



FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

BOSWORTH LAKESIDE LODGES

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1.0 INTRODUCTION

- 1.1 Golby and Luck on behalf of Bosworth Lakeside Lodges have commissioned ADC Infrastructure Limited to produce a joint Flood Risk Assessment (FRA) and Drainage Strategy report in support of a full planning application for a development of up to 40 holiday lodges, spa building, activity pods and associated infrastructure, the proposal is to extend the recently constructed Bosworth Lakeside Lodges (planning reference: 20/00026/FUL) to the adjacent field to the east, on the southern side of Wellsborough Road in Market Bosworth.
- 1.2 This report assesses the flood risk to the site and proposes an appropriate foul and surface water drainage strategy for the proposed development. It has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG). It investigates the flood risk posed to the site from fluvial, pluvial, sewer and groundwater-based sources. A section in this report provides recommendations for mitigation and an analysis of any likely residual risks.
- 1.3 An initial drainage strategy for surface water seeks to identify the potential constraints that need to be considered as the development proposals progress. Leicestershire County Council (LCC) as the Lead Local Flood Authority (LLFA) and Severn Trent Water have been consulted as the relevant statutory authorities to inform the drainage strategy for the site.

2.0 SITE DESCRIPTION

- 2.1 The site is located to the south of Wellsborough Road in Market Bosworth and currently comprises of greenfield land. Significant nearby settlements include Leicester, approximately 14.2 miles to the east, Nuneaton, approximately 9.4 miles to the south, and Tamworth approximately 13 miles to the west.
- 2.2 The location of the site is included in Figure 1 and is centred upon OS grid reference 438838, 303055.

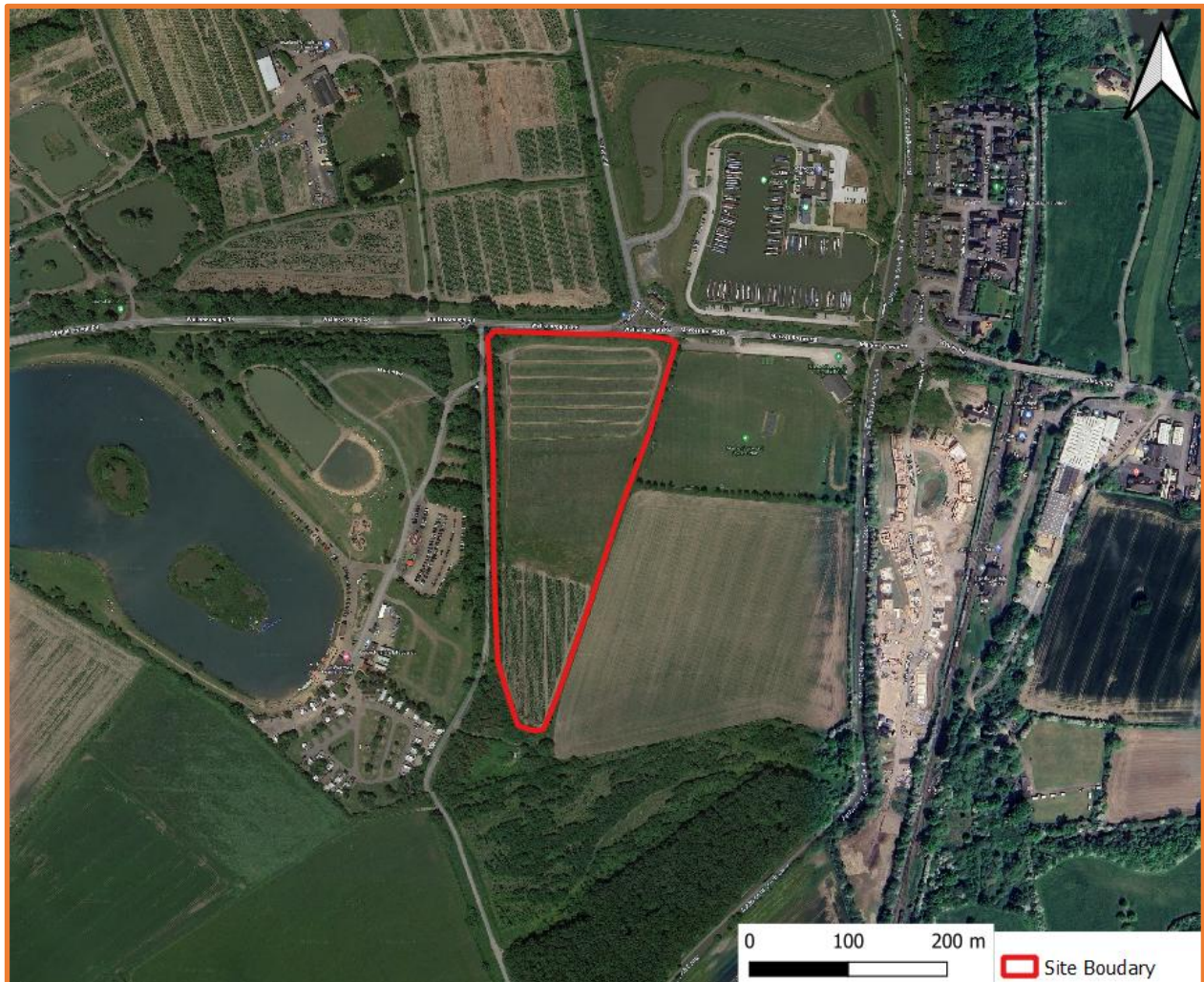


Figure 1: The site location with the red line boundary shown.

Topography

- 2.3 A topographical survey shown in **Appendix A** has been undertaken.
- 2.4 The survey shows that the highest point of the site is situated on the northeastern boundary at approximately 92m AOD, and falls to the west and south, with the lowest point being in the south-west corner at 87.40m AOD.
- 2.5 The survey shows evidence of a drainage ditch that runs in a southerly direction along the western boundary of the site. However, the ditch itself was not surveyed thoroughly and therefore some ditch levels are missing.

- 2.6 Publicly available LiDAR datasets covering the site, and the surrounding area have been obtained and reviewed to gain a better appreciation of the general topography of the area.
- 2.7 Contour lines were then extracted from the LiDAR data to form a digital elevation model, an extract of which is presented within Figure 2.
- 2.8 The LiDAR data demonstrates ground levels within the catchment surrounding the site to decline towards an unnamed ordinary watercourse and lake to the east of the site.

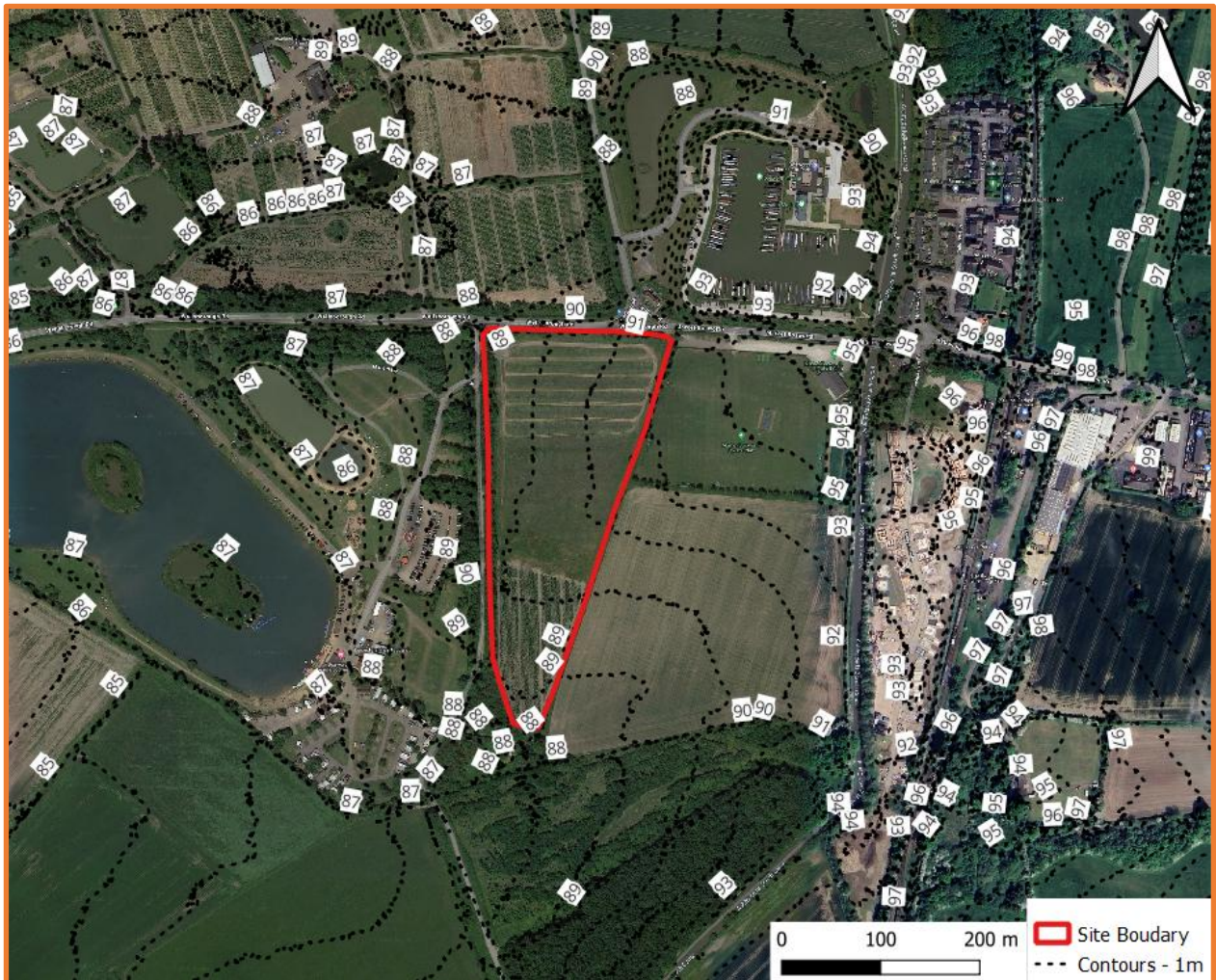


Figure 2: LiDAR map showing the elevation (m AOD) for the site and surrounding area.

Existing drainage

- 2.9 The site is greenfield in nature and as such is assumed to not be currently served by any adopted drainage infrastructure.
- 2.10 A minor watercourse flows in a south-easterly direction to the south-west of the site and ultimately outfalls into the Stoke Golding Brook to the South. A ditch network runs in a southerly direction along the site's western boundary. Given the topography of the site and the route of the ditch network and watercourse it is believed the existing runoff drains via a combination of overland flow into the ditch network and slow infiltration into the surrounding soils.

- 2.11 No Main Rivers are shown on the Flood Risk Map for Planning in close proximity to the site, therefore the watercourses and ditches in the site vicinity are assumed to be designated as Ordinary Watercourses.
- 2.12 The site is located outside of the Internal Drainage Board authoritative extents and as such any Ordinary Watercourses are subject to the regulatory requirements of the Lead Local Flood Authority (Leicestershire County Council).

Geology

- 2.13 The British Geological Survey (BGS) online mapping was reviewed to give an indication of the underlying ground conditions on site. The online mapping shows that the bedrock geology and superficial deposits are as follows:

- **Bedrock Geology:**

- Gunthorpe Member - Mudstone. Sedimentary bedrock formed between 247.1 and 237 million years ago during the Triassic period.

- **Superficial Deposits:**

- Bosworth Clay Member - Clay and silt. Sedimentary superficial deposit formed between 480 and 423 thousand years ago during the Quaternary period.

Soils

- 2.14 The Cranfield Soil and Agrifood Institute Soils mapping for the site was also reviewed. The mapping defined the underlying soil classification as:
- **Soilscape 18:** Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (majority).
 - **Soilscape 20:** Loamy and clayey floodplain soils with naturally high groundwater (southern tip)

Onsite drainage implications

- 2.15 Based upon the available data on the nature of the underlying soils and geology, it appears as through the site will possess low infiltration rates.
- 2.16 However, further investigation into ground conditions is required to make an informed judgement upon the true nature of onsite infiltration capacities. It is advised that any infiltration testing should be undertaken following BRE365 guidance.

Flood warnings/flood alert

- 2.17 Publicly available mapping demonstrates that the site is not located within a catchment that receives the EA flooding warning service.

4.0 PLANNING CONTEXT

Flood and Water Management Act

4.1 In combination with the Flood Risk Regulations, 2010 (which enact the EU Floods Directive in England and Wales), the Flood and Water Management Act places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues. The Act and Regulations together raise the requirements and targets that Local Authorities need to meet; this includes:

- to plan an active role in leading flood risk management in an area,
- the development of a Local Flood Risk Management Strategy,
- to prepare preliminary flood risk assessments (PFRAs), flood hazard and risk maps, and flood risk management plans (FRMPs),
- to develop and implement drainage and flood risk management strategies,
- to be responsible for the approval, adoption, and subsequent maintenance of Sustainable Urban Drainage Systems (SuDS)¹.

4.2 The Lead Local Flood Authority (LLFA) for the site are Leicestershire County Council, who have the responsibility for the management of flood risk for the local area. Their standard guidance has been consulted in the preparation of this flood risk assessment and drainage strategy, and a copy of their formal response can be found in **Appendix D**.

The National Planning Policy Framework (NPPF)

4.3 The NPPF sets out the government's planning policies for England and the expectations of how these policies should be applied. It acts as guidance for local planning authorities and decision-makers, both in drawing up plans and making decisions about individual planning applications.

4.4 Chapter 14 of the NPPF sets out how the government intends decision-making authorities to meet the challenge of climate change plus flooding and coastal change. Paragraph 170 sets out how inappropriate development in areas at risk of flooding should be avoided by directing development away from these areas, but where development is necessary, making it safe for its lifetime without increasing the flood risk elsewhere²

4.5 Paragraph 175 advises:

“The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).”³

4.6 Paragraph 177 advises:

¹ (GOV.UK, 2010). Flood and Water Management Act. Chapter 2. Section 9.

² (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg 49. Paragraph 170.

³ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg 50. Paragraph 175

“Having applied the sequential test, if it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.”⁴

4.7 Paragraph 178 advises that:

“The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and*
- b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.”⁵*

4.8 Paragraph 181 continues to advise that:

“When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location.*
- b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment.*
- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate.*
- d) any residual risk can be safely managed;*
- e) and safe access and escape routes are included where appropriate, as part of an agreed emergency plan”⁶*

4.9 Paragraph 182 further advises that:

“Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

- a) take account of advice from the lead local flood authority;*

⁴ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg 51. Paragraph 177.

⁵ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg 51. Paragraph 178.

⁶ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg 51. Paragraph 181.

- b) *have appropriate proposed minimum operational standards; and,*
c) *have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development;”⁷*

4.10 Annex 3 of the NPPF defines development type by its associated vulnerability to flooding, this is reproduced within the table below.

Vulnerability Classification	Definition
Essential Infrastructure	Essential transport infrastructure (including mass evacuation routes) which must cross the area at risk. Essential utility infrastructure which must be located within a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. Wind turbines. Solar farms
Highly Vulnerable	Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. Emergency dispersal points. Basement dwellings. Caravans, mobile homes, and park homes intended for permanent residential use. Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or waterside locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as ‘Essential Infrastructure’).
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.
Less Vulnerable	Police, ambulance, and fire stations which are not required to be operational during flooding. Buildings used for shops; financial, professional, and other services; restaurants, cafes, and hot food takeaways; offices; general industry, storage, and distribution; non-residential institutions not included in the ‘More Vulnerable’ class; and assembly and leisure. Land and buildings used for agriculture and forestry.

⁷ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Chapter 14. Pg.52. Paragraph 182.

	Waste treatment (except landfill* and hazardous waste facilities). Minerals working and processing (except for sand and gravel working). Water treatment works which do not need to remain operational during times of flood. Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place. Car parks.
Water Compatible Development	Flood control infrastructure. Water transmission infrastructure and pumping stations. Sewage transmission infrastructure and pumping stations. Sand and gravel working. Docks, marinas, and wharves. Navigation facilities. Ministry of Defence installations. Ship building, repairing, and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. Water-based recreation (excluding sleeping accommodation). Lifeguard and coastguard stations. Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Planning Practice Guidance (PPG)

- 4.11 The PPG associated with the NPPF provides more detailed guidance on how the requirements of the NPPF can be met in practice. It includes recommendations on the allowances for climate change and for the application of the sequential and exception tests. Three critically important tables are included within the PPG that set the framework for discussion and analysis of site-specific flood risk.
- 4.12 Table 1 of the Planning Practice Guidance defines flood zones based upon event return probability and is used to steer development and classify land for development. The table is produced below.

