
From: Caroline Large <caroline@andrewlargesurveyors.co.uk>
Sent: 08 March 2024 09:47
To: Matt Jedruch
Subject: Fwd: FW: 25192 RE: Redgate Site Extension (LPA Ref: 21/1492/FUL)
Attachments: DSWDS.pdf; Proposed Lighting Schedule.pdf; Appendices.zip; National Highways_Oct 23.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Matt

I think the report I sent over was actually a draft one so please ignore. I've contacted the applicant and asked for details on everything sent to Highways. Here is the first set of info, second email to follow. It was proposed that CTMP was governed by a planning condition.

Many thanks
Caroline

From: Simon Tucker <SJT@dtatransportation.co.uk>
Sent: Friday, October 13, 2023 1:22 PM
To: planningm@nationalhighways.co.uk
Cc: Mark Simpson <mark@extraroomselfstorage.co.uk>
Subject: 25192 RE: Redgate Site Extension (LPA Ref: 21/1492/FUL)

FAO Babatunde Adekoya-Serrano,

Dear Babatunde,

I have been passed a copy of your response to the above application and can offer the following in response:

Access and Egress

The A5 direct access has been long established and is unrestricted in terms of its level of use. It provides for inbound movements to the site only and access is controlled by a PIN code which is available to all existing customers and will be extended to customers of the new building as well. The form and layout of the access will not change as part of this application.

Lighting

Lighting Details are attached for review. If necessary the final detail can be controlled by planning condition if needed.

CTMP

This is acceptable to the applicant and again can be controlled by planning condition.

Drainage

A detailed drainage strategy has been prepared and is attached. This confirms full accordance with DfT Circular 01/22 Para 59.

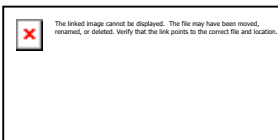
Environmental

I would be grateful if you could confirm that your environmental team are content with the proposals and if changes are needed presumably that could be subject to a planning condition.

If you wish to discuss any of the above please do give me a call.

Kind regards

Simon Tucker



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Caroline Large MSc MRICS
01332 862250

(Please note my working days are Monday, Tuesday, Thursday and Friday between the hours of 9.15 - 3.00)



DTA

Transport Planning Consultants

Detailed Surface Water Drainage Strategy - Redgate Depot

Final Report

October 2023

Prepared for:
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Extra Room
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Document Status

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Contract

JBA Project Manager	Daniel Bloomfield
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Warwickshire, B46 3AD

JBA Project Code 2023s0603

This report describes work commissioned by Extra Room by an instruction email dated 31/07/2023. The Client's representative for the contract was Mark Simpson.

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The methodology adopted and the sources of information used by JBA in providing its services are outlined in this Report. The work described in this Report was undertaken between August and October 2023 and is based on the information available during that period. The scope of this Report and the services are accordingly factually limited by these circumstances.

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Abbreviations

BGS.....	British Geological Survey
EA	Environment Agency
FRA.....	Flood Risk Assessment
JBA.....	Jeremy Benn Associates Ltd
LiDAR.....	Light Detection and Ranging
LPA	Local Planning Authority
LLFA.....	Lead Local Flood Authority
m AOD	metres Above Ordnance Datum
SFRA.....	Strategic Flood Risk Assessment
STW	Severn Trent Water
SuDS.....	Sustainable Drainage System

1 Introduction

1.1 Terms of reference

JBA Consulting were appointed by Extra Room in July 2023 to undertake a Detailed Surface Water Drainage Strategy for the proposed extension to an existing Self Storage unit at The Redgate Depot, Watling Street, Nuneaton, CV10 0RY.

This document includes a design statement, summarising the adopted design criteria and assumptions made, along with drawings of the proposed drainage layout, attenuation features and hazards associated with the lifecycle of the proposed drainage system. This report only contains the drainage strategies; detailed information about flood risk on the site is included in a separate FRA Report (Ref: KNS-JBAU-XX-XX-RP-HM-0001-A1-C03-FRA_Report).

1.2 Site details

1.2.1 Existing Site

The greenfield site forms part of a wider ownership boundary which comprises of an existing self-storage unit, located to the east of the proposed site. The site is approximately 0.65km south of Fenny Drayton and main access to the site is from the Watling Street A5 and Atherstone Road (A444) junction. The site is bordered to the west by agricultural land and to the north by Red Gate House. A summary of site information is included in Table 1-1.

Table 1-1: Summary of site details

Summary of site details	
Site name	Redgate Depot
Site location	Watling Street, Nuneaton, CV10 0RY
Total site area / impermeable area (ha)	0.229 / 0.129
Existing land-use	Greenfield
Purpose of development	Extension to storage unit
OS NGR	435114E, 295832N
County	Leicestershire
Local Planning Authority (LPA)	Hinckley and Bosworth Borough Council
Lead Local Flood Authority (LLFA)	Leicestershire County Council
Sewerage undertaker	Severn Trent Water

1.2.2 Proposed Development

The development proposal comprises of a western extension to the existing self-storage unit. Whilst the red line boundary planning application area is approximately 0.229ha and includes approximately 50m² of the existing storage unit roof (which is already drained via an existing

surface water system with no proposed changes) 0.129 ha is to become impermeable (proposed building roof) with fields bordering the building to the west and south of the development. The proposed site layout is included in Figure 1-1 and Appendix A. Access to the proposed building extension is understood to be through the existing hardstanding area associated with the building to the east.

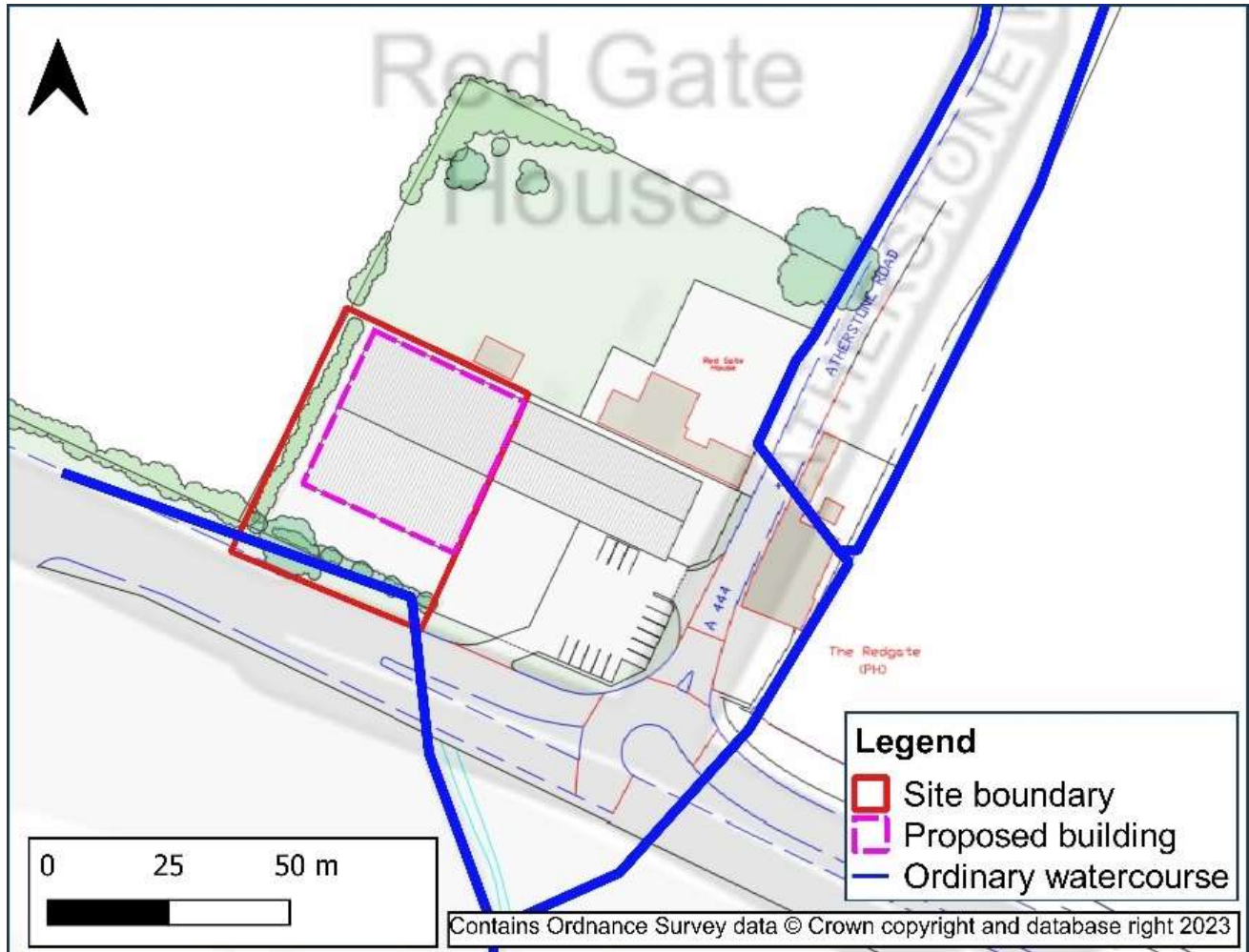


Figure 1-1: Site location plan

1.2.3 Site topography

The Environment Agency National LiDAR Programme 1m 2022 DTM was used to provide a general overview of the topography of the site and surrounding area (Figure 1-2).

The site is situated at the Redgate Junction between Watling Street (A5) and Atherstone Road. To the north of the site elevations are approximately 79.91m above ordnance datum (AOD) and the land slopes down towards Redgate Junction and unnamed ordinary watercourse where ground levels are approximately 76.43-77.62m AOD. Watling Street (A5), immediately south of the site, is at a higher elevation of approximately 78.90m AOD. To the south of this road ground levels decrease corresponding to the floodplain of the unnamed ordinary watercourse.

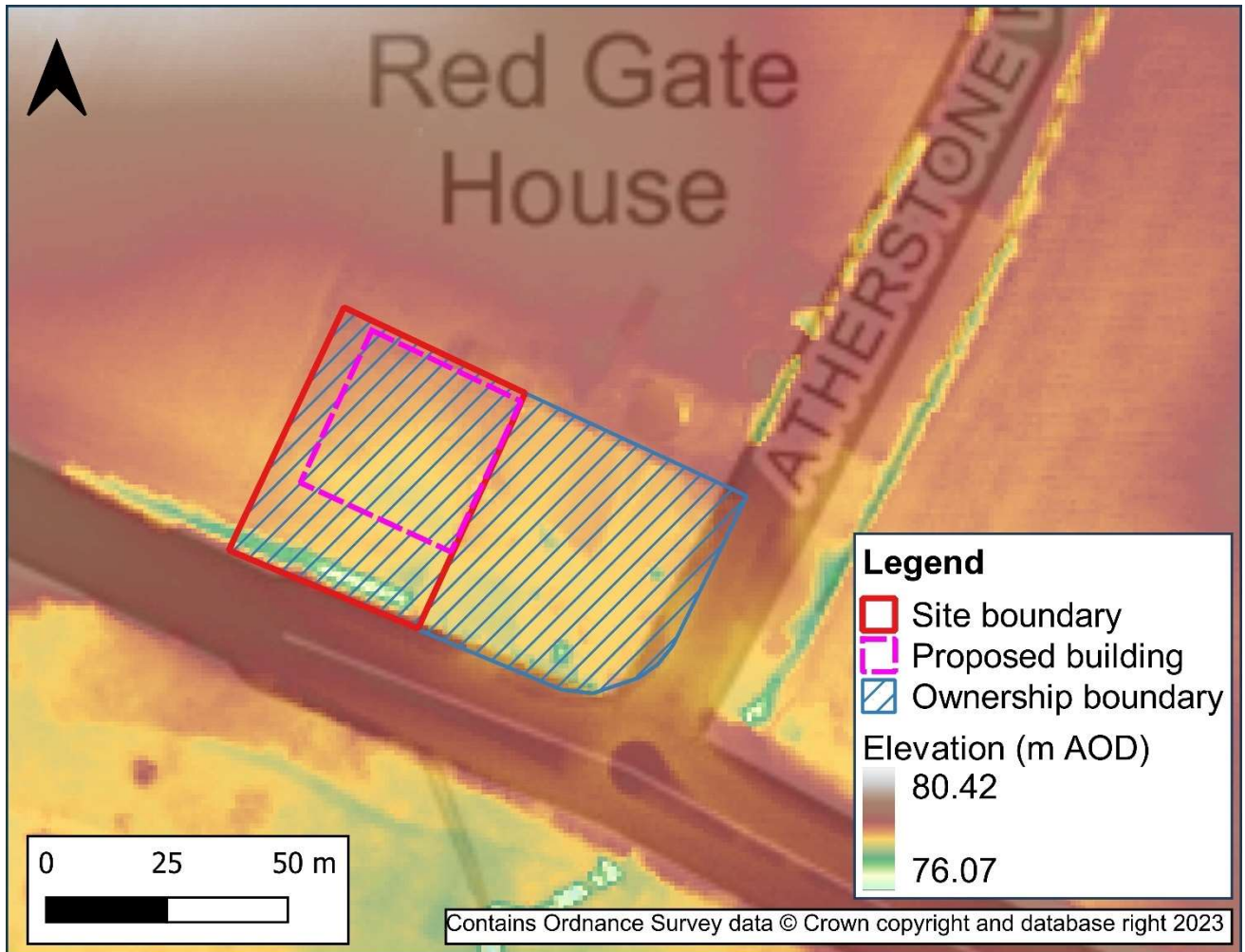


Figure 1-2: Environment Agency 2022 1m LiDAR DTM

A site-specific topographic survey was completed by SV Surveying Ltd in April 2023 (see Appendix B). The survey shows that the site is relatively flat. Ground levels range between approximately 76.43-78.33m AOD, with the higher elevations located at the north-western areas of the site and the lowest of elevations area located in the southern and eastern areas of the site. This corresponds to a ditch (unnamed ordinary watercourse) sloping east along the southern boundary of the site. The site is currently covered with grass and earth, with shrubs and trees located along the southern and western boundaries.

1.2.4 Geology and hydrogeology

British Geological Survey¹ mapping indicates that the site is underlain by the Mercia Mudstone Group (Mudstone), overlain by superficial deposits of Alluvium (clay, silt, sand and

¹ British Geological Survey,
https://geologyviewer.bgs.ac.uk/?_ga=2.85394393.1506506152.1696405871-689878081.1696405871

gravel). LandIS Soilscales mapping indicates that the underlying soil types are slightly acidic loamy and clayey soils with impeded drainage.

1.2.5 Watercourses

As shown in Figure 1-3, a series of unnamed ordinary watercourses flow nearby the site. These converge and join the River Anker, an Environment Agency Statutory Main River approximately 630m south-west of the site, where the river flows in a north-westerly direction. In close proximity to the site, two unnamed ordinary watercourses flow south along both sides of Atherstone Road and converge 70m east of the site. This unnamed ordinary watercourse is then culverted beneath the A5 and converges with another unnamed ordinary watercourse approximately 60m south of the site. Aerial photographic evidence and topographic data shows this reach consists of a ditch which slopes east along the southern boundary of the site.

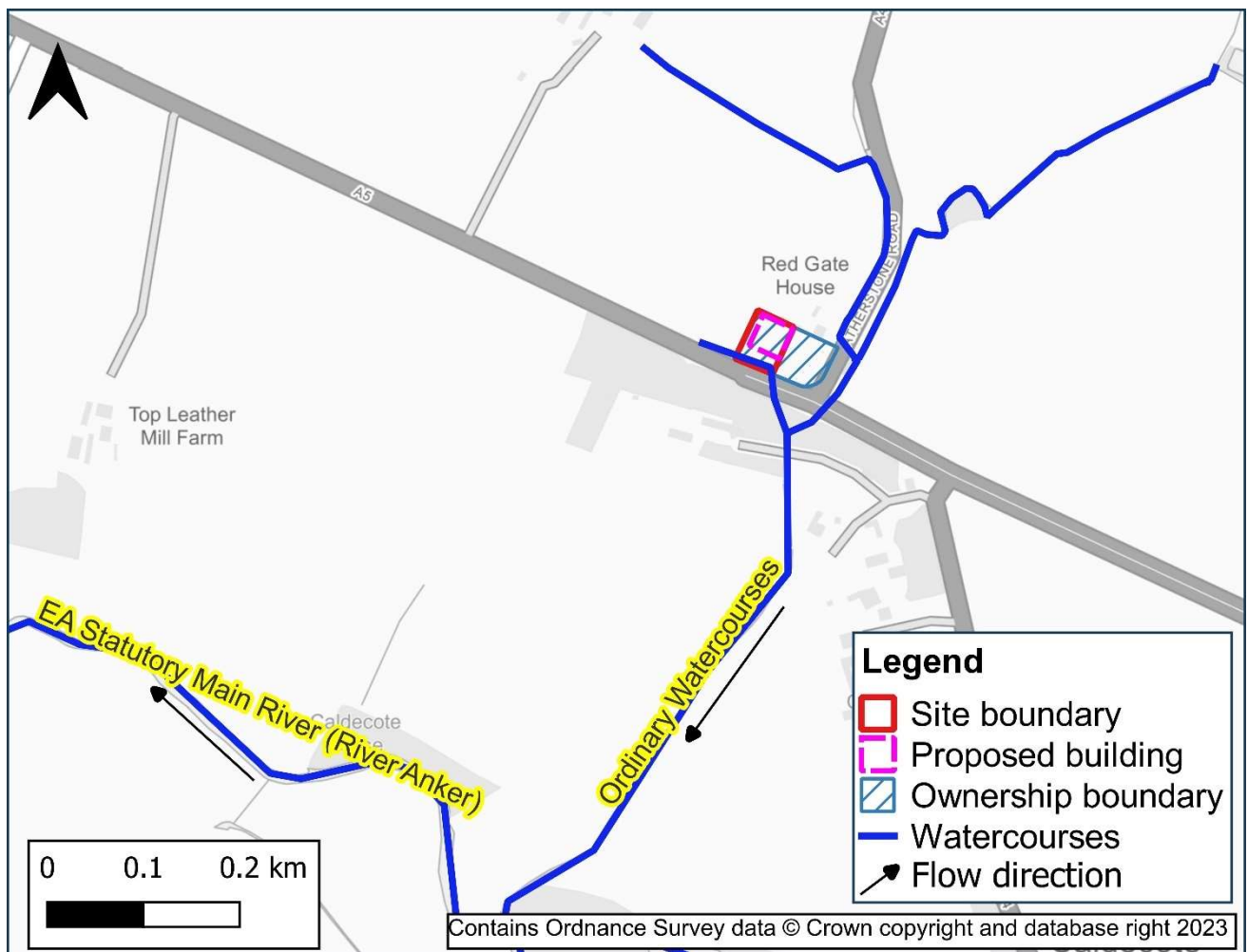


Figure 1-3: Watercourses in the vicinity of the site

1.2.6 Existing drainage conditions

Currently, the site drains via a combination of natural infiltration into the ground and overland flow following the local topography.

The sewage undertaker for the local area is Severn Trent Water. The existing storage unit within the wider ownership boundary slopes north to south and drains to the unnamed ordinary watercourse along the southern site boundary.

1.2.7 Flood Risk

The Flood Map for Planning (FMfP) shows that the site is located in Flood Zone 1, with no previous records of flooding on site. The Environment Agency Risk of Flooding from Surface Water (RoFSW) indicates that the site is at high risk; the entirety of the site is inundated with surface water during the 3.3% (1 in 30-year), 1% (1 in 100-year) and 0.1% AEP (1 in 1000-year) rainfall events. These datasets are informed by a generalised mapping approach which do not accurately represent the flood risk of the adjacent unnamed ordinary watercourses.

To accurately represent the flood risk, taking account culverts and other structures locally to the site, a surface water rainfall-runoff hydraulic model (1D-2D, Infoworks-ICM) was built alongside a hydrological assessment to allow a detailed representation of flood depths, velocities and hazards within the site boundary within the FRA study.

The model results indicate that the whole site is impacted by fluvial/surface water flooding during the 1% and 0.1% AEP flood events, whilst the 3.3% AEP event only encroaches the south and east areas of the proposed site. The 1% AEP plus 40% CC extent is similar to the 0.1% AEP flood event, inundating the entire site with flood levels of 78.81m AOD immediately adjacent to the ditch.

Post development modelling has been undertaken to compare the impact of the proposed development. Results show that there is negligible impact to the site and third-party land.

The risk of flooding from other sources; groundwater, sewer and reservoir flooding is considered to be low. For detailed information about flood risk on the site refer to the latest version of the Flood Risk Assessment report (please refer to the document no. KNS-JBAU-XX-XX-RP-HM-0001-A1-C03-FRA_Report), by JBA Consulting.

2 Surface Water Drainage Strategy

2.1 Design guidance

The design has been carried out in line with the following guidance documents:

- "Ciria 735 "The SuDS Manual", November 2015;
- "Leicestershire County Council SuDS Guidance", October 2018;
- "Flood risk assessments: climate change allowances", Environment Agency, May 2022;

Furthermore, the Hinckley and Bosworth Local Plan, adopted in June 2021, sets out the spatial planning strategy as well as the objectives and policies for new development in the Borough until 2039. The following policies are related to drainage:

- CC02 Flood Risk: "All development proposals should, wherever possible, include measures to reduce and manage surface water through appropriate sustainable drainage systems (SuDS) so as to minimise and manage flood risk and improve water quality in accordance with Policies CC03 and PMD03":
- 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 and local standards unless it can be clearly demonstrated: 1) That SuDS are not technically, operationally or financially deliverable or viable and that surface water drainage issues from the development can be alternatively mitigated; or That the SuDS scheme will adversely affect the environment or safety.
- PMD03 Preventing Pollution: "Adverse impacts from pollution will be prevented by ensuring that development proposals demonstrate that: 1) It will not adversely impact the water quality, ecological value or drainage function of water bodies in the borough. 2) Appropriate containment solutions for oils, fuels and chemicals are provided".

