

Flood Risk Assessment &  
Sustainable Drainage Statement

Brick Kiln Street

Fisher German



# FLOOD RISK ASSESSMENT AND SUSTAINABLE DRAINAGE STATEMENT

Project

Brick Kiln Street Phase 2

Client

Fisher German

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## EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) and Drainage Statement (DS) has been prepared for Fisher German by Lumax Consulting, in respect of an Outline planning application for up to 195 dwellings (including affordable housing) at the site of Cadent's Offices, Brick Kiln Lane, Hinckley, LE10 0JT.

The site lies entirely in Flood Zone 1. An investigation of flood risk has been carried out and has not identified any significant fluvial, pluvial, groundwater, canal, reservoir or sewer-based risks in the area of the site. Some simple mitigation in the form of marginally elevated finished floor levels and sensible flood routing is recommended to manage any residual risk.

The existing site is currently an entirely impermeably surfaced car park to the north and carpark and office buildings to the south. The proposed development of the site will introduce gardens, landscaping and permeable areas, thus substantially reducing any surface water run off across the site in its entirety.

A drainage statement has been prepared demonstrating how the site can be drained of surface water at a restricted rate. Although the minimum requirements could be met by restricting the development to existing rates less 50% for betterment, the LLFA have asked that the proposed development exceed the minimum requirements of the Non-Statutory Technical Standards for SuDS and restrict to greenfield rates. This report provides volumes for both scenarios. In order to restrict the proposed development to the existing rate less 50% betterment 1,367m<sup>3</sup> of storage will be required. Greenfield restrictions will require 2,100m<sup>3</sup> of restrictions. The storage is to be arranged in three catchments and the arrangement is detailed in the text of this report. It has been clearly demonstrated that sufficient storage will be available on site to attenuate flows up to greenfield discharge rates.

Surface Water and Foul from the development will be drained to the local network. Severn Trent Water have confirmed that they have capacity in the system for the proposed flows and potential discharge points have been identified.

Based on this assessment and subject to the mitigation measures proposed, the development is fully compliant with the National Planning Policy Framework.



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## 1.0 INTRODUCTION

- 1.1 This Flood Risk and Drainage Assessment has been prepared for Fisher German on behalf of their client Cadent in respect of an Outline planning application for up to 195 dwellings (including affordable housing) with all matters reserved other than access together with associated landscaping and other infrastructure at the site of Cadent's Offices, Brick Kiln Lane, Hinckley, LE10 0JT (approx. coordinates 442000,293900).
- 1.2 This FRA has been carried out in accordance with the requirements of the National Planning Policy Framework (NPPF)<sup>1</sup> and associated Planning Practice Guidance (PPG)<sup>2</sup>.
- 1.3 This FRA process investigates the risk posed to the site from fluvial, pluvial, sewer, reservoir, canal and groundwater-based sources. A section in the document provides an assessment of drainage requirements.

### Sources of Information

- 1.4 The report has been based upon a variety of information sources and a full list of data sources is included below;
- *Environment Agency Correspondence*
  - *Seven Trent Water Correspondence*
  - *National and Local Planning Policy*
  - *Topographical Survey*
  - *Proposed site layout drawing*
  - *Strategic Flood Risk Assessment*

### Existing Site

- 1.5 The proposed site is located to the southeast of Hinckley town centre to the north of the B4666, Coventry Road. The site lies approximately 2km to the east of the A5 which leads to Tamworth approximately 20 km to the northwest and the M1 motorway approximately 20 km to the southeast. A location plan for the site is included below as **FIGURE 1.1**.
- 1.6 The site is surrounded largely by residential development to the northeast and southwest, with commercial development to the southeast. A large area of parkland, Clarendon Park, lies to the northwest of the site. The Battling Brook flows along the northern boundary of the parkland, approximately 100m from the site boundary.

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<sup>1</sup> National Planning Policy Framework, Department for Communities & Local Government, Sept 2023

<sup>2</sup> Planning Practice Guidance, Department for Communities & Local Government, Live Web Source



- 1.7 Intermittent trees and a grass verge form the border of the majority of the northern car park. This continues down the western boundary of the site, with the grass verge sloping down to the rear fences of the adjacent residential gardens and continues along the southern boundary with Coventry Road. Brick Kiln Street forms the boundary between the southeast of the site and Lidl. The Cadent car park extending out to the east of the site is bordered by the Lidl car park to the south and gardens of residential properties along Trinity Vicarage Road to the north.
- 1.8 The area of the entire site is approximately 6 hectares in total. Residential development is planned across the whole site, incorporating access roads, parking, gardens and landscaping, including attenuation ponds
- 1.9 A topographical survey has been carried out and is included as **APPENDIX A**. The site falls from the east to the northwest, with highs in the far east of the site of around 116.4m AOD to lows in the northwest of approximately 101.2m AOD. There is a high point in the central south of the site from where the site falls to the southeast where the junction of Brick Kiln Street and Coventry Road stands at approximately 110.3m AOD, falling to 109.0m AOD in the far southwestern corner.
- 1.10 Much of the northern section of the site lies between approximately 103m AOD and 107m AOD, with highs of 109.5mAOD in the northeast to lows of 101.2m AOD in the north west.
- 1.11 A location plan is included below as **FIGURE 1.1**.



Figure 1-1 Approximate Site Location



## Proposed Development

- 1.12 The proposal comprises the development of up to 195 residential dwellings with associated gardens, parking and driveways and landscaping including ponds to attenuate the flow from the development.
- 1.13 The application is for outline approval only and the applicant wishes to leave the final layout, plot types and all other matters reserved for a future detailed application. Nevertheless, an outline proposed layout has been provided and is included as **APPENDIX B**. It should be borne in mind that the layout should be used to understand the general intent and quanta of development only.



## 2.0 PLANNING CONTEXT

### *The National Planning Policy Framework*

2.1 The National Planning Policy Framework (NPPF), originally introduced in 2012 and subsequently updated in 2018, 2019, 2021 and 2023, sets out the government's planning policies for England and how these should be applied. It acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.

2.2 The revised NPPF reinforces the principle set out in the 2012 NPPF that the purpose of the planning system is to contribute to the achievement of sustainable development. Sustainable development is broadly defined as: -

*“Meeting the needs of the present without compromising the ability of future generations to meet their own needs”*

2.3 Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- a) *an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
- b) *a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*
- c) *to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

2.4 Paragraph 158 of the NPPF explains expectations in relation to Climate Change

*Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure*



## 2.5 Paragraph 167 of the NPPF explains the application of the Sequential test.

*All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:*

- a) applying the sequential test and then, if necessary, the exception test as set out below;*
- b) safeguarding land from development that is required, or likely to be required, for current or future flood management;*
- c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and*
- d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.*

## 2.6 Paragraph 168 explains the purpose of the sequential test –

*The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.*

## 2.7 Paragraphs 169 to 171 go on to explain the purpose of the exception test -

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

*170. 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.*



*171. Both elements of the exception test should be satisfied for development to be allocated or permitted.*

## 2.8 In Paragraph 173 of the NPPF it is advised 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; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

## 2.9 Paragraph 174 of the NPPF states that

*Applications for some minor development and changes of use should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 59.*

*With Footnote 59 advising*

*A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use*

## 2.10 Paragraph 175 of the NPPF sets out that.

*Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

- a) take account of advice from the lead local flood authority;*
- b) have appropriate proposed minimum operational standards;*
- c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
- d) where possible, provide multifunctional benefits.'*



### *Planning Practice Guidance*

- 2.11 The Planning Practice Guidance (PPG) associated with the NPPF provides more detailed guidance on how the requirements of the NPPF can be met in practice. It includes guidance for applying the sequential and exception tests.
- 2.12 Two critically important tables are included In the PPG and these tables should be read in conjunction with Annex 3 of the NPPF itself. Taken together the three tables define flood risk zones, flood risk vulnerability and compatibility.
- 2.13 Table 1 of the PPG describes Flood Zones. This table defines flood zones based upon event return probability and is used to steer development and classify land for development.

*Table 2-1 Reproduction of Table 1 Planning Practice Guidance*

| <b>Flood Zone</b>                 | <b>Definition</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Zone 1 Low Probability            | Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Zone 2 Medium Probability         | Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Zone 3a High Probability          | Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Zone 3b The Functional Floodplain | <p>This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:</p> <ul style="list-style-type: none"><li>• land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or</li><li>• 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).</li></ul> <p>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)</p> |



2.14 Flood Risk Vulnerability Classification, this table is now included as Annex 3 of the NPPF. This table defines development type by associated vulnerability to flooding.

*Table 2-2 Reproduction of Annex 3 NPPF*

| Flood Zone                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Essential Infrastructure     | <p>Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.</p> <p>Essential utility infrastructure which has to be located in 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.</p> <p>Wind turbines.</p> <p>Solar Farms.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Highly Vulnerable            | <p>Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.</p> <p>Emergency dispersal points.</p> <p>Basement dwellings.</p> <p>Caravans, mobile homes and park homes intended for permanent residential use.</p> <p>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 water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').</p>                                                                                              |
| More Vulnerable              | <p>Hospitals</p> <p>Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.</p> <p>Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.</p> <p>Non-residential uses for health services, nurseries and educational establishments.</p> <p>Landfill* and sites used for waste management facilities for hazardous waste.</p> <p>Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.</p>                                                                                                                                                                                                                                                                                                                         |
| Less Vulnerable              | <p>Police, ambulance and fire stations which are not required to be operational during flooding.</p> <p>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.</p> <p>Land and buildings used for agriculture and forestry.</p> <p>Waste treatment (except landfill* and hazardous waste facilities).</p> <p>Minerals working and processing (except for sand and gravel working).</p> <p>Water treatment works which do not need to remain operational during times of flood.</p> <p>Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.</p> <p>Car Parks</p>                                            |
| Water Compatible Development | <p>Flood control infrastructure.</p> <p>Water transmission infrastructure and pumping stations.</p> <p>Sewage transmission infrastructure and pumping stations.</p> <p>Sand and gravel working.</p> <p>Docks, marinas and wharves.</p> <p>Navigation facilities.</p> <p>Ministry of Defence installations.</p> <p>Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.</p> <p>Water-based recreation (excluding sleeping accommodation).</p> <p>Lifeguard and coastguard stations.</p> <p>Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.</p> <p>Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.</p> |



- 2.15 Flood Risk Vulnerability and flood zone ‘incompatibility’ outlines the circumstances in which development may or may not be appropriate and when an Exception Test will be required.

*Table 2-3 Reproduction of Table 2 Planning Practice Guidance*

| 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                 | Development should not be permitted | Exception Test Required             | ✓                                   | ✓                |
| Zone 3b     | Exception Test Required                 | Development should not be permitted | Development should not be permitted | Development should not be permitted | ✓                |

### *Hinckley and Bosworth Borough Council Core Strategy*

- 2.16 The Core Strategy was adopted in 2009 and is currently being reviewed. Its purpose was to guide the council in meeting future development needs and provide a steer on housing and employment growth.
- 2.17 Paragraph 4.31 of the Core Strategy identifies Market Bosworth as a Key Rural Centre. Paragraph 4.33 goes on to explain that in order to support these villages as Key Rural Centres, they will be the focus for improvements to employment, services, facilities and public transport.
- 2.18 The core strategy links to a number of policies and of note in respect to flood risk and drainage is Policy DM7, Preventing Pollution and Flooding requires that development proposals demonstrate : -
- It will not adversely impact the water quality, ecological value or drainage function of water bodies in the borough;
  - Appropriate containment solutions for oils, fuels and chemicals are provided;
  - All reasonable steps are taken through design, siting and technological solutions to ensure the abatement of obtrusive light to avoid sky glow, glare and light intrusion;
  - It would not cause noise or vibrations of a level which would disturb areas that are valued for their tranquillity in terms of recreation or amenity;
  - Appropriate remediation of contaminated land in line with minimum national standards is undertaken;
  - It will not result in land instability or further intensify existing unstable land;



- g) 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.

#### *Strategic Flood Risk Assessment for Hinckley and Bosworth Borough Council*

- 2.19 The SFRA for Hinckley and Bosworth was completed in July 2019. It was written to support the production of the new Local Plan to 2036 which is currently being reviewed.
- 2.20 The SFRA is used to guide appropriate locations for future new development and sustainable flood risk management policies.
- 2.21 With reference to Future Developments, the SFRA states that development should be located in areas of lowest flood risk and that Sustainable Drainage should be considered at the earliest opportunity.

#### *Leicestershire County Council Preliminary Flood Risk Assessment*

- 2.22 The Leicestershire County Council Preliminary Flood Risk Assessment was adopted in June 2011. The main scope of the report was to 'provide a high-level summary of significant flood risk' in relation to past and future risk from surface water, groundwater, and main rivers, the sea and any other watercourses.
- 2.23 However, the report is now somewhat outdated and more current data information is available which will be used to inform this FRA.

#### *Local Flood Risk Management Strategy*

- 2.24 The new Leicestershire County Council Local Flood Risk Management Strategy was adopted in February 2024. It addresses only local flood risk, ie from surface water, groundwater and ordinary water courses.
- 2.25 The strategy lays out the principles, strategies and measures to understand, assess and manage local flood risk.

#### *Flood Risk Status*

- 2.26 The proposed development lies on land classified as Flood Zone 1. An extract from the EA Flood Map for Planning is included below as **FIGURE 2-1**.

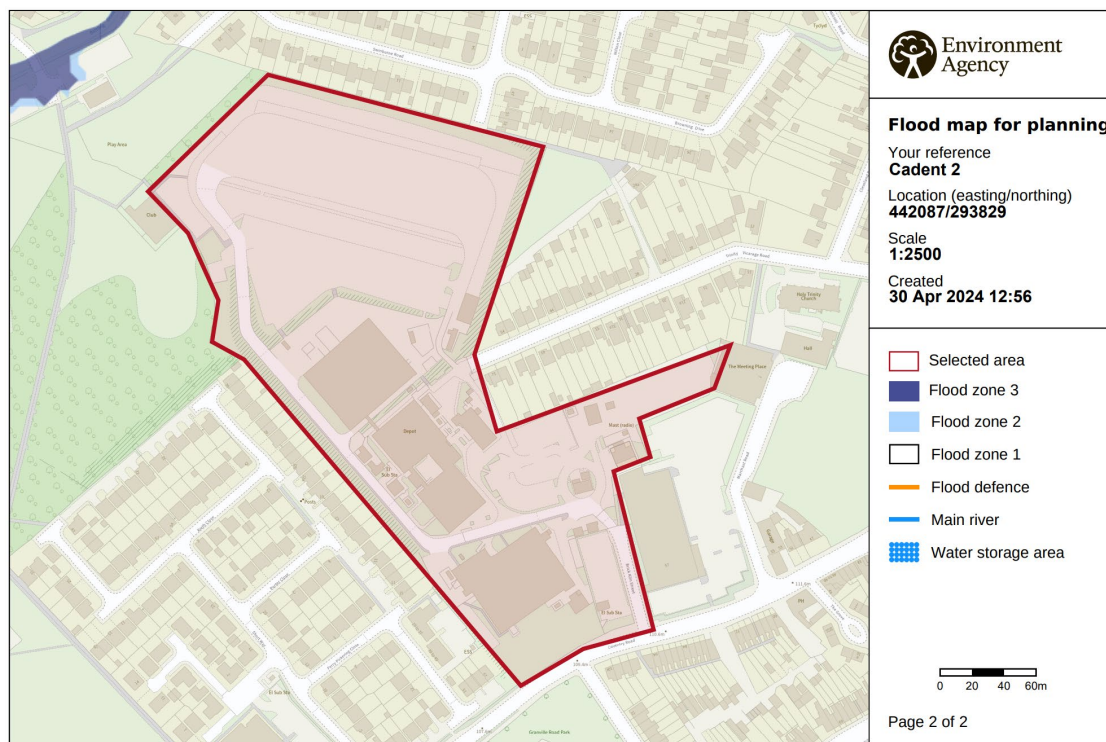


Figure 2-1 EA Flood Map Extract

- 2.27 The existing use of the site, as commercial is designated as ‘less vulnerable’ under the guidance given in Table 2 of the PPG.
- 2.28 The proposed development type is residential which is classified as more vulnerable’.
- 2.29 In accordance with the NPPF for ‘more vulnerable’ development situated in FZ1, a sequential and exception test is not required, and the development is considered appropriate. A summary of the flood risk status of the proposed development is provided below in [TABLE 2-4](#).

Table 2-4 Flood Zone Status Summary

|                                                 |                                               |
|-------------------------------------------------|-----------------------------------------------|
| <b>Flood Zone</b>                               | Flood Zone 1                                  |
| <b>Development Vulnerability Classification</b> | More Vulnerable                               |
| <b>Flood Zone Compatibility</b>                 | Sequential and Exception<br>Test Not Required |



## 3.0 FLOOD RISK ASSESSMENT

### Existing Risks

- 3.1 In accordance with the NPPF and local planning guidance this FRA considers the risk posed to the development from a range of 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.
- 3.2 The flood risks that may be posed to the site are summarised below in **TABLE 3-1**. The degree of risk posed to the study site is indicated in the table and specifics relating to the site are outlined and described in greater detail within the forthcoming section.

*Table 3-1 Pre-Mitigation Flood Risks*

| Flood Type                        | Degree of Risk | Source of Risk                                                        |
|-----------------------------------|----------------|-----------------------------------------------------------------------|
| <b>Fluvial</b>                    | None           | The site is not at risk from fluvial sources.                         |
| <b>Tidal</b>                      | None           | The development is not in a tidally influenced area.                  |
| <b>Canals</b>                     | None           | There are no canals that pose a risk to the site.                     |
| <b>Groundwater</b>                | Low            | The ground conditions are such that groundwater flooding is unlikely. |
| <b>Sewers</b>                     | None           | No history of flooding recorded.                                      |
| <b>Pluvial Runoff</b>             | Low            | Not significant provided the proposed drainage system is effective.   |
| <b>Reservoirs and Waterbodies</b> | None           | No history of flooding recorded                                       |

### *Fluvial Risk*

- 3.3 The EA flood maps have been consulted and the proposed development is not considered to be at any risk of fluvial flooding associated with any main river or modelled watercourse. The Flood Map for Planning, as shown in Fig 2.1, identifies the site to be within Flood Zone 1.
- 3.4 The nearest main watercourse is the Battling Brook, which is located, at its closest point, just over 100m northwest of the site.
- 3.5 Modelled data of the in-channel levels was obtained from the Environment Agency, and can be seen in **APPENDIX C**. This shows the highest level in the brook is during a 1:100yr event and measures 99.816m AOD. This is almost 3 metres below the lowest levels on site which stand at approximately 102.7m AOD at the lowest point. This confirms that the site is not at risk of fluvial flooding from the Battling Brook.



