

FLOOD RISK ASSESSMENT AND SURFACE WATER DRAINAGE STRATEGY

Warren Crest Farm, Finchampstead, RG40 3PY



Prepared for: Mr T Nasser

Ref: 002_8250146_Apu_Flood_Risk_Assessment

Document History

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Contents

1.0	Introduction.....	1
2.0	Site Description and Development Proposals.....	2
3.0	Planning Policy and Guidance	5
4.0	Sources of Potential Flooding	7
5.0	Flood Risk Assessment	9
6.0	Surface Water Drainage	10
7.0	Summary and Conclusions.....	15

Appendices

Appendix A:	Site Location Plan
Appendix B:	Topographical Survey
Appendix C:	Illustrative Development Proposals
Appendix D:	Flood Zone Mapping
Appendix E:	Proposed Drainage Strategy
Appendix F:	InfoDrainage Network Calculations
Appendix G:	Sewer Records
Appendix H:	InfoDrainage Permeable Pavement Calculations
Appendix I:	10 year Storm Volumes

1.0 Introduction

- 1.1 This flood risk assessment has been prepared by Glanville Consultants on behalf of Mr T Nasser at the request of Anderson Orr Architects Ltd to accompany a planning application for residential development in relation to a site at Warren Crest Farm, Wick Hill Lane, Finchampstead, RG40 3PY (herein referred to as "the site").
- 1.2 The purpose of this document is to assess the existing level of flood risk to the site and its surrounding within the context of the development proposals and to demonstrate a suitable drainage strategy for the disposal of surface water run-off from the proposed development is capable of being provided.
- 1.3 This assessment has been prepared in accordance with the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG). Local policy concerning flood risk and drainage has also been considered, with reference made to Wokingham Borough Council (WBC) Level 1 and 2 Strategic Flood Risk Assessment (SFRA) and Wokingham SuDS Strategy (WSS)
- 1.4 This assessment has been undertaken with reference to information provided and/or published by the following bodies:
- Ordnance Survey;
 - British Geological Survey;
 - Wokingham Borough Council; and
 - Environmental Agency.
- 1.5 This report concludes that the proposed development complies with relevant National and Local planning policies in respect of flood risk and drainage and therefore the site can be developed safely without increasing flood risk from any source, including an appropriate allowance for climate change. The proposals should therefore be considered acceptable in this respect.

2.0 Site Description and Development Proposals

Site Description

- 2.1 The site is located at Warren Crest Farm, Wick Hill Lane, Finchampstead, RG40 3PY, located approximately 4km south-east of Wokingham. The site stretches approximately 1.7 hectares and is located at National Grid Reference SU 80090 64565. A site location plan is included in Appendix A of this report.
- 2.2 The site is approximately square in shape with the main access in the north from Wick Hill Lane which comes from Nine Mile Ride. The site is surrounded by a mix of hedgerows and trees, with a mud track running down the north and east sides of the plot. It is mainly surrounded by farmland, but generally there are other scattered detached residential properties nearby to the north and east.

Topographical Survey

- 2.3 A topographical survey of the site was undertaken by Mapmatic in September 2023. The survey establishes that levels generally fall from west to east across the site, with an approximate high point of 87.43 Above Ordnance Datum (AOD) to the south-west of the main site and a low point of approximately 83.5m AOD south-east of the site. A copy of the topographical survey is included in Appendix B.
- 2.4 The survey recorded the current site to have existing drainage infrastructure including downpipes and inspection covers. The majority of the site is bounded by existing hedgerows, a fence and tracks.
- 2.5 There is an existing field drain ditch at the south eastern corner of the site which leads away to the south and east. Existing downpipes are reported to discharge into this ditch.

Geological mapping

- 2.6 Geological mapping published by the British Geological Survey (BGS) indicates that the site is underlain by bedrock of the Camberley Sand Formation which is a sand strata. BGS mapping suggests to the north of the site to be Windlesham Formation which is a sand, silt and clay strata. As the BGS mapping is a national scale dataset, the boundaries should not be taken as exact, and either or both bedrock types could be encountered at the site.
- 2.7 No superficial deposits are recorded at the site.
- 2.8 Soilscape mapping published by Cranfield University on behalf of DEFRA shows the majority of the site falls on soil class 18, which is defined as slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. It is also defined as having impeded drainage which will drain to the local stream network. However, a significant portion in the north is classified as soil class 6, which is described as freely draining slightly acid loamy soils. The soil is freely draining and will drain to local groundwater and rivers. Due to the national scale dataset, again, both or either soil types could be found at the site.
- 2.9 Anecdotally the site is described as having sandy, well draining soils.

Hydrological and Hydrogeological Context

- 2.10 The closest Main River to the site is the Blackwater River, which is located approximately 2.25km south of the site.
- 2.11 However, there are ordinary watercourses indicated on mapping approximately 200m to the east of the site which flow east before turning north. These watercourses are therefore associated with the catchment of the River Thames, approximately 8km to the north west, rather than the Blackwater River.
- 2.12 The EA defines Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The SPZs mapping indicates that the site is not located within an SPZ.
- 2.13 A Nitrate Vulnerable Zone (NVZ) is a conservative designation for areas of land that drain to nitrate polluted waters which could become polluted by nitrates. The NVZs mapping indicates that the site is located within a surface water NVZ.
- 2.14 The EA defines Drinking Water Safeguarding Zones (SgZs) and Drinking Water Protected Areas (DWPAs) for water sources used for public drinking water supply. SgZs define areas where water sources need to be protected to prevent pollution. DWPAs are areas where water sources need to be protected to prevent pollution. The mapping indicates the site is not located in a DWPA, with the whole site shown to be within a surface water SgZ.
- 2.15 The Bedrock Aquifer Designation Map published by the EA indicates that the Camberley Sand Formation bedrock underlying the site is classed as a secondary A aquifer. Secondary A aquifers comprise of permeable layers that can support local water supplies, and may form an important source of base flow to rivers.
- 2.16 The Superficial Aquifer Designation Map published by the EA indicates that the sites superficial deposits are an unproductive strata. Unproductive strata are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them.
- 2.17 Groundwater vulnerability mapping published by the EA indicates the risk to groundwater from any potential pollutants on-site reaching the underlying aquifer. The mapping indicates the site to be at 'medium' risk of pollutant migration.
- 2.18 The proposed use of the site is for low density residential development which will not cause high generation of pollutants or generate large flows that could activate pollutants already present from historic agricultural uses. As a result, none of the above designations are considered an issue that would prevent the re-development of the site for its proposed use. Nonetheless, careful consideration has been given to pollution control measures within the surface water drainage strategy, which is outlined in Section 6 of this report.

Existing Drainage

- 2.19 Anecdotally the existing site is served by historic piped networks including French drains leading to the ditch at the south eastern side of the site.

- 2.20 This ditch leads away to the south and east and is reported to discharge via perforated drains to a soakaway field within the same land ownership but approximately 80m outside the site boundary, with an overflow from there to the ordinary watercourses to the east.

Development Proposals

- 2.21 The development proposals seek the demolition of the existing dwelling and erection of replacement family home, and construction of 2x new dwellings in place of 3 new homes permitted by 233112.
- 2.22 The proposed replacement dwelling would have a total footprint of approximately 610m² and offer three floors of habitable accommodation including 4 bedrooms, as well as an attached double garage and a swimming pool. The proposal would sit towards the southern boundaries of the existing plot, in a similar position to the existing dwelling albeit with a larger footprint, with a barn style design.
- 2.23 The proposed two separate dwellings would comprise a 1 x 1 bed residential flat, which would occupy the first floor of a 'coach house' style building with garage space underneath, and a 1 x 2 bed dwelling. The proposed dwellings would be sited to the north-east of the existing dwelling, outside of its residential curtilage, in a similar position to the existing agricultural buildings to be replaced. The proposal would have a total footprint of approximately 160m² with a similar barn style design. An Indicative Site Layout is provided in Appendix A, and an Illustrative Development Proposal is provided in Appendix C.

3.0 Planning Policy and Guidance

- 3.1 Set out below is a summary of the national and local planning policy and guidance relating to flood risk and surface water management that are relevant to the site and any future development

National Policy and Guidance

- 3.2 At a national level, the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG) to the NPPF ensure flood risk is taken into account at all stages of the planning process, to avoid inappropriate development in areas at risk of flooding and to direct development towards areas at lowest flood risk. The NPPF retains a risk-based approach to the planning process and defines four Flood Zones to be used as the basis for applying the sequential test, as well as Flood Risk Vulnerability Classifications, which define the type of development that is considered appropriate within each zone.
- 3.3 The NPPF establishes the Flood Zones as the starting point for assessment with the overarching aim to steer new development to areas with the lowest probability of flooding. The Flood Zones are defined as follows:
- Flood Zone 1 (Low Probability) comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
 - Flood Zone 2 (Medium Probability) comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
 - Flood Zone 3a (High Probability) 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.
 - Flood Zone 3b (The Functional Floodplain) comprises land where water has to flow or be stored in times of flood.

Local Policy and Guidance

Wokingham Borough Council (WBC) Level 1 Strategic Flood Risk Assessment (SFRA), May 2023

- 3.4 The WBC Level 1 SFRA provides a reference and policy document to inform decisions on the location of future development and the preparation of land use planning policies for the long-term management of flood risk under the guidance from the NPPF and local policies. The mapping and accompanying report provide guidance and a sound framework enabling consistent and sustainable choices to be made when making future planning decisions.
- 3.5 The SFRA includes summaries and mapping of the assessed flood risk, as well as historic events, for WBCs entire administrative area. The report has considered flooding from all sources including fluvial, pluvial, groundwater and sewers and provides to planners and developers on producing site specific Flood Risk Assessment and drainage proposals.

