

JJ CHURCHILL, WAREHOUSE EXTENSION STATION ROAD, MARKET BOSWORTH

Flood Risk Assessment

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1 Introduction

1.1 Background

- 1.1.1 MJM Consulting Engineers Ltd (MJM) have been commissioned by JJ Churchill to prepare a Flood Risk Assessment (FRA) to accompany a planning application for a warehouse extension to an existing site at on Station Road, Market Bosworth.

1.2 Site Location

- 1.2.1 The site is a previously developed parcel of land, with the proposal on an area of approximately 0.42ha, located on the western extent of Market Bosworth. The site is bound by Station Road to the north, arable land to the east and south, and 'The Battlefield Line' heritage rail line to the west. Access is gained through the existing site from Station Road.
- 1.2.2 The grid reference of the site is SK 39270 02978 and OS grid reference is X – 439270, Y - 302978. The site sits within Hinckley and Bosworth District in Leicestershire County in the East Midlands of England. The site location is demonstrated in Figure 1-1 below.



Figure 1-1 Site Location (Source: Google Earth)

1.3 Development Proposals

- 1.3.1 The proposals comprise of the construction of a new warehouse with accompanying car park on land adjacent to an existing warehouse site. The proposed site layout for the new building is included at **Appendix A**.

1.4 Report Structure

1.4.1 Following this introductory section:

- **Section 2** describes the planning policy context within which the proposals will be assessed;
- **Section 3** details the existing site, considering any site specific information and current survey information which has been gathered;
- **Section 4** discusses the potential sources of flooding for the site;
- **Section 5** summarises a surface water management strategy for the site, considering any existing site drainage, the proposed point of discharge and the appropriateness of Sustainable Drainage Systems (SuDS);
- **Section 6** deals with any requirement for foul water drainage;
- **Section 7** offers a summary and conclusions

2 Relevant Policy and Guidance

2.1 National Planning Policy

2.1.1 With regard to flood risk, the National Planning Policy Framework (NPPF) requires that:

“Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.”

2.1.2 The NPPF sets out that the Sequential Test should be applied to steer development to the areas of lowest probability of flooding and states that development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding.

2.1.3 To establish the appropriateness of development at a specific site the NPPF refers to the Flood Zones, which are shown on the Environment Agency Flood Map, and establishes the range of uses which are appropriate, or compatible, land uses for each Flood Zone.

2.1.4 The Flood Zones can be summarised as follows:

- **Zone 1:** Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)
- **Zone 2:** Medium Probability. This zone comprises land assessed as having between 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%) in any year.
- **Zone 3a:** High Probability. This zone comprises land assessed as having 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- **Zone 3b:** Functional Flood Plain. This zone comprises land where water must flow or stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

2.1.5 Paragraph 162 of the NPPF goes on to state that “The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from **any** source...The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.”

2.1.6 According to the NPPF, if following the application of the Sequential Test it is not possible, consistent with wider sustainability objectives, for the development to be in zones of lower probability of flooding, the Exception Test can be applied.

2.1.7 As part of this process, it is necessary to consider the type and nature of the development. The Planning Practice Guidance: Flood Risk and Coastal Change defines the type and nature of different development classifications in the context of their flood risk vulnerability. This has been summarised in Table 2.1 below.

Table 2.1: Flood Risk Vulnerability and flood zone compatibility

Flood Risk Vulnerability	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	Exception Test Required	✓	✓
Zone 2	Exception Test Required	✓	Exception Test Required	✓	✓
Zone 3a	Exception Test Required	✓	×	Exception Test Required	✓
Zone 3b	Exception Test Required	✓	×	×	×

✓ Development is appropriate × Development should not be permitted.

- 2.1.8 The site is located in Flood Zone 1, as shown below in Figure 2-1, and has an area less than 1.0 hectare. The proposed uses are classed as less vulnerable use. Therefore, it is deemed that development is appropriate and an exception test is not required.

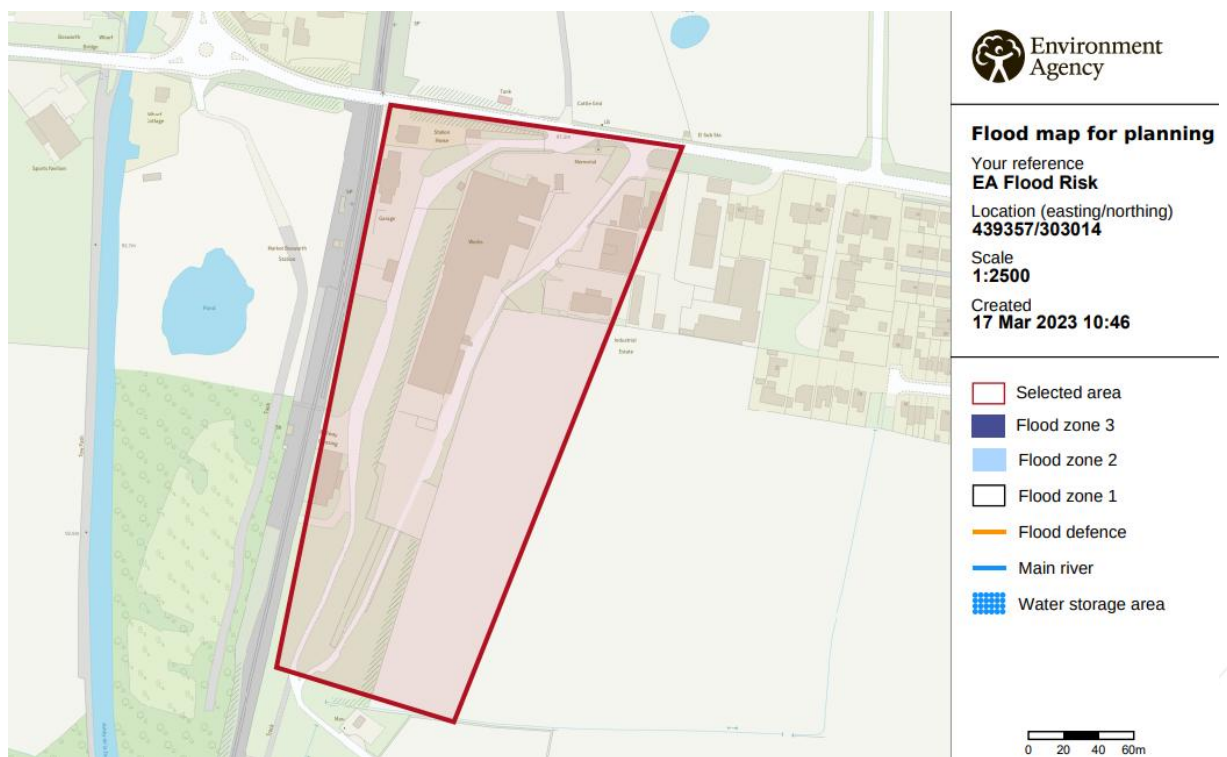


Figure 2-1 Flood Risk Map (Data Source: Environment Agency)

2.2 Local Policy

Hinckley & Bosworth Borough Council Local Plan 2006-2026 - Core Strategy

- 2.2.1 Hinckley and Bosworth Local Plan 2006-2016 sets out the vision and framework to ensure the borough of Hinckley and Bosworth is developed in the 'right way'. This includes having the right facilities and infrastructure to support the community and grow the local economy and tourism.
- 2.2.2 In the Local Plan improving resource management is seen as an issue to resolve. As part of addressing this issue a Strategic Flood Risk Assessment has been completed which suggests flooding is not a major issue in the borough. However, the Local Plan states that flood mitigation measures need to be incorporated into new developments to ensure any flooding is suitably addressed. It is recognised that sustainable urban drainage (SUDS) can be used as a flood mitigation measure on new developments

- 2.2.3 Policy 20 – Green Infrastructure is highlighted as a key priority for the council. Strategic interventions have been identified which will be supported by the council. These include installing and retaining flood prevention measures: flood storage ponds, greens roofs and swales.

