As part of the CIRIA SuDS Manual C753, Section 26 provides guidance regarding methods for managing pollution risks from surface water runoff.

8.1.2 Part of the assessment is to determine the method of assessing the risk, Table 26.1 of the CIRIA Report C753 reproduced as Table 8.1 below sets the approaches to water quality risk management. For this site the Simple Index Approach will be used.

TABLE 26.1 Approaches to water quality risk management			
Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening ¹	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Table 8.1 – CIRIA SuDS Manual C753 (Approaches to Water Quality)

8.1.3 Table 26.2 in C753 reproduced as Table 8.2, show the potential hazard indices associated with different land uses. The development will consist of residential units. It is concluded that the site should be classed within the sections shown in Table 8.2 below.

8.1.4 The roofs of the residential buildings are considered to have a “very low” pollution hazard, generating 0.2 total suspended solids, 0.2 metals and 0.05 hydrocarbons. The access and parking area are considered to have a “low” pollution hazard, generating 0.5 total suspended solids, 0.4 metals and 0.4 hydrocarbons.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Table 8.2 – CIRIA SuDS Manual C753 (Land use classifications)

- 8.1.5 The proposed development will incorporate permeable paving for attenuation for disposal of runoff from the site. Suitable treatment measures offered by SuDS features are set out in the CIRIA report.
- 8.1.6 Table 26.3 of C753 reproduced below as Table 8.3 sets out the mitigation indices provided by SuDS features for discharge to surface waters.

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Table 8.3 – CIRIA SuDS Manual C753 (Mitigation Indices to Surface Water)

- 8.1.7 The permeable paving will provide mitigation of 0.7 for total suspended solids, 0.6 for metals and 0.7 for hydrocarbons. These are all greater than the pollution hazard indices identified in Table 8.2 above so the paving will mitigate the potential hazards associated with the parking areas etc.

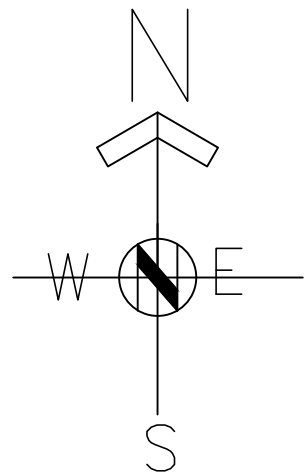
9 SUMMARY AND CONCLUSION

- 9.1.1 This report described the existing and proposed development, the implications of flooding and the impact the proposed development will have on the floodplain in accordance with the government's guidance document: The National Planning Policy Framework (NPPF), with specific reference to its Planning Practice Guidance.
- 9.1.2 The site is located in a residential area on Barkham Ride, in north Finchampstead. 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.
- 9.1.3 The site sits upon Bagshot Formation (Sand) and London Clay with a high perched water table. Due to the high groundwater level, traditional soakaways will not be viable, however the use of deep-bore soakaways into the Chalk stratum below is achievable.
- 9.1.4 Using the EA Flood Mapping Data, the site was shown to be in Flood Zone 1. The proposed development will comprise of the demolition of the existing building and the construction of 2 new replacement dwellings. Under Annex 3 of the NPPF and Planning Practical Guidance, the proposed development would be classified as a "More Vulnerable" proposed use.
- 9.1.5 The proposed method of surface water discharge will be via deep-bore soakaways. A SuDS assessment has been completed for the development and has found that infiltration via deep-bore soakaways is the most sustainable method of discharge.
- 9.1.6 This statement clearly demonstrates that the site is at low risk of flooding from all sources, suitable foul and surface water drainage can be provided for the development, and the discharge of surface water runoff from the site will not result in an increased risk of flooding to the site or surrounding area. For the reasons outlined in this report, we see no reason to refuse planning permission for this development on the grounds of flood risk or drainage.

APPENDIX A

2596-15 – GA Site Plan

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.



Project	Replacement Cottages 22a-22b Barkham Ride Finchampstead Wokingham, Berkshire		
Client	Mr T Roberts		
Drawing	General Arrangement Site Plan		
Scale	1: 200@A2	Date	July 2024


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APPENDIX B

Borehole Logs

PAGE: 4		LOCATION				BOREHOLE 3		
DATE: 11.09.89		NASHGROVE LANE - WOKINGHAM						
DESCRIPTION	REDUCED	DEPTH	LEGEND	SAMPLE		THICKNESS	SPT	REMARKS
	LEVEL m	m		TYPE	DEPTH			
TOPSOIL		0.00	X X X			0.50		Standing water level
Light brown green sandy CLAY		0.50	X X X			0.50		
Blue silty sandy CLAY		1.00	X X X	U100	1.00	0.45		-974 /3 / 1.0U
Loose becoming medium dense green grey ...		1.45	X X X					
silty SAND		2.00	X X X	U100	2.00			-974 /3 / 2.0U
			X X X					Water strike
			X X X					
			X X X					
			X X X	SPT	3.50		7	
			X X X					
			X X X	S B	5.00		10	
			X X X		5.00			-974 /3 / 5.0B
			X X X					
			X X X			10.55		
			X X X					
			X X X	SPT	8.00		13	
			X X X	S	6.50		10	
			X X X					
			X X X	B	9.00			-974 /3 / 9.0B
			X X X	SPT	9.50		15	
			X X X					
			X X X					
			X X X	SPT	11.00		17	
			X X X					
Stiff dark grey CLAY		12.00	X X X					
			X X X	U100	12.50			-974 /3 /12.5U
			X X X					
			X X X	U100	14.00			-974 /3 /14.0U
			X X X					
			X X X	U100	15.50			-974 /3 /15.5U
			X X X			7.50		
			X X X	U100	17.00			-974 /3 /17.0U
			X X X					
			X X X	U100	18.50			-974 /3 /18.5U
			X X X					
Very dense dark grey SAND with black		19.50	X X X	U100	19.50			-974 /3 /19.5U
specks			X X X			0.50		Water strike
		20.00	X X X					

