



FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

**PROPOSED EMPLOYMENT DEVELOPMENT
HORSEPOOL GRANGE, STANTON UNDER BARDON**

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1.0 INTRODUCTION

- 1.1 Marrons have commissioned ADC Infrastructure Limited to produce a joint Flood Risk Assessment (FRA) and Drainage Strategy report in support of an outline application for an industrial development on the land to the west of Elliotts Lane and the south of Cliffe Hill Road, Stanton under Bardon, Leicestershire.
- 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 both foul and surface water seeks to identify the potential constraints that need to be considered as the development proposals progress. Leicestershire County Council 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 comprises of one agricultural field parcel located on the land to the west of Elliotts Lane and the south of Cliffe Hill Road, Stanton under Bardon. The site is bound by the existing Horsepool Grange Industrial Estate to the west, agricultural field parcels to the south, beyond Elliott's Lane to the east and Old Cliffe Hill Quarry to the north beyond Cliff Hill Road.
- 2.2 The location of the site is included in Figure 1 below and is centred upon OS grid reference 447197, 309967.



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

- 2.3 A walkover of the site, and its immediate vicinity was undertaken by ADC Infrastructure in November 2025. Photographs were taken across the site and focused on the existing drainage feature; copies of the photos taken during the site walkover can be found in **Appendix A**.

Topography

- 2.4 A topographical survey, shown in **Appendix B**, has been undertaken by SV Surveying Ltd in November 2025. The topographical survey shows that there is a total change in elevation of approximately 10.3m across the site. The maximum elevation is approximately 183.20m (AOD) in the northern extents of the development and ground declines in all directions from this point; however, the minimum elevation of 172.93m (AOD) is located within the southeastern extents of the development.
- 2.5 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.

- 2.6 Contour lines were then extracted from the LiDAR data to form a digital elevation model, an extract of which is presented within Figure 2

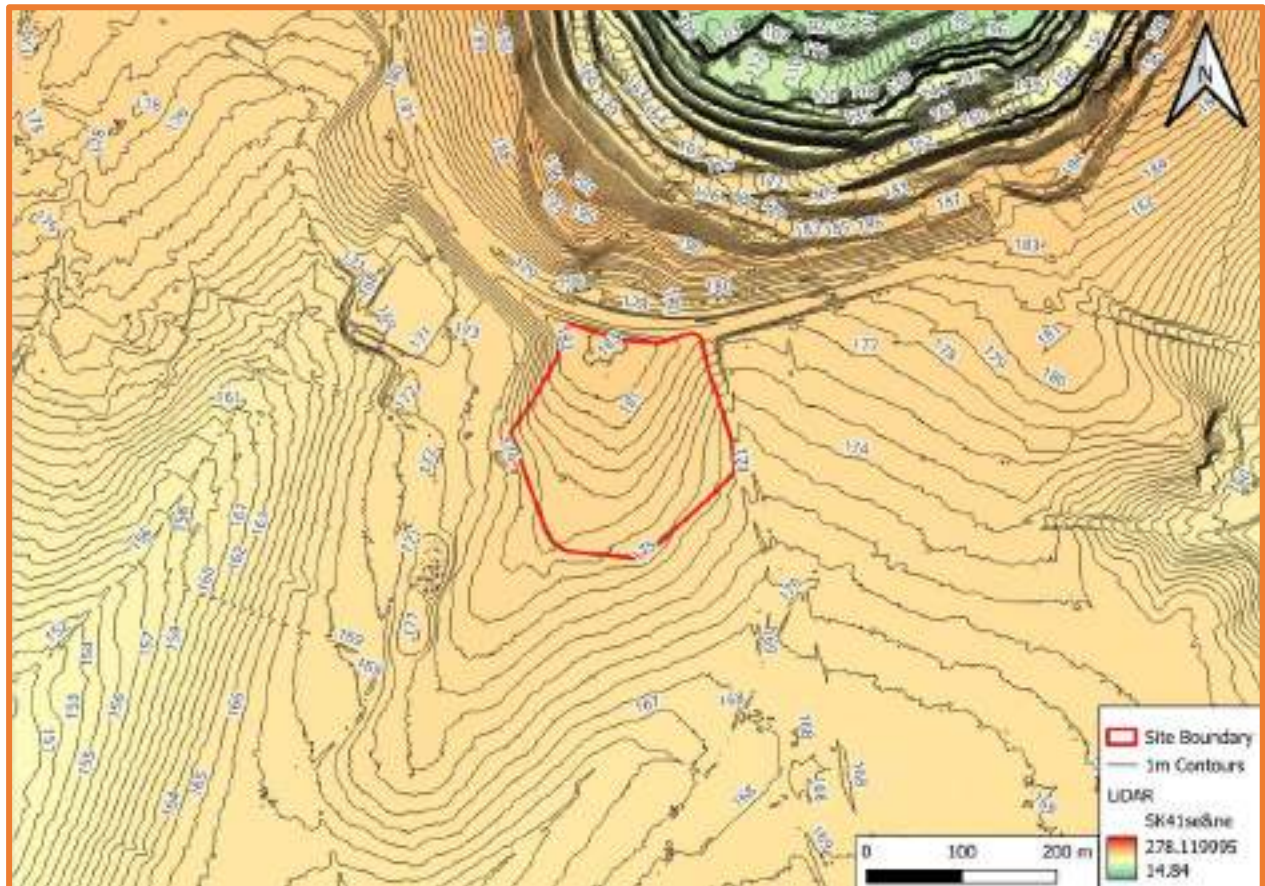


Figure 2: LiDAR map showing the elevation (m AOD) for the site and surrounding area.

- 2.7 With the exception of the north Figure 2 demonstrates that land within the wider catchment declines in all directions from the high point situated within the north of the development.

Existing drainage

- 2.8 The site is greenfield in nature and is currently served by an adopted sewerage network.
- 2.9 The topographical survey (see **Appendix B**) demonstrates that a field drainage ditch network is present along the southern and western boundary of the development, and the presence of this was confirmed during the site walkover.
- 2.10 At numerous points along its length there are points of access into the development field parcel, at which there are no culverts present. Through the site walkover however, the southeastern ditch was confirmed to discharge into the highway ditch present on the western side of Elliott's Lane.
- 2.11 OS mapping demonstrates the presence of an unnamed ordinary watercourse located approximately 230m south of the development and from the site walkover it is assumed that the highway ditch connects into this watercourse.
- 2.12 Sewer record plans, obtained from Severn Trent Water in January 2026, presented in **Appendix C** demonstrate the closes public adopted sewerage network is situated within Luke Jackson Way, approximately 450km northwest of the development.

- 2.13 Surface water runoff currently generated onsite is assumed to drain via a combination of slow infiltration and overland flow to the existing field drainage ditch network located around the extents of the development.

Geology

- 2.14 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:**

- o Edwalton Member-Mudstone. These sedimentary rocks are fluvial, lacustrine and marine in origin. They are detrital, deposited in lagoons or shallow seas; where a hot, arid climate also leads to the precipitation of beds of evaporites.

- **Superficial Deposits:**

- o Oadby Till Member-Diamicton. These sedimentary deposits are glacial in origin. They are detrital, created by the action of ice and meltwater, they can form a wide range of deposits and geomorphologies associated with glacial and inter-glacial periods during the Quaternary.

Soils

- 2.15 The Cranfield Soil and Agrifood Institute Soils mapping for the site was also reviewed. The mapping defined the underlying soil classification as:

- **Soilscape 17:** Slowly permeable seasonally wet acid loamy and clayey soils (Eastern side)
- **Soilscape 18:** Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Western side)

Onsite drainage implications

- 2.16 Based upon the available data on the nature of the underlying soils and geology, it appears as though the site will possess low infiltration rates.
- 2.17 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

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

3.0 PROPOSED DEVELOPMENT

3.1 The development proposals are for an industrial development and associated infrastructure.

3.2 Figure 3 below demonstrates the illustrative concept layout for the scheme.



Figure 3: Illustrative concept plan

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.

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:

“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

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

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;*
- b) have appropriate proposed minimum operational standards; and,*

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.

- 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. 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.

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

	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 stating:

“The sequential test should be applied to ‘Major’ and ‘Non-major’ development proposed in areas at risk of flooding, as set out in paragraphs 173 to 174 of the National Planning Policy Framework. Paragraphs 175, 176 and 180 set out exemptions from the sequential test.

In applying paragraph 175 a proportionate approach should be taken. Where a site-specific flood risk assessment demonstrates clearly that the proposed layout, design, and mitigation measures would ensure that occupiers and users would remain safe from current and future surface water flood risk for the lifetime of the development (therefore addressing the risks identified e.g. by Environment Agency flood risk mapping), without increasing flood risk elsewhere, then the sequential test need not be applied.

The absence of a 5-year housing land supply is not a relevant consideration in applying the sequential test for individual applications. However, housing considerations, including housing land supply, may be relevant in the planning balance, alongside the outcome of the sequential test.”⁸

- 4.12 Three critically important tables are included within the PPG that set the framework for discussion and analysis of site-specific flood risk.
- 4.13 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.

⁸ (Ministry of Housing, Communities and Local Government, 2025) Planning Practice Guidance – Flood Risk and Coastal Change, paragraph 027

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 a 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200, and a 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)

4.14 It is important to note that land in Flood Zone 3b is categorized as;⁹

- 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)

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

4.16 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:					

⁹ (Ministry of Housing, Communities and Local Government, 2025). Planning Practice Guidance. Flood risk and coastal change. Chapter: Flood Zone and flood risk tables. Table 1.

*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.*

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

4.18 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”.

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

4.20 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

4.21 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

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

Peak rainfall intensity¹⁰

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

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

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

¹⁰ (Environment Agency, 2022). Flood Risk Assessments: climate change allowances.

Soar 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%

- 4.26 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.

Local planning context

Hickley and Bosworth Borough Council Local Plan

- 4.27 The site falls within the jurisdiction of Hinckley and Bosworth Borough Council and is subject to the policies and guidance specified within the local plan. The latest plan was adopted in July 2016 and covers the period from 2006 and 2026.
- 4.28 The current Local Plan is made up of a series of documents, these include Core Strategy, Site Allocations & Development Management Policies.

Local Development Framework Core Strategy

- 4.29 The Core Strategy does not contain any specific policies on flood risk or surface water management, but these are covered more broadly under Strategic Objective 10, which seeks to improve resource management across the Borough. Objective 10 notes that flooding is not a major issue for the Borough but states sustainable urban drainage must be incorporated into all new developments.

Site Allocations and Development Management Policies (SADMP)

- 4.30 The SADMP accompanies the local plan and outlines the key policies for the borough. The development management policies in relation to flood risk and drainage, are DM7 (Preventing Pollution and Flooding) and DM10 (Development and Design).
- 4.31 Policy DM7 – Preventing Pollution and Flooding, states:
1. *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;*
 - 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.*

- 4.32 Policy DM10 – Development and Design, states:

1. *Developments will be permitted providing that the following requirements are met:*

- h) An appropriate Sustainable Drainage Scheme is submitted to and approved by the relevant Authority. Schemes should incorporate wildlife areas, ponds, swales and permeable paving where appropriate;*

In exceptional circumstances where outstanding, innovative design is demonstrated (particularly where high levels of sustainability are integral feature), applications will be considered favourably, even where this may result in some limited conflict with the above criteria.

Hinckley and Bosworth Draft Local Plan 2024-2045

- 4.33 Hinckley and Bosworth are currently undertaking a regulation 18 for an emerging local plan which covers the time period 2024-2045.

- 4.34 The draft policies relevant to flood risk and drainage in the emerging plan, are CC02 (Flood Risk) and CC03 (Sustainable Drainage Systems).

