CONSULTING ENGINEERS
Delivering Innovative Solutions

Flood Risk Assessment

Richborough
Station Road, Market Bosworth

08/05/2025
Ref: PJS24-0085-DOC-0008-J

Document Issue Record

Document Number	
PJS Reference	PJS24-0085-DOC-0008-J-Flood Risk Assessment

Status	Revision	Date of Issue	Author	Checked	Approved
Draft	-	20/08/2024	Jacob Vernon	Jacob Clifford	Nick Edwards
Draft	A	30/09/2024	Jacob Vernon	Jacob Clifford	Nick Edwards
Draft	B	09/10/2024	Noah George	Jacob Clifford	Nick Edwards
Draft	C	10/10/2024	Jacob Vernon	Jacob Clifford	Nick Edwards
Issue	D	28/10/24	Jacob Vernon	Nick Edwards	Paul Smith
Issue	E	12/11/2024	Noah George	Jacob Vernon	Nick Edwards
Issue	F	11/02/25	Jacob Vernon	Nick Edwards	Paul Smith
Issue	G	24/02/25	Jacob Vernon	Nick Edwards	Paul Smith
Issue	H	26/02/25	Jacob Vernon	Nick Edwards	Paul Smith
Issue	I	30/04/25	Jacob Vernon	Nick Edwards	Paul Smith
Issue	J	08/05/25	Jacob Vernon	Nick Edwards	Paul Smith

Limitations

All comments and proposals contained in this report, including any conclusions, are based on information available to PJS Consulting Engineers during investigations. The conclusions drawn by PJS Consulting Engineers could therefore differ if the information is found to be inaccurate or misleading. PJS Consulting Engineers accepts no liability should this be the case, nor if additional information exists or becomes available with respect to this scheme.

Except as otherwise requested by the client, PJS Consulting Engineers is not obliged to and disclaims any obligation to update the report for events taking place after: -

i. The date on which this assessment was undertaken, and
ii. The date on which the final report is delivered

PJS Consulting Engineers makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the following report.

The information presented and conclusions drawn are based on statistical data and are for guidance purposes only.

The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities. This report has been prepared for the sole use of Richborough. No other third parties may rely upon or reproduce the contents of this report without the written permission of PJS Consulting Engineers. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill.

Executive Summary

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of Richborough in respect of an outline planning application (with all matters reserved except for means of access to the site) for residential development, public open space and landscaping, surface water attenuation and associated infrastructure for up to 126 dwellings at Station Road, Market Bosworth.

The site falls consistently in a westerly direction from levels of around 116.5mAOD along the eastern boundary to around 94.1mAOD in the southwest corner of the site.

An existing combined sewer, two pressurised mains - one foul and one surface water - and a highway sewer traverse the site in a north-south direction. A watercourse runs through the centre of the site which outfalls to an existing culvert. This traverses the site in a westerly direction and outfalls to a culvert that traverses the railway and ultimately outfalls to a watercourse to the west.

This report demonstrates that the proposed development is not at significant flood risk, and simple flood mitigation strategies are recommended to address any residual risk that may remain.

The site is shown to be in Flood Zone 1, land considered to have a very low probability of fluvial or tidal flooding.

The watercourse and culvert within the site are not considered to pose a significant fluvial flood risk and the post development scenario, involving daylighting the existing culvert, will further reduce any potential flood risk.

A localised area of low-risk pluvial flooding affects the central portion of the site however, this emanates almost entirely from within the existing site therefore, the post development scenario will have significantly reduced extents.

The proposed development is also located outside the area shown to be at risk of reservoir failure or groundwater flooding.

Tidal and canal sources are not considered to pose a risk due to the distance and terrain between the site and tidal/canal waterbodies.

There are several small to large waterbodies within the vicinity of the site however, LIDAR information demonstrates that the surrounding topography will prohibit any overland flow routes in the event of these waterbodies overtopping. The existing ditch will also act as a cut-off feature to the northern part of the site should overland flows develop.

A surface water drainage strategy has been produced for the site. It is proposed that on-site attenuation is provided up to the 1 in 100 year plus climate change event in a pair of open attenuation basins, using sustainable drainage systems with a network of pipes to provide suitable flow transmittance.

In compliance with the requirements of National Planning Policy Framework, and subject to the mitigation measures proposed, the proposed development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area, and will in fact result in a betterment offsite, as a result of suitable management of surface water runoff discharging from the site.

Contents Page

Document Issue Record 1
Executive Summary 2
Contents Page 3
Appendices 4
1. INTRODUCTION 5
Sources of Data 5
Site Description and Existing Drainage 6
Proposed Development 8
2. POLICY FRAMEWORK 9
National Planning Policy Framework 9
Planning Policy Guidance 9
Strategic Flood Risk Assessment 10
Preliminary Flood Risk Assessment 10
Local Flood Risk Management Strategy 10
District Local Plan 11
CIRIA C753 – The SuDS Manual 13
3. POTENTIAL SOURCES OF FLOOD RISK TO THE EXISTING SITE 14
Fluvial Flood Risk 15
Tidal Flood Risk 16
Flood Risk from Canals 16
Groundwater Flood Risk 17
Flood Risk from Reservoirs & Large Waterbodies 19
Pluvial Flood Risk 20
Flood Risk from Sewers 21
Effect of Development on Wider Catchment 22
4. SEQUENTIAL AND EXCEPTION TEST 23
Sequential Test 23
Exception Test 23
5. FLOOD RISK MITIGATION 25
6. SUSTAINABLE DRAINAGE STRATEGY 27
Foul Drainage 33
7. CONCLUSIONS AND RECOMMENDATIONS 34

List of Figures and Tables

Table 1 – Site Summary 5
Figure 1 – Site location 6
Figure 2 – Existing topography with approximate direction of fall 7
Table 2 – Summary of flood risk from potential flood sources 14
Figure 3 – Extent of Fluvial Flooding 15
Figure 4 – Canal and River Trust mapping 17
Figure 5 – BGS Geological Mapping 18
Figure 6 – Extract from Hinckley and Bosworth Borough Council flood risk mapping 18
Figure 7 – EA mapping of flood risk from reservoirs 19
Figure 8 – EA mapping depicting the yearly chance of flooding between 2040 and 2060. 21
Table 3 – Flood risk vulnerability and flood zone 'incompatibility'. See the Planning Practice Guidance for further details. 24
Table 4 – Pollution and mitigation indices for the proposed development 30
Figure 9 – Extract from CIRIA C753 detailing the maintenance requirements for a detention basin 32
Table 5 – Summary of Flood Risk Assessment 34

Appendices

Appendix 1a – Topographical Survey by Greenhatch Group, 26/08/2021 Ref: 41211_T
Appendix 1b – Topographical Survey by BWB Consultancy, 12/11/2020 Ref: SMB-BWB-00-01-DR-G-001 Rev P1
Appendix 2 – Severn Trent Sewer Records 26/06/2024
Appendix 3 – Development Framework Plan, 19/07/2024 Ref: P24-1644_DE_003-01 Rev J
Appendix 4 – Technical Note Response to LLFA comments
Appendix 5 – Microdrainage Calculations
Appendix 6 – Preliminary Drainage Strategy, 28/10/24, Ref: PJS24-0085-DR-0010
Appendix 7 – Severn Trent Water Developers Enquiry Response, 26/06/2024 Ref:1119475

1. INTRODUCTION

1.1. Produced on behalf of Richborough, this Flood Risk Assessment (FRA) supports an outline planning application (with all matters reserved except for means of access to the site) for a residential development with associated public open space, landscaping, surface water attenuation and infrastructure for up to 126 dwellings at Station Road, Market Bosworth (Table 1). As such, the content and level of detail is subject to the nature of the proposals.

1.2. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. Furthermore, local-level reports, plans and policies have been referenced where relevant in support of this FRA.

Table 1 – Site Summary

Site Name	Station Road, Market Bosworth
Location	Station Road, Market Bosworth, CV130PE
NGR (approx.)	SK395032
Application Site Area (ha)	7.964 ha
Development Type	Residential
Flood Zone Classification	Flood Zone 1
Lead Local Flood Authority	Leicestershire County Council
Local Planning Authority	Hinckley and Bosworth Borough Council
NPPF Vulnerability	More Vulnerable

Sources of Data

1.3. The Report is based on the following sources of information:

i. Development Framework Plan, 19/07/2024 Ref: P24-1644_DE_003-01 Rev J
ii. Topographical Survey by Greenhatch Group, 26/08/2021 Ref: 41211_T
iii. Topographical Survey by BWB Consultancy, 12/11/2020 Ref: SMB-BWB-00-01-DR-G-001 Rev P1
iv. Severn Trent Sewer Records 26/06/2024
v. Severn Trent Water Developers Enquiry Response, 26/06/2024 Ref:1119475
vi. Environment Agency Flood Map for Planning
vii. Hinckley and Bosworth Borough Council Level 1 and Level 2 SFRA
viii. Leicestershire County Council PFRA
ix. Leicestershire Local Flood Risk Management Strategy
x. British Geological Survey
xi. CIRIA 753 “The SuDS Manual”
xii. Leicestershire Local Plan

Site Description and Existing Drainage

1.4. The existing site covers approximately 7.964ha and is located off Station Road, Market Bosworth CV13 0JS (Figure 1).

1.5. The eastern half of the northern boundary lies parallel with an existing ditch course, beyond which lies agricultural land. Beyond the western half of the northern boundary lies an existing residential dwelling and associated grounds. The site is bordered by an area of woodland to the East, Station Road to the south and the Battlefield Line Railway to the west.

Figure 1 – Site location

1.6. A topographical survey has been produced for the eastern and western portions of the site and can be seen in Figure 2 and is also located in **Appendix 1**.

1.7. The topographical survey indicates that the site slopes consistently in a westerly direction from levels of around 116.5mAOD along the eastern boundary to around 94.1mAOD in the southwest corner of the site.

1.8. Furthermore, the topography of the southern half of the site is shown to have valley like features, with levels converging towards the centre.

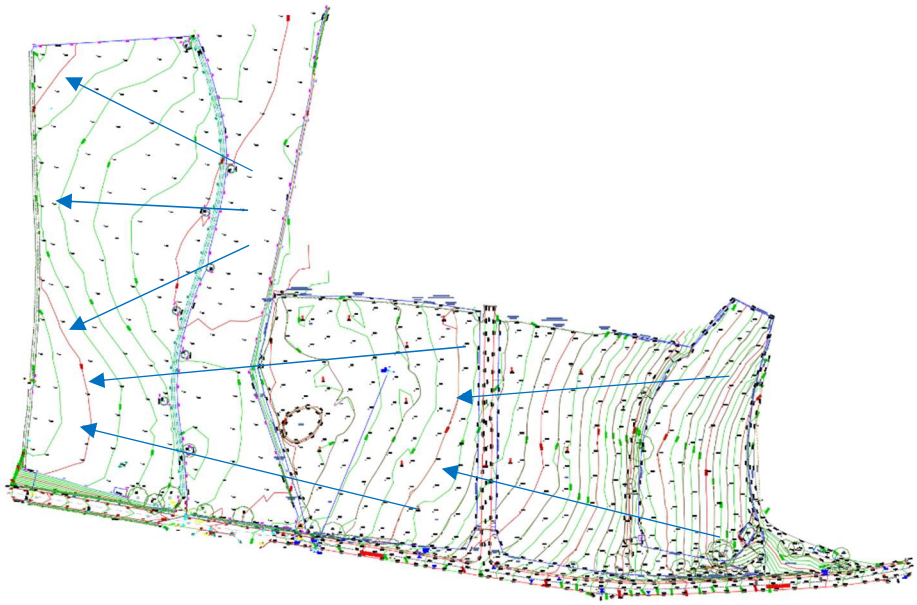


Figure 2 – Existing topography with approximate direction of fall

1.9. The site is predominantly greenfield and agricultural in use.

1.10. A ditch runs north-south through the centre of the site which converges towards its centre and outfalls to an existing on-site culvert. This culvert continues west across the site and ultimately discharges to another existing culvert at the western boundary, which then traverses the railway.

1.11. Manholes located within the neighbouring development to the west of the railway demonstrate that the outfall from the railway culvert continues west via a culverted watercourse. As depicted on the Sustainable Drainage and Landscape proposals for the marina development west of the canal, the culverted watercourse is daylighted and diverted north around the development ultimately outfalling to an existing watercourse.

1.12. The topography of the site suggests that overland flows from the majority of the site discharge to the onsite ditches and existing culverts.

1.13. Two access roads also cut through the site in a north-south direction and permit access to Station Road from the residential dwelling and agricultural land beyond the northern site boundary.

1.14. As shown on Severn Trent Water (STW) sewer records (**Appendix 2**), an existing combined sewer flows through the site from north to south. Flow from this sewer ultimately discharges to a foul pumping station located south of the site. Flows are then pumped back north via a rising main which traverses the southwestern corner and western boundary of the site.

1.15. The sewer records also show an additional overflow rising main, emanating from the same foul pumping station, that also traverses through the centre of the site.

1.16. An existing highway drain crosses the southwestern corner of the site, which is to be diverted as part of the proposed development.

1.17. An existing pond lies to the centre of the site however, no obvious inlet or outlet has been identified and is likely fed by overland flows developed on site. The pond was dry at the time of the topographic survey implying it is a seasonally dry and wet pond that fills during heavier or more persistent rainfall events. The pond provides an ecological value and will be relocated as part of the development to facilitate migration patterns and enhanced biodiversity.

Proposed Development

1.18. The applicant is applying for outline planning application (with all matters reserved except for means of access to the site) for residential development, public open space and landscaping, surface water attenuation and associated infrastructure for up to 126 dwellings with access taken from Station Road.

1.19. A Development Framework Plan for the development is included in **Appendix 3**.

2. POLICY FRAMEWORK

National Planning Policy Framework

2.1. The National Planning Policy Framework (NPPF) sets out the Government's national policies on different flood risk related aspects of land use in England.

2.2. The Planning and Flood Risk section of the NPPF addresses how development should be located in areas at little or no risk of flooding, taking into account all sources of flood risk and the current and future impacts of climate change.

2.3. This is to be achieved through the application of the Sequential Test, used to avoid flood risk to people and property by steering new development to lower risk areas. Where it is not possible to locate development in lower risk areas, then the Exception Test is applied. The need for the Exception Test depends on the potential vulnerability of the development, as per the Flood Risk Vulnerability Classification set out in Annex 3 of the NPPF.

Planning Policy Guidance

2.4. The Planning Practice Guidance (PPG), used to support the NPPF, is also available online and sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible, and highlights the importance of preventing an increase in flood risk to the wider catchment area.

2.5. The PPG states that areas at risk of flooding are those that are at risk from any source, now and in the future. These sources include: rivers and the sea, direct rainfall, rising groundwater, overwhelmed sewers and drainage systems, reservoirs, canals and lakes, and other artificial sources. All of which are to be considered when assessing site specific flood risk.

2.6. To help assess flood risk, the PPG includes two tables that define, Flood Zones (Table 1) and Flood risk vulnerability and flood zone 'incompatibility' (Table 2), with Annex 3 of the NPPF providing details on the flood risk vulnerability classification for various types of infrastructure.

2.7. Furthermore, the PPG provides further details on the application of the Sequential and Exception Test, with the process summarised in Diagram 2 and 3.

2.8. This Flood Risk Assessment is written in accordance with the NPPF and PPG and as such, will assess all sources of potential flood risk and where necessary apply the Sequential and Exception Test.

Flood Map for Planning

2.9. In accordance with Table 1 of the PPG, the Flood Map for Planning produced by the Environment Agency identifies various Flood Zones with particular reference to planning and development.

2.10. Flood Zone 1 (Low Probability) is defined as land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1%).

2.11. Flood Zone 2 (Medium Probability) is defined as land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%).

2.12. Flood Zone 3a (High Probability) is defined as land having a 1 in 100 or greater annual probability of river flooding (>1%); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5%). This is represented by "Flood Zone 3" on the Flood Map for Planning.

2.13. Flood Zone 3b (The Functional Floodplain) is defined as land where water has to flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

The Design Flood

2.14. The PPG identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.15. This is a flood event of a given annual flood probability, which is generally taken as:

- Fluvial (river) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year)
- Tidal flooding with a 0.5% annual probability (1 in 200 chance each year)
- Surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year)

Strategic Flood Risk Assessment

2.16. A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.17. A Level 1 and Level 2 SFRA were produced for the Hinckley and Bosworth Borough Council in 2019 and 2020 respectively. Relevant information from this SFRA has been referenced within this FRA.

Preliminary Flood Risk Assessment

2.18. A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities.

2.19. The Leicestershire County Council PFRA (2011) provides a high-level overview of flood risk from a variety of sources throughout Leicestershire County Council including the area of Hinkley and Bosworth District.

Local Flood Risk Management Strategy

2.20. A Local Flood Risk Management Strategy (LFRMS) is prepared by a Lead Local Flood Authority to help understand and manage flood risk at a local level. The LFRMS aims to ensure that the knowledge of

local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.

2.21. The Local Flood Risk Management Strategy for Leicestershire (2024) sets out the roles and responsibilities for various organisations, agencies, authorities and individuals across Leicestershire and the Hinkley and Bosworth district.