2.1.1 Water quantity (runoff flows and volumes)

Peak runoff rate can be readily managed and reduced using flow control and attenuation techniques. The reduction of runoff volume can however be more difficult to achieve as it relies upon infiltration, evapotranspiration or re-use. Where these SuDS techniques are not viable then the alternative is provide appropriate attenuation in underground (e.g., oversized pipes, tanks) and/or over ground (e.g., detention basins, retention ponds, swales) storage systems by restricting runoff rates to the greenfield equivalent.

2.1.2 Water quality (runoff treatment)

To mitigate against adverse impacts on water quality in the receiving water environment CIRIA 753 'The SuDS Manual' recommends the following steps to determine the required water quality management for discharges to surface waters and groundwaters:

- Plan land use to prevent runoff and associated pollutants for most rainfall events up to 5mm in depth;
- Identify the pollution hazard level associated with the given type of development;
- Select risk assessment approach based on receiving water environment and the pollution hazard level;
- Carry out the risk assessment for each outfall considering the pollution hazard level, the status of receiving water environment and effectiveness of the proposed SuDS techniques.

2.1.3 Climate change impact

In line with the climate change allowances recommended by the Environment Agency in their updated May 2022 guidance, the peak rainfall intensities should take into account increases for future climate change impacts in urban drainage designs. The recommended climate change allowances for the Tame, Anker and Mease Management Catchment are shown in Table 2-1.

Table 2-1: Tame, Anker and Mease Management Catchment peak rainfall allowances

Epoch	3.3% annual exceedance rainfall event		1% annual exceedance rainfall event	
	Central	Upper End	Central	Upper End
2050s	20%	35%	20%	40%
2070s	25%	35%	25%	40%

Based on the minimum lifespan of the proposed development of 100 years, the 2070s Epoch climate change allowances, as highlighted in the above table, have been used in this drainage strategy.

Urban creep has not been included in the calculations as it is not considered appropriate for this type of development.

2.2 Proposed drainage regime

2.2.1 Discharge Hierarchy

In accordance with SuDS guidance, surface water should be sustainably managed and designed in accordance with the discharge hierarchy. The discharge hierarchy has been considered (in order of preference) below:

- Re-use
 - The potential to incorporate rainwater harvesting at the site is unsuitable as the demand for water is insufficient for re-use to manage the surface water runoff to

the site. The storage unit is classified as an industrial site with no facilities or garden, so rainwater re-use has been discounted.

- Discharge to ground
 - Due to the complexity of the site in terms of proximity to unnamed ordinary watercourses (assumed high groundwater levels) and the potential risk of surface water flooding, the disposal of surface water from the site via infiltration methods is not considered to be a viable option. On site infiltration rate testing results are included in Appendix C.
- Discharge to watercourse
 - OS mapping and topographic survey data indicates that the nearest watercourse to the site is the unnamed ordinary watercourse owned by the client located along the southern boundary of the site, immediately adjacent to Watling Street (A5).
 - By constructing underground geocellular attenuation tanks and releasing the surface water at limited rates to the watercourse will appropriately manage site drainage.
- Discharge to sewer
 - On the preference of the CIRIA SuDS manual drainage hierarchy and the location of public sewers in relation to the site, drainage into Severn Trent Water sewers has been discounted.

2.2.2 Design Philosophy

The surface water drainage system will serve the roof of the proposed development. The attenuated runoff will be discharged by gravity and conveyed through a linear drain and pipes to two underground geocellular storage tanks, from where it will then outfall to the unnamed ordinary watercourse. Below ground geocellular storage tanks will be used instead of above ground SuDS due to spatial constraints and to ensure that the attenuation remains operational during frequent flood events. Due to the limited space along the sites northern boundary and the hydraulic and geometric constraints of the site, a linear drain will be positioned along the northern side of the storage unit.

It should be noted that the drainage design has been based on currently available information, design parameters and assumptions described in this report and associated drawings. If any of the design parameters or assumptions, including proposed site layout change, the design will have to be revisited to confirm its suitability.

2.2.3 Runoff rate and volume control

The greenfield runoff rates have been calculated using the Greenfield runoff rate estimation tool provided on the UK SuDS website. The FEH Statistical Method was used, based on the following parameters:

- Developable area: 0.129 ha
- BFI / BFIHOST: 0.339

- SAAR: 644
- Hydrological region: 4

The estimated greenfield runoff rates are presented in Table 2-2 and the calculation sheet for the site is included in Appendix D

Table 2-2: Greenfield runoff rates

Return period (yr)	Runoff rate (l/s)
Q _{BAR}	0.51
1	0.42
30	1.02
100	1.31

In line with the Hydro-Brake® solution provider, the flow control device performs best for surface water flow rate above and including 2 l/s and therefore, this minimum value has been considered for attenuation sizing at the proposed site, to ascertain optimal operation and reduce maintenance of the proposed drainage system.

2.2.4 Attenuation sizing

A source control module within MicroDrainage software has been used to estimate the required 100-year plus 40% CC attenuation volume for the proposed development. The following design parameters have been used:

- Cv assumed as 0.9 (roof surface)
- Proposed impermeable area: 0.129 ha
- Allowable discharge rate: 2 l/s (minimum allowable discharge rates of 2 l/s are considered most beneficial for future maintenance and blockage risk reduction).

The required 100-year plus 40% CC attenuation volume is 76.1m³.

The MicroDrainage calculation outputs from the Source Control attenuation sizing module are included in Appendix F.

Due to the limited space to construct the storage system, two underground geocellular storage tanks have been designed 1.2m away from the building and 2.0m away from the top bank of the unnamed ordinary watercourse, having parameters listed below:

- The proposed attenuation tank dimensions have been based on Polypipe's Permavoid Modular Crates 0.708m x 0.354m x 0.150m (L x W x H).

- The western attenuation tank has a designed width of 5.0m, a designed length of 21.2m (95% void ratio), and thickness of 600mm (4 layers of crates 150mm thick) providing a total storage volume of 60.0m³.
- The eastern attenuation tank has a designed width of 11.3m, a designed length of 3.9m (95% void ratio), and thickness of 450mm (3 layers of crates 150mm thick) providing a total storage volume of 18.9m³.
- The flow control (Hydro-Brake®) is designed so that it limits the post-development flows to 2l/s, has a design head of 600mm and an orifice of 73mm in diameter.

2.2.5 Runoff treatment

Table 2-3 (reproduced from CIRIA SuDS Manual: Section 26.7, Table 26.2) shows that the pollution hazard level for the type of proposed development is deemed to be 'low'.

Table 2-3: Pollution hazard indices for the proposed development type

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05

Sediment traps are to be incorporated along the underground conveyance pipe system to intercept coarse sediment prior to inflow into the storage facilities. Additionally, the proposed system will discharge to the existing vegetated ditch, which should enhance further surface water quality improvement.

2.2.6 Drainage network hydraulic modelling

The surface water drainage network system has been designed as gravity systems using WINDES MicroDrainage software.

The conveyance systems have been designed for 2-year in pipe flow and based on a free outfall. Additional sensitivity check calculations have been run for the system based on the assumption that the outfall pipe will be submerged by 300 mm above its soffit level (proposed soffit level is 76.989 mAOD therefore the assumed water level in the ditch equals 77.289 mAOD). The storage system (section 2.2.4) has been incorporated into the model and simulations run for a set of return period events (2-year, 30-year, 30-year plus 35% CC, 100-year plus 40% CC) and various durations to check the systems have sufficient capacity to convey and attenuate the design flows.

In accordance with the Planning Practice Guidance (PPG) and Leicester City Council as LLFA, new drainage systems should be designed to achieve no surcharging or flooding during

the 2-year rainfall event. During the 30-year and 30-year plus 35% CC events, surcharging is allowed, however flooding is not permitted. Furthermore, during the 100-year plus 40% CC event flooding is permitted, however the design of the site must ensure that all on-site surface water flood volumes and overland exceedance flows are managed safely not increasing flood risk elsewhere.

In summary, the WINDES MicroDrainage results indicate that during the free outfall event, the drainage systems will operate with no surface flooding during the 2-year, 30-year, 30-year plus 35% CC and 100-year plus 40% CC. When the outfall is submerged no flood is appears for events up to and including 30-year event.

The strategic drainage layout is shown on drawing KNS-JBAU-XX-XX-DR-C-0001, included in Appendix G, Typical Drainage Details drawings is included in Appendix H and full details of the MicroDrainage network hydraulic modelling outputs are included in Appendix E.

2.2.7 Groundwater impact assessment

The risk of 'floatation' of the proposed drainage systems/ liners due to the potential high groundwater table on site will need to be addressed during the detailed design phase.. Appropriate analysis should be undertaken, and mitigation measures incorporated into the design prior to construction phase commencing.

2.2.8 Design for exceedance

The surface water drainage strategy allows storage of storm events up to and including the 1 in 100-year plus 40% CC event. However, surcharge of the system may occur in events exceeding the design event or in the event of internal blockages.

Site level setting and landscaping should be considered such that surface water flows are directed away from the proposed buildings and towards the formal drainage system or less vulnerable areas such as roads and open spaces. The site level setting should aim to route any flood waters, in the event of a blockage or exceedance of the capacity of the drainage systems, towards the unnamed ordinary watercourse and Watling Street (A5) (Appendix G).

Additionally, in line with Building Regulations the finished floor levels of the storage unit should be set at least 150mm above the surrounding ground levels to prevent surface water ingress through doorways and other access facilities.

2.2.9 Construction Stage

It is currently envisaged that the construction runoff will be disposed of to the unnamed ordinary watercourse to the south of the site. The construction runoff can contain silt load and therefore has the potential to deteriorate water quality in the natural water environment. It will therefore need to be collected and managed on-site to remove sediment prior to discharge downstream. Silt curtains may also need to be used around the development boundary to prevent contaminated runoff draining into the unnamed ordinary watercourse or third-party land.

Before mobilisation, the construction site layout should be planned to fully consider issues such as the location of stockpiles, fuel stores, storage areas, waste disposal, refuelling points and wash down areas. These should be located in areas the least likely to affect receiving water bodies (including groundwater).

The details of the runoff management during the construction stage will be included in a site-specific Construction Management Plan, which will be prepared by an appointed contractor for the works.

2.2.10 Long term management

All conveyance and treatment drainage components will be designed to account for the underlying soil properties and withstand the predicted loading. Access for cleaning and routine inspections will also be provided.

A maintenance plan will need to be prepared prior to the site being occupied to ensure the drainage system remains operational and effective for the lifetime of the development.

The general operation and maintenance requirements for SuDS features are shown in Table 2-4 and the requirements for other drainage elements are summarised in Table 2-5.

Table 2-4: SuDS features and maintenance schedule

Drainage Element	Maintenance Schedule	Required Action	Frequency
Geocellular storage	Regular maintenance	Remove debris from the catchment surface	Monthly
		Remove sediment from pre-treatment structures	Annually or as required
	Occasional tasks	Jetting and suction where silt has settled	As required
	Remedial work	Reinstate	As required
		Repair / rehabilitate inlets, outlets, overflows and vents	Annually

Drainage Element	Maintenance Schedule	Required Action	Frequency
	Monitoring	Inspect / checks all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Monthly or annually as required
		Survey inside the tank for sediment build-up and remove if necessary	Every five years or as required

Table 2-5: Drainage elements maintenance requirements

Drainage Element	Regular Action	Frequency
Conveyance pipes	Jetting/cleaning	Every five years or as required
	CCTV survey/inspection for physical damage and remediation	Every ten years
Manholes/Inspection chambers	Visual inspection and jetting/cleaning	Annually as required
	Visual inspection for physical damage and replacement/re-setting covers and gratings if damaged and/or dislodged	Annually as required
Flow control chamber	Visual inspection for physical damage and remediation	Annually as required

In addition, the maintaining party of the drainage system should adhere to all the relevant manufacturers' recommendations in relation to operation and maintenance of the specific drainage elements.

Notes:

1. Jetting of pipes should only be carried out after removal of larger debris, as jetting alone may dislodge the debris further downstream leading to an increased flood risk elsewhere.
2. The removed waste material (both sides and liquids) from the drainage conveyance/storage system should be treated as contaminated and disposed of at a license waste management facility. It should not be re-used within the development or outside its boundary to minimise the risk of pollution to the environment.

2.2.11 Consents

It is in our understanding that outfall to the unnamed ordinary watercourse along the southern boundary of the site would be in the ownership of the client, therefore it is not expected that additional permits for discharge will be required at this stage. However, an ordinary watercourse consent is likely to be required prior to construction, due to the proximity of the building work and the drainage elements to the ordinary watercourse, and the construction of the outfall and headwall.

3 Construction (Design and Management) Review

Under the Construction (Design and Management) regulations 2015 (CDM 2015) it is the designer's duty to:

- Eliminate foreseeable health and safety risks to anyone affected by the project;
- Take steps to reduce or control any risk that cannot be eliminated;
- Communicate, cooperate and coordinate with the client, other designers and contractors involved in the project so that designs are compatible, and health and safety risks are accounted for during the project and beyond.

The potential significant hazards and associated risks associated with the construction, operation and maintenance of the proposed surface water drainage systems have been identified during the design process. The information on the identified hazards and potential mitigation measures of risks presented by the hazards have been communicated on the General Arrangement (see appendix G) and in the 'Designer's Risk Assessment', included in Appendix I

4 Conclusions and Recommendations

4.1 Conclusions

- JBA consulting were commissioned by Extra Room Self Storage in April 2023 to undertake a Flood Risk Assessment (FRA) and prepare a Detailed Surface Water Drainage Strategy for the proposed extension to an existing Self Storage unit at The Redgate Depot, Watling Street, Nuneaton, CV10 0RY.
- This document contains the drainage strategies only, whereas the FRA is included in a stand-alone report.
- The greenfield site forms part of a wider ownership boundary which comprises of an existing storage unit and is bordered to the west by agricultural land and to the north by Red Gate House.
- Current vehicle access to the site is via Watling Street A5 and Atherstone Road (A444) junction.
- The development proposal comprises of a western extension to the existing self-storage unit. 0.129 ha is to become impermeable (building roof) with fields bordering the building to the west and south of the development. No significant ground level adjustments within the site boundary are proposed.
- Topographic survey of the site undertaken by SV Surveying Ltd in April 2023 indicates that ground levels on the site range between approximately 76.43-78.33mAOD.
- A series of unnamed ordinary watercourses flow nearby the site and converge to join the River Anker, 630m south-west of the site. The current site drains via a combination of natural infiltration and overland flow to the unnamed ordinary watercourse along the southern site boundary.
- In accordance with SuDS guidance, surface water from developments should be sustainably managed and designed in accordance with the discharge hierarchy.
- Discharge to ground via site infiltration methods is not considered to be a viable option due to the surface water risk and assumed high groundwater.
- Instead discharge to watercourse is a viable option; The attenuated runoff will be discharged by gravity and conveyed through a linear drain and pipes to two underground geocellular storage tanks where it will then outfall to the client-owned unnamed ordinary watercourse. Below ground geocellular storage tanks will be used instead of above ground SuDS due to spatial constraints and to ensure that the attenuation remains operational during frequent flood events.
- The two attenuation tanks will be designed 1.2m away from the building and 2.0m away from the top bank of the unnamed ordinary watercourse.
- The proposed attenuation tanks will use Polypipe's Permavoid Modular Crates L: 0.708 x W: 0.354m x H: 0.150m:

- The western tank has a designed width of 5.0m, a designed length of 21.2m (95% void ratio), and thickness of 600mm (4 layers of crates 150mm thick) providing a total storage volume of 60.0m³.
- The eastern attenuation tank has a designed width of 11.3m, a designed length of 3.9m (95% void ratio), and thickness of 450mm (3 layers of crates 150mm thick) providing a total storage volume of 18.9m³.
- The flow control (Hydro-Brake®) is designed so that it limits the post-development flows to 2l/s, has a design head of 600mm and an orifice of 73mm in diameter.
- Sediment traps are to be incorporated along the underground conveyance pipe system to intercept coarse sediment prior to inflow into the storage facilities.
- The surface water drainage strategy allows storage of storm events up to and including the 1 in 100-year plus 40% CC event. However, surcharge of the system may occur in events exceeding the design event or in the event of internal blockages.
- The site level setting should aim to route any flood waters, in the event of a blockage or exceedance of the capacity of the drainage systems, towards the unnamed ordinary watercourse and Watling Street (A5).
- Additionally, in line with Building Regulations the finished floor levels of the storage unit should be set at least 150mm above the surrounding ground levels to prevent surface water ingress through doorways and other access facilities.

4.2 Recommendations

It is recommended that the following are undertaken prior to the detailed design of the scheme:

- Detailed survey of the existing utilities on site to confirm assumptions made in this report.

Appendices

A Proposed site layout

B Topographic survey

C Infiltration rate testing results

D Greenfield Runoff Estimate Calculation

E MicroDrainage Hydraulic Modelling Results

F Source Control Attenuation Calculations Results

G Detailed SW Drainage Strategy General Arrangement Drawing

H Drainage Typical Details Drawing

I **Designer Risk Assessment**

Offices at

Bristol
Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Leeds
Limerick
Newcastle upon Tyne
Newport
Peterborough
Portsmouth
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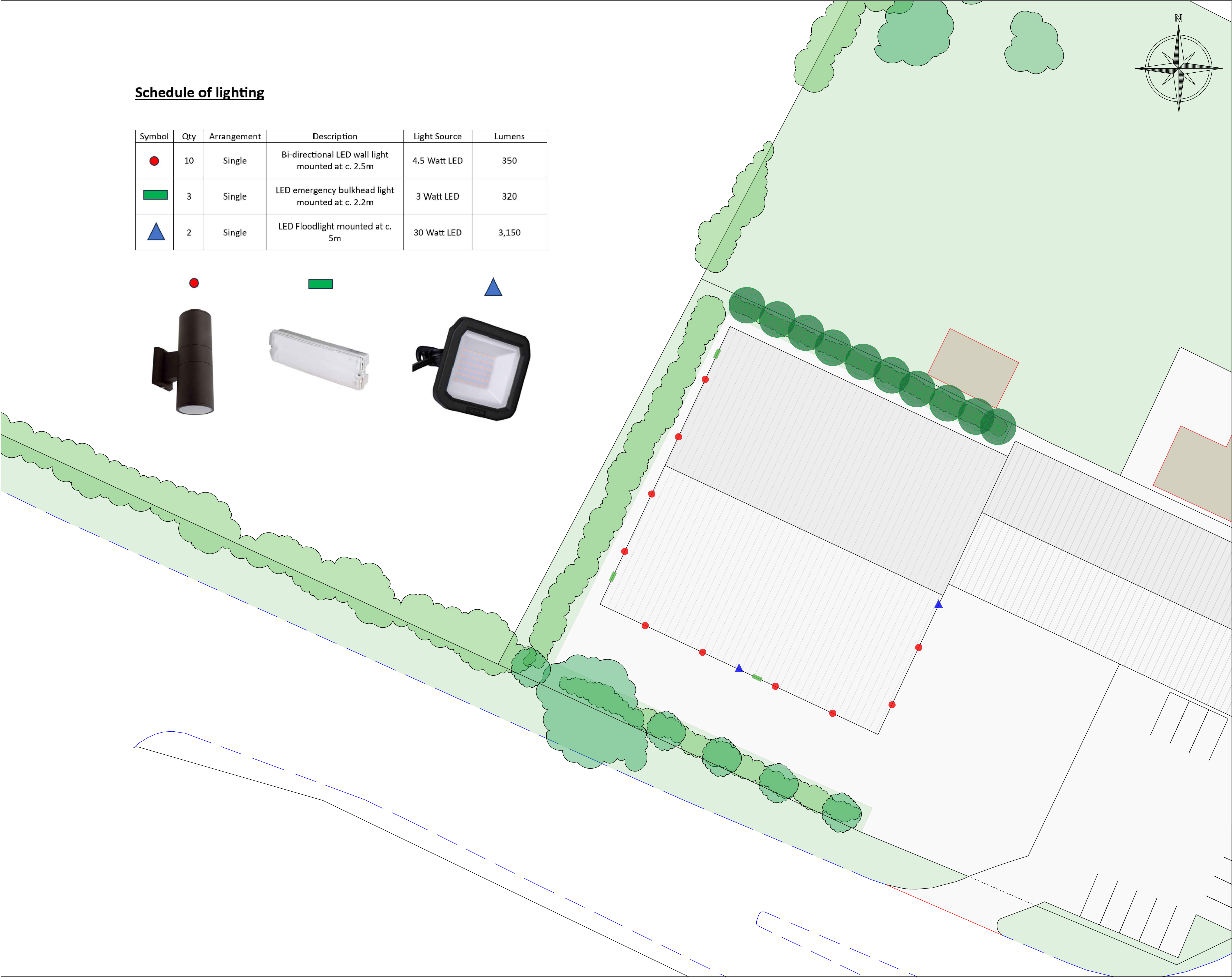
Jeremy Benn
Associates Limited

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3246693

JBA Group Ltd is
certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
ISO 45001:2018