- 4.35 Policy CC02 – Flood Risk, states:

- 1. Planning applications for development proposals that require a Flood Risk Assessment will be required to address the actual and residual risk from all forms of flooding and the impact of climate change. The Flood Risk Assessment should be prepared in accordance with national and local guidance, including the recommendations set out in the Borough Council's Strategic Flood Risk Assessment.*
- 2. Development in areas at risk of flooding will only be supported where it is satisfactorily demonstrated that:*
 - The Sequential Test has been passed;*
 - Where required, the Exception Test has been passed;*
 - The proposed development will not increase the risk of flooding on site or elsewhere and appropriate floodplain compensation is provided where necessary; and*
 - The proposed development, including the access and egress, will be safe and resilient to flooding for its lifetime, taking into account the relevant climate change allowances.*
- 3. Where development is permitted within flood risk areas, it must demonstrate that, where required, it will reduce fluvial and surface water flood risk and manage residual risks, address the impacts of climate change through appropriate flood mitigation and adaptation measures, including enhancements to existing defences.*
- 4. All development proposals should, wherever possible, include measures to reduce and manage surface water through appropriate sustainable drainage systems (SuDS) so as to minimise and manage flood risk and improve water quality in accordance with Policies CC03 and PMD03.*

- 4.36 Policy CC03 – Sustainable Drainage Systems States:

- 1. Development proposals are required to integrate well-designed and naturalised Sustainable Drainage Systems (SuDS), to manage flood risk and water quality in accordance with national and local standards unless it can be clearly demonstrated;*
 - That SuDS are not technically, operationally or financially deliverable or viable and that surface water drainage issues from the development can be alternatively mitigated; or*

- *That the SuDS scheme will adversely affect the environment or safety.*
- 2. *SuDS design should show how constraints have been considered and how the design provides multiple benefits in terms of landscape enhancement, biodiversity, recreation, amenity, leisure and the enhancement of historical features. Applicants should demonstrate how the design and layout of SuDS reflects and responds to the individual site's features such as following natural drainage routes to improve water quality and the local landscape character.*
- 3. *Applicants are expected to integrate SuDS proposals with green infrastructure and active travel proposals, as part of a multi-functional approach, which should be delivered and integrated as part of a green network. Where integration of SuDS is not proposed, applicants must provide evidence as to why it is not possible. Where SuDS are part of open space obligations, they should be safe and accessible whilst creating an enhancement to local distinctiveness.*
- 4. *Arrangements in accordance with national policy will need to be put in place for the management and long-term maintenance of the SuDS throughout the operational lifetime of the development. Planning applications for phased developments should be accompanied by a Drainage Strategy, which takes a strategic approach to drainage provision across the entire site and incorporates adequate provision for SuDS within each phase.*
- 5. *The impacts of flood risk and pollution during the construction phase(s) of development should be fully assessed, and where appropriate a Surface Water Management Plan should be put in place prior to commencement of development to identify and mitigate the potential impacts.*
- 6. *Proposals for the retrofitting of sustainable drainage systems will be supported.*

Bagworth, Thornton & Stanton-under-Bardon Draft Neighbourhood Plan 2023-2039

- 4.37 Regulation 17 examination started on the BT&SuB Neighbourhood Plan commenced on 5th September 2025 and will cover the period from 2023-2039
- 4.38 The draft policies relevant to flood risk and drainage in the emerging neighbourhood plan, is Policy H5.
- 4.39 Policy H5 – Design Standards, states:
1. *All major developments shall ensure that Sustainable Drainage Systems (SuDS) for the management of surface water run-off are put in place unless demonstrated to be inappropriate. All schemes for the inclusions of SuDS should demonstrate they have considered all four aspects of good SuDS design, Quantity, Quality, Amenity and Biodiversity, and the SuDS and development will fit into the existing landscape. The completed SuDS schemes should be accompanied by a maintenance schedule detailing maintenance boundaries, responsible parties and arrangements to ensure that the SuDS are maintained in perpetuity. Where possible, all non-major development should look to incorporate these same SuDS principles into their designs.*

Hinckley and Bosworth Level 1 Strategic Flood Risk Assessment

- 4.40 Hinckley and Bosworth Borough Council commissioned JBA to undertake a Level 1 SFRA in January 2025, to inform and support the production of the 2024-2045 Local Plan. Whilst the local plan has not been adopted the evidence base remains relevant.

4.41 The Level 1 SFRA outlines the following principles for new developments

1. Consult with statutory and non-statutory consultees at an early stage to understand their requirements.
2. Consider the risk from all sources of flooding and that they are using the most up to date flood risk data and guidance.
3. Confirm that the development does not increase flood risk elsewhere.
4. Make the development safe for future users.
5. Enhance the natural river corridor and floodplain environment through new development.
6. Consider and contribute to wider flood mitigation strategy and measures in the area and apply the relevant local planning policy.
7. Consider opportunities for betterment in locations where critical infrastructure is identified to be at flood risk

4.42 The SFRA goes onto provide advice for site specific mitigation, this includes modifying ground levels, finished floor levels and general resistance and resilience measures.

Flood Risk Status

4.43 The Environment Agency online flood mapping shows that the Site lies within Flood Zone 1 and predominantly possesses a very low chance of flooding from surface water (see Figure 4 and Figure 5 below).



Figure 4: EA Flood Map for Planning Extract.



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

Flood risk and development compatibility

- 4.44 The development is categorised as employment development. In Annex 3 of the NPPF, residential development is categorised as a 'Less vulnerable' development type.
- 4.45 The development is located within Flood Zone 1 and, except for a minor low to high chance pluvial overland flow path situated within the southern field drainage ditch, has a very low to low chance of surface water flooding.
- 4.46 In accordance with Table 2 of the PPG, the development is deemed appropriate in regard to fluvial flood risk.
- 4.47 All built development is to be located in areas shown to have a very low to low chance of surface water flooding. Any minor areas of surface water flooding will be mitigated via localised ground reprofiling to avoid maintaining low points in the development areas that could otherwise collect runoff. The development is therefore sequentially acceptable in terms of pluvial flooding and the sequential test is not required in accordance with the PPG requirements.
- 4.48 The risk posed to the development from both fluvial and pluvial sources is discussed in greater detail within section 5.

Previous flood history

- 4.49 A review of the 'Recorded Flood Outlines' and 'Historic Flood Map' datasets showed there to be no recorded flooding events within the vicinity of the site.

- 4.50 Leicestershire County Council as LLFA are required under section 19 of the Flood and Water Management act to investigate all flooding incidents that occur within Leicestershire. No records of historical flooding incidents within the vicinity of the site are held.

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 therefore possesses a low risk of fluvial flooding.
Tidal	None	There are no tidal influences in the area and so there is no risk of tidal flooding.
Canals	None	The nearest canal is the River Soar which passes through Leicester located approximately 12km east of the development and so there is no risk of canal flooding affecting the site.
Groundwater	Low	A desktop review of the underlying geology infers that the lack of bedrock permeability onsite would render groundwater flooding to be unlikely. Mapping produced as part of the 2025 Level 1 SFRA indicate that the site possesses no risk of ground water emergency and a between 25-50% ground water susceptibility, so risk is deemed low.
Sewers	Low	Local sewer plans demonstrated the closest public adopted sewer are located at a low elevation than the development and geographically remote, so risk is deemed low.
Pluvial (Surface Water) runoff	Low	The EA mapping demonstrates that the majority of the site has a very low risk of pluvial flooding, and all built development will be constructed within very low risk areas and as such the risk is deemed to be low.
Reservoirs and Waterbodies	None	The EA mapping demonstrates that the site is at minimal risk of reservoir flooding.

Fluvial flooding

- 5.3 The 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 OS Mapping demonstrates the presence of a minor unnamed ordinary watercourse located approximately 200m to the south of the development. Given the distance, the development is intuitively located above the aforementioned waterbodies and as such the risk of flooding is deemed to be low.

Tidal flooding

- 5.5 The site is located within an area that is not tidally influenced. Therefore, it is deemed that there is no risk from tidal or coastal flooding.

Canal flooding

- 5.6 There are no canals within the immediate vicinity of the site, and therefore there is no risk posed to the site.
- 5.7 The closes canal is the River Soar, which passes through the centre of Leicester and is located approximately 12km to the east of the development.

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 The 2025 Level 1 SFRA for Hinckley and Bosworth includes mapping which shows the areas across the borough that are susceptible to groundwater flooding and have risk of groundwater emergence. The mapping implies that the site falls within an area that is deemed to possess a between a 25-50% susceptibility to groundwater flooding and no risk of groundwater emergency. This mapping can be found within **Appendix D**.
- 5.11 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

- 5.12 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.
- 5.13 The mapping demonstrates the presence of a minor low to high chance pluvial overland flow path within the southern field drainage ditch network.
- 5.14 Surface water flood depth data from the EA's Long-Term Flood Risk Map has been reviewed and can be seen in Figure 6 and 7 overleaf. While the EA notes that this data is not definitive for development planning it provides useful context.
- 5.15 Figures 6 and 7 demonstrate that the majority of the pluvial overland flow path is situated between a depth of 300mm and 600mm.
- 5.16 This surface water flood mapping is generated using LiDAR data which often does not accurately represent the capacity within existing ditches/watercourses. As such, it is believed that the EA's surface water flood mapping does not accurately account for the capacity of the field drainage ditch for which the flow path is situated within, and its connectivity into the wider drainage network.



Figure 6: Annual Likelihood of 0.3m Surface Water Flood Depth



Figure 7: Annual Likelihood of 0.6m Surface Water Flood Depth

- 5.17 Nevertheless, all built development has been situated outside of the pluvial overland flow path and thus the pluvial flood risk is deemed as low.

Sewer flooding

- 5.18 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.
- 5.19 Sewer plans, shown in **Appendix C**, obtained from Severn Trent water demonstrate that the closest public adopted drainage network is situated within Luke Jackson Way approximately 450km northwest of the development.
- 5.20 Additionally, there is a public adopted foul rising main situated approximately 180m south of the development, within the wider ownership boundary.
- 5.21 Both sewer lengths are situated at a lower elevation and/or are geographically remote from the development; therefore, in the event of a sewer exceedance event effluent would route away from the development.
- 5.22 Given the above, the risk of sewer flooding is deemed low.

Reservoirs and artificial waterbodies

- 5.23 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 8.