District Local Plan

2.22. Local Plans are produced by Local Planning Authorities to provide a framework for addressing economic, social and environmental priorities for the area as well as providing a positive vision for the future.

2.23. The current local plan for the Hinckley and Bosworth borough council runs from 2006-2026 with their planning policies set out initially in the 2001 Local Plan.

2.24. Subsequently, the Local Development Framework Plan: Core Strategy was developed and adopted in December 2009 and supersedes some of the policies in the 2001 Local Plan.

2.25. As the time period for the current plan is close to expiring and the information pertaining to polices from the 2001 plan is difficult to source, a review of the 2009 Core Strategy and the Draft Local Plan (2020-2039) have been undertaken to ensure the proposals within the report broadly cover and satisfy the existing and upcoming requirements.

2.26. The policies relevant to this FRA and Drainage Strategy are summarised below:

2.27. CC01 Mitigation and Adaptation to Climate Change

- Managing flood risk associated with higher peak river flows and more extreme weather events, and relocating vulnerable uses where appropriate;
- Demonstrate that flood risk from all sources has been mitigated, including use of Sustainable Drainage Systems (SuDS) and nature based solutions where appropriate.

2.28. CC02 Flood Risk

- Development in areas at risk of flooding will only be supported where it is satisfactorily demonstrated that: a) the Sequential Test has been passed; b) where required, the Exception Test has been passed; c) the proposed development will not increase the risk of flooding on site or elsewhere and appropriate floodplain compensation is provided where necessary; and d) the proposed development, including the access and egress, will be safe and resilient to flooding for its lifetime, taking into account the relevant climate change allowances.
- Developments should, wherever possible, include measures to reduce and manage surface water through appropriate sustainable drainage systems (SuDS) so as to minimise and manage flood risk and improve water quality.

2.29. CC03 Sustainable Drainage Systems

- Development proposals are required to integrate well-designed and naturalised Sustainable Drainage Systems (SuDS), to manage flood risk and water quality in accordance with national standards and having regard to local standards.
- The layout of SuDS should reflect and respond to the individual site's features such as following natural drainage routes to improve water quality.

2.30. PMD01 High Quality Design

- Appropriate sustainable drainage solutions have been implemented within the design, in line with Policy CC03, including but not limited to wildlife areas, ponds, green roofs, swales, permeable surface materials, rain water harvesting, and tree planting and landscaping.

2.31. PMD03 Preventing Pollution

- 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;
- The development does not create or exacerbate flooding by being located away from areas of flood risk unless adequately mitigated against in line with National Policy and Policy CC02.

2.32. NAT01 Green Infrastructure

- Proposals should ensure that green infrastructure is resilient to climate change; minimises the scheme's environmental impact with respect to water and enhance water quality;
- Details of maintenance requirements and arrangements must be set out, including who is responsible for these requirements.

2.33. NAT08 Enhancing Biodiversity and habitat connectivity

- Restore and enhance existing features on site;
- Create additional habitats and ecological networks.

2.34. NAT11 Blue Infrastructure

- Do not involve the culverting of watercourses, except where essential to allow highways and/or other infrastructure to cross;
- Make appropriate provision to protect, enhance, improve and maintain accessible networks of Blue Infrastructure, through de-culverting and re-naturalisation of hard banks if appropriate;
- Maintain and enhance natural drainage features;
- Provide 'buffer strips' of vegetation along the banks of all water courses.

2.35. INF02 Water Supply and Wastewater Management

- There must be adequate water supply and wastewater treatment infrastructure and capacity in place to serve the development at the time of occupation.

CIRIA C753 – The SuDS Manual

2.36. The Ciria SuDS Manual provides guidance on the implementation of Sustainable Drainage Systems in the UK. It details their appropriate application, design specifications and various benefits including water quality control.

2.37. The Ciria SuDS Manual has been used to inform the proposed drainage strategy for the development with particular reference to water treatment.

3. POTENTIAL SOURCES OF FLOOD RISK TO THE EXISTING SITE

3.1. Flooding can occur from a variety and combination of sources, which may be natural or artificial. Table 2 provides a summary of the potential sources of flood risk to the site in its current condition, and the potential impacts of the development on the wider catchment prior to mitigation. These are discussed in greater detail in the forthcoming section.

3.2. The mitigation measures proposed to address any flood risk issues, and ensure the development is appropriate for its location, are discussed within Section 5.0.

Table 2 – Summary of flood risk from potential flood sources

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial			X		The site is located entirely within Flood Zone 1 and not in close proximity to any main rivers. There are small watercourses within the vicinity of the site however, these do not convey significant volumes of water, as such pose a low risk to the site.
Tidal/Coastal				X	The site is located far from any coastline or tidally influenced bodies of water.
Canals			X		The Ashby canal lies to the west of the site, yet sits at a lower elevation, therefore, any flood risk is considered to be low.
Groundwater			X		The sites gradient, level relative to the nearest watercourse, and identification of having a low susceptibility to groundwater flooding indicates that this poses only a low risk to the site.
Reservoirs and Waterbodies			X		Environment Agency mapping shows the site in an area not considered at risk from flooding due to reservoirs or large waterbodies. Though three small waterbodies are identified north of this site, these are not considered to pose a significant risk to the site.
Pluvial Runoff			X		Surface water flooding is identified at the existing site however, the post development scenario will have reduced extents and any residual risk will be suitably mitigated through the proposed drainage strategy.
Sewers			X		The existing sewers on and within the site are not known to have experienced flooding historically, and any new sewers to be installed are to be appropriately modelled and approved.
Effect of Development on Catchment	Impedance of Flows				The development does not appear to impede on existing pluvial or fluvial flow routes.
	Development Drainage				The development will introduce a greater impermeable area than is currently present on site. A SuDS drainage strategy has been developed to mitigate this and adopts greenfield runoff rates. The drainage strategy will also mitigate the existing on site surface water flood extents providing a betterment downstream.

Fluvial Flood Risk

3.3. Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

3.4. The study site is shown to be located entirely within Flood Zone 1 (**Figure 3**).

3.5. The SFRA also states that there is no fluvial flood risk associated with Market Bosworth.

Figure 3 – Extent of Fluvial Flooding

Main Rivers

3.6. The site is located in Flood Zone 1 and there are no main rivers within the vicinity of the site.

Minor Watercourses

3.7. A ditch runs through the centre of the site before being culverted and flowing west, ultimately outfling to a culvert that crosses under the railway and development to the west before discharging to the canal.

3.8. Based on the available information the existing ditch appears to be agricultural in use taking overland flows from the surrounding agricultural land.

3.9. There are no other small watercourses within the vicinity of the site.

3.10. Since the existing ditch and culvert do not convey consistent, large volumes of surface water they are considered to pose a low risk to the development.

3.11. There is an existing culvert located along the western boundary, which traverses the railway to the west of the site. Surface water from the site currently outfalls to this culvert and will therefore form the surface water outfall for the development.

3.12. An appropriate inspection and maintenance regime should be developed at a later planning stage in accordance with the CIRIA guidance within Culvert Design and Operation Guide C689.

Tidal Flood Risk

3.13. Due to the inland nature of the site, it is not considered to be tidally affected and therefore there is no tidal flood risk to the site.

Flood Risk from Canals

3.14. Generally, there are no direct flood risks associated with canals as they are a regulated waterbody and any instance of flooding would be considered to be a rare occurrence.

3.15. Ashby Canal – the only canal in the borough – lies approximately 130m to the west of the site at its closest point and runs parallel with the western boundary (Figure 4).

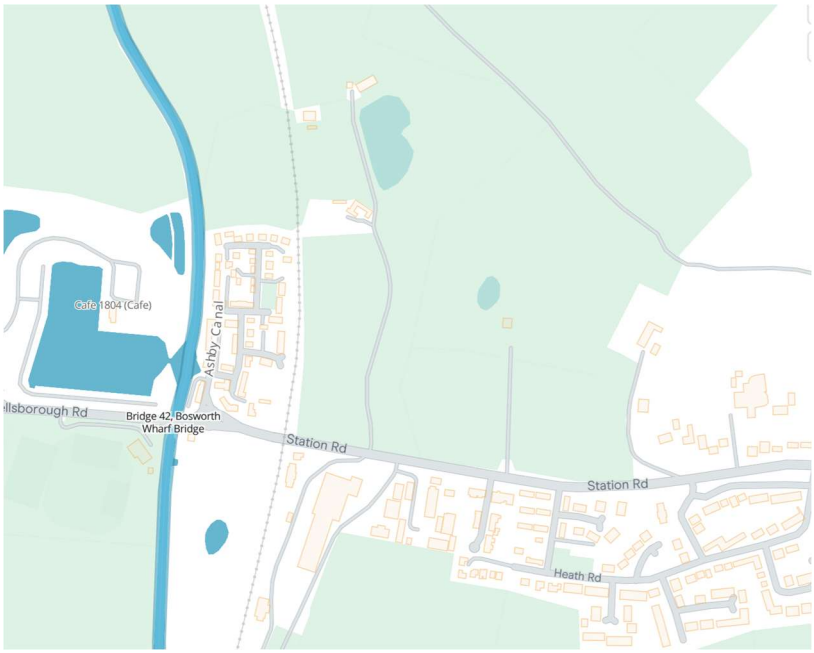


Figure 4 – Canal and River Trust mapping

3.16. The 2019 Hinckley and Bosworth SFRA identifies there have been seven recorded incidents of canal breach or overtopping for the Ashby Canal occur as far north as Congerstone and as far south as Hinckley. The locations of these incidents are shown on Figure 5-6 of the SFRA.

3.17. LIDAR information indicates the canal banks site approximately 2m lower than the western boundary.

3.18. In addition to increased elevation, the topography in the wider area generally falls in a westerly direction. The majority of Market Bosworth, including the site, lies east of the canal, as such sits at a higher elevation than the canal.

3.19. Since the canal lies at a lower elevation than the site, in the rare event that a breach was to occur any accumulation in surface water would be directed west away from the development. Therefore, flood risk from the canal is considered to be low.

3.20. The Bosworth Marina is a small waterbody, which lies immediately west of the canal, and is connected to it. Therefore, the risk associated with this is linked to the canal and also deemed negligible.

Groundwater Flood Risk

3.21. Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology.

3.22. BGS online mapping (Figure 5) identifies the bedrock geology in the area to be comprised of “Gunthorpe Member – Mudstone” with a superficial geology of “Bosworth Clay Member”.

3.23. This geology is likely to have a low infiltration rate suggesting a low propensity for groundwater flooding.

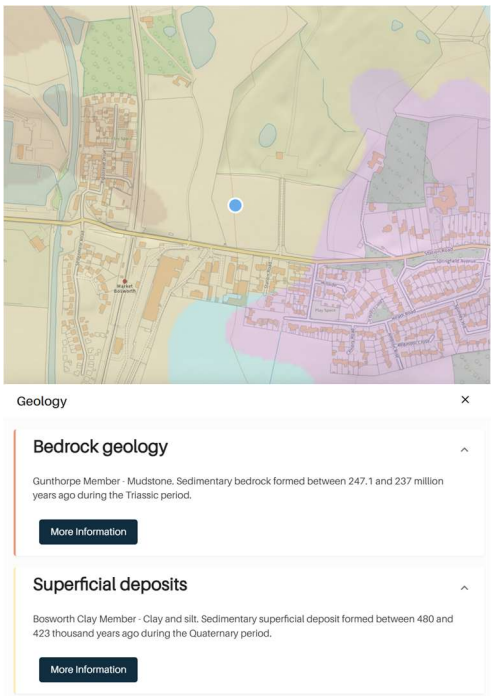


Figure 5 – BGS Geological Mapping

3.24. The SFRA includes mapping which identifies the susceptibility to groundwater flooding for the district (Figure 6). The site is shown to be in an area with less than 25% susceptibility indicating a very low risk of groundwater flooding.

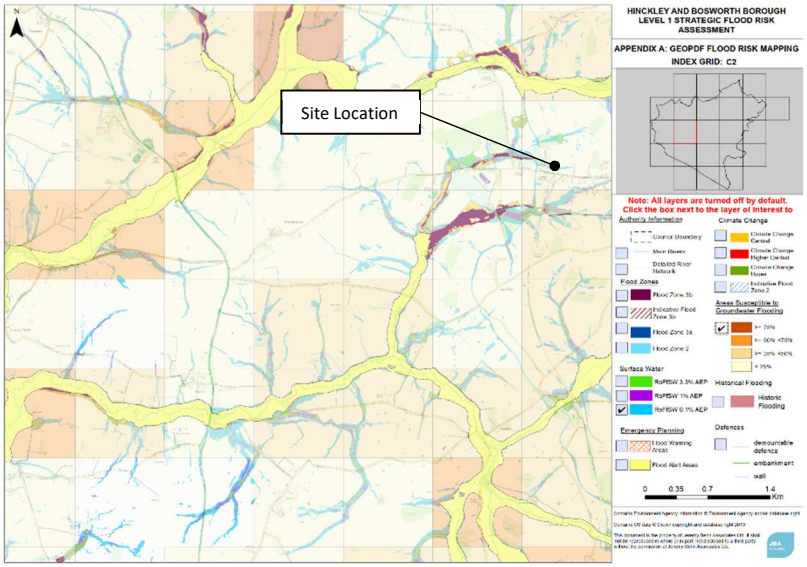


Figure 6 – Extract from Hinckley and Bosworth Borough Council flood risk mapping

3.25. Additionally, the PFRA outlines for the study area of Leicestershire, that only one historical record of groundwater flooding has been identified, which was in Melton, Mowbray – a substantial distance from the application site. No other historic instances of Groundwater Flooding have been identified in the Leicestershire area.

3.26. Onsite testing would be required to identify local groundwater conditions over an appropriate time period. It is likely that this will be conducted as part of detailed ground investigations on the site allowing for the identification of any groundwater flood risk or infiltration capacity that is not identified by this report.

Flood Risk from Reservoirs & Large Waterbodies

3.27. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

3.28. To help identify this risk, the Environment Agency provides a map identifying artificial sources of flooding and the extent of a modelled reservoir breach. This shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide.

3.29. It can be seen from the map that the site is not in the vicinity of any reservoir flooding.

3.30. It can therefore be confirmed that the site is at low to no risk of reservoir flooding.

Figure 7 – EA mapping of flood risk from reservoirs

Small Waterbodies

3.31. There is a small pond located in the centre of the site, which was shown to be dry and very shallow on the date of the topographical survey.

3.32. There are two additional ponds located in the adjacent field to the north of the eastern parcel and a further larger pond located within the residential property to the north of the western parcel.

3.33. These ponds are unlikely to retain significant volumes of water and do not appear to have an obvious inlet or outlet. Furthermore, in the event that these ponds were to overtop any overland flows would be directed west, discharge into the existing drainage ditches and avoid the proposed development.

3.34. There are no other small waterbodies within the vicinity of the site other than the Bosworth Marina which lies to the west of and is connected to the Ashby de la Zouch Canal. The risk for this is negligible and is covered earlier in the report within paragraph 3.18.

3.35. Small waterbodies are therefore not considered to pose a risk of flooding to the proposed development.

Pluvial Flood Risk

3.36. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

3.37. The recently updated mapping predicted for 2040-2060, provided by the Environment Agency, identifies a large extent of surface water flooding from the centre of the site towards the southwest (Figure 8), which is identified as having between a low and high yearly chance of flooding.

3.38. There are three segregated extents with a high yearly chance of flooding, located along the line of the existing onsite watercourse, the existing private access and at the low point to the southwest. These extents are connected by the low to medium yearly chance of flooding extents.

3.39. The extents identified along the line of the existing watercourse and site access can be attributed to shallow banking at these locations which will act to hold overland flows. The mapping appears to have adopted the same logic regarding the larger extent of surface water flooding at the low point on site, suggesting a build up of overland flows on account of shallow banking towards the Battlefield railway line.

3.40. It is likely therefore, that the mapping does not account for the culverted watercourse which crosses the site, nor the railway culvert to the west, which act to convey overland flows away to the west. As such, it is considered that the surface water flood mapping is not a true representation of the existing conditions on site, and has therefore been discounted.

3.41. The railway culvert is known to have a diameter of 700mm and be in good condition, capable of conveying flows from the site.

3.42. Despite the aforementioned inaccuracies, the extents appear to be a direct result of the existing topography. A low point in the topography, running along the line of the culverted watercourse, acts to funnel overland flows towards the low point in the southwest corner of the site. This aligns with

the same location as the culvert leaving the site outlined above in 3.41. This further reinforces the inaccuracies within the EA surface water flood mapping.

3.43. The SFRA highlights that Market Bosworth generally benefits from the surrounding topography, being situated on an area of high ground which diverts overland flows downstream.

3.44. Obtained LIDAR information confirms that the surface water flood extent is generated predominantly from the accumulation of surface water on site, with some influence from land to the east, which sits at a higher elevation.

3.45. Overland flows on site will be mitigated against via the proposed daylighting of the onsite culverted watercourse as part of the proposed development. Therefore, the post development scenario for surface water flooding will have significantly reduced extents.