Schedule of lighting

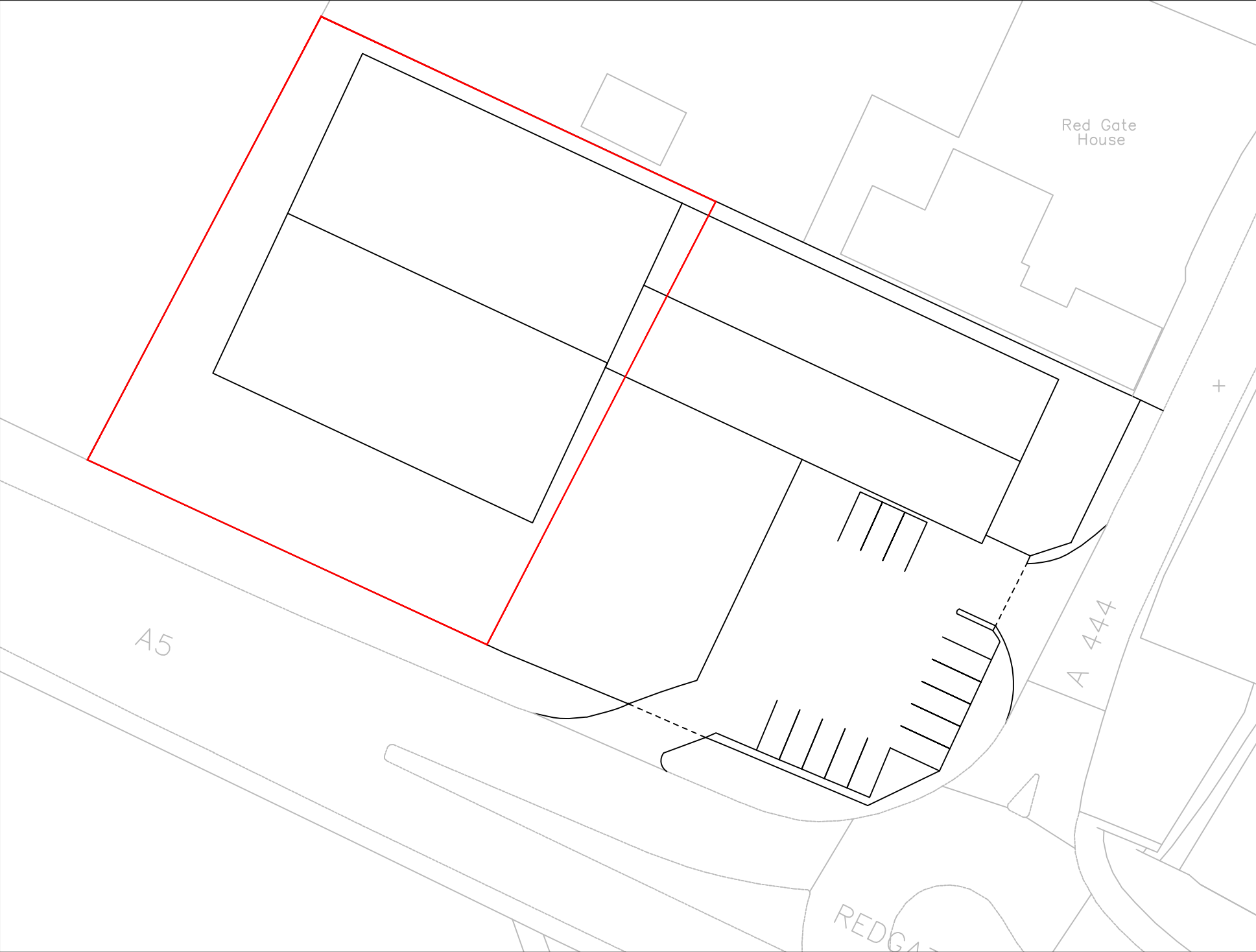
Symbol	Qty	Arrangement	Description	Light Source	Lumens
	10	Single	Bi-directional LED wall light mounted at c. 2.5m	4.5 Watt LED	350
	3	Single	LED emergency bulkhead light mounted at c. 2.2m	3 Watt LED	320
	2	Single	LED Floodlight mounted at c. 5m	30 Watt LED	3,150

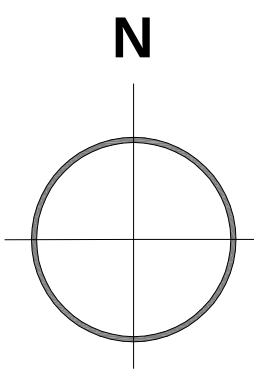
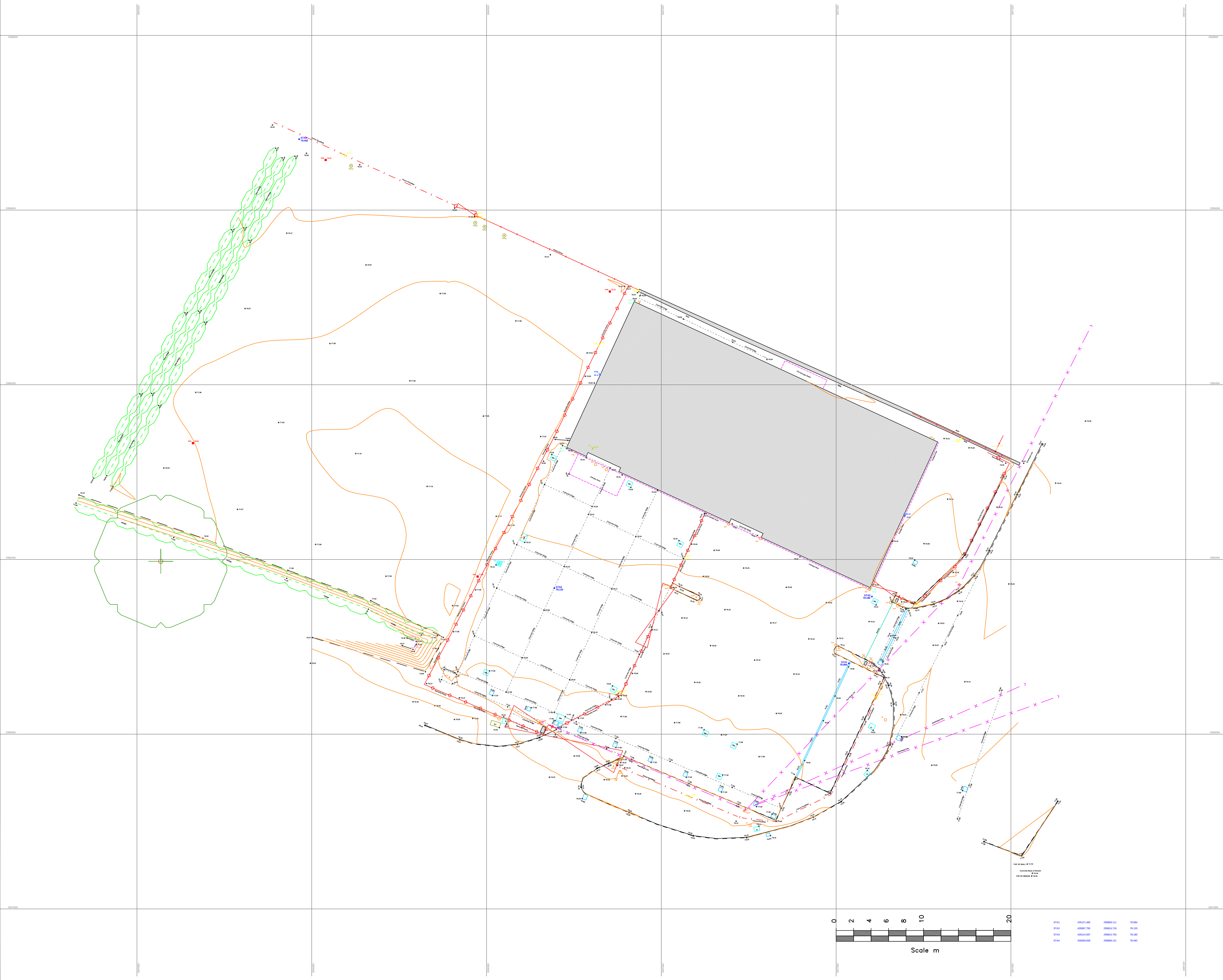


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FORMER COUNTRYWIDE STORE
ATHERSTONE ROAD
CALDECOTE
NUNEATON
CV10 0RY
PROPOSED LIGHTING SCHEDULE
SCALE: 1:200@A1





Notes :

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

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

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

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

Contours are drawn at 0.2m intervals

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

Legend:			
	Building Canopy / Overhang		Trig
	Buildings / walls		Ridge
	Kerb line		Eave
	Concrete edge		Dpc Level
	Centre Line		Floor Level
	Barrier		Soft Level
	Hedge		Soft Level
	Security Fence		Control Box
	Panel Fence		Lamp Post
	Open Fence		Sign Post
	Overhead Powerline		Post
	Chambers		Flag Staff
	Survey Station & Name		Gas Marker
	Bench Mark		Electric Post
	Temporary Bench Mark		Telegraph Post
	Tree / Sapling		Pipe Invert
	Area Of Undergrowth		Gully
	Gate		RP
	Inspection chamber		Rodding Point
	Cover level		BT
	Invert level		Cover Unknown
	Inv (Diameter)		EC
	Black Gully		Electricity Cover
	Manhole		Fire Hydrant
			Gas
			Gas Cover
			Stop Valve
			TV
			TV Cover
			WM
			Water Meter
			BB
			Bellisha Beacon
			BS
			Bus Stop
			ER
			Earthing Rod
			Box
			Post Box
			MS
			Mile Stone
			TL
			Traffic Light
			GV
			Gas Valve
			Peg



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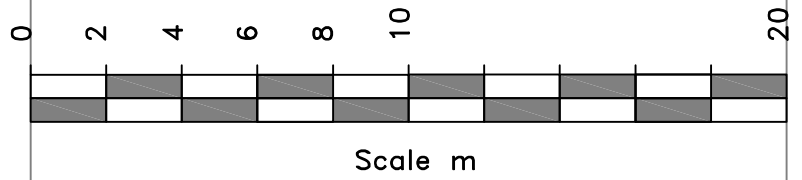
Project

**EXTRA ROOM
SELF STORAGE
CV10 0RY**

Drawing

**TOPOGRAPHIC
SITE SURVEY**

Scales	Drawn/Paper Size
1:200	AB/A1
Survey Date	Drawing No
14/04/2023	19285-23-01
DO NOT SCALE	
(c) Copyright SV Surveying Ltd 2023.	



STA1	455121.403	250806.111	70.884
STA2	455087.709	250804.719	70.125
STA3	455124.007	250815.793	70.380
STA4	455068.559	250804.125	70.402

Extra Room Self Storage

Redgate Depot, Watling Street, Nuneaton, CV10 0RY

1. Infiltration Rates Test

Soil infiltration rates were tested at the above address between Wednesday, 24th May 2023 and Saturday, 27th May 2023.

The ground consisted of clay topsoil over clay subsoil.

Weather conditions throughout the test were warm and sunny with no precipitation.

2. Method

Figure 1 is a site map showing the proposed extension building and the location of the trial pit that was excavated.

The excavation process can be seen in figure 2.

The trial pit dimensions were as follows:

Length: 2.2m

Width: 0.5m

Depth: 2.0m

Vertical sides of the trial pit were trimmed and square as can be seen in figure 3. A wooden staff was inserted into the trial pit to assist with taking measurements.

The trial pit was filled with water on 3 separate occasions. Each time the water level was recorded hourly after filling.

3. Results

Test 1

Time	Depth of water (mm)	Water level
0 mins	2,000	100%
60 mins	1,930	97%
120 mins	1,860	93%
180 mins	1,790	90%
240 mins	1,730	87%
300 mins	1,680	84%
360 mins	1,640	82%
420 mins	1,610	81%
480 mins	1,580	79%
540 mins	1,550	78%
600 mins	1,520	76%
660 mins	1,500	75%
720 mins (12hrs)	1,480	74%
1,440 mins (24hrs)	1,300	65%

Test 2

Time	Depth of water (mm)	Water level
0 mins	2,000	100%
60 mins	1,930	97%
120 mins	1,870	94%
180 mins	1,810	91%
240 mins	1,760	88%
300 mins	1,720	86%
360 mins	1,680	84%
420 mins	1,640	82%
480 mins	1,610	81%
540 mins	1,590	80%
600 mins	1,570	79%
660 mins	1,550	78%
720 mins (12 hrs)	1,530	77%
1,440 mins (24hrs)	1,350	68%

Test 3

Time	Depth of water (mm)	Water level
0 mins	2,000	100%
60 mins	1,940	97%
120 mins	1,880	94%
180 mins	1,820	91%
240 mins	1,770	89%
300 mins	1,730	87%
360 mins	1,690	85%
420 mins	1,650	83%
480 mins	1,620	81%
540 mins	1,600	80%
600 mins	1,580	79%
660 mins	1,560	78%
720 mins (12hrs)	1,540	77%
1,440 mins (24hrs)	1,340	67%

In accordance with BRE 365 guidelines, the time taken for water levels to fall from 75% to 25% effective storage depth was recorded. However, insufficient infiltration was recorded to provide an infiltration rate. Non of the 3 tests fell to an effective depth of 25% during the trial period even after more than 24 hours of testing.

Trial Pit Location



Figure 1: Location of the trial pit at The Redgate Depot

Photo Record of Test at The Redgate Depot Site



Figure 2: Digging of test hole to above mentioned depth, width & length



Figure 3: Marker installed to help identify 75% and 25% depths



Figure 4: filling of test hole to 100% depth



Figure 5: Test hole filled to 100%

Calculated by: Samuel Hotchkiss

Site name: The Redgate Depot

Site location: Watling Street, Nuneaton, CV10 0RY

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

Site Details

Latitude: 52.55919° N

Longitude: 1.48425° W

Reference: 1758718908

Date: Sep 29 2023 14:07

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 0.129

Methodology

Q_{MED} estimation method: Calculate from BFI and SAAR

BFI and SPR method: Specify BFI manually

HOST class: N/A

BFI / BFIHOST: 0.339

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor: 1.12

Hydrological characteristics

	Default	Edited
SAAR (mm):	644	644
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

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

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

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

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

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

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

Q_{BAR} (l/s):		0.51
1 in 1 year (l/s):		0.42
1 in 30 years (l/s):		1.02
1 in 100 year (l/s):		1.31
1 in 200 years (l/s):		1.55

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

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The Old School House St. Joseph's Street Tadcaster LS24 9HA		Detailed SW Drainage Strategy Hydraulic Calculations Part 1	
Date 09/10/2023		Designed by J.Moores	
File KNS-JBAU-XX-XX-MD-C-000...		Checked by A. Matlak	
Micro Drainage		Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes surface Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location GB 434850 295300 SP 34850 95300	
Data Type	Catchment
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.900
PIMP (%)	100
Add Flow / Climate Change (%)	40
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	0.450
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.095	4-8	0.034

Total Area Contributing (ha) = 0.129

Total Pipe Volume (m³) = 3.149

Network Design Table for Storm

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	35.988	0.213	169.0	0.065	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)
1.000	50.00	5.60	77.452	0.065	0.0	0.0	4.2	1.00	39.9	14.7

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The Old School House St. Joseph's Street Tadcaster LS24 9HA						Detailed SW Drainage Strategy Hydraulic Calculations Part 1																																																																																																						
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<u>Network Design Table for Storm</u> <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section</th><th>Type</th><th>Auto Design</th></tr><tr><td>1.001</td><td>23.279</td><td>0.375</td><td>62.1</td><td>0.033</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td><td></td></tr><tr><td>2.000</td><td>14.569</td><td>0.225</td><td>64.8</td><td>0.031</td><td>5.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td><td></td></tr><tr><td>1.002</td><td>5.357</td><td>0.100</td><td>53.6</td><td>0.000</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>225</td><td>Pipe/Conduit</td><td></td><td></td></tr></table> <u>Network Results Table</u> <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>1.001</td><td>50.00</td><td>5.83</td><td>77.239</td><td>0.098</td><td>0.0</td><td>0.0</td><td>6.4</td><td>1.66</td><td>66.1</td><td>22.3</td></tr><tr><td>2.000</td><td>50.00</td><td>5.15</td><td>77.091</td><td>0.031</td><td>0.0</td><td>0.0</td><td>2.0</td><td>1.63</td><td>64.7</td><td>7.1</td></tr><tr><td>1.002</td><td>50.00</td><td>5.88</td><td>76.864</td><td>0.129</td><td>0.0</td><td>0.0</td><td>8.4</td><td>1.79</td><td>71.2</td><td>29.4</td></tr></table>													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	1.001	23.279	0.375	62.1	0.033	0.00	0.0	0.600	o	225	Pipe/Conduit			2.000	14.569	0.225	64.8	0.031	5.00	0.0	0.600	o	225	Pipe/Conduit			1.002	5.357	0.100	53.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit			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)	1.001	50.00	5.83	77.239	0.098	0.0	0.0	6.4	1.66	66.1	22.3	2.000	50.00	5.15	77.091	0.031	0.0	0.0	2.0	1.63	64.7	7.1	1.002	50.00	5.88	76.864	0.129	0.0	0.0	8.4	1.79	71.2	29.4
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																																																																																																
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Detailed SW Drainage Strategy Hydraulic Calculations Part 1		
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Micro Drainage		Network 2020.1.3

<u>PIPELINE SCHEDULES for Storm</u>										
<u>Upstream Manhole</u>										
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	o	225	IC 1	78.258	77.452	0.581	Open Manhole		1200	
1.001	o	225	IC 2	78.045	77.239	0.581	Open Manhole		1200	
2.000	o	225	IC 3	77.666	77.091	0.350	Open Manhole		1200	
1.002	o	225	4	77.871	76.864	0.782	Open Manhole		1200	
<u>Downstream Manhole</u>										
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	35.988	169.0	IC 2	78.045	77.239	0.581	Open Manhole		1200	
1.001	23.279	62.1	4	77.871	76.864	0.782	Open Manhole		1200	
2.000	14.569	64.8	4	77.871	76.866	0.780	Open Manhole		1200	
1.002	5.357	53.6		77.355	76.764	0.366	Open Manhole		0	

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Detailed SW Drainage Strategy Hydraulic Calculations Part 1		
Date 09/10/2023		Designed by J.Moores
File KNS-JBAU-XX-XX-MD-C-000...		Checked by A. Matlak
Micro Drainage		Network 2020.1.3

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.065	0.065	0.065
1.001	User	-	100	0.033	0.033	0.033
2.000	User	-	100	0.031	0.031	0.031
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.129	0.129	0.129

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		77.355	76.764	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Storm Duration (mins)	30

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Micro Drainage	Network 2020.1.3	
Online Controls for Storm Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.002, Volume (m³): 2.5 Unit Reference MD-SHE-0073-2000-0600-2000 Design Head (m) 0.600 Design Flow (l/s) 2.0 Flush-Flo™ Calculated Objective Minimise upstream storage Application Surface Sump Available Yes Diameter (mm) 73 Invert Level (m) 76.864 Minimum Outlet Pipe Diameter (mm) 100 Suggested Manhole Diameter (mm) 1200 Control Points Head (m) Flow (l/s) Design Point (Calculated) 0.600 2.0 Flush-Flo™ 0.177 2.0 Kick-Flo® 0.397 1.7 Mean Flow over Head Range - 1.7 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 1.9 1.200 2.7 3.000 4.2 7.000 6.3 0.200 2.0 1.400 2.9 3.500 4.5 7.500 6.5 0.300 1.9 1.600 3.1 4.000 4.8 8.000 6.7 0.400 1.7 1.800 3.3 4.500 5.1 8.500 6.9 0.500 1.8 2.000 3.5 5.000 5.3 9.000 7.1 0.600 2.0 2.200 3.6 5.500 5.6 9.500 7.3 0.800 2.3 2.400 3.8 6.000 5.8 1.000 2.5 2.600 3.9 6.500 6.0 ©1982-2020 Innovyze		

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Micro Drainage		Network 2020.1.3

Storage Structures for Storm

Complex Manhole: 4, DS/PN: 1.002

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	0.451	0.0	0.0
0.450	42.0	0.0			

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	103.0	0.0	0.601	0.0	0.0
0.600	103.0	0.0			