Flood Zone	Definition
Zone 1 Low Probability	Land having less than a 1 in 1,000 annual probability of river or sea flooding. (shown as 'clear' on the Flood Map – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

	(not separately distinguished from Zone 3a on the Flood Map)
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4.13 It is important to note that land in Flood Zone 3b is categorized as;⁸

- Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or
- Land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding)

4.14 Areas within the functional floodplain should be identified by local planning authorities within their Strategic Flood Risk Assessments.

4.15 Table 2 of the Planning Practice Guidance (Flood Risk Vulnerability and flood zone ‘compatibility’) outlines the circumstances in which development may or may not be appropriate and when an Exception Test will be required. The table is reproduced below.

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 †	✗	Exception Test Required	✓	✓
Zone 3b	Exception Test Required*	✗	✗	✗	✓*
† In Flood Zone 3a – essential infrastructure should be designed and constructed to remain operational and safe in times of flood. * In Flood Zone 3b (functional flood plain) essential infrastructure that must be there and has passed the Exception Test, and water- compatible uses, should be designed to: remain operational and safe for users in times of flood, result in no net loss of flood plain storage not impede water flows and not increase flood risk elsewhere.					

4.16 The NPPF states that proposed development should remain safe throughout its lifetime without increasing flood risk elsewhere.

4.17 The PPG states:

“Residential development can be assumed to have a lifetime of at least 100 years, unless there is a specific justification for considering a different period... the lifetime of a non-residential development depends on the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment”.

4.18 Given the above the proposed development is anticipated to possess a design lifetime of 100 years.

⁸ (Ministry of Housing, Communities and Local Government, 2024). Planning Practice Guidance. Flood risk and coastal change. Chapter: Flood Zone and flood risk tables. Table 1.

4.19 To assess whether the proposed development would remain safe throughout its lifetime the proposals are to be assessed against the following design flood events, plus a forecasted allowance for climate change.

- river flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year); or
- tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year),

Climate change

4.20 Climate change allowances are predictions of anticipated change for:

- Peak river flow
- Peak rainfall intensity
- Sea level rise
- Offshore wind speed and extreme wave height

4.21 The most appropriate climate change allowance for use in assessing the proposed development is peak rainfall intensity.

Peak rainfall intensity⁹

4.22 Peak rainfall intensity allowances should be utilised in small catchments (less than 5km²), or urbanised drainage catchments.

4.23 For flood risk assessments and strategic flood risk assessments, both the central and upper end allowances should be assessed.

4.24 The proposed site is situated within the Humber Management catchment, the table below, outlines the peak rainfall intensity allowances for a range of periods.

Humber Management catchment	3.3% annual exceedance rainfall epoch (2050s)	3.3% annual exceedance rainfall epoch (2070s onwards)	1% annual exceedance rainfall epoch (2050s)	1% annual exceedance rainfall epoch (2070s onwards)
Upper end	35%	35%	40%	40%
Central	20%	25%	20%	25%

4.25 Given the anticipated life span of the development the site should be assessed via the 2070s epoch allowances; this is up to a 1 in 100-year+40% event.

⁹ (Environment Agency, 2022). Flood Risk Assessments: climate change allowances.

Local planning context

Hinckley & Bosworth Borough Council Borough Plan 2006-2026

- 4.26 The site falls within the jurisdiction of Hinckley and Bosworth Borough Council (HBBC) and is subject to the policies and guidance specified within the Local Plan. The Core Strategy was adopted in December 2009 and covers the period up to 2026. The LPA has recently commenced a fresh review of its Local Plan in relation to the December 2024 NPPF such that the emerging plan is now at an early stage. The target date for adoption of the new local plan is late 2027.
- 4.27 The existing Core Strategy does not contain any specific policies on flood risk or surface water management, but these are covered more broadly under Strategic Objective 20, which seeks to improve resource management across the Borough. Objective 10 notes that flooding is not a major issue for the Borough but does specify that sustainable urban drainage needs to be incorporated into the design of the new development to mitigate against any increase in flood risk.
- 4.28 The Site Allocations and Development Management Policies DPD is one of the documents that makes up the local plan. The relevant policy from this document in terms of flood risk is policy DM7 Preventing Pollution and Flooding which states:

Adverse impacts from pollution and flooding will be prevented by ensuring that development proposals demonstrate that:

- a) It will not adversely impact the water quality, ecological value or drainage function of water bodies in the borough;*
- b) Appropriate containment solutions for oils, fuels and chemicals are provided;*
- c) All reasonable steps are taken through design, siting and technological solutions to ensure the abatement of obtrusive light to avoid sky glow, glare and light intrusion;*
- d) It would not cause noise or vibrations of a level which would disturb areas that are valued for their tranquillity in terms of recreation or amenity;*
- e) Appropriate remediation of contaminated land in line with minimum national standards is undertaken;*
- f) It will not contribute to poor air quality;*
- g) It will not result in land instability or further intensify existing unstable land; and*
- h) The development doesn't create or exacerbate flooding by being located away from areas of flood risk unless adequately mitigated against in line with National Policy.*

Hinckley & Bosworth Level 1 Strategic Flood Risk Assessment (2025)

- 4.29 HBBC commissioned JBA Consulting to undertake a Level 1 Strategic Flood Risk Assessment (SFRA), to inform and support the production of the updated Local Plan up to 2045. This SFRA replaces the previous Level 1 SFRA undertaken in 2019.
- 4.30 The key objectives of the SFRA are:
- *To collate and analyse the latest available information and data for current and future (i.e., climate change) flood risk from all sources, and how these risks may be mitigated against.*
 - *To inform decisions in the emerging LPR, including informing the sustainability appraisal, the selection of development sites, and planning policies.*
 - *To provide evidence to support the application of the sequential test for the allocation of new development sites, to support the Council in the preparation of the LPR.*

- To provide a comprehensive set of maps presenting flood risk from all sources that can be used as evidence base in the LPR.
- To help decide when a Flood Risk Assessment (FRA) will be required for individual planning applications.
- To provide advice for applicants carrying out site-specific FRAs, including those at risk from sources other than river flooding, or at risk of flooding in the future due to climate change, and outline specific measures or objectives that are required to manage flood risk.
- To provide the basis for applying the sequential test on planning applications, including by identifying sources of flooding other than those in 'Flood Zones' and those at risk of flooding in the future.
- To identify opportunities to reduce the causes and impacts of flooding and gather information on the land that is likely to be required for flood risk management structures.
- To assess the cumulative impacts of development and identify catchments which may be more sensitive to increased flood risk as a result of upstream development both within and outside of the Councils' administrative area.

Flood Risk Status

4.31 The Environment Agency online flood mapping shows that the site lies within Flood Zone 1 (see Figure 4 below).

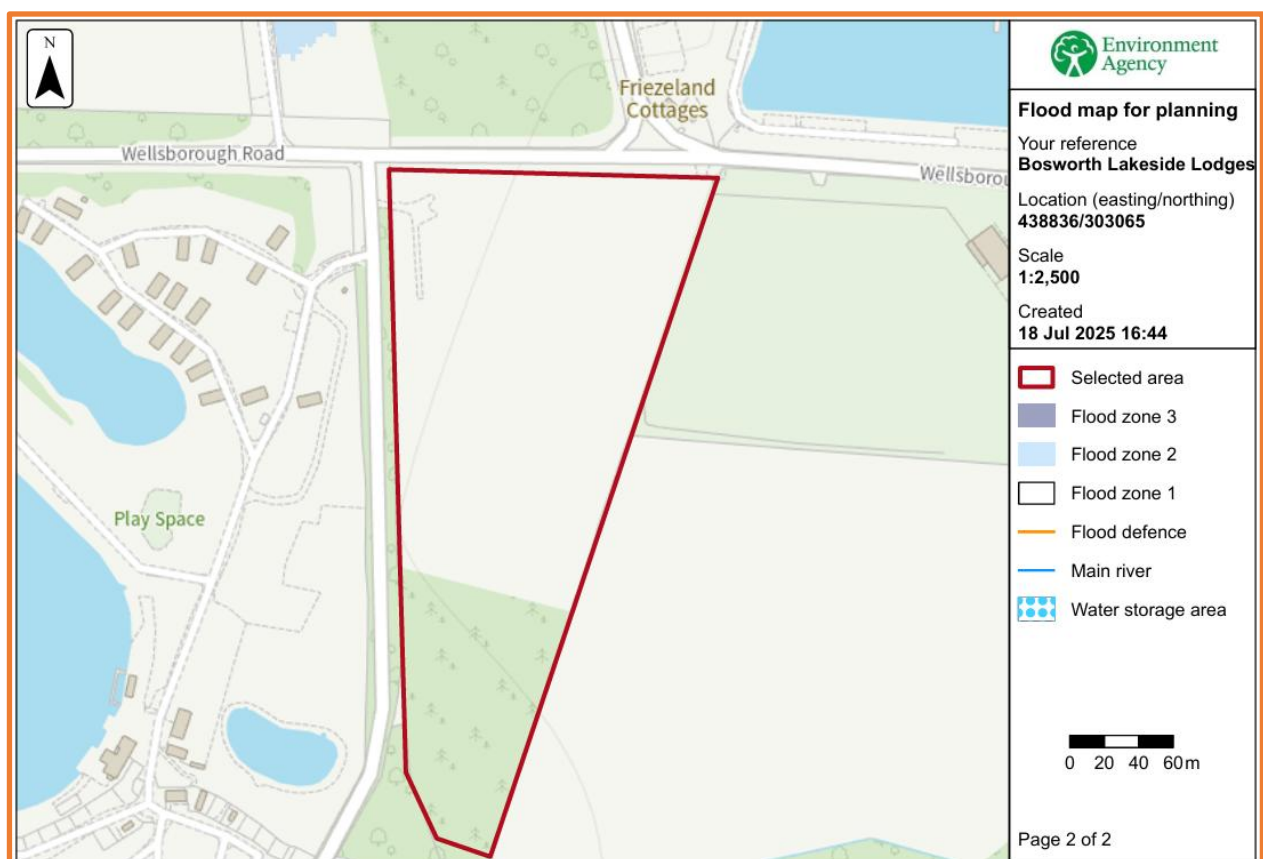


Figure 4: EA Flood Map for Planning Extract.

Flood risk and development compatibility

4.32 The development will predominantly be used for holiday or short lets. In Annex 3 of the NPPF, this type of development is categorised as a 'more vulnerable' development type.

4.33 The development is located within Flood Zone 1.

4.34 In accordance with Table 2 of the PPG, the development is deemed appropriate in regard to fluvial flood risk.

4.35 A summary of the flood risk status of the development proposals is provided in the table below.

Flood Zone	Flood Zone 1
Development Vulnerability Classification	More Vulnerable
Flood Zone Compatibility	Sequentially acceptable for fluvial flood risk

5.0 FLOOD RISK ASSESSMENT

- 5.1 In accordance with the NPPF and local planning guidance, this Flood Risk Assessment considers the risk posed to the development from a range of flooding sources. This section of the report details the investigation of flood risk from all pertinent sources; a subsequent section provides recommended mitigation where the risk is deemed significant.
- 5.2 The flood risks that may be posed to any site are summarised in the table below. The degree of risk to the site is indicated in the table below and site-specific factors are outlined and described in greater detail within the forthcoming sections.

Flooding Source	Degree of Risk	Source of Risk
Fluvial	Low	EA mapping demonstrates that the site lies in Flood Zone 1 and so is at a low risk of fluvial flooding.
Tidal	None	The site is remote from the coast and there are no tidal influences in the area.
Canals	Low	The site is over 100m away from the nearest canal and so canal flooding is considered to be low.
Groundwater	Low	A desktop review of the underlying geology infers that the lack of bedrock permeability onsite would render groundwater flooding to be unlikely. The Areas Susceptible to Groundwater Flooding map demonstrates that the area where the site is located has a <25% risk of groundwater flooding.
Sewers	Low	Local sewer plans demonstrate no significant assets in the site vicinity.
Pluvial (Surface Water) runoff	Low	The EA mapping demonstrates that the site has a very low risk of pluvial flooding.
Reservoirs and Waterbodies	None	The EA mapping demonstrates that the site is at minimal risk of reservoir flooding.

Fluvial flooding

- 5.3 The Environment Agency's Flood Map for Planning has been reviewed and shows that the site lies within Flood Zone 1 and is deemed to have a low probability of fluvial flooding.
- 5.4 An ordinary water course flows in a south-easterly direction to the south-west of the site. The watercourse is culverted under Tinsel Road before continuing in a southerly direction and discharging into the Stoke Golding Brook. There is also a lake located to the West of the site. Onsite ground levels are intuitively elevated above the watercourse and lake and as such there is deemed to be no risk of flooding from this source.

Tidal flooding

- 5.5 The site is located within an area that geographically remote from any tidally influence and at its lowest point is elevated to 88m AOD. Therefore, it is deemed that there is no risk from tidal or coastal flooding.

Canal flooding

- 5.6 The Ashby de la Zouch Canal is located approximately 200m to the East of the site. The canal is at a higher elevation than the site, however there is a 2m tall earthen bank to the west of the canal (between the canal and site) that will prevent any flooding from the canal being directed towards the site. In addition, the field parcel between the site and canal slopes to the southwest and any overland flow would be directed to the south of the site following the profile of the land, and would not enter the site.
- 5.7 There are no known records of canal flooding within the site or for at least 1km in either direction, and given the separation of the canal from the site by a large embankment, as well as a significant distance, the risk of canal flooding is deemed to be low.

Groundwater flooding

- 5.8 Groundwater flooding occurs when the water table rises following a period of prolonged rainfall and emerges on the ground surface. It is most likely to occur in low-lying areas that are underlain by permeable bedrock and superficial deposits.
- 5.9 A desk-based review of onsite geology however reveals that the promotion of groundwater movement may be impeded by the presence of a mudstone bedrock and slowly permeable soils.
- 5.10 It is recommended that a ground investigation is undertaken to confirm the underlying ground conditions on site. Should infiltration measurements be undertaken they should be conducted in accordance with BRE365 guidance. This would provide more detailed information on the ground conditions and henceforth provide further enlightenment on the site's vulnerability to groundwater flooding, but the risk is considered to be low.

Pluvial risk

- 5.11 The EA publish pluvial (surface water) flood maps as part of the Flood Map for Planning service which show the route of surface water runoff across the ground. Typically, these flood maps identify overland drainage paths that are often part of a historic natural land drainage system. An overview of the surface water flood risk to the site is shown in Figure 5.
- 5.12 The mapping shows the majority of the site to possess a very low chance of surface water flooding.
- 5.13 There are some minor low-high chance pluvial pathways associated with the existing ditch network along the site boundaries however all development is shown to be located outside of these extents.
- 5.14 Given the above the risk of flooding from surface water posed to the site is deemed to be low.

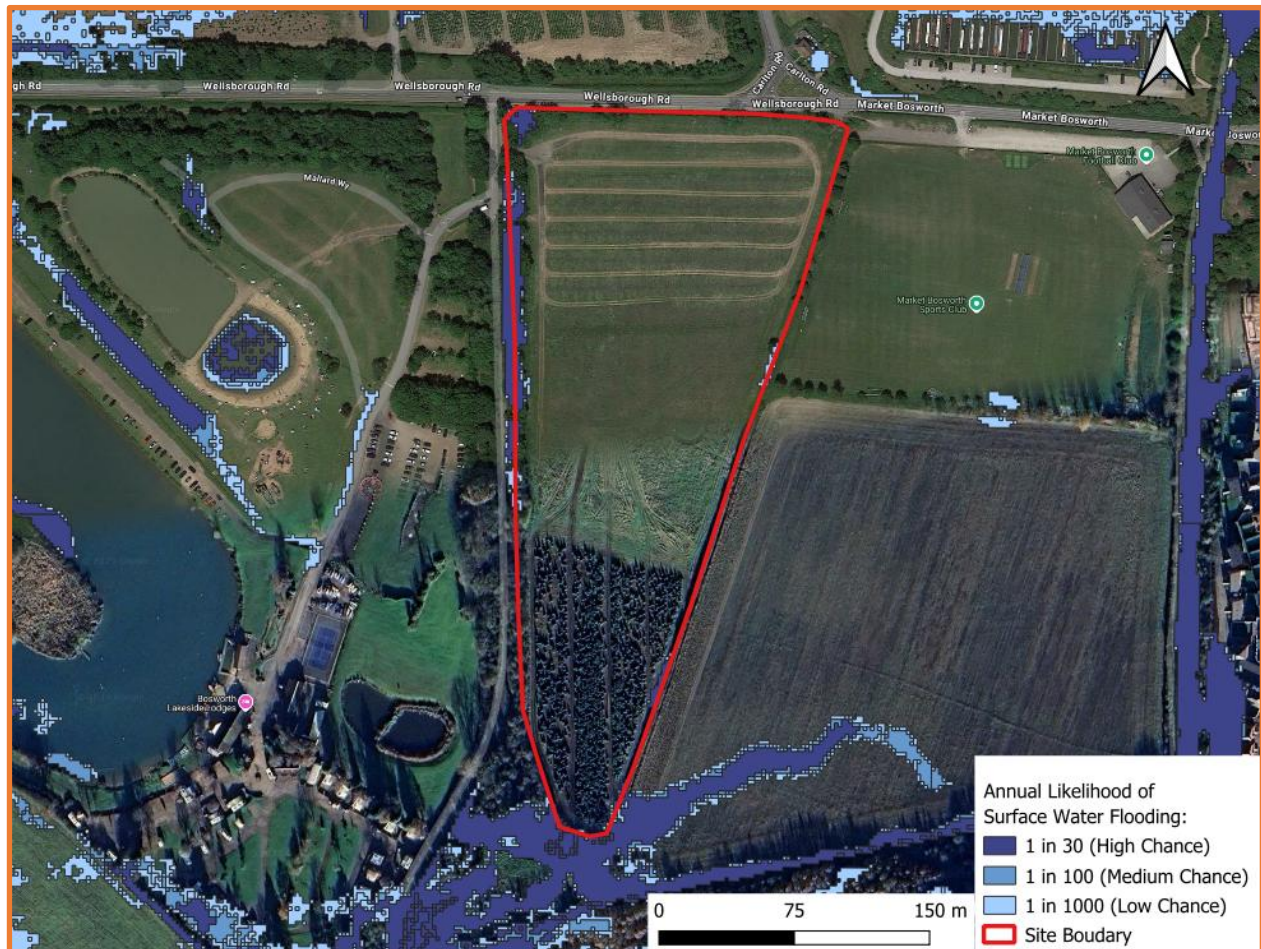


Figure 5: The pluvial flood risk extents for the site and the surrounding area.