### *Canals*

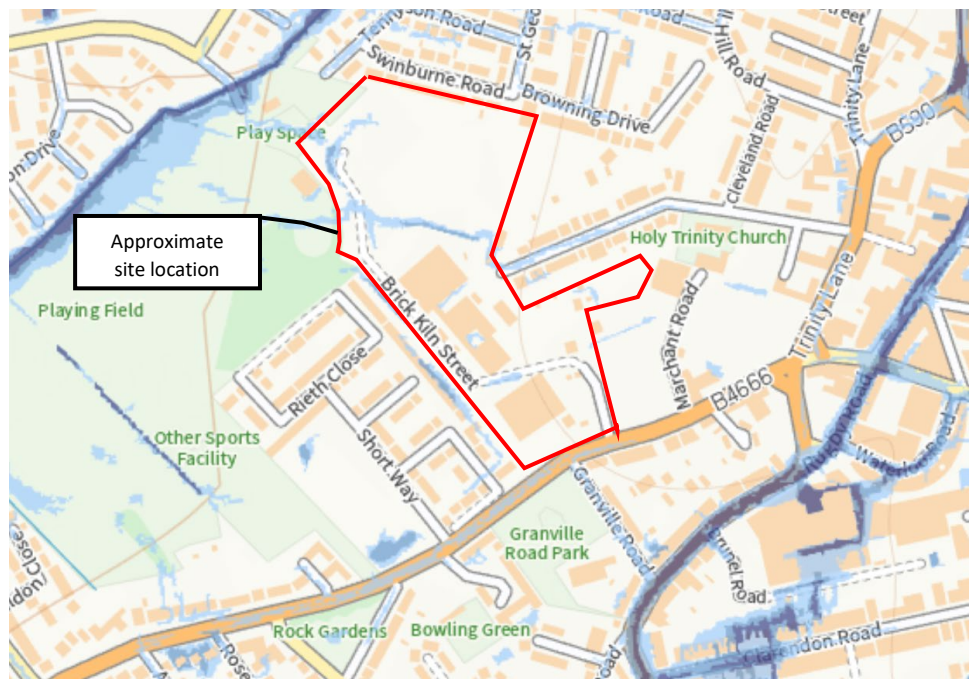
- 3.6 The Ashby de la Zouch Canal runs north to south approximately 1.5km to the west of the site. At this distance, there is no risk posed to the site by the canal.

### *Groundwater Flooding*

- 3.7 The British Geological Survey mapping of the area has been studied and suggests a bedrock geology of Mercia Mudstone.
- 3.8 With the impermeable nature of the substrate, the emergence of groundwater would be unlikely, however, some residual risk cannot be ruled out entirely.

### *Pluvial Risk*

- 3.9 The EA publish surface water flood maps which show the route of surface water across the ground. Typically, these flood maps identify overland drainage paths that are often part of a natural land drainage systems an extract is included as **FIGURE 3.1**.



*Figure 3-1 Pluvial Flood Risk*

- 3.10 Environment Agency surface water mapping indicates that the site is at low risk from isolated patches of low level surface water flooding. The flooding appears to be generally site born and does not present any significant conveyance route. The mitigation discussed later in this document will explain how this low-level flooding will be managed.

### *Sewer Flooding*

- 3.11 Severn Trent Water have been consulted and have reported no historic records of sewer flooding in the vicinity. Furthermore, the area is served by an extensive system of well-maintained sewers, with capacity for the additional residential development.



### *Reservoirs and Waterbodies*

- 3.12 The Environment Agency Long Term Flood Maps show the site is not in an area at risk from reservoir inundation.

### *Historic Flooding*

- 3.13 No incidents of historic flooding have been highlighted from any source at the site. However, it is acknowledged that some flood incidents may not be reported.
- 3.14 Furthermore, there is no reference to flooding in the area of the site in the local planning documentation.

### **Proposed Mitigation**

- 3.15 The majority of the site is currently impermeably surfaced. As can be seen from the proposed layout attached as **APPENDIX B**, the new development incorporates gardens and public green areas which will introduce permeable areas, driveways and minor access roads will incorporate under drained permeable paving.
- 3.16 Finished floor levels of the dwellings will be raised 150 mm above ground level to mitigate against any residual risk of surface water or ground water emergence. Furthermore, levels will be arranged to ensure exceedance routes direct any residual flows away from entrances.
- 3.17 The investigation has shown that there are no significant flood risks to the site itself and simple mitigation measures should be sufficient to manage any residual risk. Moreover, the proposed development will not give rise to any additional flood risk either as a result of impedance of flood flow or increased runoff. The proposal will result in a significant reduction in impermeable area and associated reduction in runoff.

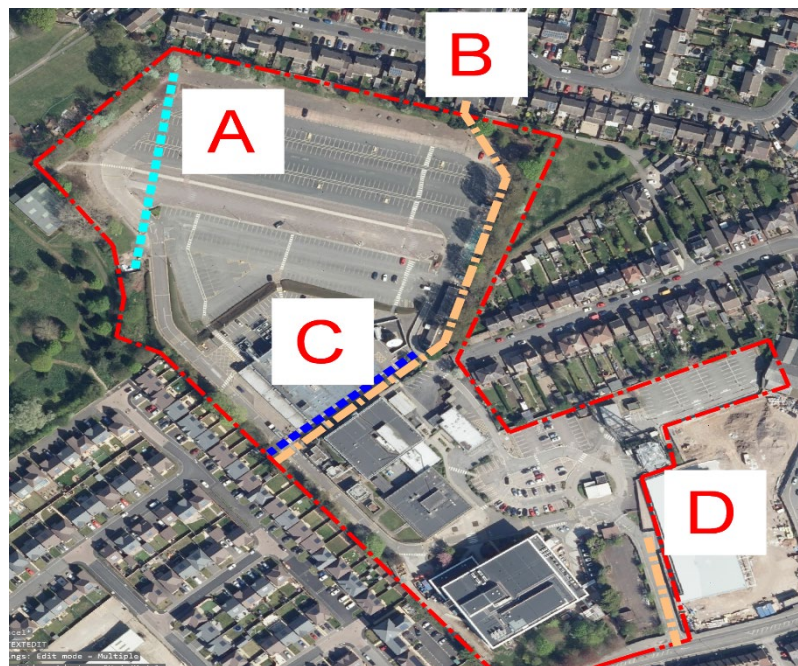


## 4.0 SURFACE WATER DRAINAGE STATEMENT

- 4.1 The developer is applying for outline consent with all matters reserved. The intention of this drainage statement is to demonstrate that the volumetric and spatial needs of an eventual drainage system can be met and that a viable drainage solution is practically achievable for the development.
- 4.2 It is to be acknowledged that further work will be required relating to the detailed design of the drainage infrastructure required to serve the site. However, this report provides sufficient information to demonstrate that a viable solution exists and that there is no technical drainage issue that would prevent successful development of the site.
- 4.3 A Developer's Services Enquiry has been carried out with Severn Trent Water and their response is included in [APPENDIX G](#).

### *Existing Drainage*

- 4.4 A full drainage connectivity survey has been carried out and is included in [APPENDIX D](#). The key sewers and drains identified are summarised below.
- 4.5 The existing site is connected to the public system via a number of public and private drains. The key pipes are identified on the sketch below.



*Figure 4-1 Key Drainage Pipes*

- 4.6 A combined 525mm public sewer crosses the centre of the site serving both the neighbouring residential areas and the foul needs of the site itself. The sewer is identified as [PIPE B](#) on the sketch above.



- 4.7 A 300mm private surface water drain flows alongside this pipe through some of the site and serves the bulk of the surface water needs of the southern site. This pipe is identified as **PIPE C** on the sketch above. It is not clear how the surface water drain is connected to the public sewer or wider land drainage network and further investigation will be required to confirm the outfall of this pipe.
- 4.8 It is possible that surface water from this area of the site drains to both the combined and surface water sewer, again, further investigation would be required to confirm this.
- 4.9 A smaller 225mm public combined sewer along Brick Kiln Street discharges into the main sewer running south along Coventry Road. This sewer is identified as **PIPE D** on the key plan.
- 4.10 A 525mm private surface water sewer has been identified in the drainage survey crossing the north west of the site identified as **PIPE A** on the plan. Gullies and catch pits run throughout the northern carpark area, channelling surface water to this pipe. The drainage survey noted that the outfall of this pipe heads into the adjacent parkland. The surveyor was able to sonically connect the drainage however, when they dye tested the outfall from site, they were unable to positively identify any dye in the nearest downstream manhole. It is presumed there may be a buried manhole in the park which the site drainage discharges into or that the system connects on a branch. Further investigation is recommended prior to commencing construction.
- 4.11 **PIPE A** is thought to just serve just the car park area but may also serve the residential area to the north. This will also need further investigation prior to commencing construction. Should the sewer serve the residential area as well as the site, it will need rerouting around the northern boundary. If, however, it only serves the site itself it can be abandoned. Sufficient space should be allocated in the design for either eventuality.
- 4.12 The STW sewers on site require easements either side with no buildings or trees. An easement of 3m is required either side of the 225mm sewer (pipe D) adjacent to Brick Kiln Street and an easement of 5m is required either side of the 525mm sewer which crosses the centre of the site (pipe B). Should the existing 525mm pipe in the north of the site require rerouting, a 5m easement should be allowed on the inside of this.

#### *Existing Discharge Rate*

- 4.13 A full impermeable area analysis of the existing site has been carried out and a drawing is included as **APPENDIX E**. The total existing impermeable area has been calculated as 4.77ha.
- 4.14 An estimate of the likely runoff associated with the existing site can be made by using the Rational Method as follows:

$$Q = 2.78 \times A_i I$$

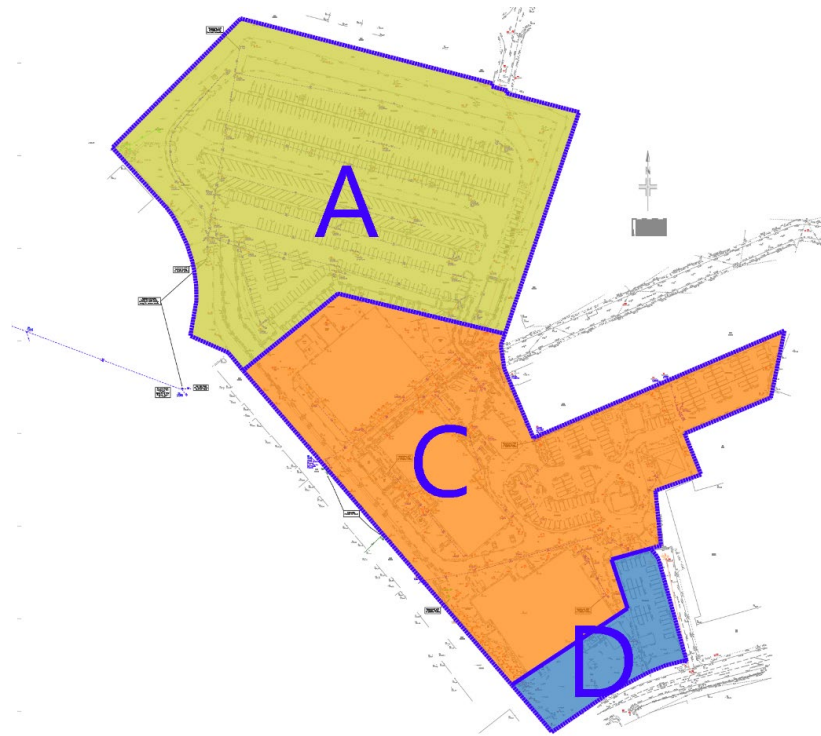


- 4.15 Where  $Q$  = runoff in l/s,  $A_i$  is the site impermeable area in Hectares, and  $I$  is the rainfall intensity in mm/hour.
- 4.16 An estimate of the runoff rate from the entire of the site has been carried out and the results are summarised below in [TABLE 3.1](#). Rainfall values have been taken from Microdrainage software using the latest FEH rainfall model.

*Table 4-1 Existing Runoff Rates for Existing Site*

| Return Period | Rainfall Rate (mm/hr) | Impermeable Area (Ha) | Runoff Rate (l/s) |
|---------------|-----------------------|-----------------------|-------------------|
| 2 Year        | 33.4                  | 4.77                  | 442               |
| 1:30 Year     | 73.0                  | 4.77                  | 968               |
| 1:100 Year    | 96.0                  | 4.77                  | 1273              |

- 4.17 The table above indicates a significant existing discharge rate for the 1:2 year, 1:30 year and 1:100-year return periods.
- 4.18 However, the site is arranged in three distinct catchments each served by drainage system with a separate outfall and it is useful to separate the total flow into these catchments. The outfalls and drainage catchments are associated with Pipe A, C and D in Figure 4.1 and to maintain consistency the catchments will be described by these letters. These catchments account for approximately 49%, 45% and 6% of the overall site respectively. The approximate breakdown of the catchments is shown in [Figure 4-2](#).



*Figure 4-2 Approximate Existing Catchment Arrangement*

- 4.19 The discharge rates presented in Table 4-1 show the potential rates for the entire site. The rates can be apportioned to each catchment and the associated 1:2, 1:30 and 1:100 rates are shown in Table 4-2.

*Table 4-2 Existing Discharge Rates by Catchment*

| Return Period         | Catchment A | Catchment C | Catchment D |
|-----------------------|-------------|-------------|-------------|
| Impermeable Area (ha) | 23100       | 21670       | 2910        |
| 2 Year (l/s)          | 214         | 201         | 27          |
| 1:30 Year (l/s)       | 468         | 440         | 59          |
| 1:100 Year (l/s)      | 616         | 579         | 77          |

- 4.20 It should be noted that the table shows the maximum runoff rate that could occur over each catchment. However, each catchment is limited by the discharge pipe associated with the drainage system.
- 4.21 Catchment A is limited by a 525mm surface water pipe crossing the northwest of the site at gradient of 1:125; the pipe full discharge capacity of this pipe has been calculated at 433.4l/s.



- 4.22 Catchment C is limited by a 300mm pipe laid at a gradient of 1:30; such a pipe would be expected to have a pipe full capacity of 203l/s.
- 4.23 Catchment D is limited by a 225mm pipe laid at a gradient of 1:150; the pipe full discharge capacity of this pipe has been calculated at 42.3l/s.
- 4.24 The rates described above are the pipe full capacities only, when surcharged it would be expected that this pipe could convey far more flow than this. Nevertheless, conservatively the figures above can be used to understand the maximum discharge rates from each area of the site. The pipe constrained figures show that flows are somewhat constrained in the 1:30 year event for all catchments but the 1:2 year flow is unconstrained.

#### *Discharge Options*

- 4.25 In accordance with the Building Regulations, the Non-Statutory Technical Standards for SuDS and prevailing best practice, surface water should be discharged according to the following preferential hierarchy.
- *Infiltration*
  - *Watercourse, River, Ditch*
  - *Surface Water Sewer*
  - *Combined Sewer*
- 4.26 The favoured method of discharge is infiltration. However, the British Geological Maps show that the site lies on Mercia Mudstone. Furthermore, the Geo-Environmental Desk Study carried out for the site confirms the Mercia Mudstone bedrock and identifies superficial deposits of Bosworth Clay Member underlying the majority of the site. The report states that 'Soakaway drainage is unlikely to be feasible for the majority of the site given the anticipated predominance of cohesive strata.'
- 4.27 This outline assessment is based upon the worst-case assumption that drainage by infiltration will not be viable.
- 4.28 The nearest watercourse to the site is the Battling Brook. At its closest point, the brook lies 100m north of the site boundary, across third party land so discharge directly to the brook is also not considered to be a viable option.
- 4.29 Severn Trent Water have been consulted and their response can be found in [APPENDIX G](#). They have confirmed that they have capacity in the public system and discharge to the public sewers is the only viable option.



- 4.30 For the bulk of the site surface water, discharge to STW Manhole 9801 or 8802 will be the preferred point of connection. The invert level of these manhole is recorded as 101.03m AOD and 98.79m AOD respectively. Ground levels across the site are significantly above this level, allowing for reasonable fall and cover. A connection should be feasible from all the development area. Drainage connectivity investigations suggest that the bulk of the northern site discharges to this manhole via an existing private connection pipe. This pipe could potentially be reused and adopted by STW under a Section 102 agreement.
- 4.31 Catchments C and D as described below may discharge either to Manhole 9801, or 8802 via an appropriate internal connection arrangement – capacity has been confirmed by STW. Or if preferred, individual connections to the surface water drain serving Catchment C could be made subject to confirmation of the outfall arrangement of Catchment C.

*Proposed Discharge Rate*

- 4.32 The Non-Statutory Technical Standards for Sustainable Drainage requires that discharge from proposed development is limited such that the proposed 1:1,1:30 and 1:100 discharge rates do not exceed that of the existing discharge rates.
- 4.33 A staged approach to discharge such as that described above requires consideration of the long-term storage volume requirements. The long-term storage requirement is stated as follows: -
- Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event but should never exceed the runoff volume from the development site prior to redevelopment for that event.*
- 4.34 In practice, for sites where infiltration is not viable, this requirement translates to a need to release the excess volume (above greenfield) at a trickle rate not considered to cause any risk, often taken in such circumstances as 2l/s/ha.
- 4.35 An alternative approach to a staged discharge and consideration of the long-term storage volume is to limit flows from the site to the existing QBar rate for all return period events.



- 4.36 In the case of this development, it is apparent that the runoff volume from the existing site which is almost 80% impermeable would be significant and the proposed residential development will introduce significantly more permeable areas. Runoff volume from the proposed development will therefore be lower than existing given the significant reduction in impermeable cover. Accordingly, the long term storage component need not be considered and a staged discharge could be viable.
- 4.37 The standards dictate that runoff should be restricted to existing rates which, in this case will be taken as the lower of the existing Qbar rate or the pipe constrained discharge rate. However, it is typically best practice to provide a betterment to existing rates. Table 4-3 below shows the minimum rate to which each catchment should be restricted to meet the requirements of the guidance along with a recommended restriction representing a 50% betterment on the existing rate.

*Table 4-3 Minimum and Recommended Discharge Rate*

| Return Period                                               | Catchment<br>A | Catchment<br>C | Catchment<br>D |
|-------------------------------------------------------------|----------------|----------------|----------------|
| Minimum Acceptable Discharge Rate (l/s)                     | 214            | 201            | 27             |
| Recommended Acceptable Discharge Rate (l/s) @50% betterment | 107            | 100.5          | 13.5           |

- 4.38 The rates shown above represent a significant reduction on the maximum potential existing rates and are all well within the maximum capacity of the discharge pipes serving the area.

#### *Storage Volumes*

- 4.39 The proposed development will cover a total area of over 6ha and a development of up to 195 dwellings together with landscaping, highways and public open space. The application is in outline form and the client at this stage intends to progress the application with parameters and an indicative layout only with all matters reserved.
- 4.40 It is logical to split the proposed development up into similar catchments to those that currently exist. Given the outline level of proposals it is not practical to carry out a full impermeable area analysis and instead a typical impermeable area percentage of 65% will be applied to each catchment. The total area of each catchment and anticipated impermeable is shown on Table 4-4.



*Table 4-4 Total Area and Impermeable Area of Proposed Development Catchments*

|                              | Catchment<br>A | Catchment<br>C | Catchment<br>D |
|------------------------------|----------------|----------------|----------------|
| <b>Total Area(ha)</b>        | 2.95           | 2.77           | 0.37           |
| <b>Impermeable Area (Ha)</b> | 1.92           | 1.80           | 0.24           |

- 4.41 An estimate of the storage volume required in order to attenuate flows to the rates shown in Table 4-5 has been produced for each catchment. Calculations have been carried out using Causeway Flow and have used the latest FEH22 data detailed output is included in [APPENDIX F](#).