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Micro Drainage		Network 2020.1.3							
2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
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 Coefficient 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 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0									
Synthetic Rainfall Details Rainfall Model FEH FEH Rainfall Version 2013 Site Location GB 434850 295300 SP 34850 95300 Data Type Catchment Cv (Summer) 0.900 Cv (Winter) 0.900 Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF Analysis Timestep Fine Inertia Status OFF DTS Status ON Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080 Return Period(s) (years) 2, 30, 100 Climate Change (%) 0, 0, 40									
		Water							
PN	US/MH Name Storm	Return Period Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)		
1.000	IC 1	15 Summer	2 +0%	100/15 Summer			77.534		
1.001	IC 2	15 Summer	2 +0%	100/15 Summer			77.316		
2.000	IC 3	15 Summer	2 +0%	100/120 Summer			77.137		
1.002	4	240 Summer	2 +0%	30/60 Summer			76.986		
				Half Drain Pipe					
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	IC 1	-0.143	0.000	0.28			10.6	OK	
1.001	IC 2	-0.148	0.000	0.25			15.2	OK	
2.000	IC 3	-0.179	0.000	0.09			5.2	OK	
1.002	4	-0.103	0.000	0.04		112	1.9	OK	
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Micro Drainage		Network 2020.1.3						
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm								
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 Coefficient 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 1						
Number of Online Controls 1		Number of Time/Area Diagrams 0						
Number of Offline Controls 0		Number of Real Time Controls 0						
Synthetic Rainfall Details								
Rainfall Model		FEH						
FEH Rainfall Version		2013						
Site Location GB 434850 295300 SP 34850 95300								
Data Type		Catchment						
Cv (Summer)		0.900						
Cv (Winter)		0.900						
Margin for Flood Risk Warning (mm) 300.0		DVD Status OFF						
Analysis Timestep		Fine Inertia Status OFF						
DTS Status		ON						
Profile(s)		Summer and Winter						
Duration(s) (mins)		15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080						
Return Period(s) (years)		2, 30, 100						
Climate Change (%)		0, 0, 40						
		Water						
PN	US/MH Name Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	IC 1	15 Summer	30	+0%	100/15 Summer			77.584
1.001	IC 2	15 Summer	30	+0%	100/15 Summer			77.368
2.000	IC 3	15 Summer	30	+0%	100/120 Summer			77.160
1.002	4	240 Summer	30	+0%	30/60 Summer			77.117
		Surcharged Flooded		Half Drain		Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Level Exceeded
1.000	IC 1	-0.093	0.000	0.63			23.8	OK
1.001	IC 2	-0.096	0.000	0.60			36.3	OK
2.000	IC 3	-0.156	0.000	0.21			11.7	OK
1.002	4	0.028	0.000	0.04		188	2.0 SURCHARGED	
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Date 09/10/2023		Designed by J.Moores																																																																							
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Micro Drainage		Network 2020.1.3																																																																							
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm																																																																									
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 Coefficient 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 1 Number of Online Controls 1 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0																																																																									
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<table><tr><td></td><td>US/MH</td><td></td><td>Return</td><td>Climate</td><td>First (X)</td><td>First (Y)</td><td>First (Z)</td><td>Overflow</td><td>Water</td></tr><tr><td>PN</td><td>Name</td><td>Storm</td><td>Period</td><td>Change</td><td>Surcharge</td><td>Flood</td><td>Overflow</td><td>Act.</td><td>Level</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(m)</td></tr><tr><td>1.000</td><td>IC 1</td><td>15 Summer</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>77.753</td></tr><tr><td>1.001</td><td>IC 2</td><td>15 Summer</td><td>100</td><td>+40%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>77.481</td></tr><tr><td>2.000</td><td>IC 3</td><td>240 Winter</td><td>100</td><td>+40%</td><td>100/120 Summer</td><td></td><td></td><td></td><td>77.433</td></tr><tr><td>1.002</td><td>4</td><td>240 Winter</td><td>100</td><td>+40%</td><td>30/60 Summer</td><td></td><td></td><td></td><td>77.432</td></tr></table>					US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level										(m)	1.000	IC 1	15 Summer	100	+40%	100/15 Summer				77.753	1.001	IC 2	15 Summer	100	+40%	100/15 Summer				77.481	2.000	IC 3	240 Winter	100	+40%	100/120 Summer				77.433	1.002	4	240 Winter	100	+40%	30/60 Summer				77.432
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water																																																																
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level																																																																
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<table><tr><td></td><td>US/MH</td><td>Depth</td><td>Volume</td><td>Flow /</td><td>Overflow</td><td>Half Drain</td><td>Pipe</td><td></td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>(m)</td><td>(m³)</td><td>Cap.</td><td>(l/s)</td><td>(mins)</td><td>Flow</td><td>Status</td><td>Exceeded</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>1.000</td><td>IC 1</td><td>0.076</td><td>0.000</td><td>1.13</td><td></td><td></td><td>42.5</td><td>SURCHARGED</td><td></td></tr><tr><td>1.001</td><td>IC 2</td><td>0.017</td><td>0.000</td><td>1.02</td><td></td><td></td><td>62.1</td><td>SURCHARGED</td><td></td></tr><tr><td>2.000</td><td>IC 3</td><td>0.117</td><td>0.000</td><td>0.07</td><td></td><td></td><td>3.9</td><td>FLOOD RISK</td><td></td></tr><tr><td>1.002</td><td>4</td><td>0.343</td><td>0.000</td><td>0.04</td><td></td><td>372</td><td>2.0</td><td>SURCHARGED</td><td></td></tr></table>					US/MH	Depth	Volume	Flow /	Overflow	Half Drain	Pipe		Level	PN	Name	(m)	(m³)	Cap.	(l/s)	(mins)	Flow	Status	Exceeded											1.000	IC 1	0.076	0.000	1.13			42.5	SURCHARGED		1.001	IC 2	0.017	0.000	1.02			62.1	SURCHARGED		2.000	IC 3	0.117	0.000	0.07			3.9	FLOOD RISK		1.002	4	0.343	0.000	0.04		372	2.0	SURCHARGED	
	US/MH	Depth	Volume	Flow /	Overflow	Half Drain	Pipe		Level																																																																
PN	Name	(m)	(m³)	Cap.	(l/s)	(mins)	Flow	Status	Exceeded																																																																
1.000	IC 1	0.076	0.000	1.13			42.5	SURCHARGED																																																																	
1.001	IC 2	0.017	0.000	1.02			62.1	SURCHARGED																																																																	
2.000	IC 3	0.117	0.000	0.07			3.9	FLOOD RISK																																																																	
1.002	4	0.343	0.000	0.04		372	2.0	SURCHARGED																																																																	
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes surface Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.900
PIMP (%)	100
Add Flow / Climate Change (%)	40
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	0.450
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.095	4-8	0.034

Total Area Contributing (ha) = 0.129

Total Pipe Volume (m³) = 3.149

Network Design Table for Storm

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	35.988	0.213	169.0	0.065	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)
1.000	50.00	5.60	77.452	0.065	0.0	0.0	4.2	1.00	39.9	14.7

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<u>PIPELINE SCHEDULES for Storm</u>										
<u>Upstream Manhole</u>										
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	o	225	IC 1	78.258	77.452	0.581	Open Manhole		1200	
1.001	o	225	IC 2	78.045	77.239	0.581	Open Manhole		1200	
2.000	o	225	IC 3	77.666	77.091	0.350	Open Manhole		1200	
1.002	o	225	4	77.871	76.864	0.782	Open Manhole		1200	
<u>Downstream Manhole</u>										
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	35.988	169.0	IC 2	78.045	77.239	0.581	Open Manhole		1200	
1.001	23.279	62.1	4	77.871	76.864	0.782	Open Manhole		1200	
2.000	14.569	64.8	4	77.871	76.866	0.780	Open Manhole		1200	
1.002	5.357	53.6		77.355	76.764	0.366	Open Manhole		0	

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.065	0.065	0.065
1.001	User	-	100	0.033	0.033	0.033
2.000	User	-	100	0.031	0.031	0.031
1.002	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.129	0.129	0.129

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.002		77.355	76.764	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Storm Duration (mins)	30

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<u>Online Controls for Storm</u> <u>Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.002, Volume (m³): 2.5</u> <table><tr><td>Unit Reference</td><td colspan="2">MD-SHE-0073-2000-0600-2000</td></tr><tr><td>Design Head (m)</td><td colspan="2">0.600</td></tr><tr><td>Design Flow (l/s)</td><td colspan="2">2.0</td></tr><tr><td>Flush-Flo™</td><td colspan="2">Calculated</td></tr><tr><td>Objective</td><td colspan="2">Minimise upstream storage</td></tr><tr><td>Application</td><td colspan="2">Surface</td></tr><tr><td>Sump Available</td><td colspan="2">Yes</td></tr><tr><td>Diameter (mm)</td><td colspan="2">73</td></tr><tr><td>Invert Level (m)</td><td colspan="2">76.864</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td colspan="2">100</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td colspan="2">1200</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.600</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>0.177</td><td>2.0</td></tr><tr><td>Kick-Flo®</td><td>0.397</td><td>1.7</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>1.7</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>1.9</td><td>1.200</td><td>2.7</td><td>3.000</td><td>4.2</td><td>7.000</td><td>6.3</td></tr><tr><td>0.200</td><td>2.0</td><td>1.400</td><td>2.9</td><td>3.500</td><td>4.5</td><td>7.500</td><td>6.5</td></tr><tr><td>0.300</td><td>1.9</td><td>1.600</td><td>3.1</td><td>4.000</td><td>4.8</td><td>8.000</td><td>6.7</td></tr><tr><td>0.400</td><td>1.7</td><td>1.800</td><td>3.3</td><td>4.500</td><td>5.1</td><td>8.500</td><td>6.9</td></tr><tr><td>0.500</td><td>1.8</td><td>2.000</td><td>3.5</td><td>5.000</td><td>5.3</td><td>9.000</td><td>7.1</td></tr><tr><td>0.600</td><td>2.0</td><td>2.200</td><td>3.6</td><td>5.500</td><td>5.6</td><td>9.500</td><td>7.3</td></tr><tr><td>0.800</td><td>2.3</td><td>2.400</td><td>3.8</td><td>6.000</td><td>5.8</td><td></td><td></td></tr><tr><td>1.000</td><td>2.5</td><td>2.600</td><td>3.9</td><td>6.500</td><td>6.0</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0073-2000-0600-2000		Design Head (m)	0.600		Design Flow (l/s)	2.0		Flush-Flo™	Calculated		Objective	Minimise upstream storage		Application	Surface		Sump Available	Yes		Diameter (mm)	73		Invert Level (m)	76.864		Minimum Outlet Pipe Diameter (mm)	100		Suggested Manhole Diameter (mm)	1200		Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.600	2.0	Flush-Flo™	0.177	2.0	Kick-Flo®	0.397	1.7	Mean Flow over Head Range	-	1.7	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.9	1.200	2.7	3.000	4.2	7.000	6.3	0.200	2.0	1.400	2.9	3.500	4.5	7.500	6.5	0.300	1.9	1.600	3.1	4.000	4.8	8.000	6.7	0.400	1.7	1.800	3.3	4.500	5.1	8.500	6.9	0.500	1.8	2.000	3.5	5.000	5.3	9.000	7.1	0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.3	0.800	2.3	2.400	3.8	6.000	5.8			1.000	2.5	2.600	3.9	6.500	6.0		
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Micro Drainage		Network 2020.1.3

Storage Structures for Storm

Complex Manhole: 4, DS/PN: 1.002

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	0.451	0.0	0.0
0.450	42.0	0.0			

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	103.0	0.0	0.601	0.0	0.0
0.600	103.0	0.0			

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<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																																																																												
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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 1																																																																												
Number of Online Controls 1 Number of Time/Area Diagrams 0																																																																												
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<u>Synthetic Rainfall Details</u>																																																																												
Rainfall Model FEH																																																																												
FEH Rainfall Version 2013																																																																												
Site Location GB 434850 295300 SP 34850 95300																																																																												
Data Type Catchment																																																																												
Cv (Summer) 0.900																																																																												
Cv (Winter) 0.900																																																																												
Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF																																																																												
Analysis Timestep Fine Inertia Status OFF																																																																												
DTS Status ON																																																																												
Profile(s) Summer and Winter																																																																												
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080																																																																												
Return Period(s) (years) 30																																																																												
Climate Change (%) 35																																																																												
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Micro Drainage		Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes surface Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.900
PIMP (%)	100
Add Flow / Climate Change (%)	40
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	0.450
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.095	4-8	0.034

Total Area Contributing (ha) = 0.129

Total Pipe Volume (m³) = 3.149

Network Design Table for Storm

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	35.988	0.213	169.0	0.065	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)
1.000	50.00	5.60	77.452	0.065	0.0	0.0	4.2	1.00	39.9	14.7

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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																																																																																																
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Date 09/10/2023 File KNS-JBAU-XX-XX-MD-C-000...		Designed by J.Moores Checked by A. Matlak
Micro Drainage		Network 2020.1.3

<u>PIPELINE SCHEDULES for Storm</u>										
<u>Upstream Manhole</u>										
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	o	225	IC 1	78.258	77.452	0.581	Open Manhole		1200	
1.001	o	225	IC 2	78.045	77.239	0.581	Open Manhole		1200	
2.000	o	225	IC 3	77.666	77.091	0.350	Open Manhole		1200	
1.002	o	225	4	77.871	76.864	0.782	Open Manhole		1200	
<u>Downstream Manhole</u>										
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	35.988	169.0	IC 2	78.045	77.239	0.581	Open Manhole		1200	
1.001	23.279	62.1	4	77.871	76.864	0.782	Open Manhole		1200	
2.000	14.569	64.8	4	77.871	76.866	0.780	Open Manhole		1200	
1.002	5.357	53.6		77.355	76.764	0.366	Open Manhole		0	