Sewer flooding

- 5.15 Sewer flooding occurs when the conveyed flows exceed the available capacity of the system. This may be due to intense rainfall events, restricted discharges to watercourses with high water levels, blockages, collapses, or equipment failure.
- 5.16 Sewer asset plans for the area do not show any significant sewerage infrastructure in the site vicinity, therefore the risk of flooding from sewers is considered low.

Reservoirs and artificial waterbodies

- 5.17 The EA has prepared reservoir failure flood risk mapping as part of the 'Check Your Long-Term Flood Risk' service to show the largest area that might be flooded if a reservoir were to fail. The mapping displays a worst-case scenario and is only intended as a guide. The site is shown to be outside areas considered at potential risk of reservoir flooding, see Figure 6.

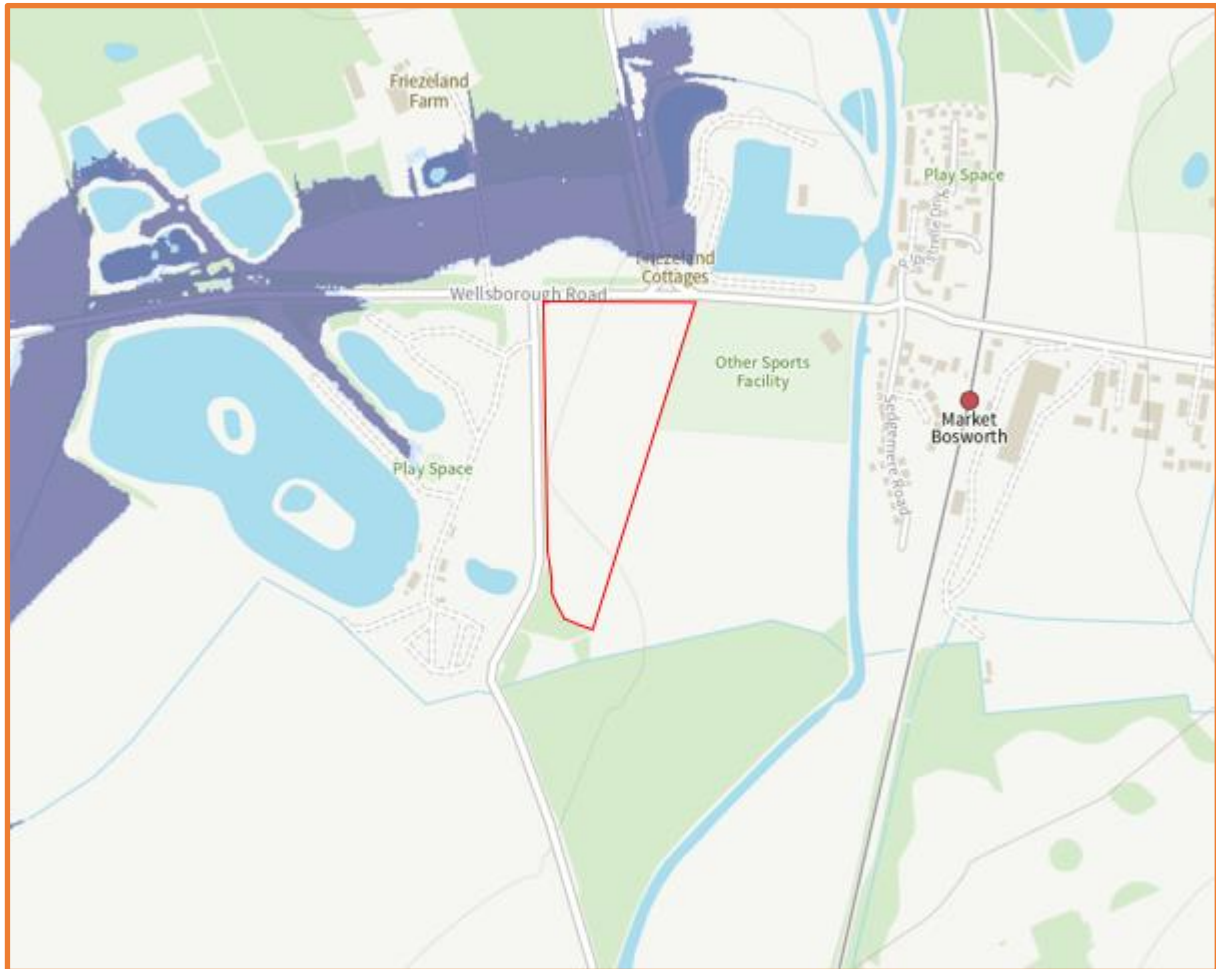


Figure 6: The flood risk from reservoir sources to the site.

- 5.18 It should be noted that these maps are indicative and the probability of the flood event from reservoir failure occurring is extremely low.

Proposed mitigation

- 5.19 The risk of flooding to the site from a variety of sources has been investigated. The evidence expressed above demonstrates that the site is located within Flood Zone 1 and as such possesses a low risk of fluvial flooding.
- 5.20 Flood risk as a result of tidal, canal, pluvial, sewer, groundwater and reservoir influences have all been deemed as low and as such no further mitigation is recommended.
- 5.21 Although the flood risk to the site from the variety of sources investigated has been deemed to be low; to alleviate any residual flood risk to the site the following should be analysed.

Access and egress

- 5.22 The PPG states that to ensure a development is safe for its lifetime the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood (0.1% annual probability of flooding plus climate change) must be considered¹⁰.

¹⁰ (Ministry of Housing, Communities and Local Government, 2024). Planning Practice Guidance. Flood risk and coastal change.

- 5.23 The access and egress route from the development is shown to be in Flood Zone 1 and possess a very low risk of pluvial flooding.

Drainage system design

- 5.24 The Non-statutory Technical Standard for SuDS has a series of recommendations in relation to the design of prospective drainage systems for new developments. These are to ensure that drainage systems on new developments are designed to a standard to negate the additional flood risk that may arise from the development. The recommendations to be implemented for the site are as follows:

- *"The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year (3.3% AEP) event."*¹¹
- *"The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year (1% AEP) rainfall event in any part of: a building (including basement); or in any utility plant susceptible to water (e.g., pumping station or electricity substation) within the development."*¹²

Exceedance routes

- 5.25 The Non-statutory Technical Standard for SuDS guidance also specifies that:

*"The design of the site must ensure that, so far as is reasonably practicable, flows resulting from the rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property."*¹³

- 5.26 Exceedance routes within the proposed development are shown to route in a south-easterly direction towards the proposed SuDS.

Finished floor levels

- 5.27 The site is not located within an area where there is a residual flood risk, however finished floor levels according to the gov.uk website should be a minimum of whichever is higher of; 300mm above the general ground level of the site or 600mm above the estimated river or sea flood level¹⁴.
- 5.28 Since the site is in Flood Zone 1 and is at a low risk of flooding it is recommended that on site finished floor levels are set to a minimum of 300mm above ground level. The raising of finished floor levels will mitigate against any residual flood risk to the site.

¹¹ (Department for Environment, Food and Rural Affairs, 2015). Non-statutory technical standards for sustainable drainage systems. Pp.2. Clause S7.

¹² (Department for Environment, Food and Rural Affairs, 2015). Non-statutory technical standards for sustainable drainage systems. Pp.2. Clause S8.

¹³ (Department for Environment, Food and Rural Affairs, 2015). Non-statutory technical standards for sustainable drainage systems. Pp.2. Clause S9.

¹⁴ GOV UK (2019). Flood risk assessment standing advice.

External site levels

- 5.29 External site levels should be designed to route any excess runoff away from buildings, and into landscaped areas or drainage outlets. Any raising of levels onsite should be designed to ensure that there is no increase in surface water runoff onto neighbouring third-party land.
- 5.30 Likewise, similar design considerations to minimise any potential risk from sewer flooding arising from the onsite drainage network should be considered, to prevent foul effluent from entering the proposed dwellings.

Flood compensatory storage

- 5.31 The cumulative impacts of development have the potential to reduce floodplain storage, where flood storage from any source of flooding is to be lost as a result of development, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of a development, should be provided. Where it is not possible to provide compensatory storage onsite, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked¹⁵.
- 5.32 The development proposals do not reduce any floodplain storage and therefore no further mitigation is required.

¹⁵ GOV UK (2022). Planning Practice Guidance. Flood risk and coastal change.

6.0 SURFACE WATER DRAINAGE STRATEGY

Existing discharge rate

- 6.1 Current proposals comprise of plans for development upon greenfield land.
- 6.2 The equivalent greenfield runoff for the developable area (1.987ha) was calculated using UKSuDS greenfield runoff tool to.
- 6.3 The full outputs are included within **Appendix B**, and a summary of the results is provided in the table below.

Return Period	Site Area (ha)	Runoff Rate (l/s)
QBar	1.987	8.56
1 in 1 Year	1.987	7.10
1 in 30 Year	1.987	17.12
1 in 100 Year	1.987	22.00

Discharge options

- 6.4 In accordance with the Building Regulations Part H, the newly published Non-Statutory Technical Standards for SuDS and prevailing best practice, surface water should look to be discharged according to the following preferential hierarchy:
- Infiltration drainage techniques, such as swales and soakaways
 - An open watercourse, river, or ditch
 - A surface water sewer
 - A combined sewer
- 6.5 The British Geological Survey (BGS) mapping and Soilsmap mapping were reviewed to give an indication of the underlying ground conditions. These suggest that the site is underlain by impermeable soils, which may limit the viability of the use of infiltration onsite. As such it is advised that a ground investigation that includes infiltration testing is undertaken to determine whether there is any soakage potential across the site.
- 6.6 LCC, as the LLFA, require that sufficient evidence is provided to prove whether infiltration is a viable option to dispose of surface water runoff or not. Should the use of infiltration features be found not to be suitable, then an alternative outfall such as a watercourse or surface water sewer needs to be confirmed.
- 6.7 The use of infiltration drainage techniques appears unfeasible; therefore, preference should be given to the disposal of surface water runoff into the nearest watercourse or ditch. On the western boundary of the site lies an un-named ditch, which offers a suitable outfall location.

Onsite surface water strategy

- 6.8 Surface water runoff will be conveyed onsite via a below ground, gravity conveyed surface water drainage network which will collect surface water runoff from impermeable surfaces (roofs and highways) as well as several green roofs across the site and outfall initially into four proposed basins which will each contain a permanent body of water, and then into an existing ditch that runs in a southerly direction along the western boundary of the site.

- 6.9 The isolated building within the south of the site will be served by a green roof. Runoff from the green roof will be attenuated via the use of an oversized pipe and hydrobrake chamber before surface water is discharged to the existing ditch.
- 6.10 There will be five onsite outfalls into the ditch, one from each proposed basin and one from the isolated building within the south of the site.
- 6.11 The proposed basins/water bodies have been named Basin A, the northern most basin, through Basin D, the southernmost basin.
- 6.12 The four proposed basins have been designed to attenuate surface water runoff for all storm events up to and including the 1 in 100-year plus 40% climate change storm event, in line with local planning guidance. The provisional design for the basins is set out below:
- Basin A – contains a minimum storage depth of 0.4m above the permanent water level of the water body. The storage volume provided utilising 300mm depth of storage is approximately 458m³ with runoff restricted to a rate of 3.7 l/s.
 - Basin B - contains a minimum storage depth of 0.4m above the permanent water level of the water body. The storage volume provided 300mm depth of storage is approximately 226m³ with runoff restricted to a rate of 1.1 l/s.
 - Basin C - contains a minimum storage depth of 0.4m above the permanent water level of the water body. The storage volume provided utilising 300mm depth of storage is approximately 169m³ with runoff restricted to a rate of 1.3 l/s.
 - Basin D - contains a minimum storage depth of 0.65m above the permanent water level of the water body. The storage volume provided utilising 550mm depth of storage is approximately 218m³ with runoff restricted to a rate of 1.1 l/s.
- 6.13 For each basin the remainder of the depth to the top of bank will provide a freeboard for each water body.
- 6.14 The proposed oversized pipe has been designed to attenuate surface water runoff for all storm events up to and including the 1 in 100-year plus 40% climate change storm event, in line with local planning guidance. The storage volume provided by the oversized pipe is approximately 7m³ with runoff rate restricted to 1l/s.
- 6.15 The above discharge rates sum to 8.2 l/s, providing a betterment from the existing greenfield rate calculated previously, using the UK SuDs greenfield runoff tool, of 8.56 l/s.
- 6.16 The proposed attenuation features and associated drainage networks have been sized and modelled using InfoDrainage, see calculations in **Appendix C**.
- 6.17 Dependent on the final use of each water body, pollution control measures such as proprietary manhole treatment systems to capture sediment will be incorporated in the upstream drainage network. The specific requirements will be determined at detailed design stage.

Drainage layout

- 6.18 A drainage layout plan, drawing 3381-ADC-HDG-XX-DR-CD-0501-S1, has prepared by ADC Infrastructure, a copy of which can be found in **Appendix E**.

7.0 SUSTAINABLE DRAINAGE ASSESSMENT

7.1 Sustainable Drainage Systems (SuDS) remove, store, re-use, and intercept surface water by mimicking the natural water cycle. In turn this not only alleviates flood risk but also promotes benefits for water quality, amenity, recreation, health, and the local ecology¹⁶.

7.2 The NPPF defines Sustainable Drainage Systems as:

“A sustainable drainage system controls surface water run off close to where it falls, combining a mixture of built and nature-based techniques to mimic natural drainage as closely as possible, and accounting for the predicted impacts of climate change. The type of system that would be appropriate will vary from small scale interventions such as permeable paving and soakaways that can be used in very small developments to larger integrated schemes in major developments.”¹⁷

7.3 A variety of SuDS options are available to reduce or temporarily hold back the discharge of surface water runoff. The proposed development will see an increase in flows and therefore will require a drainage strategy which incorporates SuDS to ensure that flows are balanced, and that flood risk is not increased elsewhere.

7.4 The table below outlines the applicability of the use of a range of SuDS devices in relation to the proposals detailed in this report, this is in accordance with the hierarchical approach outlined in The SuDS Manual (CIRIA C753).

SuDS type	Device	Description	Reason for use	Applicability (* / ✓)
Source control	Living roofs	Provide soft landscaping at roof level, intercepting and reducing surface water runoff.	In most cases the structural design of the proposed buildings are not conducive for the use of living roofs. However, there are a total of 6 living roofs proposed within the development.	✓
	Infiltration devices	Store runoff and allow water to percolate into the ground via natural infiltration.	A desktop review of the underlying ground conditions demonstrate that the site is not suitable for the use of infiltration features. This is subject to further testing.	*

¹⁶ (Ciria, 2015). The SuDS Manual C753. Part B. Chapter 1.

¹⁷ (Ministry of Housing, Communities and Local Government, 2024). National Planning Policy Framework. Annex 2. Pg 79.