3.46. Overall, the existing site is depicted as being subject to some areas of surface water flooding, however, given the likely inaccuracies in the mapping on account of not considering the existing culverts, the flood risk from pluvial sources post development is considered to pose a low risk. Mitigation measures for any remaining residual risk are presented in Section 5.

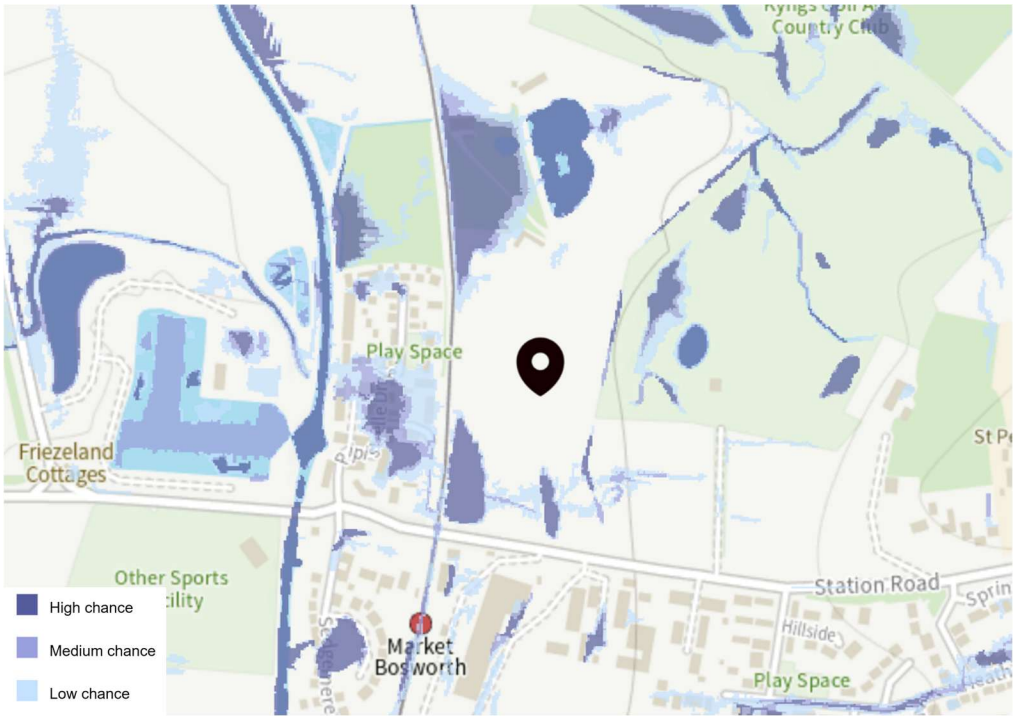


Figure 8 – EA mapping depicting the yearly chance of flooding between 2040 and 2060.

Flood Risk from Sewers

3.47. Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system

becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.48. The PFRA outlines there are numerous locations in the Leicestershire region that have experienced sewer flooding historically. However, the PFRA also highlights that the available records fail to include detailed information on the causes or impacts of any flooding. Additionally, Table 4-5 in the PFRA provides a list of areas where flooding has affected five or more locations.

3.49. None of the areas identified in the PFRA are located within the vicinity of the site.

3.50. Given that local elevations in the area fall consistently in a westerly direction, with no residential development to the east of the site, it is unlikely that any sewer flooding would enter the development. Furthermore, sewer flooding from residential development to the south would likely be channelled west along Station Road before entering the proposed development.

3.51. There are several existing sewers which traverse the site however, there is no historical evidence theses sewers flooding.

3.52. Furthermore, the highway drain within the site is to be diverted into the proposed ditch. To eliminate any flood risk associated with this sewer, levels will be profile such that any accumulation in surface water from the existing chamber located on site will be directed to the ditch and away from the proposed development.

3.53. Therefore, the risk posed to the site from sewer flooding is considered to be low.

Effect of Development on Wider Catchment

Impedance of Flood Flows

3.54. The development will influence the existing pluvial flow route through the site, which potentially accounts for overland flows developed from land to the west. However, the ultimate outfall for the existing pluvial flow route will remain unchanged.

3.55. Furthermore, the existing flood extents associated with these overland flows will be reduced as part of the proposed development through the onsite management of surface water. This provides a betterment to the site and surrounding area.

Development Drainage

3.56. As a predominantly greenfield site, the proposed development will introduce impermeable areas including roads and buildings. These impermeable areas have the potential to increase surface water runoff rates.

3.57. The implementation of a sustainable drainage strategy utilising SuDS will restrict any offsite increase in surface water runoff, and provide sufficient attenuation onsite to accommodate the consequent accumulation of surface water.

4. SEQUENTIAL AND EXCEPTION TEST

4.1. In accordance with the NPPF it is a requirement to locate new development in areas at the lowest risk of flooding. This is achieved through the application of the Sequential Test and where necessary, the Exception Test.

4.2. The planning guidance states that *"the approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, **so far as possible**, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding."*

Sequential Test

4.3. The sequential test is used to avoid flood risk to people and property by steering new development to areas at little or no risk of flooding. This is to be based on current and future medium and high risk flood areas considering all sources of flooding.

4.4. The site is located entirely within Flood Zone 1 and, there are small extents of medium to high risk surface water flooding in the centre of the site. The surface water flooding occurs under existing site conditions as such, in the post development scenario the extents will be significantly reduced. Furthermore, levels will be profiled such that overland flows avoid any proposed dwellings.

4.5. The proposal will therefore be suitably located and considered to be in accordance with the NPPF. A Sequential Test has been undertaken by Fisher German which concludes the Sequential Test is passed and no further action is required.

Exception Test

4.6. The Exception Test poses additional conditions on new developments, and may be required where it is not possible to locate new development in lower risk areas.

4.7. The need for the Exception Test depends on what Flood Zone the site is situated in and the potential vulnerability of the development and therefore, the criteria applied solely relates to information produced by the EA/SFRA for flooding from rivers and seas.

4.8. The proposed development is located entirely within Flood Zone 1 and is identified as 'More Vulnerable' under the Flood Risk Vulnerability Classification set out in Annex 3 of the NPPF.

4.9. Table 2: Flood risk vulnerability and flood zone 'incompatibility' provided within the PPG, and reproduced in Table 3 below, confirms that the Exception Test is not required based on the above grounds.

Table 3 – Flood risk vulnerability and flood zone 'incompatibility'. See the Planning Practice Guidance for further details.

Flood Zones	**Flood Risk Vulnerability Classification** - Exception Test is not required X Development should not be permitted				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	-	-	-	-	-
Zone 2	-	Exception Test required	-	-	-
Zone 3a †	Exception Test required †	X	Exception Test required	-	-
Zone 3b *	Exception Test required *	X	X	X	- *

5. FLOOD RISK MITIGATION

5.1. Section 3.0 has identified the sources of flooding which pose a potential risk to the site and the proposed development, with Section 4.0 applying the Sequential Test and Exception Test where necessary. This section of the FRA sets out the mitigation measures to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Finished Levels

5.2. Finished floor levels of dwellings should be set at 150mm above surrounding ground levels to deter any overland flow from entering dwellings.

5.3. Ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point/feature. This should provide sufficient mitigation to address any residual groundwater risks.

Safe Access and Egress

5.4. Proposed access and egress routes pass entirely through areas within Flood Zone 1 and are at low risk of flooding, therefore no mitigation is required.

5.5. No additional mitigation is therefore required.

Sources of Flooding from offsite

5.6. As part of the proposed development, and to mitigate the impact of SW flooding and sheet flow that stems from the east the site, a surface water cut-off feature is proposed to the east of the site, within the areas allocated for the village green and area of bio-diversity enhancement.

5.7. This will prevent any runoff that stems from outside the site along the eastern boundary.

5.8. Surface water runoff will be intercepted and conveyed to the swales to the west of the site.

Existing Culvert

5.9. Should the culvert traversing the railway become blocked, damaged or collapsed, there is a risk that the railway banking along the western boundary will act as an embankment leading to the attenuation of surface water in the southwestern corner of the site.

5.10. The level of surface water flooding however, would be limited to the top level of the railway banking, at which point surface water would overtop and flow west away from the site.

5.11. LIDAR level information along the existing railway suggests the track level sits at a relatively consistent level of around 95.0m AOD.

5.12. It can be concluded therefore, that the maximum flood level on site as a result of a blocked, damaged or collapsed culvert is approximately 95.0mAOD.

5.13. It is suggested therefore, that all dwellings along the western site boundary are to have FFLs set above a level of 95.15mAOD.

5.14. No further mitigation is required.

Proposed Daylighting of Culverted Watercourse

5.15. The existing culverted watercourse on site, to which the onsite ditches converge, is to be daylighted, reverting the watercourse to its natural state.

5.16. Not only will this generate an environmental and ecological betterment, but will also decrease potential flood risk on and off site.

5.17. Daylighting the watercourse will remove restrictive structures, eliminating the potential for blockage and any related flood risk. All new culverts are to be deigned to minimise the risk of blockage and to form part of the Operation and Maintenance manual for the site.

Surface Water Drainage

5.18. Mitigation against the increase in onsite surface water accumulation as a result of an increased impermeable area, is proposed through the implementation of a surface water drainage network incorporating SuDS.

5.19. The proposed SuDS will operate as attenuation features and be strategically located to facilitate conveyance, minimise land raising and provide suitable routes to outfall surface water.

5.20. Additionally, as part of the development the existing culvert on site will be diverted and daylighted to improve flow, flood resilience and ecological value.

5.21. Details of the proposed sustainable drainage strategy are provided in Section 6.0.

6. SUSTAINABLE DRAINAGE STRATEGY

Drainage Hierarchy

6.1. The Planning Policy Guidance and the SuDS Manual identify that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

6.2. The aim of this is approach is to manage surface water runoff close to where it falls and mimic natural drainage as closely as possible.

6.3. BGS online mapping identifies the site to be underlain by a superficial geology of "Bosworth Clay Member".

6.4. Infiltration testing has not been completed at the site however, given the geological conditions, it is deemed at this stage that infiltration will not be a viable means of surface water discharge.

6.5. Should infiltration testing be completed at the site at a later stage, and sufficiently high infiltration rates above the minimum rate specified by CIRIA are obtained, then infiltration as a means of surface water discharge could be considered.

6.6. The next most desirable means of surface water discharge is to a watercourse.

6.7. The site falls consistently in a westerly direction towards an existing culvert in the southwest corner of the site. Given the steep topography of the site overland flows naturally develop which are intercepted by the existing watercourses within and bordering the site. Surface water ultimately outfalls from these watercourses to the aforementioned existing culvert.

6.8. Therefore, in accordance with the existing conditions on site and the drainage hierarchy, surface water from the proposed development will discharge to the existing culvert.

Peak Flow Control

6.9. In order to comply with the Non-Statutory Technical Standards for Sustainable Drainage Systems, runoff from greenfield developments should not exceed the equivalent greenfield runoff rates for the 1- and 100-year return period events. The site is classed entirely as greenfield.

6.10. The ICP SUDS Rural Runoff Calculator was used to calculate the Greenfield runoff rate for the site, which produced a Qbar of 4.4l/s/ha.

6.11. Therefore, the discharge rate from the development has been calculated by applying the rate of 4.4l/s/ha to the total development area of the site (3.57ha) – this equates to 15.72l/s.

6.12. This accords with the comments made by the LLFA, a response to which is provided in **Appendix 4.**

Attenuation Storage

6.13. As the development proposes restricting the runoff rate, it is necessary to provide sufficient attenuation storage to accommodate the excess volume safely within the site.

6.14. To facilitate a gravity fed drainage system, the surface water storage should be positioned such that it can receive runoff from the development and discharge from the site via gravity without the need for surface water pumping facilities.

6.15. It is proposed that two attenuation basins are strategically located at low points along the southern boundary, in areas of public open space.

6.16. In the absence of a detailed layout, the catchment area discharging to each basin has been calculated by assuming 65% impermeability of the developable areas of the site, which are shown on the Development Framework Plan (**Appendix 3**). An additional 10% was added to account for urban creep.

6.17. The proposed drainage network has been modelled using Microdrainage Calculations as provided in **Appendix 5**.

6.18. The results demonstrate sufficient capacity within the system and, that the two attenuation basins providing a combined attenuation volume of 2,266m^3 cater for all storm events up to and including the 1 in 100 year plus 40% Climate Change event. The proposed drainage strategy for the site can be found in **Appendix 6**.

Long Term Storage Requirements

6.19. The Non-Statutory Technical Standards for Sustainable Drainage Systems S4-S67 states that where reasonably practical the runoff volume from a development for the 1 in 100- year 6 hour rainfall event should not exceed the runoff volume prior to development or redevelopment. Additionally, if practicable on previously developed sites, the runoff volume should not exceed the equivalent greenfield runoff volume.

6.20. Where it is not reasonably practicable to constrain the volume of runoff from a development at or below the existing volume, then the runoff must be discharged in a manner that does not adversely affect flood risk, i.e.:

i. The additional runoff volume resulting from the development (the 'long term storage volume') should be discharged separately from the site at a rate of 2l/s/ha or less. Or,
ii. All the runoff volume from the development should be discharged at a rate equivalent to the mean annual flow rate (QBAR) rate under greenfield conditions or less. Or,
iii. All runoff volume from the development should be discharged at a rate of 2l/s/ha or less.

6.21. As the development complies with the volume control criterion and proposed a discharge at a rate equivalent to the greenfield (1:1) rate, provision for long term storage is not required.

Sustainable Drainage Systems

6.22. CIRIA C753 provides extensive guidance on the use of appropriate sustainable drainage techniques. This document has been utilised in considering surface water drainage design in conjunction with applying the hierarchical approach.

6.23. The following SuDS features have been utilised within the strategy or are recommended for further consideration at detailed design.

i. Detention Basins
ii. Silt traps
iii. Sump outfall units/gullies
iv. Vortex flow control (should infiltration prove unsuitable at a later date)
v. Swales
vi. Permeable paving

6.24. The use of trapped gullies and catchpit manholes is recommended, providing additional treatment within potential pollutant areas such as access roads and turning heads.

6.25. Attenuation basins are to be incorporated to attenuate surface water runoff. Attenuation basins provide a treatment stage, providing an increase in water quality. The proposed basins are to be dry, without permanent water, and to be planted with appropriate species.

6.26. Open SUDs features have followed the standing advice and have maximum side slopes of 1:3 and a 300mm freeboard.

6.27. Permeable paving has been proposed on all shared driveways as a means of at source SuDS, which will act to improve water quality.

Water Treatment

6.28. To ensure the preservation of water quality on site, the treatment potential of the proposed SuDS features has been assessed using the Index Approach detailed in CIRIA 753.

6.29. This assigns a pollution index value to potential pollution sources, and a mitigation index to any SuDS devices. These indices are then compared via the following equation replicated from CIRIA 753.

Where the mitigation index of an individual component is insufficient, two components (or more) in series will be required, where:

Total SuDS mitigation index = mitigation index $_1$ + 0.5 (mitigation index $_2$)

Where:

mitigation index $_n$ = mitigation index for component n

A factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations

6.30. The indices utilised are selected based on Table 26.2 and Table 26.4 of CIRIA 753.

6.31. This assessment and the results are identified in Table 4 below:

Table 4 – Pollution and mitigation indices for the proposed development

	Total Suspended Solids	Metals	Hydrocarbons
Pollution Index (Residential Roofs)	0.2	0.2	0.05
Pollution Index (Driveways, Residential Roads)	0.5	0.4	0.4
Worst-case Pollution Index	**0.5**	**0.4**	**0.4**
Mitigation Index (Detention Basin)	0.5	0.5	0.6
Water Treatment Satisfied?	✓	✓	✓

Maintenance

6.32. Requirements for ongoing maintenance of the drainage network should form part of the Operation and Maintenance manual for the site and should be undertaken by the site management. Any specialist or proprietary products that are specified at detailed design would have a manufacturer specific maintenance regime which should be included within the document.

6.33. It is envisaged that the Operation and Maintenance manual will be developed at the detailed design stage, but some examples are included below. This is to be developed in accordance with the Operation and Maintenance requirements as set out within Tables 13.2 and 23.1 reproduced overleaf:

i. All drainage features should be located in open areas which are readily accessible.
ii. Gullies should be inspected and de-silted at least once a year, where necessary.
iii. Pipes, manholes and silt traps should be inspected and de-silted at least once a year, where necessary.
iv. The surface water attenuation areas should be seeded with a wildflower grass seed mix that can tolerate wet ground conditions.
v. Regular inspections of the attenuation basin should be undertaken to remove litter/debris, invasive/colonising vegetation and silt build up as necessary. Inlet and outlet structures to be regularly inspected, with remedial work as required to maintain water flows and prevent silt/vegetation build up.
vi. Vegetation/grass with the attenuation basin should be maintained appropriately to allow establishment and promote habitat formation, without impeding the operation of the inlet and outlet structure.
vii. Any vortex controls, such as Hydro-brakes, should be inspected every 6 months, litter/debris and silt build up should be removed as necessary.
viii. Permanent signage should be provided in multi-function open space that may infrequently flood during extreme events. Signage should be informative and clear and will be considered in more detail at detailed design stage.
ix. A 3m wide maintenance margin alongside the existing watercourses to be retained to ensure ongoing maintenance can be undertaken with adequate working space.