Wokingham Borough Council (WBC) Level 2 Strategic Flood Risk Assessment (SFRA), August 2023

- 3.6 The level 2 SFRA is required where land in Flood Zone 1 cannot appropriately accommodate all necessary development, creating the need to apply the NPPF's exception test. In these circumstances the assessment should consider the detailed nature of the flood characteristics within a Flood Zone and assessment of other sources of flooding.
- 3.7 The level 2 SFRA provides individual flood risk analysis for site options using the latest available flood risk data, thereby assisting WBC in applying the exception test to their proposed site options through the emerging Local Plan Update (LPU). It uses available data to provide information and a comprehensive set of maps presenting flood risk from all sources for each site option. Where the exception test is required, it also provides recommendations for making the site safe throughout its lifetime. It takes into account the most recent policy and legislation in the NPPF, Planning Practice Guidance and Lead Local Flood Authority SuDS guidance. Finally, it updated the catchments that are most sensitive to new development in flood risk terms and further review policy and recommendations for these catchments.

Wokingham Borough Council (WBC) Wokingham SuDS Strategy (WSS), January 2017

- 3.8 This WSS is designed to be used by developers and their design teams when master planning all developments, from the Strategic Development Location (SDL) scale, through to a ten-dwelling development, to ensure surface water runoff within the development is sustainably discharged. This Strategy also provides advice to help mitigate flood risk, water quality and biodiversity concerns in the wider catchment.
- 3.9 As the development proposed is smaller than the ten-dwelling development the SuDS Strategy was developed to advise, it has been consulted for general advice on local conditions and good practice only.

4.0 Sources of Potential Flooding

- 4.1 Flood risk to the site is considered from all likely sources of flooding, as defined in the NPPF and the PPG to the NPPF. These include tidal, fluvial, artificial sources, groundwater, sewer, and surface water. The following paragraphs consider flood risk to the site from all these sources.

Tidal/Coastal

- 4.2 Given that there is no tidally influenced watercourse on or within the vicinity of the site, tidal flooding is not an issue that would prevent the development of the site.

Fluvial

- 4.3 The EA published flood zone mapping on the GOV.UK website which shows the modelled extents of fluvial flooding. An extract from the EA mapping is included in Appendix D. The flood zone mapping indicates that the entirety of the site is located within Flood Zone 1, at the lowest risk of fluvial flooding (<1 in 1,000-year return period). The proposed dwellings are therefore considered to be at very low risk of fluvial flooding.

Artificial Sources

- 4.4 The closest reservoir is Longmoor Lake which is located 1.5km north-west of the site and has a surface area of 40,000m², but is topographically below the site.
- 4.5 The EA published indicative mapping on its website which shows the maximum extent of reservoir flooding in the unlikely event that a large reservoir should fail. The mapping indicates that the site is not located within a reservoir flood risk area and there are no embanked canals in the area. The risk of flooding posed to the site from this source is likely to be negligible.
- 4.6 The SFRA states that the likelihood of such flooding is difficult to estimate but is extremely low compared to flooding from other sources.

Groundwater

- 4.7 According to the flood risk summary published on the long term flood risk GOV.UK site, the site is unlikely to experience any flooding from groundwater.
- 4.8 The SFRA states that no groundwater flooding was identified in the Wokingham Lead Local Flood Authority area from at least 1993.
- 4.9 The site is topographically elevated with falls away in all directions and no low areas where water could rise or pond.
- 4.10 Overall it is considered to be at a very low risk of groundwater flooding.

Sewer

- 4.11 The WBC SFRA includes tables on the number of sewer flooding incidents recorded from 2000-2022 by postcode area. The local postcode of the site, RG40 3, had no recorded incidents of sewer flooding in that time period

- 4.12 Appendix G shows the public sewer records for the area surrounding the site. It can be seen that the only nearby public foul sewer is at the entrance to the property and lies downhill of the proposed residential units.
- 4.13 The existing private drainage on site has never been reported as flooding, and there is no reason to think that this drainage would be inadequate for the small number of buildings that it serves.
- 4.14 There is therefore a very low risk of sewer flooding affecting the proposed property.

Surface Water

- 4.15 The EA published a Flood Risk from surface water map on the GOV.UK website which indicates the predicted risk of surface water flooding if rainwater does not drain away through normal drainage systems or soak into the ground. The mapping indicates that the entire site is at a 'very low' risk of surface water flooding, with an annual probability of flooding less than 1:1,000.

Historic Flooding

- 4.16 Records of historic flooding and the flood outlines shown on mapping for the district are included within the SODC SFRA. No recorded incidents have occurred on or near the site, with the site shown to be well beyond any recorded flood events, the closest being 1.5km east of the site.

Recorded Flooding

- 4.17 All recorded flooding events and their outlines are shown on mapping produced by the EA. The closest recorded flood event was located 1.5 km north-east of the site coming from the Queens Mere Lake.

Summary

- 4.18 The site is located with Flood Zone 1, at the lowest risk of fluvial flooding. All other identified sources of potential flooding are considered to present a very low risk to the proposed development. It is therefore considered that the site can be developed safely in accordance with National and Local Planning Policy.

5.0 Flood Risk Assessment

- 5.1 The NPPF encourages a sequential, risk-based approach to determine the suitability of land for development. This document advises that the development of sites within Flood Zone 1 should be given preferences where available.
- 5.2 Table 2 of the PPG to the NPPF categorises different types of development into five flood risk vulnerability classifications:
- Essential Infrastructure;
 - Highly Vulnerable;
 - More Vulnerable;
 - Less Vulnerable;
 - And Water Compatible Development.
- 5.3 As discussed in Section 4, all proposed dwellings are located entirely within Flood Zone 1. Table 2 of the PPG states that all uses are appropriate for Flood Zone 1. Therefore, the proposed development use is compatible with the flood zone of the site and developing the site for its intended purposes is considered appropriate in terms of flood risk. As such, the Sequential Test and Exception Test are not required to be applied to this development.
- 5.4 The development proposals and site are considered to be at a very low risk from all other identified sources of flooding.

6.0 Surface Water Drainage

6.1 The PPG recommends that priority should be given to the use of Sustainable Drainage Systems (SuDS) as they are designed to control surface water run-off where it falls and mimic natural drainage characteristics as closely as possible. Sustainable Drainage Systems (SuDS) also provide opportunities for the following:

- Reducing the causes and impacts of flooding;
- Removing pollutants from urban run-off at source; and
- Combining water management and green space with benefits for amenity, recreation and wildlife.

6.2 The NPPF and the Building Regulations part H3 stipulate that rainwater from roofs and paved areas is carried away from surface to discharge to one of the following, listed in order of priority:

- a) An adequate soakaway or some other adequate infiltration system; or, where that is not practical;
- b) A watercourse; or, where that is not practical
- c) A sewer.

Surface Water Drainage Strategy

6.3 Since the existing drainage of the site is by soakaway field and the soils are reported as sandy and well draining, infiltration will be pursued as the primary mechanism of disposal from the site.

6.4 At this time infiltration testing results from the site are unavailable, and the strategy has therefore been developed based on an assumed infiltration rate of 1×10^{-6} m/s. This is a very conservative rate, as sandy soils would typically expect to achieve a rate in the order of 1×10^{-5} m/s or better, and therefore by showing that the strategy can work based on this conservative rate there is a very high degree of confidence that the actual site conditions will be better than assumed, meaning that any space allocation provided for soakaway features will be more than sufficient.

6.5 However, should poor infiltration rates be observed, it would be possible to drain the site using a flow-controlled discharge into the existing drainage ditch at the south east corner. This ditch currently takes the greenfield run-off from the site, and would therefore have capacity to take a new outfall from the site if controlled to greenfield rate.

6.6 As a result, there is very high confidence that the site can achieve a deliverable drainage strategy regardless of the infiltration rates achieved, and it is therefore considered acceptable to grant planning permission in advance of measured infiltration rates.

6.7 The new properties are proposed to drain via soakaways in the landscaping nearby.

6.8 Driveways and paved areas will be constructed using permeable sub-base and will drain under their own footprint into underlying soils. Check dams will be used approximately every 15m within the pavement to separate the paving into bays and promote infiltration along the full length of paving. Calculations shown in Appendix H

- 6.9 The assumed infiltration rate of the soil on the site is 1×10^{-6} m/s. This was assumed because, as discussed earlier, it is desired to be conservative at this stage since the soil on the site may have clayey elements and according to the Unified Soil Classification System clayey sands have a typical infiltration rate of 1×10^{-6} m/s. Based on these assumed rates the calculations showing the performance of the infiltration basin, soakaway and typical bay of the permeable paving in storm events up to and including the 100 year + 40% climate change allowance event have been provided in Appendix F. The calculations include a C_v value of 1. An urban creep allowance of 10% in line with the WSS standards has been included in the design. It can be seen that there is no flooding up to and including the 1-in-100 year + 40% climate change event.
- 6.10 However, it should be noted that the half drain down times for the system exceeds the 1440 minutes proposed in the SuDS manual. In order to allow additional volume to accommodate a following 1-in-10 year storm within the drain down period, additional volume has been added to the SuDS features in order to accommodate the following storm.

Table 1: Additional size for SuDS features to accommodate drain down period.

	Required size as calculated for the critical storm event	Additional volume needed for a subsequent 1-in-10 year storm	Final designed size
Soakaway A (main house)	21m long 8m wide 0.4m deep (63.8m ³)*	32.65 m ³	25m long 10m wide 0.4m deep (95m ³)*
Soakaway B (flats and garages)	8m long 3m wide 0.8m deep (18.2m ³)*	8.71m ³	9m long 4m wide 0.8m deep (27.4m ³)*

*assuming a porosity of 95% in typical geocellular attenuation crates

- 6.11 The additional volumes for the following storm have been calculated using InfoDrainage. The runoff volumes generated by each catchment area in a 1-in-10 year storm are given in Appendix I.
- 6.12 The final drainage strategy, accounting for all storm events up to and including the 1-in-100 year storm + 40% and the possibility of a subsequent 1-in-10 year storm during the drain down period, is illustrated on the Proposed Drainage Strategy given in Appendix E.
- 6.13 The strategy will be fully reviewed at detailed design once infiltration results are available. Note that it is reasonably likely that the size of soakage features will be able to be reduced following the receipt of detailed infiltration rates.