Strategic Flood Risk Assessment for Hinckley and Bosworth Borough Council January 2025

- 2.2.4 The purpose of the SFRA is to provide evidence to support the production of the Local Plan to 2036. It will be used to inform decisions on the location of the future development and sustainable policies for the management of long term flood risk.
- 2.2.5 The key objectives of the Level 1 SFRA include providing up to date information and guidance on flood risk taking into account latest flood risk information and national planning policy; determine in current and future flood risk; provide a comprehensive set of maps presenting flood risk; to provide advice for applicants carrying out site-specific flood risk assessments.
- 2.2.6 It is noted within the SFRA that the past flooding information available is limited. The data that does exist indicates that the main flooding risks in Hinckley and Bosworth area are from surface water and culverted watercourses. Historically, the most affected areas correspond with the main urban areas in the borough.
- 2.2.7 Within the Hinckley and Bosworth borough the underlying geology is almost exclusively sandstone, siltstone and mudstone. The bedrock geology that have been identified across the borough consist of Mercia Mudstone Group, Edwalton Member Mudstone and Siltstone, and Gunthorpe Member mudstone.
- 2.2.8 The SFRA also notes there's a mix of slowly permeable, freely draining and impeded drainage and naturally high groundwater soils within the borough.
- 2.2.9 The Hinckley and Bosworth borough SFRA sets out what the strategic solutions encourage developments to do. These include: use of sustainable flood storage and mitigation to store water and manage surface water run off; promote and consider SUDS at the earliest stage of the development of a site; use SFRA to inform future development and minimise flood risk from all sources.
- 2.2.10 The SFRA Appendix A provides interactive mapping showing the Flood zones, areas at risk of flooding from surface water and areas susceptible to groundwater.
- 2.2.11 Appendix A, Index Grid C2 of the SFRA shows the following: the site is located within Flood Zone 1; some small areas at the edge of the site are at minimal risk from surface water flooding; is in an area susceptible to groundwater flooding ($\geq 25\% < 50\%$).
- 2.2.12 The sources of the data used to create the interactive mapping are stated in Appendix B of the SFRA. Flood zone data has been taken from Environment Agency's Flood Map for Planning. Surface water flooding data has been taken from the Environment Agency's Risk of Flooding from Surface Water maps. Groundwater flood risk areas have been taken from Areas Susceptible to Groundwater (AStGWF) dataset. It is noted that the (AStGWF) dataset is taken over 1km grid squares taking account of the general geological and hydrogeological conditions and therefore only isolated areas within the 1km grid will experience groundwater flooding. The data should only be used in combination with other information, for example historic data.

Leicestershire County Council Preliminary Flood Risk Assessment 2011

- 2.2.13 In accordance with the Flood Risk Regulations 2009 a Preliminary Flood Risk Assessment (PFRA) has been completed for Leicestershire County Council. The PFRA is a summary of significant flood risk, covering the probability and consequences of past and future flooding events, based on available and readily derivable information. Sources include Environment Agency, Strategic Flood Risk Assessment and Surface Water Management Plans.
- 2.2.14 Objectives have been outlined in the PFRA which include establishing a base of historic flood risk information, assessment of historic flood events and the potential harmful consequences of future flood events.
- 2.2.15 The study area of the PFRA is defined as the administrative of Leicestershire CC, covering approximately 2,073km². The boundary includes Blaby District Council, Charnwood Borough Council, Harborough District Council, Hinckley and Bosworth Borough Council, Melton Borough Council, North West Leicestershire District Council and Oadby and Wigston Borough Council.
- 2.2.16 The historic data for the PFRA was collated through contacting the following authorities and organisations; the above district councils, teams in the county council, Rutland Council, Anglian Water, Severn Trent Water, British Waterways, Leicestershire Fire and Rescue Service, and the EA.
- 2.2.17 It is noted in the review of the historic data collected for surface water flooding, ordinary watercourse flooding, flooding from canals and sewer flooding that it is all limited. The data is deemed insufficient to draw definitive conclusions about the impacts and consequences of historic flood events. In the future flood events will be recorded in full details to inform future PFRA cycles.
- 2.2.18 The EA have given a threshold which is to be used to identify future consequences of flooding. The assessment was carried out over 1km² grid. The criteria to exceed the threshold include 'Flooded to a depth of 0.3m during a rainfall event with a 1 in 200 chance of occurring (or 0.5%)' to areas with 200 people or 20 businesses or 1 critical service. A map of the areas identified in the PFRA is shown in figure 2.2.

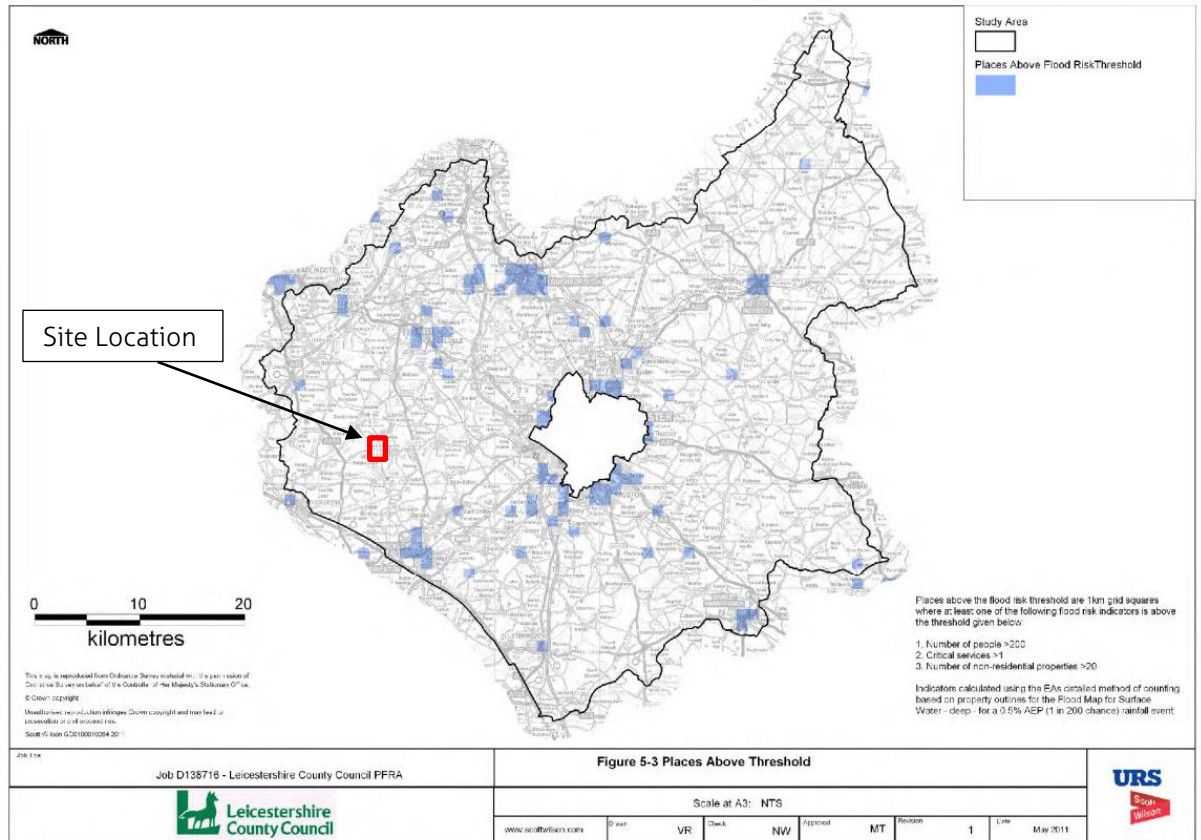


Figure 2-2 EA Threshold Criteria Map (Data Source: Leicestershire County Council PFRA 2011)

- 2.2.19 An Indicative Flood Risk Area has been identified within the PFRA using this mapping where there is a cluster of grid squares and over 30,000 properties that are predicted to be at risk of flooding. The identified indicative flood risk area includes Leicester City and associated critical infrastructure and residential and commercial properties in the fringes of the city.

Leicestershire County Council Local Flood Risk Management Strategy 2015

- 2.2.20 Leicestershire County Council as the Lead Local Flood Authority are responsible for developing maintaining, applying and monitoring a Local Flood Risk Management Strategy. The strategy focuses on local flood risk from surface water, groundwater and watercourse flooding.
- 2.2.21 The aim of the strategy is to provide a framework for the LLFA to enable them to lead and co-ordinate flood risk management across Leicestershire. This would be achieved through the strategy by utilising a range of options to manage and communicate the risks and consequences of flooding.
- 2.2.22 Objectives have been set in the strategy to enable Leicestershire CC to achieve the strategy aim. Some of the objectives include: working collaboratively with local partners and stakeholders, improving local knowledge and understanding of local flood risk, promotion of sustainable drainage systems. The Local Flood Risk Management Strategy Action Plan sets out the identified actions that have been developed to achieve the strategies objectives.
- 2.2.23 The strategy acknowledges the contribution Surface Water Management Plans (SWMPs) can make as a tool to identify flood risk from surface water and ordinary watercourses. In addition, SWMPs can be used to assess options to understand the risk and where possible mitigation and preparation can take place to manage the risk. 4 key areas have been identified

geographical areas have been identified that would benefit from the preparation of SWMP: Loughborough, Burbage, Harborough and Greater Leicester Flood Risk Area. The output of the SWMPs is to be used to inform development control decisions.

- 2.2.24 As the LLFA, local planning authorities must consult with the County Council on the management of surface water. The County Council acknowledges the benefits SuDS provides in flood risk management and intends to set an example by using SuDS in highway improvement schemes and in its own developments.

Existing Site

2.3 Site Specific information

- 2.3.1 This section of the report contains information gathered from the Environment Agency (EA), Leicestershire County Council and the above mentioned Strategic Flood Risk Assessment (SFRA).

2.4 Topographical Survey

- 2.4.1 The site comprises of an existing access track, trees and dense vegetation. The access track passes through the middle of the site with retaining walls either side and two raised parcels of land.
- 2.4.2 A topographical survey of the site has been completed and is included at **Appendix B**.
- 2.4.3 Ground levels across the site fall from north to south. On the two sets of raised land ground levels fall from approximately 97.5m AOD to 96.4m AOD, at a gradient of approximately 1.2%. The existing access track ground levels fall from approximately 96.25m AOD to 95.1m, at a gradient of approximately 1%.