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Figure 9 – Extract from CIRIA C753 detailing the maintenance requirements for a detention basin

Foul Drainage

6.34. Foul drainage from the development will discharge to the 300mm combined sewer located within the site via MH SK39035201. This is confirmed within the Severn Trent Water Developer Enquiry included in **Appendix 7**.

6.35. Due to the steep nature of the site, and the level difference between the invert level of the proposed foul outfall and the western boundary, a pumping station will be required to pump flows from plots located in the western half of the site.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Produced on behalf of Richborough, this FRA supports an outline planning application for a residential development for up to 126 dwellings off Station Road, Market Bosworth. As such, the content and level of detail is subject to the nature of the proposals.

7.2. This FRA has been prepared in accordance with the requirements set out in the NPPF and the associated Planning Practice Guidance, with the support of local-level reports, plans and policies.

7.3. This report demonstrates that the proposed development is not at significant flood risk, and simple mitigation measures are recommended to address any residual risk. The identified risks and mitigation measures are summarised in Table 5.

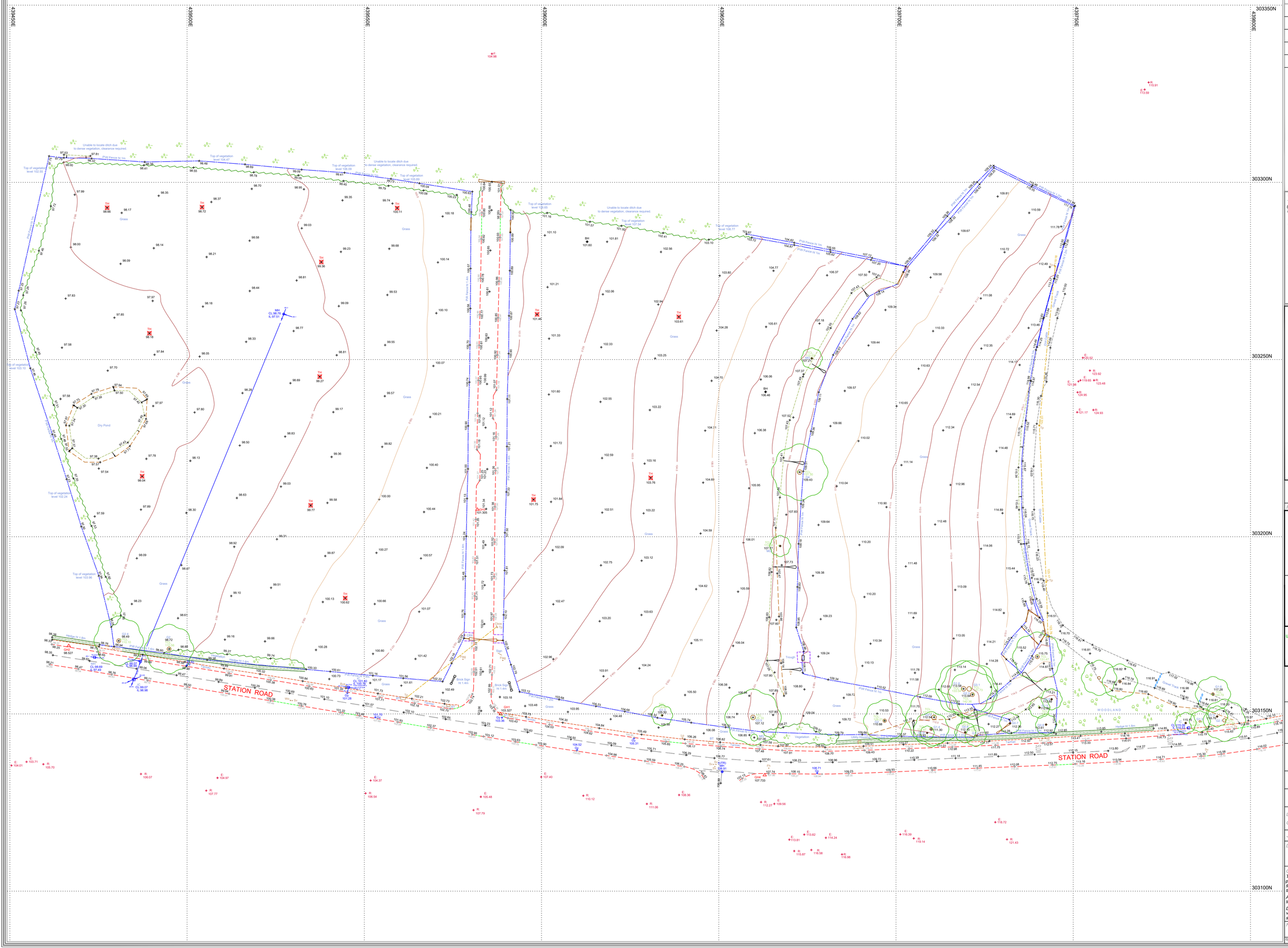
Table 5 – Summary of Flood Risk Assessment

Flood Source	Risk and Proposed Mitigation Measures
Pluvial runoff, Sewers and Groundwater	Risk from most sources is considered to be low with only the low-risk pluvial flood extents. Houses are to be set 150mm above surrounding ground levels to deter overland flows. Ground are to be profiled to encourage overland flows away from the built development and towards the nearest drainage point.
Impact of the Development	The impermeable area of the site will be increased. This will be mitigated by a SuDS network comprised of: a control chamber reducing flow into the existing culvert to greenfield rates; sufficient storage for a 1:100 year plus climate change event provided by detention basins; and the daylighting of an existing culvert. The development will also provide a betterment to the wider catchment by alleviating the existing overland flows that emanate from the existing site.
This summary is to be read in conjunction with the full report. It reflects an assessment of the site conducted by PJS Consulting Engineers based on the information received by PJS at the time of production.	

7.4. In compliance with the requirements of National Planning Policy Framework, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area, and in fact result in a betterment downstream, as a result of suitable management of surface water runoff discharging from the site.

Appendix 1

Topographical Survey



N

Station Information:

Station	Easting (m)	Northing (m)	Level (m)
GH1	439588.515	303149.979	103.327
GH2	439466.644	303169.215	98.527
GH3	439581.923	303207.700	101.305
GH4	439662.991	303132.741	107.733
GH5	439814.478	303141.296	116.641

OS Note:

This survey has been orientated to the Ordnance Survey (O.S) National Grid OSGB36(15) via Global Navigation Satellite Systems (GNSS) 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 OSTN15GB & OSGM15GB transformation models.

The survey has been correlated to this point and a further one or more OSGB36 (15) points established to create a true O.S. 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 Table to enable establishment of the on-site grid and datum.

Legend:

Buildings; Wall; Fence; Line marking; Grip kerb; Centre line; Top of bank; Ridge; 100.000 Station Level; Tree / Bush / Sapling; Area of Undergrowth; Woodland; R: Ridge Level; E: Eaves Level; F: Flat Roof Level; Gate

Fence types: IW Intervisiveness; IR Iron Railings; WM Wire Mesh; PR Post & Rail; PW Post & Wire; CL Chain Link; WP Wooden Panels; CB Close Boarded; SP Steel Palisade

Overhead Cable; Concrete edge; Concrete edge; Grass verge; Canopy/Overhang; Hedge; Bottom of bank; Bank Top; Station and Name

IC Inspection chamber; Pipe Pipe Invert; Gy Gully; Bg Back gully; Dp Down pipe; Pipe Pipe above ground; MH Manhole; WL Water level; FI Flood light; Lp Lamp post; Tp Telegraph post; Ep Electricity post; TI Traffic light; Bus Bus stop; Sv Stop valve; St Stop tap; Er Earth rod; Wm Water meter; Gas Gas valve; Air Air valve; ICU Unidentified inspection; Wm Wash out; Re Rodding eye; BB Bellsha beacon; CTV Cable tv; Mk Marker post; Gmkr Gas marker post; So Soffit; Fh Fire hydrant

Bo Bollard; Bi Illuminated bollard; Bin Rubbish bin; Vp Vent pipe; Gvt Ground light; Lbox Letter box; Stump Tree Stump; Sty Stile; IFL Internal floor level; THL Threshold level; Sp Sign post; Ts Trashbin; BH Borehole; ELC Electric; BT British Telecom; Ctrol Control box; TT Tactile; BP Brick paved; CPS Concrete paving slabs; CVR Cover; Rwall Retaining wall; TWL Top of Wall Level; TCL Tree canopy level; G Girth; MG Multi girth; IC Inspection chamber; CL Cover level; IL Invert level; UTR Unable to raise; Direction of Flow

Rev.	Date	Description	Drawn	Q. Ref.

greenhatch group

- Topographical Surveys
- Site Engineering
- Utility / CCTV Surveys
- Measured Building Surveys
- 3D Laser Scanning
- Revit & BIM Models

Rowan House
Duffield Road
Little Eaton
Derby
DE21 5DR
Tel (01332) 830044 Fax (01332) 830055
admin@greenhatch-group.co.uk
www.greenhatch-group.co.uk

St Albans: Unit 8, The Courtyard, Albon Park, St Albans, Hertfordshire AL4 0LA, t. (01727) 854481

Newcastle: 24 Riverside Studios, Amethyst Road, Newcastle Bus. Park, Newcastle-U-Tyne NE4 7YL, t. (01912) 736391

London: 27, Cornwall Terrace Mews, Regents Park, London NW1 5LL, t. (02072) 241806

CLIENT
Richborough Estates Ltd

PROJECT
Station Road, Market Bosworth, CV13 0NP

TITLE
Topographical Survey

SCALE	DATE
A1@ 1: 500	26.08.21
DRAWN	QUALITY REF
LP	GH11442

Level datum	See note
Grid orientation	See note
Job number	41211
Drawing No.	Rev.
41211_T	0

Comments

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

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

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

Notes:

© Copyright Greenhatch Group 06/07/13

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	439400.511	303173.509	97.340
BWB02	439333.714	303191.507	99.907
BWB03	439510.147	303161.889	99.977

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- 0.25 / 1 — Flow direction and pipe diameter
- Station and Name
- BH 1 — Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- +50.00 — Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
		Gas	Gas	TL	Traffic Light
DK	Drop Kerb	GV	Gas Valve	TP	Telegraph Post
DP	Down Pipe	GY	Gully	TS	Traffic Signal
Elec	Electric	Ht	Height	UTS	Unable to Survey
EP	Electricity Post	IC	Inspection Chamber	WL	Water Level
ER	Earth Rod	IFL	Internal Floor Level	WM	Water Meter
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev
P1	12.11.20	First Issue	SS	DS

Issues & Revisions

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

- ■ Birmingham | 0121 233 3322
- □ Leeds | 0113 233 8000
- □ London | 020 7407 3879
- □ Manchester | 0161 233 4260
- □ Nottingham | 0115 924 1100

www.bwbconsulting.com

Client

Turley Associates

Project Title

Land at Station Road Market Bosworth

Drawing Title

Existing Site Plan Sheet 1 of 2

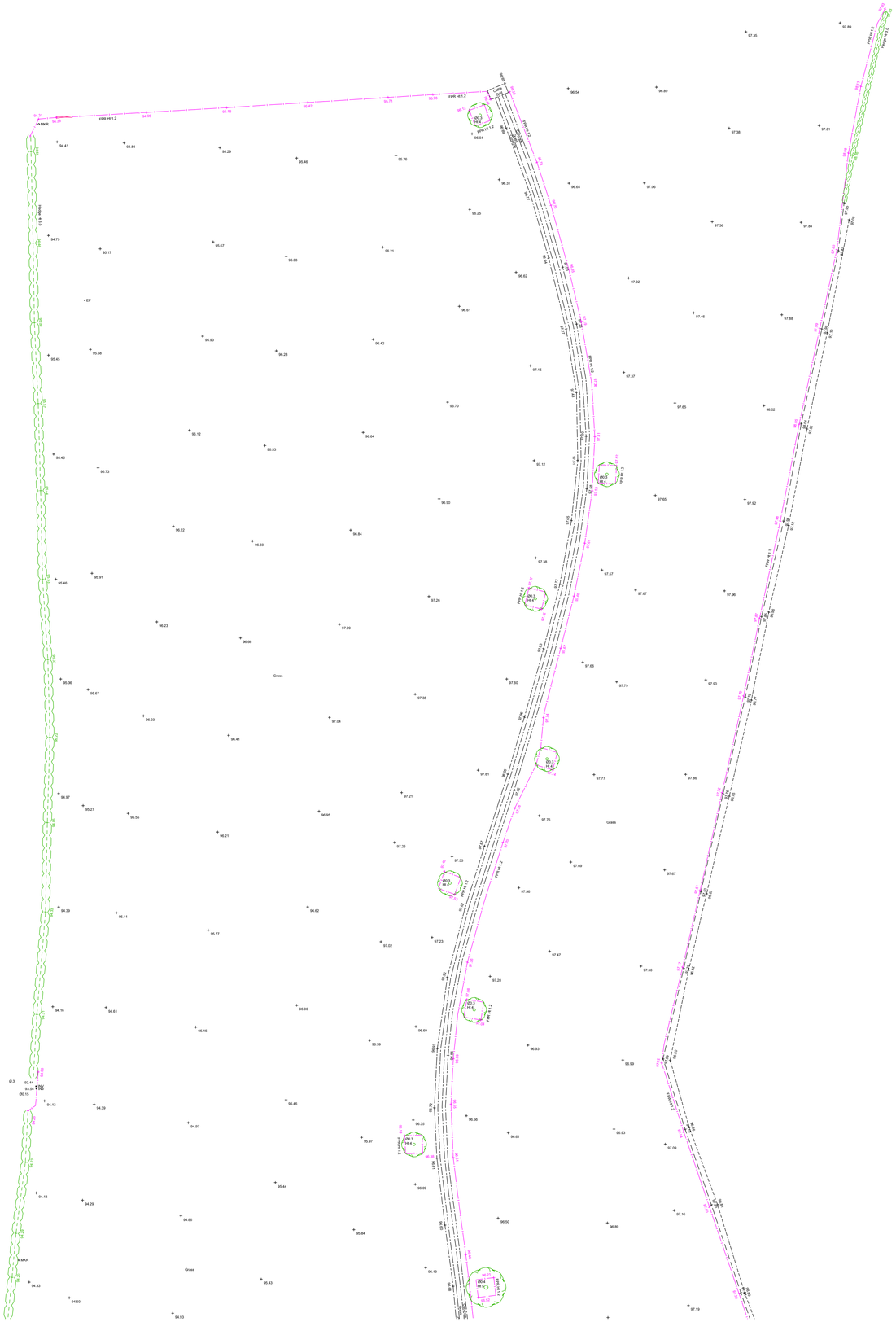
Drawn:	S. D. Shreeves	Reviewed:	D. Smith		
BWB Ref:	BMW3189	Date:	12.11.20	Scale@A1:	1:500

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SMB-BWB-00-01-DR-G-001	S2	P1

© Copyright BWB Consulting Ltd



Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	439400.511	303173.509	97.340
BWB02	439333.714	303191.507	99.907
BWB03	439510.147	303161.889	99.977

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- 0.25 / 1 — Flow direction and pipe diameter
- Station and Name
- BH 1 — Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- +50.00 — Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
		Gas	Gas	TL	Traffic Light
DK	Drop Kerb	GV	Gas Valve	TP	Telegraph Post
DP	Down Pipe	GY	Gully	TS	Traffic Signal
Elec	Electric	Ht	Height	UTS	Unable to Survey
EP	Electricity Post	IC	Inspection Chamber	WL	Water Level
ER	Earth Rod	IFL	Internal Floor Level	WM	Water Meter
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev
P1	12.11.20	First Issue	SS	DS

Issues & Revisions

BWB
CONSULTANCY | ENVIRONMENT
INFRASTRUCTURE | BUILDINGS

- ■ Birmingham | 0121 233 3322
- ☐ Leeds | 0113 233 8000
- ☐ London | 020 7407 3879
- ☐ Manchester | 0161 233 4260
- ☐ Nottingham | 0115 924 1100

www.bwbconsulting.com

Client

Turley Associates

Project Title

Land at Station Road Market Bosworth

Drawing Title

Existing Site Plan Sheet 2 of 2

Drawn:	S. D. Shreeves	Reviewed:	D. Smith		
BWB Ref:	BMW3189	Date:	12.11.20	Scale@A1:	1:500