Water quality

- 6.14 Pollution control measures are designed to minimise the transmittal of any pollutants collected by runoff flowing over hard paved areas to the receiving aquifer.
- 6.15 Table 26.2 of 'The SuDS Manual' indicates the minimum treatment indices for contributing pollution hazards for different land use classifications. The treatment indices for the land uses proposed within the development are shown in Table 2. In order to deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index. Table 3 indicates the SuDS mitigation indices for each of the SuDS features proposed.
- 6.16 The pollution indices in Table 1 should be compared with the mitigation indices in Table 2 and the following formulae applied:

$$\text{Total SuDS Mitigation Index} \geq \text{Pollution Hazards Index (for each contaminant type)}$$

$$\text{Total SuDS Mitigation Index} = 1^{\text{st}} \text{ Stage Mitigation Index} + 0.5 (2^{\text{nd}} \text{ Stage Mitigation Index})$$

- 6.17 Run-off from the roofs will infiltrate to the ground through a layer of unsaturated soil below the proposed geocellular crates. Run-off from the driveway access will be treated by filtration within its own permeable sub-base before infiltration into the ground.

Table 2: Pollution Hazards Indices for Different Land Use Classifications (Table 26.2, CIRIA C753)

Land Use	Pollution Hazard Level	Pollution Hazard Indices		
		Suspended Solids	Metals	Hydrocarbons
Individual property driveways, residential car parks, low traffic roads (e.g. cul-de-sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g. schools, offices)	Low	0.5	0.4	0.4
Residential Roofs	Very Low	0.2	0.2	0.05

Table 3: SuDS Mitigation Indices (Table 26.4, CIRIA C753)

SuDS Component	Mitigation Indices		
	Suspended Solids	Metals	Hydrocarbons
A soil with good contaminant attenuation potential of at least 300m in depth (Unsaturated zone below soakaway)	0.4	0.3	0.3
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.6

Maintenance

- 6.18 All new surface water infrastructure will be designed in accordance with Appendix C of the Sewerage Sector Guidance ("The Code"), Building Regulations and best practice as appropriate.
- 6.19 Surface water infrastructure serving individual properties located within private land will be the responsibility of the property owner. Where features are shared between neighbouring properties a shared responsibility will need to be included in the property title.
- 6.20 A summary of typical maintenance activities required is given below.

Table 4: Conventional Pipe Network – Typical Maintenance Activities

Schedule	Maintenance Activity	Inspection Frequency
Regular Maintenance	CCTV survey to inspect pipework for blockages, root ingress, displaced joints, or other signs of differential settlement.	Annually, or as required
Remedial Actions	Clear pipework of blockages, root ingress, repair joints or repair other signs of differential settlement.	As required
	Replacement of pipe systems	As required

Table 5: Geo-cellular Soakaway Crates – Typical Maintenance Activities

Schedule	Maintenance Activity	Inspection Frequency
Regular Maintenance	Initial inspection and identify any areas that are not operating correctly and wither clean or replacement inlets, outlets, overflows, and/or vents	Monthly for 3 months, then annually
	Inspect / check all inlets, outlets, vents, and overflows to ensure that they are in good condition and opening and operating as designed	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Survey inside of crates for sediment build up and remove if necessary	Every 5 years or as required

Table 6: Permeable Paving – Typical Maintenance Activities

Schedule	Maintenance Activity	Inspection Frequency
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth	Three monthly, and 48 hours after large storms in the first six months.
	Monitor inspection chambers	Annually
	Check surface for signs of clogging or build-up of debris/dirt/silt etc. Particular attention of be paid to areas where water runs onto the previous surface from adjacent impermeable areas i.e. transition from aisle to parking bay	Annually
Regular Maintenance	Brush and/or vacuum surface	Based on site-specific observations of clogging (see above, or else annually (after autumn fall))
Occasional Maintenance	Stabilise and mow adjacent grassed areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator (rather than spraying)	As required, or else annually
Remedial Actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
	Replacement of pavement system	As required

7.0 Summary and Conclusions

Summary

- 7.1 This Flood Risk Assessment has been prepared by Glanville Consultants on behalf of Mr T Nasser at the request of Anderson Orr Architects Ltd to accompany a planning application for residential development at Warren Crest Farm, Wick Hill Lane, Finchamstead, RG40 3PY.
- 7.2 This assessment has been prepared in accordance with the requirement of National Planning Policy Framework, Planning Practice Guidance, and with reference to the relevant Strategic Flood Risk Assessment and National and Local drainage standards.
- 7.3 The report concludes that the site is at very low risk from all sources of flooding, including allowance for the potential effects of climate change. Flood risk to the site and surrounding area will not increase as a result of the development
- 7.4 The proposed surface water drainage strategy strives to utilise sustainable drainage techniques in accordance with the guidance in CIRIA C753 and employs a combination of permeable pavement, and geocellular soakaways to provide infiltration and treatment of surface water flows generated by the proposed development.
- 7.5 InfoDrainage calculations demonstrate no flooding will occur on-site for all storm events up to and including a 1 in 100-year storm with +40% accounting for climate change, and includes an allowance for a following storm where drain down times do not meet the preferred criteria.

Conclusion

- 7.6 In conclusion, this report demonstrated that the proposed development:
- Is in accordance with National Planning Policy Framework;
 - Will not be at an unacceptable risk from surface water flooding or other sources;
 - Will not increase flood risk elsewhere; and
 - Will employ a surface water drainage strategy based on the principles of sustainable drainage.
- 7.7 The proposals are therefore considered to fully comply with nation, regional and local planning policy

Appendices



Appendix A

Site Location Plan





NOTES

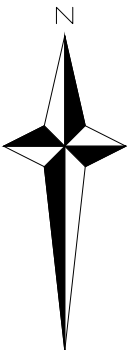
- 1. This drawing is to be read in conjunction with all other documents and specifications
- 2. Dimensions not to be scaled from drawing

LOCATION

Nearby postcode: RG40 3PY
Grid reference: Easting: 480079
Northing: 164557

KEY

Approximate site boundary ————



P2	Updated Site Boundary	April 2025	APu	LM
P1	First Drawing	April 2025	APu	LM
Rev.	Description	Date	By	Chkd



Survey > Plan > Engineer

 Civil Engineering

 Structural Engineering

 Transport Planning

 Highways Engineering

 Building Surveying

 Geomatics

Hertfordshire

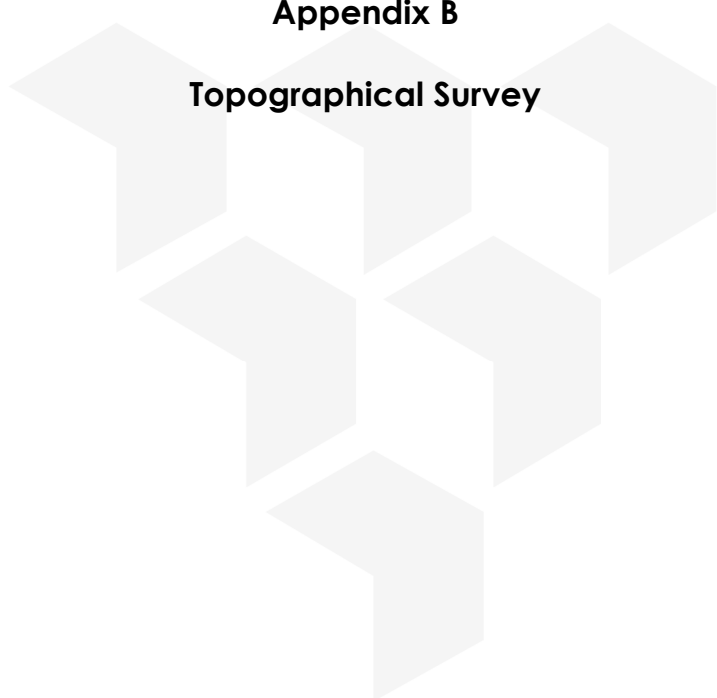
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Cambridgeshire

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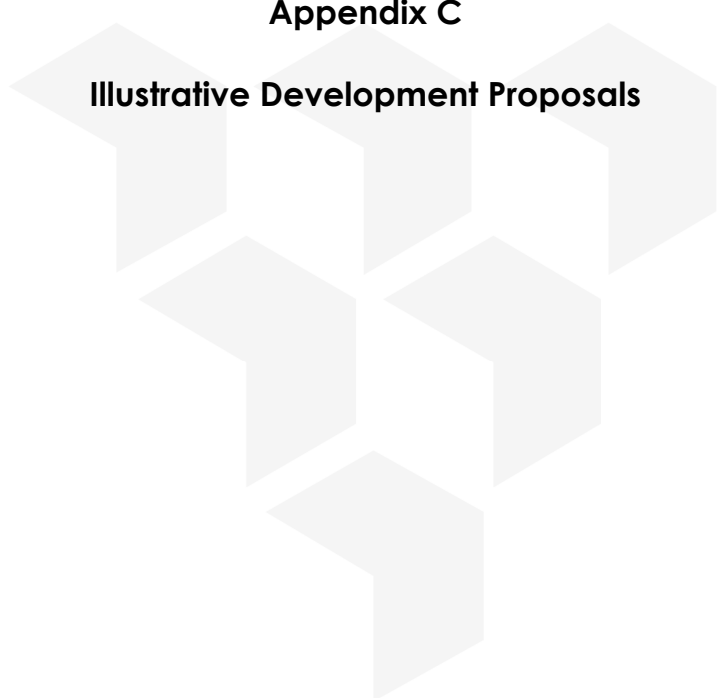
Client :	
Anderson Orr Architects Ltd	
Project :	Warren Crest Farm, Finchampstead, RG40 3PY
Title :	Site Location Plan
Engineer : APu	Date : April 2025
Director : KR	Scale : NTS
Status :	Planning