2.5 Geotechnical Investigation

- 2.5.1 A desk study and intrusive ground investigation has been completed and we are currently awaiting the results.
- 2.5.2 The British Geological Survey (BGS) has been consulted, in lieu of an intrusive site investigation, to identify the likely ground conditions of the proposed site. This demonstrates the following:
- The site is likely to be above a bedrock of Gunthorpe Member Mudstone.
 - This is likely overlain by Clays and Silts of the Bosworth Clay family
 - A nearby borehole record (SK30SE23) appears to confirm this, with clays found to a depth of 2.5m where the borehole record ends.

3 Potential Sources of Flooding

3.1.1 As required by NPPF, all sources of flooding have been assessed as part of this FRA report. The specific issues relating to each source and its impact on this development are discussed below.

3.1 Fluvial and Tidal Flooding

3.1.1 The Environment Agency flood map in Figure 2.1 shows the site is located within Flood Zone 1 and as such has a low probability of flooding (less than 1 in 1000 annual probability (<0.1%)). The proposed uses are classed as less vulnerable use and are compatible with the site in Flood Zone 1.

3.2 Flooding from Land (Overland flow & Surface Water Flooding)

3.2.1 From reviewing the Flood map for planning it can be seen that there is a small amount of surface water flooding within the existing site. This is located within a low lying area of the site and is isolated to any other areas of flooding. Therefore this flooding is caused by water landing within the site boundary, which will be captured and attenuated by the proposed drainage system for the site. As a result of this it is considered that the risk of flooding from land is **low**.

3.3 Ground Water Flooding

3.3.1 British Geological Mapping shows the site to be underlain by the Bosworth Clay Member – grey to brown laminated clay and silt.

3.3.2 The SFRA mapping shows the site is in an area with a $\geq 25\%$ - $< 50\%$ susceptibility to groundwater flooding. The mapping is produced in 1km grid squares, where geological and hydrogeological conditions indicate the potential conditions for groundwater flooding to occur. The SFRA mapping also shows that there is No Risk of groundwater emergence.

3.3.3 Given there has been no previous evidence of groundwater flooding either on the site or in the vicinity of the site, and provided the below recommendations are to be followed to ensure the risk of groundwater flooding is not exacerbated, it is considered the risk of groundwater flooding can be summarised as **low**.

3.3.4 The following measures should be considered to ensure flood risk from groundwater remains low:

- No infiltration drainage to be allowed without appropriate ground water level monitoring
- No use of septic tanks
- Ensure drainage systems are sealed and increase the level of testing of drainage installations
- Prevention of storm discharges to foul systems
- Avoid construction of basements
- Ensure access routes remain free of groundwater flooding
- Specification of materials resilient to long term exposure to flooding
- Consultation with local communities on groundwater flooding and emergence

3.4 Flooding from Sewers

- 3.4.1 In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as “combined sewers”. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked, or is of inadequate capacity; this will continue until the water drains away. When this happens to combined sewers, there is a high risk of land and property flooding with water contaminated with raw sewage as well as pollution of rivers due to discharge from combined sewer overflows.
- 3.4.2 Sewer record information has been obtained from Severn Trent Water and is attached in Appendix C of this note. This search has identified a combined rising main running adjacent to the eastern section of the site with the associated pumping station at the south eastern corner of the site. No known issues with regards to flooding of these existing sewers is known. Consequently, the risk of flooding to the proposed development from this source is considered **low**.

3.5 Flooding from Reservoirs, Canals and other Artificial Sources

- 3.5.1 Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operational and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas. The potential effects of flood risk management infrastructure and other structures also need to be considered. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and/or as a result of dam or bank failure.
- 3.5.2 The Environment Agency’s flood risk from reservoirs map shows that the site is not at risk from flooding from reservoirs, canals or other artificial sources. The risk of flooding from this source is therefore considered **very low**.

3.6 Flood Risk Summary

- 3.6.1 As can be seen from the various searches and maps above, the proposed site is located within Flood Zone 1 and is therefore at low risk of flooding. There are no significant risks from surface water flooding. Measures have been suggested in 3.3.5 to ensure the risk of groundwater flooding remains low. The site is also not located in an area susceptible to sewer flooding or artificial sources such as canals or reservoirs.
- 3.6.2 NPPF guidance must be followed with particular reference to Paragraph 162: “*The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from **any** source*”. This would suggest that a sequential test is therefore not required for the site given no risk of flooding from any source has been identified.

4 Surface Water Management Strategy

4.1 Existing Site Drainage

- 4.1.1 No existing drainage is apparent on the site from either the topographic survey or asset record drawings obtained from Severn Trent Water.

4.2 Sustainable Drainage Systems (SuDS)

- 4.2.1 NPPF Planning Practice Guidance Paragraph 080 states that:

- 4.2.2 "Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. *into the ground (infiltration);*
2. *to a surface water body;*
3. *to a surface water sewer, highway drain, or another drainage system;*
4. *to a combined sewer."*

- 4.2.3 Section 1.1 of the SuDS Manual (Ciria C753) states the following:

- "Sustainable drainage systems (SuDS) can deliver multiple benefits. Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.
- The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water run-off from developed areas.
- The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone."
- The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 5.1 below which is a representation of The SuDS Manual Figure 2.1.

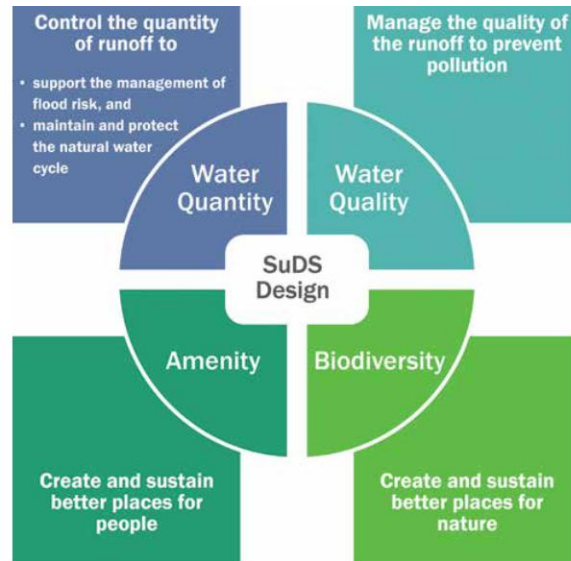


Figure 5.1: Extract Representation of Figure 2.1 of The SuDS Manual

4.3 SuDS and the Proposed Development

Water Quantity

- 4.3.1 To achieve a Greenfield runoff rate of 5 l/s for the new surface water drainage system it is proposed a pond and hydro brake are used. The volume of the pond will be sized up to and including the 1:100 year storm event plus 40% allowance for climate change. Refer to Section 6 for more information.

Water Quality

- 4.3.2 The SuDS design for the development site should ensure the quality of any receiving water body is not adversely affected and preferably enhanced in accordance with Ciria SuDS Manual C753. Table 26.2 in the Ciria SuDS Manual shows that the development has a high pollution hazard. It is proposed to implement fuel interceptors, silt traps, trapped gullies and trapped drainage channels to intercept oils and silt entering the water system.

Amenity and Biodiversity

- 4.3.3 Given the nature of the development, it is unlikely that there will be opportunities for SuDS to contribute significantly to biodiversity and amenity. This will be explored further by the architect and landscape designers.

5 Proposed Surface Water Drainage

5.1 Proposed Site Layout

- 5.1.1 Refer to section 1.3 for a description of the development proposals. A proposed site plan is presented within **Appendix A**.

5.2 Discharge to Soakaways or Infiltration Systems

- 5.2.1 Infiltration testing to BRE Digest 365 has not been carried out to date. A ground investigation has been completed and more information on ground conditions and suitability for an infiltration system will be provided once the results have been received.
- 5.2.2 Based on the BGS info described in Section 2.5 of this report, it does not appear that soakaways would be a feasible means of storm water discharge from the site given the presence of clays and mudstone within the existing ground. These types of material are generally considered unsuitable for soakaways.
- 5.2.3 Furthermore, there appears to be a low risk of groundwater flooding on the site. In accordance with the GMS, no infiltration should be allowed without suitable groundwater monitoring taking place. To minimise the potential risk of groundwater flooding we believe it would be prudent to avoid drainage via soakaways or other infiltration systems.
- 5.2.4 Soakaway testing will be completed on site to confirm the above, with results to be shared with the LLFA when available.

5.3 Discharge to Watercourse

- 5.3.1 An ordinary watercourse has been identified at the southern extents of the site within an existing ditch with accompanying headwall.
- 5.3.2 The intention is for the new surface water drainage to discharge into the existing watercourse. The new building and associated impermeable area will be limited to a discharge rate of a Greenfield runoff rate of 5l/s.