 TERRAMECH INVESTIGATIONS LIMITED 183 LONG LANE TILEHURST READING	REMARKS:

U100=100mm dia. UNDISTURBED SAMPLE	U38=38mm dia. UNDISTURBED SAMPLE	D=SMALL DISTURBED SAMPLE
B=BULK SAMPLE	W=WATER SAMPLE	SPT=STANDARD PENETRATION TEST
		CPT=CONE PENETRATION TEST

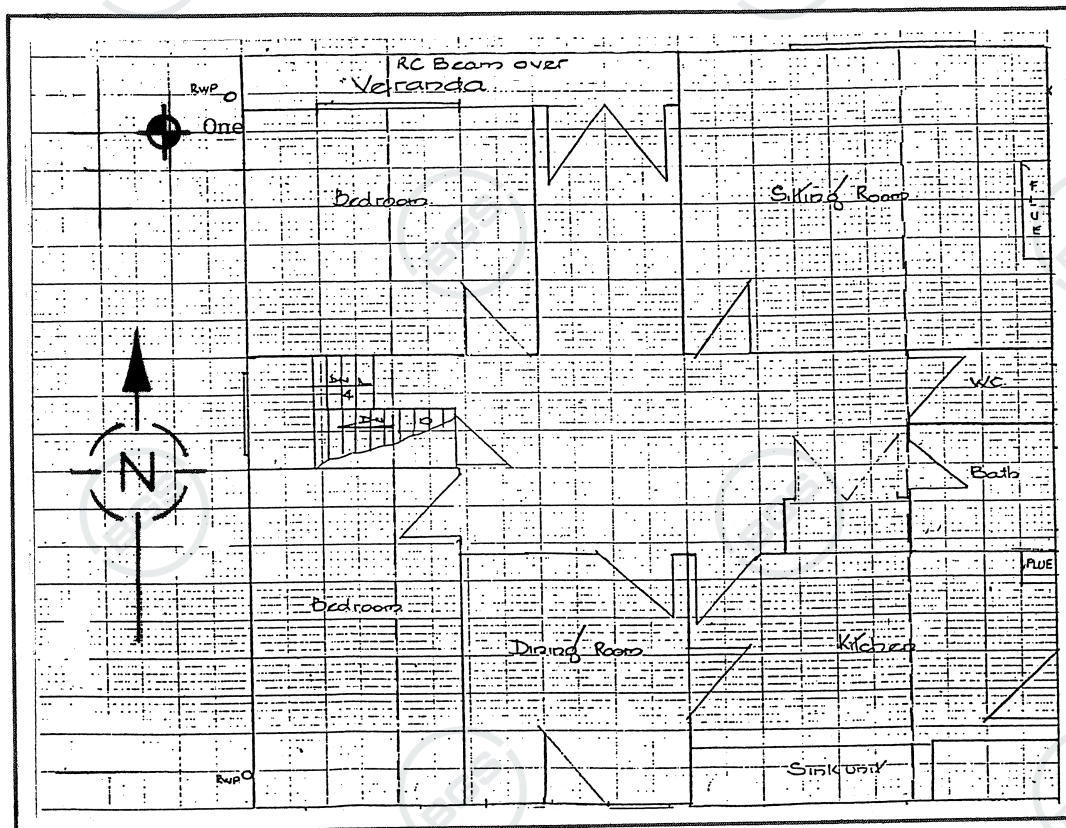


PAGE: 1	LOCATION	BOREHOLE LAYOUT
DATE: 11.09.89	NASHGROVE LANE - WOKINGHAM	

BOREHOLE LAYOUT



Contact BGS: ngdc@bgs.ac.uk



Borehole Location

Scale 1 : 111

Date
May 1988

BOREHOLE LOCATION PLAN

Report No.
S.1047

APPENDIX C

Thames Water Sewer Records



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.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

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.

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 diverts 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	

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

241868/DS/01 – Drainage Strategy



A1 Roberts Properties Ltd

22a-22b Barkham Ride
Finchampstead, Wokingham, RG40 4EU
Proposed Drainage Strategy

LANMOR Consulting
Civil Engineers & Transport Planning

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

SCALE 1:200

DRAWN BY LB

PRJ No. 241868

DWG No. 241868/DS/01