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Area Summary for Storm <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.065</td><td>0.065</td><td>0.065</td></tr><tr><td>1.001</td><td>User</td><td>-</td><td>100</td><td>0.033</td><td>0.033</td><td>0.033</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.031</td><td>0.031</td><td>0.031</td></tr><tr><td>1.002</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td></td><td></td><td></td><td></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td></td><td></td><td></td><td></td><td>0.129</td><td>0.129</td><td>0.129</td></tr></tbody></table> Surcharged Outfall Details for Storm <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D,L (mm)</th><th>W (mm)</th></tr></thead><tbody><tr><td>1.002</td><td></td><td>77.355</td><td>76.764</td><td>0.000</td><td>0</td><td>0</td></tr></tbody></table> Datum (m) 0.000 Offset (mins) 0 <table><thead><tr><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th></tr></thead><tbody><tr><td>10</td><td>77.289</td><td>260</td><td>77.289</td><td>510</td><td>77.289</td><td>760</td><td>77.289</td><td>1010</td><td>77.289</td><td>1260</td><td>77.289</td></tr><tr><td>20</td><td>77.289</td><td>270</td><td>77.289</td><td>520</td><td>77.289</td><td>770</td><td>77.289</td><td>1020</td><td>77.289</td><td>1270</td><td>77.289</td></tr><tr><td>30</td><td>77.289</td><td>280</td><td>77.289</td><td>530</td><td>77.289</td><td>780</td><td>77.289</td><td>1030</td><td>77.289</td><td>1280</td><td>77.289</td></tr><tr><td>40</td><td>77.289</td><td>290</td><td>77.289</td><td>540</td><td>77.289</td><td>790</td><td>77.289</td><td>1040</td><td>77.289</td><td>1290</td><td>77.289</td></tr><tr><td>50</td><td>77.289</td><td>300</td><td>77.289</td><td>550</td><td>77.289</td><td>800</td><td>77.289</td><td>1050</td><td>77.289</td><td>1300</td><td>77.289</td></tr><tr><td>60</td><td>77.289</td><td>310</td><td>77.289</td><td>560</td><td>77.289</td><td>810</td><td>77.289</td><td>1060</td><td>77.289</td><td>1310</td><td>77.289</td></tr><tr><td>70</td><td>77.289</td><td>320</td><td>77.289</td><td>570</td><td>77.289</td><td>820</td><td>77.289</td><td>1070</td><td>77.289</td><td>1320</td><td>77.289</td></tr><tr><td>80</td><td>77.289</td><td>330</td><td>77.289</td><td>580</td><td>77.289</td><td>830</td><td>77.289</td><td>1080</td><td>77.289</td><td>1330</td><td>77.289</td></tr><tr><td>90</td><td>77.289</td><td>340</td><td>77.289</td><td>590</td><td>77.289</td><td>840</td><td>77.289</td><td>1090</td><td>77.289</td><td>1340</td><td>77.289</td></tr><tr><td>100</td><td>77.289</td><td>350</td><td>77.289</td><td>600</td><td>77.289</td><td>850</td><td>77.289</td><td>1100</td><td>77.289</td><td>1350</td><td>77.289</td></tr><tr><td>110</td><td>77.289</td><td>360</td><td>77.289</td><td>610</td><td>77.289</td><td>860</td><td>77.289</td><td>1110</td><td>77.289</td><td>1360</td><td>77.289</td></tr><tr><td>120</td><td>77.289</td><td>370</td><td>77.289</td><td>620</td><td>77.289</td><td>870</td><td>77.289</td><td>1120</td><td>77.289</td><td>1370</td><td>77.289</td></tr><tr><td>130</td><td>77.289</td><td>380</td><td>77.289</td><td>630</td><td>77.289</td><td>880</td><td>77.289</td><td>1130</td><td>77.289</td><td>1380</td><td>77.289</td></tr><tr><td>140</td><td>77.289</td><td>390</td><td>77.289</td><td>640</td><td>77.289</td><td>890</td><td>77.289</td><td>1140</td><td>77.289</td><td>1390</td><td>77.289</td></tr><tr><td>150</td><td>77.289</td><td>400</td><td>77.289</td><td>650</td><td>77.289</td><td>900</td><td>77.289</td><td>1150</td><td>77.289</td><td>1400</td><td>77.289</td></tr><tr><td>160</td><td>77.289</td><td>410</td><td>77.289</td><td>660</td><td>77.289</td><td>910</td><td>77.289</td><td>1160</td><td>77.289</td><td>1410</td><td>77.289</td></tr><tr><td>170</td><td>77.289</td><td>420</td><td>77.289</td><td>670</td><td>77.289</td><td>920</td><td>77.289</td><td>1170</td><td>77.289</td><td>1420</td><td>77.289</td></tr><tr><td>180</td><td>77.289</td><td>430</td><td>77.289</td><td>680</td><td>77.289</td><td>930</td><td>77.289</td><td>1180</td><td>77.289</td><td>1430</td><td>77.289</td></tr><tr><td>190</td><td>77.289</td><td>440</td><td>77.289</td><td>690</td><td>77.289</td><td>940</td><td>77.289</td><td>1190</td><td>77.289</td><td>1440</td><td>77.289</td></tr><tr><td>200</td><td>77.289</td><td>450</td><td>77.289</td><td>700</td><td>77.289</td><td>950</td><td>77.289</td><td>1200</td><td>77.289</td><td>1450</td><td>77.289</td></tr><tr><td>210</td><td>77.289</td><td>460</td><td>77.289</td><td>710</td><td>77.289</td><td>960</td><td>77.289</td><td>1210</td><td>77.289</td><td>1460</td><td>77.289</td></tr><tr><td>220</td><td>77.289</td><td>470</td><td>77.289</td><td>720</td><td>77.289</td><td>970</td><td>77.289</td><td>1220</td><td>77.289</td><td>1470</td><td>77.289</td></tr><tr><td>230</td><td>77.289</td><td>480</td><td>77.289</td><td>730</td><td>77.289</td><td>980</td><td>77.289</td><td>1230</td><td>77.289</td><td>1480</td><td>77.289</td></tr><tr><td>240</td><td>77.289</td><td>490</td><td>77.289</td><td>740</td><td>77.289</td><td>990</td><td>77.289</td><td>1240</td><td>77.289</td><td>1490</td><td>77.289</td></tr><tr><td>250</td><td>77.289</td><td>500</td><td>77.289</td><td>750</td><td>77.289</td><td>1000</td><td>77.289</td><td>1250</td><td>77.289</td><td>1500</td><td>77.289</td></tr></tbody></table>			Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.065	0.065	0.065	1.001	User	-	100	0.033	0.033	0.033	2.000	User	-	100	0.031	0.031	0.031	1.002	-	-	100	0.000	0.000	0.000					Total	Total	Total					0.129	0.129	0.129	Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)	1.002		77.355	76.764	0.000	0	0	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	10	77.289	260	77.289	510	77.289	760	77.289	1010	77.289	1260	77.289	20	77.289	270	77.289	520	77.289	770	77.289	1020	77.289	1270	77.289	30	77.289	280	77.289	530	77.289	780	77.289	1030	77.289	1280	77.289	40	77.289	290	77.289	540	77.289	790	77.289	1040	77.289	1290	77.289	50	77.289	300	77.289	550	77.289	800	77.289	1050	77.289	1300	77.289	60	77.289	310	77.289	560	77.289	810	77.289	1060	77.289	1310	77.289	70	77.289	320	77.289	570	77.289	820	77.289	1070	77.289	1320	77.289	80	77.289	330	77.289	580	77.289	830	77.289	1080	77.289	1330	77.289	90	77.289	340	77.289	590	77.289	840	77.289	1090	77.289	1340	77.289	100	77.289	350	77.289	600	77.289	850	77.289	1100	77.289	1350	77.289	110	77.289	360	77.289	610	77.289	860	77.289	1110	77.289	1360	77.289	120	77.289	370	77.289	620	77.289	870	77.289	1120	77.289	1370	77.289	130	77.289	380	77.289	630	77.289	880	77.289	1130	77.289	1380	77.289	140	77.289	390	77.289	640	77.289	890	77.289	1140	77.289	1390	77.289	150	77.289	400	77.289	650	77.289	900	77.289	1150	77.289	1400	77.289	160	77.289	410	77.289	660	77.289	910	77.289	1160	77.289	1410	77.289	170	77.289	420	77.289	670	77.289	920	77.289	1170	77.289	1420	77.289	180	77.289	430	77.289	680	77.289	930	77.289	1180	77.289	1430	77.289	190	77.289	440	77.289	690	77.289	940	77.289	1190	77.289	1440	77.289	200	77.289	450	77.289	700	77.289	950	77.289	1200	77.289	1450	77.289	210	77.289	460	77.289	710	77.289	960	77.289	1210	77.289	1460	77.289	220	77.289	470	77.289	720	77.289	970	77.289	1220	77.289	1470	77.289	230	77.289	480	77.289	730	77.289	980	77.289	1230	77.289	1480	77.289	240	77.289	490	77.289	740	77.289	990	77.289	1240	77.289	1490	77.289	250	77.289	500	77.289	750	77.289	1000	77.289	1250	77.289	1500	77.289
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)																																																																																																																																																																																																																																																																																																																																																																																			
1.000	User	-	100	0.065	0.065	0.065																																																																																																																																																																																																																																																																																																																																																																																			
1.001	User	-	100	0.033	0.033	0.033																																																																																																																																																																																																																																																																																																																																																																																			
2.000	User	-	100	0.031	0.031	0.031																																																																																																																																																																																																																																																																																																																																																																																			
1.002	-	-	100	0.000	0.000	0.000																																																																																																																																																																																																																																																																																																																																																																																			
				Total	Total	Total																																																																																																																																																																																																																																																																																																																																																																																			
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1.002		77.355	76.764	0.000	0	0																																																																																																																																																																																																																																																																																																																																																																																			
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)																																																																																																																																																																																																																																																																																																																																																																														
10	77.289	260	77.289	510	77.289	760	77.289	1010	77.289	1260	77.289																																																																																																																																																																																																																																																																																																																																																																														
20	77.289	270	77.289	520	77.289	770	77.289	1020	77.289	1270	77.289																																																																																																																																																																																																																																																																																																																																																																														
30	77.289	280	77.289	530	77.289	780	77.289	1030	77.289	1280	77.289																																																																																																																																																																																																																																																																																																																																																																														
40	77.289	290	77.289	540	77.289	790	77.289	1040	77.289	1290	77.289																																																																																																																																																																																																																																																																																																																																																																														
50	77.289	300	77.289	550	77.289	800	77.289	1050	77.289	1300	77.289																																																																																																																																																																																																																																																																																																																																																																														
60	77.289	310	77.289	560	77.289	810	77.289	1060	77.289	1310	77.289																																																																																																																																																																																																																																																																																																																																																																														
70	77.289	320	77.289	570	77.289	820	77.289	1070	77.289	1320	77.289																																																																																																																																																																																																																																																																																																																																																																														
80	77.289	330	77.289	580	77.289	830	77.289	1080	77.289	1330	77.289																																																																																																																																																																																																																																																																																																																																																																														
90	77.289	340	77.289	590	77.289	840	77.289	1090	77.289	1340	77.289																																																																																																																																																																																																																																																																																																																																																																														
100	77.289	350	77.289	600	77.289	850	77.289	1100	77.289	1350	77.289																																																																																																																																																																																																																																																																																																																																																																														
110	77.289	360	77.289	610	77.289	860	77.289	1110	77.289	1360	77.289																																																																																																																																																																																																																																																																																																																																																																														
120	77.289	370	77.289	620	77.289	870	77.289	1120	77.289	1370	77.289																																																																																																																																																																																																																																																																																																																																																																														
130	77.289	380	77.289	630	77.289	880	77.289	1130	77.289	1380	77.289																																																																																																																																																																																																																																																																																																																																																																														
140	77.289	390	77.289	640	77.289	890	77.289	1140	77.289	1390	77.289																																																																																																																																																																																																																																																																																																																																																																														
150	77.289	400	77.289	650	77.289	900	77.289	1150	77.289	1400	77.289																																																																																																																																																																																																																																																																																																																																																																														
160	77.289	410	77.289	660	77.289	910	77.289	1160	77.289	1410	77.289																																																																																																																																																																																																																																																																																																																																																																														
170	77.289	420	77.289	670	77.289	920	77.289	1170	77.289	1420	77.289																																																																																																																																																																																																																																																																																																																																																																														
180	77.289	430	77.289	680	77.289	930	77.289	1180	77.289	1430	77.289																																																																																																																																																																																																																																																																																																																																																																														
190	77.289	440	77.289	690	77.289	940	77.289	1190	77.289	1440	77.289																																																																																																																																																																																																																																																																																																																																																																														
200	77.289	450	77.289	700	77.289	950	77.289	1200	77.289	1450	77.289																																																																																																																																																																																																																																																																																																																																																																														
210	77.289	460	77.289	710	77.289	960	77.289	1210	77.289	1460	77.289																																																																																																																																																																																																																																																																																																																																																																														
220	77.289	470	77.289	720	77.289	970	77.289	1220	77.289	1470	77.289																																																																																																																																																																																																																																																																																																																																																																														
230	77.289	480	77.289	730	77.289	980	77.289	1230	77.289	1480	77.289																																																																																																																																																																																																																																																																																																																																																																														
240	77.289	490	77.289	740	77.289	990	77.289	1240	77.289	1490	77.289																																																																																																																																																																																																																																																																																																																																																																														
250	77.289	500	77.289	750	77.289	1000	77.289	1250	77.289	1500	77.289																																																																																																																																																																																																																																																																																																																																																																														
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Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1510	77.289	1970	77.289	2430	77.289	2890	77.289	3350	77.289	3810	77.289
1520	77.289	1980	77.289	2440	77.289	2900	77.289	3360	77.289	3820	77.289
1530	77.289	1990	77.289	2450	77.289	2910	77.289	3370	77.289	3830	77.289
1540	77.289	2000	77.289	2460	77.289	2920	77.289	3380	77.289	3840	77.289
1550	77.289	2010	77.289	2470	77.289	2930	77.289	3390	77.289	3850	77.289
1560	77.289	2020	77.289	2480	77.289	2940	77.289	3400	77.289	3860	77.289
1570	77.289	2030	77.289	2490	77.289	2950	77.289	3410	77.289	3870	77.289
1580	77.289	2040	77.289	2500	77.289	2960	77.289	3420	77.289	3880	77.289
1590	77.289	2050	77.289	2510	77.289	2970	77.289	3430	77.289	3890	77.289
1600	77.289	2060	77.289	2520	77.289	2980	77.289	3440	77.289	3900	77.289
1610	77.289	2070	77.289	2530	77.289	2990	77.289	3450	77.289	3910	77.289
1620	77.289	2080	77.289	2540	77.289	3000	77.289	3460	77.289	3920	77.289
1630	77.289	2090	77.289	2550	77.289	3010	77.289	3470	77.289	3930	77.289
1640	77.289	2100	77.289	2560	77.289	3020	77.289	3480	77.289	3940	77.289
1650	77.289	2110	77.289	2570	77.289	3030	77.289	3490	77.289	3950	77.289
1660	77.289	2120	77.289	2580	77.289	3040	77.289	3500	77.289	3960	77.289
1670	77.289	2130	77.289	2590	77.289	3050	77.289	3510	77.289	3970	77.289
1680	77.289	2140	77.289	2600	77.289	3060	77.289	3520	77.289	3980	77.289
1690	77.289	2150	77.289	2610	77.289	3070	77.289	3530	77.289	3990	77.289
1700	77.289	2160	77.289	2620	77.289	3080	77.289	3540	77.289	4000	77.289
1710	77.289	2170	77.289	2630	77.289	3090	77.289	3550	77.289	4010	77.289
1720	77.289	2180	77.289	2640	77.289	3100	77.289	3560	77.289	4020	77.289
1730	77.289	2190	77.289	2650	77.289	3110	77.289	3570	77.289	4030	77.289
1740	77.289	2200	77.289	2660	77.289	3120	77.289	3580	77.289	4040	77.289
1750	77.289	2210	77.289	2670	77.289	3130	77.289	3590	77.289	4050	77.289
1760	77.289	2220	77.289	2680	77.289	3140	77.289	3600	77.289	4060	77.289
1770	77.289	2230	77.289	2690	77.289	3150	77.289	3610	77.289	4070	77.289
1780	77.289	2240	77.289	2700	77.289	3160	77.289	3620	77.289	4080	77.289
1790	77.289	2250	77.289	2710	77.289	3170	77.289	3630	77.289	4090	77.289
1800	77.289	2260	77.289	2720	77.289	3180	77.289	3640	77.289	4100	77.289
1810	77.289	2270	77.289	2730	77.289	3190	77.289	3650	77.289	4110	77.289
1820	77.289	2280	77.289	2740	77.289	3200	77.289	3660	77.289	4120	77.289
1830	77.289	2290	77.289	2750	77.289	3210	77.289	3670	77.289	4130	77.289
1840	77.289	2300	77.289	2760	77.289	3220	77.289	3680	77.289	4140	77.289
1850	77.289	2310	77.289	2770	77.289	3230	77.289	3690	77.289	4150	77.289
1860	77.289	2320	77.289	2780	77.289	3240	77.289	3700	77.289	4160	77.289
1870	77.289	2330	77.289	2790	77.289	3250	77.289	3710	77.289	4170	77.289
1880	77.289	2340	77.289	2800	77.289	3260	77.289	3720	77.289	4180	77.289
1890	77.289	2350	77.289	2810	77.289	3270	77.289	3730	77.289	4190	77.289
1900	77.289	2360	77.289	2820	77.289	3280	77.289	3740	77.289	4200	77.289
1910	77.289	2370	77.289	2830	77.289	3290	77.289	3750	77.289	4210	77.289
1920	77.289	2380	77.289	2840	77.289	3300	77.289	3760	77.289	4220	77.289
1930	77.289	2390	77.289	2850	77.289	3310	77.289	3770	77.289	4230	77.289
1940	77.289	2400	77.289	2860	77.289	3320	77.289	3780	77.289	4240	77.289
1950	77.289	2410	77.289	2870	77.289	3330	77.289	3790	77.289	4250	77.289
1960	77.289	2420	77.289	2880	77.289	3340	77.289	3800	77.289	4260	77.289
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Micro Drainage				Network 2020.1.3							
<u>Surcharged Outfall Details for Storm</u>											
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
4270	77.289	4730	77.289	5190	77.289	5650	77.289	6110	77.289	6570	77.289
4280	77.289	4740	77.289	5200	77.289	5660	77.289	6120	77.289	6580	77.289
4290	77.289	4750	77.289	5210	77.289	5670	77.289	6130	77.289	6590	77.289
4300	77.289	4760	77.289	5220	77.289	5680	77.289	6140	77.289	6600	77.289
4310	77.289	4770	77.289	5230	77.289	5690	77.289	6150	77.289	6610	77.289
4320	77.289	4780	77.289	5240	77.289	5700	77.289	6160	77.289	6620	77.289
4330	77.289	4790	77.289	5250	77.289	5710	77.289	6170	77.289	6630	77.289
4340	77.289	4800	77.289	5260	77.289	5720	77.289	6180	77.289	6640	77.289
4350	77.289	4810	77.289	5270	77.289	5730	77.289	6190	77.289	6650	77.289
4360	77.289	4820	77.289	5280	77.289	5740	77.289	6200	77.289	6660	77.289
4370	77.289	4830	77.289	5290	77.289	5750	77.289	6210	77.289	6670	77.289
4380	77.289	4840	77.289	5300	77.289	5760	77.289	6220	77.289	6680	77.289
4390	77.289	4850	77.289	5310	77.289	5770	77.289	6230	77.289	6690	77.289
4400	77.289	4860	77.289	5320	77.289	5780	77.289	6240	77.289	6700	77.289
4410	77.289	4870	77.289	5330	77.289	5790	77.289	6250	77.289	6710	77.289
4420	77.289	4880	77.289	5340	77.289	5800	77.289	6260	77.289	6720	77.289
4430	77.289	4890	77.289	5350	77.289	5810	77.289	6270	77.289	6730	77.289
4440	77.289	4900	77.289	5360	77.289	5820	77.289	6280	77.289	6740	77.289
4450	77.289	4910	77.289	5370	77.289	5830	77.289	6290	77.289	6750	77.289
4460	77.289	4920	77.289	5380	77.289	5840	77.289	6300	77.289	6760	77.289
4470	77.289	4930	77.289	5390	77.289	5850	77.289	6310	77.289	6770	77.289
4480	77.289	4940	77.289	5400	77.289	5860	77.289	6320	77.289	6780	77.289
4490	77.289	4950	77.289	5410	77.289	5870	77.289	6330	77.289	6790	77.289
4500	77.289	4960	77.289	5420	77.289	5880	77.289	6340	77.289	6800	77.289
4510	77.289	4970	77.289	5430	77.289	5890	77.289	6350	77.289	6810	77.289
4520	77.289	4980	77.289	5440	77.289	5900	77.289	6360	77.289	6820	77.289
4530	77.289	4990	77.289	5450	77.289	5910	77.289	6370	77.289	6830	77.289
4540	77.289	5000	77.289	5460	77.289	5920	77.289	6380	77.289	6840	77.289
4550	77.289	5010	77.289	5470	77.289	5930	77.289	6390	77.289	6850	77.289
4560	77.289	5020	77.289	5480	77.289	5940	77.289	6400	77.289	6860	77.289
4570	77.289	5030	77.289	5490	77.289	5950	77.289	6410	77.289	6870	77.289
4580	77.289	5040	77.289	5500	77.289	5960	77.289	6420	77.289	6880	77.289
4590	77.289	5050	77.289	5510	77.289	5970	77.289	6430	77.289	6890	77.289
4600	77.289	5060	77.289	5520	77.289	5980	77.289	6440	77.289	6900	77.289
4610	77.289	5070	77.289	5530	77.289	5990	77.289	6450	77.289	6910	77.289
4620	77.289	5080	77.289	5540	77.289	6000	77.289	6460	77.289	6920	77.289
4630	77.289	5090	77.289	5550	77.289	6010	77.289	6470	77.289	6930	77.289
4640	77.289	5100	77.289	5560	77.289	6020	77.289	6480	77.289	6940	77.289
4650	77.289	5110	77.289	5570	77.289	6030	77.289	6490	77.289	6950	77.289
4660	77.289	5120	77.289	5580	77.289	6040	77.289	6500	77.289	6960	77.289
4670	77.289	5130	77.289	5590	77.289	6050	77.289	6510	77.289	6970	77.289
4680	77.289	5140	77.289	5600	77.289	6060	77.289	6520	77.289	6980	77.289
4690	77.289	5150	77.289	5610	77.289	6070	77.289	6530	77.289	6990	77.289
4700	77.289	5160	77.289	5620	77.289	6080	77.289	6540	77.289	7000	77.289
4710	77.289	5170	77.289	5630	77.289	6090	77.289	6550	77.289	7010	77.289
4720	77.289	5180	77.289	5640	77.289	6100	77.289	6560	77.289	7020	77.289
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Micro Drainage					Network 2020.1.3						
Surcharged Outfall Details for Storm											
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
7030	77.289	7490	77.289	7950	77.289	8410	77.289	8870	77.289	9330	77.289
7040	77.289	7500	77.289	7960	77.289	8420	77.289	8880	77.289	9340	77.289
7050	77.289	7510	77.289	7970	77.289	8430	77.289	8890	77.289	9350	77.289
7060	77.289	7520	77.289	7980	77.289	8440	77.289	8900	77.289	9360	77.289
7070	77.289	7530	77.289	7990	77.289	8450	77.289	8910	77.289	9370	77.289
7080	77.289	7540	77.289	8000	77.289	8460	77.289	8920	77.289	9380	77.289
7090	77.289	7550	77.289	8010	77.289	8470	77.289	8930	77.289	9390	77.289
7100	77.289	7560	77.289	8020	77.289	8480	77.289	8940	77.289	9400	77.289
7110	77.289	7570	77.289	8030	77.289	8490	77.289	8950	77.289	9410	77.289
7120	77.289	7580	77.289	8040	77.289	8500	77.289	8960	77.289	9420	77.289
7130	77.289	7590	77.289	8050	77.289	8510	77.289	8970	77.289	9430	77.289
7140	77.289	7600	77.289	8060	77.289	8520	77.289	8980	77.289	9440	77.289
7150	77.289	7610	77.289	8070	77.289	8530	77.289	8990	77.289	9450	77.289
7160	77.289	7620	77.289	8080	77.289	8540	77.289	9000	77.289	9460	77.289
7170	77.289	7630	77.289	8090	77.289	8550	77.289	9010	77.289	9470	77.289
7180	77.289	7640	77.289	8100	77.289	8560	77.289	9020	77.289	9480	77.289
7190	77.289	7650	77.289	8110	77.289	8570	77.289	9030	77.289	9490	77.289
7200	77.289	7660	77.289	8120	77.289	8580	77.289	9040	77.289	9500	77.289
7210	77.289	7670	77.289	8130	77.289	8590	77.289	9050	77.289	9510	77.289
7220	77.289	7680	77.289	8140	77.289	8600	77.289	9060	77.289	9520	77.289
7230	77.289	7690	77.289	8150	77.289	8610	77.289	9070	77.289	9530	77.289
7240	77.289	7700	77.289	8160	77.289	8620	77.289	9080	77.289	9540	77.289
7250	77.289	7710	77.289	8170	77.289	8630	77.289	9090	77.289	9550	77.289
7260	77.289	7720	77.289	8180	77.289	8640	77.289	9100	77.289	9560	77.289
7270	77.289	7730	77.289	8190	77.289	8650	77.289	9110	77.289	9570	77.289
7280	77.289	7740	77.289	8200	77.289	8660	77.289	9120	77.289	9580	77.289
7290	77.289	7750	77.289	8210	77.289	8670	77.289	9130	77.289	9590	77.289
7300	77.289	7760	77.289	8220	77.289	8680	77.289	9140	77.289	9600	77.289
7310	77.289	7770	77.289	8230	77.289	8690	77.289	9150	77.289	9610	77.289
7320	77.289	7780	77.289	8240	77.289	8700	77.289	9160	77.289	9620	77.289
7330	77.289	7790	77.289	8250	77.289	8710	77.289	9170	77.289	9630	77.289
7340	77.289	7800	77.289	8260	77.289	8720	77.289	9180	77.289	9640	77.289
7350	77.289	7810	77.289	8270	77.289	8730	77.289	9190	77.289	9650	77.289
7360	77.289	7820	77.289	8280	77.289	8740	77.289	9200	77.289	9660	77.289
7370	77.289	7830	77.289	8290	77.289	8750	77.289	9210	77.289	9670	77.289
7380	77.289	7840	77.289	8300	77.289	8760	77.289	9220	77.289	9680	77.289
7390	77.289	7850	77.289	8310	77.289	8770	77.289	9230	77.289	9690	77.289
7400	77.289	7860	77.289	8320	77.289	8780	77.289	9240	77.289	9700	77.289
7410	77.289	7870	77.289	8330	77.289	8790	77.289	9250	77.289	9710	77.289
7420	77.289	7880	77.289	8340	77.289	8800	77.289	9260	77.289	9720	77.289
7430	77.289	7890	77.289	8350	77.289	8810	77.289	9270	77.289	9730	77.289
7440	77.289	7900	77.289	8360	77.289	8820	77.289	9280	77.289	9740	77.289
7450	77.289	7910	77.289	8370	77.289	8830	77.289	9290	77.289	9750	77.289
7460	77.289	7920	77.289	8380	77.289	8840	77.289	9300	77.289	9760	77.289
7470	77.289	7930	77.289	8390	77.289	8850	77.289	9310	77.289	9770	77.289
7480	77.289	7940	77.289	8400	77.289	8860	77.289	9320	77.289	9780	77.289
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Detailed SW Drainage Strategy Hydraulic Calculations Part 1		
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File KNS-JBAU-XX-XX-MD-C-000...		Checked by A. Matlak
Micro Drainage		Network 2020.1.3

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
9790	77.289	9830	77.289	9870	77.289	9910	77.289	9950	77.289	9990	77.289
9800	77.289	9840	77.289	9880	77.289	9920	77.289	9960	77.289	10000	77.289
9810	77.289	9850	77.289	9890	77.289	9930	77.289	9970	77.289		
9820	77.289	9860	77.289	9900	77.289	9940	77.289	9980	77.289		

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	1.000
Storm Duration (mins)	30

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The Old School House St. Joseph's Street Tadcaster LS24 9HA																																																																																																																										
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Online Controls for Storm Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.002, Volume (m³): 2.5 <table><tr><td>Unit Reference</td><td colspan="2">MD-SHE-0073-2000-0600-2000</td></tr><tr><td>Design Head (m)</td><td colspan="2">0.600</td></tr><tr><td>Design Flow (l/s)</td><td colspan="2">2.0</td></tr><tr><td>Flush-Flo™</td><td colspan="2">Calculated</td></tr><tr><td>Objective</td><td colspan="2">Minimise upstream storage</td></tr><tr><td>Application</td><td colspan="2">Surface</td></tr><tr><td>Sump Available</td><td colspan="2">Yes</td></tr><tr><td>Diameter (mm)</td><td colspan="2">73</td></tr><tr><td>Invert Level (m)</td><td colspan="2">76.864</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td colspan="2">100</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td colspan="2">1200</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.600</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>0.177</td><td>2.0</td></tr><tr><td>Kick-Flo®</td><td>0.397</td><td>1.7</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>1.7</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>1.9</td><td>1.200</td><td>2.7</td><td>3.000</td><td>4.2</td><td>7.000</td><td>6.3</td></tr><tr><td>0.200</td><td>2.0</td><td>1.400</td><td>2.9</td><td>3.500</td><td>4.5</td><td>7.500</td><td>6.5</td></tr><tr><td>0.300</td><td>1.9</td><td>1.600</td><td>3.1</td><td>4.000</td><td>4.8</td><td>8.000</td><td>6.7</td></tr><tr><td>0.400</td><td>1.7</td><td>1.800</td><td>3.3</td><td>4.500</td><td>5.1</td><td>8.500</td><td>6.9</td></tr><tr><td>0.500</td><td>1.8</td><td>2.000</td><td>3.5</td><td>5.000</td><td>5.3</td><td>9.000</td><td>7.1</td></tr><tr><td>0.600</td><td>2.0</td><td>2.200</td><td>3.6</td><td>5.500</td><td>5.6</td><td>9.500</td><td>7.3</td></tr><tr><td>0.800</td><td>2.3</td><td>2.400</td><td>3.8</td><td>6.000</td><td>5.8</td><td></td><td></td></tr><tr><td>1.000</td><td>2.5</td><td>2.600</td><td>3.9</td><td>6.500</td><td>6.0</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0073-2000-0600-2000		Design Head (m)	0.600		Design Flow (l/s)	2.0		Flush-Flo™	Calculated		Objective	Minimise upstream storage		Application	Surface		Sump Available	Yes		Diameter (mm)	73		Invert Level (m)	76.864		Minimum Outlet Pipe Diameter (mm)	100		Suggested Manhole Diameter (mm)	1200		Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.600	2.0	Flush-Flo™	0.177	2.0	Kick-Flo®	0.397	1.7	Mean Flow over Head Range	-	1.7	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.9	1.200	2.7	3.000	4.2	7.000	6.3	0.200	2.0	1.400	2.9	3.500	4.5	7.500	6.5	0.300	1.9	1.600	3.1	4.000	4.8	8.000	6.7	0.400	1.7	1.800	3.3	4.500	5.1	8.500	6.9	0.500	1.8	2.000	3.5	5.000	5.3	9.000	7.1	0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.3	0.800	2.3	2.400	3.8	6.000	5.8			1.000	2.5	2.600	3.9	6.500	6.0		
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Micro Drainage		Network 2020.1.3