Drawing No.	Rev
8250146 – SK01	P2



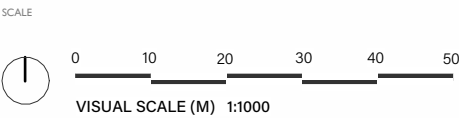
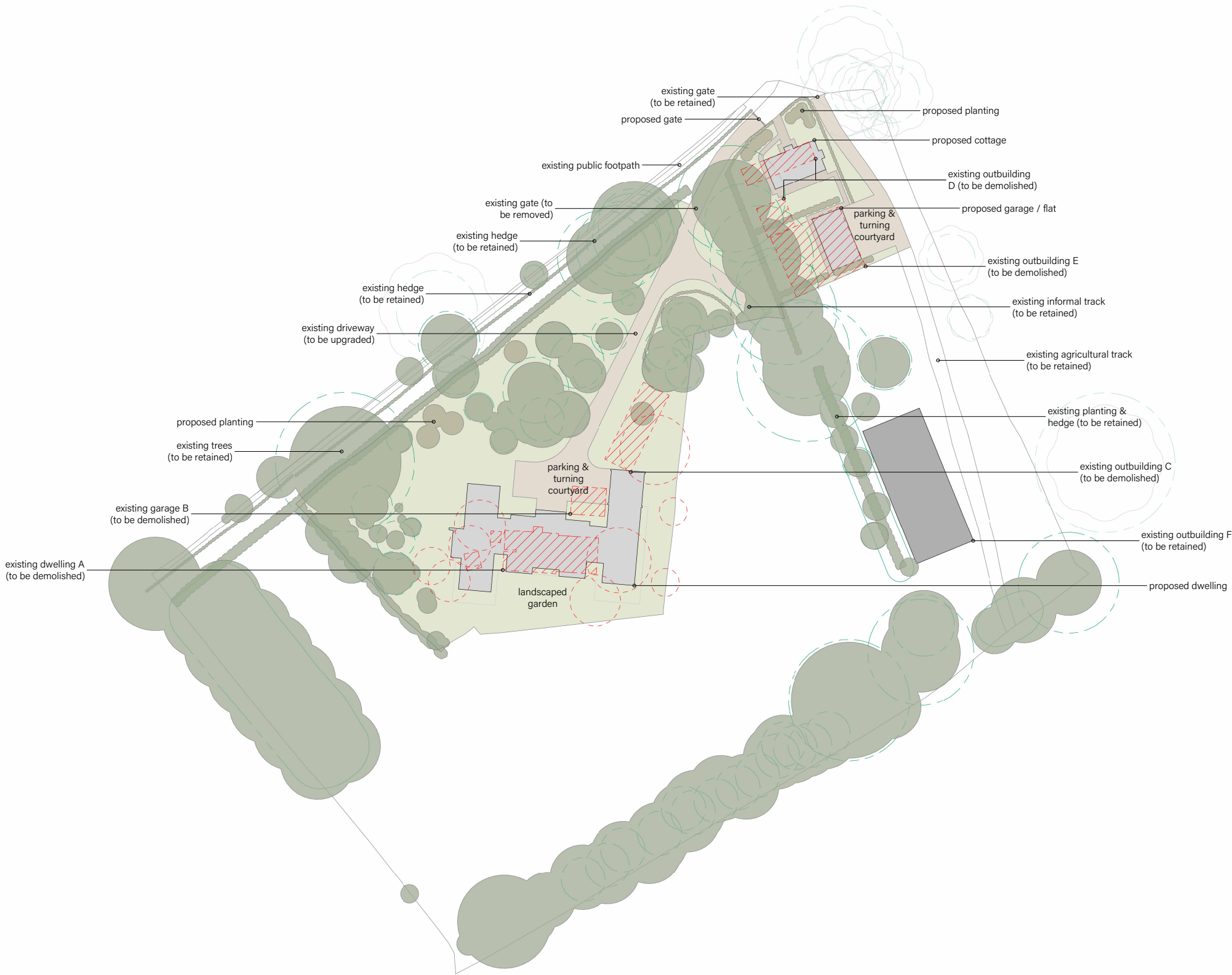
Appendix B

Topographical Survey



Appendix C

Illustrative Development Proposals



GENERAL NOTE
ALL DIMENSIONS MUST BE CHECKED ON SITE AND NOT SCALED FROM THIS DRAWING

FOR USE IN PRECISE NAMED LOCATION ONLY
ANDERSON ORR ARCHITECTS LTD. © ALL RIGHTS RESERVED

REVISIONS

Legend

- Existing trees
- Proposed trees
- Root protection area (in accordance with Sarah Venner's TCP)
- Existing structures (to be demolished)

C	MINOR AMENDMENTS	23/04/25
B	MINOR AMENDMENTS	02/04/25
A	DRAWING AMENDMENTS	14/10/24
REVISION	DESCRIPTION	DATE

STATUS

PLANNING

PROJECT TITLE
WARREN CREST FARM, WICK HILL LANE, FINCHAMPSTEAD, RG40 3PY

DRAWING TITLE
PROPOSED SITE PLAN

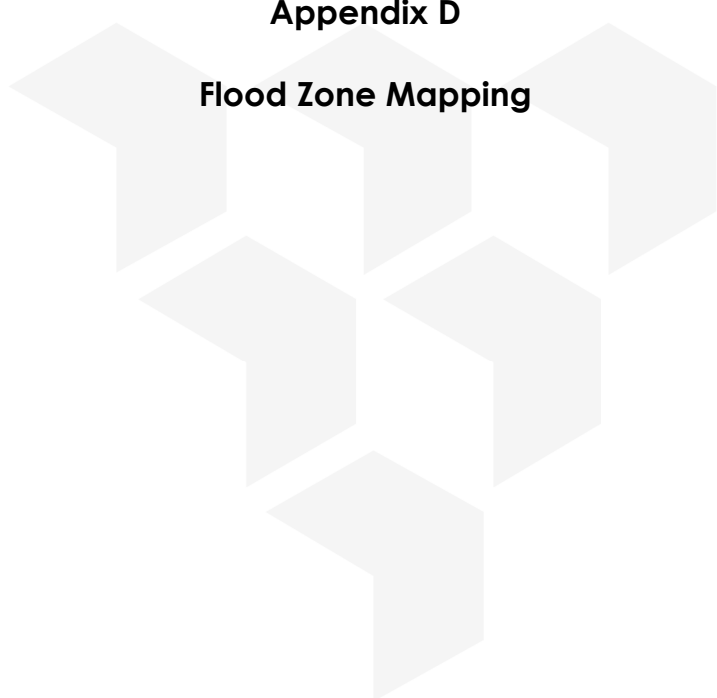
FIRST ISSUED	DRAWN	SCALE (A3)
13/09/24	WH	1:1000

PROJECT - DRAWING NO - REVISION

23046-PP2013-C

The Big Barn: Units 8-10, Oddington Grange,
Weston-on-the-Green, Oxfordshire, OX25 3QW
+44 (0) 1865 873936 | info@andersonorr.com | andersonorr.com

AndersonOrr



Appendix D

Flood Zone Mapping

Flood map for planning

Your reference
Unspecified

Location (easting/northing)
480083/164584

Created
29 April 2025 11:06

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- in an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2025 AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

Your reference

Unspecified

Location (easting/northing)
480083/164584

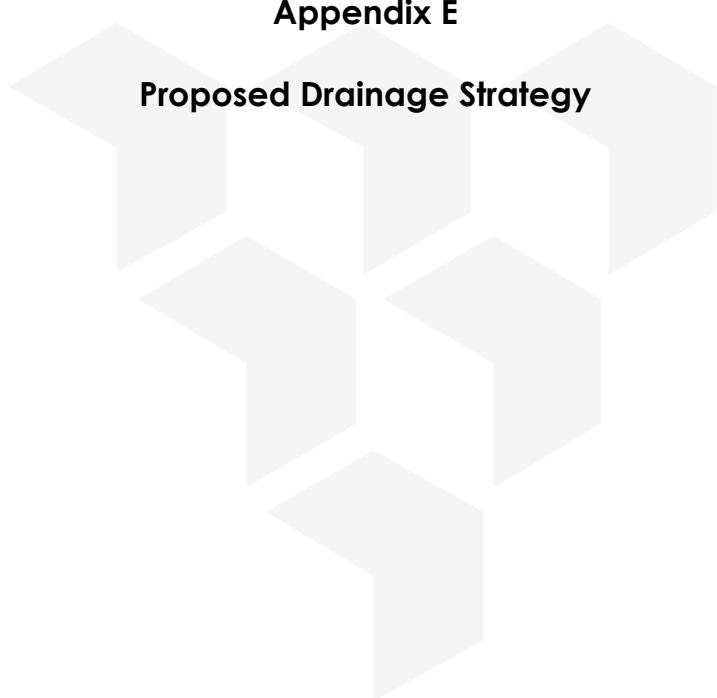
Scale
1:2,500

Created
29 Apr 2025 11:07

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area

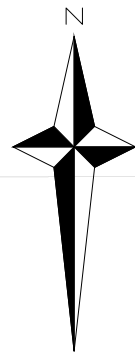


0 20 40 60m



Appendix E

Proposed Drainage Strategy



Pavement will have a porous sub-base depth of 0.39m with an assumed porosity of 30%.
Pavement surface may be permeable or non-permeable to suit roundscaping design, but will have a porous sub-base for infiltration beneath

Pipe alignment to avoid tree root zones as much as possible.
Pipe through root zone of retained trees to be sensitively installed using methodology approved by the arboriculturalist

Geocellular crate soakaway
Dimensions: L 25m x W 10m x 0.4m H
Assumed infiltration rate = 1×10^{-6} m/s
Assumed porosity = 95%
Cover level ~ 86.20
Crate invert level ~ 84.80
Top of crate level ~ 85.20

0.2m thick check dams approximately every 15m to separate paving into bays due to approximately 1:60 fall at surface

Geocellular crate soakaway
Dimensions: L 9m x W 4m x 0.8m H
Assumed infiltration rate = 1×10^{-6} m/s
Assumed porosity = 95%
Cover level ~ 84.45
Crate invert level ~ 82.65
Top of crate level ~ 83.45

NOTES:

1. This drawing is to be read in conjunction with all other drawings and specifications.
2. Any discrepancies found between information shown on this or any other drawing shall be reported to the engineer.
3. Dimensions to be scaled for planning purposes only.
4. Drainage runs and inspection chamber locations are shown indicatively all details subject to detailed design.
5. Refer to architects drawings for rain water pipe locations.
6. All rainwater downpipes to be provided with above ground roddable access points.
7. All RWP connections to be 100mm at minimum gradient of 1 in 80 unless otherwise noted on schedules.
8. Private pipework may be either VC or thermoplastic structured wall sewer pipe and shall comply with WIS 4-35-01. Pipes shall be BSI Kitemarked, or have equivalent third part certification.
9. All works to be to Building Regulations Part H.
10. All pipeworks shall join at soffit level unless stated otherwise.
11. It is the contractor's responsibility to ensure that all services that are affected by the works are located prior to works commencing. Trial holes are to be dug if necessary.
12. All manhole chamber covers to be installed parallel to final kerbs, edgings, paving joints or building lines as appropriate.