SuDS type	Device	Description	Reason for use	Applicability (x / ✓)
	Pervious surfaces	Storm water is allowed to infiltrate through the surface into a storage layer, from which it can either infiltrate and/or slowly release to sewers.	The nature and use of the proposed car park would be suitable for permeable paving.	✓
	Rainwater harvesting	Reduces the annual average rate of runoff from the site by reusing water for non-potable uses e.g., toilet flushing.	The capacity for the use of rainwater harvesting on site is limited.	x
	Street trees	Storm water is conveyed to trees located adjacent to the internal roads, the tree pits attenuate and treat runoff	The site will possess no internal road that is suitable for street trees.	x
Permeable conveyance	Swales	Broad shallow channels that convey /store runoff and allow infiltration when ground conditions are permitting.	Due to the topography of the site combined with the site's spatial layout swales are not suitable for use within the site's drainage design.	x

SuDS type	Device	Description	Reason for use	Applicability (x / ✓)
	Bioretention area/ Rain garden	Shallow landscaped depression which are under drained and rely on engineered soils and enhanced vegetation and filtration to remove pollution and reduce runoff downstream.	A linear rain garden could be incorporated into the landscaping onsite to provide an element of surface water treatment.	✓
	Filter strips	Wide gently sloping areas of grass or dense vegetation that remove pollutants from run-off from adjacent areas.	A desktop review of the underlying ground conditions and spatial layout of the proposed development demonstrates that the site is not suitable for the use of filter strips. This is subject to further testing.	x
	Filter drains and perforated pipes	Trenches filled with granular materials (which are designed to take flows from adjacent impermeable areas) that convey runoff while allowing infiltration.	A network of Filter Drains to collect runoff from the car park at the north of the site and the pathways that run through the site has been proposed.	✓

SuDS type	Device	Description	Reason for use	Applicability (x / ✓)
End of pipe treatment	Infiltration basins	Depressions in the surface designed to store runoff and allow infiltration.	A desktop review of the underlying ground conditions demonstrates that the site is not suitable for the use of infiltration basins. This is subject to further testing.	x
	Wet ponds	Provide water quality treatment & temporary storage above the permanent water level.	The site layout and use as holiday lodges means that the use of wet ponds is ideal for use within the site's surface water drainage strategy.	✓
	Attenuation tanks	Oversized pipes or geo-cellular tanks designed to store water below ground level.	An oversized pipe can provide the necessary attenuation for the isolated building in the south of the site after treatment has been provided by the green roof.	✓

7.5 Given the table above the proposed drainage combination will incorporate the following components:

- Living roofs on six of the proposed buildings.
- Filter Drains serving the car park and pathways.
- Permeable paving to the car park.
- A series of Wet Ponds.
- An oversized pipe.

- 7.6 The site's proposed drainage combination has been selected due to spatial and topographical aspects of the site and its proposed layout, and the need to attenuate and convey onsite surface water runoff.

Water quality assessment

- 7.7 Any such development can give rise to pollution during both the construction and occupation phases in relation to hydrocarbons, suspended soils, and general waste. Careful consideration of the treatment of surface water runoff should provide confidence that the proposed development will not result in any detriment to the receiving waters.
- 7.8 The proposed impermeable areas on the site are currently divided into residential roofs and private accessways. In accordance with the CIRIA SuDS Manual C753 (2015), the attributed pollution 'hazard' levels associated with these classifications of hardstanding are between low and very low risk.

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Private driveways, residential car parks and low traffic roads.	Low	0.5	0.4	0.4
source: CIRIA SuDS Manual (C753) (2015) Part E. Chapter 26, Table 26.3, pg. 568				

- 7.9 As the pollution hazard risk from the development is deemed to be low-medium, then the simple index approach (SIA) is applicable. SIA uses a source to receptor pathway approach which considers three pollutants: total suspended solids (TSS), heavy metals and hydrocarbons. For the selected SuDS components, total pollution indices based on the reduction in pollution, are assigned.
- 7.10 The selected SuDS components and the associated total pollution mitigation indexes are outlined in the table below (CIRIA SuDS Manual Table 26.3 extract). The proposed SuDS treatment train has been designed to exceed the pollution values/risk occurring from proposed land uses highlighted in the table above.

Type of SuDS component	TSS	Metals	Hydrocarbons
Permeable paving surfaces	0.7	0.6	0.7
Pond	0.7	0.7	0.5
Filter drain	0.4	0.4	0.4
source: CIRIA SuDS Manual (C753) (2015) Part E. Chapter 26, Table 26.3, pg. 569			

- 7.11 Based on the pollution mitigation indices highlighted in the table above, it is anticipated that the proposed SuDS treatment train will provide more than enough mitigation for the anticipated pollutants that will be generated by the development.
- 7.12 However, dependent on the final use of each water body on the site, additional pollution control measures such as proprietary manhole treatment systems to capture sediment will be

incorporated in the upstream drainage network. The specific requirements for inclusion of any such devices will be determined at detailed design stage.

Alternative benefits of SuDS

- 7.13 Ponds can both provide habitats for a range of species, this can heavily assist in boosting the ecological value of a site and offer much more support for the ecosystem in comparison to alternative grey solutions.

- 7.14 The following extract regards the biodiversity and alternative benefits that can be reaped from ponds and has been obtained from the CIRIA SuDS Manual (C753);

“They can support emergent and submerged aquatic vegetation along their shoreline and in shallow, marshy zones, which helps enhance treatment processes and has amenity and biodiversity benefits. Dense stands of vegetation facilitate the adhesion of contaminant to vegetation, aerobic decomposition of pollutants and can also help stabilise settled sediment and prevent resuspension”.

- 7.15 In addition to water quality and biodiversity benefits mentioned above the proposed SuDS combination can offer a range of benefits, these include aesthetic enhancements, a platform for education, recreational opportunities, and health benefits.

- 7.16 The design of the SuDS incorporated within the drainage design will develop as the planning proposals progress, to boost the multifunctionality of the proposed components it is advised that the proposed SuDS are constructed in accordance with the CIRIA SuDS Manual (C753).

8.0 MAINTENANCE AND ADOPTION

- 8.1 The proposed drainage network will require consistent maintenance to ensure that the efficiency of the systems is sustained.
- 8.2 The proposed filter drains, and wet ponds will be entirely contained within the site and will be constructed to adoptable standards, however it is anticipated that the drainage will remain private and be maintained by the operator of the site.
- 8.3 The onsite drainage system including the wet ponds and associated inlets/outlets, headwalls and pipework will be subject to routine monitoring and maintenance, a record of this should be upheld.

Maintenance schedules

- 8.4 The sections below express the minimum standards for the onsite maintenance regime and have been prepared from recommendations contained within the CIRIA SuDS Manual (C753).
- 8.5 It should be noted that any invasive maintenance work such as silt or vegetation removal is only required intermittently but it should be planned to be sympathetic to the requirements of the ecosystem. The window for carrying out maintenance to achieve this is usually towards the end of the growing season (September/October) although this varies with species¹⁸.

Storage and attenuation

- 8.6 Surface water runoff from the site is to be attenuated by a network of filter drains and four wet ponds. The proposed maintenance regime for the ponds and filter drains is expressed in the tables below.

Operation and maintenance requirements for filter drains		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets, and perforated pipework for silt accumulation, and establish appropriate removal frequencies.	Six monthly

¹⁸ (Ciria, 2015). SuDS Manual (C753). Part D. Chapter 23. Pg 500.

	Remove sediment from pre-treatment devices.	Six monthly, or as required
Occasional maintenance	Check tree health and manage tree appropriately	As required
	Remove all build up from inlets and surface and replace mulch as necessary.	Five yearly, or as required
	Clear perforated pipe works of blockages	As required
source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 16, pg. 310		

Operation and maintenance requirements for detention basins		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin.	Half yearly (spring before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets, and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool –where provided	Annually (as set out in CIRIA SuDs guidance)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim ant trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial action	Repair erosion or other damage by reseedling or re-turfing	As required
	Realignment of riprap	As required

	Repair/ rehabilitation of inlets, outlets, and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required
source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 22, pg. 483		

Conveyance, pipework, and flow control

- 8.7 Surface water runoff is to drain from impermeable surfaces onsite via a gravity conveyed surface water sewer.
- 8.8 A flow control device is to restrict flows to the equivalent greenfield discharge rate via the surface water outfall into the ditch.
- 8.9 The associated maintenance regime required to sustain the aforementioned drainage features are expressed within the table below.

Drainage Component	Maintenance Task	Frequency
Drainage Network	Inspect for blockages to ensure network is free running	Every 3 months and after any significant storm event
Surface water gullies/ Linear drainage features	Inspect for blockages and ensure that the drainage feature is free running. Jet or vacuum as appropriate.	Every 3 months and after any significant storm event
Catchpits	Inspect for and remove silt	Every 6 months and after any significant storm event
Discharge Control	Inspect for blockage and correct operation	Every 3 months and after any significant storm event
source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 28		

Connections

- 8.10 Surface water is to discharge into the ditch via four new outfalls. The proposed maintenance regime for these components is expressed in the table below.

Drainage Component	Maintenance Task	Frequency
Outfall pipe	Regular maintenance and monitoring to ensure sufficient operation.	Annually or as required
Drainage ditch	Monitoring of watercourse levels	Frequently post development then as required/after any storm event
source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 28		

Design life

- 8.11 The design life of the development may exceed the design life of certain components of the surface water network, this however is based upon numerous unpredictable variables.
- 8.12 During the maintenance regime it should be assessed whether any repairs are required and whether drainage components have reached the end of their functional lifetime. The proposed drainage network is to be built to adoptable standards, and it is anticipated that the network will

be adopted by Severn Trent, thus the responsibility to replace/repair any unfunctional components of the drainage network will lie with Severn Trent. Should any components fail prior to adoption the responsibility would lie with the landowner.

9.0 CONCLUSIONS AND RECOMMENDATIONS

- 9.1 This Flood Risk Assessment and Drainage Strategy has been carried out to support a planning application for up to 40 holiday lodges, a spa building, activity pods and the associated infrastructure. The assessment has been conducted in accordance with the requirements of the NPPF and the associated Planning Practice guidance.
- 9.2 The site has been found to not be at any direct flood risk from flooding associated with fluvial, sewer or groundwater sources. The development site is entirely within Flood Zone 1 and there are no established sources of flood risk.
- 9.3 The EA mapping highlights that the site has a very low chance of surface water flooding. However, any residual risk will be mitigated by the proposed surface water strategy as well as general design considerations such as the raising of floor levels above existing ground levels and the arrangement of external levels to preferentially divert any exceedance flows away from building thresholds.
- 9.4 The surface water drainage strategy has been considered, and a calculation of the anticipated discharge rates and attenuation volumes has been carried out. The proposed development shall look to discharge surface water runoff into the existing drainage ditch along the western boundary of the site.
- 9.5 Attenuation is proposed via the use of four wet ponds that will be sited throughout the development to suit the onsite topography and development proposals. Attenuation for the isolated building in the south of the site is to be provided by an oversized pipe. The Attenuation features have been designed to attenuate surface water runoff for all storm events up to and including the 1 in 100-year plus 40% climate change storm event, in line with local planning guidance.
- 9.6 Provided that the recommendations of this report are followed, then the development can proceed without being at any significant flood risk and without increasing flood risk elsewhere. The development proposals are considered sustainable from a flood risk and drainage perspective.

10.0 REFERENCES

- Ciria, 2015. *The SuDS Manual*, London: Ciria.
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- Sewerage Sector Guidance, 2021. *Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England*, s.l.: Water UK.

APPENDIX A

TOPOGRAPHICAL SURVEY

Survey Notes

2: All Levels are related to Ordnance Survey Datum, OSG836 (15).

- 3: The information shown on this drawing is surveyed to the accuracy of the base scale shown.
- 4: Man entry to sewers has not been undertaken. Depths and pipe sizes are measured / estimated from the ground. This should be checked with Local Authority records or on site prior to the commencement of any works.
- 5: Boundaries shown are physical features and may not represent legally conveyed ownership.

the time of survey.

7: Where adjacent buildings have been surveyed remotely all walls may not be shown due to obstructions along lines of sight.

8: This plan should only be used for its original purpose. NCC Surveys LTD accepts no responsibility for this plan if it is supplied to any party other than the original client.

9: Ordnance survey background data used under licence and should only be used in accordance with the Ordnance Survey guidelines.

Survey Key

Stem Form/Inflection & Abbreviations		Error Types & Abbreviations	
1	SV	1	BAW
2	AV	2	PAI
3	AV	3	PAI
4	AV	4	PAI
5	AV	5	PAI
6	AV	6	PAI
7	AV	7	PAI
8	AV	8	PAI
9	AV	9	PAI
10	AV	10	PAI
11	AV	11	PAI
12	AV	12	PAI
13	AV	13	PAI
14	AV	14	PAI
15	AV	15	PAI
16	AV	16	PAI
17	AV	17	PAI
18	AV	18	PAI
19	AV	19	PAI
20	AV	20	PAI
21	AV	21	PAI
22	AV	22	PAI
23	AV	23	PAI
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40	AV	40	PAI
41	AV	41	PAI
42	AV	42	PAI
43	AV	43	PAI
44	AV	44	PAI
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89	AV	89	PAI
90	AV	90	PAI
91	AV	91	PAI
92	AV	92	PAI
93	AV	93	PAI
94	AV	94	PAI
95	AV	95	PAI
96	AV	96	PAI
97	AV	97	PAI
98	AV	98	PAI
99	AV	99	PAI
100	AV	100	PAI

Fashion Lines	
	Hedge
	Saw
	Fence
	Cable
	Sole
	Fragrant line
	Drooping line
	Went line
	Wedge line
	Unlined line
	Faint
	Wall
	Dwarf
	Fading line

REV	DATE	DESCRIPTION	BY	APP.



The Old Police Station, South Street, Ashby de la Zouch,
Leicestershire, LE65 1BQ

Telephone ● 01530 414251

Mail office@njcsurveys.co.uk

1000

Topographical Surveys • Measured Building Surveys • Laser Scanning • Utility Surveys
Site Engineering • Monitoring Surveys • Ground Modelling • Volumetric Calculations

Client

Mr T Ryley

Project Title	Land Off Wellsborough Road Market Bosworth			
Drawing Title	Topographical Survey Sheet 1 of 2			
Drawn	TG	Checked	NJC	Authorised NJC
Date	17/04/2023	Scale	1/500	Sheet size A1
Dep. No.				Revision -

Survey Notes

2: All Levels are related to Ordnance Survey Datum, OSG836 (15).

3: The information shown on this drawing is surveyed to the accuracy of the base scale shown.

4: Man entry to sewers has not been undertaken. Depths and pipe sizes are measured / estimated from the ground. This should be checked with local Authority records or on site prior to the commencement of any works.

5: Boundaries shown are physical features and may not represent legally conveyed ownership.

6: Some features may be omitted due to obstructions and features are shown at the time of survey.

7: Where adjacent buildings have been surveyed remotely all walls may not be shown due to obstructions along lines of sight.

shown due to obstructions along lines of sight.

8: This plan should only be used for its original purpose. NCC Surveys LTD accepts no responsibility for this plan if it is supplied to any party other than the original client.

9: Ordnance Survey background data used under licence and should only be used in accordance with the Ordnance Survey guidelines.

Survey Key

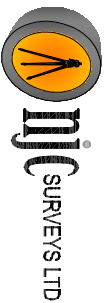
Street Furniture Symbols & Abbreviations

[illegible]

Feature Lines

	Overlaid Trace Line
	Overlaid Tectonic Mo
	Ground Level
35	
	Involuted Tree
	Involuted Bath
	Structure
	Watercourse / Embankment etc.
70	Slope 70%
85	Slope 85%

REV	DATE	DESCRIPTION	BY	APP.