*Table 4-5 Proposed Storage Volumes Exceeding Minimum Required Standard*

| Return Period                        | Catchment A | Catchment C | Catchment D |
|--------------------------------------|-------------|-------------|-------------|
| <b>Impermeable Area (ha)</b>         | 1.92        | 1.80        | 0.24        |
| <b>1:2 (m<sup>3</sup>)</b>           | 169         | 157         | 13          |
| <b>1:30 +35 % (m<sup>3</sup>)</b>    | 445         | 415         | 50          |
| <b>1:100 + 40%cc (m<sup>3</sup>)</b> | 667         | 622         | 78          |

- 4.42 Based on the calculations outlined above up to 1,367m<sup>3</sup> of storage may be required across the site to reduce flows to 50% less than the existing Qbar rate.
- 4.43 The table above sets out the minimum volumes required to meet the standards set out in the Non-Statutory Technical Standards. However, following feedback from a previous application for this development the LLFA have indicated that they expect the proposed development to vastly exceed the minimum requirements of the standards and have asked the developer to restrict to greenfield rates.
- 4.44 Greenfield runoff rates can be estimated using the ICP SuDS implementation of the IH124 methodology. The proposed development area covers a total extent of 6.1ha. Results are provided in [APPENDIX F](#) and summarised below in Table 4-6. The table also shows the discharge rates apportioned to the individual catchments on a pro rata basis.



Table 4-6 IH124 Runoff Rates

| Return Period | Greenfield Discharge Rate (l/s) | Catchment A | Catchment C | Catchment D |
|---------------|---------------------------------|-------------|-------------|-------------|
| 1             | 22.09                           | 10.70       | 10.05       | 1.35        |
| QBAR          | 26.62                           | 12.89       | 12.11       | 1.62        |
| 30            | 53.23                           | 25.78       | 24.21       | 3.25        |
| 1:100         | 68.40                           | 33.13       | 31.10       | 4.17        |

- 4.45 The LLFA have advised that, where there is no increase in impermeable area as a result of the development, the greenfield runoff volume need not be considered, and the development may discharge at a rate no greater than the 100-year greenfield rate. Note that it is impractical to stage discharge from Catchment D as the discharge rates are lower than could be accommodated by a safely sized flow control device. Accordingly discharge from catchment D will be limited to 5l/s for all events.
- 4.46 An estimate of the total volume of balancing storage required on site has been made using the Microdrainage Quick Storage Module for the reduced greenfield rates. Calculations have been made for a range of return periods using the FEH rainfall profile. Full outputs are included as [APPENDIX F](#) and the results have been summarised in Table 4-7. In accordance with the latest EA Guidance an allowance has been made for climate change of up to 40% and this has been used in the calculations.

Table 4-7 Proposed Greenfield Attenuation Volumes

| Return Period                   | Catchment A | Catchment C | Catchment D |
|---------------------------------|-------------|-------------|-------------|
| Impermeable Area (ha)           | 1.92        | 1.80        | 0.24        |
| 1:2 (m <sup>3</sup> )           | 179         | 168         | 17          |
| 1:30 +35 % (m <sup>3</sup> )    | 700         | 658         | 75          |
| 1:100 + 40%cc (m <sup>3</sup> ) | 1012        | 949         | 112         |

- 4.47 The calculations outlined above show that up to approximately 2,100m<sup>3</sup> of attenuation storage will be required to restrict flows from the site to greenfield rates.
- 4.48 The outline layout has allowed for sufficient space to accommodate ponds of the size required for the worst-case greenfield discharge restriction at a depth of 1m.



4.49 In addition to the primary attenuation structures the developer should incorporate further source control measures where viable and appropriate. The following additional source control measures should be considered.

- *Permeable Paving*
- *Bioretention Areas/Tree Pits/ Rain Gardens*
- *Roadside Swales*
- *Rainwater Recycling Buts*
- *Vortex Separators*
- *Silt/Oil Separators*

4.50 The exact distribution of source control measures such as those outlined above can be resolved at the detailed design stage.

4.51 The developer will, as far as is possible, develop a minimum two stage treatment train.

#### *SuDS Treatment Approach*

4.52 Ciria C753 the SuDS Manual provides an approach to assessing the effectiveness of various SuDS techniques in controlling pollution and improving water quality. The approach is known as the simple index method and can be summarised as follows.

4.53 A pollution hazard index is applied to various land used from residential roofs to service yards and more hazardous areas. The Hazard Indexes for various land uses are identified below in Table 4-8.

*Table 4-8 Pollution Hazard Indexes*

| LAND USE                                                    | Pollution Hazard Level | Total Suspended Solids | Metals | Hydrocarbons |
|-------------------------------------------------------------|------------------------|------------------------|--------|--------------|
| <b>Residential Roofs</b>                                    | Very Low               | 0.2                    | 0.2    | 0.05         |
| <b>Other Roofs</b>                                          | Low                    | 0.3                    | 0.2    | 0.05         |
| <b>Residential Properties, Car Parking and Access Roads</b> | Low                    | 0.5                    | 0.4    | 0.4          |
| <b>Commercial and Delivery Areas Higher Traffic Roads</b>   | Medium                 | 0.7                    | 0.6    | 0.7          |
| <b>Haulage Yards, Lorry Parks</b>                           | High                   | 0.8                    | 0.8    | 0.9          |

4.54 The pollution Hazard Indexes are matched by a similar matrix indicating the potential for various SuDS components to remove contaminants. This table is reproduced below in Table 4-9.



Table 4-9 SuDS Mitigation Index

| SuDS COMPONENTS    | TSS | Metals | Hydrocarbons |
|--------------------|-----|--------|--------------|
| Filter Strip       | 0.4 | 0.4    | 0.5          |
| Filter Drain       | 0.4 | 0.4    | 0.4          |
| Swale              | 0.5 | 0.6    | 0.6          |
| Bioretention Areas | 0.8 | 0.8    | 0.8          |
| Permeable Pavement | 0.7 | 0.6    | 0.7          |
| Detention Basin    | 0.5 | 0.5    | 0.6          |
| Pond               | 0.7 | 0.7    | 0.5          |
| Wetland            | 0.8 | 0.8    | 0.8          |

- 4.55 Where more than one mitigation feature is to be used, the guidance suggests that the total mitigation index can be found as follows: -

$$\text{Total SuDS mitigation index} = \text{mitigation Index}_1 + 0.5(\text{mitigation index}_2)$$

- 4.56 The proposed development is residential in nature and the bulk of the land use can be described as of Low Pollution Hazard level. The primary access route through the site may be described as Medium Hazard.
- 4.57 SuDS Components will be selected from Table 4-9 in order to meet or exceed the minimum Hazard index outlined in Table 4-8.

#### *Maintenance and Adoption*

- 4.58 The proposed drainage systems will be offered for adoption by the Sewer Undertaker under a Section 104 process. Recent changes to guidance allow for the adoption of both above and below ground SuDS features and it is considered that the proposed attenuation feature will be suitable for adoption.
- 4.59 Table 4-10 has been prepared from the recommendations contained in the SuDS manual and should set minimum standards for inspection and maintenance.



Table 4-10 Suds Drainage Systems Inspection & Maintenance Regimes

| Drainage Component                                        | Maintenance Task                                                                     | Frequency                                            |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>Below Ground Drainage Pipes</b>                        | Inspect for blockages ensure free running                                            | Every 2 months and after any significant storm event |
| <b>Surface water gullies and linear drainage features</b> | Inspect for blockages ensure free running jet/vacuum as appropriate                  | Every 2 months and after any significant storm event |
| <b>Permeable Paving Surface</b>                           | Permeable paving to be swept/vacuumed in accordance with manufacturer's instructions | Once a year                                          |
| <b>Permeable Paving</b>                                   | Inspect Joints top up as required                                                    | Yearly                                               |
| <b>Catch Pits</b>                                         | Inspection for and Removal of Silt from catchpits                                    | Every 6 months and after any significant storm       |
| <b>Attenuation Pond</b>                                   | Litter Pick                                                                          | Every 2 months and after any significant storm       |
| <b>Attenuation Pond</b>                                   | Weeding                                                                              | Every month during growing Season.                   |
| <b>Flow Control Device</b>                                | Inspect for Blockages and Correct Operation                                          | After any Major Storm otherwise every 2 months       |
| <b>Outfall</b>                                            | Inspect for correct operation of flap valve                                          | After any Major Storm otherwise every 2 months       |
| <b>Outfall</b>                                            | Remove Debris                                                                        | Every 2 months and after any significant storm       |
| <b>Outfall</b>                                            | Check for structural integrity                                                       | Yearly                                               |



## 5.0 FOUL DRAINAGE STATEMENT

- 5.1 The proposed development is for up to 195 residential dwellings. The residential development will replace existing office, commercial and industrial use and the existing foul load should be assessed before demolition commences.
- 5.2 The developer should create a register of all existing WC's, sinks, showers, washing machines etc. This will allow a loading table to be produced which will demonstrate the infrastructure load of the existing use.
- 5.3 The foul load of the proposed development of 195 dwellings can be assessed on the basis of 4000l/dwelling at 6DWF which equates to a flow rate of 9l/s. For catchment planning purposes a DWF multiplier of 2 is often used and is more appropriate on larger scale developments. This equates to a total discharge rate of 3l/s.
- 5.4 Severn Trent Water have been consulted and have confirmed that these foul flows can be accommodated at MH0802. However, this manhole is located in the centre of the site. The invert level of this manhole is 104.34m AOD. Although the invert of the pipe reduces further towards the boundary of the site the reduction is not significant and a connection limit of around 104.00m exists on this combined drain run at the edge of the site. Although catchments C and D, as discussed below, should be able to drain to this connection by gravity, a pumping station will be required to serve the development associated with Catchment A. If a pumping station is required, STW have requested pumped flows of around 5l/s.
- 5.5 Alternative options may be viable for foul connection and may be considered by the developer. Sewer records show a 225mm pipe on Brick Kiln Street. This pipe appears to serve the existing development only but may carry flows from other sources. STW have confirmed they could accommodate some of the frontage development associated with Catchment D in their system at MH 2601. However, levels are not conducive to a connection for some of Catchment C and all of Catchment A.
- 5.6 Sewer records show a further set of combined sewers in the park land to the west of the development. Sewer records do not include invert levels or cover levels on this network but based on the general topography cover levels of less than 100m AOD are expected, and invert levels should be conducive to a connection by gravity from the entirety of the site, however a requisition across third party land or by agreement will be required. STW has confirmed capacity at MH 8800 for up to approximately 60 houses as a potential option.
- 5.7 In conclusion foul capacity is available for the development at manhole 0802 and a pumping station will be required to drain some of the development if this connection point is pursued. Other options are possible and may be more cost effective. Further discussion with STW will be required to confirm these alternatives.



## 6.0 CONCLUSIONS & RECOMMENDATIONS

- 6.1 This FRA and Drainage Statement has been prepared for Fisher German on behalf of Cadent in respect of a proposed residential development at the site of Cadent's Offices, Brick Kiln Lane, Hinckley
- 6.2 This FRA has been conducted in accordance with the requirements of the NPPF and associated Planning Practice Guidance. Flooding from a variety of sources has been investigated, and the site is not considered to be at significant risk from any source.
- 6.3 Some simple mitigation is sensible to manage any residual risk not identified. External levels should be arranged to direct any exceedance or flood flow away from thresholds. Finished floor levels should be elevated 150mm above external ground level where possible.

*Table 6-1 Summary of Mitigation Features*

| Flood Risk                                            | Mitigation                                                                                                                                             |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>NO RISK IDENTIFIED</b>                             | FFL's to be raised above external ground levels. External ground levels to be shaped to divert flow away from property entrances                       |
| <b>RESIDUAL CONCERNS AND BEST PRACTICE RECOMENDED</b> | Designing for Exceedance should be adopted.                                                                                                            |
| <b>Drainage</b>                                       | A sustainable drainage system should be implemented which will limit flow to, as a minimum, the existing rate less an allowance for betterment of 50%. |

- 6.4 The existing site is largely impermeable, and the development will incorporate both increased permeable area and improved sustainable drainage, thus decreasing the infrastructure load in the wider area.
- 6.5 A reasonable approach in keeping with the Non-Statutory Technical Standards for SuDS is to restrict the runoff from the development to the existing rate less a reduction for betterment. Adopting this approach the development will require a total of 1,367m<sup>3</sup> of storage to balance flows from the development.
- 6.6 The LLFA have expressed a desire to reduce the runoff from the development to greenfield rates. If this approach is adopted up to 2,100m<sup>3</sup> of storage may be required.
- 6.7 The development is split into three natural catchments and the proportion of attenuation required for each catchment is discussed in the body of this document.

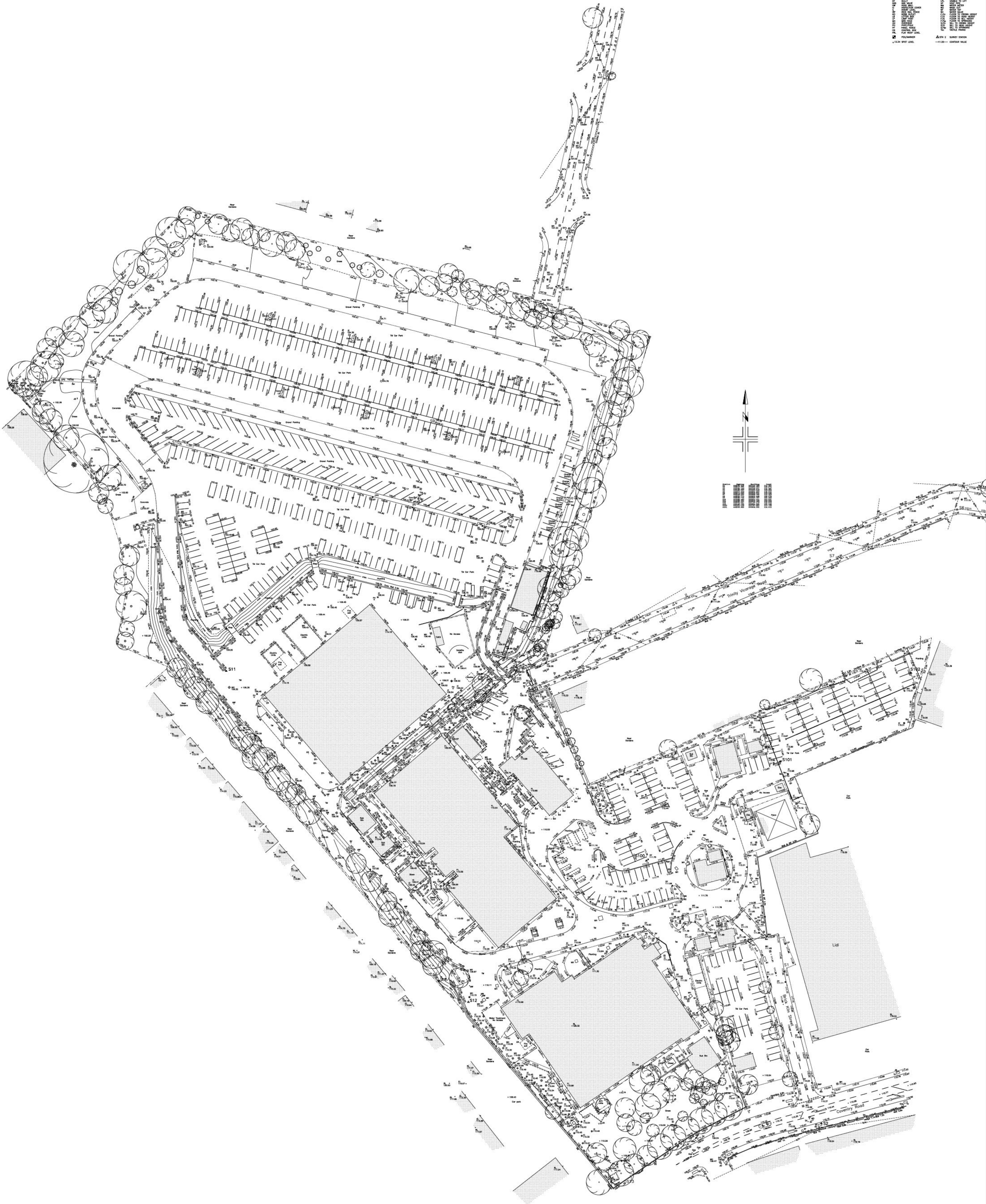


- 6.8 The developer is applying for outline consent only with all matters reserved. A detailed site layout is not available and detailed drainage layouts have therefore not been produced. However, a framework is presented in the body of this document setting out minimum storage and treatment options. The indicative layout included in Appendix B has allowed sufficient space for the key storage components. A two train SuDS drainage train will be employed for most of the development and additional source control measures including permeable paving, bio retention and roadside swales will be considered by the developer during the future detailed design.
- 6.9 It has been clearly demonstrated that there is sufficient storage capacity on site to attenuate flows up to Greenfield discharge rates.
- 6.10 Severn Trent Water have confirmed capacity for both surface and foul water discharge from the site, and potential discharge points agreed.
- 6.11 It has been demonstrated in this report that a viable solution can be achieved by discharging all SW by gravity to MH 8802 on the surface water run to the west of the site.
- 6.12 Foul drainage will also be discharged to the public system. If the existing foul discharge routes are to be reflected, a pumping station will be required as the northern section of the proposed development will be at a lower level than the proposed discharge point at MH0802. Foul drainage from the southern catchment could be discharged to MH2601. Other potential options can be investigated at a later stage.
- 6.13 There are existing STW pipes on site and these sewers require an easement either side, with the main 525mm sewer requiring no building or trees within 5 metres and the smaller sewer requiring a similar easement 3m either side.
- 6.14 It is considered that the development can proceed without being at any significant flood risk and without increasing flood risk elsewhere. Assuming that the proposed recommendations are included in future detailed design, the development proposals are considered to represent **SUSTAINABLE DEVELOPMENT** from a flood risk and drainage perspective.