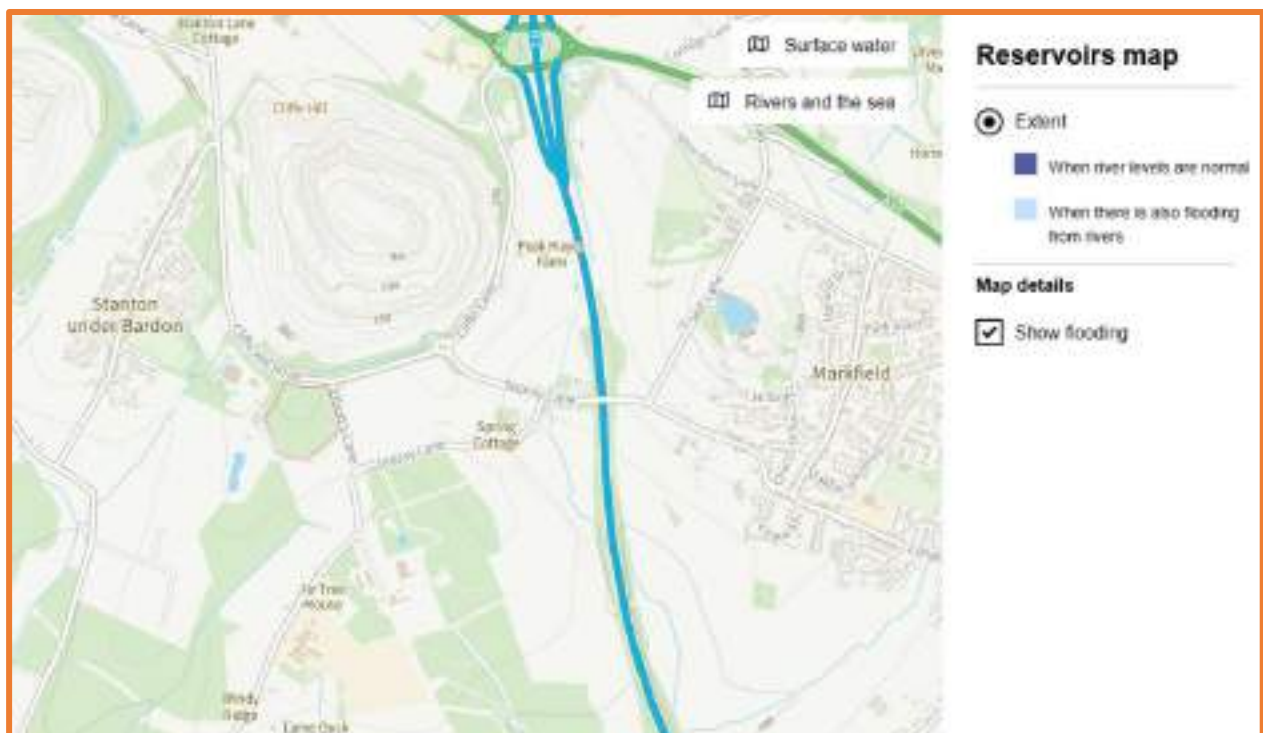


Figure 8: The flood risk from reservoir sources to the site.

- 5.24 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

- 5.25 The risk of flooding to the site from a variety of sources has been investigated. The evidence expressed above demonstrates the risk of flooding from fluvial sources to be low.
- 5.26 The risk of flooding from surface water to the development areas is considered to be low or very low. Any minor areas of surface water flooding will be mitigated via localised ground reprofiling to avoid maintaining low points in the development areas that could otherwise collect runoff.
- 5.27 A surface water drainage strategy for the site is proposed in further detail in Section 6 of this report.
- 5.28 Flood risk as a result of tidal, canal, sewer and reservoir influences have all been deemed as low and so no further mitigation is recommended.
- 5.29 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

- 5.30 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 considered¹¹.
- 5.31 The access and egress route from the development is shown to be in Flood Zone 1 and possess a low risk of pluvial flooding.

Drainage system design

- 5.32 The National Standards 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 National Standard for SuDS states:

“The surface water drainage system shall be designed so that, unless an area is designated to hold or convey water as part of the design, flooding does not occur on any part of the development for rainfall events up to the 3.3% AEP event.”¹²

“The surface water drainage system shall be designed so that flooding does not occur during rainfall events up to a 1% AEP event in any part of: a building (including a basement); any utility plant susceptible to water (for example, pumping station or electricity substation) within the development; or any route designed to provide safe access and escape during flooding.”¹³

¹¹ (Ministry of Housing, Communities and Local Government, 2025). Planning Practice Guidance. Flood risk and coastal change.

¹² (Department for Environment, Food and Rural Affairs, 2025). National standards for sustainable drainage systems (SuDS) paragraph 3.35

¹³ (Department for Environment, Food and Rural Affairs, 2025). National standards for sustainable drainage systems (SuDS) paragraph 3.36

Exceedance routes

- 5.33 The National Standards for SuDS guidance also specifies that:

“The surface water drainage system shall be assessed for exceedance events in excess of the 1% AEP event with expected exceedance routes identified across the development to confirm there is no adverse flood risk to the development or elsewhere.”¹⁴

- 5.34 The proposed SuDS features have been sized to accommodate all runoff generated onsite for up to the 1 in 100-year+40% storm event, as such there will be no exceedance flows within the site for the 1%AEP event.
- 5.35 However, a drainage catchment plan showing exceedance routes for the proposed drainage network, drawing 3968-ADC-HDG-XX-DR-CD-0521-S1, has been prepared by ADC Infrastructure, a copy of which can be found in **Appendix E**.
- 5.36 Exceedance routes within the proposed development are shown to route away from the proposed development and towards the existing field drainage ditch network to the south.

Finished floor levels

- 5.37 The site is not located within an area where there is a residual flood risk, however finished floor levels according to flood risk assessment standing guidance should be a minimum of 600mm above the estimated flood level¹⁵. However, this can potentially be reduced to 300mm where there is a high level of certainty about the estimated flood level.
- 5.38 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 surrounding ground levels.

External site levels

- 5.39 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.
- 5.40 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 industrial units.

Flood compensatory storage

- 5.41 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

¹⁴ (Department for Environment, Food and Rural Affairs, 2025). National standards for sustainable drainage systems (SuDS) paragraph 3.40

¹⁵ (Environment Agency, 2024). Flood risk assessment standing advice.

storage onsite, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked¹⁶.

- 5.42 The development proposals do not reduce any floodplain storage and therefore no further mitigation is required.

¹⁶ (Ministry of Housing, Communities and Local Government, 2025). 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 an industrial development upon greenfield land.
- 6.2 Given the scale of the development the site has been split into six drainage catchments reflective of the potential for different drainage catchments within the development. A full surface water catchment and exceedance route plan has been produced and can be seen in **Appendix E**.
- 6.3 Each catchment has its own discharge rate reflective of the impermeable area of the catchment and has been calculated using the UK SuDS greenfield runoff rate. The full outputs are included within **Appendix F**, and a summary of the results is provided in the tables below.

Catchment	Impermeable Area (ha)	QBar	1 in 1 Year	1 in 2 Year	1 in 30 Year	1 in 100 Year
Catchment 1	0.305	2.0	1.7	1.8	4.1	5.2
Catchment 2	0.299	2.0	1.6	1.7	3.9	5.0
Catchment 3	0.356	2.3	1.9	2.1	4.7	6.0
Catchment 4	0.527	3.4	2.9	3.1	6.9	8.9
Catchment 5	0.941	6.2	5.1	5.5	12.3	15.8
Catchment 6	0.285	1.9	1.5	1.7	3.7	4.8
Total	2.713	17.8	14.7	15.9	35.6	45.7

Discharge options

- 6.4 In accordance with the Building Regulations Part H, the newly published National Standards for SuDS and prevailing best practice, surface water should look to be discharged according to the following preferential hierarchy:
- Priority 1: collected for non-potable use
 - Priority 2: infiltrated to ground
 - Priority 3: discharged to an above ground surface water body
 - Priority 4: discharged to a surface water sewer, or another piped drainage system
 - Priority 5: discharged to a combined sewer
- 6.5 The British Geological Survey (BGS) mapping and Soilscape mapping were reviewed to give an indication of the underlying ground conditions. These suggest that the site is underlain by a mudstone bedrock and slowly permeable 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 Leicestershire County Council, 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 given the bedrock geology; therefore, preference should be given to the disposal of surface water runoff into the nearest above ground surface water body.

- 6.8 A field drainage ditch network is present along the southern and western boundaries of the development. Through the site walkover survey, it was confirmed that only the portion within the southeastern extents of the development has connectivity into the wider drainage network, and thus this portion would provide a suitable surface water outfall.

Onsite surface water strategy

- 6.9 The proposed onsite surface water strategy within each catchment will look to convey surface water runoff generated on site via a below ground gravity network to a network of attenuation basins and attenuation tanks in each catchment.
- 6.10 The proposed attenuation basins and attenuation tanks will temporarily store and treat surface water runoff before discharging to the existing field drainage ditch network, at a 1 in 2-year greenfield runoff rate, in line with National SuDS standards.
- 6.11 The proposed attenuation basins and attenuation tanks have been sized using the InfoDrainage for all storms up to and including a 100-year+40% storm event. Given that the development will be used for industrial purposes and that all remaining green space will be required for earthworks at detailed design, there has been no consideration for additional urban creep. The InfoDrainage calculations are shown within **Appendix G**.
- 6.12 The provisional design for all basins is features which have a 1.3m storage depth, inclusive of a 300mm freeboard and all tanks have been designed with a 1m storage depth. The drainage areas and storage volume required for each catchment can be seen in the table below.

Catchment	Area (m ²)	Total (m ²)	Attenuation Feature	Volume (m ³)
Catchment 1	Roof - 1020	3050	Basin	330
	Yard - 2030			
Catchment 2	Roof - 1010	2990	Tank	270
	Yard - 1980			
Catchment 3	Roof - 1510	3560	Basin	380
	Yard - 2050			
Catchment 4	Roof - 2020	5270	Basin	290
	Yard - 3250		Tank	500
Catchment 5	Roof - 5030	9410	Tank	850
	Yard - 4380			
Catchment 6	2850	2850	Tank	260
	Total:	2.713ha	-	2880

- 6.13 The discharge from all catchments has been routed through a final attenuation basin which will be ephemerally wet to provide additional treatment of surface water onsite. Given that the purpose of this basin is to provide treatment, the total attenuation provided has been excluded from the calculations.
- 6.14 It is also proposed that each yard area should be served by an oil/petrol interceptor to ensure that, should a spill occur, the risk of pollution is mitigated
- 6.15 Surface water runoff generated onsite will ultimately outfall from each catchment at the following rates:

Catchment	Discharge Rate (l/s)
Catchment 1	1.8
Catchment 2	1.7
Catchment 3	2.1
Catchment 4	3.1
Catchment 5	5.5
Catchment 6	1.7

- 6.16 The total restricted discharge rate for the proposed drainage scheme is shown to not exceed the 1 in2 year greenfield rate of 15.9 l/s.

Drainage layout

- 6.17 A drainage layout plan, drawing 3968-ADC-HDG-XX-DR-CD-0511-S1, has prepared by ADC Infrastructure, a copy of which can be found in Appendix H. The drainage layout demonstrates the drainage routes within the site and the preliminary design for the proposed surface water attenuation features.

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 ecology¹⁷.

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.”¹⁸

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 (x / ✓)
Source control	Living roofs	Provide soft landscaping at roof level, intercepting and reducing surface water runoff.	The structural design of the proposed buildings is not conducive for the use of living roofs.	x
	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.	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 not be conducive with permeable paving.	x
	Rainwater harvesting	Reduces the annual average rate of runoff from the site by reusing	Given the industrial nature of the development, rainwater harvesting	x

¹⁷ (Ciria, 2015). The SuDS Manual C753. Part B. Chapter 1.

¹⁸ (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 / ✓)
		water for non-potable uses e.g., toilet flushing.	isn't conducive with the development.	
	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 an internal road but the site layout is not conducive for their inclusion	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
	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.	There is limited space for the inclusion of a linear rain garden within the proposed site layout	x
	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 desktop review of the underlying ground conditions and spatial layout of the proposed development demonstrates that the site is not conducive for the use of filter drains and perforated pipes. This is subject to further testing.	x

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.	Given the large discharge volume and site layout the use of a wet pond is conducive	✓
	Attenuation Basins	Vegetated depressions in the surface, with an outlet that restricts runoff, designed to store and treat runoff.	An attenuation basin is proposed within the site's surface water drainage strategy.	✓
	Attenuation tanks	Oversized pipes or geo-cellular tanks designed to store water below ground level.	An attenuation tank within the proposed car park could provide the necessary surface water storage required onsite.	✓

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

- Wet Pond
- Attenuation Basins
- Attenuation Tanks

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 roofs (typical commercial/industrial), commercial yard and delivery area, non-residential parking with frequent change. In accordance with the CIRIA SuDS Manual C753 (2015), the attributed pollution 'hazard' levels associated with these classifications of hardstanding are between low and medium risk.