5.4 Proposed Surface Water Strategy

- 5.4.1 The drainage system and ground levels will be designed such that:
- Unless an area is designed to hold and/or convey water, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.
 - Flooding does not occur during a 1 in 100-year storm event (including allowance for up to 40% increase to allow for the anticipated impacts of climate change) in any part of a building (including a basement) or in any utility plant susceptible to water within the development.
 - Flows resulting from rainfall in any event exceeding the 1 in 100-year rainfall event are managed in exceedance routes to minimise as far as practicable the risk of flooding to people and property both on and off site.
 - The management of surface water on site will ensure that there is no increased risk of flooding on and offsite as a result of the development.
 - The SuDS design for the development site should ensure that the quality of any receiving water body is not adversely affected and preferably enhanced in accordance with Ciria SuDS Manual, Chapter 4.

- 5.4.2 Refer to **Appendix E** for the attenuation storage calculations.
- 5.4.3 In summary, all hard standing areas will discharge to the existing watercourse in the ditch at the southern extent of the site. The rate of discharge will be controlled by a hydro brake with excess water stored in a proposed pond. This would be the most SuDS compatible solution for the site.
- 5.4.4 calculations have been completed using Causeway Flow to determine the anticipated size of a pond with the discharge rate to be controlled using a Hydro brake.
- 5.4.5 Following an iterative process, the output of the preliminary calculations indicated a pond with a volume of 135m³ would be required for the Greenfield run off rate of 5l/sec for the proposed site.
- 5.4.6 It is currently our proposal to locate the pond in an area indicated as landscaping west of the proposed warehouse. Detailed layouts of the proposed drainage system, including the pond and hydro brake, are provided in **Appendix H**.

6 Proposed Foul Drainage

- 6.1.1 Most private sewers and private lateral drains which were connected to a public sewer as of July 2011 transferred in ownership to Severn Trent Water. Severn Trent Water does not possess complete records of these assets and some assets may not be displayed on the asset map.
- 6.1.2 A predevelopment enquiry has been made to Severn Trent Water and a response has been received and considered in the below proposals.
- 6.1.3 Severn Trent records indicate there is an existing Combined Rising Main is located on the eastern extent of the site and the associated pumping station is located south eastern extent of the site. Following correspondence with Severn Trent, permission will not be granted to discharge to the Combined Rising Main.
- 6.1.4 A foul/combined 300mm gravity sewer is located to the east of the existing site entrance on Station Road. Correspondence with Severn Trent indicates a connection to this sewer will be acceptable with a S106 submission.
- 6.1.5 It is proposed that the new development will connect to the 300mm gravity sewer east of the site entrance on Station Road, subject to the approval of a S106 submission. A pumping station will be required on site to achieve the connection.
- 6.1.6 The peak discharge rate of foul water for the new development is anticipated to be 1.0l/s. This value is based on the values provided in the 'British Water Code of Practice – Flow and Loads - Table of Loadings for Sewage Treatment Systems' for developable land.

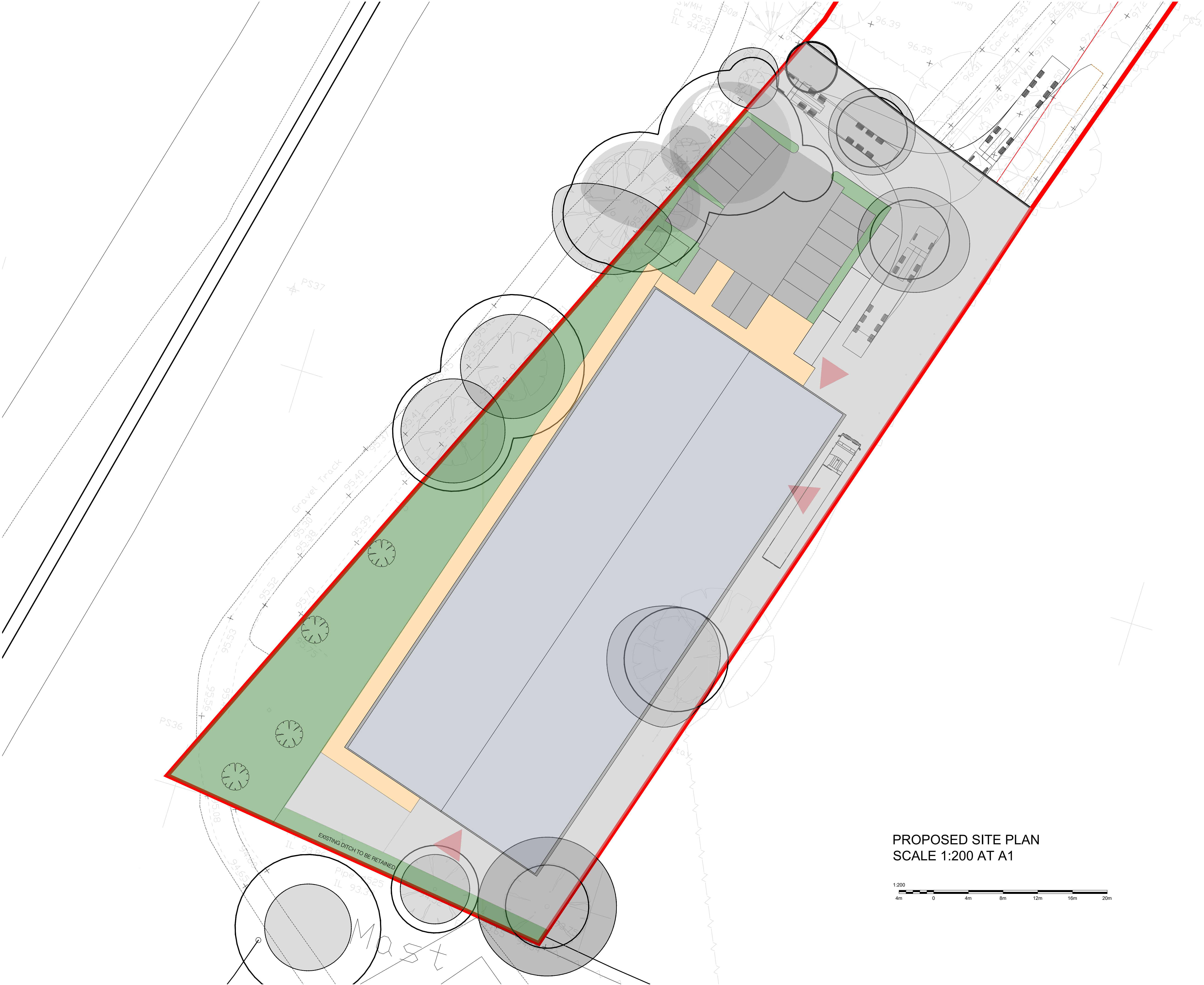
6.1 Drainage Maintenance strategy

- 6.1.1 For the proposed drainage system to function efficiently, it is important that the network is inspected and maintained on a regular basis. The surface water drainage will not be adopted and is to remain private, therefore it is anticipated that the drainage system will be maintained by the owner. Refer to Appendix D for the drainage maintenance plan.

7 Conclusions

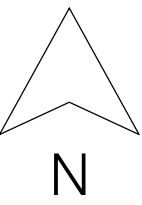
- 7.1.1 The NPPF Technical Guide classifies the flood risk vulnerability of buildings used for 'General Industry' as a less vulnerable use and Table 3 of the Technical Guide indicates that such development is compatible with Flood Zone 1.
- 7.1.2 All forms of flood risk to the site have been assessed and it has been determined that there is **low** risk of flooding to the proposed development.
- 7.1.3 The development proposals are in accordance with both National and Local Policy and Guidance relating to Flood Risk and Surface Water Management.
- 7.1.4 Site Wide Measures are designed to ensure external ground levels will be designed to direct any surface water flow away from building thresholds.
- 7.1.5 The design foul water flow from the proposed development will discharge to the existing Severn Trent Water 300mm gravity sewer east of the site entrance on Station Road, subject to the approval of a S106 submission. A pumping station will be required on site to achieve the connection.
- 7.1.6 The SuDS strategy will be developed as part of the detailed design to meet the following criteria:
 - Unless an area is designed to hold and/or convey water, flooding will not occur on any part of the site for a 1 in 30-year rainfall event.
 - Flooding does not occur during a 1 in 100-year storm event (including an allowance for a 40% increase in rainfall intensity due to climate change) in any part of a building (including a basement) or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
 - Discharge of surface water will be to the ordinary watercourse in the ditch in the southern extents of the site at a rate limited to 5 l/sec.
 - In order to achieve the above, sufficient storm water attenuation will be provided to manage the storm water discharging from site.
 - Flows resulting from rainfall in any event exceeding the 1 in 100-year rainfall event are managed in exceedance routes to minimise as far as practicable the risk of flooding to people and property both on and off site.
 - The SuDS design for the development site should ensure that the quality of any receiving water body is not adversely affected and preferably enhanced in accordance with Ciria SuDS Manual C753, Chapter 4.