Drawing Status

PRELIMINARY

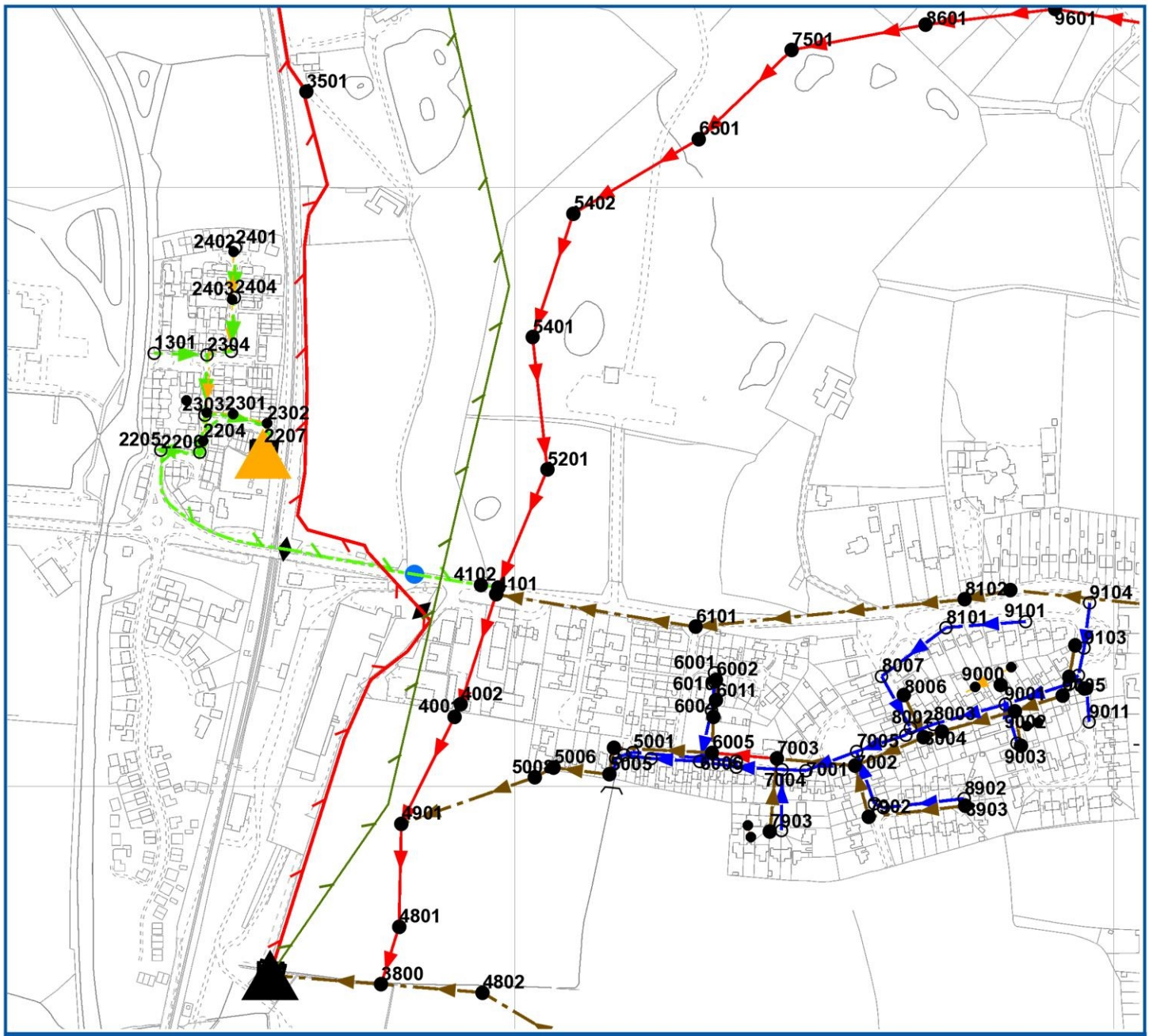
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
SMB-BWB-00-02-DR-G-001	S2	P1

© Copyright BWB Consulting Ltd

Appendix 2

Severn Trent Water

Sewer Records



LEGEND

Operational Site

Waste Water Pump
- Transferred Asset
- S24
- S104
- S102
- Null Private
- Null
- None
- Highway Drain
- Adopted Sewer

Storage
- Disposal Site
- Off-Line Waste Water Storage
- On-Line Waste Water Storage
- Wet Well

Waste Water Process Structure
- Sewage Treatment Point
- Sewage Treatment Structure
- Sludge Treatment Point
- Sludge Treatment Structure

Manhole
- Foul Bifurcation Manhole
- Combined Bifurcation Manhole
- Surface Water Bifurcation Manhole
- Dual Manhole
- Foul Single Manhole
- Combined Single Manhole
- Surface Water Single Manhole
- Twin Manhole
- Foul Adopted Manhole
- Combined Adopted Manhole
- Surface Adopted Manhole
- Transferred Manhole
- Unsurveyed Manhole

Gravity Sewer Pipe
- Foul Gravity Sewer
- Combined Gravity Sewer
- Surface Water Gravity Sewer
- S104 Surface Water Gravity Sewer
- S104 Combined Gravity Sewer
- S104 Foul Gravity Sewer
- Private Surface Water Gravity Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
- Surface Water Unsurveyed Pipe
- Combined Unsurveyed Pipe
- Foul Unsurveyed Pipe
- Transferred Surface Water Sewer
- Transferred Combined Sewer
- Transferred Foul Sewer
- Disposal Pipe
- Overflow Pipe
- Culverted Water Course
- Waste Internal Site Pipe
- Sewer Service Connection
- Gravity Sewer Others

Pressure Sewer Pipe
- Surface Water Pressure Sewer
- Combined Pressure Sewer
- Foul Pressure Sewer
- S104 Surface Water Pressure Sewer
- S104 Combined Pressure Sewer
- S104 Foul Pressure Sewer
- Private Surface Water Pressure Sewe
- Private Combined Pressure Sewer
- Private Foul Pressure Sewer
- Surface Water Vacuum Sewer
- Foul Vacuum Sewer
- Combined Vacuum Sewer
- S104 Surface Water Vacuum Sewer
- S104 Combined Vacuum Sewer
- S104 Foul Vacuum Sewer
- Private Surface Water Vaccum Sewer
- Private Combined Vacuum Sewer
- Private Foul Vacuum Sewer
- Surface Water Siphon
- Combined Siphon
- Foul Siphon
- Private Surface Water Siphon
- Private Combined Siphon
- Private Foul Siphon
- S104 Surface Water Siphon
- S104 Combined Siphon
- S104 Foul Siphon
- Surface Water Unsurveyed Pipe
- Combined Unsurveyed Pipe
- Foul Unsurveyed Pipe
- Disposal Pipe

Service Pipe
- Surface Water Lateral Drain
- Combined Lateral Drain
- Foul Lateral Drain
- S104 Surface Water Lateral Drain
- S104 Combined Lateral Drain
- S104 Foul Lateral Drain
- Private Surface Water Lateral Drain
- Private Combined Lateral Drain
- Private Foul Lateral Drain
- Transferred Surface Water Lateral Dra
- Transferred Combined Lateral Drain
- Transferred Foul Lateral Drain

Ancillary
- Balancing Lagoon
- Grease Trap
- Interceptor
- Screen

Chamber
- Flushing Chamber
- Scalaway
- Overflow

Fitting
- Blind Shaft
- Facility Connector
- Head Node
- Lamphole
- Sewerage Air Valve
- Sewerage Chemical Injection Point
- Sewerage Hatch Box
- Sewerage Pressure Washout
- Vent Column
- Waste Water Outfall

Control Valve
- Hydrobrake
- Penstock
- Sewerage Isolation Valve
- Sewerage Non Return Valve

Print500mLine

Severn Trent Water Limited
Asset Data Management
PO Box 5344
Coventry
CV3 9FT
Telephone: 0345 601 6616

SEWER RECORD

O/S Map Scale: 1:5,000

This map is centred upon:

Date of Issue: 26-06-24

X: 439548.89 **Y:** 303223.62

Disclaimer Statement:

1 **Do not scale off this Map.**

2 This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.

3 On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected 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 sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map.

4 Reproduction by permission of Ordnance Survey on behalf of HMSO. Crown Copyright and database right 2004. All rights reserved.

5 Ordnance Survey licence number: **100031673**

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.

Sewer Node Sewer Pipe Data

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK39032402	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39038005	111.04	109.46	108.73	F	VC	C	150	<UNK>	21.66	31/12/1899 00:00:00
SK40020804	115.1399	112.83	110.31	F	VC	C	150	<UNK>	22.81	31/12/1899 00:00:00
SK39034001	99.11	96.58	96.19	C	VC	C	300	<UNK>	260.31	31/12/1899 00:00:00
SK39034103	99.1299	97.12	97.07	C	VC	C	300	0	117	31/12/1899 00:00:00
SK39039000	<UNK>	<UNK>	<UNK>	F	VC	U	150	<UNK>	<UNK>	31/12/1899 00:00:00
SK39032306	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK40030101	121.92	120.07	116.76	F	VC	C	175	<UNK>	43.44	31/12/1899 00:00:00
SK39035002	102.9599	101.19	100.73	F	VC	C	150	<UNK>	52.89	31/12/1899 00:00:00
SK39039103	116.6299	114.77	114.4	S	VC	C	225	<UNK>	63.11	31/12/1899 00:00:00
SK39028903	114.2099	111.69	107.34	F	VC	C	150	<UNK>	18.76	31/12/1899 00:00:00
SK39038001	109.2799	107.59	106.26	S	CO	C	300	<UNK>	32.57	31/12/1899 00:00:00
SK40030003	<UNK>	<UNK>	<UNK>	F	VC	C	<UNK>	<UNK>	<UNK>	19/02/2017 00:00:00
SK39032303	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39032303	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39036007	105.47	103.82	103.79	S	CO	C	375	<UNK>	105.33	31/12/1899 00:00:00
SK39036007	105.47	104.52	103.21	S	CO	C	<UNK>	<UNK>	23.77	31/12/1899 00:00:00
SK39035003	103.11	101.77	101.63	S	CO	C	375	<UNK>	54.43	31/12/1899 00:00:00
SK39034002	99.12	96.62	96.59	C	VC	C	<UNK>	<UNK>	298	31/12/1899 00:00:00
SK39036003	106.6	105.02	103.3	S	VC	C	<UNK>	<UNK>	25.1	31/12/1899 00:00:00
SK40020705	108.36	106.56	104.89	S	CO	C	300	<UNK>	13.68	31/12/1899 00:00:00
SK39025701	99.0199	97.4	96.16	F	VC	C	225	<UNK>	70.53	31/12/1899 00:00:00
SK39027903	107.05	105.2	104.49	F	VC	C	<UNK>	<UNK>	83.39	31/12/1899 00:00:00
SK39036011	107.3	105.26	105.03	F	VC	C	150	<UNK>	48.61	31/12/1899 00:00:00
SK39038006	111.0299	109.56	108.73	F	VC	C	150	<UNK>	46.36	31/12/1899 00:00:00
SK39039102	116.4599	115.31	114.96	F	VC	C	150	<UNK>	75.66	31/12/1899 00:00:00
SK39037501	102.08	100.48	98.79	C	VC	C	300	<UNK>	63.78	31/12/1899 00:00:00
SK39038601	104.9199	102.24	100.48	C	GRP	C	300	0	64.23	31/12/1899 00:00:00
SK39036008	105.29	103.74	101.95	S	CO	C	375	<UNK>	48.2	31/12/1899 00:00:00
SK39024802	97.01	96.16	<UNK>	F	VC	C	225	<UNK>	<UNK>	31/12/1899 00:00:00
SK39027904	107.05	105.14	104.56	S	VC	C	225	<UNK>	86.22	31/12/1899 00:00:00
SK39035402	99.76	98.31	97.94	C	VC	C	300	<UNK>	294.22	31/12/1899 00:00:00
SK39026701	101.44	99.99	97.45	F	VC	C	225	<UNK>	35.54	31/12/1899 00:00:00
SK39039105	119.8199	116.74	115.8	F	VC	C	175	<UNK>	41.31	31/12/1899 00:00:00
SK39037002	107.7099	105.86	104.41	F	VC	C	<UNK>	<UNK>	45.6	31/12/1899 00:00:00
SK39038004	110.26	108.69	105.87	F	VC	C	150	<UNK>	21.8	31/12/1899 00:00:00
SK39036010	107.8	105.86	105.04	S	VC	C	<UNK>	<UNK>	31.91	31/12/1899 00:00:00
SK40020803	114.0899	111	109.12	S	VC	C	225	<UNK>	35.74	31/12/1899 00:00:00
SK40020702	110.5599	106.4	<UNK>	F	VC	C	225	<UNK>	0	31/12/1899 00:00:00
SK39039601	103.953	102.33	102.24	C	VC	C	300	<UNK>	1205.78	31/12/1899 00:00:00
SK39036001	108.0199	106.04	105.89	S	VC	C	150	<UNK>	33.33	31/12/1899 00:00:00

Sewer Node Sewer Pipe Data

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK39029703	<UNK>	<UNK>	103.9	F	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK39038101	116.5	114.43	110.54	S	VC	C	225	<UNK>	17.43	31/12/1899 00:00:00
SK39038102	118.54	115.78	105.14	F	VC	C	175	<UNK>	21.15	31/12/1899 00:00:00
SK39039007	116.25	114.94	114.53	F	VC	C	150	<UNK>	40.88	31/12/1899 00:00:00
SK39039009	117.1699	115.71	<UNK>	S	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SK39039008	116.15	114.39	<UNK>	S	VC	C	225	<UNK>	0	31/12/1899 00:00:00
SK39036006	104.57	103.21	102.42	S	CO	C	<UNK>	<UNK>	50.89	31/12/1899 00:00:00
SK39036501	100.3499	98.79	98.31	C	VC	C	300	0	253.31	31/12/1899 00:00:00
SK39023800	<UNK>	96.16	<UNK>	F	VC	C	225	<UNK>	<UNK>	31/12/1899 00:00:00
SK39035008	100.3199	98.87	96.43	F	VC	C	150	<UNK>	48.22	31/12/1899 00:00:00
SK39032401	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39036004	106.61	103.25	102.88	F	VC	C	<UNK>	<UNK>	86.65	31/12/1899 00:00:00
SK39027701	103	101.53	100.01	F	VC	C	225	<UNK>	61.19	31/12/1899 00:00:00
SK39039004	117.1299	114.89	112.62	S	VC	C	225	<UNK>	15.19	31/12/1899 00:00:00
SK39039104	119.0999	117.51	114.8	S	VC	C	150	<UNK>	14.2	31/12/1899 00:00:00
SK39024801	96.5	95.79	<UNK>	C	VC	C	300	<UNK>	<UNK>	31/12/1899 00:00:00
SK39037004	106.25	104.37	103.82	S	CO	C	300	<UNK>	67.67	31/12/1899 00:00:00
SK39032302	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39035004	102.8199	101.49	99.79	S	CO	C	450	<UNK>	10.65	31/12/1899 00:00:00
SK39035401	99.3499	97.94	97.51	C	VC	C	300	<UNK>	259.47	31/12/1899 00:00:00
SK40030000	<UNK>	<UNK>	<UNK>	F	VC	C	<UNK>	<UNK>	<UNK>	19/02/2017 00:00:00
SK39039011	119.7699	118.63	115.77	S	VC	C	150	<UNK>	9.81	31/12/1899 00:00:00
SK39035201	98.7699	97.51	97.12	C	VC	C	300	<UNK>	272.54	31/12/1899 00:00:00
SK39035006	<UNK>	<UNK>	98.88	F	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK39037001	106.94	105.05	104.41	S	CO	C	300	<UNK>	31.28	31/12/1899 00:00:00
SK39032304	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39037005	107.83	106.23	105.05	S	CO	C	300	<UNK>	39.19	31/12/1899 00:00:00
SK39034101	99.12	0	0	C	VC	<UNK>	0	0	0	31/12/2009 00:00:00
SK39034101	99.12	97.12	96.69	C	VC	C	<UNK>	<UNK>	225.28	31/12/1899 00:00:00
SK39028701	<UNK>	<UNK>	101.56	F	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK39027902	109.76	107.29	105.92	F	VC	C	150	<UNK>	32.93	31/12/1899 00:00:00
SK39039002	114.72	112.6	109.52	F	VC	C	150	<UNK>	20.56	31/12/1899 00:00:00
SK39038002	109.9499	107.84	107.64	S	VC	C	225	<UNK>	36.05	31/12/1899 00:00:00
SK39029701	105.65	103.88	<UNK>	F	VC	C	225	<UNK>	0	31/12/1899 00:00:00
SK39036009	103.73	102.41	102	S	CO	C	300	<UNK>	56.15	31/12/1899 00:00:00
SK39039010	117.12	115.55	114.95	F	VC	C	150	<UNK>	27.33	31/12/1899 00:00:00
SK40030601	104.4499	103.06	102.38	C	VC	C	300	<UNK>	118.28	31/12/1899 00:00:00
SK39027901	109.3899	106.99	106.41	S	VC	C	225	<UNK>	79.6	31/12/1899 00:00:00
SK39024901	98.26	96.19	95.81	C	VC	C	300	<UNK>	226.34	31/12/1899 00:00:00
SK39032305	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39039003	117.4499	115.51	112.62	F	VC	C	150	<UNK>	10.18	31/12/1899 00:00:00
SK39032301	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00