## APPENDIX A

### TOPOGRAPHICAL SURVEY

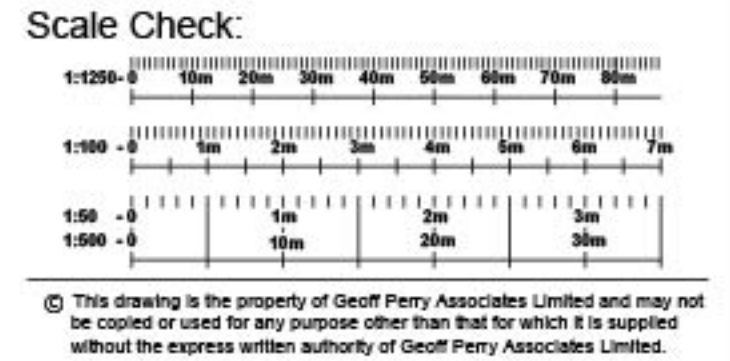
| STANDARD ABBREVIATIONS |                               |
|------------------------|-------------------------------|
| AC                     | Asphalt Concrete              |
| AD                     | Asphalt Driveway              |
| AE                     | Asphalt Embankment            |
| AF                     | Asphalt Footpath              |
| AG                     | Asphalt Gravel                |
| AL                     | Asphalt Laid                  |
| AM                     | Asphalt Macadam               |
| AN                     | Asphalt Natural               |
| AO                     | Asphalt Overlay               |
| AP                     | Asphalt Pavement              |
| AR                     | Asphalt Road                  |
| AS                     | Asphalt Surface               |
| AT                     | Asphalt Tarmac                |
| AV                     | Asphalt Veneer                |
| AW                     | Asphalt Wearing Course        |
| AX                     | Asphalt X-Base                |
| AY                     | Asphalt Y-Base                |
| AZ                     | Asphalt Z-Base                |
| BA                     | Brickwork                     |
| BB                     | Brickwork Boundary            |
| BC                     | Brickwork Chimney             |
| BD                     | Brickwork Drainage            |
| BE                     | Brickwork Embankment          |
| BF                     | Brickwork Footpath            |
| BG                     | Brickwork Gravel              |
| BH                     | Brickwork Hatched             |
| BI                     | Brickwork Inset               |
| BJ                     | Brickwork Joints              |
| BK                     | Brickwork Kerb                |
| BL                     | Brickwork Laid                |
| BM                     | Brickwork Macadam             |
| BN                     | Brickwork Natural             |
| BO                     | Brickwork Overlay             |
| BP                     | Brickwork Pavement            |
| BQ                     | Brickwork Road                |
| BR                     | Brickwork Surface             |
| BS                     | Brickwork Tarmac              |
| BT                     | Brickwork Veneer              |
| BV                     | Brickwork Wearing Course      |
| BW                     | Brickwork X-Base              |
| BX                     | Brickwork Y-Base              |
| BY                     | Brickwork Z-Base              |
| CA                     | Concrete                      |
| CB                     | Concrete Boundary             |
| CC                     | Concrete Chimney              |
| CD                     | Concrete Drainage             |
| CE                     | Concrete Embankment           |
| CF                     | Concrete Footpath             |
| CG                     | Concrete Gravel               |
| CH                     | Concrete Hatched              |
| CI                     | Concrete Inset                |
| CJ                     | Concrete Joints               |
| CK                     | Concrete Kerb                 |
| CL                     | Concrete Laid                 |
| CM                     | Concrete Macadam              |
| CN                     | Concrete Natural              |
| CO                     | Concrete Overlay              |
| CP                     | Concrete Pavement             |
| CQ                     | Concrete Road                 |
| CR                     | Concrete Surface              |
| CS                     | Concrete Tarmac               |
| CT                     | Concrete Veneer               |
| CV                     | Concrete Wearing Course       |
| CW                     | Concrete X-Base               |
| CX                     | Concrete Y-Base               |
| CY                     | Concrete Z-Base               |
| DA                     | Damp Proof Course             |
| DB                     | Damp Proofing                 |
| DC                     | Damp Proofing Boundary        |
| DD                     | Damp Proofing Chimney         |
| DE                     | Damp Proofing Drainage        |
| DF                     | Damp Proofing Embankment      |
| DF                     | Damp Proofing Footpath        |
| DG                     | Damp Proofing Gravel          |
| DH                     | Damp Proofing Hatched         |
| DI                     | Damp Proofing Inset           |
| DJ                     | Damp Proofing Joints          |
| DK                     | Damp Proofing Kerb            |
| DL                     | Damp Proofing Laid            |
| DM                     | Damp Proofing Macadam         |
| DN                     | Damp Proofing Natural         |
| DO                     | Damp Proofing Overlay         |
| DP                     | Damp Proofing Pavement        |
| DQ                     | Damp Proofing Road            |
| DR                     | Damp Proofing Surface         |
| DS                     | Damp Proofing Tarmac          |
| DT                     | Damp Proofing Veneer          |
| DV                     | Damp Proofing Wearing Course  |
| DW                     | Damp Proofing X-Base          |
| DX                     | Damp Proofing Y-Base          |
| DY                     | Damp Proofing Z-Base          |
| EA                     | Earthwork                     |
| EB                     | Earthwork Boundary            |
| EC                     | Earthwork Chimney             |
| ED                     | Earthwork Drainage            |
| EE                     | Earthwork Embankment          |
| EF                     | Earthwork Footpath            |
| EG                     | Earthwork Gravel              |
| EH                     | Earthwork Hatched             |
| EI                     | Earthwork Inset               |
| EJ                     | Earthwork Joints              |
| EK                     | Earthwork Kerb                |
| EL                     | Earthwork Laid                |
| EM                     | Earthwork Macadam             |
| EN                     | Earthwork Natural             |
| EO                     | Earthwork Overlay             |
| EP                     | Earthwork Pavement            |
| EQ                     | Earthwork Road                |
| ER                     | Earthwork Surface             |
| ES                     | Earthwork Tarmac              |
| ET                     | Earthwork Veneer              |
| EV                     | Earthwork Wearing Course      |
| EW                     | Earthwork X-Base              |
| EX                     | Earthwork Y-Base              |
| EY                     | Earthwork Z-Base              |
| FA                     | Fabric                        |
| FB                     | Fabric Boundary               |
| FC                     | Fabric Chimney                |
| FD                     | Fabric Drainage               |
| FE                     | Fabric Embankment             |
| FF                     | Fabric Footpath               |
| FG                     | Fabric Gravel                 |
| FH                     | Fabric Hatched                |
| FI                     | Fabric Inset                  |
| FJ                     | Fabric Joints                 |
| FK                     | Fabric Kerb                   |
| FL                     | Fabric Laid                   |
| FM                     | Fabric Macadam                |
| FN                     | Fabric Natural                |
| FO                     | Fabric Overlay                |
| FP                     | Fabric Pavement               |
| FQ                     | Fabric Road                   |
| FR                     | Fabric Surface                |
| FS                     | Fabric Tarmac                 |
| FT                     | Fabric Veneer                 |
| FV                     | Fabric Wearing Course         |
| FW                     | Fabric X-Base                 |
| FX                     | Fabric Y-Base                 |
| FY                     | Fabric Z-Base                 |
| GA                     | Gravel                        |
| GB                     | Gravel Boundary               |
| GC                     | Gravel Chimney                |
| GD                     | Gravel Drainage               |
| GE                     | Gravel Embankment             |
| GF                     | Gravel Footpath               |
| GG                     | Gravel Gravel                 |
| GH                     | Gravel Hatched                |
| GI                     | Gravel Inset                  |
| GJ                     | Gravel Joints                 |
| GK                     | Gravel Kerb                   |
| GL                     | Gravel Laid                   |
| GM                     | Gravel Macadam                |
| GN                     | Gravel Natural                |
| GO                     | Gravel Overlay                |
| GP                     | Gravel Pavement               |
| GQ                     | Gravel Road                   |
| GR                     | Gravel Surface                |
| GS                     | Gravel Tarmac                 |
| GT                     | Gravel Veneer                 |
| GV                     | Gravel Wearing Course         |
| GW                     | Gravel X-Base                 |
| GX                     | Gravel Y-Base                 |
| GY                     | Gravel Z-Base                 |
| HA                     | Hatched                       |
| HB                     | Hatched Boundary              |
| HC                     | Hatched Chimney               |
| HD                     | Hatched Drainage              |
| HE                     | Hatched Embankment            |
| HF                     | Hatched Footpath              |
| HG                     | Hatched Gravel                |
| HH                     | Hatched Hatched               |
| HI                     | Hatched Inset                 |
| HJ                     | Hatched Joints                |
| HK                     | Hatched Kerb                  |
| HL                     | Hatched Laid                  |
| HM                     | Hatched Macadam               |
| HN                     | Hatched Natural               |
| HO                     | Hatched Overlay               |
| HP                     | Hatched Pavement              |
| HQ                     | Hatched Road                  |
| HR                     | Hatched Surface               |
| HS                     | Hatched Tarmac                |
| HT                     | Hatched Veneer                |
| HV                     | Hatched Wearing Course        |
| HW                     | Hatched X-Base                |
| HX                     | Hatched Y-Base                |
| HY                     | Hatched Z-Base                |
| IA                     | Inset                         |
| IB                     | Inset Boundary                |
| IC                     | Inset Chimney                 |
| ID                     | Inset Drainage                |
| IE                     | Inset Embankment              |
| IF                     | Inset Footpath                |
| IG                     | Inset Gravel                  |
| IH                     | Inset Hatched                 |
| II                     | Inset Inset                   |
| IJ                     | Inset Joints                  |
| IK                     | Inset Kerb                    |
| IL                     | Inset Laid                    |
| IM                     | Inset Macadam                 |
| IN                     | Inset Natural                 |
| IO                     | Inset Overlay                 |
| IP                     | Inset Pavement                |
| IQ                     | Inset Road                    |
| IR                     | Inset Surface                 |
| IS                     | Inset Tarmac                  |
| IT                     | Inset Veneer                  |
| IV                     | Inset Wearing Course          |
| IW                     | Inset X-Base                  |
| IX                     | Inset Y-Base                  |
| IY                     | Inset Z-Base                  |
| JA                     | Joints                        |
| JB                     | Joints Boundary               |
| JC                     | Joints Chimney                |
| JD                     | Joints Drainage               |
| JE                     | Joints Embankment             |
| JF                     | Joints Footpath               |
| JG                     | Joints Gravel                 |
| JH                     | Joints Hatched                |
| JI                     | Joints Inset                  |
| JJ                     | Joints Joints                 |
| JK                     | Joints Kerb                   |
| JL                     | Joints Laid                   |
| JM                     | Joints Macadam                |
| JN                     | Joints Natural                |
| JO                     | Joints Overlay                |
| JP                     | Joints Pavement               |
| JQ                     | Joints Road                   |
| JR                     | Joints Surface                |
| JS                     | Joints Tarmac                 |
| JT                     | Joints Veneer                 |
| JV                     | Joints Wearing Course         |
| JW                     | Joints X-Base                 |
| JX                     | Joints Y-Base                 |
| JY                     | Joints Z-Base                 |
| KA                     | Kerb                          |
| KB                     | Kerb Boundary                 |
| KC                     | Kerb Chimney                  |
| KD                     | Kerb Drainage                 |
| KE                     | Kerb Embankment               |
| KF                     | Kerb Footpath                 |
| KG                     | Kerb Gravel                   |
| KH                     | Kerb Hatched                  |
| KI                     | Kerb Inset                    |
| KJ                     | Kerb Joints                   |
| KK                     | Kerb Kerb                     |
| KL                     | Kerb Laid                     |
| KM                     | Kerb Macadam                  |
| KN                     | Kerb Natural                  |
| KO                     | Kerb Overlay                  |
| KP                     | Kerb Pavement                 |
| KQ                     | Kerb Road                     |
| KR                     | Kerb Surface                  |
| KS                     | Kerb Tarmac                   |
| KT                     | Kerb Veneer                   |
| KV                     | Kerb Wearing Course           |
| KW                     | Kerb X-Base                   |
| KX                     | Kerb Y-Base                   |
| KY                     | Kerb Z-Base                   |
| LA                     | Laid                          |
| LB                     | Laid Boundary                 |
| LC                     | Laid Chimney                  |
| LD                     | Laid Drainage                 |
| LE                     | Laid Embankment               |
| LF                     | Laid Footpath                 |
| LG                     | Laid Gravel                   |
| LH                     | Laid Hatched                  |
| LI                     | Laid Inset                    |
| LJ                     | Laid Joints                   |
| LK                     | Laid Kerb                     |
| LL                     | Laid Laid                     |
| LM                     | Laid Macadam                  |
| LN                     | Laid Natural                  |
| LO                     | Laid Overlay                  |
| LP                     | Laid Pavement                 |
| LQ                     | Laid Road                     |
| LR                     | Laid Surface                  |
| LS                     | Laid Tarmac                   |
| LT                     | Laid Veneer                   |
| LV                     | Laid Wearing Course           |
| LW                     | Laid X-Base                   |
| LX                     | Laid Y-Base                   |
| LY                     | Laid Z-Base                   |
| MA                     | Macadam                       |
| MB                     | Macadam Boundary              |
| MC                     | Macadam Chimney               |
| MD                     | Macadam Drainage              |
| ME                     | Macadam Embankment            |
| MF                     | Macadam Footpath              |
| MG                     | Macadam Gravel                |
| MH                     | Macadam Hatched               |
| MI                     | Macadam Inset                 |
| MJ                     | Macadam Joints                |
| MK                     | Macadam Kerb                  |
| ML                     | Macadam Laid                  |
| MM                     | Macadam Macadam               |
| MN                     | Macadam Natural               |
| MO                     | Macadam Overlay               |
| MP                     | Macadam Pavement              |
| MQ                     | Macadam Road                  |
| MR                     | Macadam Surface               |
| MS                     | Macadam Tarmac                |
| MT                     | Macadam Veneer                |
| MV                     | Macadam Wearing Course        |
| MW                     | Macadam X-Base                |
| MX                     | Macadam Y-Base                |
| MY                     | Macadam Z-Base                |
| NA                     | Natural                       |
| NB                     | Natural Boundary              |
| NC                     | Natural Chimney               |
| ND                     | Natural Drainage              |
| NE                     | Natural Embankment            |
| NF                     | Natural Footpath              |
| NG                     | Natural Gravel                |
| NH                     | Natural Hatched               |
| NI                     | Natural Inset                 |
| NJ                     | Natural Joints                |
| NK                     | Natural Kerb                  |
| NL                     | Natural Laid                  |
| NM                     | Natural Macadam               |
| NN                     | Natural Natural               |
| NO                     | Natural Overlay               |
| NP                     | Natural Pavement              |
| NQ                     | Natural Road                  |
| NR                     | Natural Surface               |
| NS                     | Natural Tarmac                |
| NT                     | Natural Veneer                |
| NV                     | Natural Wearing Course        |
| NW                     | Natural X-Base                |
| NX                     | Natural Y-Base                |
| NY                     | Natural Z-Base                |
| OA                     | Overlay                       |
| OB                     | Overlay Boundary              |
| OC                     | Overlay Chimney               |
| OD                     | Overlay Drainage              |
| OE                     | Overlay Embankment            |
| OF                     | Overlay Footpath              |
| OG                     | Overlay Gravel                |
| OH                     | Overlay Hatched               |
| OI                     | Overlay Inset                 |
| OJ                     | Overlay Joints                |
| OK                     | Overlay Kerb                  |
| OL                     | Overlay Laid                  |
| OM                     | Overlay Macadam               |
| ON                     | Overlay Natural               |
| OO                     | Overlay Overlay               |
| OP                     | Overlay Pavement              |
| OQ                     | Overlay Road                  |
| OR                     | Overlay Surface               |
| OS                     | Overlay Tarmac                |
| OT                     | Overlay Veneer                |
| OV                     | Overlay Wearing Course        |
| OW                     | Overlay X-Base                |
| OX                     | Overlay Y-Base                |
| OY                     | Overlay Z-Base                |
| PA                     | Pavement                      |
| PB                     | Pavement Boundary             |
| PC                     | Pavement Chimney              |
| PD                     | Pavement Drainage             |
| PE                     | Pavement Embankment           |
| PF                     | Pavement Footpath             |
| PG                     | Pavement Gravel               |
| PH                     | Pavement Hatched              |
| PI                     | Pavement Inset                |
| PJ                     | Pavement Joints               |
| PK                     | Pavement Kerb                 |
| PL                     | Pavement Laid                 |
| PM                     | Pavement Macadam              |
| PN                     | Pavement Natural              |
| PO                     | Pavement Overlay              |
| PP                     | Pavement Pavement             |
| PQ                     | Pavement Road                 |
| PR                     | Pavement Surface              |
| PS                     | Pavement Tarmac               |
| PT                     | Pavement Veneer               |
| PV                     | Pavement Wearing Course       |
| PW                     | Pavement X-Base               |
| PX                     | Pavement Y-Base               |
| PY                     | Pavement Z-Base               |
| RA                     | Road                          |
| RB                     | Road Boundary                 |
| RC                     | Road Chimney                  |
| RD                     | Road Drainage                 |
| RE                     | Road Embankment               |
| RF                     | Road Footpath                 |
| RG                     | Road Gravel                   |
| RH                     | Road Hatched                  |
| RI                     | Road Inset                    |
| RJ                     | Road Joints                   |
| RK                     | Road Kerb                     |
| RL                     | Road Laid                     |
| RM                     | Road Macadam                  |
| RN                     | Road Natural                  |
| RO                     | Road Overlay                  |
| RP                     | Road Pavement                 |
| RQ                     | Road Road                     |
| RR                     | Road Surface                  |
| RS                     | Road Tarmac                   |
| RT                     | Road Veneer                   |
| RV                     | Road Wearing Course           |
| RW                     | Road X-Base                   |
| RX                     | Road Y-Base                   |
| RY                     | Road Z-Base                   |
| SA                     | Surface                       |
| SB                     | Surface Boundary              |
| SC                     | Surface Chimney               |
| SD                     | Surface Drainage              |
| SE                     | Surface Embankment            |
| SF                     | Surface Footpath              |
| SG                     | Surface Gravel                |
| SH                     | Surface Hatched               |
| SI                     | Surface Inset                 |
| SJ                     | Surface Joints                |
| SK                     | Surface Kerb                  |
| SL                     | Surface Laid                  |
| SM                     | Surface Macadam               |
| SN                     | Surface Natural               |
| SO                     | Surface Overlay               |
| SP                     | Surface Pavement              |
| SQ                     | Surface Road                  |
| SR                     | Surface Surface               |
| SS                     | Surface Tarmac                |
| ST                     | Surface Veneer                |
| SV                     | Surface Wearing Course        |
| SW                     | Surface X-Base                |
| SX                     | Surface Y-Base                |
| SY                     | Surface Z-Base                |
| TA                     | Tarmac                        |
| TB                     | Tarmac Boundary               |
| TC                     | Tarmac Chimney                |
| TD                     | Tarmac Drainage               |
| TE                     | Tarmac Embankment             |
| TF                     | Tarmac Footpath               |
| TG                     | Tarmac Gravel                 |
| TH                     | Tarmac Hatched                |
| TI                     | Tarmac Inset                  |
| TJ                     | Tarmac Joints                 |
| TK                     | Tarmac Kerb                   |
| TL                     | Tarmac Laid                   |
| TM                     | Tarmac Macadam                |
| TN                     | Tarmac Natural                |
| TO                     | Tarmac Overlay                |
| TP                     | Tarmac Pavement               |
| TQ                     | Tarmac Road                   |
| TR                     | Tarmac Surface                |
| TS                     | Tarmac Tarmac                 |
| TT                     | Tarmac Veneer                 |
| TV                     | Tarmac Wearing Course         |
| TW                     | Tarmac X-Base                 |
| TX                     | Tarmac Y-Base                 |
| TY                     | Tarmac Z-Base                 |
| VA                     | Veneer                        |
| VB                     | Veneer Boundary               |
| VC                     | Veneer Chimney                |
| VD                     | Veneer Drainage               |
| VE                     | Veneer Embankment             |
| VF                     | Veneer Footpath               |
| VG                     | Veneer Gravel                 |
| VH                     | Veneer Hatched                |
| VI                     | Veneer Inset                  |
| VJ                     | Veneer Joints                 |
| VK                     | Veneer Kerb                   |
| VL                     | Veneer Laid                   |
| VM                     | Veneer Macadam                |
| VN                     | Veneer Natural                |
| VO                     | Veneer Overlay                |
| VP                     | Veneer Pavement               |
| VQ                     | Veneer Road                   |
| VR                     | Veneer Surface                |
| VS                     | Veneer Tarmac                 |
| VT                     | Veneer Veneer                 |
| VV                     | Veneer Wearing Course         |
| VW                     | Veneer X-Base                 |
| VX                     | Veneer Y-Base                 |
| VY                     | Veneer Z-Base                 |
| WA                     | Wearing Course                |
| WB                     | Wearing Course Boundary       |
| WC                     | Wearing Course Chimney        |
| WD                     | Wearing Course Drainage       |
| WE                     | Wearing Course Embankment     |
| WF                     | Wearing Course Footpath       |
| WG                     | Wearing Course Gravel         |
| WH                     | Wearing Course Hatched        |
| WI                     | Wearing Course Inset          |
| WJ                     | Wearing Course Joints         |
| WK                     | Wearing Course Kerb           |
| WL                     | Wearing Course Laid           |
| WM                     | Wearing Course Macadam        |
| WN                     | Wearing Course Natural        |
| WO                     | Wearing Course Overlay        |
| WP                     | Wearing Course Pavement       |
| WQ                     | Wearing Course Road           |
| WR                     | Wearing Course Surface        |
| WS                     | Wearing Course Tarmac         |
| WT                     | Wearing Course Veneer         |
| WV                     | Wearing Course Wearing Course |
| WW                     | Wearing Course X-Base         |
| WX                     | Wearing Course Y-Base         |
| WY                     | Wearing Course Z-Base         |
| XA                     | X-Base                        |
| XB                     | X-Base Boundary               |
| XC                     | X-Base Chimney                |
| XD                     | X-Base Drainage               |
| XE                     | X-Base Embankment             |
| XF                     | X-Base Footpath               |
| XG                     | X-Base Gravel                 |
| XH                     | X-Base Hatched                |
| XI                     | X-Base Inset                  |
| XJ                     | X-Base Joints                 |
| XK                     | X-Base Kerb                   |
| XL                     | X-Base Laid                   |
| XM                     | X-Base Macadam                |
| XN                     | X-Base Natural                |
| XO                     | X-Base Overlay                |
| XP                     | X-Base Pavement               |
| XQ                     | X-Base Road                   |
| XR                     | X-Base Surface                |
| XS                     | X-Base Tarmac                 |
| XT                     | X-Base Veneer                 |
| XV                     | X-Base Wearing Course         |
| XW                     | X-Base X-Base                 |
| XX                     | X-Base Y-Base                 |
| XY                     | X-Base Z-Base                 |
| YA                     | Y-Base                        |
| YB                     | Y-Base Boundary               |
| YC                     | Y-Base Chimney                |
| YD                     | Y-Base Drainage               |
| YE                     | Y-Base Embankment             |
| YF                     | Y-Base Footpath               |
| YG                     | Y-Base Gravel                 |
| YH                     | Y-Base Hatched                |
| YI                     | Y-Base Inset                  |
| YJ                     | Y-Base Joints                 |
| YK                     | Y-Base Kerb                   |
| YL                     | Y-Base Laid                   |
| YM                     | Y-Base Macadam                |
| YN                     | Y-Base Natural                |
| YO                     | Y-Base Overlay                |
| YP                     | Y-Base Pavement               |
| YQ                     | Y-Base Road                   |
| YR                     | Y-Base Surface                |
| YS                     | Y-Base Tarmac                 |
| YT                     | Y-Base Veneer                 |
| YV                     | Y-Base Wearing Course         |
| YW                     | Y-Base X-Base                 |
| YX                     | Y-Base Y-Base                 |
| YY                     | Y-Base Z-Base                 |
| ZA                     | Z-Base                        |
| ZB                     | Z-Base Boundary               |
| ZC                     | Z-Base Chimney                |
| ZD                     | Z-Base Drainage               |
| ZE                     | Z-Base Embankment             |
| ZF                     | Z-Base Footpath               |
| ZG                     | Z-Base Gravel                 |
| ZH                     | Z-Base Hatched                |
| ZI                     | Z-Base Inset                  |
| ZJ                     | Z-Base Joints                 |
| ZK                     | Z-Base Kerb                   |
| ZL                     | Z-Base Laid                   |
| ZM                     | Z-Base Macadam                |
| ZN                     | Z-Base Natural                |
| ZO                     | Z-Base Overlay                |
| ZP                     | Z-Base Pavement               |
| ZQ                     | Z-Base Road                   |
| ZR                     | Z-Base Surface                |
| ZS                     | Z-Base Tarmac                 |
| ZT                     | Z-Base Veneer                 |
| ZV                     | Z-Base Wearing Course         |
| ZW                     | Z-Base X-Base                 |
| ZX                     | Z-Base Y-Base                 |
| ZY                     | Z-Base Z-Base                 |