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Roofs (typical commercial/industrial)	Low	0.3	0.2 (can be up to 0.8 if there is potential for metals to leach)	0.05
Commercial yard and delivery area, non-residential parking with frequent change	Medium	0.7	0.6	0.7
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.
- 7.11 Where the mitigation index of an individual component is insufficient, two components or more in series will be required. A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations as below:

Total SuDS mitigation index = mitigation index 1 + 0.5 (mitigation index 2)

Type of SuDS component	TSS	Metals	Hydrocarbons
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
source: CIRIA SuDS Manual (C753) (2015) Part E. Chapter 26, Table 26.3, pg. 569			

- 7.12 It is proposed that oil/petrol interceptors are included within the yard areas and as a result contribute towards the treatment train onsite.
- 7.13 Based on the pollution mitigation indices highlighted in the table above and the inclusion of oil/petrol interceptors within the site layout, 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.

Alternative benefits of SuDS

- 7.14 SuDS features can 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.
- 7.15 In addition to water quality and biodiversity benefits mentioned above the proposed SuDS combination can offer a range of benefits. The following is a list of the benefits that SuDS can provide which has been obtained from the CIRIA SuDS Manual (C753).
- protecting people and property from increased flood risk resulting from the development
 - protecting the quality of groundwater and surface waters from polluted runoff from the development
 - protecting natural flow regimes (and thus the morphology and associated ecology) in rivers, lakes and streams
 - supporting local natural habitats and associated ecosystems by encouraging greater biodiversity and linking habitats
 - improving soil moisture and replenishing depleted groundwater levels
 - providing society with a valuable supply of water
 - creating attractive places where people want to live, work and play through the integration of water and green spaces with the built environment
 - improving people's understanding of how runoff from their development is being managed and used, and the benefits of more sustainable approaches
 - supporting the creation of developments that are more able to cope with changes in climate
 - delivering cost-effective infrastructure that uses fewer natural resources and has a smaller whole-life carbon footprint than conventional drainage
- 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 SuDS will be entirely contained within the site and will be constructed to adoptable standards; however, it is expected that the proposed SuDS will remain under private ownership and will be maintained by the management company for the development.
- 8.3 The onsite drainage system including the SuDS 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 species¹⁹.

Storage and attenuation

- 8.6 Surface water runoff from the site is to be attenuated by attenuation basins, attenuation tanks and a wet pond. The proposed maintenance regime for the aforementioned features is expressed in the tables below.

Operation and maintenance requirements for attenuation storage tanks		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface	Annually, or as required

¹⁹ (Ciria, 2015). SuDS Manual (C753). Part D. Chapter 23. Pg 500.

	infiltration medium as necessary.	
Remedial actions	Repair/ rehabilitate inlets, outlets, overflows, and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 21, pg. 469

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 reseeding 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		

Operation and maintenance requirements for ponds and wetlands		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cute the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstock	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be

		required rarely, e.g. every 25-50 years
Remedial action	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign riprap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required
source: CIRIA SuDs Manual (C753) (2015) Part D. Chapter 23, pg. 502		

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 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

- 8.9 Surface water is to discharge into the existing field drainage ditch network via an outfall pipe. 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

- 8.10 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.

- 8.11 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; however, it is expected to remain under private ownership, thus the responsibility to replace/repair any unfunctional components of the drainage network will lie with the management company for the development site.

9.0 CONCLUSIONS AND RECOMMENDATIONS

- 9.1 This Flood Risk Assessment and Drainage Strategy has been carried out on behalf of Marrons and supports the planning application for an industrial development, on the land to the west of Elliotts Lane and the south of Cliffe Hill Road, Stanton under Bardon, Leicestershire .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 there are areas of minor surface water flood risk in the existing field drainage ditch network. This 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 field drainage ditch network where it makes a connection into the wider drainage network.
- 9.5 Attenuation is proposed via the use of a network of attenuation basins and attenuation tanks. The basin 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.
- 9.6 The provisional design for all basins is features which have a 1.3m storage depth, inclusive of a 300mm freeboard and all tanks have been designed with a 1m storage depth. The total restricted discharge rate for the proposed drainage scheme will not exceed the 1 in2 year greenfield rate for the site.
- 9.7 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

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APPENDIX A

SITE WALKOVER SURVEY

Site Walkover Photos

Location: Horsepool Grange Industrial Estate, Stanton-under-Bardon, November 2025



Figure 1: Site Location Plan



Figure 2: View of development looking southwest from the high point in topography



Figure 3: View of development looking southeast from the high point in topography



Figure 4: View of development from western boundary



Figure 5: Existing ditch extending into existing Horsepool Grange Industrial Estate



Figure 6: Existing ditch along western boundary



Figure 7: Existing ditch on southwestern boundary



Figure 8: Existing ditch on southeastern boundary



Figure 9: Connectivity into wider drainage network



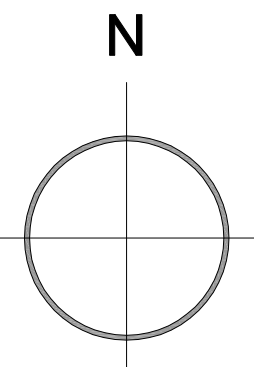
Figure 10: Highway ditch on west of Elliotts Lane



Figure 11: Culvert under existing access to Horsepool Grange industrial estate.

APPENDIX B

TOPOGRAPHICAL SURVEY



Notes :

This plan should only be used for its original purpose. SV Surveying Ltd accepts no responsibility for this plan if supplied to any other party other than the original client.

All dimensions / levels should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and should be treated as approximate only.

Tree information (where applicable) has been surveyed from ground level and therefore should be treated as approximate only.

Contours are drawn at 0.2m intervals

The survey has been fixed to GPS OSGB 1936 using the active GPS network.

Legend:

	Building Canopy / Overhang	Trig	Trig Pillar
	Buildings / walls	Ridge	Ridge Level
	Kerb line	Eave	Eave Level
	Carrieway edge	DPC	Dpc Level
	Floor Level	FL	Floor Level
	Centre Line	Soft	Soft Level
	Barrier	T&B	Control Box
	Hedge	LP	Lamp Post
	Security Fence	SP	Sign Post
	Panel Fence	Post	Post
	Open Fence	FS	Flag Staff
	Overhead Powerline	Mk	Gas Marker
	Chambers	EP	Electric Post
	Survey Station & Name	TP	Telegraph Post
	Bench Mark	Inv	Pipe Invert
	Temporary Bench Mark	GU	Gully
	Tree / Sapling	RP	Rodding Point
	Area Of Undergrowth	BT	Bt Cover
	Gate	CO	Cover Unknown
	IC	EC	Electricity Cover
	CL	FH	Fire Hydrant
	IL	GAS	Gas Cover
	Inv Ø150	SV	Stop Valve
	Gy	TV	Tv Cover
	Black Gully	WM	Water Meter
	MH	BB	Bellisha Beacon
		Bt	Bollard
		BS	Bus Stop
		ER	Earthing Rod
		Box	Post Box
		MS	Mile Stone
		TL	Traffic Light
		GV	Gas Valve
		Peg	Peg



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Project

**MARRONS
HORSEPOOL GRANGE**

Drawing

**TOPOGRAPHIC
SITE SURVEY**

Scales

1:500

Drawn/Paper Size

SF/A1

Survey Date

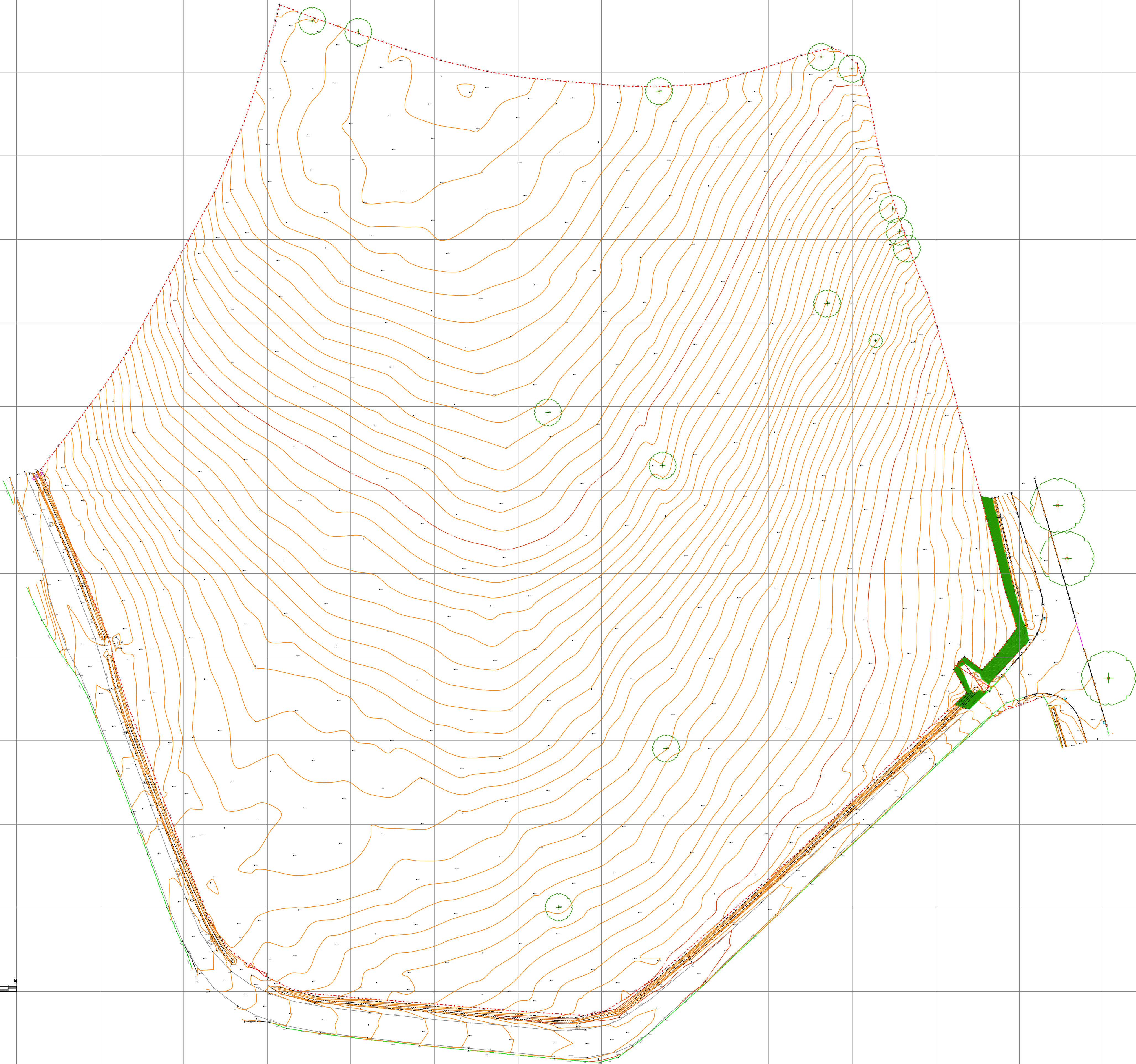
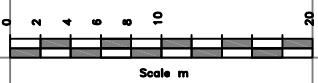
26/11/2025