Sewer Node Sewer Pipe Data

Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK39032301	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39032206	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39028901	110.26	107.15	107.02	S	VC	C	225	<UNK>	65.69	31/12/1899 00:00:00
SK39039101	117.01	115.04	114.46	S	VC	C	150	<UNK>	114.12	31/12/1899 00:00:00
SK39032403	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39028902	113.7399	112	107.19	S	VC	C	150	<UNK>	14.03	31/12/1899 00:00:00
SK39034102	0	0	97.29	F	VC	C	225	0	<UNK>	31/12/1899 00:00:00
SK39032207	0	0	0	F	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39035001	103.26	101.95	101.84	S	CO	C	375	<UNK>	66.18	31/12/1899 00:00:00
SK39031301	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39039006	116.12	114.23	112.53	S	CO	C	300	<UNK>	32.74	31/12/1899 00:00:00
SK39038007	112.79	110.34	107.89	S	VC	C	225	<UNK>	20.1	31/12/1899 00:00:00
SK39037003	106.47	104.38	102.76	C	VC	C	<UNK>	<UNK>	33.48	31/12/1899 00:00:00
SK39035005	102.1299	100.72	<UNK>	F	VC	C	150	<UNK>	0	31/12/1899 00:00:00
SK39036005	104.85	102.75	101.2	F	VC	C	<UNK>	<UNK>	52.4	31/12/1899 00:00:00
SK39036101	106.8399	105.08	97.29	F	VC	C	<UNK>	<UNK>	21.65	31/12/1899 00:00:00
SK39038003	110.73	108.67	107.61	S	CO	C	300	<UNK>	23.3	31/12/1899 00:00:00
SK39039001	114.5299	112.51	108.68	S	CO	C	300	<UNK>	16.28	31/12/1899 00:00:00
SK39039005	116.0599	114.52	112.72	F	VC	C	150	<UNK>	23.37	31/12/1899 00:00:00
SK39032404	0	0	0	S	<UNK>	<UNK>	0	0	0	31/12/1899 00:00:00
SK39036002	108.08	105.74	105.28	F	VC	C	150	<UNK>	36.96	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	22/12/2022 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	22/12/2022 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	13/03/2023 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	31/12/1899 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	13/03/2023 00:00:00
<UNK>	<UNK>	<UNK>	<UNK>	F	VC	<UNK>	<UNK>	<UNK>	<UNK>	02/12/2023 00:00:00

Appendix 3

Development Framework Plan

KEY

- APPLICATION BOUNDARY 7.964 HECTARES / 19.679 ACRES
- ACCESS VIA STATION ROAD
- RESIDENTIAL DEVELOPMENT
- PUBLIC OPEN SPACE (INC. SUDS)
- PRIMARY TREE LINED MOVEMENT ROUTE INCORPORATING CYCLE AND PEDESTRIAN MOVEMENT
- SECONDARY MOVEMENT ROUTE INCORPORATING RAINWTARE GARDENS
- TERTIARY STREET
- PRIVATE LANE
- RETAINED FARM TRACK ACCESS FOR WHARF AND GODSONS HILL FARM
- PRIMARY PEDESTRIAN / CYCLE MOVEMENT ROUTE
- PEDESTRIAN MOVEMENT ROUTE
- MOWN PATH MOVEMENT ROUTE
- EXISTING VEGETATION WITH ROOT PROTECTION AREA
- PROPOSED STRUCTURAL WOODLAND PLANTING
- PROPOSED LOW-RISE NATIVE HEDGEROW / SHRUBBERY
- PROPOSED NATIVE HEDGEROW PLANTING
- MIXED SCRUB / NEUTRAL GRASSLAND
- WILDFLOWER PLANTING
- PRIORITY HABITAT POND
- PROPOSED ORNAMENTAL PLANTING
- COMMUNITY ORCHARD PLANTING
- LOCALLY EQUIPPED AREA FOR PLAY (LEAP)
- LOCAL AREA FOR PLAY (LAP)
- ACCESS TO EXISTING WHARF FARM AND KYNGS GOLF AND COUNTRY CLUB
- PROPOSED PUMP STATION
- SUSTAINABLE DRAINAGE SOLUTIONS WITH REEDBED PLANTING
- EXISTING VEGETATION TO BE REMOVED

KEY PRINCIPLES

1. PRIMARY ACCESS POINT VIA STATION ROAD;
2. PROPOSED PRIMARY KEY MOVEMENT ROUTE PROVIDING CYCLE AND PEDESTRIAN MOVEMENT THROUGHOUT THE DEVELOPMENT;
3. SECONDARY MOVEMENT ROUTES CREATING CONNECTED STREETS;
4. TERTIARY STREETS SERVING SMALL CLUSTERS OF DEVELOPMENT;
5. MAXIMISE OUTWARD FACING DEVELOPMENT FOR NATURAL SURVEILLANCE;
6. FULLY CIRCULATORY CYCLE / PEDESTRIAN ROUTES PROVIDING ACCESS TO ALL AREAS OF PUBLIC OPEN SPACE;
7. MAXIMUM RETENTION OF EXISTING VEGETATION;
8. PROPOSED TREE AND HEDGEROW PLANTING TO STRENGTHEN EXISTING VEGETATION;
9. AREA OF BIO-DIVERSITY ENHANCEMENTS INCORPORATING NATIVE HEDGEROW PLANTING, PRIORITY HABITAT PONDS, TREE PLANTING AND WILDFLOWER/NEUTRAL GRASSLAND PLANTING WITH LIMITED PUBLIC ACCESS;
10. RELOCATION OF PRIORITY HABITAT PONDS FOR THE GREAT CRESTED NEWT POPULATION;
11. ORCHARD COMMUNITY SPACES;
12. AREAS OF EQUIPPED PLAY AND RECREATION FOR ALL AGES AT BOSWORTH COMMON, ASH GREEN AND BIRCH GREEN;
13. VIEWING CORRIDORS WITH LONG DISTANCE VIEWS TO WIDER COUNTRYSIDE; AND
14. VILLAGE GREEN PROVIDING SPACE TO MEET AND RELAX.

Rev J: Updated in accordance to the testing layout (07.04.25 EA)
Rev I: Updated in accordance (29.10.24 EA)
Rev H: Updates to landscaping. Added farm track to Godsons Hill Farm (19.10.24 EA)
Rev G: Updates to existing and proposed planting (24.10.24 CM)
Rev F: Updated design principles. Updated northern block. General POS and developable area updates. (02.10.24)
Rev E: Updated redline, changes to POS and developable area. (07.10.24 EA)
Rev D: Updated redline. (04.10.24 EA)
Rev C: Updates to layout following client and consultants comments. (26.08.2024 MC)
Rev B: Road alignments updated to run along existing track. (07.08.2024 RL)
REV A: Drainage system changes, and block changes to increase developable area (15.08.2024 EA)
First Issue: (16.07.2024 MC)

Expertly Done.

DESIGN | ECONOMICS | ENVIRONMENT | HERITAGE | LAND & PROPERTY | PLANNING | TRANSPORT & INFRASTRUCTURE

Copyright Pegasus Planning Group Ltd. Crown copyright. All rights reserved. 2022. Ordnance Survey Copyright Licence number 100042093. Promap Licence number 100020449.
Pegasus accepts no liability for any use of this document other than for its original purpose, or by the original client, or following Pegasus' express agreement to such use. T 01285641717 www.pegasusgroup.co.uk

© Pegasus Planning Group Limited. © Crown copyright and database rights OS 100042093. Promap Licence number 100020449. EmapSite Licence number 0100031673. Terms & Conditions @ pegasusgroup.co.uk

LAND NORTH OF STATION ROAD - **DEVELOPMENT FRAMEWORK PLAN**

PEGASUS GROUP

| PEGASUSGROUP.CO.UK | TEAM/DRAWN BY: MC | APPROVED BY: JW | DATE: 19.07.24 | SCALE: 1:1000@A1 | DRWG: P24-1644_DE_003-01 | REV: J | CLIENT: RICHBOROUGH

Appendix 4

Technical Note Response

To LLFA Comments

CONSULTING ENGINEERS
Delivering Innovative Solutions

Technical Note

Richborough
Station Road, Market Bosworth

February 2025
Ref: PJS24-0085-DOC-0015-B

Introduction

This Technical Note has been undertaken on behalf of Richborough in response to comments made by the Lead Local Flood Authority (LLFA) regarding planning application 24/01079/OUT.

LLFA Comments

The comments made by the LLFA are summarised below.

The applicant should consider the developed area of the site and correct the site discharge rate accordingly. As per industry guidance, the greenfield rate should exclude large open spaces and areas not intercepted by the proposed surface water drainage.

The applicant should submit an existing drainage plan which identifies sub-catchments on-site, receptors, drainage features, overland flow routing etc. The proposals should seek to mimic the existing drainage regime of the site and not result in catchment transfer.

Leicestershire County Council as Lead Local Flood Authority (LLFA) advises the Local Planning Authority (LPA) that the application documents as submitted are insufficient for the LLFA to provide a substantive response at this stage. In order to provide a substantive response, the following information is required:

- *Amendment of the site discharge rate as noted.*
- *Update calculations to suit any change in discharge rate.*
- *Existing drainage regime plan to support the discharge rate and outfall.*
- *Consideration of source control SuDS, such as pervious paving.*

Designer Actions

An Existing Catchment Plan (PJS24-0085-DR-0011) has been produced for the site, which demonstrates that the existing catchments on site fall consistently in a westerly direction. The eastern catchment is intercepted by existing on-site watercourses which outfall to a culverted watercourse, which in turn outfalls to a railway culvert to the west of the site. The western catchment is also shown to fall in a south-westerly direction towards this railway culvert.

Manholes located within the neighbouring development to the west of the railway demonstrate that the outfall from the railway culvert continues west. As depicted on the Sustainable Drainage and Landscape proposals for the marina development to the west of the canal, the culverted watercourse is daylighted and diverted north around the development ultimately outfalling to an existing watercourse.

A Developable Area Catchment Plan (PJS24-0085-DR-0014) has also been produced for the site and illustrates a total developable area of 3.57ha. This area is a reduction from the total site area previously used to calculate the discharge rate for the site. Based on the developable area alone, and a Qbar of 4.4l/s/ha, a revised discharge rate of 15.7l/s has been adopted for the site. Accordingly, the micro drainage calculations, pond arrangement and sewer network have been revised to suit the reduced discharge rate. Furthermore, permeable paving has been shown indicatively in the location of all shared driveways, which will act as at source SuDS features.

Appendix 5

Microdrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 3

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Surface Network 3

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.201	4-8	1.665	8-12	0.049

Total Area Contributing (ha) = 2.915

Total Pipe Volume (m³) = 219.861

Network Design Table for Surface Network 3

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	27.212	0.163	167.0	0.087	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	32.869	0.254	129.2	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	30.891	1.163	26.6	0.052	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	23.659	0.820	28.9	0.026	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.45	99.382	0.087	0.0	0.0	0.0	1.01	40.1	11.8
1.001	50.00	5.85	99.144	0.171	0.0	0.0	0.0	1.38	97.7	23.1
2.000	50.00	5.26	101.023	0.052	0.0	0.0	0.0	1.96	34.7	7.0
2.001	50.00	5.47	99.860	0.078	0.0	0.0	0.0	1.88	33.2	10.6

©1982-2019 Innovyze

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.002	25.019	0.390	64.2	0.023	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	15.856	0.580	27.3	0.016	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	31.960	1.090	29.3	0.061	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	33.158	0.525	63.2	0.131	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	16.023	0.130	123.3	0.035	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.002	18.327	0.170	107.8	0.088	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	21.571	0.200	107.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	11.845	0.080	148.1	0.191	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.007	8.387	0.030	279.6	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
1.008	6.582	0.070	94.0	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
1.009	6.638	0.110	60.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.010	14.774	0.160	92.3	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.011	30.361	0.269	112.9	0.029	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.012	20.741	0.072	289.2	0.021	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.013	20.384	0.065	314.3	0.085	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.000	31.956	0.244	131.0	0.109	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	25.704	0.233	110.4	0.143	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.002	50.00	6.06	98.890	0.272	0.0	0.0	0.0	1.97	139.0	36.8
1.003	50.00	6.15	98.500	0.287	0.0	0.0	0.0	3.02	213.4	38.9
1.004	50.00	6.33	97.920	0.349	0.0	0.0	0.0	2.91	206.0	47.2
3.000	50.00	5.34	97.730	0.131	0.0	0.0	0.0	1.65	65.5	17.7
3.001	50.00	5.52	97.130	0.166	0.0	0.0	0.0	1.41	100.0	22.4
3.002	50.00	5.73	97.000	0.254	0.0	0.0	0.0	1.51	107.0	34.4
1.005	50.00	6.51	96.680	0.602	0.0	0.0	0.0	1.96	311.3	81.6
1.006	50.00	6.63	96.480	0.793	0.0	0.0	0.0	1.67	265.4	107.4
1.007	50.00	6.68	96.400	0.793	0.0	0.0	0.0	2.65	4065.8	107.4
1.008	50.00	6.71	96.370	0.793	0.0	0.0	0.0	4.58	7025.0	107.4
1.009	50.00	6.75	96.300	0.793	0.0	0.0	0.0	2.34	258.0	107.4
1.010	50.00	6.88	96.190	0.793	0.0	0.0	0.0	1.89	208.4	107.4
1.011	50.00	7.18	95.805	0.823	0.0	0.0	0.0	1.70	188.2	111.4
1.012	50.00	7.51	95.536	0.844	0.0	0.0	0.0	1.06	117.1	114.3
1.013	50.00	7.84	95.464	0.928	0.0	0.0	0.0	1.02	112.3«	125.7
4.000	50.00	5.47	96.628	0.109	0.0	0.0	0.0	1.14	45.4	14.8
5.000	50.00	5.34	96.616	0.143	0.0	0.0	0.0	1.24	49.4	19.4

©1982-2019 Innovyze

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.001	55.456	0.834	66.5	0.116	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	19.296	0.043	453.9	0.066	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.015	15.307	0.182	84.1	0.014	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.016	21.865	0.245	89.2	0.154	0.00	0.0	0.600	o	375	Pipe/Conduit	
6.000	36.220	0.480	75.5	0.051	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.017	17.470	0.930	18.8	0.057	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.018	38.022	0.150	253.5	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
7.000	16.962	0.171	99.0	0.039	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.001	21.924	0.131	167.0	0.182	0.00	0.0	0.600	o	300	Pipe/Conduit	
7.002	12.742	0.048	268.2	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit	
8.000	35.741	1.592	22.4	0.111	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.003	9.205	0.041	224.5	0.036	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.004	32.952	0.115	286.5	0.056	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.005	54.877	0.476	115.3	0.147	0.00	0.0	0.600	o	450	Pipe/Conduit	
7.006	30.981	0.110	281.6	0.138	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.001	50.00	5.95	96.309	0.368	0.0	0.0	0.0	1.93	136.5	49.9
1.014	50.00	8.18	95.324	1.363	0.0	0.0	0.0	0.95	150.7«	184.5
1.015	50.00	8.30	95.282	1.377	0.0	0.0	0.0	2.22	352.7	186.4
1.016	50.00	8.49	95.100	1.531	0.0	0.0	0.0	1.92	211.9	207.4
6.000	50.00	5.52	95.560	0.051	0.0	0.0	0.0	1.16	20.5	6.9
1.017	50.00	8.55	94.780	1.639	0.0	0.0	0.0	4.71	748.8	222.0
1.018	50.00	8.78	93.850	1.639	0.0	0.0	0.0	2.78	4270.9	222.0
7.000	50.00	5.22	95.568	0.039	0.0	0.0	0.0	1.31	52.3	5.3
7.001	50.00	5.52	95.322	0.221	0.0	0.0	0.0	1.21	85.8	29.9
7.002	50.00	5.74	95.190	0.246	0.0	0.0	0.0	0.96	67.5	33.4
8.000	50.00	5.21	96.810	0.111	0.0	0.0	0.0	2.77	110.3	15.0
7.003	50.00	5.85	94.993	0.393	0.0	0.0	0.0	1.35	215.1	53.2
7.004	50.00	6.31	94.952	0.449	0.0	0.0	0.0	1.20	190.2	60.8
7.005	50.00	6.79	94.837	0.595	0.0	0.0	0.0	1.89	301.0	80.6
7.006	50.00	7.18	94.286	0.734	0.0	0.0	0.0	1.33	287.8	99.4

©1982-2019 Innovyze

Network Design Table for Surface Network 3

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
7.007	41.087	0.116	354.2	0.082	0.00	0.0	0.600	o	525	Pipe/Conduit	
9.000	21.420	0.495	43.3	0.157	5.00	0.0	0.600	o	225	Pipe/Conduit	
9.001	21.293	0.605	35.2	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
9.002	10.208	0.334	30.6	0.068	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.008	33.537	0.211	158.9	0.127	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.009	25.949	0.058	450.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.010	17.080	0.038	450.0	0.089	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.011	9.891	0.030	329.7	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
7.012	5.762	0.020	288.1	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
1.019	6.420	0.100	64.2	0.000	0.00	0.0	0.600	\/	38	Pipe/Conduit	
1.020	6.477	0.040	161.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.021	4.904	0.017	288.5	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
7.007	50.00	7.76	94.176	0.816	0.0	0.0	0.0	1.18	256.4	110.5
9.000	50.00	5.18	95.870	0.157	0.0	0.0	0.0	1.99	79.3	21.2
9.001	50.00	5.31	95.300	0.176	0.0	0.0	0.0	2.66	188.0	23.8
9.002	50.00	5.36	94.620	0.244	0.0	0.0	0.0	3.29	363.1	33.1
7.008	50.00	8.08	94.060	1.187	0.0	0.0	0.0	1.77	384.1	160.7
7.009	50.00	8.49	93.850	1.187	0.0	0.0	0.0	1.05	227.2	160.7
7.010	50.00	8.76	93.792	1.276	0.0	0.0	0.0	1.05	227.2	172.7
7.011	50.00	8.83	93.750	1.276	0.0	0.0	0.0	2.44	3742.4	172.7
7.012	50.00	8.86	93.720	1.276	0.0	0.0	0.0	2.61	4005.0	172.7
1.019	50.00	8.88	93.700	2.915	0.0	0.0	0.0	5.54	8506.2	394.7
1.020	50.00	8.94	93.600	2.915	0.0	0.0	0.0	1.91	540.4	394.7
1.021	50.00	9.01	93.560	2.915	0.0	0.0	0.0	1.19	189.6«	394.7