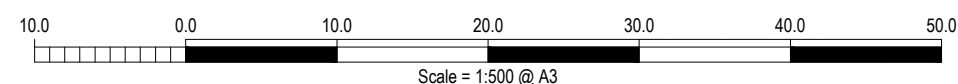
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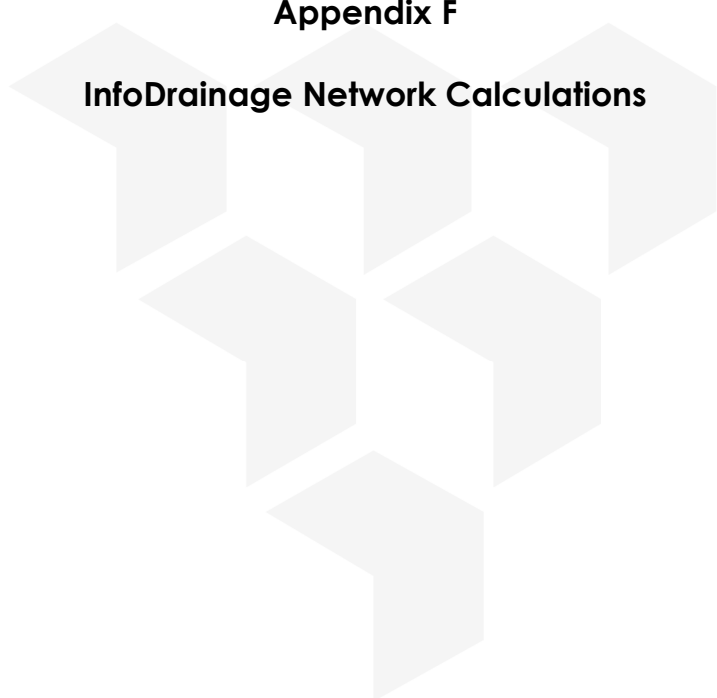
- Paving with porous sub-base, fully infiltrating its own footprint
- Proposed manhole / inspection chamber
- Proposed surface water pipe
- Proposed geocellular soakaway formed of Aquacell crates or similar
- Site boundary
- New buildings

P2	Updated site boundary	April 2025	APu	LM
P1	Draft for comments	April 2025	APu	LM
Rev.	Description	Date	By	Chkd



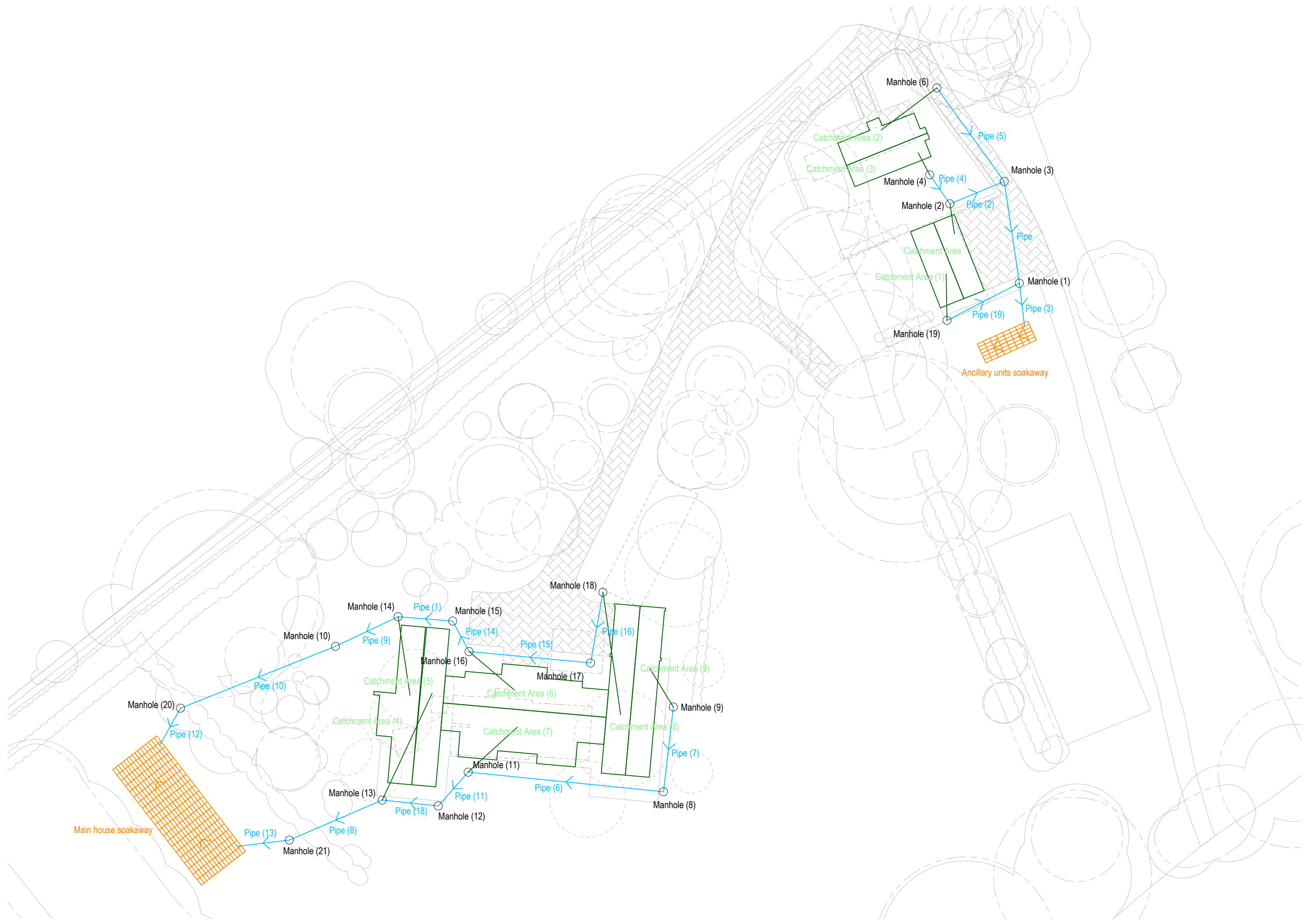
Client : Anderson Orr Architects Ltd	
Project : Warren Crest Farm	
Title : Surface Water Drainage Strategy	
Engineer : APu	Date : April 2025
Director : KR	Scale : 1:500 @ A3
Status : Planning	
Drawing No. 8250146 /1001	Rev P2





Appendix F

InfoDrainage Network Calculations



Project:	Date: 08/04/2025		
	Designed by: LMoxon	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		



Ancillary units soakaway

Type : Cellular Storage

Dimensions

Exceedance Level (m)	84.450
Depth (m)	0.800
Base Level (m)	82.650
Number of Crates Long	8
Number of Crates Wide	6
Number of Crates High	2
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.4
Total Volume (m³)	19.240

Advanced

Base Infiltration Rate (m/hr)	0.0036
Side Infiltration Rate (m/hr)	0.0036
Safety Factor	2.0



Main house soakaway

Type : Cellular Storage

Dimensions

Exceedance Level (m)	86.200
Depth (m)	0.400
Base Level (m)	84.800
Number of Crates Long	21
Number of Crates Wide	16
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	1
Crate Width (m)	0.5
Crate Height (m)	0.4
Total Volume (m³)	64.840

Advanced

Base Infiltration Rate (m/hr)	0.0036
Side Infiltration Rate (m/hr)	0.0036
Safety Factor	2.0

Project:	Date: 08/04/2025		
	Designed by: LMoxon	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Company Address:	



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Manhole (2)		Time of Concentration	0.004	100	10	110	0.004
Catchment Area (1)	Manhole (19)		Time of Concentration	0.004	100	10	110	0.005
Catchment Area (2)	Manhole (6)		Time of Concentration	0.004	100	10	110	0.005
Catchment Area (3)	Manhole (4)		Time of Concentration	0.004	100	10	110	0.004
Catchment Area (4)	Manhole (14)		Time of Concentration	0.009	100	10	110	0.010
Catchment Area (5)	Manhole (13)		Time of Concentration	0.008	100	10	110	0.009
Catchment Area (6)	Manhole (16)		Time of Concentration	0.012	100	10	110	0.013
Catchment Area (7)	Manhole (11)		Time of Concentration	0.015	100	10	110	0.016
Catchment Area (8)	Manhole (18)		Time of Concentration	0.009	100	10	110	0.009
Catchment Area (9)	Manhole (9)		Time of Concentration	0.009	100	10	110	0.009
TOTAL		0.0		0.077				0.085

Project:	Date: 08/04/2025			
	Designed by: LMoxon	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	10
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project:	Date: 08/04/2025			
	Designed by: LMoxon	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:			



Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Ancillary units soakaway	FSR: 100 years: +40 %: 1440 mins: Winter	83.409	83.409	0.759	0.759	0.5	17.311	0.000	3.106	0.0	0.064	7928	10.028
Main house soakaway	FSR: 100 years: +40 %: 1440 mins: Winter	85.201	85.201	0.401	0.401	2.1	63.895	0.000	15.835	0.0	0.000	5853	1.457

Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
	LMoxon			
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:			