Drawing No

25483-25-01

DO NOT SCALE

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APPENDIX C

SEWER RECORD PLANS

Sewer Node

Sewer Pipe Data

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK46107101	<UNK>	<UNK>	169.57	S	CO	C	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00
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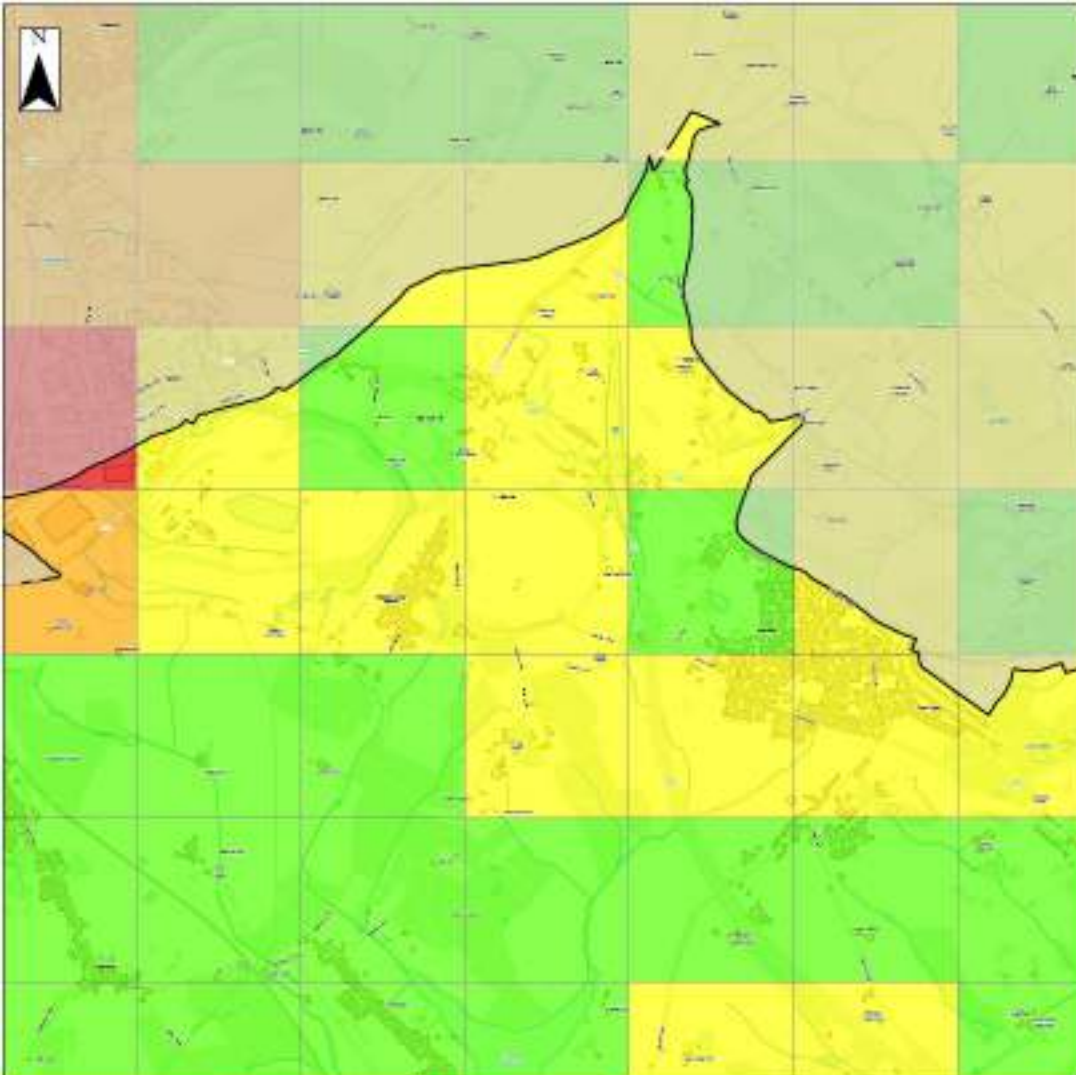
Sewer Node

Sewer Pipe Data

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APPENDIX D

2025 LEVEL 1 SFRA GEOPDF



Hinckley and Bosworth Borough Level 1 Strategic Flood Risk Assessment

Authority Information

- ☐ Hinckley & Bosworth Borough Boundary

Watercourses

- ☐ Main Rivers
- ☐ All Watercourses
- ☐ 8m Watercourses Buffer
- ☐ Canals

Defences

- ☐ Bridge Abutment
- ☐ Embankment
- ☐ Engineered High Ground
- ☐ Natural High Ground
- ☐ Wall

Modelled Flood Zones (Fluvial)

- ☐ Modelled Flood Zone 3b
- ☐ Modelled Flood Zone 3a
- ☐ Modelled Flood Zone 2

EA Flood Map for Planning

- ☐ Indicative Flood Zone 3b
- ☐ Flood Zone 3a
- ☐ Flood Zone 2

Climate Change Extent (Modelled)

- ☐ Indicative 3.3% AEP Central
- ☐ 3.3% AEP Central
- ☐ 3.3% AEP Higher Central
- ☐ 3.3% AEP Upper End
- ☐ 1% AEP Central
- ☐ 1% AEP Higher Central
- ☐ 1% AEP Upper End

Reservoir Flood Extents (EA)

- ☐ Dry Day Extent
- ☐ Wet Day Extent
- ☐ Fluvial Contribution

Risk of Flood from Rivers and Sea (EA)

- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

Reduction in Risk of Flooding from Rivers and Sea

- ☐ Reduction In Risk Of Flooding

Risk of Flooding From Surface Water (EA)

- ☐ 3.3% AEP
- ☐ 1% AEP
- ☐ 0.1% AEP

Surface Water Climate Change Extent (Modelled)

- ☐ 3.3% AEP Upper End 2070s CC
- ☐ 1% AEP Upper End 2070s CC

Groundwater Emergence Mapping (JBA)

- ☐ Less than 0.025m below surface
- ☐ Between 0.025- 0.5m below surface
- ☐ Between 0.5- 5m below surface
- ☐ At least 5m below surface
- ☐ No risk.

Groundwater Flooding Susceptibility (EA)

- ☒ Susceptibility (EA)
- ☐ < 25%
- ☐ >= 25% < 50%
- ☐ >= 50% < 75%
- ☐ >= 75%

Historic Flooding

- ☐ Recorded Flood Outlines
- ☐ Historic Flood Map

EA Flood Alert and Warning Areas

- ☐ Flood Warning Areas
- ☐ Flood Alert Areas

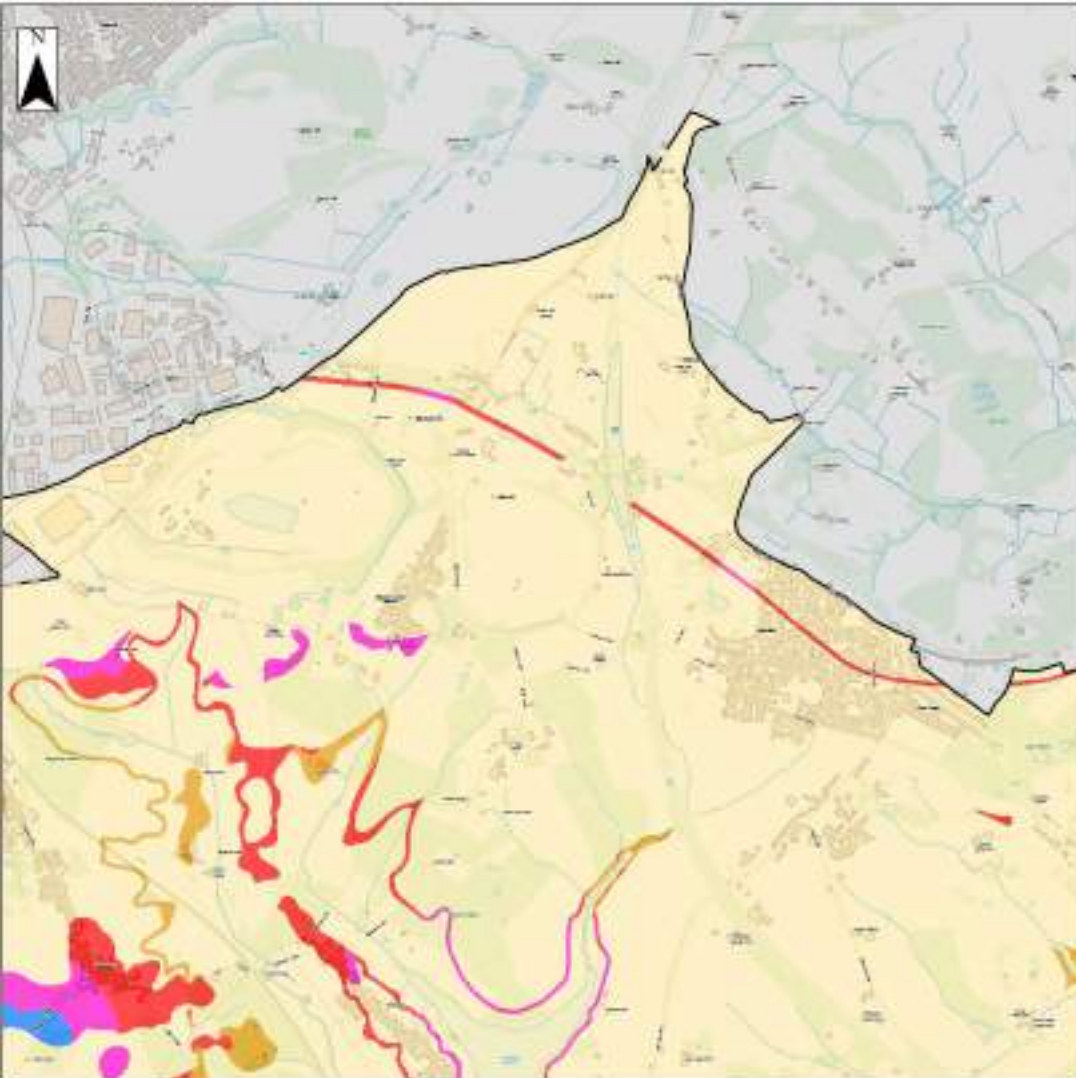
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To use:
Click on check box to turn a layer on/off





Hinckley and Bosworth Borough Level 1 Strategic Flood Risk Assessment

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- ☐ Wall

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- ☐ Modelled Flood Zone 3a
- ☐ Modelled Flood Zone 2

EA Flood Map for Planning

- ☐ Indicative Flood Zone 3b
- ☐ Flood Zone 3a
- ☐ Flood Zone 2

Climate Change Extent (Modelled)

- ☐ Indicative 3.3% AEP Central
- ☐ 3.3% AEP Central
- ☐ 3.3% AEP Higher Central
- ☐ 3.3% AEP Upper End
- ☐ 1% AEP Central
- ☐ 1% AEP Higher Central
- ☐ 1% AEP Upper End

Reservoir Flood Extents (EA)

- ☐ Dry Day Extent
- ☐ Wet Day Extent
- ☐ Fluvial Contribution

Risk of Flood from Rivers and Sea (EA)

- ☐ High
- ☐ Medium
- ☐ Low
- ☐ Very Low

Reduction in Risk of Flooding from Rivers and Sea

- ☐ Reduction in Risk Of Flooding

Risk of Flooding From Surface Water (EA)

- ☐ 3.3% AEP
- ☐ 1% AEP
- ☐ 0.1% AEP

Surface Water Climate Change Extent (Modelled)

- ☐ 3.3% AEP Upper End 2070s CC
- ☐ 1% AEP Upper End 2070s CC

Groundwater Emergence Mapping (JBA)

- ☐ Less than 0.025m below surface
- ☐ Between 0.025- 0.5m below surface
- ☐ Between 0.5- 5m below surface
- ☐ At least 5m below surface
- ☐ No risk.