Simulation Criteria for Surface Network 3

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	2
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

©1982-2019 Innovyze

Simulation Criteria for Surface Network 3

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

©1982-2019 Innovyze

Online Controls for Surface Network 3

Hydro-Brake® Optimum Manhole: S15, DS/PN: 1.009, Volume (m³): 10.2

Unit Reference	MD-SHE-0079-3000-1200-3000
Design Head (m)	1.200
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	79
Invert Level (m)	96.300
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	3.0
Flush-Flo™	0.348	2.9
Kick-Flo®	0.707	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.3	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.8	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.9	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.9	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.8	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.7	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Hydro-Brake® Optimum Manhole: S48, DS/PN: 1.021, Volume (m³): 12.0

Unit Reference	MD-SHE-0176-1570-1200-1570
Design Head (m)	1.200
Design Flow (l/s)	15.7
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	176
Invert Level (m)	93.560
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

©1982-2019 Innovyze

Hydro-Brake® Optimum Manhole: S48, DS/PN: 1.021, Volume (m³): 12.0

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	15.7
Flush-Flo™	0.366	15.7
Kick-Flo®	0.809	13.0
Mean Flow over Head Range	-	13.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.2	1.200	15.7	3.000	24.3	7.000	36.5
0.200	14.8	1.400	16.9	3.500	26.2	7.500	37.8
0.300	15.6	1.600	18.0	4.000	27.9	8.000	39.0
0.400	15.7	1.800	19.0	4.500	29.5	8.500	40.1
0.500	15.5	2.000	20.0	5.000	31.1	9.000	41.3
0.600	15.1	2.200	20.9	5.500	32.5	9.500	42.4
0.800	13.2	2.400	21.8	6.000	33.9		
1.000	14.4	2.600	22.7	6.500	35.2		

©1982-2019 Innovyze

Storage Structures for Surface Network 3

Tank or Pond Manhole: S15, DS/PN: 1.009

Invert Level (m) 96.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	457.0	0.400	577.8	0.800	708.3	1.200	847.8
0.100	485.9	0.500	609.6	0.900	742.3	1.300	884.0
0.200	516.0	0.600	641.9	1.000	776.9	1.400	920.9
0.300	546.6	0.700	674.8	1.100	812.0	1.500	958.3

Tank or Pond Manhole: S47, DS/PN: 1.020

Invert Level (m) 93.600

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1001.9	0.400	1157.1	0.800	1322.1	1.200	1496.2
0.100	1039.3	0.500	1197.5	0.900	1364.8	1.300	1541.1
0.200	1078.0	0.600	1238.5	1.000	1408.0	1.400	1586.6
0.300	1117.3	0.700	1280.0	1.100	1451.8	1.500	1632.6

©1982-2019 Innovyze

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S3	15 Winter	1	+0%	100/15 Summer			
1.001	S4	15 Winter	1	+0%	100/15 Summer			
2.000	S1	15 Winter	1	+0%	100/15 Summer			
2.001	S2	15 Winter	1	+0%	100/15 Summer			
1.002	S5	15 Winter	1	+0%	100/15 Summer			
1.003	S6	15 Winter	1	+0%	100/15 Summer			
1.004	S7	15 Winter	1	+0%	100/15 Summer			
3.000	S8	15 Winter	1	+0%	100/15 Summer			
3.001	S9	15 Winter	1	+0%	30/15 Summer			
3.002	S10	15 Winter	1	+0%	30/15 Summer			
1.005	S11	15 Winter	1	+0%	30/15 Summer			
1.006	S12	15 Winter	1	+0%	30/15 Summer			
1.007	S13	15 Winter	1	+0%	100/960 Winter			
1.008	S14	480 Winter	1	+0%	100/480 Winter			
1.009	S15	480 Winter	1	+0%	30/120 Summer			
1.010	S16	480 Winter	1	+0%				
1.011	S17	30 Winter	1	+0%	100/15 Summer			
1.012	S18	15 Winter	1	+0%	100/15 Summer			
1.013	S19	15 Winter	1	+0%	30/15 Summer			
4.000	S21	15 Winter	1	+0%	100/15 Summer	100/15 Winter		
5.000	S20	15 Winter	1	+0%	30/15 Winter	100/15 Summer		

©1982-2019 Innovyze

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S3	99.471	-0.136	0.000	0.32		11.9	OK	
1.001	S4	99.245	-0.199	0.000	0.24		21.7	OK	
2.000	S1	101.070	-0.103	0.000	0.21		7.1	OK	
2.001	S2	99.919	-0.091	0.000	0.32		10.2	OK	
1.002	S5	98.998	-0.192	0.000	0.28		34.7	OK	
1.003	S6	98.591	-0.209	0.000	0.20		36.5	OK	
1.004	S7	98.017	-0.203	0.000	0.23		43.4	OK	
3.000	S8	97.814	-0.141	0.000	0.29		17.9	OK	
3.001	S9	97.235	-0.195	0.000	0.26		22.1	OK	
3.002	S10	97.124	-0.176	0.000	0.35		32.6	OK	
1.005	S11	96.848	-0.282	0.000	0.30		75.8	OK	
1.006	S12	96.727	-0.203	0.000	0.57		96.6	OK	
1.007	S13	96.559	-0.635	0.000	0.06		97.3	OK	
1.008	S14	96.521	-0.643	0.000	0.01		13.7	OK	
1.009	S15	96.521	-0.154	0.000	0.02		2.8	OK	
1.010	S16	96.222	-0.343	0.000	0.02		2.8	OK	
1.011	S17	95.845	-0.335	0.000	0.03		4.2	OK	
1.012	S18	95.622	-0.289	0.000	0.06		6.1	OK	
1.013	S19	95.603	-0.237	0.000	0.16		15.4	OK	
4.000	S21	96.721	-0.132	0.000	0.35		14.9	OK	1
5.000	S20	96.721	-0.120	0.000	0.43		19.6	OK	2

©1982-2019 Innovyze

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.001	S22	15 Winter	1	+0%	100/15 Summer			
1.014	S23	15 Winter	1	+0%	30/15 Summer			
1.015	S24	15 Winter	1	+0%	100/15 Summer			
1.016	S25	15 Winter	1	+0%	30/15 Summer			
6.000	S26	15 Winter	1	+0%	100/15 Summer			
1.017	S27	15 Winter	1	+0%				
1.018	S28	15 Winter	1	+0%	100/480 Winter			
7.000	S30	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
7.001	S31	15 Winter	1	+0%	30/15 Summer			
7.002	S32	15 Winter	1	+0%	30/15 Summer			
8.000	S33	15 Winter	1	+0%	100/15 Winter			
7.003	S34	15 Winter	1	+0%	100/15 Summer			
7.004	S35	15 Winter	1	+0%	100/15 Summer			
7.005	S36	15 Winter	1	+0%	100/15 Summer			
7.006	S37	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
7.007	S38	15 Winter	1	+0%	30/15 Summer			
9.000	S39	15 Winter	1	+0%	100/15 Summer			
9.001	S40	15 Winter	1	+0%	100/15 Summer			
9.002	S41	15 Winter	1	+0%	100/15 Summer			
7.008	S42	15 Winter	1	+0%	30/15 Summer			
7.009	S43	15 Winter	1	+0%	30/15 Summer			
7.010	S44	15 Winter	1	+0%	30/15 Summer			
7.011	S45	15 Winter	1	+0%	100/240 Winter			
7.012	S61	15 Winter	1	+0%	100/240 Winter			
1.019	S46	15 Winter	1	+0%	100/240 Winter			
1.020	S47	360 Winter	1	+0%	100/30 Winter			
1.021	S48	480 Winter	1	+0%	30/60 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	S22	96.436	-0.173	0.000	0.37		48.0	OK	
1.014	S23	95.582	-0.192	0.000	0.62		69.0	OK	
1.015	S24	95.448	-0.284	0.000	0.29		70.2	OK	
1.016	S25	95.284	-0.191	0.000	0.48		86.0	OK	
6.000	S26	95.622	-0.088	0.000	0.36		7.1	OK	
1.017	S27	94.908	-0.322	0.000	0.18		98.2	OK	
1.018	S28	93.982	-0.662	0.000	0.03		97.4	OK	
7.000	S30	95.619	-0.174	0.000	0.12		5.4	OK	2
7.001	S31	95.446	-0.176	0.000	0.35		26.7	OK	
7.002	S32	95.347	-0.143	0.000	0.54		29.7	OK	
8.000	S33	96.868	-0.167	0.000	0.15		15.4	OK	
7.003	S34	95.172	-0.271	0.000	0.33		48.8	OK	
7.004	S35	95.130	-0.272	0.000	0.33		54.3	OK	
7.005	S36	94.992	-0.295	0.000	0.25		70.0	OK	
7.006	S37	94.504	-0.307	0.000	0.34		82.8	OK	1

©1982-2019 Innovyze

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
7.007	S38	94.409	-0.292	0.000	0.40		89.5	OK	
9.000	S39	95.955	-0.140	0.000	0.30		21.7	OK	
9.001	S40	95.377	-0.223	0.000	0.14		23.8	OK	
9.002	S41	94.714	-0.281	0.000	0.14		32.0	OK	
7.008	S42	94.297	-0.287	0.000	0.38		123.3	OK	
7.009	S43	94.214	-0.161	0.000	0.64		119.5	OK	
7.010	S44	94.163	-0.155	0.000	0.84		125.3	OK	
7.011	S45	93.955	-0.589	0.000	0.09		125.0	OK	
7.012	S61	93.928	-0.586	0.000	0.10		124.5	OK	
1.019	S46	93.871	-0.623	0.000	0.07		209.3	OK	
1.020	S47	93.838	-0.362	0.000	0.06		17.2	OK	
1.021	S48	93.902	-0.108	0.000	0.13		15.1	OK	

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S3	15 Winter	30	+0%	100/15 Summer			
1.001	S4	15 Winter	30	+0%	100/15 Summer			
2.000	S1	15 Winter	30	+0%	100/15 Summer			
2.001	S2	15 Winter	30	+0%	100/15 Summer			
1.002	S5	15 Winter	30	+0%	100/15 Summer			
1.003	S6	15 Winter	30	+0%	100/15 Summer			
1.004	S7	15 Winter	30	+0%	100/15 Summer			
3.000	S8	15 Winter	30	+0%	100/15 Summer			
3.001	S9	15 Winter	30	+0%	30/15 Summer			
3.002	S10	15 Winter	30	+0%	30/15 Summer			
1.005	S11	15 Winter	30	+0%	30/15 Summer			
1.006	S12	15 Winter	30	+0%	30/15 Summer			
1.007	S13	480 Winter	30	+0%	100/960 Winter			
1.008	S14	480 Winter	30	+0%	100/480 Winter			
1.009	S15	480 Winter	30	+0%	30/120 Summer			
1.010	S16	30 Winter	30	+0%				
1.011	S17	15 Winter	30	+0%	100/15 Summer			
1.012	S18	15 Winter	30	+0%	100/15 Summer			
1.013	S19	15 Winter	30	+0%	30/15 Summer			
4.000	S21	15 Winter	30	+0%	100/15 Summer	100/15 Winter		
5.000	S20	15 Winter	30	+0%	30/15 Winter	100/15 Summer		

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S3	99.537	-0.071	0.000	0.78		29.2	OK	
1.001	S4	99.325	-0.120	0.000	0.64		57.5	OK	
2.000	S1	101.102	-0.071	0.000	0.53		17.6	OK	
2.001	S2	99.969	-0.041	0.000	0.85		26.9	OK	
1.002	S5	99.087	-0.103	0.000	0.75		92.5	OK	
1.003	S6	98.659	-0.141	0.000	0.55		98.3	OK	
1.004	S7	98.095	-0.125	0.000	0.63		118.2	OK	
3.000	S8	97.874	-0.081	0.000	0.71		43.8	OK	
3.001	S9	97.460	0.030	0.000	0.62		52.7	SURCHARGED	
3.002	S10	97.349	0.049	0.000	0.87		80.3	SURCHARGED	
1.005	S11	97.214	0.084	0.000	0.79		199.2	SURCHARGED	
1.006	S12	97.050	0.120	0.000	1.54		259.7	SURCHARGED	
1.007	S13	96.806	-0.388	0.000	0.02		29.4	OK	
1.008	S14	96.806	-0.358	0.000	0.01		29.0	OK	
1.009	S15	96.806	0.131	0.000	0.02		2.9	SURCHARGED	
1.010	S16	96.223	-0.342	0.000	0.02		2.9	OK	
1.011	S17	95.920	-0.260	0.000	0.07		11.2	OK	
1.012	S18	95.911	0.000	0.000	0.25		24.3	OK	
1.013	S19	95.896	0.057	0.000	0.46		43.8	SURCHARGED	
4.000	S21	96.792	-0.060	0.000	0.86		36.6	OK	1
5.000	S20	96.855	0.014	0.000	1.04		47.4	SURCHARGED	2

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.001	S22	15 Winter	30	+0%	100/15 Summer			
1.014	S23	15 Winter	30	+0%	30/15 Summer			
1.015	S24	15 Winter	30	+0%	100/15 Summer			
1.016	S25	15 Winter	30	+0%	30/15 Summer			
6.000	S26	15 Winter	30	+0%	100/15 Summer			
1.017	S27	15 Winter	30	+0%				
1.018	S28	360 Winter	30	+0%	100/480 Winter			
7.000	S30	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
7.001	S31	15 Winter	30	+0%	30/15 Summer			
7.002	S32	15 Winter	30	+0%	30/15 Summer			
8.000	S33	15 Winter	30	+0%	100/15 Winter			
7.003	S34	15 Winter	30	+0%	100/15 Summer			
7.004	S35	15 Winter	30	+0%	100/15 Summer			
7.005	S36	15 Winter	30	+0%	100/15 Summer			
7.006	S37	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
7.007	S38	15 Winter	30	+0%	30/15 Summer			
9.000	S39	15 Winter	30	+0%	100/15 Summer			
9.001	S40	15 Winter	30	+0%	100/15 Summer			
9.002	S41	15 Winter	30	+0%	100/15 Summer			
7.008	S42	15 Winter	30	+0%	30/15 Summer			
7.009	S43	15 Winter	30	+0%	30/15 Summer			
7.010	S44	15 Winter	30	+0%	30/15 Summer			
7.011	S45	360 Winter	30	+0%	100/240 Winter			
7.012	S61	360 Winter	30	+0%	100/240 Winter			
1.019	S46	360 Winter	30	+0%	100/240 Winter			
1.020	S47	360 Winter	30	+0%	100/30 Winter			
1.021	S48	480 Winter	30	+0%	30/60 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	S22	96.548	-0.060	0.000	0.94		121.4	OK	
1.014	S23	95.814	0.039	0.000	1.58		176.8	SURCHARGED	
1.015	S24	95.665	-0.067	0.000	0.75		179.3	OK	
1.016	S25	95.568	0.093	0.000	1.19		213.4	SURCHARGED	
6.000	S26	95.670	-0.040	0.000	0.87		17.3	OK	
1.017	S27	94.991	-0.239	0.000	0.45		242.0	OK	
1.018	S28	94.164	-0.480	0.000	0.02		42.7	OK	
7.000	S30	95.710	-0.083	0.000	0.30		13.8	OK	2
7.001	S31	95.685	0.064	0.000	0.99		75.1	SURCHARGED	
7.002	S32	95.545	0.055	0.000	1.53		84.5	SURCHARGED	
8.000	S33	96.904	-0.131	0.000	0.36		37.9	OK	
7.003	S34	95.333	-0.110	0.000	0.91		133.7	OK	
7.004	S35	95.292	-0.110	0.000	0.90		149.6	OK	
7.005	S36	95.125	-0.162	0.000	0.69		188.9	OK	
7.006	S37	94.939	0.128	0.000	0.82		199.6	SURCHARGED	1