Status
OK
OK

Appendix G

Sewer Records

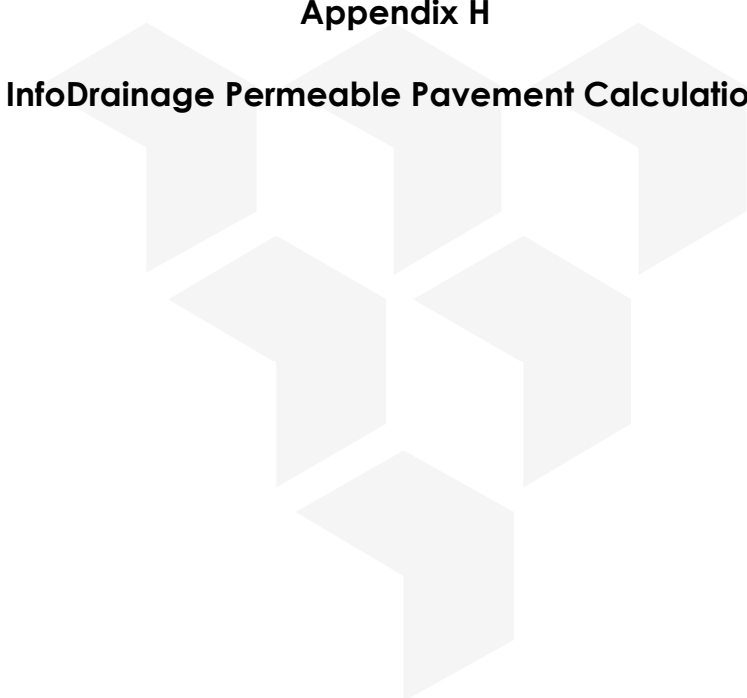
[illegible]

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 480173,164791

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 with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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



Appendix H

InfoDrainage Permeable Pavement Calculations

Project:	Date: 16/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:			Company Address:	
Type: Stormwater Controls Storm Phase: Phase				



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	84.900
Depth (m)	0.600
Base Level (m)	84.300
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	100000.0
Porosity (%)	30
Length (m)	15.000
Long. Slope (1:X)	60.00
Width (m)	4.300
Total Volume (m³)	9.481

Advanced

Base Infiltration Rate (m/hr)	0.0036
Side Infiltration Rate (m/hr)	0.0036
Safety Factor	2.0
Conductivity (m/hr)	10000.0

Project:	Date: 16/04/2025		
	Designed by: apurvis	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Company Address:	



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.006	100	10	110	0.007
TOTAL		0.0		0.006				0.007

Project:	Date: 16/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	apurvis Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	10
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project:	Date: 16/04/2025			
	Designed by: apurvis	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:			

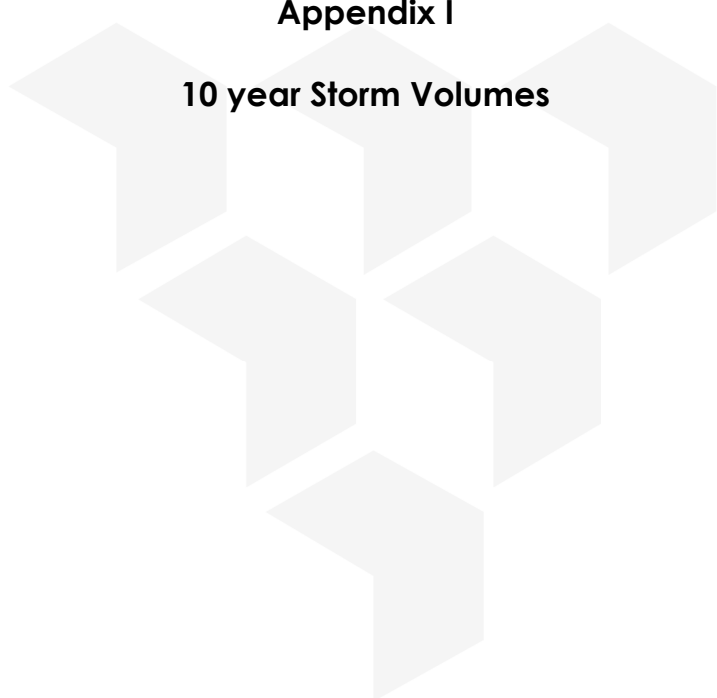


Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Porous Paving	FSR: 100 years: +40 %: 1440 mins: Winter	84.736	84.736	0.186	0.436	0.2	6.018	0.000	5.960	0.0	0.000	1377	36.529

Project:	Date: 16/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	apurvis			
	Company Address:			

Status
OK



Appendix I

10 year Storm Volumes

Project:	Date: 08/04/2025		
	Designed by: apurvis	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Company Address:	



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Manhole (2)		Time of Concentration	0.004	100	10	110	0.004
Catchment Area (1)	Manhole (19)		Time of Concentration	0.004	100	10	110	0.005
Catchment Area (2)	Manhole (6)		Time of Concentration	0.004	100	10	110	0.005
Catchment Area (3)	Manhole (4)		Time of Concentration	0.004	100	10	110	0.004
Catchment Area (4)	Manhole (14)		Time of Concentration	0.009	100	10	110	0.010
Catchment Area (5)	Manhole (13)		Time of Concentration	0.008	100	10	110	0.009
Catchment Area (6)	Manhole (16)		Time of Concentration	0.012	100	10	110	0.013
Catchment Area (7)	Manhole (11)		Time of Concentration	0.015	100	10	110	0.016
Catchment Area (8)	Manhole (18)		Time of Concentration	0.009	100	10	110	0.009
Catchment Area (9)	Manhole (9)		Time of Concentration	0.009	100	10	110	0.009
TOTAL		0.0		0.077				0.085

Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Inflow Results Storm Phase: Phase	apurvis			



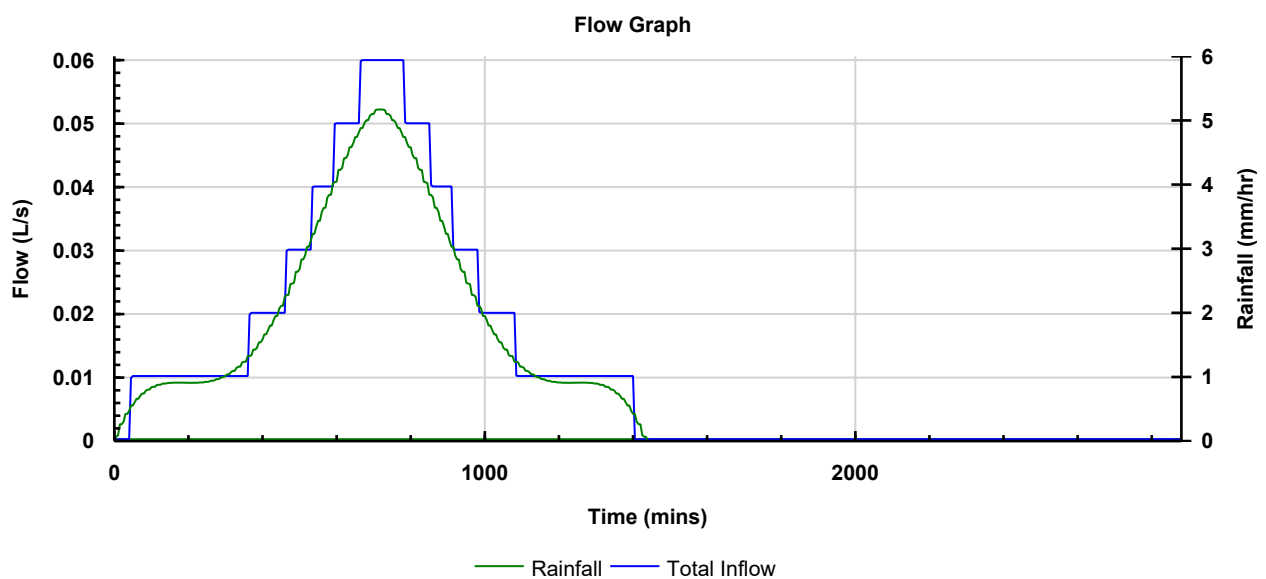
Catchment Area
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	2.016

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Inflow Results Storm Phase: Phase	apurvis			



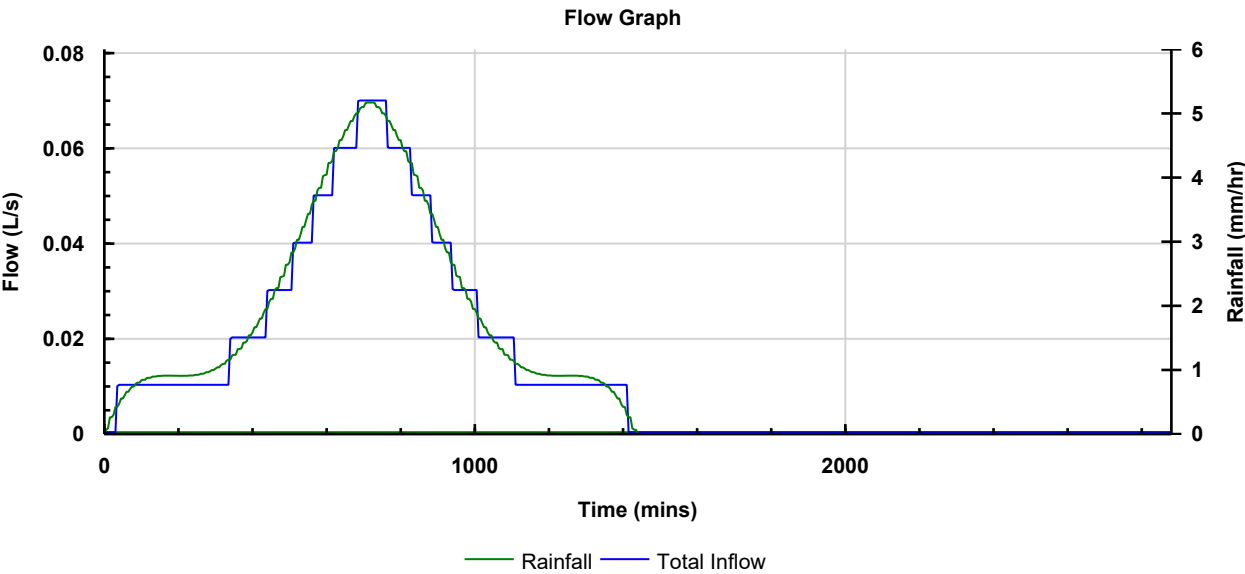
Catchment Area (1)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	2.256