Storage Structures for Storm

Complex Manhole: 4, DS/PN: 1.002

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	0.451	0.0	0.0
0.450	42.0	0.0			

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	103.0	0.0	0.601	0.0	0.0
0.600	103.0	0.0			

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Micro Drainage		Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coeffiecient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Online Controls 1

Number of Offline Controls 0

Number of Storage Structures 1

Number of Time/Area Diagrams 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

FEH Rainfall Version 2013

Site Location GB 434850 295300 SP 34850 95300

Data Type Catchment

Cv (Summer) 0.900

Cv (Winter) 0.900

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep

DTS Status ON

DVD Status OFF

Fine Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080

Return Period(s) (years) 2, 30, 100

Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	IC 1	15 Summer	2	+0%	100/15 Summer			
1.001	IC 2	15 Summer	2	+0%	100/15 Summer			
2.000	IC 3	10080 Winter	2	+0%	30/720 Summer	100/240 Summer		
1.002	4	10080 Winter	2	+0%	2/480 Summer	100/180 Winter		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	IC 1	77.534	-0.143	0.000	0.28			10.6	OK
1.001	IC 2	77.316	-0.148	0.000	0.25			15.2	OK
2.000	IC 3	77.298	-0.018	0.000	0.00			0.1	OK
1.002	4	77.298	0.209	0.000	0.04		3624	2.0	SURCHARGED

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The Old School House St. Joseph's Street Tadcaster LS24 9HA	Detailed SW Drainage Strategy Hydraulic Calculations Part 1																			
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Micro Drainage	Network 2020.1.3																			
<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																				
<table><tr><td></td><td>US/MH</td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>Exceeded</td></tr><tr><td>1.000</td><td>IC 1</td><td></td></tr><tr><td>1.001</td><td>IC 2</td><td></td></tr><tr><td>2.000</td><td>IC 3</td><td>5</td></tr><tr><td>1.002</td><td>4</td><td>7</td></tr></table>				US/MH	Level	PN	Name	Exceeded	1.000	IC 1		1.001	IC 2		2.000	IC 3	5	1.002	4	7
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Micro Drainage		Network 2020.1.3																		
<u>30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																				
<table><tr><td></td><td>US/MH</td><td>Level</td></tr><tr><td>PN</td><td>Name</td><td>Exceeded</td></tr><tr><td>1.000</td><td>IC 1</td><td></td></tr><tr><td>1.001</td><td>IC 2</td><td></td></tr><tr><td>2.000</td><td>IC 3</td><td>5</td></tr><tr><td>1.002</td><td>4</td><td>7</td></tr></table>				US/MH	Level	PN	Name	Exceeded	1.000	IC 1		1.001	IC 2		2.000	IC 3	5	1.002	4	7
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Micro Drainage	Network 2020.1.3								
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm									
Simulation Criteria									
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000	MADD Factor * 10m³/ha Storage	2.000	Inlet Coefficient	0.800	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0								
Hot Start Level (mm)	0								
Manhole Headloss Coeff (Global)	0.500								
Foul Sewage per hectare (l/s)	0.000								
Number of Input Hydrographs	0	Number of Storage Structures	1	Number of Online Controls	1	Number of Time/Area Diagrams	0	Number of Offline Controls	0
Synthetic Rainfall Details									
Rainfall Model									FEH
FEH Rainfall Version									2013
Site Location	GB 434850 295300 SP 34850 95300								
Data Type									Catchment
Cv (Summer)									0.900
Cv (Winter)									0.900
Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF	Analysis Timestep	Fine Inertia	Status	OFF	DTS Status	ON
Profile(s)									Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080								
Return Period(s) (years)									2, 30, 100
Climate Change (%)									0, 0, 40
WARNING: Half Drain Time has not been calculated as the structure is too full.									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
1.000	IC 1	480 Summer	100	+40%	100/15 Summer				
1.001	IC 2	480 Summer	100	+40%	100/15 Summer				
2.000	IC 3	720 Winter	100	+40%	30/720 Summer	100/240 Summer			
1.002	4	480 Summer	100	+40%	2/480 Summer	100/180 Winter			
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status		
1.000	IC 1	77.754	0.077	0.000	0.20	7.5	SURCHARGED		

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Micro Drainage		Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes surface Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	2
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.900
PIMP (%)	100
Add Flow / Climate Change (%)	40
Minimum Backdrop Height (m)	0.000
Maximum Backdrop Height (m)	0.000
Min Design Depth for Optimisation (m)	0.450
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.095	4-8	0.034

Total Area Contributing (ha) = 0.129

Total Pipe Volume (m³) = 3.149

Network Design Table for Storm

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	35.988	0.213	169.0	0.065	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)
1.000	50.00	5.60	77.452	0.065	0.0	0.0	4.2	1.00	39.9	14.7

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Micro Drainage		Network 2020.1.3

<u>PIPELINE SCHEDULES for Storm</u>										
<u>Upstream Manhole</u>										
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	o	225	IC 1	78.258	77.452	0.581	Open Manhole		1200	
1.001	o	225	IC 2	78.045	77.239	0.581	Open Manhole		1200	
2.000	o	225	IC 3	77.666	77.091	0.350	Open Manhole		1200	
1.002	o	225	4	77.871	76.864	0.782	Open Manhole		1200	
<u>Downstream Manhole</u>										
PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., (mm)	L*W	
1.000	35.988	169.0	IC 2	78.045	77.239	0.581	Open Manhole		1200	
1.001	23.279	62.1	4	77.871	76.864	0.782	Open Manhole		1200	
2.000	14.569	64.8	4	77.871	76.866	0.780	Open Manhole		1200	
1.002	5.357	53.6		77.355	76.764	0.366	Open Manhole		0	

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Area Summary for Storm <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.065</td><td>0.065</td><td>0.065</td></tr><tr><td>1.001</td><td>User</td><td>-</td><td>100</td><td>0.033</td><td>0.033</td><td>0.033</td></tr><tr><td>2.000</td><td>User</td><td>-</td><td>100</td><td>0.031</td><td>0.031</td><td>0.031</td></tr><tr><td>1.002</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td></td><td></td><td></td><td></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td></td><td></td><td></td><td></td><td>0.129</td><td>0.129</td><td>0.129</td></tr></tbody></table> Surcharged Outfall Details for Storm <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D,L (mm)</th><th>W (mm)</th></tr></thead><tbody><tr><td>1.002</td><td></td><td>77.355</td><td>76.764</td><td>0.000</td><td>0</td><td>0</td></tr></tbody></table> Datum (m) 0.000 Offset (mins) 0 <table><thead><tr><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th><th>Time (mins)</th><th>Depth (m)</th></tr></thead><tbody><tr><td>10</td><td>77.289</td><td>260</td><td>77.289</td><td>510</td><td>77.289</td><td>760</td><td>77.289</td><td>1010</td><td>77.289</td><td>1260</td><td>77.289</td></tr><tr><td>20</td><td>77.289</td><td>270</td><td>77.289</td><td>520</td><td>77.289</td><td>770</td><td>77.289</td><td>1020</td><td>77.289</td><td>1270</td><td>77.289</td></tr><tr><td>30</td><td>77.289</td><td>280</td><td>77.289</td><td>530</td><td>77.289</td><td>780</td><td>77.289</td><td>1030</td><td>77.289</td><td>1280</td><td>77.289</td></tr><tr><td>40</td><td>77.289</td><td>290</td><td>77.289</td><td>540</td><td>77.289</td><td>790</td><td>77.289</td><td>1040</td><td>77.289</td><td>1290</td><td>77.289</td></tr><tr><td>50</td><td>77.289</td><td>300</td><td>77.289</td><td>550</td><td>77.289</td><td>800</td><td>77.289</td><td>1050</td><td>77.289</td><td>1300</td><td>77.289</td></tr><tr><td>60</td><td>77.289</td><td>310</td><td>77.289</td><td>560</td><td>77.289</td><td>810</td><td>77.289</td><td>1060</td><td>77.289</td><td>1310</td><td>77.289</td></tr><tr><td>70</td><td>77.289</td><td>320</td><td>77.289</td><td>570</td><td>77.289</td><td>820</td><td>77.289</td><td>1070</td><td>77.289</td><td>1320</td><td>77.289</td></tr><tr><td>80</td><td>77.289</td><td>330</td><td>77.289</td><td>580</td><td>77.289</td><td>830</td><td>77.289</td><td>1080</td><td>77.289</td><td>1330</td><td>77.289</td></tr><tr><td>90</td><td>77.289</td><td>340</td><td>77.289</td><td>590</td><td>77.289</td><td>840</td><td>77.289</td><td>1090</td><td>77.289</td><td>1340</td><td>77.289</td></tr><tr><td>100</td><td>77.289</td><td>350</td><td>77.289</td><td>600</td><td>77.289</td><td>850</td><td>77.289</td><td>1100</td><td>77.289</td><td>1350</td><td>77.289</td></tr><tr><td>110</td><td>77.289</td><td>360</td><td>77.289</td><td>610</td><td>77.289</td><td>860</td><td>77.289</td><td>1110</td><td>77.289</td><td>1360</td><td>77.289</td></tr><tr><td>120</td><td>77.289</td><td>370</td><td>77.289</td><td>620</td><td>77.289</td><td>870</td><td>77.289</td><td>1120</td><td>77.289</td><td>1370</td><td>77.289</td></tr><tr><td>130</td><td>77.289</td><td>380</td><td>77.289</td><td>630</td><td>77.289</td><td>880</td><td>77.289</td><td>1130</td><td>77.289</td><td>1380</td><td>77.289</td></tr><tr><td>140</td><td>77.289</td><td>390</td><td>77.289</td><td>640</td><td>77.289</td><td>890</td><td>77.289</td><td>1140</td><td>77.289</td><td>1390</td><td>77.289</td></tr><tr><td>150</td><td>77.289</td><td>400</td><td>77.289</td><td>650</td><td>77.289</td><td>900</td><td>77.289</td><td>1150</td><td>77.289</td><td>1400</td><td>77.289</td></tr><tr><td>160</td><td>77.289</td><td>410</td><td>77.289</td><td>660</td><td>77.289</td><td>910</td><td>77.289</td><td>1160</td><td>77.289</td><td>1410</td><td>77.289</td></tr><tr><td>170</td><td>77.289</td><td>420</td><td>77.289</td><td>670</td><td>77.289</td><td>920</td><td>77.289</td><td>1170</td><td>77.289</td><td>1420</td><td>77.289</td></tr><tr><td>180</td><td>77.289</td><td>430</td><td>77.289</td><td>680</td><td>77.289</td><td>930</td><td>77.289</td><td>1180</td><td>77.289</td><td>1430</td><td>77.289</td></tr><tr><td>190</td><td>77.289</td><td>440</td><td>77.289</td><td>690</td><td>77.289</td><td>940</td><td>77.289</td><td>1190</td><td>77.289</td><td>1440</td><td>77.289</td></tr><tr><td>200</td><td>77.289</td><td>450</td><td>77.289</td><td>700</td><td>77.289</td><td>950</td><td>77.289</td><td>1200</td><td>77.289</td><td>1450</td><td>77.289</td></tr><tr><td>210</td><td>77.289</td><td>460</td><td>77.289</td><td>710</td><td>77.289</td><td>960</td><td>77.289</td><td>1210</td><td>77.289</td><td>1460</td><td>77.289</td></tr><tr><td>220</td><td>77.289</td><td>470</td><td>77.289</td><td>720</td><td>77.289</td><td>970</td><td>77.289</td><td>1220</td><td>77.289</td><td>1470</td><td>77.289</td></tr><tr><td>230</td><td>77.289</td><td>480</td><td>77.289</td><td>730</td><td>77.289</td><td>980</td><td>77.289</td><td>1230</td><td>77.289</td><td>1480</td><td>77.289</td></tr><tr><td>240</td><td>77.289</td><td>490</td><td>77.289</td><td>740</td><td>77.289</td><td>990</td><td>77.289</td><td>1240</td><td>77.289</td><td>1490</td><td>77.289</td></tr><tr><td>250</td><td>77.289</td><td>500</td><td>77.289</td><td>750</td><td>77.289</td><td>1000</td><td>77.289</td><td>1250</td><td>77.289</td><td>1500</td><td>77.289</td></tr></tbody></table>			Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)	1.000	User	-	100	0.065	0.065	0.065	1.001	User	-	100	0.033	0.033	0.033	2.000	User	-	100	0.031	0.031	0.031	1.002	-	-	100	0.000	0.000	0.000					Total	Total	Total					0.129	0.129	0.129	Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)	1.002		77.355	76.764	0.000	0	0	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	10	77.289	260	77.289	510	77.289	760	77.289	1010	77.289	1260	77.289	20	77.289	270	77.289	520	77.289	770	77.289	1020	77.289	1270	77.289	30	77.289	280	77.289	530	77.289	780	77.289	1030	77.289	1280	77.289	40	77.289	290	77.289	540	77.289	790	77.289	1040	77.289	1290	77.289	50	77.289	300	77.289	550	77.289	800	77.289	1050	77.289	1300	77.289	60	77.289	310	77.289	560	77.289	810	77.289	1060	77.289	1310	77.289	70	77.289	320	77.289	570	77.289	820	77.289	1070	77.289	1320	77.289	80	77.289	330	77.289	580	77.289	830	77.289	1080	77.289	1330	77.289	90	77.289	340	77.289	590	77.289	840	77.289	1090	77.289	1340	77.289	100	77.289	350	77.289	600	77.289	850	77.289	1100	77.289	1350	77.289	110	77.289	360	77.289	610	77.289	860	77.289	1110	77.289	1360	77.289	120	77.289	370	77.289	620	77.289	870	77.289	1120	77.289	1370	77.289	130	77.289	380	77.289	630	77.289	880	77.289	1130	77.289	1380	77.289	140	77.289	390	77.289	640	77.289	890	77.289	1140	77.289	1390	77.289	150	77.289	400	77.289	650	77.289	900	77.289	1150	77.289	1400	77.289	160	77.289	410	77.289	660	77.289	910	77.289	1160	77.289	1410	77.289	170	77.289	420	77.289	670	77.289	920	77.289	1170	77.289	1420	77.289	180	77.289	430	77.289	680	77.289	930	77.289	1180	77.289	1430	77.289	190	77.289	440	77.289	690	77.289	940	77.289	1190	77.289	1440	77.289	200	77.289	450	77.289	700	77.289	950	77.289	1200	77.289	1450	77.289	210	77.289	460	77.289	710	77.289	960	77.289	1210	77.289	1460	77.289	220	77.289	470	77.289	720	77.289	970	77.289	1220	77.289	1470	77.289	230	77.289	480	77.289	730	77.289	980	77.289	1230	77.289	1480	77.289	240	77.289	490	77.289	740	77.289	990	77.289	1240	77.289	1490	77.289	250	77.289	500	77.289	750	77.289	1000	77.289	1250	77.289	1500	77.289
Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)																																																																																																																																																																																																																																																																																																																																																																																			
1.000	User	-	100	0.065	0.065	0.065																																																																																																																																																																																																																																																																																																																																																																																			
1.001	User	-	100	0.033	0.033	0.033																																																																																																																																																																																																																																																																																																																																																																																			
2.000	User	-	100	0.031	0.031	0.031																																																																																																																																																																																																																																																																																																																																																																																			
1.002	-	-	100	0.000	0.000	0.000																																																																																																																																																																																																																																																																																																																																																																																			
				Total	Total	Total																																																																																																																																																																																																																																																																																																																																																																																			
				0.129	0.129	0.129																																																																																																																																																																																																																																																																																																																																																																																			
Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)																																																																																																																																																																																																																																																																																																																																																																																			
1.002		77.355	76.764	0.000	0	0																																																																																																																																																																																																																																																																																																																																																																																			
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)																																																																																																																																																																																																																																																																																																																																																																														
10	77.289	260	77.289	510	77.289	760	77.289	1010	77.289	1260	77.289																																																																																																																																																																																																																																																																																																																																																																														
20	77.289	270	77.289	520	77.289	770	77.289	1020	77.289	1270	77.289																																																																																																																																																																																																																																																																																																																																																																														
30	77.289	280	77.289	530	77.289	780	77.289	1030	77.289	1280	77.289																																																																																																																																																																																																																																																																																																																																																																														
40	77.289	290	77.289	540	77.289	790	77.289	1040	77.289	1290	77.289																																																																																																																																																																																																																																																																																																																																																																														
50	77.289	300	77.289	550	77.289	800	77.289	1050	77.289	1300	77.289																																																																																																																																																																																																																																																																																																																																																																														
60	77.289	310	77.289	560	77.289	810	77.289	1060	77.289	1310	77.289																																																																																																																																																																																																																																																																																																																																																																														
70	77.289	320	77.289	570	77.289	820	77.289	1070	77.289	1320	77.289																																																																																																																																																																																																																																																																																																																																																																														
80	77.289	330	77.289	580	77.289	830	77.289	1080	77.289	1330	77.289																																																																																																																																																																																																																																																																																																																																																																														
90	77.289	340	77.289	590	77.289	840	77.289	1090	77.289	1340	77.289																																																																																																																																																																																																																																																																																																																																																																														
100	77.289	350	77.289	600	77.289	850	77.289	1100	77.289	1350	77.289																																																																																																																																																																																																																																																																																																																																																																														
110	77.289	360	77.289	610	77.289	860	77.289	1110	77.289	1360	77.289																																																																																																																																																																																																																																																																																																																																																																														
120	77.289	370	77.289	620	77.289	870	77.289	1120	77.289	1370	77.289																																																																																																																																																																																																																																																																																																																																																																														
130	77.289	380	77.289	630	77.289	880	77.289	1130	77.289	1380	77.289																																																																																																																																																																																																																																																																																																																																																																														
140	77.289	390	77.289	640	77.289	890	77.289	1140	77.289	1390	77.289																																																																																																																																																																																																																																																																																																																																																																														
150	77.289	400	77.289	650	77.289	900	77.289	1150	77.289	1400	77.289																																																																																																																																																																																																																																																																																																																																																																														
160	77.289	410	77.289	660	77.289	910	77.289	1160	77.289	1410	77.289																																																																																																																																																																																																																																																																																																																																																																														
170	77.289	420	77.289	670	77.289	920	77.289	1170	77.289	1420	77.289																																																																																																																																																																																																																																																																																																																																																																														
180	77.289	430	77.289	680	77.289	930	77.289	1180	77.289	1430	77.289																																																																																																																																																																																																																																																																																																																																																																														
190	77.289	440	77.289	690	77.289	940	77.289	1190	77.289	1440	77.289																																																																																																																																																																																																																																																																																																																																																																														
200	77.289	450	77.289	700	77.289	950	77.289	1200	77.289	1450	77.289																																																																																																																																																																																																																																																																																																																																																																														
210	77.289	460	77.289	710	77.289	960	77.289	1210	77.289	1460	77.289																																																																																																																																																																																																																																																																																																																																																																														
220	77.289	470	77.289	720	77.289	970	77.289	1220	77.289	1470	77.289																																																																																																																																																																																																																																																																																																																																																																														
230	77.289	480	77.289	730	77.289	980	77.289	1230	77.289	1480	77.289																																																																																																																																																																																																																																																																																																																																																																														
240	77.289	490	77.289	740	77.289	990	77.289	1240	77.289	1490	77.289																																																																																																																																																																																																																																																																																																																																																																														
250	77.289	500	77.289	750	77.289	1000	77.289	1250	77.289	1500	77.289																																																																																																																																																																																																																																																																																																																																																																														
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JBA Consulting								Page 6			
The Old School House St. Joseph's Street Tadcaster LS24 9HA				Detailed SW Drainage Strategy Hydraulic Calculations Part 1							
Date 09/10/2023 File KNS-JBAU-XX-XX-MD-C-000...				Designed by J.Moores Checked by A. Matlak							
Micro Drainage				Network 2020.1.3							
Surcharged Outfall Details for Storm											
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1510	77.289	1970	77.289	2430	77.289	2890	77.289	3350	77.289	3810	77.289
1520	77.289	1980	77.289	2440	77.289	2900	77.289	3360	77.289	3820	77.289
1530	77.289	1990	77.289	2450	77.289	2910	77.289	3370	77.289	3830	77.289
1540	77.289	2000	77.289	2460	77.289	2920	77.289	3380	77.289	3840	77.289
1550	77.289	2010	77.289	2470	77.289	2930	77.289	3390	77.289	3850	77.289
1560	77.289	2020	77.289	2480	77.289	2940	77.289	3400	77.289	3860	77.289
1570	77.289	2030	77.289	2490	77.289	2950	77.289	3410	77.289	3870	77.289
1580	77.289	2040	77.289	2500	77.289	2960	77.289	3420	77.289	3880	77.289
1590	77.289	2050	77.289	2510	77.289	2970	77.289	3430	77.289	3890	77.289
1600	77.289	2060	77.289	2520	77.289	2980	77.289	3440	77.289	3900	77.289
1610	77.289	2070	77.289	2530	77.289	2990	77.289	3450	77.289	3910	77.289
1620	77.289	2080	77.289	2540	77.289	3000	77.289	3460	77.289	3920	77.289
1630	77.289	2090	77.289	2550	77.289	3010	77.289	3470	77.289	3930	77.289
1640	77.289	2100	77.289	2560	77.289	3020	77.289	3480	77.289	3940	77.289
1650	77.289	2110	77.289	2570	77.289	3030	77.289	3490	77.289	3950	77.289
1660	77.289	2120	77.289	2580	77.289	3040	77.289	3500	77.289	3960	77.289
1670	77.289	2130	77.289	2590	77.289	3050	77.289	3510	77.289	3970	77.289
1680	77.289	2140	77.289	2600	77.289	3060	77.289	3520	77.289	3980	77.289
1690	77.289	2150	77.289	2610	77.289	3070	77.289	3530	77.289	3990	77.289
1700	77.289	2160	77.289	2620	77.289	3080	77.289	3540	77.289	4000	77.289
1710	77.289	2170	77.289	2630	77.289	3090	77.289	3550	77.289	4010	77.289
1720	77.289	2180	77.289	2640	77.289	3100	77.289	3560	77.289	4020	77.289
1730	77.289	2190	77.289	2650	77.289	3110	77.289	3570	77.289	4030	77.289
1740	77.289	2200	77.289	2660	77.289	3120	77.289	3580	77.289	4040	77.289
1750	77.289	2210	77.289	2670	77.289	3130	77.289	3590	77.289	4050	77.289
1760	77.289	2220	77.289	2680	77.289	3140	77.289	3600	77.289	4060	77.289
1770	77.289	2230	77.289	2690	77.289	3150	77.289	3610	77.289	4070	77.289
1780	77.289	2240	77.289	2700	77.289	3160	77.289	3620	77.289	4080	77.289
1790	77.289	2250	77.289	2710	77.289	3170	77.289	3630	77.289	4090	77.289
1800	77.289	2260	77.289	2720	77.289	3180	77.289	3640	77.289	4100	77.289
1810	77.289	2270	77.289	2730	77.289	3190	77.289	3650	77.289	4110	77.289
1820	77.289	2280	77.289	2740	77.289	3200	77.289	3660	77.289	4120	77.289
1830	77.289	2290	77.289	2750	77.289	3210	77.289	3670	77.289	4130	77.289
1840	77.289	2300	77.289	2760	77.289	3220	77.289	3680	77.289	4140	77.289
1850	77.289	2310	77.289	2770	77.289	3230	77.289	3690	77.289	4150	77.289
1860	77.289	2320	77.289	2780	77.289	3240	77.289	3700	77.289	4160	77.289
1870	77.289	2330	77.289	2790	77.289	3250	77.289	3710	77.289	4170	77.289
1880	77.289	2340	77.289	2800	77.289	3260	77.289	3720	77.289	4180	77.289
1890	77.289	2350	77.289	2810	77.289	3270	77.289	3730	77.289	4190	77.289
1900	77.289	2360	77.289	2820	77.289	3280	77.289	3740	77.289	4200	77.289
1910	77.289	2370	77.289	2830	77.289	3290	77.289	3750	77.289	4210	77.289
1920	77.289	2380	77.289	2840	77.289	3300	77.289	3760	77.289	4220	77.289
1930	77.289	2390	77.289	2850	77.289	3310	77.289	3770	77.289	4230	77.289
1940	77.289	2400	77.289	2860	77.289	3320	77.289	3780	77.289	4240	77.289
1950	77.289	2410	77.289	2870	77.289	3330	77.289	3790	77.289	4250	77.289
1960	77.289	2420	77.289	2880	77.289	3340	77.289	3800	77.289	4260	77.289
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Micro Drainage				Network 2020.1.3							
<u>Surcharged Outfall Details for Storm</u>											
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
4270	77.289	4730	77.289	5190	77.289	5650	77.289	6110	77.289	6570	77.289
4280	77.289	4740	77.289	5200	77.289	5660	77.289	6120	77.289	6580	77.289
4290	77.289	4750	77.289	5210	77.289	5670	77.289	6130	77.289	6590	77.289
4300	77.289	4760	77.289	5220	77.289	5680	77.289	6140	77.289	6600	77.289
4310	77.289	4770	77.289	5230	77.289	5690	77.289	6150	77.289	6610	77.289
4320	77.289	4780	77.289	5240	77.289	5700	77.289	6160	77.289	6620	77.289
4330	77.289	4790	77.289	5250	77.289	5710	77.289	6170	77.289	6630	77.289
4340	77.289	4800	77.289	5260	77.289	5720	77.289	6180	77.289	6640	77.289
4350	77.289	4810	77.289	5270	77.289	5730	77.289	6190	77.289	6650	77.289
4360	77.289	4820	77.289	5280	77.289	5740	77.289	6200	77.289	6660	77.289
4370	77.289	4830	77.289	5290	77.289	5750	77.289	6210	77.289	6670	77.289
4380	77.289	4840	77.289	5300	77.289	5760	77.289	6220	77.289	6680	77.289
4390	77.289	4850	77.289	5310	77.289	5770	77.289	6230	77.289	6690	77.289
4400	77.289	4860	77.289	5320	77.289	5780	77.289	6240	77.289	6700	77.289
4410	77.289	4870	77.289	5330	77.289	5790	77.289	6250	77.289	6710	77.289
4420	77.289	4880	77.289	5340	77.289	5800	77.289	6260	77.289	6720	77.289
4430	77.289	4890	77.289	5350	77.289	5810	77.289	6270	77.289	6730	77.289
4440	77.289	4900	77.289	5360	77.289	5820	77.289	6280	77.289	6740	77.289
4450	77.289	4910	77.289	5370	77.289	5830	77.289	6290	77.289	6750	77.289
4460	77.289	4920	77.289	5380	77.289	5840	77.289	6300	77.289	6760	77.289
4470	77.289	4930	77.289	5390	77.289	5850	77.289	6310	77.289	6770	77.289
4480	77.289	4940	77.289	5400	77.289	5860	77.289	6320	77.289	6780	77.289
4490	77.289	4950	77.289	5410	77.289	5870	77.289	6330	77.289	6790	77.289
4500	77.289	4960	77.289	5420	77.289	5880	77.289	6340	77.289	6800	77.289
4510	77.289	4970	77.289	5430	77.289	5890	77.289	6350	77.289	6810	77.289
4520	77.289	4980	77.289	5440	77.289	5900	77.289	6360	77.289	6820	77.289
4530	77.289	4990	77.289	5450	77.289	5910	77.289	6370	77.289	6830	77.289
4540	77.289	5000	77.289	5460	77.289	5920	77.289	6380	77.289	6840	77.289
4550	77.289	5010	77.289	5470	77.289	5930	77.289	6390	77.289	6850	77.289
4560	77.289	5020	77.289	5480	77.289	5940	77.289	6400	77.289	6860	77.289
4570	77.289	5030	77.289	5490	77.289	5950	77.289	6410	77.289	6870	77.289
4580	77.289	5040	77.289	5500	77.289	5960	77.289	6420	77.289	6880	77.289
4590	77.289	5050	77.289	5510	77.289	5970	77.289	6430	77.289	6890	77.289
4600	77.289	5060	77.289	5520	77.289	5980	77.289	6440	77.289	6900	77.289
4610	77.289	5070	77.289	5530	77.289	5990	77.289	6450	77.289	6910	77.289
4620	77.289	5080	77.289	5540	77.289	6000	77.289	6460	77.289	6920	77.289
4630	77.289	5090	77.289	5550	77.289	6010	77.289	6470	77.289	6930	77.289
4640	77.289	5100	77.289	5560	77.289	6020	77.289	6480	77.289	6940	77.289
4650	77.289	5110	77.289	5570	77.289	6030	77.289	6490	77.289	6950	77.289
4660	77.289	5120	77.289	5580	77.289	6040	77.289	6500	77.289	6960	77.289
4670	77.289	5130	77.289	5590	77.289	6050	77.289	6510	77.289	6970	77.289
4680	77.289	5140	77.289	5600	77.289	6060	77.289	6520	77.289	6980	77.289
4690	77.289	5150	77.289	5610	77.289	6070	77.289	6530	77.289	6990	77.289
4700	77.289	5160	77.289	5620	77.289	6080	77.289	6540	77.289	7000	77.289
4710	77.289	5170	77.289	5630	77.289	6090	77.289	6550	77.289	7010	77.289
4720	77.289	5180	77.289	5640	77.289	6100	77.289	6560	77.289	7020	77.289
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Micro Drainage					Network 2020.1.3						
Surcharged Outfall Details for Storm											
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
7030	77.289	7490	77.289	7950	77.289	8410	77.289	8870	77.289	9330	77.289
7040	77.289	7500	77.289	7960	77.289	8420	77.289	8880	77.289	9340	77.289
7050	77.289	7510	77.289	7970	77.289	8430	77.289	8890	77.289	9350	77.289
7060	77.289	7520	77.289	7980	77.289	8440	77.289	8900	77.289	9360	77.289
7070	77.289	7530	77.289	7990	77.289	8450	77.289	8910	77.289	9370	77.289
7080	77.289	7540	77.289	8000	77.289	8460	77.289	8920	77.289	9380	77.289
7090	77.289	7550	77.289	8010	77.289	8470	77.289	8930	77.289	9390	77.289
7100	77.289	7560	77.289	8020	77.289	8480	77.289	8940	77.289	9400	77.289
7110	77.289	7570	77.289	8030	77.289	8490	77.289	8950	77.289	9410	77.289
7120	77.289	7580	77.289	8040	77.289	8500	77.289	8960	77.289	9420	77.289
7130	77.289	7590	77.289	8050	77.289	8510	77.289	8970	77.289	9430	77.289
7140	77.289	7600	77.289	8060	77.289	8520	77.289	8980	77.289	9440	77.289
7150	77.289	7610	77.289	8070	77.289	8530	77.289	8990	77.289	9450	77.289
7160	77.289	7620	77.289	8080	77.289	8540	77.289	9000	77.289	9460	77.289
7170	77.289	7630	77.289	8090	77.289	8550	77.289	9010	77.289	9470	77.289
7180	77.289	7640	77.289	8100	77.289	8560	77.289	9020	77.289	9480	77.289
7190	77.289	7650	77.289	8110	77.289	8570	77.289	9030	77.289	9490	77.289
7200	77.289	7660	77.289	8120	77.289	8580	77.289	9040	77.289	9500	77.289
7210	77.289	7670	77.289	8130	77.289	8590	77.289	9050	77.289	9510	77.289
7220	77.289	7680	77.289	8140	77.289	8600	77.289	9060	77.289	9520	77.289
7230	77.289	7690	77.289	8150	77.289	8610	77.289	9070	77.289	9530	77.289
7240	77.289	7700	77.289	8160	77.289	8620	77.289	9080	77.289	9540	77.289
7250	77.289	7710	77.289	8170	77.289	8630	77.289	9090	77.289	9550	77.289
7260	77.289	7720	77.289	8180	77.289	8640	77.289	9100	77.289	9560	77.289
7270	77.289	7730	77.289	8190	77.289	8650	77.289	9110	77.289	9570	77.289
7280	77.289	7740	77.289	8200	77.289	8660	77.289	9120	77.289	9580	77.289
7290	77.289	7750	77.289	8210	77.289	8670	77.289	9130	77.289	9590	77.289
7300	77.289	7760	77.289	8220	77.289	8680	77.289	9140	77.289	9600	77.289
7310	77.289	7770	77.289	8230	77.289	8690	77.289	9150	77.289	9610	77.289
7320	77.289	7780	77.289	8240	77.289	8700	77.289	9160	77.289	9620	77.289
7330	77.289	7790	77.289	8250	77.289	8710	77.289	9170	77.289	9630	77.289
7340	77.289	7800	77.289	8260	77.289	8720	77.289	9180	77.289	9640	77.289
7350	77.289	7810	77.289	8270	77.289	8730	77.289	9190	77.289	9650	77.289
7360	77.289	7820	77.289	8280	77.289	8740	77.289	9200	77.289	9660	77.289
7370	77.289	7830	77.289	8290	77.289	8750	77.289	9210	77.289	9670	77.289
7380	77.289	7840	77.289	8300	77.289	8760	77.289	9220	77.289	9680	77.289
7390	77.289	7850	77.289	8310	77.289	8770	77.289	9230	77.289	9690	77.289
7400	77.289	7860	77.289	8320	77.289	8780	77.289	9240	77.289	9700	77.289
7410	77.289	7870	77.289	8330	77.289	8790	77.289	9250	77.289	9710	77.289
7420	77.289	7880	77.289	8340	77.289	8800	77.289	9260	77.289	9720	77.289
7430	77.289	7890	77.289	8350	77.289	8810	77.289	9270	77.289	9730	77.289
7440	77.289	7900	77.289	8360	77.289	8820	77.289	9280	77.289	9740	77.289
7450	77.289	7910	77.289	8370	77.289	8830	77.289	9290	77.289	9750	77.289
7460	77.289	7920	77.289	8380	77.289	8840	77.289	9300	77.289	9760	77.289
7470	77.289	7930	77.289	8390	77.289	8850	77.289	9310	77.289	9770	77.289
7480	77.289	7940	77.289	8400	77.289	8860	77.289	9320	77.289	9780	77.289
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Micro Drainage		Network 2020.1.3