Appendix A
Proposed Site Layout



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DETAIL DRAWINGS AT LARGER SCALE TAKE PRECEDENCE OVER GENERAL ARRANGEMENT DRAWINGS

P01	17/02/2023	NO	FIRST ISSUE
P02	26/06/2023	NO	HARD LANDSCAPING AMENDED TO RETAIN EXISTING DITCH + NEW TREES CREATED



JJ Churchill Ltd
PRECISION ENGINEERING



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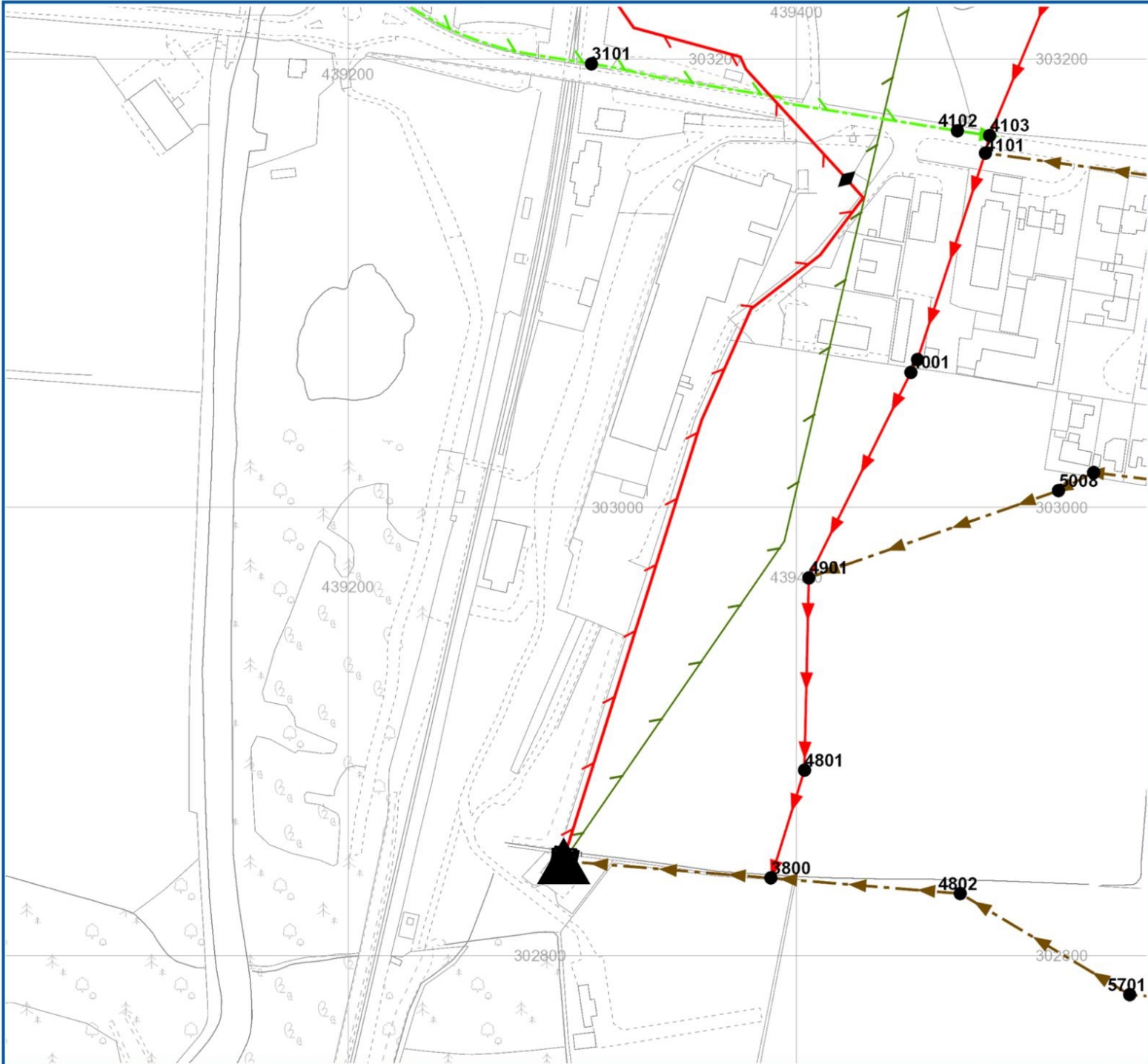
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Project	JJ CHURCHILL WAREHOUSE EXTENSION STATION ROAD, MARKET BOSWORTH
IMA Project No.	223008
	223008-IMA - ST-XX-DR-A-050102
Revision	P02
Status	PLANNING
Drawing Title	SITE PLAN
Date	17/02/2023
Scale	1:200
Sheet Size	A1
Drawn By	NO
Checked By	AD

Appendix B
Topographical Survey

Appendix C
Existing Sewer Records



Reference	Cover Level	Invert Level Upstream	Invert Level Downstream	Purpose	Material	Pipe Shape	Max Size	Min Size	Gradient	Year Laid
SK39035006	<UNK>	<UNK>	98.88	F	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK39034102	0	0	97.29	F	VC	C	225	0	<UNK>	31/12/1899 00:00:00
SK39033101	0	0	0	F	<UNK>	<UNK>	<UNK>	<UNK>	0	31/12/1899 00:00:00
SK39024801	96.5	95.79	<UNK>	C	VC	C	300	<UNK>	<UNK>	31/12/1899 00:00:00
SK39024802	97.01	96.16	<UNK>	F	VC	C	225	<UNK>	<UNK>	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
SK39034002	99.12	96.62	96.59	C	VC	C	300	<UNK>	298	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
SK39025701	99.0199	97.4	96.16	F	VC	C	225	<UNK>	70.53	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
SK39035008	100.3199	98.87	96.43	F	VC	C	150	<UNK>	48.22	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
SK39023800	<UNK>	96.16	<UNK>	F	VC	C	225	<UNK>	<UNK>	31/12/1899 00:00:00

LEGEND

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
- Hydroblade
- Penstock

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
- Transfered Manhole
- Unsurveyed Manhole

Storage

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

Waste Water Process Structure

- Sewage Treatment Point
- Sewage Service Connection
- Sludge Treatment Point
- Sludge Treatment Structure

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

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 Sewer
- Private Combined Pressure Sewer
- Private Foul Pressure Sewer

Service Pipe

- Surface Water Unserved Pipe
- Combined Unserved Pipe
- Foul Unserved Pipe
- Disposal Pipe

Null

- None
- Highway Drain
- Adopted Sewer

Private Foul Gravity Sewer

- Surface Water Unserved Pipe
- Combined Unserved Pipe
- Foul Unserved Pipe
- Transfered Surface Water Sewer
- Transfered Combined Sewer
- Transfered Foul Sewer
- Disposal Pipe
- Overflow Pipe
- Culverted Water Course
- Waste Internal Site Pipe
- Sewer Service Connection
- Gravity Sewer Others

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 Vacuum 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 Unserved Pipe
- Combined Unserved Pipe
- Foul Unserved Pipe
- Disposal 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
- Transfered Surface Water Lateral Da
- Transfered Combined Lateral Drain
- Transfered Foul Lateral Drain

MATERIALS

- NONE
- AC - ASBESTOS CEME
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- GRP - GLASS REINFORCED PLASTIC
- MAC - MASONRY IN REGULAR COURSES
- MAR - MASONRY RANDOMLY COURSED
- PE - POLYETHYLENE
- PF - PITCH
- PP - POLYPROPYLENE
- PSC - PLASTIC STEEL COMPOSITE
- PVC - POLYVINYL CHLORIDE
- RPM - REINFORCED PLASTIC MATRIX
- SI - SPUN (GREY) IRON
- ST - STEEL
- U - UNKNOWN
- VC - VITRIFIED CLAY
- XXX - OTHER

CATEGORIES

- W - WEIR
- C - CASCADE
- DB - DAMBOARD
- SE - SIDE ENTRY
- FV - FLAP VALVE
- BD - BACK DROP
- S - SIPHON
- D - HIGHWAY DRAIN
- S104 - SECTION 104

SHAPE

- C - CIRCULAR
- E - EGG SHAPED
- O - OTHER
- R - RECTANGLE
- S - SQUARE
- T - TRAPEZOIDAL
- U - UNKNOWN

PURPOSE

- C - COMBINED
- E - FINAL EFFLUENT
- F - FOUL
- L - SLUDGE
- S - SURFACE WATER



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

SEWER RECORD (Tabular)

O/S Map Scale: 1:2,500
Date of Issue: 17-04-23
This map is centred upon:
X: 439301.62 Y: 302987.79

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.

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Appendix D
Drainage Maintenance Plan

JJ Churchill, *Market Bosworth*

Surface Water Drainage Maintenance Plan – 28th March 2023

The following surface water management plan applies to the development of a new warehouse with accompanying carpark as an extension to an existing site in Market Bosworth.

The underground surface water drainage within the site boundary will be maintained by JJ Churchill upon completion. All proprietary systems will be maintained in accordance with manufacturer's recommendations. The current recommendations, where appropriate, are included below. However, the guidance provided below should be reviewed as and when manufacturer's guidance is updated. All installation and maintenance guides for proprietary systems will be retained on the premises in the Health & Safety file.

In addition to the following guidance on the underground drainage system, the above ground roof rainwater drainage system should be maintained strictly in accordance with the designer's guidance to ensure that roof run-off is conveyed in to the underground system as intended.

Gullies

Road gullies draining the site hardstandings should be inspected regularly to ensure that they continue to operate effectively, and are free from damage and blockage by debris or solid objects.

They should be cleaned at least once a year, and incorporated into a planned maintenance schedule.