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Inflow Results Storm Phase: Phase	apurvis			



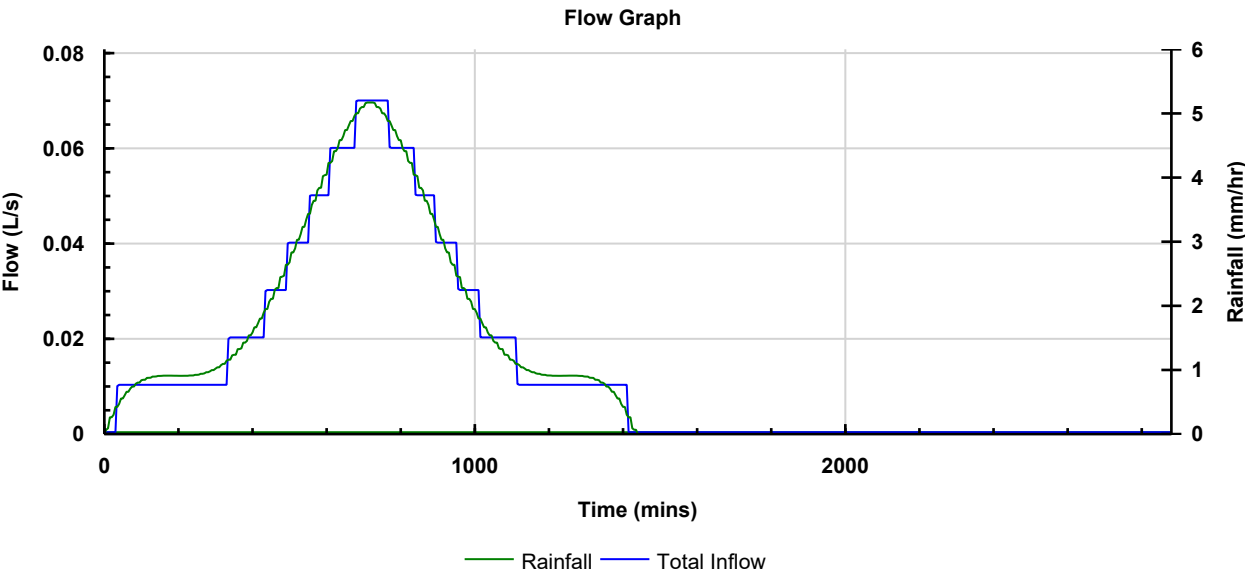
Catchment Area (2)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	2.316

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Inflow Results Storm Phase: Phase	apurvis			



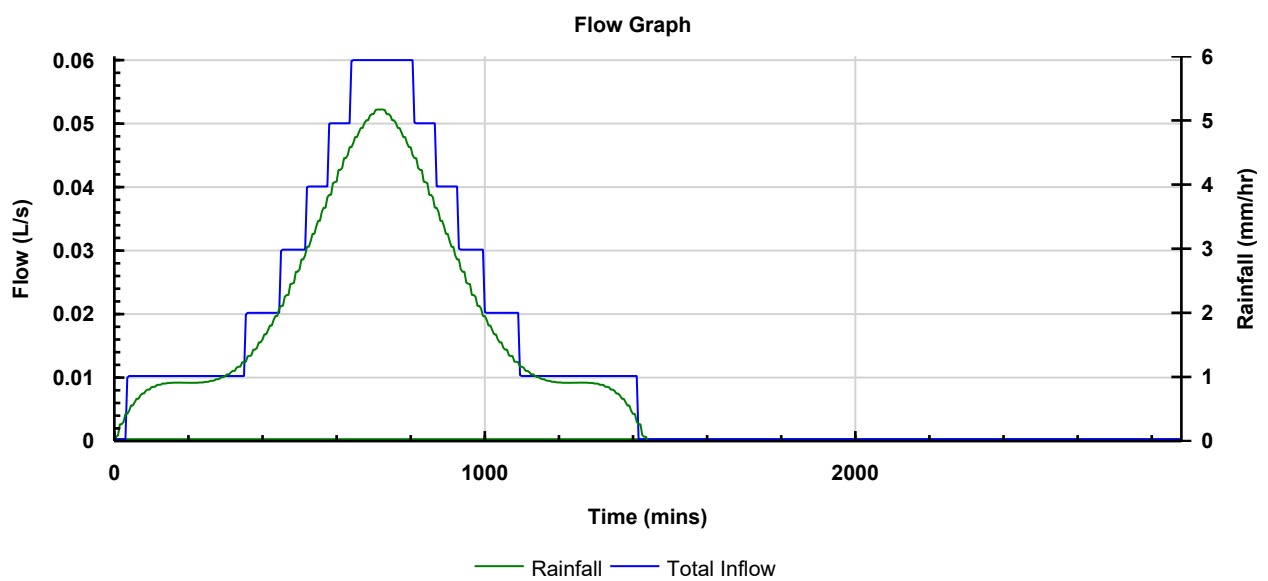
Catchment Area (3)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	2.124

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	apurvis			
	Company Address:			



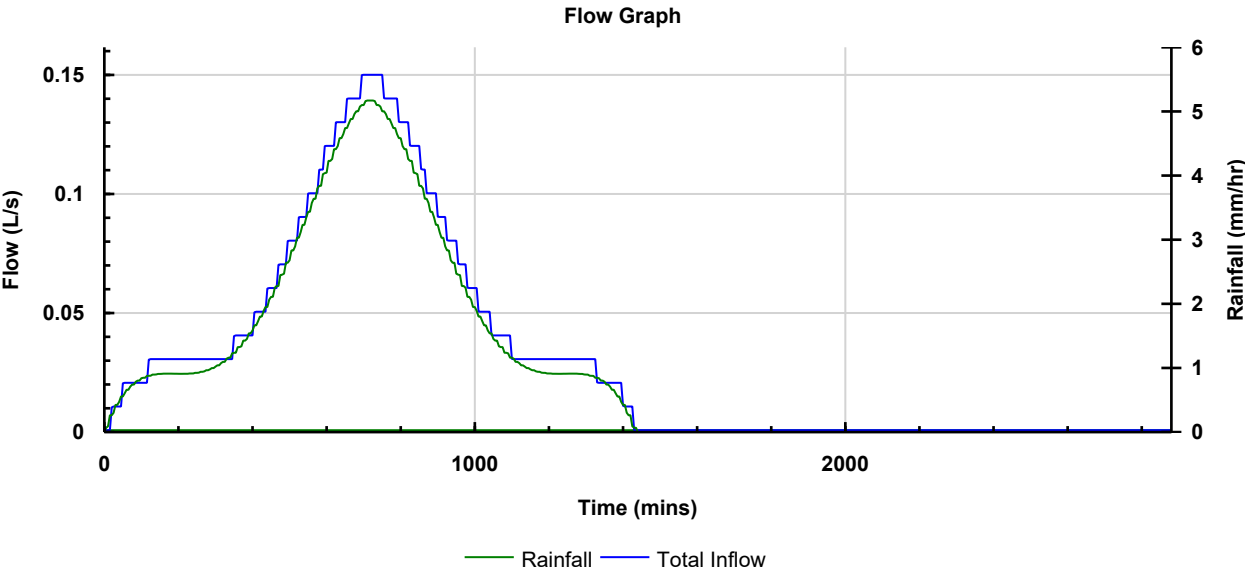
Catchment Area (4)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.2
Total Inflow Volume (m³)	5.160

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	apurvis			
	Company Address:			



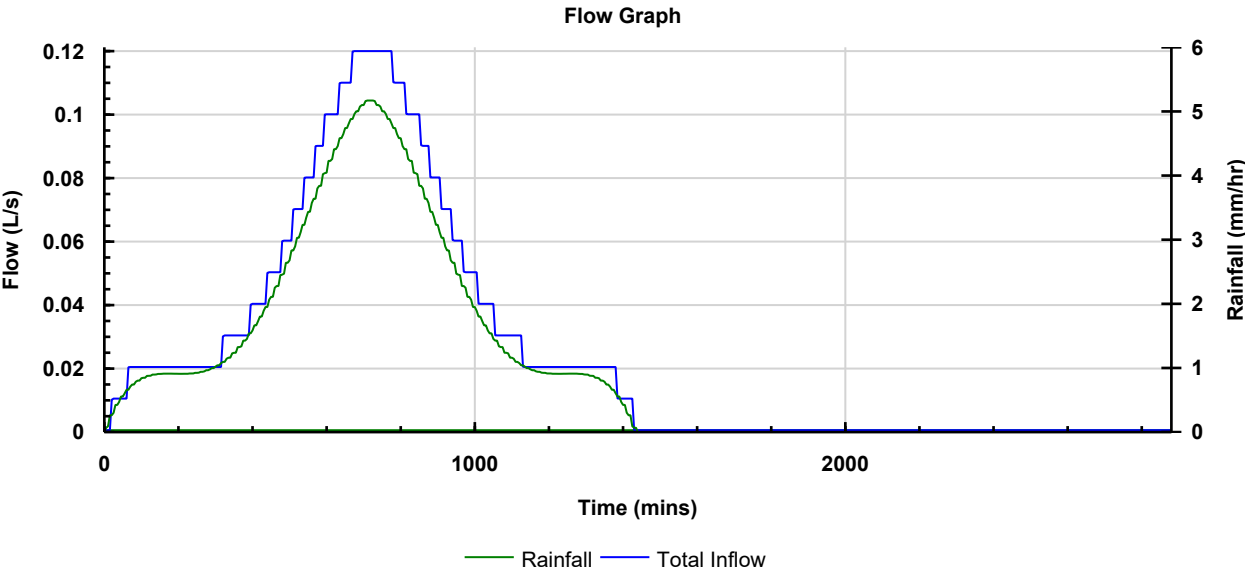
Catchment Area (5)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	4.152

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	apurvis			
	Company Address:			