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Client

Mr T Ryley

Project Title

Drawing Title

Topographical Survey

Sheet 2 of 2

Drawn	Checked	Authorised
TG	MC	MC
Date	Scale	Sheet size
17/04/2023	1/500	A1

S2260/05

This is a detailed topographic map of a coastal region. The map features a grid with northing coordinates (302800 N to 303050 N) and easting coordinates (438700 E to 439000 E). Key geographical features include:

- Colon Lane:** A road running horizontally across the upper portion of the map.
- Long Green:** A large, irregularly shaped area, possibly a field or meadow, located in the center-right.
- Dense Thicket:** Several areas labeled as such, primarily along the coastline and in the upper right.
- Coastline:** A dashed line representing the boundary between land and water, with numerous spot elevations.
- Contours:** Solid lines indicating elevation changes, with labels such as 90.00, 90.20, 90.40, 90.60, 90.80, 91.00, 91.20, 91.40, 91.60, 91.80, 92.00, 92.20, 92.40, 92.60, 92.80, 93.00, 93.20, 93.40, 93.60, 93.80, 94.00, 94.20, 94.40, 94.60, 94.80, 95.00, 95.20, 95.40, 95.60, 95.80, 96.00, 96.20, 96.40, 96.60, 96.80, 97.00, 97.20, 97.40, 97.60, 97.80, 98.00, 98.20, 98.40, 98.60, 98.80, 99.00, 99.20, 99.40, 99.60, 99.80, 100.00, 100.20, 100.40, 100.60, 100.80, 101.00, 101.20, 101.40, 101.60, 101.80, 102.00, 102.20, 102.40, 102.60, 102.80, 103.00, 103.20, 103.40, 103.60, 103.80, 104.00, 104.20, 104.40, 104.60, 104.80, 105.00, 105.20, 105.40, 105.60, 105.80, 106.00, 106.20, 106.40, 106.60, 106.80, 107.00, 107.20, 107.40, 107.60, 107.80, 108.00, 108.20, 108.40, 108.60, 108.80, 109.00, 109.20, 109.40, 109.60, 109.80, 110.00, 110.20, 110.40, 110.60, 110.80, 111.00, 111.20, 111.40, 111.60, 111.80, 112.00, 112.20, 112.40, 112.60, 112.80, 113.00, 113.20, 113.40, 113.60, 113.80, 114.00, 114.20, 114.40, 114.60, 114.80, 115.00, 115.20, 115.40, 115.60, 115.80, 116.00, 116.20, 116.40, 116.60, 116.80, 117.00, 117.20, 117.40, 117.60, 117.80, 118.00, 118.20, 118.40, 118.60, 118.80, 119.00, 119.20, 119.40, 119.60, 119.80, 120.00, 120.20, 120.40, 120.60, 120.80, 121.00, 121.20, 121.40, 121.60, 121.80, 122.00, 122.20, 122.40, 122.60, 122.80, 123.00, 123.20, 123.40, 123.60, 123.80, 124.00, 124.20, 124.40, 124.60, 124.80, 125.00, 125.20, 125.40, 125.60, 125.80, 126.00, 126.20, 126.40, 126.60, 126.80, 127.00, 127.20, 127.40, 127.60, 127.80, 128.00, 128.20, 128.40, 128.60, 128.80, 129.00, 129.20, 129.40, 129.60, 129.80, 130.00, 130.20, 130.40, 130.60, 130.80, 131.00, 131.20, 131.40, 131.60, 131.80, 132.00, 132.20, 132.40, 132.60, 132.80, 133.00, 133.20, 133.40, 133.60, 133.80, 134.00, 134.20, 134.40, 134.60, 134.80, 135.00, 135.20, 135.40, 135.60, 135.80, 136.00, 136.20, 136.40, 136.60, 136.80, 137.00, 137.20, 137.40, 137.60, 137.80, 138.00, 138.20, 138.40, 138.60, 138.80, 139.00, 139.20, 139.40, 139.60, 139.80, 140.00, 140.20, 140.40, 140.60, 140.80, 141.00, 141.20, 141.40, 141.60, 141.80, 142.00, 142.20, 142.40, 142.60, 142.80, 143.00, 143.20, 143.40, 143.60, 143.80, 144.00, 144.20, 144.40, 144.60, 144.80, 145.00, 145.20, 145.40, 145.60, 145.80, 146.00, 146.20, 146.40, 146.60, 146.80, 147.00, 147.20, 147.40, 147.60, 147.80, 148.00, 148.20, 148.40, 148.60, 148.80, 149.00, 149.20, 149.40, 149.60, 149.80, 150.00, 150.20, 150.40, 150.60, 150.80, 151.00, 151.20, 151.40, 151.60, 151.80, 152.00, 152.20, 152.40, 152.60, 152.80, 153.00, 153.20, 153.40, 153.60, 153.80, 154.00, 154.20, 154.40, 154.60, 154.80, 155.00, 155.20, 155.40, 155.60, 155.80, 156.00, 156.20, 156.40, 156.60, 156.80, 157.00, 157.20, 157.40, 157.60, 157.80, 158.00, 158.20, 158.40, 158.60, 158.80, 159.00, 159.20, 159.40, 159.60, 159.80, 160.00, 160.20, 160.40, 160.60, 160.80, 161.00, 161.20, 161.40, 161.60, 161.80, 162.00, 162.20, 162.40, 162.60, 162.80, 163.00, 163.20, 163.40, 163.60, 163.80, 164.00, 164.20, 164.40, 164.60, 164.80, 165.00, 165.20, 165.40, 165.60, 165.80, 166.00, 166.20, 166.40, 166.60, 166.80, 167.00, 167.20, 167.40, 167.60, 167.80, 168.00, 168.20, 168.40, 168.60, 168.80, 169.00, 169.20, 169.40, 169.60, 169.80, 170.00, 170.20, 170.40, 170.60, 170.80, 171.00, 171.20, 171.40, 171.60, 171.80, 172.00, 172.20, 172.40, 172.60, 172.80, 173.00, 173.20, 173.40, 173.60, 173.80, 174.00, 174.20, 174.40, 174.60, 174.80, 175.00, 175.20, 175.40, 175.60, 175.80, 176.00, 176.20, 176.40, 176.60, 176.80, 177.00, 177.20, 177.40, 177.60, 177.80, 178.00, 178.20, 178.40, 178.60, 178.80, 179.00, 179.20, 179.40, 179.60, 179.80, 180.00, 180.20, 180.40, 180.60, 180.80, 181.00, 181.20, 181.40, 181.60, 181.80, 182.00, 182.20, 182.40, 182.60, 182.80, 183.00, 183.20, 183.40, 183.60, 183.80, 184.00, 184.20, 184.40, 184.60, 184.80, 185.00, 185.20, 185.40, 185.60, 185.80, 186.00, 186.20, 186.40, 186.60, 186.80, 187.00, 187.

APPENDIX B

UK SUDS GREENFIELD RUNOFF RATE ESTIMATIONS

Calculated by:	James Tuck
Site name:	Bosworth Lakeside Lodges
Site location:	Market Bosworth

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	52.62419° N
Longitude:	1.42766° W
Reference:	703514788
Date:	Sep 02 2024 11:16

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	1.987
-----------------------	-------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	635	635
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s):	8.56	8.56
1 in 1 year (l/s):	7.1	7.1
1 in 30 years (l/s):	17.12	17.12
1 in 100 year (l/s):	22	22
1 in 200 years (l/s):	26.02	26.02

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX C

INFODRAINAGE NETWORK CALCULATIONS

InfoDrainage Network Calculations

Basin A

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Catchment Area

Type : Catchment Area

Area (ha)	0.033
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.063
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Green Roof

Type : Catchment Area

Area (ha)	0.099
-----------	-------

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff	1.000
Coefficient	
Winter Volumetric Runoff	1.000
Coefficient	
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.063
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.059
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Green Roof (1)

Type : Catchment Area

Area (ha)	0.099
-----------	-------

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff	1.000
Coefficient	
Winter Volumetric Runoff	1.000
Coefficient	
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		





Catchment Area (4)

Type : Catchment Area

Area (ha)

0.019

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (5)

Type : Catchment Area

Area (ha)

0.039

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (6)

Type : Catchment Area

Area (ha)

0.03

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		





Catchment Area (7)

Type : Catchment Area

Area (ha)	0.039
-----------	-------

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
1.000	Manhole	438891.556	303149.028	91.150	1.670	89.480	Circular	1.200
1.001	Manhole	438886.976	303142.687	91.100	1.700	89.400	Circular	1.200
1.002	Manhole	438872.180	303150.613	90.850	1.640	89.210	Circular	1.200
1.003	Manhole	438856.327	303156.162	90.600	1.560	89.040	Circular	1.200
1.004	Manhole	438791.243	303131.708	89.520	0.660	88.860	Circular	1.200
2.000	Manhole	438848.719	303157.534	90.400	1.000	89.400	Circular	1.200
2.001	Manhole	438831.996	303157.477	90.400	1.180	89.220	Circular	1.200
2.002	Manhole	438814.932	303153.211	90.400	1.370	89.030	Circular	1.200
3.000	Manhole	438811.633	303161.459	90.400	1.320	89.080	Circular	1.200
4.000	Manhole	438830.727	303127.638	90.160	1.090	89.070	Circular	1.200
5.000	Manhole	438852.814	303121.065	90.700	1.460	89.240	Circular	1.200
6.000	Manhole	438889.003	303124.151	91.200	1.400	89.800	Circular	1.200
Ditch	Manhole	438769.283	303122.160	89.040	0.320	88.720	Circular	1.200

Name	Lock
1.000	None
1.001	None
1.002	None
1.003	None
1.004	None
2.000	None
2.001	None
2.002	None
3.000	None
4.000	None
5.000	None
6.000	None
Ditch	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
1.000	Inlet	Catchment Area (3) Green Roof (1)	(None)	No Restriction
1.001	Inlet	1.000 Catchment Area (2)	(None)	No Restriction
1.002	Inlet	1.001	(None)	No Restriction
1.003	Inlet	1.002	(None)	No Restriction
1.004	Inlet	1.004	(None)	No Restriction
2.000	Inlet	Catchment Area (1)	(None)	No Restriction
2.001	Inlet	2.000	(None)	No Restriction
2.002	Inlet	2.001 3.000 Catchment Area (4)	(None)	No Restriction
3.000	Inlet	Green Roof Catchment Area	(None)	No Restriction
4.000	Inlet	Catchment Area (5)	(None)	No Restriction
5.000	Inlet	Catchment Area (6)	(None)	No Restriction
6.000	Inlet	Catchment Area (7)	(None)	No Restriction
Ditch	Inlet	1.005	(None)	No Restriction

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
1.000	Outlet	1.000	Free Discharge
1.001	Outlet	1.001	Free Discharge
1.002	Outlet	1.002	Free Discharge
1.003	Outlet	1.003	Free Discharge
1.004	Outlet	1.005	Free Discharge
2.000	Outlet	2.000	Free Discharge
2.001	Outlet	2.001	Free Discharge
2.002	Outlet	2.002	Free Discharge
3.000	Outlet	3.000	Free Discharge
4.000	Outlet	4.000	Free Discharge
5.000	Outlet	5.000	Free Discharge
6.000	Outlet	6.000	Free Discharge

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	90.000
Depth (m)	0.400
Base Level (m)	89.600
Freeboard (mm)	100
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	444.693

Depth (m)	Area (m²)	Volume (m³)
0.000	1421.32	0.000
0.100	1461.70	144.146
0.200	1502.64	292.359
0.300	1544.15	444.693
0.400	1586.22	601.207

Inlets

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	1.003
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	4.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (5)

Inlet Type	Point Inflow
Incoming Item(s)	5.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (6)

Inlet Type	Point Inflow
Incoming Item(s)	6.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	2.002
Bypass Destination	(None)
Capacity Type	No Restriction

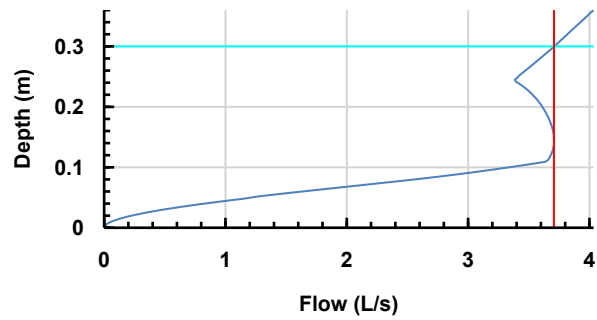
Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Outlets

Outlet

Outgoing Connection	1.004
Outlet Type	Hydro-Brake®
Invert Level (m)	89.600
Design Depth (m)	0.300
Design Flow (L/s)	3.71
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☒
Unit Reference	SHE-0101-3710-0300-3710



Advanced

Perimeter	Circular
Length (m)	72.503
Friction Scheme	Manning's n
n	0.022

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
1.000	91.150 89.480	Diameter / Length: 1.200					Manhole
E:438891.556 N:303149.028	1.670						
			{a} 1.000	Pipe	89.480	Diam/Width:225	Not Applicable
1.001	91.100 89.400	Diameter / Length: 1.200	{1} 1.000	Pipe	89.400	Diam/Width:225	Manhole
E:438886.976 N:303142.687	1.700						
			{a} 1.001	Pipe	89.400	Diam/Width:225	Not Applicable
1.002	90.850 89.210	Diameter / Length: 1.200	{1} 1.001	Pipe	89.210	Diam/Width:225	Manhole
E:438872.180 N:303150.613	1.640						
			{a} 1.002	Pipe	89.210	Diam/Width:225	Not Applicable
1.003	90.600 89.040	Diameter / Length: 1.200	{1} 1.002	Pipe	89.040	Diam/Width:225	Manhole
E:438856.327 N:303156.162	1.560						
			{a} 1.003	Pipe	89.040	Diam/Width:225	Not Applicable
1.004	89.520 88.860	Diameter / Length: 1.200	{1} 1.004	Pipe	88.860	Diam/Width:150	Manhole
E:438791.243 N:303131.708	0.660						
			{a} 1.005	Pipe	88.860	Diam/Width:150	Not Applicable

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
2.000	90.400 89.400	Diameter / Length: 1.200					Manhole
E:438848.719	1.000						
N:303157.534			{a} 2.000	Pipe	89.400	Diam/Width:150	Not Applicable
2.001	90.400 89.220	Diameter / Length: 1.200	{1} 2.000	Pipe	89.220	Diam/Width:150	Manhole
E:438831.996	1.180						
N:303157.477			{a} 2.001	Pipe	89.220	Diam/Width:150	Not Applicable
2.002	90.400 89.030	Diameter / Length: 1.200	{1} 2.001	Pipe	89.030	Diam/Width:150	Manhole
E:438814.932	1.370		{2} 3.000	Pipe	89.030	Diam/Width:150	
N:303153.211			{a} 2.002	Pipe	89.030	Diam/Width:225	Not Applicable
3.000	90.400 89.080	Diameter / Length: 1.200					Manhole
E:438811.633	1.320						
N:303161.459			{a} 3.000	Pipe	89.080	Diam/Width:150	Not Applicable
4.000	90.160 89.070	Diameter / Length: 1.200					Manhole
E:438830.727	1.090						
N:303127.638			{a} 4.000	Pipe	89.070	Diam/Width:150	Not Applicable

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
5.000	90.700 89.240	Diameter / Length: 1.200					Manhole
E:438852.814 N:303121.065	1.460						
			{a} 5.000	Pipe	89.240	Diam/Width:150	Not Applicable
6.000	91.200 89.800	Diameter / Length: 1.200					Manhole
E:438889.003 N:303124.151	1.400						
			{a} 6.000	Pipe	89.800	Diam/Width:150	Not Applicable
Ditch	89.040 88.720	Diameter / Length: 1.200	{1} 1.005	Pipe	88.720	Diam/Width:150	Manhole
E:438769.283 N:303122.160	0.320						
							Not Applicable

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
Max. Diameter (mm)	0

Diameter (mm)	Min. Slope (1:X)	Max. Slope (1:X)
100	0.00	0.00
150	0.00	0.00

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Manhole Options

Apply Offset

☐

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024			
	Designed by: JT	Checked by: RW	Approved By:	
Report Details: Type: Outfall Details Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
Ditch	Free Discharge			

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Title: Rainfall Analysis Criteria	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Runoff Type	Dynamic
Output Interval (mins)	15
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FEH	Type: FEH
Site Location	GB 438807 303090 SK 38807 03090
Rainfall Version	2013
Data Type	Point
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
1.000	FEH: 100 years: +40 %: 15 mins: Winter	0.000	Surcharged
1.001	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
1.002	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
1.003	FEH: 100 years: +40 %: 30 mins: Summer	0.000	Surcharged
1.004	FEH: 100 years: +40 %: 60 mins: Summer	0.000	OK
2.000	FEH: 100 years: +40 %: 30 mins: Summer	2.922	Flood
2.001	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk
2.002	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
3.000	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk
4.000	FEH: 100 years: +40 %: 720 mins: Winter	0.000	Flood Risk
5.000	FEH: 100 years: +40 %: 720 mins: Winter	0.000	Surcharged
6.000	FEH: 100 years: +40 %: 15 mins: Summer	0.000	OK
Ditch	FEH: 100 years: +40 %: 60 mins: Summer	0.000	Flood Risk

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		





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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 720 mins: Winter	89.909	89.909	0.309	0.309	32.1	458.125	0.000	0.000	3.7	249.783	-3.020	Flood Risk

Bosworth Lakeside Lodges: Basin A network v2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottigham NG1 7FG		



Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
1.000	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	1.000	1.001	91.150	90.604	0.225	42.461	1.1	0.8	42.3	Surcharged
1.001	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	1.001	1.002	91.100	90.529	0.225	63.017	1.7	1.2	66.6	Surcharged
1.002	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	1.002	1.003	90.850	90.208	0.225	62.010	1.7	1.27	66.5	Surcharged
1.003	FEH: 100 years: +40 %: 180 mins: Winter	Pipe	1.003	Pond	90.600	89.864	0.225	0.000	1.6	2.13	63.6	Surcharged
1.004	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	Pond	1.004	90.000	89.789	0.047	17.829	0.8	0.15	3.7	Surcharged
1.005	FEH: 100 years: +40 %: 60 mins: Summer	Pipe	1.004	Ditch	89.520	88.915	0.054	17.589	0.6	0.27	3.7	OK
2.000	FEH: 100 years: +40 %: 30 mins: Winter	Pipe	2.000	2.001	90.400	90.402	0.150	27.658	1.1	1.07	19.7	Flood
2.001	FEH: 100 years: +40 %: 30 mins: Winter	Pipe	2.001	2.002	90.400	90.195	0.150	26.724	1.1	1.07	19.8	Flood Risk
3.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	3.000	2.002	90.400	90.344	0.150	33.135	1.8	2.41	32.0	Flood Risk
4.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	4.000	Pond	90.160	89.754	0.150	0.000	0.8	1.1	14.6	Surcharged
5.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	5.000	Pond	90.700	89.731	0.150	0.000	0.6	0.84	11.1	Surcharged
6.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	6.000	Pond	91.200	89.919	0.091	13.459	1.3	0.9	14.8	OK
2.002	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	2.002	Pond	90.400	90.029	0.225	0.000	1.4	1.93	57.4	Surcharged

InfoDrainage Network Calculations

Basin B

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Green Roof

Type : Catchment Area

Area (ha)	0.018
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Dynamic Sizing	
Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120



Catchment Area

Type : Catchment Area

Area (ha)	0.044
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.043
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Catchment Area (1) (1)

Type : Catchment Area

Area (ha)	0.042
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (1) (1) (1)

Type : Catchment Area

Area (ha)	0.057
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Filter Drain

Type : Catchment Area

Area (ha)	0.064
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.600
Winter Volumetric Runoff	0.600
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
7.000	Manhole	438836.181	303084.198	90.200	1.100	89.100	Circular	1.200
8.000	Manhole	438798.957	303096.580	90.000	1.170	88.830	Circular	1.200
9.000	Manhole	438804.218	303059.506	90.000	1.120	88.880	Circular	1.200
10.000	Manhole	438860.431	303070.817	90.600	1.200	89.400	Circular	1.200
Ditch	Manhole	438769.087	303072.614	88.970	0.170	88.800	Circular	1.200

Name	Lock
7.000	None
8.000	None
9.000	None
10.000	None
Ditch	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
7.000	Inlet	Catchment Area (1) Filter Drain	(None)	No Restriction
8.000	Inlet	Catchment Area	(None)	No Restriction
9.000	Inlet	Catchment Area (1) (1) (1)	(None)	No Restriction
10.000	Inlet	Green Roof Catchment Area (1) (1)	(None)	No Restriction
Ditch	Inlet	7.001	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
7.000	Outlet	7.000	Free Discharge
8.000	Outlet	8.000	Free Discharge
9.000	Outlet	9.000	Free Discharge
10.000	Outlet	10.000	Free Discharge

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	89.500
Depth (m)	0.400
Base Level (m)	89.100
Freeboard (mm)	100
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	576.831

Depth (m)	Area (m²)	Volume (m³)
0.000	1853.25	0.000
0.100	1899.31	187.623
0.200	1945.94	379.881
0.300	1993.14	576.831
0.400	2040.90	778.528

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	7.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	8.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	9.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

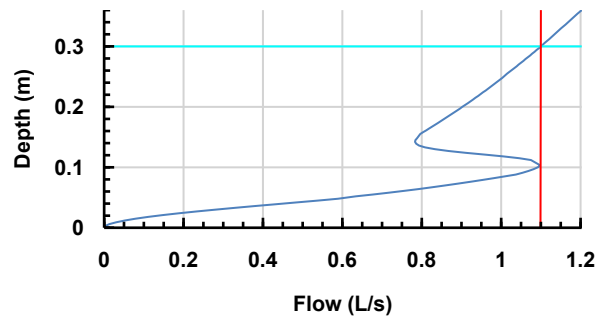
Inlet Type	Point Inflow
Incoming Item(s)	10.000
Bypass Destination	(None)
Capacity Type	No Restriction

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024			
	Designed by: JT	Checked by: RW	Approved By:	
Report Details:	ADC Infrastructure:			
Type: Stormwater Controls Storm Phase: Phase	34-36 Carrington Street Nottingham NG1 7FG			

Outlets

Outlet

Outgoing Connection	7.001
Outlet Type	Hydro-Brake®
Invert Level (m)	89.100
Design Depth (m)	0.300
Design Flow (L/s)	1.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0059-1100-0300-1100



Advanced

Perimeter	Circular
Length (m)	83.591
Friction Scheme	Manning's n
n	0.022

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Connections Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
7.000	2.943	Pipe	0.000		0.6	150	90.200	89.100
8.000	1.901	Pipe	-7.041		0.6	150	90.000	88.830
9.000	3.470	Pipe	-15.772		0.6	150	90.000	88.880
10.000	3.571	Pipe	11.902		0.6	150	90.600	89.400
7.001	8.553	Pipe	28.509		0.6	150	89.500	89.100

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
7.000	89.500	89.100	None		(None)	(None)
8.000	89.500	89.100	None		(None)	(None)
9.000	89.500	89.100	None		(None)	(None)
10.000	89.500	89.100	None		(None)	(None)
7.001	88.970	88.800	None	1.1	(None)	(None)

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
7.000	90.200 89.100	Diameter / Length: 1.200					Manhole
E:438836.181	1.100						
N:303084.198			{a} 7.000	Pipe	89.100	Diam/Width:150	Not Applicable
8.000	90.000 88.830	Diameter / Length: 1.200					Manhole
E:438798.957	1.170						
N:303096.580			{a} 8.000	Pipe	88.830	Diam/Width:150	Not Applicable
9.000	90.000 88.880	Diameter / Length: 1.200					Manhole
E:438804.218	1.120						
N:303059.506			{a} 9.000	Pipe	88.880	Diam/Width:150	Not Applicable
10.000	90.600 89.400	Diameter / Length: 1.200					Manhole
E:438860.431	1.200						
N:303070.817			{a} 10.000	Pipe	89.400	Diam/Width:150	Not Applicable
Ditch	88.970 88.800	Diameter / Length: 1.200	{1} 7.001	Pipe	88.800	Diam/Width:150	Manhole
E:438769.087	0.170						
N:303072.614							Not Applicable

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Title: Rainfall Analysis Criteria	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Runoff Type	Dynamic
Output Interval (mins)	15
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FEH	Type: FEH
Site Location	GB 438807 303090 SK 38807 03090
Rainfall Version	2013
Data Type	Point
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
7.000	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
8.000	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
9.000	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Surcharged
10.000	FEH: 100 years: +40 %: 15 mins: Winter	0.000	OK
Ditch	FEH: 100 years: +40 %: 960 mins: Winter	0.000	Flood Risk

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





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. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 960 mins: Winter	89.220	89.220	0.120	0.120	11.4	226.056	0.000	0.000	1.1	90.021	60.811	OK

Bosworth Lakeside Lodges: Basin B networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
7.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	7.000	Pond	90.200	89.308	0.125	27.548	1.9	2.3	30.5	Surcharged
8.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	8.000	Pond	90.000	89.245	0.150	0.000	0.9	1.25	16.5	Surcharged
9.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	9.000	Pond	90.000	89.340	0.150	0.000	1.2	1.61	21.4	Surcharged
10.000	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	10.000	Pond	90.600	89.477	0.059	18.459	3.0	0.38	19.5	OK
7.001	FEH: 100 years: +40 %: 960 mins: Winter	Pipe	Pond	Ditch	89.500	89.220	0.019	89.979	0.9	0.03	1.1	OK

InfoDrainage Network Calculations

Basin C

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Catchment Area

Type : Catchment Area

Area (ha)	0.043
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.045
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.600
Winter Volumetric Runoff	0.600
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.054
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Catchment Area (3)

Type : Catchment Area

Area (ha)

0.029

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100



Catchment Area (4)

Type : Catchment Area

Area (ha)

0.042

Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	15
Percentage Impervious (%)	100

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
11.000	Manhole	438835.804	303024.339	90.500	1.390	89.110	Circular	1.200
Ditch	Manhole	438772.378	302983.055	89.650	0.890	88.760	Circular	1.200
12.000	Manhole	438812.967	303018.985	90.160	1.115	89.045	Circular	1.200
13.000	Manhole	438813.464	303002.495	90.130	1.100	89.030	Circular	1.200
14.000	Manhole	438834.917	302998.960	90.300	1.200	89.100	Circular	1.200

Name	Lock
11.000	None
Ditch	None
12.000	None
13.000	None
14.000	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
11.000	Inlet	Catchment Area Catchment Area (1)	(None)	No Restriction
Ditch	Inlet	11.001	(None)	No Restriction
12.000	Inlet	Catchment Area (2)	(None)	No Restriction
13.000	Inlet	Catchment Area (3)	(None)	No Restriction
14.000	Inlet	Catchment Area (4)	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
11.000	Outlet	11.000	Free Discharge
12.000	Outlet	12.000	Free Discharge
13.000	Outlet	13.000	Free Discharge
14.000	Outlet	14.000	Free Discharge

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	89.700
Depth (m)	0.400
Base Level (m)	89.300
Freeboard (mm)	100
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	371.211

Depth (m)	Area (m²)	Volume (m³)
0.000	1181.69	0.000
0.100	1218.53	120.006
0.200	1255.93	243.724
0.300	1293.90	371.211
0.400	1332.44	502.523

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	11.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	12.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	13.000
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	14.000
Bypass Destination	(None)
Capacity Type	No Restriction

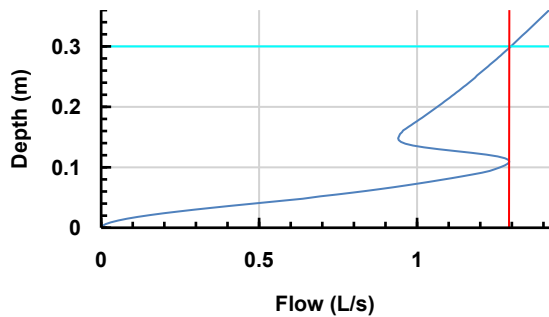
Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Outlets

Outlet

Outgoing Connection	11.001
Outlet Type	Hydro-Brake®
Invert Level (m)	89.300
Design Depth (m)	0.300
Design Flow (L/s)	1.3
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0064-1300-0300-1300



Advanced

Perimeter	Circular
Length (m)	69.231
Friction Scheme	Manning's n
n	0.022

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Connections Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
11.000	3.767	Pipe	-19.826		0.6	150	90.500	89.110
12.000	1.684	Pipe	-6.602		0.6	150	90.160	89.045
13.000	2.517	Pipe	-9.322		0.6	150	90.130	89.030
14.000	1.822	Pipe	-9.109		0.6	150	90.300	89.100
11.001	42.546	Pipe	78.788		0.6	150	89.700	89.300

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
11.000	89.700	89.300	None		(None)	(None)
12.000	89.700	89.300	None		(None)	(None)
13.000	89.700	89.300	None		(None)	(None)
14.000	89.700	89.300	None		(None)	(None)
11.001	89.650	88.760	None	1.3	(None)	(None)

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
11.000	90.500 89.110	Diameter / Length: 1.200					Manhole
E:438835.804 N:303024.339	1.390						
			{a} 11.000	Pipe	89.110	Diam/Width:150	Not Applicable
Ditch	89.650 88.760	Diameter / Length: 1.200	{1} 11.001	Pipe	88.760	Diam/Width:150	Manhole
E:438772.378 N:302983.055	0.890						
							Not Applicable
12.000	90.160 89.045	Diameter / Length: 1.200					Manhole
E:438812.967 N:303018.985	1.115						
			{a} 12.000	Pipe	89.045	Diam/Width:150	Not Applicable
13.000	90.130 89.030	Diameter / Length: 1.200					Manhole
E:438813.464 N:303002.495	1.100						
			{a} 13.000	Pipe	89.030	Diam/Width:150	Not Applicable
14.000	90.300 89.100	Diameter / Length: 1.200					Manhole
E:438834.917 N:302998.960	1.200						
			{a} 14.000	Pipe	89.100	Diam/Width:150	Not Applicable

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024			
	Designed by: JT	Checked by: RW	Approved By:	
Report Details: Type: Outfall Details Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
Ditch	Free Discharge			

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Title: Rainfall Analysis Criteria	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Runoff Type	Dynamic
Output Interval (mins)	15
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FEH	Type: FEH
Site Location	GB 438807 303090 SK 38807 03090
Rainfall Version	2013
Data Type	Point
Summer	☒
Winter	☒

Return Period	
Return Period (years)	Increase Rainfall (%)
100.0	40.000
Storm Durations	
Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
11.000	FEH: 100 years: +40 %: 15 mins: Winter	0.000	Surcharged
Ditch	FEH: 100 years: +40 %: 360 mins: Summer	0.000	OK
12.000	FEH: 100 years: +40 %: 60 mins: Summer	0.000	Surcharged
13.000	FEH: 100 years: +40 %: 600 mins: Winter	0.000	Surcharged
14.000	FEH: 100 years: +40 %: 15 mins: Winter	0.000	Surcharged

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 600 mins: Winter	89.440	89.440	0.140	0.140	14.3	168.516	0.000	0.000	1.3	69.195	54.604	OK

Bosworth Lakeside Lodges: Basin C networkv2	Date: 05/09/2024		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
11.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	11.000	Pond	90.500	89.646	0.150	0.000	1.5	1.97	26.1	Surcharged
12.000	FEH: 100 years: +40 %: 15 mins: Winter	Pipe	12.000	Pond	90.160	89.437	0.150	0.000	2.4	3.16	41.9	Surcharged
13.000	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	13.000	Pond	90.130	89.393	0.150	0.000	0.6	0.85	11.3	Surcharged
14.000	FEH: 100 years: +40 %: 120 mins: Summer	Pipe	14.000	Pond	90.300	89.412	0.150	0.000	1.2	1.56	20.7	Surcharged
11.001	FEH: 100 years: +40 %: 360 mins: Summer	Pipe	Pond	Ditch	89.700	89.435	0.026	40.716	0.6	0.06	1.3	OK

InfoDrainage Network Calculations

Basin D

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025			
	Designed by: JT	Checked by: RW	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



Filter Drain

Type : Catchment Area

Area (ha)	0.068
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area

Type : Catchment Area

Area (ha)	0.011
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.011
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		





Catchment Area (2)

Type : Catchment Area

Area (ha)	0.029
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2) (1)

Type : Catchment Area

Area (ha)	0.029
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Green Roof

Type : Catchment Area

Area (ha)	0.047
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Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff	1.000
Coefficient	
Winter Volumetric Runoff	1.000
Coefficient	
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025			
	Designed by: JT	Checked by: RW	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



Green Roof (1)

Type : Catchment Area

Area (ha)	0.047
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Dynamic Sizing	
Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Junctions Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
Ditch	Manhole	438774.278	302911.515	88.800	0.330	88.470	Circular	1.200
Hydrobrake	Manhole	438798.766	302912.277	89.680	1.050	88.630	Circular	1.200
SW1	Manhole	438840.122	302932.490	90.590	1.350	89.240	Circular	1.200
SW2	Manhole	438836.687	302925.619	90.540	1.350	89.190	Circular	1.200
SW3	Manhole	438816.472	302931.300	90.400	1.350	89.050	Circular	1.200
SW5	Manhole	438794.276	302932.291	90.255	1.425	88.830	Circular	1.200
SW4	Manhole	438793.351	302939.690	90.305	1.425	88.880	Circular	1.200
SW6	Manhole	438794.745	302922.715	89.890	1.125	88.765	Circular	1.200

Name	Lock
Ditch	None
Hydrobrake	None
SW1	None
SW2	None
SW3	None
SW5	None
SW4	None
SW6	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Ditch	Inlet	Pipe (1)	(None)	No Restriction
Hydrobrake	Inlet	Pipe	(None)	No Restriction
SW1	Inlet	Green Roof Catchment Area (1)	(None)	No Restriction
SW2	Inlet	Pipe (2)	(None)	No Restriction
SW3	Inlet	Pipe (3) Catchment Area (2) Catchment Area (2) (1)	(None)	No Restriction
SW5	Inlet	Pipe (4) Pipe (7)	(None)	No Restriction
SW4	Inlet	Catchment Area Green Roof (1) Filter Drain	(None)	No Restriction
SW6	Inlet	Pipe (5)	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Hydrobrake	Outlet	Pipe (1)	Free Discharge
SW1	Outlet	Pipe (2)	Free Discharge
SW2	Outlet	Pipe (3)	Free Discharge
SW3	Outlet	Pipe (4)	Free Discharge
SW5	Outlet	Pipe (5)	Free Discharge
SW4	Outlet	Pipe (7)	Free Discharge
SW6	Outlet	Pipe (6)	Free Discharge

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	89.320
Depth (m)	0.650
Base Level (m)	88.670
Freeboard (mm)	100
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	218.227