Any debris or blockages near to the surface of the gully should be removed by hand or by jet-vac. The trap element of the gully can be cleaned through the use of a high-pressure hose.

The seating areas for grates should be cleaned before they are replaced. If grates are allowed to move within their frame, this may cause damage to the frame or seating.

Drainage channels

Drainage channels should be inspected regularly to ensure that the system continues to operate effectively, and is free from damage and blockage by debris or solid objects.

The system should be cleaned at least once a year, and incorporated into a planned maintenance schedule. Channel units can be cleaned through the use of a high-pressure hose. This can be fed into the channel system through access units which are strategically placed along the channel run.

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Company Registration Number 3145094, VAT Number 721619645.
A member of the MJMC (Holdings) Limited Group of Companies.

The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface liquids into the drainage channel. Any debris within the throat should be removed.

The seating areas for covers and grates should be cleaned before they are replaced. The covers and grates should be locked into position to prevent these being removed, stolen or dislodged by traffic. Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If grates/ covers are allowed to move within their frame, this may cause damage to the frame or seating.

Pipes and manholes

Manholes are to be inspected annually for signs of blockage, with pipes jet washed and CCTV inspections carried out to the pipelines as appropriate should a blockage occur.

The flow control device located within the manhole prior to tying into the existing network is also to be checked bi-annually for blockages.

Attenuation Basin

The attenuation basin is to be inspected bi-annually for signs of clogging and excessive debris and sediment accumulation. Any sediment build-up should be removed when the basin is thoroughly dry. Any debris, trash, sediments and other waste material should be disposed or recycled in compliance with local, state and federal waste regulations.

General guidance for the safe inspection of underground systems and confined spaces

- Contaminated surface water can contain substances harmful to human health. Any person carrying out maintenance on equipment which could potentially contain contaminated water should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.
- When covers are removed precautions should be taken against personnel falling into the unit.
- The working area should be adequately lit and the inspector should be familiar with the area and access points
- Correct posture should be maintained, particularly when lifting. Appropriate lifting equipment should be used when necessary. Proper footing and balance should be maintained at all times, taking care to avoid any sharp edges.

Appendix E
Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.200	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
SW01	0.053	4.00	95.228	475	439303.449	302926.917	1.068	94.160
SW02	0.058	4.00	95.290	1350	439292.378	302930.187	1.240	94.050
SW03	0.089	4.00	95.152	1350	439283.663	302922.692	1.262	93.890
SW04	0.000	4.00	94.959	1350	439274.515	302892.223	1.339	93.620
SW05			95.000	1500	439268.884	302853.459	1.520	93.480
Pond Inlet 1			94.800		439260.374	302886.036	1.230	93.570
Pond Inlet 2	0.080		94.800		439261.697	302860.806	1.480	93.320
Pond Outlet	0.024	4.00	94.800		439260.374	302856.175	1.230	93.570
Outfall	0.000		94.981	1200	439268.709	302850.948	1.531	93.450
RE		4.00	95.010	300	439292.788	302851.428	0.710	94.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
P01	SW01	SW02	10.445	0.600	94.160	94.050	0.110	95.0	225	4.13	50.0
P02	SW02	SW03	10.355	0.600	94.050	93.940	0.110	94.1	225	4.26	50.0
P03	SW03	SW04	30.614	0.600	93.890	93.620	0.270	113.4	300	4.60	50.0
P04	SW04	Pond Inlet 1	7.186	0.600	93.620	93.570	0.050	143.7	300	4.70	50.0
PO5	Pond Outlet	SW05	8.333	0.600	93.570	93.480	0.090	92.6	225	4.10	50.0
P06	SW05	Outfall	1.675	0.600	93.480	93.450	0.030	55.8	150	4.12	50.0
P07	RE	Pond Inlet 2	30.405	0.600	94.300	93.320	0.980	31.0	150	4.28	50.0

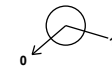
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
P01	1.342	53.3	10.1	0.843	1.015	0.053	0.0	66	1.039
P02	1.348	53.6	21.1	1.015	0.987	0.111	0.0	98	1.269
P03	1.475	104.3	37.9	0.962	1.039	0.200	0.0	125	1.363
P04	1.309	92.5	37.9	1.039	0.930	0.200	0.0	134	1.247
PO5	1.359	54.0	4.6	1.005	1.295	0.024	0.0	44	0.827
P06	1.349	23.8	4.6	1.370	1.381	0.024	0.0	44	1.041
P07	1.814	32.0	0.0	0.560	1.330	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
P01	10.445	95.0	225	Circular	95.228	94.160	0.843	95.290	94.050	1.015
P02	10.355	94.1	225	Circular	95.290	94.050	1.015	95.152	93.940	0.987
P03	30.614	113.4	300	Circular	95.152	93.890	0.962	94.959	93.620	1.039
P04	7.186	143.7	300	Circular	94.959	93.620	1.039	94.800	93.570	0.930
PO5	8.333	92.6	225	Circular	94.800	93.570	1.005	95.000	93.480	1.295
P06	1.675	55.8	150	Circular	95.000	93.480	1.370	94.981	93.450	1.381
P07	30.405	31.0	150	Circular	95.010	94.300	0.560	94.800	93.320	1.330

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
P01	SW01	475	Manhole	Adoptable	SW02	1350	Manhole	Adoptable
P02	SW02	1350	Manhole	Adoptable	SW03	1350	Manhole	Adoptable
P03	SW03	1350	Manhole	Adoptable	SW04	1350	Manhole	Adoptable
P04	SW04	1350	Manhole	Adoptable	Pond Inlet 1		Junction	
PO5	Pond Outlet		Junction		SW05	1500	Manhole	Adoptable
P06	SW05	1500	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable
P07	RE	300	Manhole	Adoptable	Pond Inlet 2		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW01	439303.449	302926.917	95.228	1.068	475				
						0	P01	94.160	225
SW02	439292.378	302930.187	95.290	1.240	1350		1	P01	94.050
						0	P02	94.050	225
SW03	439283.663	302922.692	95.152	1.262	1350		1	P02	93.940
						0	P03	93.890	300
SW04	439274.515	302892.223	94.959	1.339	1350		1	P03	93.620
						0	P04	93.620	300
SW05	439268.884	302853.459	95.000	1.520	1500		1	PO5	93.480
						0	P06	93.480	150
Pond Inlet 1	439260.374	302886.036	94.800	1.230			1	P04	93.570
									300
Pond Inlet 2	439261.697	302860.806	94.800	1.480			1	P07	93.320
									150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
Pond Outlet	439260.374	302856.175	94.800	1.230			0	PO5	93.570	225
Outfall	439268.709	302850.948	94.981	1.531	1200		1	P06	93.450	150
RE	439292.788	302851.428	95.010	0.710	300		0	P07	94.300	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.200	Additional Storage (m³/ha)	0.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

Node SW05 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	93.480	Product Number	CTL-SHE-0104-5000-1100-5000
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node Pond Outlet Pond Storage Structure

Invert Level (m) 93.570 | Time to half empty (mins) | Analyse flow through structure x

Inlets

Pond Inlet 1 | Pond Inlet 2

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	22.0	1.250	297.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	143.027	40.472	30 year 360 minute summer	31.507	8.108
2 year 15 minute winter	100.370	40.472	30 year 360 minute winter	20.480	8.108
2 year 30 minute summer	92.708	26.233	30 year 480 minute summer	24.545	6.486
2 year 30 minute winter	65.058	26.233	30 year 480 minute winter	16.307	6.486
2 year 60 minute summer	61.944	16.370	30 year 600 minute summer	19.934	5.452
2 year 60 minute winter	41.154	16.370	30 year 600 minute winter	13.620	5.452
2 year 120 minute summer	37.846	10.001	30 year 720 minute summer	17.647	4.730
2 year 120 minute winter	25.144	10.001	30 year 720 minute winter	11.860	4.730
2 year 180 minute summer	28.977	7.457	30 year 960 minute summer	14.342	3.777
2 year 180 minute winter	18.836	7.457	30 year 960 minute winter	9.500	3.777
2 year 240 minute summer	22.879	6.046	30 year 1440 minute summer	10.251	2.747
2 year 240 minute winter	15.200	6.046	30 year 1440 minute winter	6.889	2.747
2 year 360 minute summer	17.414	4.481	100 year +40% CC 15 minute summer	493.585	139.667
2 year 360 minute winter	11.319	4.481	100 year +40% CC 15 minute winter	346.375	139.667
2 year 480 minute summer	13.692	3.618	100 year +40% CC 30 minute summer	323.995	91.679
2 year 480 minute winter	9.096	3.618	100 year +40% CC 30 minute winter	227.365	91.679
2 year 600 minute summer	11.203	3.064	100 year +40% CC 60 minute summer	216.808	57.296
2 year 600 minute winter	7.655	3.064	100 year +40% CC 60 minute winter	144.042	57.296
2 year 720 minute summer	9.981	2.675	100 year +40% CC 120 minute summer	130.814	34.570
2 year 720 minute winter	6.708	2.675	100 year +40% CC 120 minute winter	86.910	34.570
2 year 960 minute summer	8.198	2.159	100 year +40% CC 180 minute summer	98.589	25.370
2 year 960 minute winter	5.431	2.159	100 year +40% CC 180 minute winter	64.085	25.370
2 year 1440 minute summer	5.953	1.595	100 year +40% CC 240 minute summer	76.601	20.243
2 year 1440 minute winter	4.001	1.595	100 year +40% CC 240 minute winter	50.892	20.243
30 year 15 minute summer	271.552	76.840	100 year +40% CC 360 minute summer	57.163	14.710
30 year 15 minute winter	190.562	76.840	100 year +40% CC 360 minute winter	37.157	14.710
30 year 30 minute summer	176.758	50.016	100 year +40% CC 480 minute summer	44.353	11.721
30 year 30 minute winter	124.040	50.016	100 year +40% CC 480 minute winter	29.467	11.721
30 year 60 minute summer	117.774	31.124	100 year +40% CC 600 minute summer	35.904	9.820
30 year 60 minute winter	78.247	31.124	100 year +40% CC 600 minute winter	24.531	9.820
30 year 120 minute summer	71.120	18.795	100 year +40% CC 720 minute summer	31.696	8.495
30 year 120 minute winter	47.250	18.795	100 year +40% CC 720 minute winter	21.302	8.495
30 year 180 minute summer	53.792	13.842	100 year +40% CC 960 minute summer	25.642	6.752
30 year 180 minute winter	34.966	13.842	100 year +40% CC 960 minute winter	16.986	6.752
30 year 240 minute summer	41.974	11.093	100 year +40% CC 1440 minute summer	18.202	4.878
30 year 240 minute winter	27.887	11.093	100 year +40% CC 1440 minute winter	12.233	4.878