Groundwater Flooding Susceptibility (EA)

- ☐ < 25%
- ☐ >= 25% < 50%
- ☐ >= 50% < 75%
- ☐ >= 75%

Historic Flooding

- ☐ Recorded Flood Outlines
- ☐ Historic Flood Map

EA Flood Alert and Warning Areas

- ☐ Flood Warning Areas
- ☐ Flood Alert Areas

To use:
Click on check box to turn a layer on/off

0 0.5 1 1.5 2 Kilometers

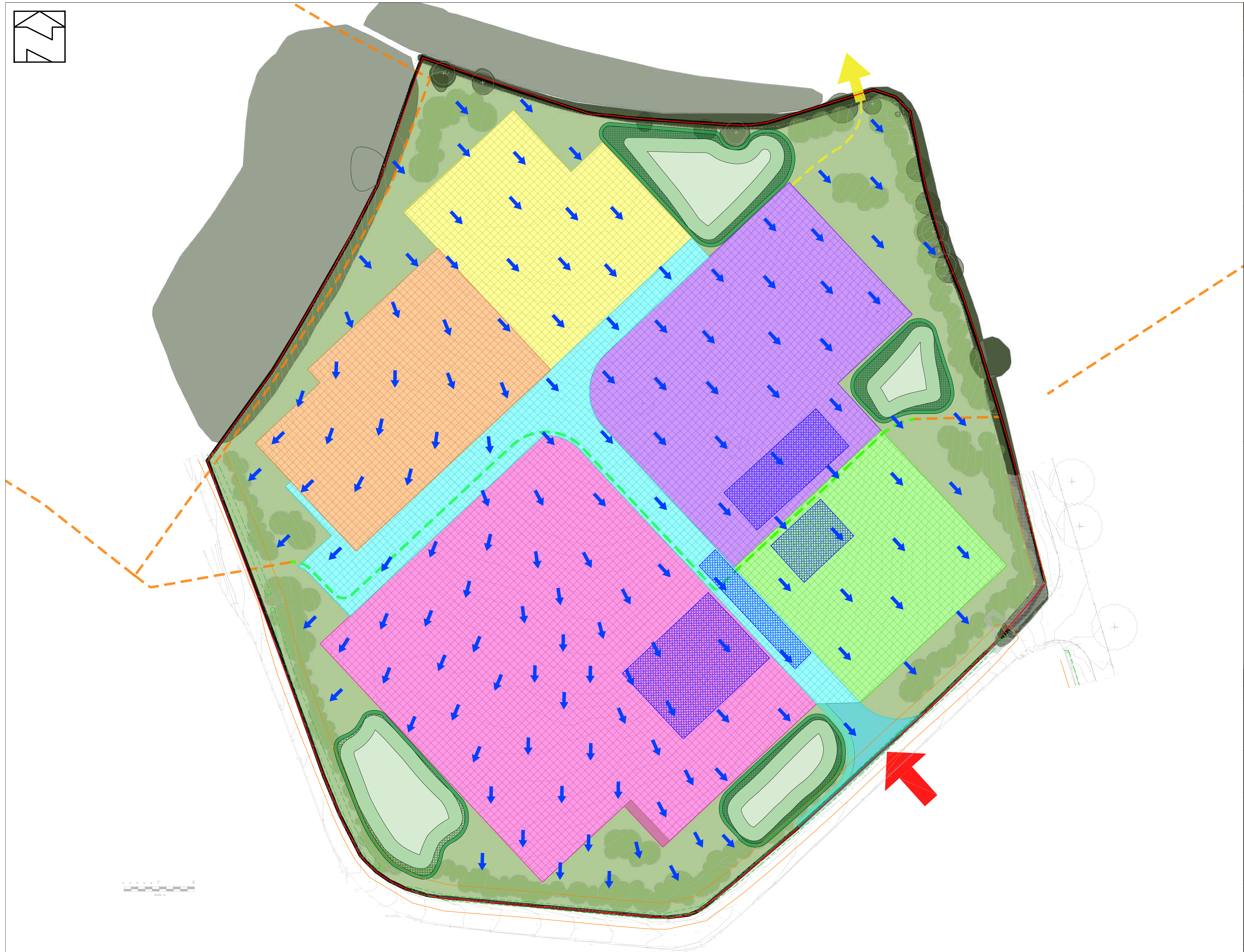
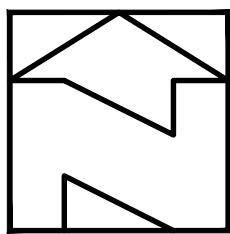
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APPENDIX E

SURFACE WATER CATCHMENT AND EXCEEDANCE PLAN



This drawing references the data noted below

Data	Source	Reference	Rev.	Dated
Site Layout	Marrons	Concept Plan	M	15.01.26
Topographical Survey	SV Surveying	25483-25-01	-	16.11.25

General Notes

1.

Do not scale this drawing. All dimensions must be checked/verified on site.

2.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3.

All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.

4.

Any discrepancies noted on site are to be reported to the engineer immediately.

Key

Site Red Boundary

Drainage Features

Proposed Attenuation Tank

Proposed Attenuation Basin

Existing Field Drainage Ditch

Drainage Ditch Clear Margin

Catchment Boundaries

Catchment 1

Catchment 2

Catchment 3

Catchment 4

Catchment 5

Catchment 6

P01	21.01.26	First Issue	RM	RW
Rev	Date	Description	Dr	Ch

Client:

Marrons

Project:

Horsepool Grange, Stanton under Barton

Title:

Surface Water Catchment and Exceedance Plan

ADC

INFRASTRUCTURE

© ADC Infrastructure Limited

Size:

A1

Scale:

1:500

Status:

PRELIMINARY

Project	Originator	Volume	Level	Type	Role	Number	Status	Revision
3968	-ADC-HGN-XX-DR-CH-0521	S1	P01					

APPENDIX F

GREENFIELD RUNOFF RATE CALCULATIONS

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.

Project details

Date	21/01/2026
Calculated by	ADC Infratructure
Reference	Catchment 1
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447202
Site northing (British National Grid)	309952

Site details

Total site area (ha)	0.305	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	-----------------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	1.124
QMed (l/s)	1.8	l/s
QBar (FEH statistical 2025) (l/s)	2	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	1.7	l/s
Flow rate 2 year (l/s)	1.8	l/s
Flow rate 10 years (l/s)	3.0	l/s
Flow rate 30 years (l/s)	4.0	l/s
Flow rate 100 years (l/s)	5.1	l/s
Flow rate 200 years (l/s)	6.1	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

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Project details

Date	21/01/2026
Calculated by	ADC Infratructure
Reference	Catchment 2
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447202
Site northing (British National Grid)	309952

Site details

Total site area (ha)	0.285	ha
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Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	☒ 1.124
QMed (l/s)	1.7	l/s
QBar (FEH statistical 2025) (l/s)	1.9	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	☒ 4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	1.5	l/s
Flow rate 2 year (l/s)	1.7	l/s
Flow rate 10 years (l/s)	2.8	l/s
Flow rate 30 years (l/s)	3.7	l/s
Flow rate 100 years (l/s)	4.8	l/s
Flow rate 200 years (l/s)	5.7	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

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Project details

Date	21/01/2026
Calculated by	ADC Infratructure
Reference	Catchment 3
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447212
Site northing (British National Grid)	310008

Site details

Total site area (ha)	0.356	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	☒ 1.124
QMed (l/s)	2.1	l/s
QBar (FEH statistical 2025) (l/s)	2.3	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	☒ 4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	1.9	l/s
Flow rate 2 year (l/s)	2.1	l/s
Flow rate 10 years (l/s)	3.5	l/s
Flow rate 30 years (l/s)	4.7	l/s
Flow rate 100 years (l/s)	6.0	l/s
Flow rate 200 years (l/s)	7.1	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

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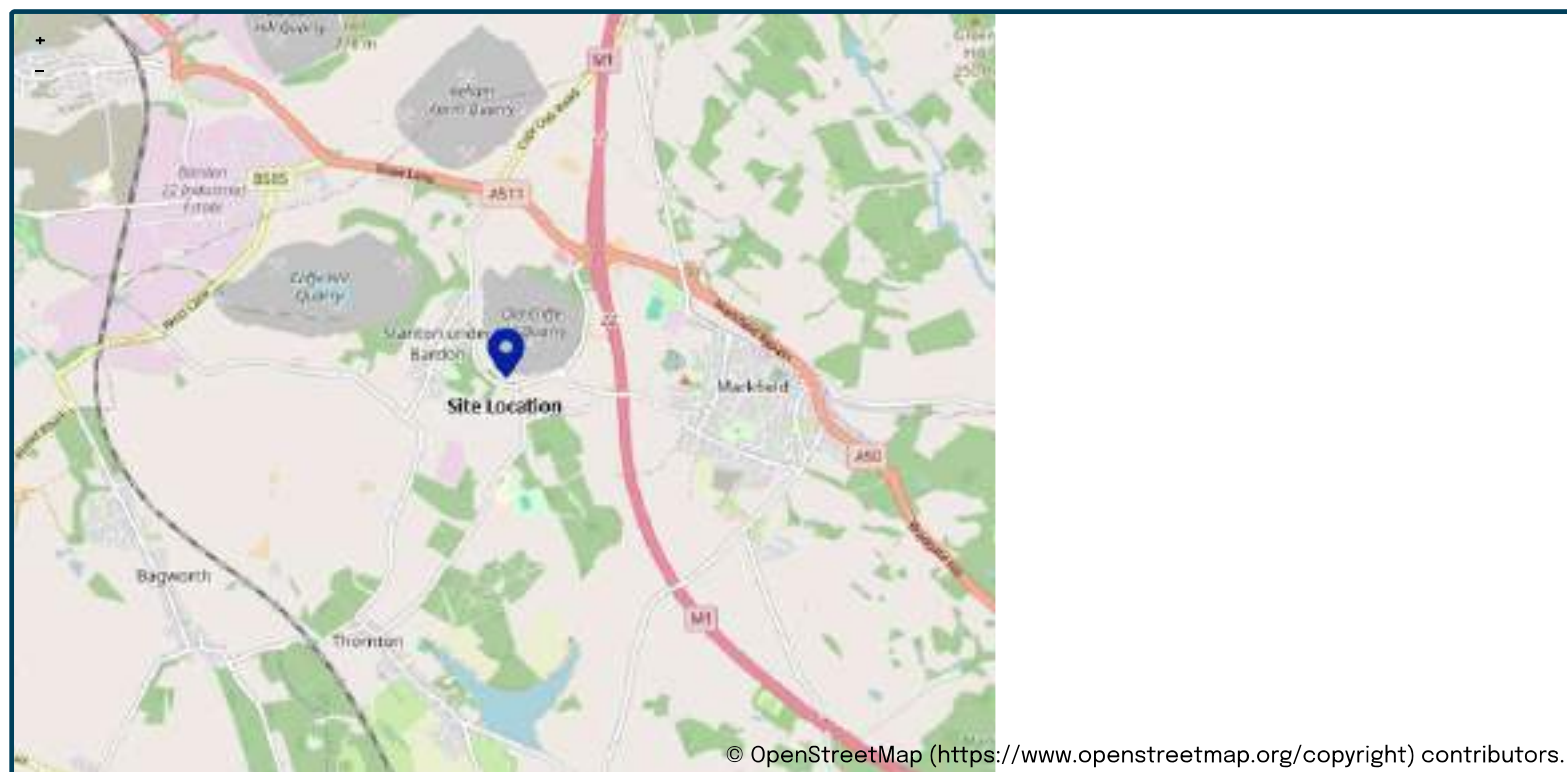
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	21/01/2026
Calculated by	ADC Infrastructure
Reference	Catchment 4
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447212
Site northing (British National Grid)	310008