Depth (m)	Area (m²)	Volume (m³)
0.000	340.00	0.000
0.100	359.89	34.990
0.200	380.35	71.997
0.300	401.37	111.079
0.400	422.96	152.291
0.500	445.12	195.690
0.600	467.84	241.333
0.650	479.41	265.013

Inlets

Inlet

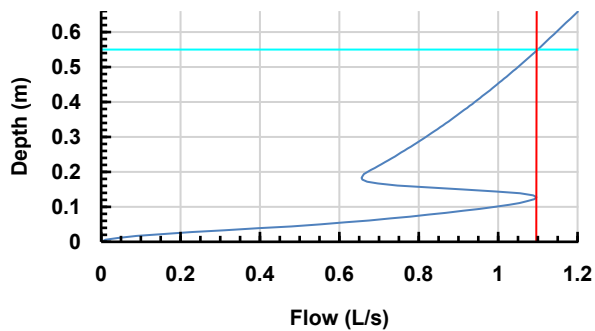
Inlet Type	Point Inflow
Incoming Item(s)	Pipe (6)
Bypass Destination	(None)
Capacity Type	No Restriction

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Hydro-Brake®
Invert Level (m)	88.670
Design Depth (m)	0.550
Design Flow (L/s)	1.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐
Unit Reference	CHE-0055-1100-0550-1100



Advanced

Perimeter	Circular
Length (m)	25.578
Friction Scheme	Manning's n
n	0.022

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Connections Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	From	To	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)
Pipe	Pond	Hydrobrake	15.668	Pipe	391.701		0.6	150
Pipe (1)	Hydrobrake	Ditch	24.500	Pipe	153.124		0.6	150
Pipe (2)	SW1	SW2	7.681	Pipe	153.627		0.6	150
Pipe (3)	SW2	SW3	20.998	Pipe	149.986		0.6	150
Pipe (4)	SW3	SW5	22.219	Pipe	153.233		0.6	150
Pipe (5)	SW5	SW6	9.588	Pipe	147.507		0.6	225
Pipe (6)	SW6	Pond	21.979	Pipe	231.359		0.6	225
Pipe (7)	SW4	SW5	7.456	Pipe	149.129		0.6	225

Name	Height (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)
Pipe		89.320	88.670	89.680	88.630	All	1.1
Pipe (1)		89.680	88.630	88.800	88.470	All	
Pipe (2)		90.590	89.240	90.540	89.190	All	
Pipe (3)		90.540	89.190	90.400	89.050	All	
Pipe (4)		90.400	89.050	90.255	88.905	All	
Pipe (5)		90.255	88.830	89.890	88.765	All	
Pipe (6)		89.890	88.765	89.320	88.670	All	
Pipe (7)		90.305	88.880	90.255	88.830	All	

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
Ditch	88.800 88.470	Diameter / Length: 1.200	{1} Pipe (1)	Pipe	88.470	Diam/Width:150	Manhole
E:438774.278	0.330						
N:302911.515							Not Applicable
Hydrobrake	89.680 88.630	Diameter / Length: 1.200	{1} Pipe	Pipe	88.630	Diam/Width:150	Manhole
E:438798.766	1.050						
N:302912.277			{a} Pipe (1)	Pipe	88.630	Diam/Width:150	Not Applicable
SW1	90.590 89.240	Diameter / Length: 1.200					Manhole
E:438840.122	1.350						
N:302932.490			{a} Pipe (2)	Pipe	89.240	Diam/Width:150	Not Applicable
SW2	90.540 89.190	Diameter / Length: 1.200	{1} Pipe (2)	Pipe	89.190	Diam/Width:150	Manhole
E:438836.687	1.350						
N:302925.619			{a} Pipe (3)	Pipe	89.190	Diam/Width:150	Not Applicable
SW3	90.400 89.050	Diameter / Length: 1.200	{1} Pipe (3)	Pipe	89.050	Diam/Width:150	Manhole
E:438816.472	1.350						
N:302931.300			{a} Pipe (4)	Pipe	89.050	Diam/Width:150	Not Applicable

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	Cover Level (m) Invert Level (m)		Connection Details				Type
Coordinates (m)	Depth (m)	Manhole Size (m)	Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW5	90.255 88.830	Diameter / Length: 1.200	{1} Pipe (4)	Pipe	88.905	Diam/Width:150	Manhole
E:438794.276 N:302932.291	1.425		{2} Pipe (7)	Pipe	88.830	Diam/Width:225	
			{a} Pipe (5)	Pipe	88.830	Diam/Width:225	Not Applicable
SW4	90.305 88.880	Diameter / Length: 1.200					Manhole
E:438793.351 N:302939.690	1.425		{a} Pipe (7)	Pipe	88.880	Diam/Width:225	Not Applicable
SW6	89.890 88.765	Diameter / Length: 1.200	{1} Pipe (5)	Pipe	88.765	Diam/Width:225	Manhole
E:438794.745 N:302922.715	1.125		{a} Pipe (6)	Pipe	88.765	Diam/Width:225	Not Applicable

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025		
	Designed by: JT	Checked by: RW	Approved By:
Report Title: Rainfall Analysis Criteria	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH	Type: FEH
Site Location	GB 438807 303090 SK 38807 03090
Rainfall Version	2022
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	40.000
30.0	0.000
2.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
Ditch	FEH: 100 years: +40 %: 5760 mins: Winter	0.000	OK
Hydrobrake	FEH: 100 years: +40 %: 5760 mins: Winter	0.000	OK
SW1	FEH: 100 years: +40 %: 15 mins: Summer	0.160	Flood
SW2	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk
SW3	FEH: 100 years: +40 %: 15 mins: Summer	5.315	Flood
SW5	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk
SW4	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk
SW6	FEH: 100 years: +40 %: 15 mins: Summer	0.000	Flood Risk

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
Ditch	FEH: 30 years: +0 %: 5760 mins: Winter	0.000	OK
Hydrobrake	FEH: 30 years: +0 %: 5760 mins: Winter	0.000	OK
SW1	FEH: 30 years: +0 %: 30 mins: Summer	0.000	Surcharged
SW2	FEH: 30 years: +0 %: 30 mins: Summer	0.000	Surcharged
SW3	FEH: 30 years: +0 %: 15 mins: Summer	0.000	Surcharged
SW5	FEH: 30 years: +0 %: 15 mins: Summer	0.000	Surcharged
SW4	FEH: 30 years: +0 %: 15 mins: Summer	0.000	Surcharged
SW6	FEH: 30 years: +0 %: 15 mins: Summer	0.000	Surcharged

Project: ADC3381 Bosworth Lakeside Lodges	Date: 09/07/2025		
	Designed by: JT	Checked by: RW	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG		



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Max. Flooded Volume (m³)	Status
Ditch	FEH: 2 years: +0 %: 720 mins: Summer	0.000	OK
Hydrobrake	FEH: 2 years: +0 %: 720 mins: Summer	0.000	OK
SW1	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK
SW2	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK
SW3	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK
SW5	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK
SW4	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK
SW6	FEH: 2 years: +0 %: 15 mins: Summer	0.000	OK

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



**FEH: 100 years: Increase Rainfall (%): +40: 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)	Percentage Available (%)	Status
Pond	FEH: 100 years: +40 %: 720 mins: Winter	89.215	89.214	0.545	0.544	14.2	215.736	0.000	0.000	1.1	74.335	1.142	OK

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 30 years: Increase Rainfall (%): +0: 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. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 30 years: +0 %: 720 mins: Summer	88.987	88.987	0.317	0.317	12.2	118.043	0.000	0.000	1.1	54.977	45.908	OK

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 2 years: Increase Rainfall (%): +0: 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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FEH: 2 years: +0 %: 720 mins: Summer	88.835	88.835	0.165	0.165	7.0	58.701	0.000	0.000	1.1	58.898	73.101	OK

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +40 %: 4320 mins: Winter	Pipe	Pond	Hydrobrake	89.320	89.130	0.033	326.192	0.4	0.12	1.1	Surcharged
Pipe (1)	FEH: 100 years: +40 %: 5760 mins: Winter	Pipe	Hydrobrake	Ditch	89.680	88.659	0.028	356.513	0.5	0.08	1.1	OK
Pipe (2)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	SW1	SW2	90.590	90.590	0.150	14.469	0.9	1.07	15.2	Flood
Pipe (3)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	SW2	SW3	90.540	90.534	0.150	14.363	1.3	1.59	23.0	Flood Risk
Pipe (4)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	SW3	SW5	90.400	90.403	0.150	49.679	2.1	2.59	37.1	Flood
Pipe (5)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	SW5	SW6	90.255	89.961	0.225	71.446	2.1	1.95	83.2	Flood Risk
Pipe (6)	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	SW6	Pond	89.890	89.585	0.225	102.825	2.0	2.34	79.5	Surcharged
Pipe (7)	FEH: 100 years: +40 %: 15 mins: Summer	Pipe	SW4	SW5	90.305	90.124	0.225	37.746	1.6	1.49	63.3	Flood Risk

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +0 %: 5760 mins: Winter	Pipe	Pond	Hydrobrake	89.320	88.843	0.033	212.725	0.4	0.12	1.1	Surcharged
Pipe (1)	FEH: 30 years: +0 %: 5760 mins: Winter	Pipe	Hydrobrake	Ditch	89.680	88.659	0.028	212.720	0.5	0.08	1.1	OK
Pipe (2)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	SW1	SW2	90.590	89.642	0.150	8.212	0.7	0.68	9.8	Surcharged
Pipe (3)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	SW2	SW3	90.540	89.631	0.150	8.124	0.7	0.91	13.1	Surcharged
Pipe (4)	FEH: 30 years: +0 %: 30 mins: Summer	Pipe	SW3	SW5	90.400	89.600	0.150	27.799	1.3	1.66	23.7	Surcharged
Pipe (5)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	SW5	SW6	90.255	89.238	0.225	40.516	1.5	1.36	58.1	Surcharged
Pipe (6)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	SW6	Pond	89.890	89.066	0.169	40.330	1.7	1.64	55.7	Surcharged
Pipe (7)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	SW4	SW5	90.305	89.302	0.225	21.442	1.0	0.89	37.8	Surcharged

Project: ADC3381 Bosworth Lakeside Lodges		Date: 09/07/2025			
		Designed by: JT	Checked by: RW		Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 2 years: +0 %: 600 mins: Summer	Pipe	Pond	Hydrobrake	89.320	88.835	0.033	51.592	0.4	0.12	1.1	Surcharged
Pipe (1)	FEH: 2 years: +0 %: 720 mins: Summer	Pipe	Hydrobrake	Ditch	89.680	88.659	0.028	58.815	0.5	0.08	1.1	OK
Pipe (2)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW1	SW2	90.590	89.302	0.059	3.788	0.7	0.32	4.6	OK
Pipe (3)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW2	SW3	90.540	89.245	0.095	3.713	0.5	0.3	4.3	OK
Pipe (4)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW3	SW5	90.400	89.184	0.122	8.822	0.9	0.99	14.2	OK
Pipe (5)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW5	SW6	90.255	88.999	0.165	18.657	1.0	0.73	31.4	OK
Pipe (6)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW6	Pond	89.890	88.926	0.093	18.543	1.9	0.89	30.1	OK
Pipe (7)	FEH: 2 years: +0 %: 15 mins: Summer	Pipe	SW4	SW5	90.305	89.016	0.152	9.920	0.6	0.43	18.2	OK

InfoDrainage Network Calculations

Oversized Pipe

Project: ADC3381 Bosworth Lakeside Lodges	Date: 21/07/2025			
	Designed by: JT	Checked by:	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



Type : Catchment Area

Area (ha)	0.018
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Dynamic Sizing	
Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	1.000
Winter Volumetric Runoff Coefficient	1.000
Depression Storage (mm)	0
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Project: ADC3381 Bosworth Lakeside Lodges		Date: 21/07/2025			
		Designed by: JT	Checked by:		Approved By:
Report Details: Type: Junctions Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

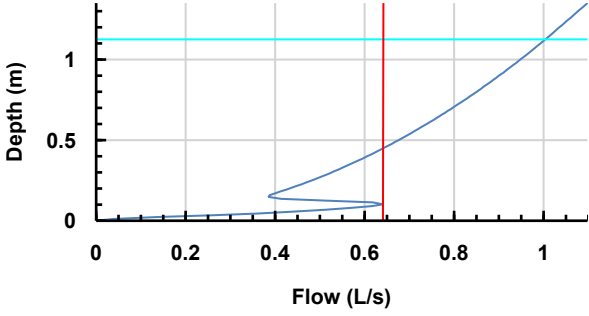
Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
17.000	Manhole	438812.285	302855.820	89.130	1.045	87.780	Circular	1.200
17.001	Manhole	438808.259	302825.494	88.930	1.145	87.580	Circular	1.200
Ditch	Manhole	438807.061	302823.310	88.000	0.440	87.560	Circular	1.200

Name	Lock
17.000	None
17.001	None
Ditch	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
17.000	Inlet	Green Roof	(None)	No Restriction
17.001	Inlet	17.000	(None)	No Restriction
Ditch	Inlet	17.001	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
17.000	Outlet	17.000	Free Discharge
	Outlet	17.001	Hydro-Brake®
	Invert Level (m)	87.580	
	Design Depth (m)	1.125	
	Design Flow (L/s)	1.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0044-1000-1125-1000	
			
17.001			

Project: ADC3381 Bosworth Lakeside Lodges		Date: 21/07/2025			
		Designed by: JT	Checked by:		Approved By:
Report Details: Type: Connections Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
17.000	30.593	Pipe	152.963		0.6	450	89.130	87.780
17.001	2.491	Pipe	124.537		0.6	150	88.930	87.580

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
17.000	88.930	87.580		None		(None)	(None)
17.001	88.000	87.560		None	1.0	(None)	(None)

Project: ADC3381 Bosworth Lakeside Lodges		Date: 21/07/2025			
		Designed by: JT	Checked by:		Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
17.000	89.130 87.780	Diameter / Length: 1.200					Manhole
E:438812.285 N:302855.820	1.045						
			{a} 17.000	Pipe	87.780	Diam/Width:450	Not Applicable
17.001	88.930 87.580	Diameter / Length: 1.200	{1} 17.000	Pipe	87.580	Diam/Width:450	Manhole
E:438808.259 N:302825.494	1.145						
			{a} 17.001	Pipe	87.580	Diam/Width:150	Not Applicable
Ditch	88.000 87.560	Diameter / Length: 1.200	{1} 17.001	Pipe	87.560	Diam/Width:150	Manhole
E:438807.061 N:302823.310	0.440						
							Not Applicable

Project: ADC3381 Bosworth Lakeside Lodges	Date: 21/07/2025			
	Designed by: JT	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH	Type: FEH
Site Location	GB 438807 303090 SK 38807 03090
Rainfall Version	2022
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	40.000
30.0	0.000
2.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520

Project: ADC3381 Bosworth Lakeside Lodges		Date: 21/07/2025			
		Designed by: JT	Checked by:		Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
17.000	FEH: 100 years: +40 %: 120 mins: Winter	89.13 0	87.78 0	88.637	0.857	3.1	0.970	0.000	2.1	11.354	Surcharged
17.001	FEH: 100 years: +40 %: 120 mins: Winter	88.93 0	87.58 0	88.637	1.057	2.1	1.196	0.000	1.0	8.964	Flood Risk
Ditch	FEH: 100 years: +40 %: 120 mins: Winter	88.00 0	87.56 0	87.585	0.025	1.0	0.000	0.000	1.0	8.940	OK

Project: ADC3381 Bosworth Lakeside Lodges		Date: 21/07/2025			
		Designed by: JT	Checked by:		Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase		ADC Infrastructure: 34-36 Carrington Street Nottingham NG1 7FG			



Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
17.000	FEH: 100 years: +40 %: 30 mins: Summer	Pipe	17.000	17.001	89.130	88.086	0.406	4.967	0.3	0.02	4.0	OK
17.001	FEH: 100 years: +40 %: 120 mins: Winter	Pipe	17.001	Ditch	88.930	88.637	0.026	8.940	0.5	0.06	1.0	Flood Risk

APPENDIX D

LLFA RESPONSE AND CONSULTEE COMMENTS

James Tuck

From: Jack Harriman <Jack.Harriman@leics.gov.uk>
Sent: 04 September 2024 08:43
To: james.tuck@ADCInfrastructure.com
Cc: Alice.Kirsz@ADCInfrastructure.com
Subject: RE: LLFA Enquiry - Market Bosworth

Categories: Filed to CloudFiler

Hi James

Thank you for request for pre-application advice. Following review of the submitted documents, I can confirm the following.

The applicant is looking to situate a recreational development on a greenfield site.

When determining planning applications, the local planning authority should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific flood risk assessment (FRA) confirming it will not put the users of the development at risk. Where a FRA is applicable this should be undertaken in accordance with the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG). All sources of flood risk including (but not limited to) fluvial, pluvial, groundwater, canals, reservoirs, sewers, etc. should be considered as part of any forthcoming planning application. The LLFA would recommend reviewing the relevant Strategic Flood Risk Assessment for this area which may contain additional flood risk details.