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.48%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SW01	9	94.228	0.068	10.3	0.0121	0.0000	OK
15 minute summer	SW02	10	94.158	0.108	21.6	0.1549	0.0000	OK
15 minute winter	SW03	10	94.021	0.131	38.9	0.1875	0.0000	OK
60 minute winter	SW04	57	93.948	0.328	18.8	0.4689	0.0000	SURCHARGED
60 minute winter	SW05	57	93.940	0.460	16.7	0.8136	0.0000	SURCHARGED
60 minute winter	Pond Inlet 1	57	93.948	0.378	17.0	0.0000	0.0000	OK
60 minute winter	Pond Inlet 2	57	93.945	0.625	7.6	0.0000	0.0000	OK
60 minute winter	Pond Outlet	57	93.941	0.371	14.1	23.6964	0.0000	SURCHARGED
15 minute winter	Outfall	13	93.497	0.047	5.0	0.0000	0.0000	OK
15 minute summer	RE	1	94.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW01	P01	SW02	10.3	0.715	0.193	0.1515	
15 minute summer	SW02	P02	SW03	21.6	1.214	0.403	0.1844	
15 minute winter	SW03	P03	SW04	39.0	1.150	0.374	1.2485	
15 minute summer	SW04	P04	Pond Inlet 1	36.9	1.348	0.399	0.4750	
15 minute summer	SW05	P06	Outfall	5.0	0.950	0.209	0.0088	22.5
30 minute winter	Pond Outlet	PO5	SW05	17.8	0.666	0.330	0.3314	
15 minute summer	RE	P07	Pond Inlet 2	0.0	0.000	0.000	0.2676	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW01	10	94.261	0.101	19.6	0.0178	0.0000	OK
15 minute summer	SW02	10	94.216	0.166	41.0	0.2377	0.0000	OK
120 minute winter	SW03	116	94.216	0.326	22.0	0.4661	0.0000	SURCHARGED
120 minute winter	SW04	116	94.216	0.596	21.1	0.8523	0.0000	SURCHARGED
120 minute winter	SW05	118	94.208	0.728	15.4	1.2871	0.0000	SURCHARGED
120 minute winter	Pond Inlet 1	116	94.216	0.646	20.4	0.0000	0.0000	OK
120 minute winter	Pond Inlet 2	118	94.213	0.893	8.8	0.0000	0.0000	OK
120 minute winter	Pond Outlet	118	94.209	0.639	14.2	59.5375	0.0000	SURCHARGED
180 minute winter	Outfall	80	93.497	0.047	5.0	0.0000	0.0000	OK
15 minute summer	RE	1	94.300	0.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW01	P01	SW02	19.6	0.800	0.367	0.2539	
15 minute summer	SW02	P02	SW03	41.0	1.397	0.766	0.3038	
15 minute summer	SW03	P03	SW04	74.7	1.284	0.716	1.8011	
15 minute summer	SW04	P04	Pond Inlet 1	72.8	1.301	0.786	0.5060	
15 minute summer	SW05	P06	Outfall	5.0	0.950	0.209	0.0088	43.2
30 minute winter	Pond Outlet	PO5	SW05	15.4	0.754	0.285	0.3314	
15 minute summer	RE	P07	Pond Inlet 2	0.0	0.000	0.000	0.2676	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.23%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SW01	11	95.045	0.885	35.6	0.1566	0.0000	FLOOD RISK
15 minute winter	SW02	11	94.987	0.937	71.8	1.3411	0.0000	SURCHARGED
15 minute winter	SW03	11	94.732	0.842	127.7	1.2043	0.0000	SURCHARGED
180 minute winter	SW04	176	94.590	0.970	28.8	1.3876	0.0000	SURCHARGED
180 minute winter	SW05	176	94.581	1.101	11.4	1.9455	0.0000	SURCHARGED
180 minute winter	Pond Inlet 1	176	94.590	1.020	28.5	0.0000	0.0000	OK
180 minute winter	Pond Inlet 2	176	94.586	1.266	13.1	0.0000	0.0000	OK
180 minute winter	Pond Outlet	176	94.582	1.012	18.7	135.8983	0.0000	FLOOD RISK
180 minute summer	Outfall	72	93.497	0.047	5.0	0.0000	0.0000	OK
180 minute winter	RE	176	94.586	0.286	0.5	0.0203	0.0000	SURCHARGED

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SW01	P01	SW02	32.8	0.825	0.615	0.4154	
15 minute winter	SW02	P02	SW03	67.9	1.708	1.268	0.4118	
15 minute winter	SW03	P03	SW04	124.5	1.768	1.194	2.1558	
15 minute winter	SW04	P04	Pond Inlet 1	122.2	1.735	1.320	0.5060	
15 minute summer	SW05	P06	Outfall	5.0	0.950	0.209	0.0088	69.6
30 minute summer	Pond Outlet	PO5	SW05	16.1	0.806	0.299	0.3314	
60 minute winter	RE	P07	Pond Inlet 2	-1.2	-0.106	-0.039	0.5353	

Appendix F

Correspondence with Leading Local Flood Authority and Severn Trent Water

WONDERFUL ON TAP

SEVERN
TRENT

MJMC Consulting Engineers Ltd
Southgate House
Southgate
Wakefield

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

www.stwater.co.uk

Email:
Network.Solutions@SevernTrent.co.uk

Our ref: 1079712

FAO: Emily Wilkes

17th April 2023

Dear Sir/Madam,

Proposed development: (1 Commercial development) – Station Road Market Bosworth Nuneaton CV13 0PF 439270 302987

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

Records show a 225mm rising main running along site boundary. This sewer requires a 15m protective strip, 7.5m on each side of pipe centreline. No permanent structures or planting of trees within the 15m protective strip.

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.

Foul Water Drainage

Records show foul/combined 300mm gravity sewer to the east, crossing Station Road is the most suitable connection point for your development. Land contour suggests the site will require a pump solution. Given the nature of commercial development, we do not expect flows to exceed 1 l/s (pump). The network has the capacity to accommodate foul flows from the development. Therefore, a connection will be acceptable to the company with S106 submission.

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.

Severn Trent is committed to reduce flooding and pollution from our sewers and consequently have a renewed focus on reducing these risks. Every connection of surface water into a foul/combined sewer adds to the risk of flooding and pollution, and as such Severn Trent expects all new development to manage their surface water in a sustainable manner. As a result we will not accept any surface water into our foul/combined sewer. Developers will have to find an alternative solution that does not involve discharge to the public combined network.

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.