Site details

Total site area (ha)	0.527	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	1.124
QMed (l/s)	3.1	l/s
QBar (FEH statistical 2025) (l/s)	3.4	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	2.9	l/s
Flow rate 2 year (l/s)	3.1	l/s
Flow rate 10 years (l/s)	5.1	l/s
Flow rate 30 years (l/s)	6.9	l/s
Flow rate 100 years (l/s)	8.9	l/s
Flow rate 200 years (l/s)	10.5	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

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Project details

Date	21/01/2026
Calculated by	ADC Infratructure
Reference	Catchment 5
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447187
Site northing (British National Grid)	309996

Site details

Total site area (ha)	0.941	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	1.124
QMed (l/s)	5.5	l/s
QBar (FEH statistical 2025) (l/s)	6.2	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	5.1	l/s
Flow rate 2 year (l/s)	5.5	l/s
Flow rate 10 years (l/s)	9.2	l/s
Flow rate 30 years (l/s)	12.3	l/s
Flow rate 100 years (l/s)	15.8	l/s
Flow rate 200 years (l/s)	18.7	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

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Project details

Date	21/01/2026
Calculated by	ADC Infratructure
Reference	Catchment 6
Model version	2.2.2

Location

Site name	Horsepool Grange
Site location	Stanton-Under-Bardon



Site easting (British National Grid)	447187
Site northing (British National Grid)	309996

Site details

Total site area (ha)	0.285	ha
----------------------	------------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	789	mm
BFIHOST19scaled	0.332	
QMed-QBar conversion	1.124	☒ 1.124
QMed (l/s)	1.7	l/s
QBar (FEH statistical 2025) (l/s)	1.9	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	4	☒ 4
1 year growth factor	0.83	
2 year growth factor	0.89	
10 year growth factor	1.49	
30 year growth factor	2	
100 year growth factor	2.57	
200 year growth factor	3.04	

Results

Method	FEH statistical (2025)	
Flow rate 1 year (l/s)	1.5	l/s
Flow rate 2 year (l/s)	1.7	l/s
Flow rate 10 years (l/s)	2.8	l/s
Flow rate 30 years (l/s)	3.7	l/s
Flow rate 100 years (l/s)	4.8	l/s
Flow rate 200 years (l/s)	5.7	l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

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APPENDIX G

INFODRAINAGE CALCULATIONS

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1	Date: 21/01/0026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Roof Area

Type : Catchment Area

Area (ha)	0.102
-----------	-------

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



Yard Area

Type : Catchment Area

Area (ha)	0.203
-----------	-------

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



Basin Area

Type : Catchment Area

Area (ha)	0.05
-----------	------

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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1	Date: 21/01/0026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Basin

Type : Pond

Dimensions

Exceedance Level (m)	182.000
Depth (m)	1.300
Base Level (m)	180.700
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	331.801

Depth (m)	Area (m²)	Volume (m³)
0.000	240.00	0.000
0.100	256.76	24.833
0.200	274.08	51.370
0.300	291.97	79.668
0.400	310.42	109.783
0.500	329.44	141.772
0.600	349.03	175.691
0.700	369.18	211.597
0.800	389.90	249.546
0.900	411.18	289.595
1.000	433.03	331.801
1.100	455.44	376.220
1.200	478.42	422.908
1.300	501.96	471.922

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Yard Area
Bypass Destination	Roof Area
Capacity Type	(None)
	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Basin Area
Bypass Destination	(None)
Capacity Type	No Restriction

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1	Date: 21/01/0026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		

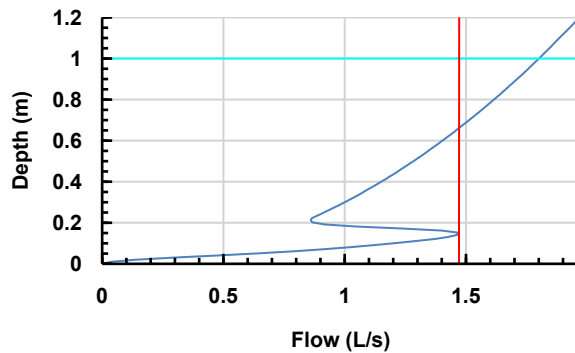


Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	180.700
Design Depth (m)	1.000
Design Flow (L/s)	1.8
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0061-1800-1000-1800
----------------	-------------------------



Advanced

Perimeter	Circular
Length (m)	20.141
Friction Scheme	Manning's n
n	0.022

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1		Date: 21/01/0026			
		Designed by: RM	Checked by: RW		Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Basin Area	Basin		Time of Concentration	0.050	100	0	100	0.050
Roof Area	Basin		Time of Concentration	0.102	100	0	100	0.102
Yard Area	Basin		Time of Concentration	0.203	100	0	100	0.203
TOTAL		0.0		0.355				0.355

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1	Date: 21/01/0026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 1		Date: 21/01/0026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 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
Basin	FEH: 100 years: +40 %: 720 mins: Winter	181.674	181.674	0.974	0.974	22.0	320.556	0.000	0.000	1.8	129.104	3.389	OK

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2	Date: 21/01/2026			
Report Details: Type: Inflows Storm Phase: Phase	Designed by: RM	Checked by: RW	Approved By: RW	
	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			



Roof Area

Type : Catchment Area

Area (ha)	0.101
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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



Yard Area

Type : Catchment Area

Area (ha)	0.198
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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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Tank

Type : Tank

Dimensions

Exceedance Level (m)	176.400
Depth (m)	1.000
Base Level (m)	175.400
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	270.000

Depth (m)	Area (m²)	Volume (m³)
0.000	270.00	0.000
1.000	270.00	270.000

Inlets

Inlet

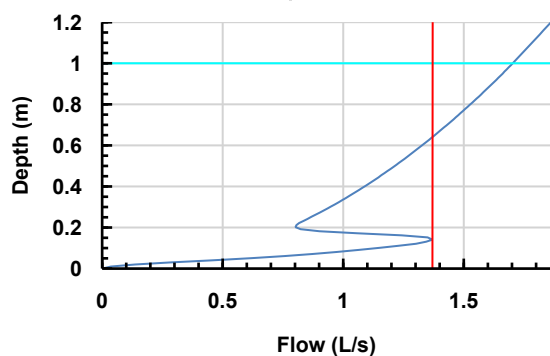
Inlet Type	Point Inflow
Incoming Item(s)	Roof Area Yard Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	175.400
Design Depth (m)	1.000
Design Flow (L/s)	1.7
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0059-1700-1000-1700
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ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
	Report Details: Type: Stormwater Controls Storm Phase: Phase		
ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Advanced

Perimeter	Circular
Length (m)	31.869

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Roof Area	Tank		Time of Concentration	0.101	100	0	100	0.101
Yard Area	Tank		Time of Concentration	0.198	100	0	100	0.198
TOTAL		0.0		0.299				0.299

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 2		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 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
Tank	FEH: 100 years: +40 %: 720 mins: Winter	176.385	176.385	0.985	0.985	18.5	266.072	0.000	0.000	1.7	119.367	1.455	OK

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Roof Area

Type : Catchment Area

Area (ha)	0.151
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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



Yard Area

Type : Catchment Area

Area (ha)	0.205
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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



Basin Area

Type : Catchment Area

Area (ha)	0.056
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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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Basin

Type : Pond

Dimensions

Exceedance Level (m)	177.400
Depth (m)	1.300
Base Level (m)	176.100
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	378.401

Depth (m)	Area (m²)	Volume (m³)
0.000	280.00	0.000
0.100	298.08	28.899
0.200	316.72	59.634
0.300	335.93	92.262
0.400	355.71	126.839
0.500	376.05	163.422
0.600	396.95	202.067
0.700	418.42	242.831
0.800	440.46	285.770
0.900	463.06	330.942
1.000	486.23	378.401
1.100	509.96	428.206
1.200	534.26	480.412
1.300	559.12	535.076

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Yard Area
	Roof Area
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Basin Area
Bypass Destination	(None)
Capacity Type	No Restriction

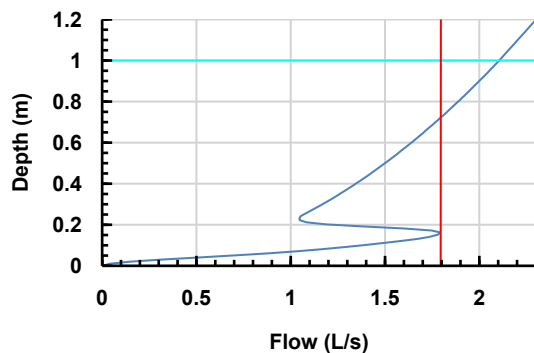
ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3		Date: 21/01/2026			
Report Details: Type: Stormwater Controls Storm Phase: Phase		Designed by: RM	Checked by: RW		Approved By: RW
		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	176.100
Design Depth (m)	1.000
Design Flow (L/s)	2.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0066-2100-1000-2100
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Advanced

Perimeter	Circular
Length (m)	20.141
Friction Scheme	Manning's n
n	0.022

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3		Date: 21/01/2026			
		Designed by: RM	Checked by: RW		Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Basin Area	Basin		Time of Concentration	0.056	100	0	100	0.056
Roof Area	Basin		Time of Concentration	0.151	100	0	100	0.151
Yard Area	Basin		Time of Concentration	0.205	100	0	100	0.205
TOTAL		0.0		0.412				0.412

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 3		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 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
Basin	FEH: 100 years: +40 %: 720 mins: Winter	177.085	177.085	0.985	0.985	25.5	371.091	0.000	0.000	2.1	151.727	1.932	OK

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Roof Area

Type : Catchment Area

Area (ha)	0.202
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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



Yard Area

Type : Catchment Area

Area (ha)	0.325
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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



Basin Area

Type : Catchment Area

Area (ha)	0.039
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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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Basin

Type : Pond

Dimensions

Exceedance Level (m)	177.500
Depth (m)	1.300
Base Level (m)	176.200
Freeboard (mm)	300
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.00
Total Volume (m³)	242.728

Depth (m)	Area (m²)	Volume (m³)
0.000	165.00	0.000
0.100	178.94	17.192
0.200	193.45	35.808
0.300	208.53	55.902
0.400	224.17	77.532
0.500	240.37	100.754
0.600	257.14	125.625
0.700	274.48	152.201
0.800	292.38	180.539
0.900	310.85	210.696
1.000	329.88	242.728
1.100	349.48	276.691
1.200	369.64	312.642
1.300	390.37	350.638

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Yard Area
Bypass Destination	Roof Area
Capacity Type	(None)
	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Basin Area
Bypass Destination	(None)
Capacity Type	No Restriction

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		

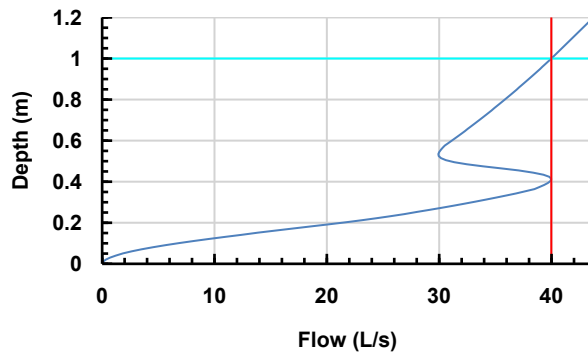


Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Hydro-Brake®
Invert Level (m)	176.200
Design Depth (m)	1.000
Design Flow (L/s)	40.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0255-4000-1000-4000
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Advanced

Perimeter	Circular
Length (m)	20.141
Friction Scheme	Manning's n
n	0.022

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Tank

Type : Tank

Dimensions

Exceedance Level (m)	175.600
Depth (m)	1.000
Base Level (m)	174.600
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	500.000