Leicestershire County Council's Infrastructure Planning (Flood Risk Management) team has no records of the following flooding incidents within close proximity to the site. It is advised that not all instances of flooding are reported to Leicestershire County Council and as such, there may be a history of flooding for which we have no record.

All development has the potential to increase flood risk so it is essential that all forms of flooding are taken into consideration within any flood risk assessment (where required) or planning application. Where there is insufficient information regarding any aspect of risk, the responsibility to investigate falls to the applicant.

Leicestershire County Council as the Lead Local Flood Authority (LLFA) would expect a sequential approach to masterplan development, locating development in areas at lowest risk of flooding.

Given the currently undeveloped nature of the site, the LLFA would expect surface water runoff from the site to be suitably managed as per best practice guidance given in the CIRIA C753 The SuDS Manual. The LLFA would expect any surface water drainage proposal to seek to infiltrate unless demonstrated to be unfeasible. Such demonstration should include infiltration testing in accordance with BRE Digest 365 Soakaway Design. Should this not be appropriate, the LLFA would expect runoff from site to be discharge to the next most appropriate receptor at rates and volumes no greater than the event specific greenfield values. As such, the surface water drainage strategy you have outline in your email would be acceptable in principle should conditions be met.

Leicestershire County Council opposes the culverting of watercourses; however, we recognise there are instances where culverting may be unavoidable. Any applicant will be required to justify the use of culverts and provide information demonstrating that there will be no detrimental effect on flood risk. Please refer to the County Council's Local Flood Risk Management Strategy which contains the culverting policy (Appendix 3) which can also be found on our website.

To safeguard access to watercourses or ditches for future maintenance, inspection and improvement works in the future; clear margins should be provided from the top of banks. A minimum clear margin of 3m should be provided from each top of bank for watercourses less than 2 metres in width, a minimum clear margin of 4.5m should be provided for watercourses 2 metres or greater in width.

The LLFA would expect any future surface water drainage scheme to assess the use of SuDS including but not limited to swales, attenuation basins and permeable paving in line with 'CIRIA C753 The SuDS Manual'. Such above ground SuDS structures would also provide one of the required treatment trains to manage water quality. It should be noted that the LLFA do not consider the use of underground storage tanks or oversize pipes as a suitable treatment train and as such where these are proposed, additional treatment trains should be implemented. Leicestershire County Council, in their role as LLFA, does not adopt SuDS. For enquiries regarding the proposed development and future adoption and maintenance of SuDS features, please direct these to your local District or Borough Council.

Any surface water drainage features should be located within the areas at lowest risk of flooding to ensure they remain operational during an extreme event. Any drainage features should also consider how an extreme event may constrain the discharge from any proposed drainage system and ensure the drainage infrastructure can adequately manage surface water runoff regardless (for example a surcharged outfall).

Where a site-specific flood risk assessment (FRA) is required by NPPF the associated drainage strategy should also provide outline operation and maintenance details along with an indicative proposal of who will maintain any SuDS features over the lifetime of the development.

Please find the LLFA planning checklist and guidance available on our website.

If you have any further questions, please do not hesitate to contact us.

Kind Regards,

Jack Harriman
Senior Technician (Flood Risk Management)
Union Rep for UNISON
Environment & Transport Department
Leicestershire County Council
Tel: 0116 305 2261

www.flooding@leics.gov.uk

www.leicestershire.gov.uk/planning-and-environment/flooding-and-drainage

From: James Tuck <james.tuck@ADCInfrastructure.com>
Sent: Tuesday, August 13, 2024 9:49 AM
To: Flooding <Flooding@leics.gov.uk>
Cc: Alice Kirszt <Alice.Kirszt@ADCInfrastructure.com>
Subject: LLFA Enquiry - Market Bosworth

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Good morning,

I am currently writing a Flood Risk Assessment and Drainage Strategy report to support a full planning application for a site off Wellsborough Road, Market Bosworth. The proposal is to extend the recently constructed Bosworth Lakeside Lodges (planning reference: 20/00026/FUL) to the adjacent field to the east.

The site address details are as follows:

Land South of Wellsborough Road,
Market Bosworth,
Leicestershire,
CV13 6FA

X – 438829, Y-303186

The development proposals are for a residential development consisting of up to 40 holiday lodges, at this stage there is not a fixed Masterplan, however, I have attached a copy of the site location plan for your reference.

I have reviewed the online flood mapping, which shows that the site is located within Flood Zone 1, the surface water mapping demonstrates no risk of pluvial flooding on the site. There is no reservoir flood risk.

A desktop review of the underlying geology found that the site is underlain by a mudstone bedrock, thus the site does not appear to be conducive with infiltration drainage devices. A topographical survey conducted for the site demonstrates onsite ground levels to decline in a south-westerly direction, a series of ordinary watercourses are also highlighted within the survey and as such surface water runoff will be sought to be discharged from the site at a restricted greenfield runoff rate into the ordinary watercourses within the site.

A Developer Enquiry will be submitted to Severn Trent to consider an appropriate foul strategy for the site in due course.

As LLFA could you advise whether the above strategy is acceptable in principle, furthermore, could you clarify any established easements associated with the existing ditches, and what area should form the basis of the greenfield runoff calculations i.e net area, developable area, or impermeable area?

Do let me know if you require any further information or clarification at all. I look forward to your response.

Kind Regards,

James Tuck

Graduate Engineer – ADC Infrastructure Limited

T: 0115 9414817 M:

4th Floor, City Buildings, 34-36 Carrington Street, Nottingham NG1 7FG

james.tuck@ADCInfrastructure.com

www.ADCInfrastructure.com

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From: public.access@hinckley-bosworth.gov.uk
Sent: 04 April 2024 15:00
To: Planning Application Comments
Subject: Consultee Comments for Planning Application 24/10028/PREMAJ

Consultee comments

Dear Sir/Madam,

A consultee has commented on a Planning Application. A summary of the comments is provided below.

Comments were submitted at 04/04/2024 2:59 PM from Mr Peter Reid (peter.reid@hinckley-bosworth.gov.uk) on behalf of HBBC Drainage.

Application Summary

Reference:	24/10028/PREMAJ
Address:	Land East Of Bosworth Water Park Wellsborough Road Market Bosworth Leicestershire
Proposal:	Proposed spa building and up to 60 holiday lodges with associated access, car parking and landscaping
Case Officer:	Matt Jedruch

[Click for further information](#)

Comments Details

Advice to Applicant:

According to the Environment Agency (EA) website, the application site is located within Flood Zone 1, designated as low probability of flooding from rivers and sea, and the principle of development in low flood risk areas is acceptable. Please note that for larger developments, a Flood Risk Assessment will be required where the site area exceeds 1 Hectare.

The EA Surface Water mapping also indicates that the application site is located in an area at varying risk of flooding from surface water.

Comments:

The surface water drainage system for the proposed development should incorporate sustainable drainage principles (SuDS) to mitigate the risk of flooding on the site, and ensure that surface water runoff does not increase flood risk elsewhere. The proposals should also include measures to address issues of water quality in accordance with current SuDS guidance.

The proposed outfall for the discharge of surface water runoff from the development should be in accordance with the hierarchical approach outlined in Building Regulations Part H.

The use of infiltration drainage is preferred, subject to the site being free from a contaminated ground legacy. The suitability of the ground strata for soakaway drainage should be ascertained by means of the test described in BRE Digest 365, and the results approved by the Building Control Surveyor before development is commenced

If the ground strata are insufficiently permeable to avoid discharging some surface water off-site, flow attenuation methods should be employed, either alone or in combination with infiltration systems and/or rainwater harvesting systems.

Kind regards

James Tuck

From: Jack Harriman <Jack.Harriman@leics.gov.uk>
Sent: 03 April 2024 09:07
To: Planning Folder New
Cc: Matt Jedruch
Subject: RE: Planning Consultation for LCC Drainage re. Pre-Application 24/10028/PREMAJ

FAO Matt Jedruch

When determining planning applications, the local planning authority should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where informed by a site-specific flood risk assessment (FRA) confirming it will not put the users of the development at risk. Where a FRA is applicable this should be undertaken in accordance with the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG).

From review of the Flood Map for Planning which shows fluvial flood risk, the site is entirely located within flood zone 1. The risk of flooding from surface water map shows the site to predominately be at very low risk from surface water flooding with two veins of high and medium risk indication the presence of two on-site ordinary watercourses.

Other sources of flood risk including (but not limited to) groundwater, canals, reservoirs, sewers, etc. should be considered as part of any forthcoming planning application. The LLFA would recommend reviewing the relevant Strategic Flood Risk Assessment for this area which may contain additional flood risk details.

All development has the potential to increase flood risk so it is essential that all forms of flooding are taken into consideration within any flood risk assessment (where required) or planning application. Where there is insufficient information regarding any aspect of risk, the responsibility to investigate falls to the applicant.

Leicestershire County Council as the Lead Local Flood Authority (LLFA) would expect a sequential approach to masterplan development, locating development in areas at lowest risk of flooding. For development within or in close proximity to flood zone 2, or the risk of flooding from surface water is medium or high risk as identifies on the risk of flooding from surface water map, the LLFA would expect finished floor levels to be set at a minimum of the highest level of the following;

- 300mm above the general ground level of the site OR
- 600mm above the Flood Zone 2 water level.

In order to deliver safe development, we advise that single storey buildings or ground floor subdivisions with no access to higher floors, should have access to a refuge set above the 1 in 1,000 annual probability (0.1%) in any year flood level including an allowance for climate change. Basement rooms should have unimpeded access internally to an upper level

Given the currently undeveloped nature of the site, the LLFA would expect surface water runoff from the site to be suitably managed as per best practice guidance given in the CIRIA C753 The SuDS Manual.

The LLFA would expect any surface water drainage proposal to seek to infiltrate unless demonstrated to be unfeasible. Such demonstration should include infiltration testing in accordance with BRE Digest 365 Soakaway Design.

Should this not be appropriate, the LLFA would expect runoff from site to be discharge to the next most appropriate receptor at rates and volumes no greater than the event specific greenfield values. Where discharge volumes from the site will increase, mitigation through reduction in the peak flow rate (typically to QBar) should be sought. Refer to CIRIA C753 for additional guidance on discharge rates and volumes.

The proposed on-site amenity ponds should be utilised for surface water harvesting and on-site storage. Any overflow details should be shown as part of the site surface water drainage strategy.

Leicestershire County Council opposes the culverting of watercourses; however, we recognise there are instances where culverting may be unavoidable. Any applicant will be required to justify the use of culverts and provide information demonstrating that there will be no detrimental effect on flood risk. Please refer to the County Council's Local Flood Risk Management Strategy which contains the culverting policy (Appendix 3) which can also be found on our website.

To safeguard access to watercourses or ditches for future maintenance, inspection and improvement works in the future; clear margins should be provided from the top of banks. A minimum clear margin of 3m should be provided from each top of bank for watercourses less than 2 metres in width, a minimum clear margin of 4.5m should be provided for watercourses 2 metres or greater in width.

The LLFA would expect any future surface water drainage scheme to assess the use of SuDS including but not limited to swales, attenuation basins and permeable paving in line with 'CIRIA C753 The SuDS Manual'. Such above ground SuDS structures would also provide one of the required treatment trains to manage water quality. It should be noted that the LLFA do not consider the use of underground storage tanks or oversize pipes as a suitable treatment train and as such where these are proposed, additional treatment trains should be implemented. Leicestershire County Council, in their role as LLFA, does not adopt SuDS. For enquiries regarding the proposed development and future adoption and maintenance of SuDS features, please direct these to your local District or Borough Council.

Any surface water drainage features should be located within the areas at lowest risk of flooding to ensure they remain operational during an extreme event. Any drainage features should also consider how an extreme event may constrain the discharge from any proposed drainage system and ensure the drainage infrastructure can adequately manage surface water runoff regardless (for example a surcharged outfall).

Where a site-specific flood risk assessment (FRA) is required by NPPF the associated drainage strategy should also provide outline operation and maintenance details along with an indicative proposal of who will maintain any SuDS features over the lifetime of the development.

If you have any further questions, please do not hesitate to contact us.

Flood Risk Management
Environment & Transport Department
Leicestershire County Council
Tel: 0116 305 0001

www.flooding@leics.gov.uk

www.leicestershire.gov.uk/planning-and-environment/flooding-and-drainage

-----Original Message-----

From: planning@hinckley-bosworth.gov.uk <planning@hinckley-bosworth.gov.uk>

Sent: 13 March 2024 11:59

To: Ilfa <llfa@leics.gov.uk>

Subject: Planning Consultation for LCC Drainage re. Pre-Application 24/10028/PREMAJ

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Main office: Hinckley Hub, Rugby Road, Hinckley, Leics LE10 0FR. Main switchboard: 01455 238141

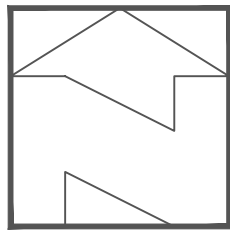
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APPENDIX E

DRAINAGE STRATEGY LAYOUT



This drawing has been based / developed using the following data					
Type	Originator	Reference Number	Rev	Drawing date	date received
Topo survey	njc surveys LTD	2260 - 04 - 05		17:04:23	03:10:23
Site Layout	Golby +luck	Development Proposal Plan - GL2223 02	E	14:07:25	15:07:25

- Notes
1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
 2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
 3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
 4. Any discrepancies noted on site are to be reported to the engineer immediately.

- Drainage Notes
1. All adoptable surface and foul water drainage works to be carried out in accordance with 'Sewers for Adoption 7th edition' and any specific requirements of the adopting authority/sewerage undertaker.
 2. All private drainage works are to be carried out in accordance with Building Regulations Part H, BS EN 752, the Civil Engineering Specification for the Water Industry.
 3. The exact position, level, line, size and use of existing drainage is to be confirmed on site. Any discrepancies to be reported to the engineer prior to the commencement of works.
 4. All temporary works associated with the construction of the drainage works shall be the responsibility of the contractor, including the protection of any uncovered/shallow pipework against construction traffic.
 5. The Contractor is responsible for obtaining and paying for all necessary permissions to enable construction of the works to be undertaken, including but not limited to licences for street works and connections to existing sewers. This includes Section 108 applications when connecting directly or indirectly to the public sewerage network (complete application to be made at least 3 weeks prior to the planned outfall construction works).
 6. All proposed chamber covers are to be marked permanently with 'SWS' (or equiv.) on surface water sewers and 'FWS' (or equiv.) on foul sewers. All covers to be in accordance with BS EN 124.
 7. Unless noted otherwise, all lateral connections are to be installed with level soffits to the diameters and gradients shown on the layout drawing. Any pipe bends should be provided to suit the direction of flow & no pipework should be downsized in the direction of flow.
 8. Foul water 'stop up positions' are shown indicatively only, to be confirmed by the Architect / M&E contractor prior to commencement of works. Refer to Architect plans for setting out of internal floor pop up positions.
 9. All RWPs and SVPs to be fitted with roddable access plates. All foul drains to have roddable access.
 10. Above ground drainage details to be designed/confirmed by the Architect/M&E contractor, including ventilation of the foul drainage system.
 11. Proposed drainage passing through new foundations to be sleeved with cast-in oversized pipework.
 12. All specialist/proprietary products such as separators, attenuation tanks, channel drains, soakaways, package pumping station and water treatment units to be installed as per the manufacturer's installation details and specifications.
 13. All new drainage to be constructed adjacent to new and proposed tree planting to be adequately protected against root activity using root barriers in accordance with the manufacturer's recommendations.
 14. Grease trap requirements, associated fittings and installation, whether buried or above ground, to M&E contractor's design / detail.
 15. Unless stated otherwise chambers situated within the Section 38 highway are to be type 2 PCC manholes with D400 grade covers. Chambers beyond the extent of Section 38 highway, unless stated otherwise, are to be telescopic Type 3 PPIC inspection chambers. Refer to drainage details for further information

- KEY:
- Surface Water Drain ————
- Filter Drain ————
- Green Roof Catchment Area [Purple Hatched Box]
- SW Catchment Area [Pink Hatched Box]
- Filter Drain Catchment Area [Light Pink Hatched Box]

P03	21.07.25	Amended to updated site layout	JT	AK
P02	04.10.24	Basin water levels amended	JT	RW
P01	30.09.24	First issue	JT	RW
Rev	Date	Description	Dr	Ch

Client:

Bosworth Lakeside Lodges Ltd

Project:

Bosworth Lakeside Lodges

Title:

Proposed Drainage Layout

Size: A1

Scale: 1:500

Status: PRELIMINARY

Project	Originator	Volume	Level	Type	Role	Number	Status	Revision
3381	ADC-ZZ-XX-DR	D	-0501	S1	P03			