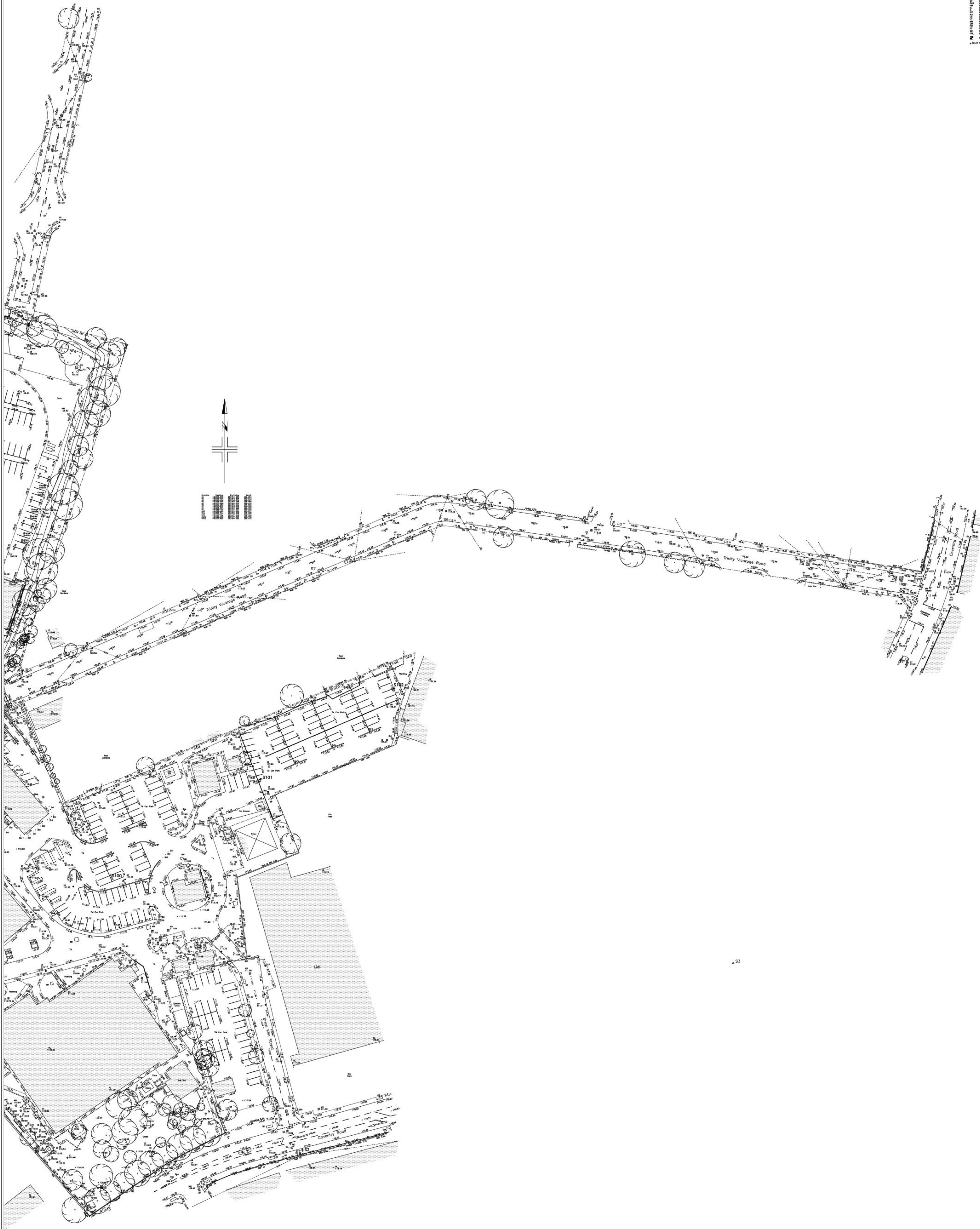


The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor is to comply in all respects with current Building Regulations, British Standards, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated on this drawing. This drawing must be read with and checked against any structural, geotechnical or other associated documentation provided. This drawing is not intended to show details of foundations, ground conditions or ground contaminants. Each area of ground intended to support any structure (including drainage) must be investigated by the Contractor. A suitable method of foundation should be provided allowing for existing ground conditions. Any suspect or full ground, contaminated on or within the ground, should be further investigated by a suitable report. Any earthwork construction shown on this drawing is for guidance only and should be further investigated by a suitable report. Where existing trees are to be retained they should be subject to a full Arboricultural Inspection for safety. All trees are to be protected so as to ensure they are a minimum of 5 metres from buildings and 3 metres from drainage and services. A suitable method of foundation is to be provided to accommodate the proposed tree planting. Geoff Perry Associates Limited do not accept any responsibility for any losses (financial or otherwise) to any Client or third party arising out of the Client's (or Developer or Contractor but not limited thereto) non-compliance with above mentioned provisions.

This survey has been oriented to the Ordnance Survey (O.S.) National Grid (OSGB36) via a Global Positioning System (GPS) and the O.S. Active Network (OS Net). A true (OSGB36) coordinate has been established near to the site centre via a transformation using the OSGB36 & OSGB36 transformation matrix. The survey has been conducted in this point and a further one or more OSGB36 points established to create a true O.S. datum for angle orientation. No other factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a valid factor applied. Please refer to Survey Station Table to enable establishment of the on-site grid. Physical features present in the vicinity of the site may not represent reality conveyed accurately. It should be noted that some features may have been obscured at time of survey. (Printed on ECT).

Revisions:



[illegible]

The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at all construction points before works starts. The Contractor is to comply in all respects with current Building Legislation, British Standard Specifications, Building Regulations, Construction (Design & Management) Regulations, Party Wall Act, etc. whether or not specifically stated in the contract documents. The Contractor is to ensure that all work is carried out in accordance with the relevant planning documentation provided. This drawing is not intended to show details of foundations, ground conditions or ground contaminants. Each area of ground relied upon to support any structure described (including drainage) must be investigated by the Contractor and the results of the investigation must be included in the Contractor's design. The Contractor is to ensure that all foundations, ground conditions and ground contaminants on or within the ground, should be further investigated by a suitable expert. Any earthwork constructions should include typical slopes for guidance only & should be further investigated by a suitable expert.

It is the Contractor's responsibility to ensure that all retaining structures for safety are designed and constructed to be installed so as to ensure they are a minimum of 5 metres from buildings and 3 metres from drainage and services. A suitable method of foundation is to be provided to accommodate the proposed free standing retaining.

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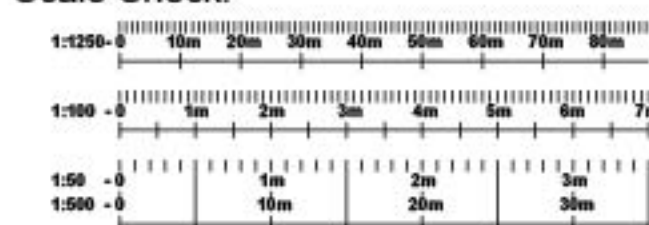
This survey has been oriented to the Ordnance Survey (O.S.) National Grid (OSGB36) via a Global Position System (GPS) and the O.S. Active Network (OS Net).

The true OSGB36 coordinate has been established near to the site center as a transformation using the OSTN15 & OGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true OS. bearing for angle orientation.

No scale factor has been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied. Please refer to Survey Station Tables to enable establishment of the on-site grid. Physical features present in the vicinity of boundaries may not represent legally conveyed ownership. It should be noted that some features may

## Revisions

### Scale Check



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**Client:** Fisher German LLP

**Project:** Cadent  
Brick Kiln Street, Hinckley

**Title:** Topographical Survey  
Sheet 2

Date: Oct 2020      Scale: 1:500 @ A0

Drawn by: DW      Checked by:

|         |         |     |
|---------|---------|-----|
| Job No. | Drg No. | Rev |
| S219    | 1168    |     |



**Geoff Perry  
Associates Limited**  
The Shrubbery, 28 Erdington Road  
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e: [enquiries@geoffperryassoc.co.uk](mailto:enquiries@geoffperryassoc.co.uk)  
t: 01922 744 900

## APPENDIX B

### PROPOSED LAYOUT

# Land Off Brick Kiln St, Hinckley

## ILLUSTRATIVE MASTERPLAN



0 10 20 30 40 50m

**LEGEND**

Site Allocation Boundary

Primary Movement Routes

Secondary Movement Routes

Shared/Private Drives

Proposed Attenuation

Indicative position of new tree planting

Proposed POS

Potential Site Access off Brick Kiln St

Potential Highway Emergency Link

Easement

Existing Mast

Proposed Development Structure

Existing Trees

LEGEND

Site Allocation Boundary

Primary Movement Routes

Secondary Movement Routes

Shared/Private Drives

Proposed Attenuation

Proposed Pedestrian/Cycle Route

Indicative position of new tree planting

Proposed Development Structure

Existing Trees

Proposed POS

Potential Highway Emergency Link

Easement

Existing Mast

TRINITY VICARAGE RD

PORTER CLOSE

COVENTRY RD

DGL Associates Limited  
Barn Meadow House  
Southfield Fold Farm  
Southfield  
Burnley  
Lancashire  
BB10 3RH

Tel : 01282 601157  
Mbl : 07976 782876

|           |                       |          |
|-----------|-----------------------|----------|
| Revision: |                       | Checked  |
| A         | Drawn<br>B.O'Sullivan |          |
|           | Scale<br>SEPT 2023    | Approved |
|           | Drawn<br>1:1000@A2    |          |
| E-mail :  | ben.dglia@gmail.com   |          |

A2

|               |                                  |
|---------------|----------------------------------|
| Client        | CADENT                           |
| Project       | LAND OFF BRICK KILN ST, HINCKLEY |
| Drawing Title | ILLUSTRATIVE MASTERPLAN          |
| Drawing No.   | DGL_230929_5830.001              |



## APPENDIX C

### ENVIRONMENT AGENCY DATA

E-mail: [kate.loewenthal@lumax-consulting.com](mailto:kate.loewenthal@lumax-consulting.com)

Our ref: 188336  
Your ref:

Date: 9 October 2020

Dear Kate

**Flood history for the land around Brick Kiln Street, Hinckley, LE10 0NA.**

Thank you for your enquiry which was received on 5 October 2020.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

With regards to the history of flooding I can advise that we do not have any records of flooding in this area. It is possible that other flooding may have occurred that we do not have records for, and other organisations, such as the Lead Local Flood Authority or Internal Drainage Boards (where relevant), may have records.

Please refer to [Open Government Licence](#) which explains the permitted use of this information.

**Please note:**

- The information we supply does **not** provide an indicator of flood risk at an **individual property / site level**.
- This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.
- Our records on historic flooding can include flooding from groundwater.
- We log historic flooding where we have adequate records and do not have a record of all past flooding. If an area of land is shown outside the extent of recorded flooding it doesn't mean it has never flooded, simply that we don't hold a record of the area of land being flooded.

### **Flood Warning Service**

Your property/site may be covered by the Environment Agency's Flood Warning Service. If you are unsure and/or you wish to register for this free service please contact Floodline on Tel no. 0345 988 1188 or 0845 988 1188.

You may also wish to contact your local authority or internal drainage board, to ask about surface water flooding or if they have other relevant local flood information.

### **Data Available Online**

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#))
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments:

<https://www.gov.uk/planning-applications-assessing-flood-risk>

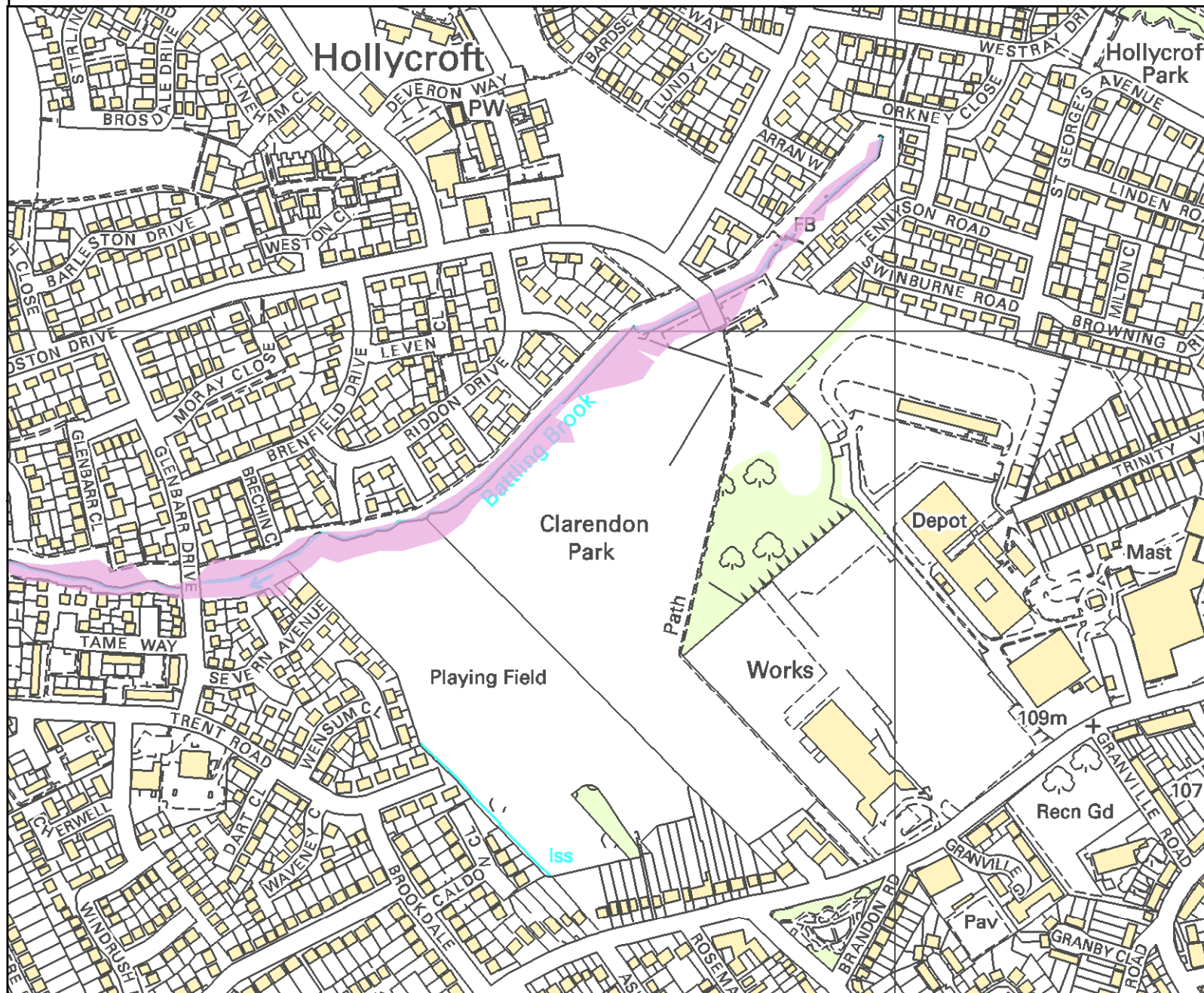
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Rachel Hamer  
Customers & Engagement Officer  
Team Tel No: 02084 747856.  
E-mail: [Enquiries\\_westmids@environment-agency.gov.uk](mailto:Enquiries_westmids@environment-agency.gov.uk)