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
9790	77.289	9830	77.289	9870	77.289	9910	77.289	9950	77.289	9990	77.289
9800	77.289	9840	77.289	9880	77.289	9920	77.289	9960	77.289	10000	77.289
9810	77.289	9850	77.289	9890	77.289	9930	77.289	9970	77.289		
9820	77.289	9860	77.289	9900	77.289	9940	77.289	9980	77.289		

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	1.000
Storm Duration (mins)	30

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The Old School House St. Joseph's Street Tadcaster LS24 9HA																																																																																																															
Detailed SW Drainage Strategy Hydraulic Calculations Part 1																																																																																																															
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Micro Drainage		Network 2020.1.3																																																																																																													
<u>Online Controls for Storm</u> <u>Hydro-Brake® Optimum Manhole: 4, DS/PN: 1.002, Volume (m³): 2.5</u> <table><tr><td colspan="2">Unit Reference MD-SHE-0073-2000-0600-2000</td></tr><tr><td>Design Head (m)</td><td>0.600</td></tr><tr><td>Design Flow (l/s)</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>Calculated</td></tr><tr><td>Objective</td><td>Minimise upstream storage</td></tr><tr><td>Application</td><td>Surface</td></tr><tr><td>Sump Available</td><td>Yes</td></tr><tr><td>Diameter (mm)</td><td>73</td></tr><tr><td>Invert Level (m)</td><td>76.864</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td>100</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td>1200</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>0.600</td><td>2.0</td></tr><tr><td>Flush-Flo™</td><td>0.177</td><td>2.0</td></tr><tr><td>Kick-Flo®</td><td>0.397</td><td>1.7</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>1.7</td></tr></table> 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 <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>1.9</td><td>1.200</td><td>2.7</td><td>3.000</td><td>4.2</td><td>7.000</td><td>6.3</td></tr><tr><td>0.200</td><td>2.0</td><td>1.400</td><td>2.9</td><td>3.500</td><td>4.5</td><td>7.500</td><td>6.5</td></tr><tr><td>0.300</td><td>1.9</td><td>1.600</td><td>3.1</td><td>4.000</td><td>4.8</td><td>8.000</td><td>6.7</td></tr><tr><td>0.400</td><td>1.7</td><td>1.800</td><td>3.3</td><td>4.500</td><td>5.1</td><td>8.500</td><td>6.9</td></tr><tr><td>0.500</td><td>1.8</td><td>2.000</td><td>3.5</td><td>5.000</td><td>5.3</td><td>9.000</td><td>7.1</td></tr><tr><td>0.600</td><td>2.0</td><td>2.200</td><td>3.6</td><td>5.500</td><td>5.6</td><td>9.500</td><td>7.3</td></tr><tr><td>0.800</td><td>2.3</td><td>2.400</td><td>3.8</td><td>6.000</td><td>5.8</td><td></td><td></td></tr><tr><td>1.000</td><td>2.5</td><td>2.600</td><td>3.9</td><td>6.500</td><td>6.0</td><td></td><td></td></tr></table>			Unit Reference MD-SHE-0073-2000-0600-2000		Design Head (m)	0.600	Design Flow (l/s)	2.0	Flush-Flo™	Calculated	Objective	Minimise upstream storage	Application	Surface	Sump Available	Yes	Diameter (mm)	73	Invert Level (m)	76.864	Minimum Outlet Pipe Diameter (mm)	100	Suggested Manhole Diameter (mm)	1200	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.600	2.0	Flush-Flo™	0.177	2.0	Kick-Flo®	0.397	1.7	Mean Flow over Head Range	-	1.7	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.9	1.200	2.7	3.000	4.2	7.000	6.3	0.200	2.0	1.400	2.9	3.500	4.5	7.500	6.5	0.300	1.9	1.600	3.1	4.000	4.8	8.000	6.7	0.400	1.7	1.800	3.3	4.500	5.1	8.500	6.9	0.500	1.8	2.000	3.5	5.000	5.3	9.000	7.1	0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.3	0.800	2.3	2.400	3.8	6.000	5.8			1.000	2.5	2.600	3.9	6.500	6.0		
Unit Reference MD-SHE-0073-2000-0600-2000																																																																																																															
Design Head (m)	0.600																																																																																																														
Design Flow (l/s)	2.0																																																																																																														
Flush-Flo™	Calculated																																																																																																														
Objective	Minimise upstream storage																																																																																																														
Application	Surface																																																																																																														
Sump Available	Yes																																																																																																														
Diameter (mm)	73																																																																																																														
Invert Level (m)	76.864																																																																																																														
Minimum Outlet Pipe Diameter (mm)	100																																																																																																														
Suggested Manhole Diameter (mm)	1200																																																																																																														
Control Points	Head (m)	Flow (l/s)																																																																																																													
Design Point (Calculated)	0.600	2.0																																																																																																													
Flush-Flo™	0.177	2.0																																																																																																													
Kick-Flo®	0.397	1.7																																																																																																													
Mean Flow over Head Range	-	1.7																																																																																																													
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																																								
0.100	1.9	1.200	2.7	3.000	4.2	7.000	6.3																																																																																																								
0.200	2.0	1.400	2.9	3.500	4.5	7.500	6.5																																																																																																								
0.300	1.9	1.600	3.1	4.000	4.8	8.000	6.7																																																																																																								
0.400	1.7	1.800	3.3	4.500	5.1	8.500	6.9																																																																																																								
0.500	1.8	2.000	3.5	5.000	5.3	9.000	7.1																																																																																																								
0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.3																																																																																																								
0.800	2.3	2.400	3.8	6.000	5.8																																																																																																										
1.000	2.5	2.600	3.9	6.500	6.0																																																																																																										
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JBA Consulting		Page 11
The Old School House St. Joseph's Street Tadcaster LS24 9HA	Detailed SW Drainage Strategy Hydraulic Calculations Part 1	
Date 09/10/2023 File KNS-JBAU-XX-XX-MD-C-000...	Designed by J.Moores Checked by A. Matlak	
Micro Drainage		Network 2020.1.3

Storage Structures for Storm

Complex Manhole: 4, DS/PN: 1.002

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

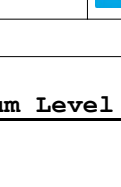
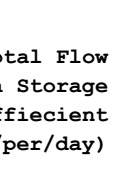
Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	42.0	0.0	0.451	0.0	0.0
0.450	42.0	0.0			

Cellular Storage

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	103.0	0.0	0.601	0.0	0.0
0.600	103.0	0.0			

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The Old School House St. Joseph's Street Tadcaster LS24 9HA		
Detailed SW Drainage Strategy		
Hydraulic Calculations Part 1		
Date 09/10/2023		
File KNS-JBAU-XX-XX-MD-C-000...		
Designed by J.Moores		
Checked by A. Matlak		
Micro Drainage		Network 2020.1.3

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

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 Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Cv (Summer)	0.900
Cv (Winter)	0.900

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 480, 720, 1440, 2880, 5760, 10080
Return Period(s) (years)	30
Climate Change (%)	35

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	IC 1	15 Summer	30	+35%					77.615
1.001	IC 2	15 Summer	30	+35%					77.397
2.000	IC 3	720 Winter	30	+35%	30/180 Summer				77.390
1.002	4	720 Winter	30	+35%	30/30 Summer				77.390

PN	US/MH Name	Depth (m)	Surcharged Volume (m³)	Flooded Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	IC 1	-0.062	0.000	0.85		32.1	OK	