Depth (m)	Area (m²)	Volume (m³)
0.000	500.00	0.000
1.000	500.00	500.000

Inlets

Inlet

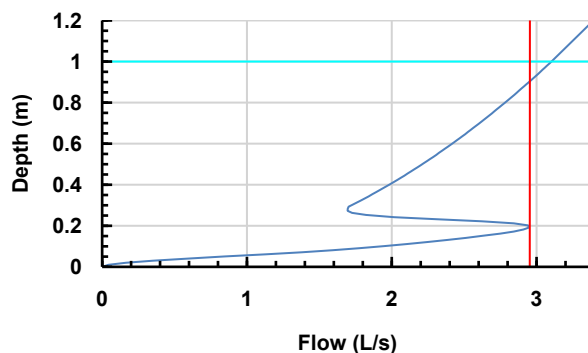
Inlet Type	Point Inflow
Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	174.600
Design Depth (m)	1.000
Design Flow (L/s)	3.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0080-3100-1000-3100
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Advanced

Perimeter	Circular
Length (m)	30.899

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4		Date: 21/01/2026			
		Designed by: RM	Checked by: RW		Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Basin Area	Basin		Time of Concentration	0.039	100	0	100	0.039
Roof Area	Basin		Time of Concentration	0.202	100	0	100	0.202
Yard Area	Basin		Time of Concentration	0.325	100	0	100	0.325
TOTAL		0.0		0.566				0.566

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 4		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 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
Basin	FEH: 100 years: +40 %: 120 mins: Summer	177.195	177.194	0.995	0.994	188.7	241.041	0.000	0.000	39.7	372.066	0.695	OK
Tank	FEH: 100 years: +40 %: 720 mins: Winter	175.590	175.590	0.990	0.990	31.7	495.052	0.000	0.000	3.1	211.864	0.990	OK

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Roof Area

Type : Catchment Area

Area (ha)	0.503
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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



Yard Area

Type : Catchment Area

Area (ha)	0.438
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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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Tank

Type : Tank

Dimensions

Exceedance Level (m)	175.360
Depth (m)	1.000
Base Level (m)	174.360
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	850.000

Depth (m)	Area (m²)	Volume (m³)
0.000	850.00	0.000
1.000	850.00	850.000

Inlets

Inlet

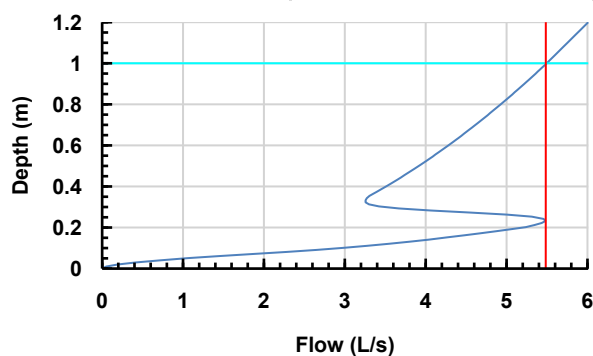
Inlet Type	Point Inflow
Incoming Item(s)	Roof Area Yard Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	174.360
Design Depth (m)	1.000
Design Flow (L/s)	5.5
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0105-5500-1000-5500
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ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Advanced

Perimeter	Circular
Length (m)	31.869

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5		Date: 21/01/2026			
		Designed by: RM	Checked by: RW		Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Roof Area	Tank		Time of Concentration	0.503	100	0	100	0.503
Yard Area	Tank		Time of Concentration	0.438	100	0	100	0.438
TOTAL		0.0		0.941				0.941

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 5		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 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
Tank	FEH: 100 years: +40 %: 720 mins: Winter	175.340	175.340	0.980	0.980	58.3	832.645	0.000	0.000	5.5	384.692	2.042	OK

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 6	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Inflows Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Road Area

Type : Catchment Area

Area (ha)	0.285
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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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 6	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Storm Phase: Phase	ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		



Tank

Type : Tank

Dimensions

Exceedance Level (m)	176.200
Depth (m)	1.000
Base Level (m)	175.200
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	0.00
Total Volume (m³)	260.000

Depth (m)	Area (m²)	Volume (m³)
0.000	260.00	0.000
1.000	260.00	260.000

Inlets

Inlet

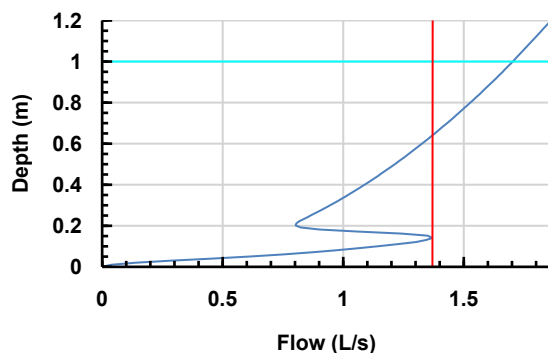
Inlet Type	Point Inflow
Incoming Item(s)	Road Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	175.200
Design Depth (m)	1.000
Design Flow (L/s)	1.7
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0059-1700-1000-1700
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Advanced

Perimeter	Circular
Length (m)	31.869

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 6		Date: 21/01/2026			
		Designed by: RM	Checked by: RW		Approved By: RW
Report Details: Type: Inflow Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Road Area	Tank		Time of Concentration	0.285	100	0	100	0.285
TOTAL		0.0		0.285				0.285

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 6	Date: 21/01/2026		
	Designed by: RM	Checked by: RW	Approved By: RW
Report Title: Rainfall Analysis Criteria	ADC Infrastructure Ltd: 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 447195 309995 SK 47195 09995
Rainfall Version	2022
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

ADC3968: Horsepool Grange Stanton-under-Bardon Catchment 6		Date: 21/01/2026		
		Designed by: RM	Checked by: RW	Approved By: RW
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		ADC Infrastructure Ltd: 34-36 Carrington Street Nottingham NG1 7FG		

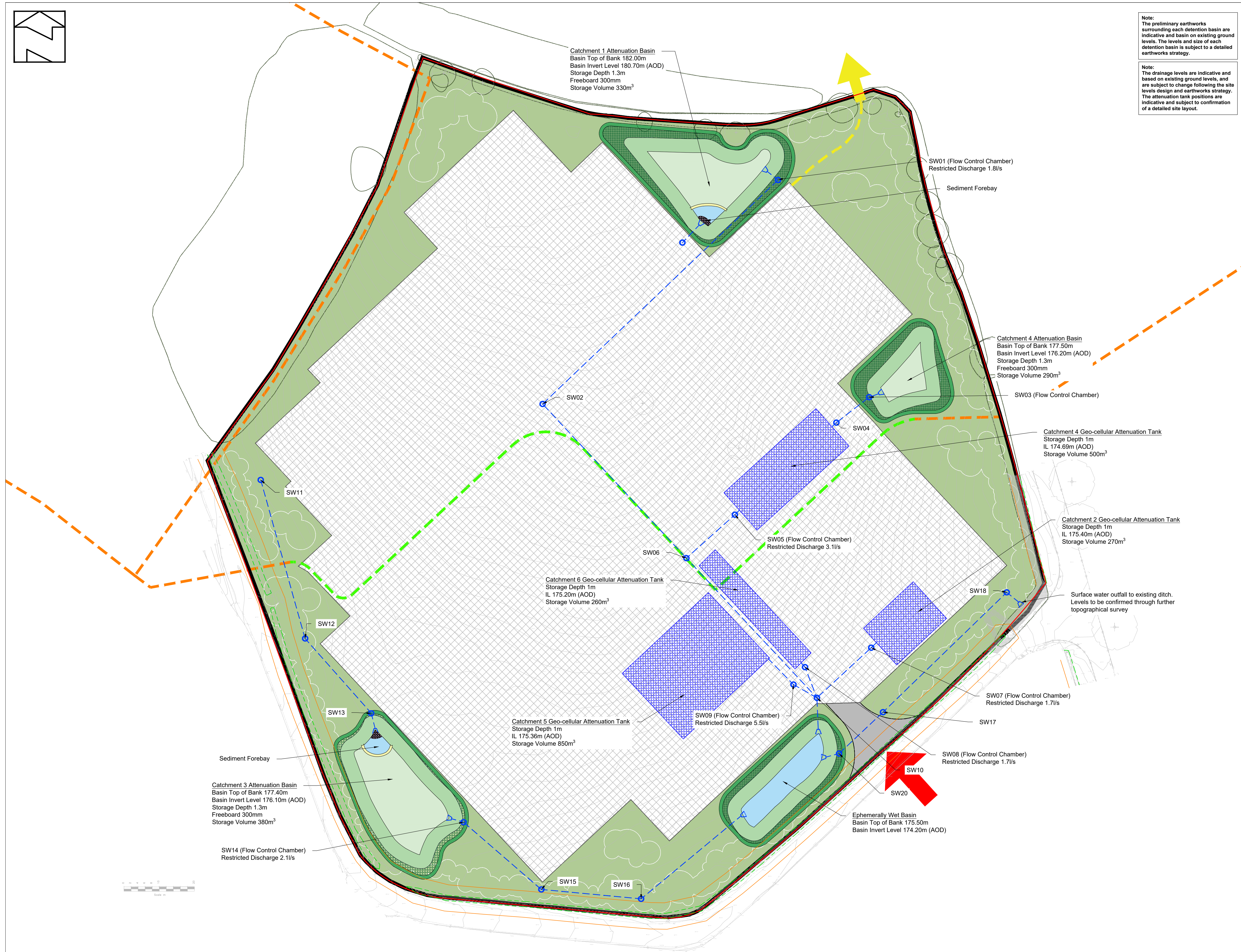
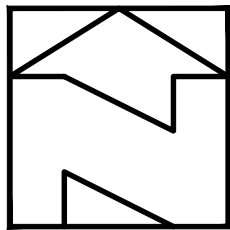


**FEH: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By:
Max. Avg. Depth**

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
Tank	FEH: 100 years: +40 %: 720 mins: Winter	176.168	176.168	0.968	0.968	17.7	251.621	0.000	0.000	1.7	118.156	3.223	OK

APPENDIX H

DRAINAGE LAYOUT



Note:
The preliminary earthworks surrounding each detention basin are indicative and basin on existing ground levels. The levels and size of each detention basin is subject to a detailed earthworks strategy.

Note:
The drainage levels are indicative and based on existing ground levels, and are subject to change following the site levels design and earthworks strategy. The attenuation tank positions are indicative and subject to confirmation of a detailed site layout.

This drawing references the data noted below

Data	Source	Reference	Rev.	Dated
Site Layout	Marrons	Concept Plan	M	15.01.26
Topographical Survey	SV Surveying	25483-25-01	-	16.11.25

General Notes

1.

Do not scale this drawing. All dimensions must be checked/verified on site.

2.

This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3.

All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.

4.

Any discrepancies noted on site are to be reported to the engineer immediately.

Key

Site Boundary

Drainage Features

Proposed Surface water gravity sewer

Proposed Attenuation Tank

Proposed Attenuation Basin

Existing Field Drainage Ditch

Drainage Ditch Clear Margin

P03	21.01.26	Update to Drainage Strategy	RM	RW
P02	23.12.25	Update to Masterplan	RM	RW
P01	17.10.25	First Issue	RM	RW
Rev	Date	Description	Dr	Ch

Client:

Marrons

Project:

Horsepool Grange, Stanton under Barton

Title:

Preliminary Drainage Layout

ADC

INFRASTRUCTURE

© ADC Infrastructure Limited

Size:

A1

Scale:

1:500

Status:

PRELIMINARY

Project	Originator	Volume	Level	Type	Role	Number	Status	Revision
3968	-ADC	-HGN	-XX	-DR	-CH	-0511	S1	P03