# Flood Alert Area map, centred on Brick Kiln Street, Hinckley, created 15 January 2021



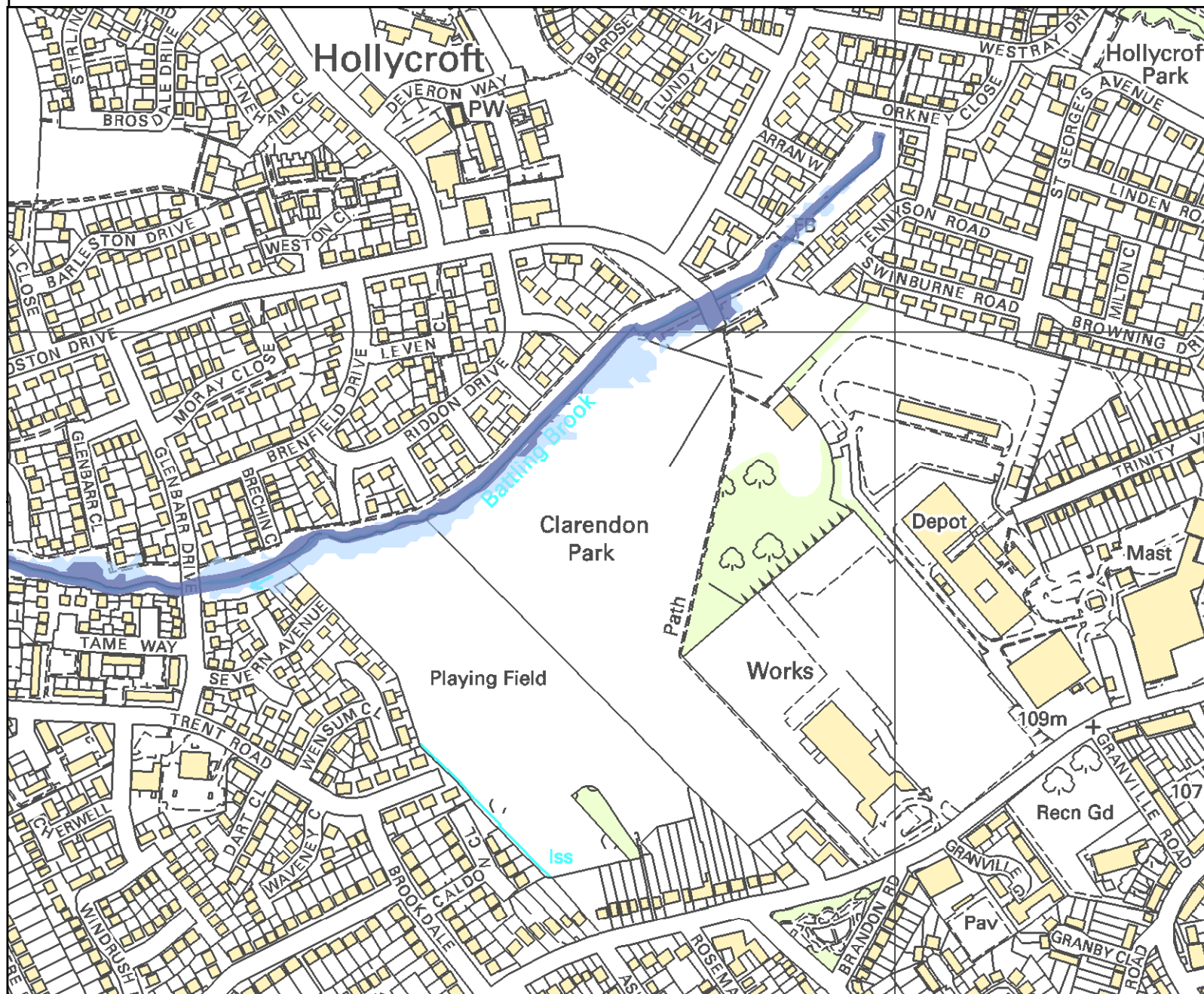
## Legend

- Main Rivers
- Flood Alert Area

Scale 1:5,000



# Flood Zone map, centred on Brick Kiln Street, Hinckley, created 15 January 2021



## Legend

- Main Rivers
- Flood Zone 3
- Flood Zone 2

**Flood Map Areas (assuming no defences)**  
 Flood Zone 3 shows the area that could be affected by flooding from a river with a 1 in 100 (1%) or greater chance of happening each year.  
 Flood Zone 2 shows the extent of an extreme flood from rivers with up to a 1 in 1000 (0.1% - 1%) chance of occurring each year

Scale 1:5,000



## Detailed Flood Risk Data for Brick Kiln Street, Hinckley

Reference number: 194411

Date of issue: 15 January 2021

### Model Information

The following information and attached maps contain a summary of the modelled information relevant to the area of interest. The information provided is based on the best available data as of the date of issue.

| Model Name                                 | Release Date |
|--------------------------------------------|--------------|
| Stour & Hinckley Tribs Flood Mapping Study | 2013         |

The model can be downloaded from this link:

<https://ea.sharefile.com/d-s7fb7e4eb5104469aa129d5dc9509ca1b>

### Flood Map for Planning (Rivers and Sea)

The Flood Map for Planning (Rivers and Sea) indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring in any year for fluvial (river) flooding (Flood Zone 3). It also shows the extent of the Extreme Flood Outlines (Flood Zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The Flood Zones refer to the land at risk of flooding and **do not** refer to individual properties. It is possible for properties to be built at a level above the floodplain but still fall within the risk area.

This Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water, sewers, road drainage, etc.

To find out which flood zone a location is in please use: <https://flood-map-for-planning.service.gov.uk/>

## Definition of flood zones

- **Zone 1** - The area is within the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1000 to 1 chance).
- **Zone 2** - The area which falls between the extent of a flood with an annual probability of 0.1% (i.e. a 1000 to 1 chance) fluvial and tidal, or greatest recorded historic flood, whichever is greater, and the extent of a flood with an annual probability of 1% (i.e. a 100 to 1 chance) fluvial / 0.5% (i.e. a 200 to 1 chance) tidal. (Land shown in light blue on the Flood Map).
- **Zone 3** - The chance of flooding in any one year is greater than or equal to 1% (i.e. a 100 to 1 chance) for river flooding and greater than or equal to 0.5% (i.e. a 200 to 1 chance) for coastal and tidal flooding.

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the [Strategic Flood Risk Assessment](#) when considering location and potential future flood risks to developments and land uses.

## **Node Data/ Modelled Levels**

The attached map and spreadsheet will show a selection of 1D model node points near to your site.

### **Fluvial Flood Levels (m AOD)**

The modelled levels are given in m AOD (N), m AOD indicates metres Above Ordnance Datum (Newlyn).

The information is taken from the model referenced above and does not include the updated climate change figures.

## **Climate Change**

In February 2016 the '[Flood Risk Assessments: Climate Change Allowances](#)' were published on GOV.UK. This is in replacement of previous climate change allowances for planning applications. The data provided in this product does not include the new allowances. You will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding. The fluvial climate change factors are now more complex and a single uplift percentage across England cannot be justified.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it remains the applicant's responsibility to demonstrate through their proposal and flood risk assessments that new developments will be safe in flood risk terms for its lifetime.

## **Recorded Flood Outlines**

Following examination of our records of historical flooding we have no record of flooding in the area. The absence of coverage for an area does not mean that the area has never flooded, only that we do not currently have records of flooding in this area. It is also possible that the pattern of flooding in this area has changed and that this area would now flood or not flood under different circumstances.

You may also wish to contact your Local Authority or Internal Drainage Board, to see if they have other relevant local flood information.

## **Planning development/s**

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments. You can also request pre application advice:

<https://www.gov.uk/planning-applications-assessing-flood-risk>

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

## **Supporting Information**

### **Surface Water**

Managing the risk of flooding from surface water is the responsibility of Lead Local Flood Authorities. The 'risk of flooding from surface water' map has been produced by the Environment Agency on behalf of government, using information and input from Lead Local Flood Authorities.

You may wish to contact your Local Authority who may be able to provide further detailed information on surface water.

It is not possible to say for certain what the flood risk is but we use the best information available to provide an indication so that people can make informed choices about living with or managing the risks. The information we supply does not provide an indicator of flood risk at an individual site level. Further information can be found on the Agency's website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk>

### **Flood Alert & Flood Warning Area**

We issue flood alert/warnings to specific areas when flooding is expected. If you receive a flood warning you should take immediate action.

Your site is near a Flood Alert Area. You can register online using the links below:

<https://www.gov.uk/check-flood-risk>

<https://www.gov.uk/sign-up-for-flood-warnings>

If you would prefer to register by telephone, or if you need help during the registration process, please call Floodline on 0345 988 1188.

The associated dataset for flood warning areas is available here:

<https://data.gov.uk/dataset/flood-warning-areas3>

The associated dataset for flood alert areas is available here: <https://data.gov.uk/dataset/flood-alert-areas2>

## **Flood Risk Activity Permits**

We now consider applications for works, which may be Flood Risk Activities, under Environmental Permitting Regulations. This replaces the process of applying for a Flood Defence Consent. You may need an environmental Permit for flood risk activities if you want to do work:

- in, under, over or near a main river (including where the river is in a culvert)
- on or near a flood defence on a main river
- in the flood plain of a main river
- on or near a sea defence

Please go to this website to find out more about how to apply:

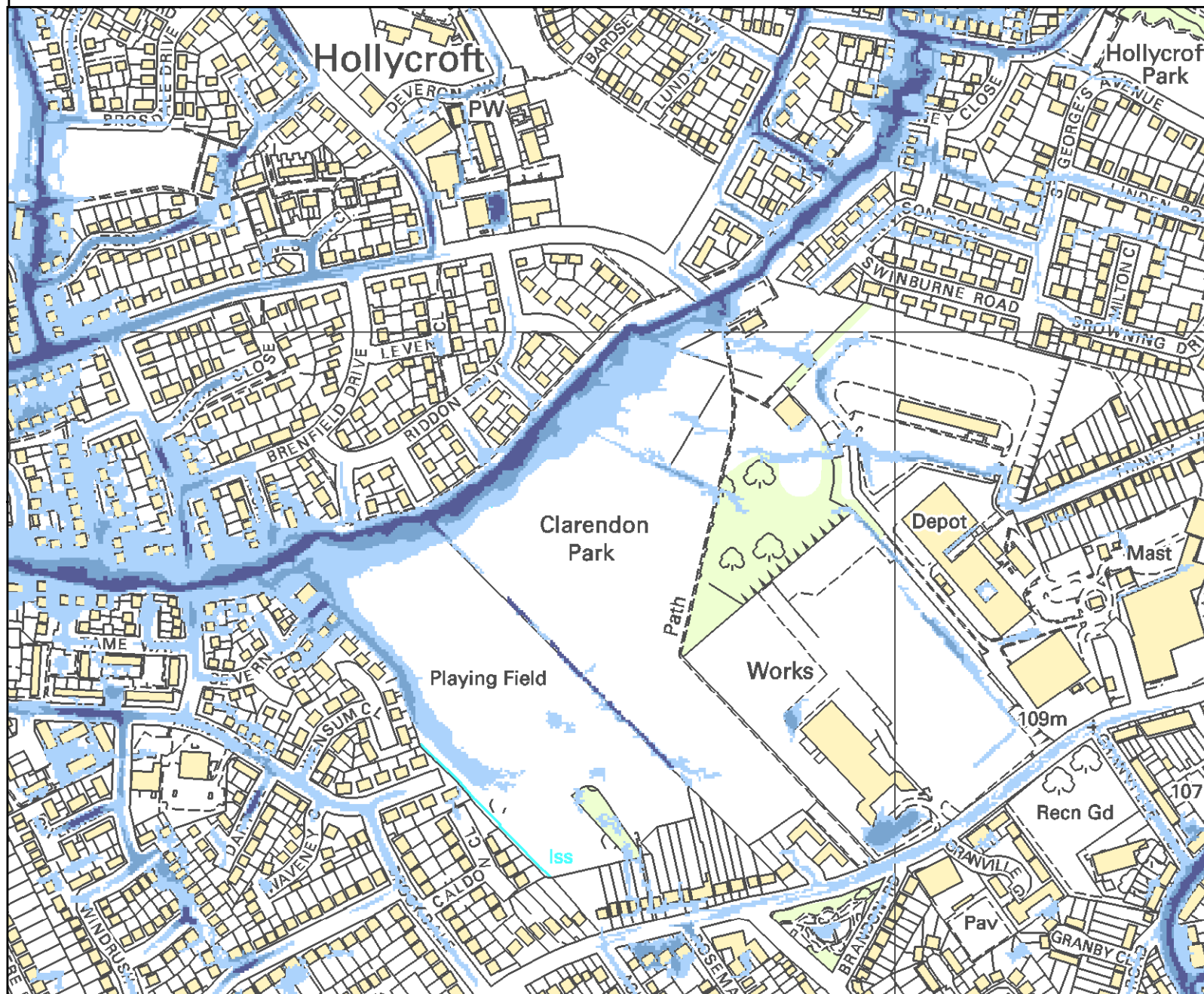
<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>.

Please be aware that Bespoke and Standard Rules permits can take up to 2 months to determine and will incur a charge.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

# Surface Water flood map, centred on Brick Kiln Street, Hinckley, created 15 January 2021



## Legend

- Main Rivers
- uFMfSW 1 in 30 flood extent
- uFMfSW 1 in 100 flood extent
- uFMfSW 1 in 1000 flood extent

Scale 1:5,000



## APPENDIX D

### DRAINAGE CONNECTIVITY SURVEY



ALWAYS USE SAFE DIGGING PRACTICES. ALWAYS CONSULT A TRAINED AND COMPETENT PERSON TO CHECK YOUR EXCAVATION AREA BEFORE BREAKING GROUND

[illegible]

The Contractor shall check and verify all building and site dimensions, levels and sewer invert levels at connection points before work starts. The Contractor shall ensure that all work is done in accordance with applicable codes, specifications, British Standard Specifications, Building Regulations, and all other applicable codes and standards. The Contractor shall ensure that all work is done in accordance with the approved drawings, whether or not specifically stated in this drawing. This drawing may be amended by the Engineer without notice. The Contractor shall ensure that all work is done in accordance with the approved drawings, whether or not specifically stated in this drawing. This drawing may be amended by the Engineer without notice. The Contractor shall ensure that all work is done in accordance with the approved drawings, whether or not specifically stated in this drawing. This drawing may be amended by the Engineer without notice.

This survey has been oriented to the Ordnance Survey (O.S.) National Grid (OSGB36) via a Global Positioning System (GPS) and the O.S. Active Labelled Grid.

A true OSGB36 coordinate has been established near to the site centre via a transformation using the OSTN15 & OSGM15 transformation models. The survey has been correlated to this point and a further one or more OSGB36 points established to create a true O.S. bearing for angle orientation.

No other points have been applied to the survey therefore the coordinates shown are arbitrary & not true O.S. Coordinates which have a scale factor applied

Please refer to Survey Station Table to enable establishment of the on-site grid.

Physical features present in the vicinity of boundaries may not represent legally conveyed ownership, it should be noted that some features may have been acquired at times of noval, (Purchased or C.T.).

**DRAINAGE LEGEND**

|                                                                                     |                       |
|-------------------------------------------------------------------------------------|-----------------------|
|  | POUL DENVER           |
|  | SURFACE WATER SEWER   |
|  | COMBINED SEWER        |
|  | DUTY OF SEWER UNKNOWN |
|  | REG MAIN              |

**ADDITIONAL SERVICE INFORMATION**

|                                                                                     |     |     |                              |
|-------------------------------------------------------------------------------------|-----|-----|------------------------------|
|  | AR  | AR  | ASSUMED ROUTER               |
|  | TFR | TFR | SERVICE STATION FROM RECORDS |
|  |     |     | SERVICES SURVEY AREA         |
|  |     |     | END OF TRACE                 |

[illegible]

## SERVICE LOCATION

ELECTRODETECTIVE AND/OR GROUND PROBING RADAR (GPR) TECHNIQUES ARE USED TO LOCATE BURIED SERVICES. GPR SERVICES SHOWN ON PLAN ARE INTERPRETIVE METHODS AND IF IT IS THEREFORE RECOMMENDED THAT TRAIL DELINEATIONS OR SIMILAR ARE CARRIED OUT TO CONFIRM LOCATION. LOCATION OF SERVICES NOT SHOWN ON PLAN BUT WHICH ARE BEING TAKEN CARE OF HAS BEEN TAKEN AND REPORT MADE IN SERVING A VALUABLE SERVICE RECORD TO COMPANY. HOWEVER, THE COST OF USE OF INFORMATION TO BE USED IN THE US LAGN AND UNDERGROUND SURVEYS TO NOT BE GUARANTEED.

IF SIGNAL IS NOT DETECTED CERTAIN TYPES OF SERVICES, SUCH AS PLASTIC OR CONCRETE PIPES OR CONDUITS WHERE THERE IS NO DIRECT ACCESS TO THE PIPE, ARE NOT TRACEABLE BY CONVENTIONAL SURFACE DETECTION METHODS. DEPTHS OBTAINED USING TECHNIQUES SUCH AS GROUND PROBING RADAR ARE TO BE USED AS INDICATIONS OF DEPTHS OF SERVICES. GPR DEPTHS TO TRACED METALLIC PIPEWORK RATHER THAN OF PLASTIC.