©1982-2019 Innovyze

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
7.007	S38	94.861	0.160	0.000	0.96		214.3	SURCHARGED	
9.000	S39	96.016	-0.079	0.000	0.74		53.3	OK	
9.001	S40	95.426	-0.174	0.000	0.36		59.9	OK	
9.002	S41	94.781	-0.214	0.000	0.37		84.3	OK	
7.008	S42	94.746	0.161	0.000	0.91		296.2	SURCHARGED	
7.009	S43	94.569	0.194	0.000	1.59		294.7	SURCHARGED	
7.010	S44	94.419	0.102	0.000	2.06		307.9	SURCHARGED	
7.011	S45	94.164	-0.380	0.000	0.04		59.5	OK	
7.012	S61	94.163	-0.351	0.000	0.05		58.8	OK	
1.019	S46	94.163	-0.331	0.000	0.03		98.1	OK	
1.020	S47	94.161	-0.039	0.000	0.07		19.9	OK	
1.021	S48	94.168	0.158	0.000	0.14		15.7	SURCHARGED	

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 2
Number of Online Controls 2 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.400
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 20.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S3	15 Winter	100	+40%	100/15 Summer			
1.001	S4	15 Winter	100	+40%	100/15 Summer			
2.000	S1	15 Winter	100	+40%	100/15 Summer			
2.001	S2	15 Winter	100	+40%	100/15 Summer			
1.002	S5	15 Winter	100	+40%	100/15 Summer			
1.003	S6	15 Winter	100	+40%	100/15 Summer			
1.004	S7	15 Winter	100	+40%	100/15 Summer			
3.000	S8	15 Winter	100	+40%	100/15 Summer			
3.001	S9	15 Winter	100	+40%	30/15 Summer			
3.002	S10	15 Winter	100	+40%	30/15 Summer			
1.005	S11	15 Winter	100	+40%	30/15 Summer			
1.006	S12	15 Winter	100	+40%	30/15 Summer			
1.007	S13	960 Winter	100	+40%	100/960 Winter			
1.008	S14	960 Winter	100	+40%	100/480 Winter			
1.009	S15	960 Winter	100	+40%	30/120 Summer			
1.010	S16	15 Winter	100	+40%				
1.011	S17	15 Winter	100	+40%	100/15 Summer			
1.012	S18	15 Winter	100	+40%	100/15 Summer			
1.013	S19	15 Winter	100	+40%	30/15 Summer			
4.000	S21	15 Winter	100	+40%	100/15 Summer	100/15 Winter		
5.000	S20	15 Winter	100	+40%	30/15 Winter	100/15 Summer		

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	S3	99.938	0.331	0.000	1.29		48.1	SURCHARGED	
1.001	S4	99.681	0.236	0.000	1.04		93.4	SURCHARGED	
2.000	S1	101.441	0.268	0.000	0.83		27.5	SURCHARGED	
2.001	S2	100.671	0.661	0.000	1.25		39.4	SURCHARGED	
1.002	S5	99.417	0.227	0.000	1.12		138.5	SURCHARGED	
1.003	S6	98.919	0.119	0.000	0.83		149.9	SURCHARGED	
1.004	S7	98.563	0.343	0.000	0.93		174.5	SURCHARGED	
3.000	S8	98.922	0.967	0.000	1.18		72.6	SURCHARGED	
3.001	S9	98.189	0.759	0.000	1.08		91.0	SURCHARGED	
3.002	S10	98.043	0.743	0.000	1.48		136.1	SURCHARGED	
1.005	S11	97.663	0.533	0.000	1.23		310.2	SURCHARGED	
1.006	S12	97.382	0.452	0.000	2.43		411.0	SURCHARGED	
1.007	S13	97.222	0.028	0.000	0.02		30.0	SURCHARGED	
1.008	S14	97.222	0.058	0.000	0.01		29.4	SURCHARGED	
1.009	S15	97.222	0.547	0.000	0.02		2.9	SURCHARGED	
1.010	S16	96.501	-0.064	0.000	0.05		8.1	OK	
1.011	S17	96.528	0.348	0.000	0.15		25.5	SURCHARGED	
1.012	S18	96.520	0.609	0.000	0.32		32.1	SURCHARGED	
1.013	S19	96.513	0.673	0.000	0.57		53.8	SURCHARGED	
4.000	S21	98.077	1.225	0.529	1.38		58.5	FLOOD	1
5.000	S20	97.993	1.152	3.409	1.64		74.8	FLOOD	2

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.001	S22	15 Winter	100	+40%	100/15 Summer			
1.014	S23	15 Winter	100	+40%	30/15 Summer			
1.015	S24	15 Winter	100	+40%	100/15 Summer			
1.016	S25	15 Winter	100	+40%	30/15 Summer			
6.000	S26	15 Winter	100	+40%	100/15 Summer			
1.017	S27	15 Winter	100	+40%				
1.018	S28	480 Winter	100	+40%	100/480 Winter			
7.000	S30	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
7.001	S31	15 Winter	100	+40%	30/15 Summer			
7.002	S32	15 Winter	100	+40%	30/15 Summer			
8.000	S33	15 Winter	100	+40%	100/15 Winter			
7.003	S34	15 Winter	100	+40%	100/15 Summer			
7.004	S35	15 Winter	100	+40%	100/15 Summer			
7.005	S36	15 Winter	100	+40%	100/15 Summer			
7.006	S37	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
7.007	S38	15 Winter	100	+40%	30/15 Summer			
9.000	S39	15 Winter	100	+40%	100/15 Summer			
9.001	S40	15 Winter	100	+40%	100/15 Summer			
9.002	S41	15 Winter	100	+40%	100/15 Summer			
7.008	S42	15 Winter	100	+40%	30/15 Summer			
7.009	S43	15 Winter	100	+40%	30/15 Summer			
7.010	S44	15 Winter	100	+40%	30/15 Summer			
7.011	S45	480 Winter	100	+40%	100/240 Winter			
7.012	S61	480 Winter	100	+40%	100/240 Winter			
1.019	S46	480 Winter	100	+40%	100/240 Winter			
1.020	S47	480 Winter	100	+40%	100/30 Winter			
1.021	S48	480 Winter	100	+40%	30/60 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.001	S22	97.751	1.142	0.000	1.24		159.8	SURCHARGED	
1.014	S23	96.446	0.672	0.000	2.21		246.6	SURCHARGED	
1.015	S24	96.256	0.525	0.000	1.06		254.2	SURCHARGED	
1.016	S25	96.059	0.584	0.000	1.81		325.1	SURCHARGED	
6.000	S26	96.195	0.485	0.000	1.41		27.9	SURCHARGED	
1.017	S27	95.063	-0.167	0.000	0.70		380.7	OK	
1.018	S28	94.656	0.012	0.000	0.02		60.1	SURCHARGED	
7.000	S30	97.014	1.221	2.396	0.92		42.7	FLOOD	2
7.001	S31	97.109	1.487	0.000	1.39		105.3	FLOOD RISK	
7.002	S32	96.941	1.450	0.000	2.01		110.8	SURCHARGED	
8.000	S33	97.173	0.138	0.000	0.64		67.1	SURCHARGED	
7.003	S34	96.768	1.326	0.000	1.22		178.6	SURCHARGED	
7.004	S35	96.669	1.267	0.000	1.20		199.1	SURCHARGED	
7.005	S36	96.498	1.211	0.000	0.96		265.2	SURCHARGED	
7.006	S37	96.020	1.209	3.473	1.29		312.8	FLOOD	1

©1982-2019 Innovyze

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 3

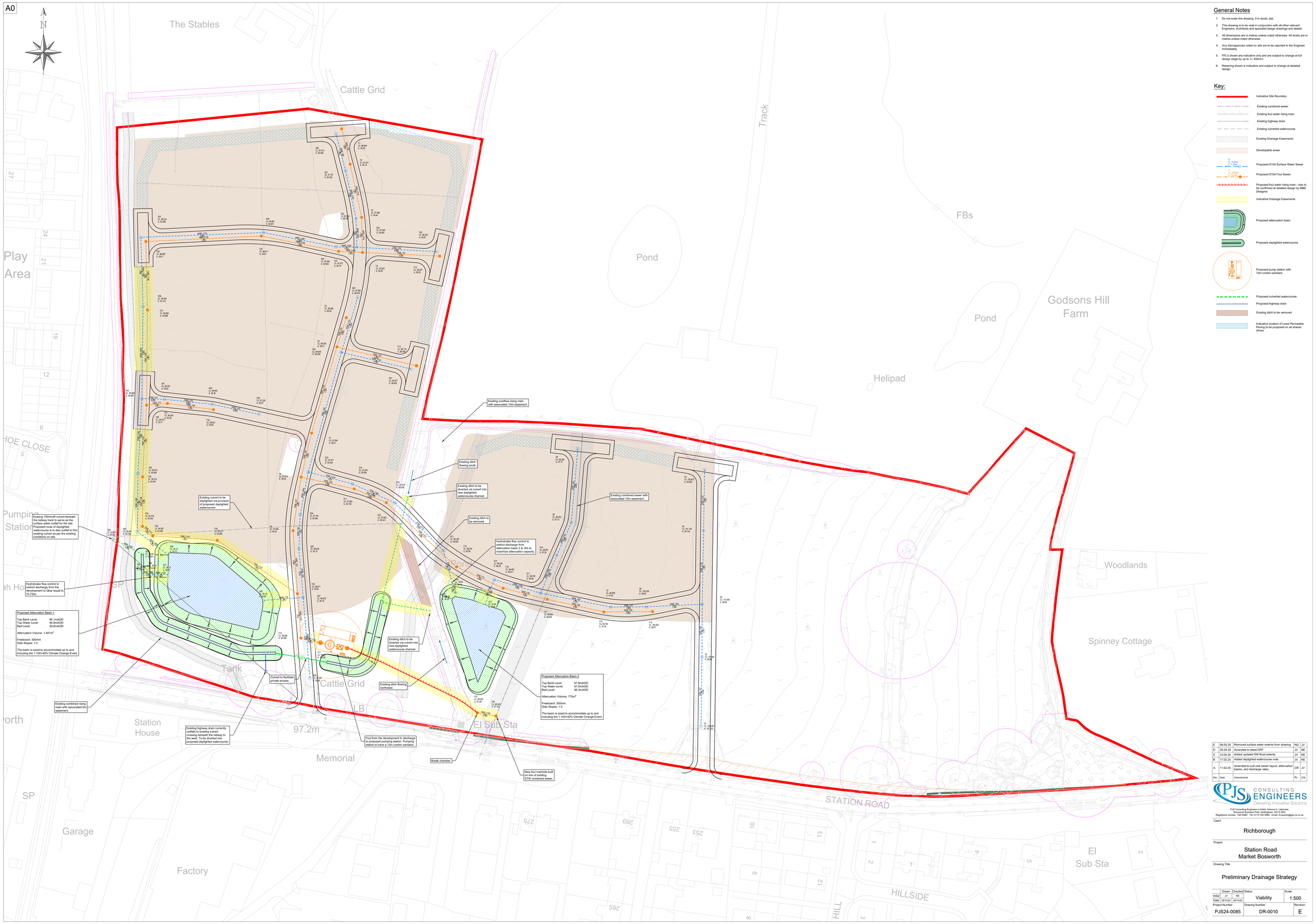
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
7.007	S38	95.900	1.199	0.000	1.53		341.4	FLOOD RISK	
9.000	S39	96.580	0.485	0.000	1.23		88.5	SURCHARGED	
9.001	S40	96.046	0.446	0.000	0.56		92.2	SURCHARGED	
9.002	S41	95.822	0.827	0.000	0.50		113.4	SURCHARGED	
7.008	S42	95.630	1.045	0.000	1.52		497.4	SURCHARGED	
7.009	S43	95.142	0.767	0.000	2.64		489.9	SURCHARGED	
7.010	S44	94.729	0.412	0.000	3.48		520.5	SURCHARGED	
7.011	S45	94.656	0.112	0.000	0.06		84.2	SURCHARGED	
7.012	S61	94.656	0.142	0.000	0.06		81.9	SURCHARGED	
1.019	S46	94.656	0.162	0.000	0.05		130.2	SURCHARGED	
1.020	S47	94.656	0.456	0.000	0.10		28.2	SURCHARGED	
1.021	S48	94.786	0.776	0.000	0.13		15.6	SURCHARGED	

©1982-2019 Innovyze

Appendix 6

Preliminary Drainage Strategy

A0



General Notes

1. Do not scale this drawing. If in doubt, ask.
2. This drawing is to be read in conjunction with all other relevant Engineers, Architects and specialist design drawings and details.
3. All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the Engineer immediately.
5. FFL's shown are indicative only and are subject to change at full design stage by up to +/- 450mm.
6. Retaining shown is indicative and subject to change at detailed design.

Key:

- Indicative Site Boundary
- Existing combined sewer
- Existing foul water rising main
- Existing highway drain
- Existing culverted watercourse
- Existing Drainage Easements
- Developable areas
- Proposed S104 Surface Water Sewer
- Proposed S104 Foul Sewer
- Proposed foul water rising main - size to be confirmed at detailed design by M&E Designer.
- Indicative Drainage Easements
- Proposed attenuation basin
- Proposed daylighted watercourse
- Proposed pump station with 15m cordon sanitaire
- Proposed culverted watercourse
- Proposed highway drain
- Existing ditch to be removed
- Indicative location of Lined Permeable Paving to be proposed on all shared drives.

Rev	Date	Amendments	By	Chk
E	08.05.25	Removed surface water extents from drawing	NG	JV
D	30.04.25	Amended to latest DFP	JV	NE
C	14.04.25	Added updated SW flood extents	JV	NE
B	17.02.25	Added daylighted watercourse note.	JV	NE
A	11.02.25	Amended to suit new sewer layout, attenuation basins, and discharge rates.	CR	JV

PJS CONSULTING ENGINEERS
Delivering Innovative Solutions
PJS Consulting Engineers Limited, Geneva II, Lakeview, Sherwood Business Park, Nottingham, NG15 0ED.
Registered number: 10810693 Tel: 0115 704 3969 Email: Enquiries@pjs-ce.co.uk

Client

Richborough

Project

Station Road
Market Bosworth

Drawing Title

Preliminary Drainage Strategy

	Drawn	Checked	Status	Scale
Initial	JV	NE	Viability	1:500
Date	28/10/24	28/10/24		

Project Number	Drawing Number	Revision
PJS24-0085	DR-0010	E

Appendix 7

Severn Trent Water

Pre-development Enquiry

WONDERFUL ON TAP

SEVERN TRENT

Severn Trent Water Ltd
Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

www.stwater.co.uk

Email:
Network.Solutions@SevernTrent.co.uk
Page Barot
Tel:
Our ref: 1119475

PJS Consulting Engineers,
Unit 3 Lake View,
View Drive,
Annesley,
Nottingham,
NG15 0ED

F.A.O: Jacob Vernon

26/06/2024

Dear Sir/Madam,

Proposed Development: (170 Dwellings – 2.65 l/s) Station Road, Market Bosworth, Nuneaton, CV13 0PE, 439552, 303251

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

Protective Strip

Sewer Records show a public 225mm pressurised combined sewer and associated manhole within the west of the site. This sewer will require a 10m clearance about the pipe's centreline (5m each side) where no planting of trees or construction shall be permitted.

Additionally, records also show a 300m combined sewer and associated manhole within the centre of the site. This sewer will require a 10m clearance about the pipe's centreline (5m each side) where no planting of trees or construction shall be permitted.

To conclude, there is an overflow pipe crossing the centre of the site. This sewer will require a 10m clearance about the pipe's centreline (5m each side) where no planting of trees or construction shall be permitted. Please note, a connection to this sensitive asset will not be granted under any circumstances.

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 located in your client's land. These

sewers would require protective strips of 3 metres either side of the sewer's centreline 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.

Please note: there is no guarantee that you will be able to build over or close to any Severn Trent sewers, and where a diversion is required there is no guarantee that you will be able to undertake those works on a self-lay basis. Every approach to build near to or divert our assets has to be assessed on its own merit and the decision of what is or isn't permissible is taken based on the risk to the asset and the wider catchment it serves. It is vital therefore that you contact us at the earliest opportunity to discuss the implications of our assets crossing your site. Failure to do so could significantly affect the costs and timescales of your project if it transpires diversionary works need to be carried out by Severn Trent.

Foul Water Drainage

The 300mm combined sewer, MH SK39035201 crossing the centre of the site would be the most suitable connection point for your development. Due to issues with surcharging downstream, the proximity of the sewage pumping station and considering the new development adjacent to the site. Modelling will need to take place to confirm the network has capacity to accommodate your site.

We are undergoing a prioritisation process of all investment requirements and emerging risks from growth on our network and treatment works as we build our plan for the coming Asset Management Plan period (2025-2030) and beyond. We will pass details of your site over for consideration and feedback if anything arises which is of concern. We will let you know as soon as possible if anything will affect your connection point or timescales, should we need to make representation to the Planning Authority to apply conditions relating to phasing or occupation of the site.

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If these are found to be unsuitable, satisfactory evidence will need to be submitted. The

evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter).

Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA / EA.
Note, STW will have to be satisfied that all sustainable option have been exhausted before allowing discharge to the public network.

Sewer records show a watercourse that runs in the centre of the site. It is advised to pursue a connection to this if feasible, with flow rates to be agreed by the LLFA.

Connections

For any new connections (including the re-use of existing connections) to the public sewerage system, the developer will need to submit a Section 106 application form. Our Developer Services department are responsible for handling all new connections 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.

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

Yours sincerely

Page Barot
Network Solutions
Developer Services