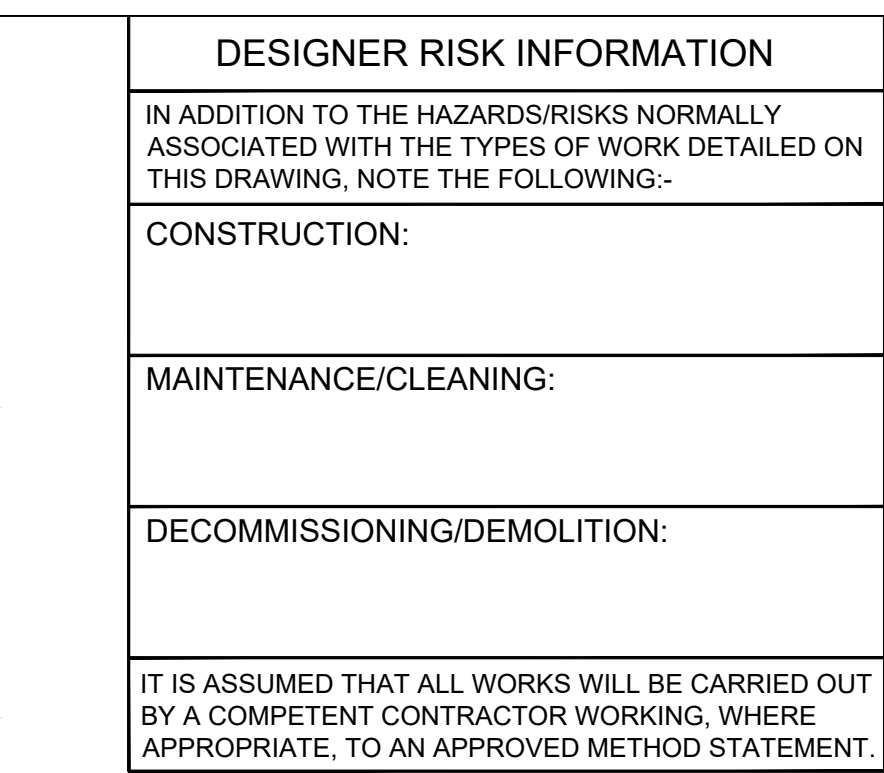
Please quote the above reference in any future correspondence (including e-mails) with STW Limited. Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Belal Ali', with a stylized flourish at the end.

Belal Ali
Network Solutions
Developer Services

Appendix G
Drainage Layouts



Proposed Sewers	
Surface Water	
Pipe Run	= 
Manhole	= 
Petrol Interceptor	= 
Attenuation Pond	= 
Foul Water	
Pipe Run	= 
Manhole	= 
Rising Foul Water	
Pipe Run	= 
Drainage Channels	
Service Yard (E600)	= 
Car Park (D400)	= 
Gully	= 
Ex Foul Water	
Pipe Run	= 

1.	ALL DRAINAGE MATERIALS & SPECIFICATIONS TO BE IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE APPENDIX C 'DESIGN AND CONSTRUCTION GUIDANCE'.	27.	IF A SIPHONIC ROOF DRAINAGE SYSTEM IS PROPOSED THE SIPHONIC PIPEWORK IS TO BE CONTINUED BELOW GROUND TO THE FIRST EXTERNAL MANHOLE, WHICH IS TO BE VENTED TO BREAK THE SIPHONIC ACTION.
2.	REFER TO MJMC CONSULTING ENGINEERS DRAWING No'S D-5010, D-5211 & D-5212 FOR ALL STANDARD DRAINAGE DETAILS.	28.	ALL DRAINAGE COVERS IN PEDESTRIAN AREAS ARE TO BE FITTED WITH HEEF SAFE LIDS.
3.	THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINS/SEWERS AND SERVICES SHALL BE ESTABLISHED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS ON SITE. ANY DISCREPANCIES FROM THE INFORMATION INDICATED ON THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER.	29.	ALL PETROL INTERCEPTORS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND FITTED WITH ALARMS AND VENTS TO LOCATIONS AS AGREED WITH THE CLIENT.
4.	ALL PIPES SHALL BE LAID WITH SOFFITS LEVEL AND ALL MANHOLES/INSPECTION CHAMBER INVERT LEVELS SHOWN ARE FOR THE OUT GOING PIPE. UNLESS OTHERWISE INDICATED ON THE DRAWING.	30.	IF A PILED OR SUSPENDED SLAB IS PROPOSED ALL INTERNAL DRAINAGE IS TO BE SUSPENDED FROM THE SLAB WITH ROCKER PIPES USED AT THE EDGES OF THE BUILDING.
5.	ALL VITRIFIED CLAY PIPES AND FITTINGS TO BE IN ACCORDANCE WITH BS. EN295 & BS 65.	31.	ALL DOMESTIC FOUL DRAINAGE MUST BE KEPT SEPARATE FROM CONDENSATE DRAINAGE UNTIL OUTSIDE THE BUILDING WITH STEPS TAKEN TO TRAP ANY ODOURS.
6.	ALL CIRCULAR CONCRETE PIPES IN TRENCHES AND FITTINGS TO BE IN ACCORDANCE WITH BS EN1916 & BS 5911 AND BE STRENGTH CLASS 120.	32.	ALL FOUL RUNS MUST BE VENTED IN ACCORDANCE WITH BUILDING REGULATIONS. VENT LOCATIONS TO BE PROVIDED BY THE ABOVE GROUND DRAINAGE DESIGNER.
7.	ALL STRUCTURED WALL PLASTIC PIPES AND FITTINGS TO BE IN ACCORDANCE WITH W4.435-01. MAXIMUM LENGTH OF PIPE FOR LAYING IS 3m.	33.	REGARDLESS OF MANHOLE POSITIONS SHOWN ON THIS DRAWING, THE ACCESS LIDS ARE TO BE POSITIONED AWAY FROM MAIN WHEEL LINES AND BE SQUARE TO KERBS AND OTHER SURFACE FEATURES SUCH AS YARD SLAB JOINTS.
8.	PIPES AND FITTINGS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.	34.	ALL TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.
9.	ALL CONNECTIONS TO GULLIES & DRAINAGE CHANNELS TO BE 150mm DIAMETER UNLESS NOTED OTHERWISE.	35.	THE CONTRACTOR SHALL PROVIDE LAND DRAINAGE AS NECESSARY TO PREVENT RUNOFF FROM LANDSCAPED AREAS WASHING SILT ONTO HARDSTANDINGS AND THIRD PARTY LAND.
10.	ALL CONNECTIONS FROM DRAINAGE CHANNELS TO BE TRAPPED AND ROADABLE.	36.	THE CONTRACTOR IS RESPONSIBLE FOR SEWER CONNECTION APPROVALS UNLESS NOTED OTHERWISE.
11.	COVER LEVELS INDICATED IN MANHOLE SCHEDULES ARE APPROXIMATE AND SHOULD BE CHECKED AGAINST ARCHITECT'S DETAILED LEVELS DRAWINGS.	37.	ALL MANHOLE LIDS TO BE PAINTED BLACK IMMEDIATELY PRIOR TO PRACTICAL COMPLETION.
12.	WHERE THE COVER TO PIPES IS LESS THAN 1200mm IN TRAFFICKED AREAS & 900mm IN OTHER AREAS, THEN CONCRETE PROTECTION IS TO BE PROVIDED. NB UNTIL FINAL SURFACE IS CONSTRUCTED, HEAVY TRAFFIC IS NOT TO BE ALLOWED OVER PIPE TRENCHES WITHOUT SPECIFIC PROTECTION MEASURES IN PLACE.	38.	JUST PRIOR TO PRACTICAL COMPLETION OF THE PROJECT THE CONTRACTOR SHALL CLEAN ALL DRAIN RUNS BY JETTING AND REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE PUBLIC SEWER AND INTERCOURSE SYSTEM ONCE THE DRAINAGE SYSTEM HAS BEEN FULLY CLEANED OUT A CCTV SURVEY OF THE COMPLETE PIPE NETWORK (INCLUDING ATTENUATION TANKS AND CARRIER CHANNELS) SHALL BE CARRIED OUT, WITH A COPY BEING SENT TO THE ENGINEER.
13.	SOFT SPOTS IN THE BOTTOM OF TRENCHES SHALL BE REMOVED AND BACKFILLED WITH TYPE 1 SUB-MATERIAL, PIPE BEDDING MATERIAL OR LEAN MIX CONCRETE.	39.	VISUAL INSPECTIONS (THROUGH CCTV SURVEY) SHALL BE CARRIED OUT BY A QUALIFIED AND APPROVED CONTRACTOR, AND IN ACCORDANCE WITH THE 'WSA/IFA MODEL CONTRACT DOCUMENT FOR SEWER CONDITION INSPECTIONS': THE AS BUILT INVERT AND COVER LEVELS SHALL BE RECORDED BY THE CONTRACTOR AND PASSED TO THE ENGINEER FOR REVIEW.
14.	ALL CONCRETE WORK IS TO BE IN ACCORDANCE WITH MJMC CONSULTING ENGINEERS NBS-SECTION E.		
15.	RELEVANT CONCRETE MIX DESIGN:-		
	CONCRETE ELEMENT	DESIGN CHEMICAL CLASS	SPEC. CLAUSE No.
	PIPE SURROUND		
	MH SURROUND	DC-2	130H
16.	DRAINAGE CHANNEL SPECIFICATIONS:-		

LOCATION	CHANNEL TYPE	Min. LOAD CLASS
YARD	Aco-Multidrain	E600
CAR PARK	Aco-Multidrain	C250
ACCESS ROAD	Aco-Multidrain	D400
PEDESTRIAN AREAS	Aco-Multidrain	B125

FOUL WATER MANHOLE SCHEDULE						
MANHOLE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO MH SUMP (m)	MANHOLE SIZE, TYPE AND CLEAR OPENING(mm)	COVER GRADE	NOTES
FW01	94.979	94.279	0.700	1200x900mm, Type C with 1200x600mm Clear Opening	B125	PUMP STATION TO SPECIALISTS DESIGN
FW02	94.958	93.345	1.613	TBC	B125	
FW03	TBC	TBC	TBC	474mmØ, TYPE D	B125	
FWO4	TBS	TBS	TBS	475mm Ø, TYPE D	B125	

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