ALL SERVICES ARE UNDERGROUND EXCEPT WHERE INDICATED. INFORMATION SHOWN AS TYPICAL GROUND HAS NOT BEEN PROVEN ON SITE.

|      |              |           |            |
|------|--------------|-----------|------------|
| XXX  | XXX          | XXX       | XX/XX/XXXX |
| Ref: | Description: | Initials: | Date:      |



Client:  
FISHER GERMAN LLP

**Project:**  
CADENT, BRICK KILN STREET  
HINCKLEY, LE10 0NA

**Title:**  
DRAINAGE SURVEY

Date: 27/01/2021      Scale: 1:500 @ A0  
Drawn by: ICP      Checked by: ~

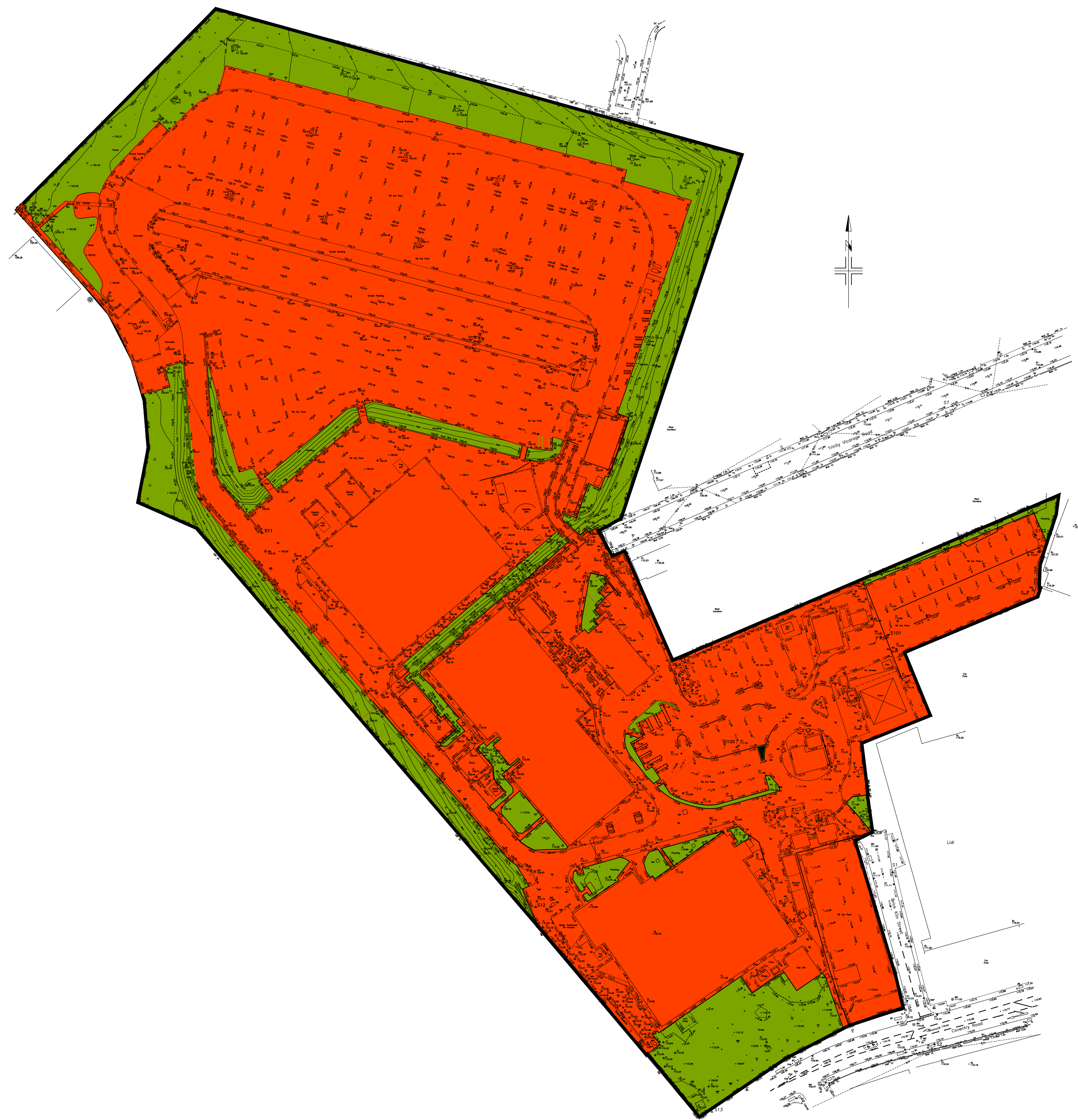
|         |         |      |
|---------|---------|------|
| Job No. | Drg No. | Rev. |
| S219    | 1168    | ~    |

Scale Check:



## APPENDIX E

### IMPERMEABLE AREA ANALYSIS



- NOTES:
1. DO NOT SCALE THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED/ VERIFIED ON SITE. IF IN DOUBT ASK.
  2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND SPECIFICATIONS.
  3. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE. ALL LEVELS IN METRES UNLESS NOTED OTHERWISE.
  4. ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

LEGEND:

| KEY                                |                       |
|------------------------------------|-----------------------|
| <div></div> Total Permeable Area   | =12,834m <sup>2</sup> |
| <div></div> Total Impermeable Area | =47,713m <sup>2</sup> |
| Total Site Area                    | =60,547m <sup>2</sup> |

|     |                                   |            |          |
|-----|-----------------------------------|------------|----------|
| P2  | ADJUSTMENTS TO BOUNDARY AND TABLE | 10/05/2024 | DIS      |
| P1  | FIRST EXTERNAL ISSUE              | 07/02/2021 | SR       |
| REV | DESCRIPTION                       | DATE       | DRAWN BY |

DRAWING TITLE:

|                                   |           |       |
|-----------------------------------|-----------|-------|
| Existing Impermeable<br>Area Plan |           |       |
| DRAWING NUMBER:                   | REVISION: |       |
| LMX 344/100                       | P2        |       |
| SCALE:                            | DRAWN:    | SIZE: |
| 1:1000                            | SR        | A1    |

PROJECT:

Cadent, Brick Kiln Street  
Hinckley

CLIENT:

Fisher German



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[www.lumax-consulting.com](http://www.lumax-consulting.com)  
0115 8559339  
[info@lumax-consulting.com](mailto:info@lumax-consulting.com)

## APPENDIX F

### CALCULATIONS

|                |                           |
|----------------|---------------------------|
| Calculated by: | Darren Loewenthal-Stewart |
| Site name:     | Cadent                    |
| Site location: | Hinckley                  |

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

## Site Details

|            |                   |
|------------|-------------------|
| Latitude:  | 52.53955° N       |
| Longitude: | 1.37995° W        |
| Reference: | 3673040100        |
| Date:      | May 12 2024 09:52 |

## Runoff estimation approach

IH124

## Site characteristics

|                       |     |
|-----------------------|-----|
| Total site area (ha): | 6.1 |
|-----------------------|-----|

## Methodology

|                                     |                             |
|-------------------------------------|-----------------------------|
| Q <sub>BAR</sub> estimation method: | Calculate from SPR and SAAR |
| SPR estimation method:              | Calculate from SOIL type    |

## Notes

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

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

## Soil characteristics

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

(2) Are flow rates  $< 5.0 \text{ l/s}$ ?

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

## Hydrological characteristics

|                                | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm):                     | 642     | 642    |
| Hydrological region:           | 4       | 4      |
| Growth curve factor 1 year:    | 0.83    | 0.83   |
| Growth curve factor 30 years:  | 2       | 2      |
| Growth curve factor 100 years: | 2.57    | 2.57   |
| Growth curve factor 200 years: | 3.04    | 3.04   |

(3) Is  $\text{SPR/SPRHOST} \leq 0.3$ ?

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

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OK, I AGREE

MORE INFO

By clicking the Accept button, you agree to us doing so.

Greenfield runoff rates

Default

Edited

|                               |       |       |
|-------------------------------|-------|-------|
| <b>Q<sub>BAR</sub> (l/s):</b> | 26.62 | 26.62 |
| <b>1 in 1 year (l/s):</b>     | 22.09 | 22.09 |
| <b>1 in 30 years (l/s):</b>   | 53.23 | 53.23 |
| <b>1 in 100 year (l/s):</b>   | 68.4  | 68.4  |
| <b>1 in 200 years (l/s):</b>  | 80.91 | 80.91 |

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

**We use cookies on this site to enhance your user experience**

By clicking the Accept button, you agree to us doing so.



Nodes

| Name        | T of E<br>(mins) | Add<br>Inflow<br>(l/s) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|-------------|------------------|------------------------|-----------------------|------------------|----------------|-----------------|--------------|
| Catchment A | 5.00             | 0.0                    | 100.000               | 1800             | 14.326         | 86.905          | 1.000        |
| 2           |                  |                        | 100.000               | 1500             | 11.758         | 72.747          | 1.288        |
| Catchment C | 5.00             |                        | 100.000               |                  | 34.253         | 52.322          | 1.000        |
| 3           |                  |                        | 100.000               | 1500             | 27.706         | 47.174          | 1.236        |
| Catchment D | 5.00             |                        | 100.000               |                  | 66.430         | 34.695          | 1.000        |
| 1           |                  |                        | 100.000               | 1500             | 56.581         | 25.574          | 1.226        |

Links

| Name  | US<br>Node  | DS<br>Node | Length<br>(m) | ks (mm) /<br>n | US IL<br>(m) | DS IL<br>(m) | Fall<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | T of C<br>(mins) | Rain<br>(mm/hr) |
|-------|-------------|------------|---------------|----------------|--------------|--------------|-------------|----------------|-------------|------------------|-----------------|
| 1.000 | Catchment A | 2          | 14.389        | 0.600          | 99.000       | 98.712       | 0.288       | 50.0           | 525         | 5.08             | 50.0            |
| 3.000 | Catchment C | 3          | 8.329         | 0.600          | 99.000       | 98.764       | 0.236       | 35.3           | 525         | 5.04             | 50.0            |
| 2.000 | Catchment D | 1          | 13.424        | 0.600          | 99.000       | 98.774       | 0.226       | 59.4           | 525         | 5.08             | 50.0            |

| Name  | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) | US<br>Depth<br>(m) | DS<br>Depth<br>(m) | Σ Area<br>(ha) | Σ Add<br>Inflow<br>(l/s) | Pro<br>Depth<br>(mm) | Pro<br>Velocity<br>(m/s) |
|-------|--------------|--------------|---------------|--------------------|--------------------|----------------|--------------------------|----------------------|--------------------------|
| 1.000 | 3.173        | 686.8        | 0.0           | 0.475              | 0.763              | 0.000          | 0.0                      | 0                    | 0.000                    |
| 3.000 | 3.779        | 818.0        | 0.0           | 0.475              | 0.711              | 0.000          | 0.0                      | 0                    | 0.000                    |
| 2.000 | 2.910        | 629.9        | 0.0           | 0.475              | 0.701              | 0.000          | 0.0                      | 0                    | 0.000                    |

Simulation Settings

|                      |        |                        |        |                            |     |
|----------------------|--------|------------------------|--------|----------------------------|-----|
| Rainfall Methodology | FEH-22 | Analysis Speed         | Normal | Additional Storage (m³/ha) | 0.0 |
| Summer CV            | 0.750  | Skip Steady State      | x      | Check Discharge Rate(s)    | x   |
| Winter CV            | 0.840  | Drain Down Time (mins) | 240    | Check Discharge Volume     | x   |

Storm Durations

|    |     |     |     |     |      |      |      |      |       |
|----|-----|-----|-----|-----|------|------|------|------|-------|
| 15 | 60  | 180 | 360 | 600 | 960  | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 |       |

| Return Period<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 2                        | 0                        | 0                        | 0                        |
| 30                       | 35                       | 0                        | 0                        |
| 100                      | 40                       | 0                        | 0                        |

Node Catchment A Time-Area Diagram

|                                    |   |                               |   |                              |   |
|------------------------------------|---|-------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m²)  | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm) | 0 |                              |   |
| Applies to All storms              |   |                               |   |                              |   |

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.640        | 5-10           | 0.640        | 10-15          | 0.640        |

Node Catchment C Time-Area Diagram

|                                    |   |                               |   |                              |   |
|------------------------------------|---|-------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m²)  | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm) | 0 |                              |   |

Applies to All storms

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.600        | 5-10           | 0.600        | 10-15          | 0.600        |

#### Node Catchment D Time-Area Diagram

|                                    |   |                                           |   |                              |   |
|------------------------------------|---|-------------------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m <sup>2</sup> ) | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm)             | 0 |                              |   |

Applies to All storms

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.080        | 5-10           | 0.080        | 10-15          | 0.080        |

#### Node Catchment A Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 99.000 | Product Number          | CTL-SHE-0406-1070-1000-1070    |
| Design Depth (m)         | 1.000  | Min Outlet Diameter (m) | 0.450                          |
| Design Flow (l/s)        | 107.0  | Min Node Diameter (mm)  |                                |

#### Node Catchment C Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 99.000 | Product Number          | CTL-SHE-0396-1005-1000-1005    |
| Design Depth (m)         | 1.000  | Min Outlet Diameter (m) | 0.450                          |
| Design Flow (l/s)        | 100.5  | Min Node Diameter (mm)  |                                |

#### Node Catchment D Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 99.000 | Product Number          | CTL-SHE-0167-1350-1000-1350    |
| Design Depth (m)         | 1.000  | Min Outlet Diameter (m) | 0.225                          |
| Design Flow (l/s)        | 13.5   | Min Node Diameter (mm)  | 1200                           |

#### Node Catchment A Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) | 74     |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 891.0                     | 0.0                           | 1.000        | 891.0                     | 0.0                           |

#### Node Catchment C Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) | 76     |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 834.0                     | 0.0                           | 1.000        | 834.0                     | 0.0                           |



**Node Catchment D Depth/Area Storage Structure**

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) | 57     |

| Depth<br>(m) | Area<br>(m²) | Inf Area<br>(m²) | Depth<br>(m) | Area<br>(m²) | Inf Area<br>(m²) |
|--------------|--------------|------------------|--------------|--------------|------------------|
| 0.000        | 111.0        | 0.0              | 1.000        | 111.0        | 0.0              |

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

| Node Event        | US Node     | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|-------------------|-------------|-------------|-----------|-----------|--------------|---------------|------------|--------|
| 180 minute winter | Catchment A | 124         | 99.190    | 0.190     | 69.1         | 169.8922      | 0.0000     | OK     |
| 15 minute summer  | 2           | 1           | 98.712    | 0.000     | 13.0         | 0.0000        | 0.0000     | OK     |
| 180 minute winter | Catchment C | 124         | 99.188    | 0.188     | 64.8         | 156.7855      | 0.0000     | OK     |
| 15 minute summer  | 3           | 1           | 98.764    | 0.000     | 12.8         | 0.0000        | 0.0000     | OK     |
| 120 minute winter | Catchment D | 80          | 99.118    | 0.118     | 10.7         | 13.0950       | 0.0000     | OK     |
| 15 minute summer  | 1           | 1           | 98.774    | 0.000     | 5.2          | 0.0000        | 0.0000     | OK     |

| Link Event<br>(Upstream Depth) | US Node     | Link         | DS Node | Outflow (l/s) | Discharge Vol (m³) |
|--------------------------------|-------------|--------------|---------|---------------|--------------------|
| 180 minute winter              | Catchment A | Hydro-Brake® | 2       | 36.4          | 269.5              |
| 180 minute winter              | Catchment C | Hydro-Brake® | 3       | 35.0          | 254.4              |
| 120 minute winter              | Catchment D | Hydro-Brake® | 1       | 7.7           | 31.3               |

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

| Node Event       | US<br>Node  | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status |
|------------------|-------------|----------------|--------------|--------------|-----------------|------------------|---------------|--------|
| 60 minute winter | Catchment A | 55             | 99.498       | 0.498        | 382.0           | 445.0876         | 0.0000        | OK     |
| 15 minute summer | 2           | 1              | 98.712       | 0.000        | 89.8            | 0.0000           | 0.0000        | OK     |
| 60 minute winter | Catchment C | 55             | 99.498       | 0.498        | 358.1           | 415.0087         | 0.0000        | OK     |
| 15 minute summer | 3           | 1              | 98.764       | 0.000        | 86.7            | 0.0000           | 0.0000        | OK     |
| 60 minute winter | Catchment D | 55             | 99.449       | 0.449        | 47.7            | 49.8141          | 0.0000        | OK     |
| 15 minute summer | 1           | 1              | 98.774       | 0.000        | 13.5            | 0.0000           | 0.0000        | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node  | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|-------------|--------------|------------|------------------|-----------------------|
| 60 minute winter               | Catchment A | Hydro-Brake® | 2          | 106.4            | 595.0                 |
| 60 minute winter               | Catchment C | Hydro-Brake® | 3          | 100.1            | 560.1                 |
| 60 minute winter               | Catchment D | Hydro-Brake® | 1          | 13.5             | 79.1                  |

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

| Node Event        | US Node     | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|-------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 120 minute winter | Catchment A | 98          | 99.747    | 0.747     | 361.8        | 667.1166      | 0.0000     | FLOOD RISK |
| 15 minute summer  | 2           | 1           | 98.712    | 0.000     | 105.4        | 0.0000        | 0.0000     | OK         |
| 120 minute winter | Catchment C | 98          | 99.746    | 0.746     | 339.2        | 622.1987      | 0.0000     | FLOOD RISK |
| 15 minute summer  | 3           | 1           | 98.764    | 0.000     | 99.4         | 0.0000        | 0.0000     | OK         |
| 60 minute winter  | Catchment D | 61          | 99.701    | 0.701     | 66.0         | 77.8573       | 0.0000     | FLOOD RISK |
| 15 minute summer  | 1           | 1           | 98.774    | 0.000     | 13.5         | 0.0000        | 0.0000     | OK         |

| Link Event<br>(Upstream Depth) | US Node     | Link         | DS Node | Outflow (l/s) | Discharge Vol (m³) |
|--------------------------------|-------------|--------------|---------|---------------|--------------------|
| 120 minute winter              | Catchment A | Hydro-Brake® | 2       | 106.8         | 1035.1             |
| 120 minute winter              | Catchment C | Hydro-Brake® | 3       | 100.4         | 973.1              |
| 60 minute winter               | Catchment D | Hydro-Brake® | 1       | 13.5          | 109.6              |



Nodes

| Name        | Area<br>(ha) | T of E<br>(mins) | Add<br>Inflow<br>(l/s) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|-------------|--------------|------------------|------------------------|-----------------------|------------------|----------------|-----------------|--------------|
| Catchment A | 1.920        | 5.00             | 0.0                    | 100.000               | 1800             | 14.326         | 86.905          | 1.000        |
| 2           |              |                  |                        | 100.000               | 1500             | 11.758         | 72.747          | 1.288        |
| Catchment C |              | 5.00             |                        | 100.000               |                  | 34.253         | 52.322          | 1.000        |
| 3           |              |                  |                        | 100.000               | 1500             | 27.706         | 47.174          | 1.236        |
| Catchment D |              | 5.00             |                        | 100.000               |                  | 66.430         | 34.695          | 1.000        |
| 1           |              |                  |                        | 100.000               | 1500             | 56.581         | 25.574          | 1.226        |

Links

| Name  | US<br>Node  | DS<br>Node | Length<br>(m) | ks (mm) /<br>n | US IL<br>(m) | DS IL<br>(m) | Fall<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | T of C<br>(mins) | Rain<br>(mm/hr) |
|-------|-------------|------------|---------------|----------------|--------------|--------------|-------------|----------------|-------------|------------------|-----------------|
| 1.000 | Catchment A | 2          | 14.389        | 0.600          | 99.000       | 98.712       | 0.288       | 50.0           | 525         | 5.08             | 50.0            |
| 3.000 | Catchment C | 3          | 8.329         | 0.600          | 99.000       | 98.764       | 0.236       | 35.3           | 525         | 5.04             | 50.0            |
| 2.000 | Catchment D | 1          | 13.424        | 0.600          | 99.000       | 98.774       | 0.226       | 59.4           | 525         | 5.08             | 50.0            |

| Name  | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) | US<br>Depth<br>(m) | DS<br>Depth<br>(m) | Σ Area<br>(ha) | Σ Add<br>Inflow<br>(l/s) | Pro<br>Depth<br>(mm) | Pro<br>Velocity<br>(m/s) |
|-------|--------------|--------------|---------------|--------------------|--------------------|----------------|--------------------------|----------------------|--------------------------|
| 1.000 | 3.173        | 686.8        | 260.2         | 0.475              | 0.763              | 1.920          | 0.0                      | 223                  | 2.962                    |
| 3.000 | 3.779        | 818.0        | 0.0           | 0.475              | 0.711              | 0.000          | 0.0                      | 0                    | 0.000                    |
| 2.000 | 2.910        | 629.9        | 0.0           | 0.475              | 0.701              | 0.000          | 0.0                      | 0                    | 0.000                    |