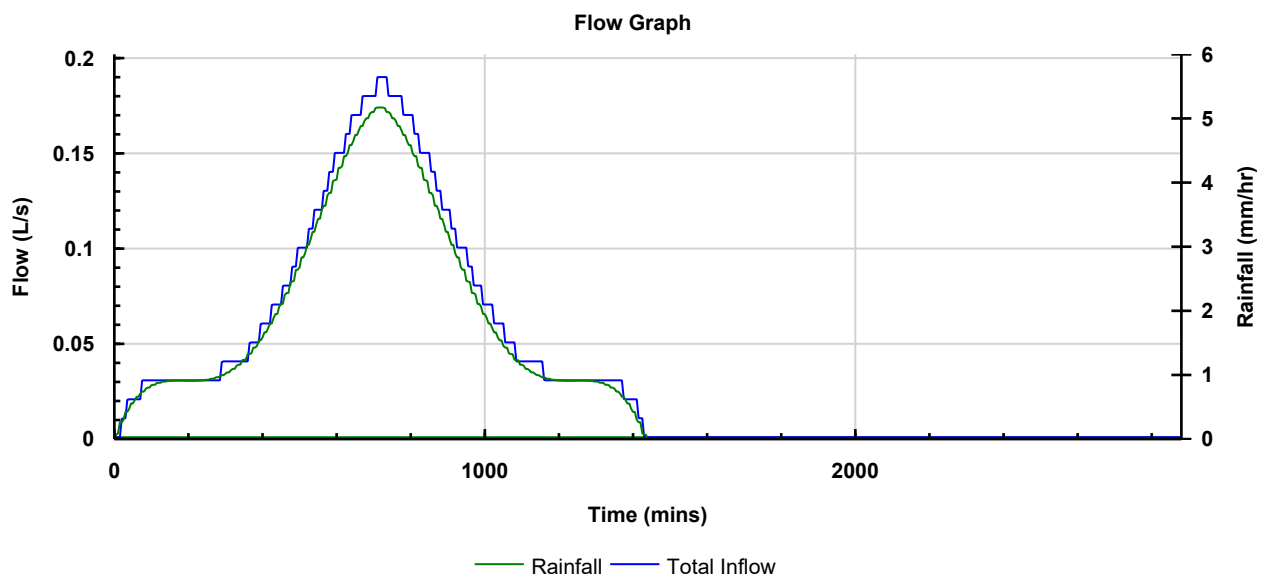
Catchment Area (6)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.2
Total Inflow Volume (m³)	6.348

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	apurvis			
	Company Address:			



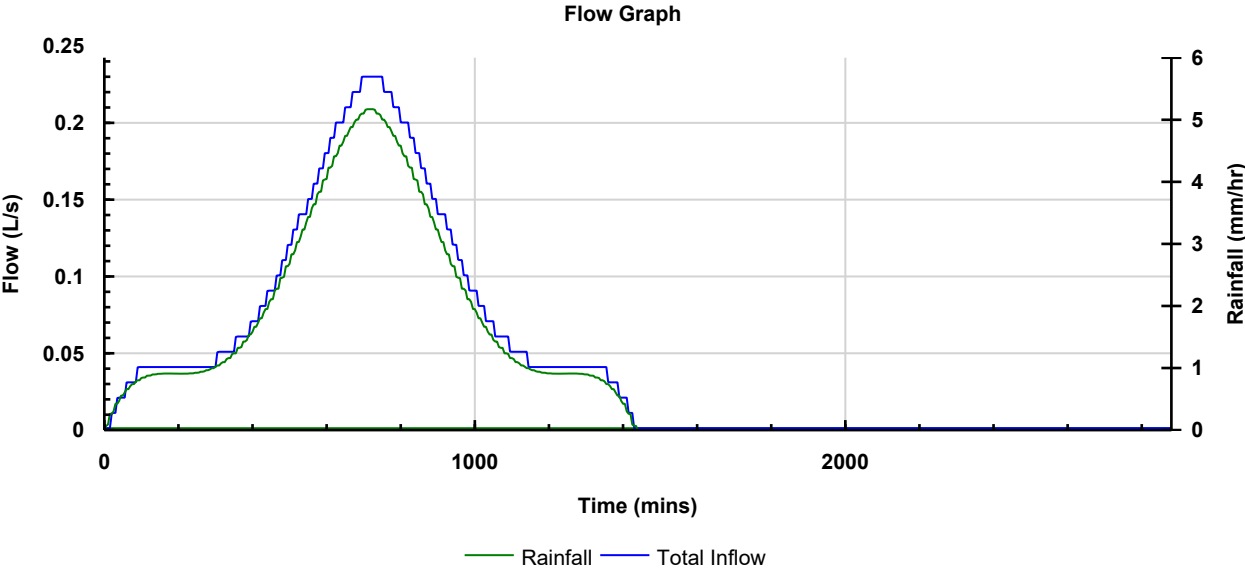
Catchment Area (7)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.2
Total Inflow Volume (m³)	7.848

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Inflow Results Storm Phase: Phase	apurvis			
	Company Address:			



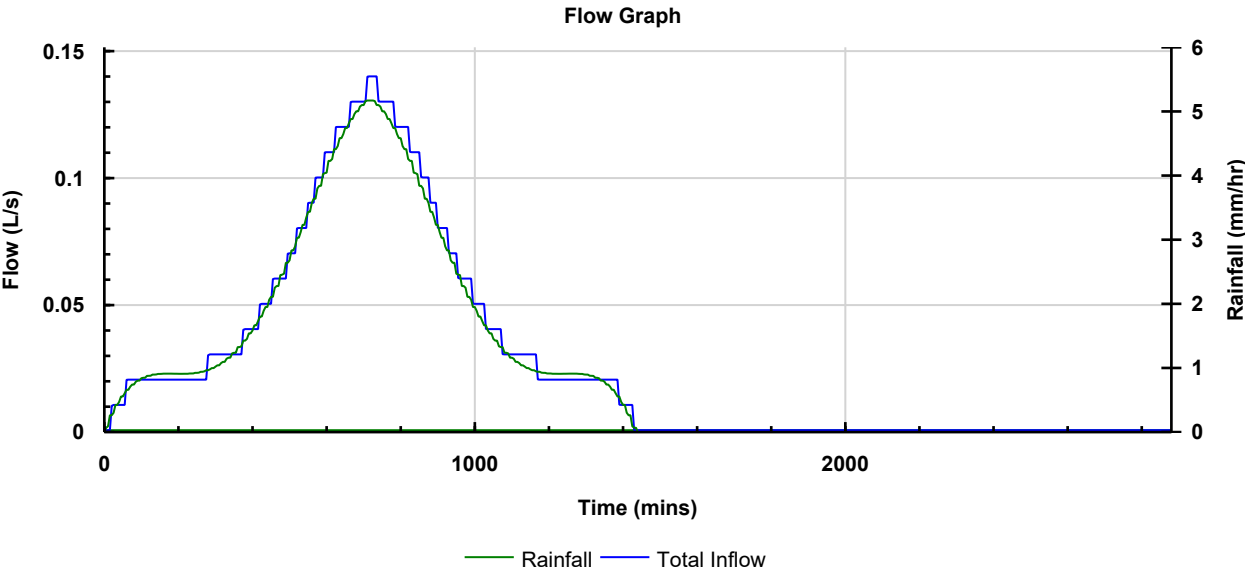
Catchment Area (8)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	4.572

Graphs



Project:	Date: 08/04/2025			
	Designed by:	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Inflow Results Storm Phase: Phase	apurvis			



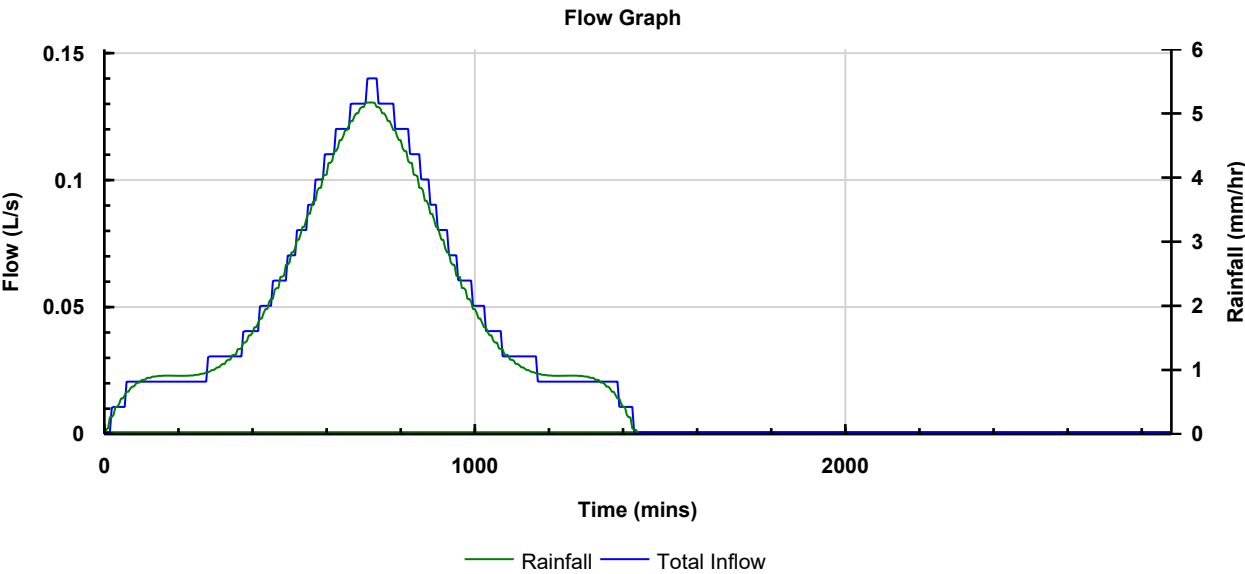
Catchment Area (9)
FSR: 10 years: Increase Rainfall (%): +0: 1440 mins: Winter

Type : Catchment Area

Inflow

Max. Inflow (L/s)	0.1
Total Inflow Volume (m³)	4.572

Graphs



Hertfordshire

|

Oxfordshire

|

Cambridgeshire

|

Bristol

postbox@glanvillegroup.com | www.glanvillegroup.com



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Boundary Way, Hemel Hempstead, Hertfordshire, HP2 7TE