Simulation Settings

|                      |        |                        |        |                            |     |
|----------------------|--------|------------------------|--------|----------------------------|-----|
| Rainfall Methodology | FEH-22 | Analysis Speed         | Normal | Additional Storage (m³/ha) | 0.0 |
| Summer CV            | 0.750  | Skip Steady State      | x      | Check Discharge Rate(s)    | x   |
| Winter CV            | 0.840  | Drain Down Time (mins) | 240    | Check Discharge Volume     | x   |

Storm Durations

|    |     |     |     |     |      |      |      |      |       |
|----|-----|-----|-----|-----|------|------|------|------|-------|
| 15 | 60  | 180 | 360 | 600 | 960  | 2160 | 4320 | 7200 | 10080 |
| 30 | 120 | 240 | 480 | 720 | 1440 | 2880 | 5760 | 8640 |       |

| Return Period<br>(years) | Climate Change<br>(CC %) | Additional Area<br>(A %) | Additional Flow<br>(Q %) |
|--------------------------|--------------------------|--------------------------|--------------------------|
| 2                        | 0                        | 0                        | 0                        |
| 30                       | 35                       | 0                        | 0                        |
| 100                      | 40                       | 0                        | 0                        |

Node Catchment A Time-Area Diagram

|                                    |   |                               |   |                              |   |
|------------------------------------|---|-------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m²)  | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm) | 0 |                              |   |
| Applies to All storms              |   |                               |   |                              |   |

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.640        | 5-10           | 0.640        | 10-15          | 0.640        |

Node Catchment C Time-Area Diagram

|                                    |   |                               |   |                              |   |
|------------------------------------|---|-------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m²)  | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm) | 0 |                              |   |

Applies to All storms

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.600        | 5-10           | 0.600        | 10-15          | 0.600        |

#### Node Catchment D Time-Area Diagram

|                                    |   |                                           |   |                              |   |
|------------------------------------|---|-------------------------------------------|---|------------------------------|---|
| Overrides Design Area              | ✓ | Depression Storage Area (m <sup>2</sup> ) | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm)             | 0 |                              |   |

Applies to All storms

| Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) | Time<br>(mins) | Area<br>(ha) |
|----------------|--------------|----------------|--------------|----------------|--------------|
| 0-5            | 0.080        | 5-10           | 0.080        | 10-15          | 0.080        |

#### Node Catchment A Online Depth/Flow Control

|                          |   |                  |        |                   |      |
|--------------------------|---|------------------|--------|-------------------|------|
| Flap Valve               | x | Invert Level (m) | 99.000 | Design Flow (l/s) | 33.1 |
| Replaces Downstream Link | ✓ | Design Depth (m) | 1.000  |                   |      |

| Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) |
|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| 0.001        | 12.890        | 0.176        | 12.890        | 0.687        | 25.780        | 1.000        | 33.100        |

#### Node Catchment C Online Depth/Flow Control

|                          |   |                  |        |                   |      |
|--------------------------|---|------------------|--------|-------------------|------|
| Flap Valve               | x | Invert Level (m) | 99.000 | Design Flow (l/s) | 31.1 |
| Replaces Downstream Link | ✓ | Design Depth (m) | 1.000  |                   |      |

| Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) | Depth<br>(m) | Flow<br>(l/s) |
|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| 0.001        | 12.110        | 0.179        | 12.110        | 0.702        | 24.210        | 1.000        | 31.100        |

#### Node Catchment D Online Hydro-Brake® Control

|                          |        |                         |                                |
|--------------------------|--------|-------------------------|--------------------------------|
| Flap Valve               | x      | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓      | Sump Available          | ✓                              |
| Invert Level (m)         | 99.000 | Product Number          | CTL-SHE-0106-5000-1000-5000    |
| Design Depth (m)         | 1.000  | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 5.0    | Min Node Diameter (mm)  | 1200                           |

#### Node Catchment A Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |        |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 1015.0                    | 0.0                           | 1.000        | 1015.0                    | 0.0                           |

#### Node Catchment C Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |        |



| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 950.0                     | 0.0                           | 1.000        | 950.0                     | 0.0                           |

**Node Catchment D Depth/Area Storage Structure**

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 99.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 1.00 | Time to half empty (mins) |        |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 112.0                     | 0.0                           | 1.000        | 112.0                     | 0.0                           |

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

| Node Event        | US<br>Node  | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status |
|-------------------|-------------|----------------|--------------|--------------|-----------------|------------------|---------------|--------|
| 240 minute winter | Catchment A | 192            | 99.176       | 0.176        | 58.6            | 178.9458         | 0.0000        | OK     |
| 15 minute summer  | 2           | 1              | 98.712       | 0.000        | 12.9            | 0.0000           | 0.0000        | OK     |
| 240 minute winter | Catchment C | 192            | 99.176       | 0.176        | 55.0            | 167.6220         | 0.0000        | OK     |
| 15 minute summer  | 3           | 1              | 98.764       | 0.000        | 12.1            | 0.0000           | 0.0000        | OK     |
| 120 minute winter | Catchment D | 90             | 99.156       | 0.156        | 10.7            | 17.4443          | 0.0000        | OK     |
| 15 minute summer  | 1           | 1              | 98.774       | 0.000        | 3.5             | 0.0000           | 0.0000        | OK     |

| Link Event<br>(Upstream Depth) | US<br>Node  | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|-------------|--------------|------------|------------------|-----------------------|
| 240 minute winter              | Catchment A | Depth/Flow   | 2          | 12.9             | 339.5                 |
| 240 minute winter              | Catchment C | Depth/Flow   | 3          | 12.1             | 318.5                 |
| 120 minute winter              | Catchment D | Hydro-Brake® | 1          | 4.6              | 30.8                  |

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

| Node Event        | US Node     | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|-------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 240 minute winter | Catchment A | 232         | 99.688    | 0.688     | 165.6        | 700.3165      | 0.0000     | SURCHARGED |
| 15 minute summer  | 2           | 1           | 98.712    | 0.000     | 16.7         | 0.0000        | 0.0000     | OK         |
| 240 minute winter | Catchment C | 232         | 99.692    | 0.692     | 155.3        | 657.6818      | 0.0000     | SURCHARGED |
| 15 minute summer  | 3           | 1           | 98.764    | 0.000     | 15.5         | 0.0000        | 0.0000     | OK         |
| 180 minute winter | Catchment D | 172         | 99.666    | 0.666     | 25.2         | 74.5431       | 0.0000     | SURCHARGED |
| 15 minute summer  | 1           | 1           | 98.774    | 0.000     | 5.0          | 0.0000        | 0.0000     | OK         |

| Link Event<br>(Upstream Depth) | US Node     | Link         | DS Node | Outflow (l/s) | Discharge Vol (m³) |
|--------------------------------|-------------|--------------|---------|---------------|--------------------|
| 240 minute winter              | Catchment A | Depth/Flow   | 2       | 25.8          | 570.9              |
| 240 minute winter              | Catchment C | Depth/Flow   | 3       | 24.0          | 532.2              |
| 180 minute winter              | Catchment D | Hydro-Brake® | 1       | 5.0           | 101.9              |

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

| Node Event        | US<br>Node  | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|-------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 240 minute winter | Catchment A | 232            | 99.995       | 0.995        | 228.7           | 1012.6360        | 0.0000        | FLOOD RISK |
| 15 minute summer  | 2           | 1              | 98.712       | 0.000        | 19.8            | 0.0000           | 0.0000        | OK         |
| 240 minute winter | Catchment C | 232            | 99.999       | 0.999        | 214.4           | 949.2994         | 0.0000        | FLOOD RISK |
| 15 minute summer  | 3           | 1              | 98.764       | 0.000        | 18.4            | 0.0000           | 0.0000        | OK         |
| 180 minute winter | Catchment D | 176            | 99.997       | 0.997        | 34.7            | 111.6384         | 0.0000        | FLOOD RISK |
| 15 minute summer  | 1           | 1              | 98.774       | 0.000        | 5.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node  | Link         | DS<br>Node | Outflow<br>(l/s) | Discharge<br>Vol (m³) |
|--------------------------------|-------------|--------------|------------|------------------|-----------------------|
| 240 minute winter              | Catchment A | Depth/Flow   | 2          | 33.0             | 714.1                 |
| 240 minute winter              | Catchment C | Depth/Flow   | 3          | 31.1             | 668.5                 |
| 180 minute winter              | Catchment D | Hydro-Brake® | 1          | 5.0              | 105.9                 |

## APPENDIX G

### SEVERN TRENT CONSULTATION AND SEWER MAPS

## WONDERFUL ON TAP



**Severn Trent Water Ltd**  
Oxley Moor Rd  
Wolverhampton  
WV9 5HN

[www.stwater.co.uk](http://www.stwater.co.uk)  
[Network.Solutions@severntrent.co.uk](mailto:Network.Solutions@severntrent.co.uk)

Contact: Michael Taylor

Your ref:  
Our ref: 1124914

Kate Helen Loewenthal  
Lumax Consulting  
4 Harlaxton Drive  
Nottingham  
NG7 1JA

22<sup>nd</sup> August 2024

Dear Kate

### **Proposed Redevelopment at: Cadent. Brick Kiln Street**

I refer to your 'Development Enquiry Request' for 195 property development in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes which refer to surface water disposal from development sites.

### **Public Sewers in Site – Required Protection**

Due to a change in legislation on 1 October 2011, there may be former private sewers on the site which have transferred to the responsibility of Severn Trent Water Ltd, which are not shown on the statutory sewer records, but are in your client's land. These sewers would also have protective strips that we will not allow to be built over. If such sewers are identified to be present on the site, please contact us for further guidance. Our records indicate that there are 225mm and 600mm combined sewers crossing the site.

These public sewers carry the following protection zones.

225mm cws 6m protection zone (3m either side)

600mm cws 10m protection zone (5m either side)

We do not permit any new construction within these zones, and restricted tree planting and landscaping will apply.

The site should be planned that these sewers run within public open space or highway.

### **Foul Water Drainage**

The new development would generate additional foul flows approx. 3l/s 2x dwf gravity. The additional flows via a new connection to m/h the public sewer connection will have no adverse effect on the receiving network. Severn Trent would prefer that gravity connections are utilized over pump stations, if a pump station is required, for a development of this size we would expect pumped flows of around 5l/s.

If you wish to split the flows the 300mm combined sewer to the south could receive flows m/h 2601.

# WONDERFUL ON TAP



Please be advised that a new / indirect connection to this sewer would only be considered subject to a formal S.106 sewer connection approval (see later).

## Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soak ways should be considered as the primary method.

If following testing, it has been demonstrated that soakaways would not be possible on the site; satisfactory evidence will need to be submitted from the SI consultant (extract or a supplementary letter).

If soak way are not possible then a connection to the watercourse to the north for the whole site should be fully investigated @ 5l/s/ha greenfield rates or rates agreed with the LLFA. If a connection to the surface water sewer is required then m/h 8802 would be acceptable @ a minimum of 50% betterment of existing rates, if existing rates cannot be proven, or the site did not positively discharge to our network then greenfield rates 5l/s/ha would apply. Within the highway, Regardless of previous connections whilst there are other options available to dispose of the surface water , we will not permit any discharge of surface water into the combined water network.

This would satisfy SGN1 (enclosed), in accordance with Leicestershire Council SUDS Policy as the Lead Local Flood Authority (LLFA) for the area and statutory consultee in the planning process. Please see the guidance notes attached for further information.

## New Connections

For any new connections (including the re-use of existing connections) to the public sewerage system, the developer will need to submit Section 106 application forms. Our New Connections department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 7076600 or download from [www.stwater.co.uk](http://www.stwater.co.uk).

Please quote 1124914 in any future correspondence (including e-mails) with STW Limited. Please note that 'Development Enquiry' responses are only valid for 6 months from the date of this letter.

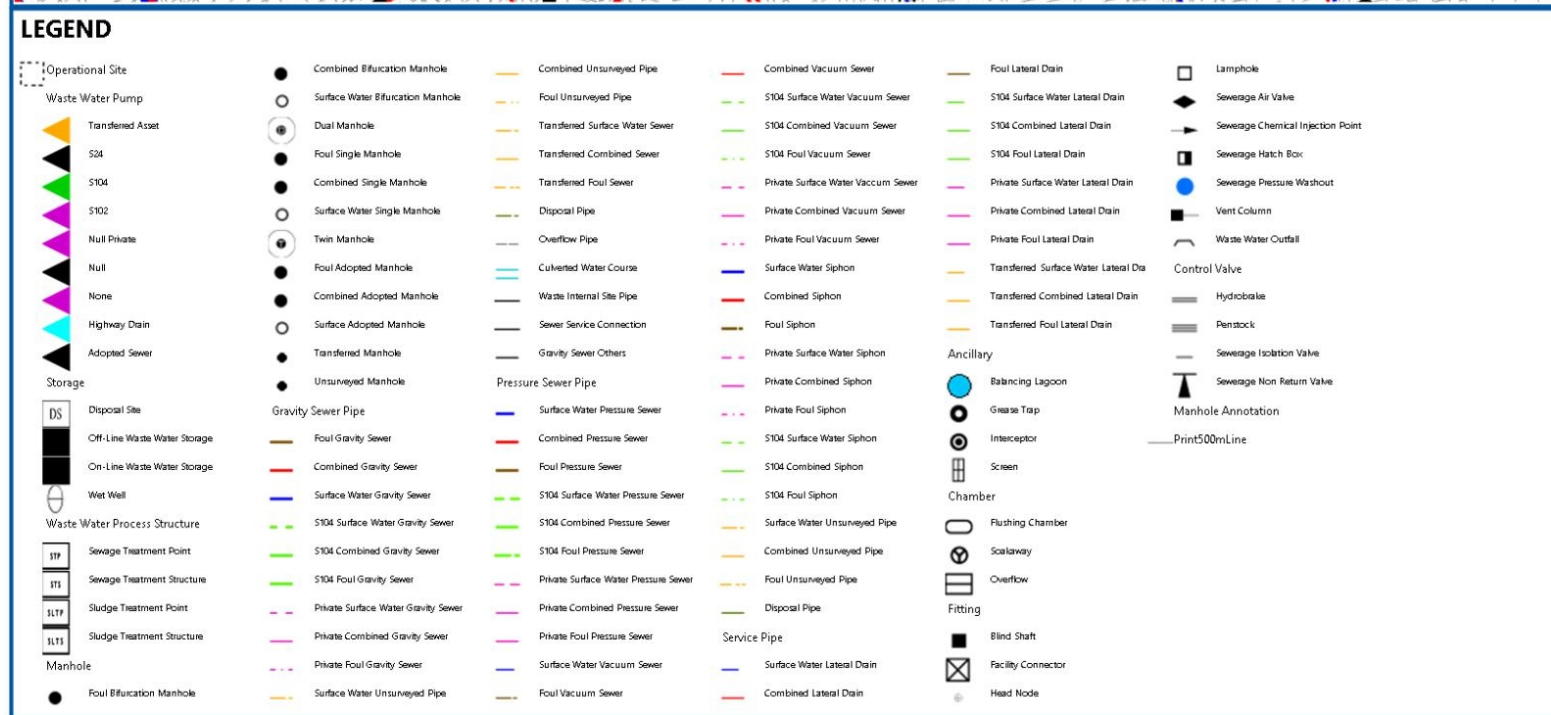
**WONDERFUL ON TAP**



Yours sincerely

A handwritten signature in black ink, appearing to be "MT" with a stylized flourish.

Michael Taylor  
Network Solutions



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b><u>MATERIALS</u></b></p> <p>- - NONE</p> <p>AC - ASBESTOS CEME</p> <p>BR - BRICK</p> <p>CC - CONCRETE BOX CULVERT</p> <p>CI - CAST IRON</p> <p>CO - CONCRETE</p> <p>CSB - CONCRETE SEGMENTS (BOLTED)</p> <p>CSU - CONCRETE SEGMENTS (UNBOLTED)</p> <p>DI - DUCTILE IRON</p> <p>GRP - GLASS REINFORCED PLASTIC</p> <p>MAC - MASONRY IN REGULAR COURSES</p> <p>MAR - MASONRY RANDOMLY COURSED</p> <p>PE - POLYETHYLENE</p> <p>PF - PITCH</p> <p>PP - POLYPROPYLENE</p> <p>PSC - PLASTIC STEEL COMPOSITE</p> <p>PVC - POLYVINYL CHLORIDE</p> <p>RPM - REINFORCED PLASTIC MATRIX</p> <p>SI - SPUN (GREY) IRON</p> <p>ST - STEEL</p> <p>U - UNKNOWN</p> <p>VC - VITRIFIED CLAY</p> <p>XXX - OTHER</p> | <p><b><u>CATEGORIES</u></b></p> <p>W - WEIR</p> <p>C - CASCADE</p> <p>DB - DAMBOARD</p> <p>SE - SIDE ENTRY</p> <p>FV - FLAP VALVE</p> <p>BD - BACK DROP</p> <p>S - SIPHON</p> <p>D - HIGHWAY DRAIN</p> <p>S104 - SECTION 104</p> | <p><b><u>SHAPE</u></b></p> <p>C - CIRCULAR</p> <p>E - EGG SHAPED</p> <p>O - OTHER</p> <p>R - RECTANGLE</p> <p>S - SQUARE</p> <p>T - TRAPEZOIDAL</p> <p>U - UNKNOWN</p> | <p><b><u>PURPOSE</u></b></p> <p>C - COMBINED</p> <p>E - FINAL EFFLUENT</p> <p>F - FOUL</p> <p>L - SLUDGE</p> <p>S - SURFACE WATER</p> | <p>Severn Trent Water Limited</p> <p>Asset Data Management</p> <p>PO Box 5344</p> <p>Coventry</p> <p>CV3 9FT</p> <p>Telephone: 0345 601 6616</p> |
| <p><b>SEWER RECORD (Tabular)</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p><b>O/S Map Scale:</b> 1:5,000</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>Date of Issue:</b> 22-08-24</p>                                                                                                                                                                                            | <p><b>This map is centred upon:</b></p>                                                                                                                                | <p><b>X:</b> 442303.81</p>                                                                                                            | <p><b>Y:</b> 293852.68</p>                                                                                                                       |
| <p><b>Disclaimer Statement:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>1 Do not scale off this Map.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>2 This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and is not to be relied upon in its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the vicinity of SEVERN TRENT Water assets or for purposes of determining the suitability of a point of connection to the sewerage or distribution systems.</p>                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were owned by private owners, were transferred to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewerage areas, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not own or operate any of these assets. These assets may not be displayed on the map.</p>                                                                     |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>4 Reproduced by permission of Ordnance Survey on behalf of HMSO. Crown Copyright and database right 2004. All rights reserved.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>5 Ordnance Survey licence number: <b>100031673</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |
| <p>6 Document users other than SEVERN TRENT WATER business users are advised that this document is provided for reference purpose only and is subject to copyright, therefore, no further copies should be made from it.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                  |                                                                                                                                                                        |                                                                                                                                       |                                                                                                                                                  |