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JBA Consulting		Page 1																																																																																																																																																																																																																																																																																		
The Library St Philips Courtyard Coleshill B46 3AD		2023s0603 The Redgate Depot Detailed SW Drainage Strategy																																																																																																																																																																																																																																																																																		
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Micro Drainage		Source Control 2020.1.3																																																																																																																																																																																																																																																																																		
Summary of Results for 100 year Return Period (+40%) Half Drain Time : 317 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Control (l/s)</th><th>Max Σ Outflow (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>77.156</td><td>0.270</td><td>0.0</td><td>2.0</td><td>2.0</td><td>37.2</td><td>O K</td></tr><tr><td>30 min Summer</td><td>77.237</td><td>0.351</td><td>0.0</td><td>2.0</td><td>2.0</td><td>48.3</td><td>O K</td></tr><tr><td>60 min Summer</td><td>77.310</td><td>0.424</td><td>0.0</td><td>2.0</td><td>2.0</td><td>58.4</td><td>O K</td></tr><tr><td>120 min Summer</td><td>77.400</td><td>0.514</td><td>0.0</td><td>2.0</td><td>2.0</td><td>68.2</td><td>O K</td></tr><tr><td>180 min Summer</td><td>77.443</td><td>0.557</td><td>0.0</td><td>2.0</td><td>2.0</td><td>72.4</td><td>O K</td></tr><tr><td>240 min Summer</td><td>77.458</td><td>0.572</td><td>0.0</td><td>2.0</td><td>2.0</td><td>73.9</td><td>O K</td></tr><tr><td>360 min Summer</td><td>77.450</td><td>0.564</td><td>0.0</td><td>2.0</td><td>2.0</td><td>73.1</td><td>O K</td></tr><tr><td>480 min Summer</td><td>77.428</td><td>0.542</td><td>0.0</td><td>2.0</td><td>2.0</td><td>71.0</td><td>O K</td></tr><tr><td>600 min Summer</td><td>77.401</td><td>0.515</td><td>0.0</td><td>2.0</td><td>2.0</td><td>68.4</td><td>O K</td></tr><tr><td>720 min Summer</td><td>77.373</td><td>0.487</td><td>0.0</td><td>2.0</td><td>2.0</td><td>65.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>77.321</td><td>0.435</td><td>0.0</td><td>2.0</td><td>2.0</td><td>59.9</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>77.233</td><td>0.347</td><td>0.0</td><td>2.0</td><td>2.0</td><td>47.9</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>77.127</td><td>0.241</td><td>0.0</td><td>2.0</td><td>2.0</td><td>33.2</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>77.054</td><td>0.168</td><td>0.0</td><td>2.0</td><td>2.0</td><td>23.1</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>76.976</td><td>0.090</td><td>0.0</td><td>1.9</td><td>1.9</td><td>12.4</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>76.949</td><td>0.063</td><td>0.0</td><td>1.7</td><td>1.7</td><td>8.7</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>76.938</td><td>0.052</td><td>0.0</td><td>1.5</td><td>1.5</td><td>7.2</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>76.931</td><td>0.045</td><td>0.0</td><td>1.4</td><td>1.4</td><td>6.2</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>76.926</td><td>0.040</td><td>0.0</td><td>1.2</td><td>1.2</td><td>5.5</td><td>O K</td></tr><tr><td>15 min Winter</td><td>77.156</td><td>0.270</td><td>0.0</td><td>2.0</td><td>2.0</td><td>37.3</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak 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Summer</td><td>4.812</td><td>0.0</td><td>134.0</td><td>914</td></tr><tr><td>2160 min Summer</td><td>3.363</td><td>0.0</td><td>140.5</td><td>1280</td></tr><tr><td>2880 min Summer</td><td>2.616</td><td>0.0</td><td>145.7</td><td>1620</td></tr><tr><td>4320 min Summer</td><td>1.859</td><td>0.0</td><td>155.3</td><td>2292</td></tr><tr><td>5760 min Summer</td><td>1.476</td><td>0.0</td><td>164.4</td><td>2944</td></tr><tr><td>7200 min Summer</td><td>1.249</td><td>0.0</td><td>174.0</td><td>3672</td></tr><tr><td>8640 min Summer</td><td>1.099</td><td>0.0</td><td>183.7</td><td>4408</td></tr><tr><td>10080 min Summer</td><td>0.994</td><td>0.0</td><td>193.8</td><td>5136</td></tr><tr><td>15 min Winter</td><td>133.840</td><td>0.0</td><td>38.8</td><td>22</td></tr></tbody></table>				Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	15 min Summer	77.156	0.270	0.0	2.0	2.0	37.2	O K	30 min Summer	77.237	0.351	0.0	2.0	2.0	48.3	O K	60 min Summer	77.310	0.424	0.0	2.0	2.0	58.4	O K	120 min Summer	77.400	0.514	0.0	2.0	2.0	68.2	O K	180 min Summer	77.443	0.557	0.0	2.0	2.0	72.4	O K	240 min Summer	77.458	0.572	0.0	2.0	2.0	73.9	O K	360 min Summer	77.450	0.564	0.0	2.0	2.0	73.1	O K	480 min Summer	77.428	0.542	0.0	2.0	2.0	71.0	O K	600 min Summer	77.401	0.515	0.0	2.0	2.0	68.4	O K	720 min Summer	77.373	0.487	0.0	2.0	2.0	65.6	O K	960 min Summer	77.321	0.435	0.0	2.0	2.0	59.9	O K	1440 min Summer	77.233	0.347	0.0	2.0	2.0	47.9	O K	2160 min Summer	77.127	0.241	0.0	2.0	2.0	33.2	O K	2880 min Summer	77.054	0.168	0.0	2.0	2.0	23.1	O K	4320 min Summer	76.976	0.090	0.0	1.9	1.9	12.4	O K	5760 min Summer	76.949	0.063	0.0	1.7	1.7	8.7	O K	7200 min Summer	76.938	0.052	0.0	1.5	1.5	7.2	O K	8640 min Summer	76.931	0.045	0.0	1.4	1.4	6.2	O K	10080 min Summer	76.926	0.040	0.0	1.2	1.2	5.5	O K	15 min Winter	77.156	0.270	0.0	2.0	2.0	37.3	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	133.840	0.0	38.8	22	30 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min Winter</td><td>77.425</td><td>0.539</td><td>0.0</td><td>2.0</td><td>2.0</td><td>70.8</td><td>O K</td></tr><tr><td>600 min Winter</td><td>77.393</td><td>0.507</td><td>0.0</td><td>2.0</td><td>2.0</td><td>67.6</td><td>O K</td></tr><tr><td>720 min Winter</td><td>77.356</td><td>0.470</td><td>0.0</td><td>2.0</td><td>2.0</td><td>64.0</td><td>O K</td></tr><tr><td>960 min Winter</td><td>77.293</td><td>0.407</td><td>0.0</td><td>2.0</td><td>2.0</td><td>56.1</td><td>O K</td></tr><tr><td>1440 min Winter</td><td>77.169</td><td>0.283</td><td>0.0</td><td>2.0</td><td>2.0</td><td>38.9</td><td>O K</td></tr><tr><td>2160 min Winter</td><td>77.039</td><td>0.153</td><td>0.0</td><td>2.0</td><td>2.0</td><td>21.0</td><td>O K</td></tr><tr><td>2880 min Winter</td><td>76.971</td><td>0.085</td><td>0.0</td><td>1.9</td><td>1.9</td><td>11.7</td><td>O K</td></tr><tr><td>4320 min Winter</td><td>76.936</td><td>0.050</td><td>0.0</td><td>1.5</td><td>1.5</td><td>6.9</td><td>O K</td></tr><tr><td>5760 min Winter</td><td>76.924</td><td>0.038</td><td>0.0</td><td>1.2</td><td>1.2</td><td>5.2</td><td>O K</td></tr><tr><td>7200 min Winter</td><td>76.917</td><td>0.031</td><td>0.0</td><td>1.0</td><td>1.0</td><td>4.3</td><td>O K</td></tr><tr><td>8640 min Winter</td><td>76.913</td><td>0.027</td><td>0.0</td><td>0.9</td><td>0.9</td><td>3.7</td><td>O K</td></tr><tr><td>10080 min Winter</td><td>76.910</td><td>0.024</td><td>0.0</td><td>0.8</td><td>0.8</td><td>3.3</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>30 min Winter</td><td>88.200</td><td>0.0</td><td>51.1</td><td>37</td></tr><tr><td>60 min Winter</td><td>55.160</td><td>0.0</td><td>64.0</td><td>66</td></tr><tr><td>120 min Winter</td><td>34.300</td><td>0.0</td><td>79.6</td><td>124</td></tr><tr><td>180 min Winter</td><td>25.814</td><td>0.0</td><td>89.8</td><td>180</td></tr><tr><td>240 min Winter</td><td>20.965</td><td>0.0</td><td>97.3</td><td>236</td></tr><tr><td>360 min Winter</td><td>15.423</td><td>0.0</td><td>107.4</td><td>342</td></tr><tr><td>480 min Winter</td><td>12.278</td><td>0.0</td><td>114.0</td><td>388</td></tr><tr><td>600 min Winter</td><td>10.231</td><td>0.0</td><td>118.7</td><td>464</td></tr><tr><td>720 min Winter</td><td>8.785</td><td>0.0</td><td>122.3</td><td>544</td></tr><tr><td>960 min Winter</td><td>6.867</td><td>0.0</td><td>127.5</td><td>698</td></tr><tr><td>1440 min Winter</td><td>4.812</td><td>0.0</td><td>134.0</td><td>958</td></tr><tr><td>2160 min Winter</td><td>3.363</td><td>0.0</td><td>140.5</td><td>1300</td></tr><tr><td>2880 min Winter</td><td>2.616</td><td>0.0</td><td>145.7</td><td>1592</td></tr><tr><td>4320 min Winter</td><td>1.859</td><td>0.0</td><td>155.3</td><td>2252</td></tr><tr><td>5760 min Winter</td><td>1.476</td><td>0.0</td><td>164.4</td><td>2944</td></tr><tr><td>7200 min Winter</td><td>1.249</td><td>0.0</td><td>174.0</td><td>3680</td></tr><tr><td>8640 min Winter</td><td>1.099</td><td>0.0</td><td>183.7</td><td>4336</td></tr><tr><td>10080 min Winter</td><td>0.994</td><td>0.0</td><td>193.8</td><td>5088</td></tr></table>			Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status	30 min Winter	77.237	0.351	0.0	2.0	2.0	48.3	O K	60 min Winter	77.311	0.425	0.0	2.0	2.0	58.5	O K	120 min Winter	77.401	0.515	0.0	2.0	2.0	68.4	O K	180 min Winter	77.446	0.560	0.0	2.0	2.0	72.8	O K	240 min Winter	77.463	0.577	0.0	2.0	2.0	74.5	O K	360 min Winter	77.454	0.568	0.0	2.0	2.0	73.6	O K	480 min Winter	77.425	0.539	0.0	2.0	2.0	70.8	O K	600 min Winter	77.393	0.507	0.0	2.0	2.0	67.6	O K	720 min Winter	77.356	0.470	0.0	2.0	2.0	64.0	O K	960 min Winter	77.293	0.407	0.0	2.0	2.0	56.1	O K	1440 min Winter	77.169	0.283	0.0	2.0	2.0	38.9	O K	2160 min Winter	77.039	0.153	0.0	2.0	2.0	21.0	O K	2880 min Winter	76.971	0.085	0.0	1.9	1.9	11.7	O K	4320 min Winter	76.936	0.050	0.0	1.5	1.5	6.9	O K	5760 min Winter	76.924	0.038	0.0	1.2	1.2	5.2	O K	7200 min Winter	76.917	0.031	0.0	1.0	1.0	4.3	O K	8640 min Winter	76.913	0.027	0.0	0.9	0.9	3.7	O K	10080 min Winter	76.910	0.024	0.0	0.8	0.8	3.3	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	30 min Winter	88.200	0.0	51.1	37	60 min Winter	55.160	0.0	64.0	66	120 min Winter	34.300	0.0	79.6	124	180 min Winter	25.814	0.0	89.8	180	240 min Winter	20.965	0.0	97.3	236	360 min Winter	15.423	0.0	107.4	342	480 min Winter	12.278	0.0	114.0	388	600 min Winter	10.231	0.0	118.7	464	720 min Winter	8.785	0.0	122.3	544	960 min Winter	6.867	0.0	127.5	698	1440 min Winter	4.812	0.0	134.0	958	2160 min Winter	3.363	0.0	140.5	1300	2880 min Winter	2.616	0.0	145.7	1592	4320 min Winter	1.859	0.0	155.3	2252	5760 min Winter	1.476	0.0	164.4	2944	7200 min Winter	1.249	0.0	174.0	3680	8640 min Winter	1.099	0.0	183.7	4336	10080 min Winter	0.994	0.0	193.8	5088
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Date 09/10/2023 File KNS-JBAU-XX-XX-MD-C-000...	Designed by J. Moores Checked by A.Matlak	
Micro Drainage Source Control 2020.1.3		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 434850 295300 SP 34850 95300
Data Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.900
Cv (Winter)	0.900
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.129

Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)
0 4	0.000	4 8	0.129

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Model Details

Storage is Online Cover Level (m) 77.871

Cellular Storage Structure

Invert Level (m) 76.886 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	145.0	0.0	0.600	103.0	0.0
0.450	145.0	0.0	0.601	0.0	0.0
0.451	103.0	0.0			

Hydro-Brake® Optimum Outflow Control

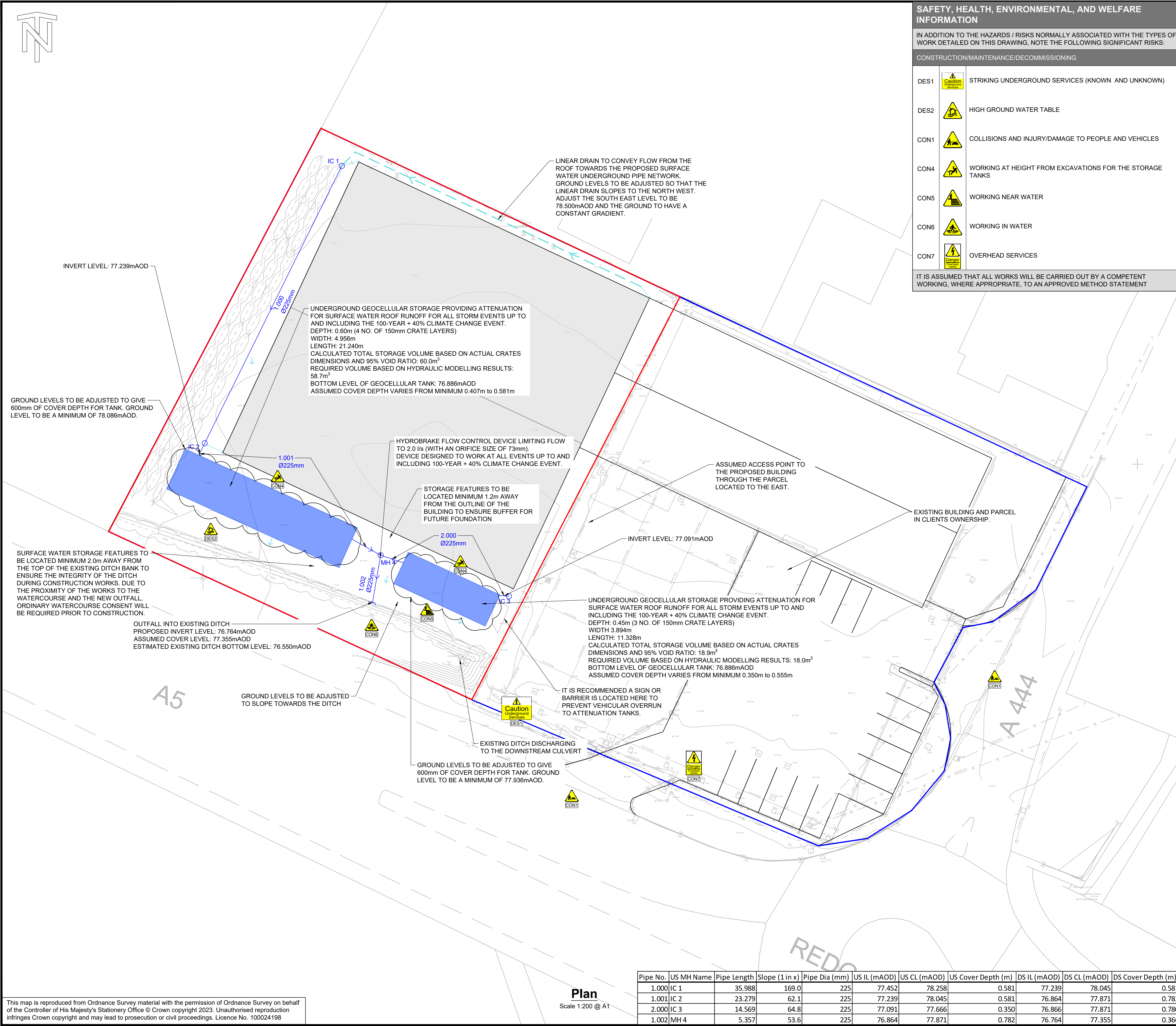
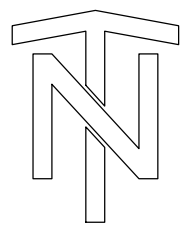
Unit Reference MD-SHE-0073-2000-0600-2000
Design Head (m) 0.600
Design Flow (l/s) 2.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 73
Invert Level (m) 76.864
Minimum Outlet Pipe Diameter (mm) 100
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.600	2.0
Flush-Flo™	0.177	2.0
Kick-Flo®	0.397	1.7
Mean Flow over Head Range	-	1.7

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	1.9	1.200	2.7	3.000	4.2	7.000	6.3
0.200	2.0	1.400	2.9	3.500	4.5	7.500	6.5
0.300	1.9	1.600	3.1	4.000	4.8	8.000	6.7
0.400	1.7	1.800	3.3	4.500	5.1	8.500	6.9
0.500	1.8	2.000	3.5	5.000	5.3	9.000	7.1
0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.3
0.800	2.3	2.400	3.8	6.000	5.8		
1.000	2.5	2.600	3.9	6.500	6.0		

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SAFETY, HEALTH, ENVIRONMENTAL, AND WELFARE INFORMATION

IN ADDITION TO THE HAZARDS / RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RISKS:

CONSTRUCTION/MAINTENANCE/DECOMMISSIONING

DES1		STRIKING UNDERGROUND SERVICES (KNOWN AND UNKNOWN)
DES2		HIGH GROUND WATER TABLE
CON1		COLLISIONS AND INJURY/DAMAGE TO PEOPLE AND VEHICLES
CON4		WORKING AT HEIGHT FROM EXCAVATIONS FOR THE STORAGE TANKS
CON5		WORKING NEAR WATER
CON6		WORKING IN WATER
CON7		OVERHEAD SERVICES

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- ALL LEVELS ARE IN METRES RELATIVE TO ORDNANCE DATUM NEWLYN (OD) UNLESS NOTED OTHERWISE.
- ALL COORDINATES ARE IN METRES RELATIVE TO ORDNANCE SURVEY NATIONAL GRID.
- DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS MUST BE CHECKED/VERIFIED ON SITE.
- THIS DRAWING IS BASED ON THE PROPOSED SITE PLAN DRAWING "Simpson Mark - Countrywide Store 2023" DATED 16/08/23.
- NO GEOTECHNICAL AND STRUCTURAL ANALYSIS OF THE PROPOSED DRAINAGE SYSTEM HAS BEEN CARRIED OUT AT THIS STAGE.
- GROUND LEVELS HAVE BEEN ASSUMED FROM THE EXISTING TOPOGRAPHIC SURVEY "19285-23-01-TOPOGRAPHICAL" BY "SV SURVEYING LTD" DATED 14/04/23.
- THE MINIMUM COVER LEVEL OF SOME OF THE PIPES IS 350mm UNDER THE ASSUMPTION THAT THIS LAND WILL REMAIN AS GRASS LAND AND NOT TO BE DRIVEN OVER REGULARLY WITH A VEHICLE.
- NO DEEP ROOTED TREES/BUSHES SHOULD BE PLANTED WITHIN THE IMMEDIATE VICINITY OF THE UNDERGROUND DRAINAGE SYSTEM TO PREVENT DAMAGE DUE TO ROOT INGRESS.
- ALL WORKS IN THE DITCH WILL BE CARRIED OUT WITH CARE TO MINIMISE THE RISK OF POLLUTION ADHERING TO POLLUTION PREVENTION GUIDELINES.
- THE PROPOSED ATTENUATION TANKS SHAPE HAS BEEN BASED ON POLYPIPE'S PERMAVOID MODULAR CRATES 0.708m x 0.354m x 0.150m (L x W x H).
- THE LOCATIONS OF ANY KNOWN SERVICES SHOWN ON THE DRAWING ARE APPROXIMATE AND FOR GUIDANCE ONLY. OTHER SERVICES, NOT SHOWN ON THIS DRAWING, MAY ALSO BE PRESENT WITHIN THE AREA OF INTEREST. THE CONTRACTOR SHALL CONFIRM THE LOCATION AND DETAILS OF SERVICES PRIOR TO CONSTRUCTION WORKS COMMENCING TO ENSURE CLASHES WITH PROPOSED DRAINAGE SYSTEM ARE AVOIDED.
- THE ELECTRONIC VERSION OF THIS DRAWING IS NOT TO BE USED FOR SETTING OUT.
- THIS DRAWING IS FOR CONSULTATION ONLY AND DOES NOT CONSTITUTE A "FOR CONSTRUCTION" DESIGN. THE DESIGN FOR CONSTRUCTION MUST INDEPENDENTLY VERIFY AND FURTHER DEVELOP ALL ELEMENTS TO A SUITABLE LEVEL OF DETAIL. JBA CANNOT ACCEPT LIABILITY FOR THE DESIGN FOR CONSTRUCTION OR THE SCHEME AS-CONSTRUCTED.
- THIS DRAWING SHOULD BE PRINTED IN COLOUR.

REFERENCE DRAWING SCHEDULE

KNS-JBAU-XX-XX-DR-C-0002 TYPICAL DRAINAGE DETAILS

LEGEND

	SITE BOUNDARY
	CLIENT OWNERSHIP BOUNDARY
	EXISTING GROUND LEVEL
	EXISTING HEDGE
	PROPOSED BUILDING FOOTPRINT
	OVERLAND EXCESS FLOW ROUTE
	PROPOSED SURFACE WATER PIPE WITH AN INSPECTION CHAMBER
	PROPOSED SURFACE WATER NETWORK OUTFALL HEADWALL
	PROPOSED LINEAR DRAIN (ACO OR SIMILAR APPROVED)
	PROPOSED RAINWATER DOWNPIPE
	PROPOSED GEOCELLULAR STORAGE (PERMAVOID OR OTHER APPROVED)



A3-C01	Final version	13/10/23	JM	JM	AM	LV
S3-P01	Issued for comments	12/10/23	JM	JM	AM	LV
Rev.	Description	Date	Author	Designer	Checker	Approver

Document Control	
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Project Title	Redgate Depot
Drawing Title	General Arrangement

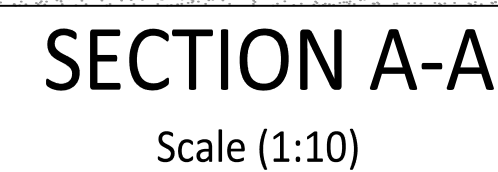
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Parent Model				
NOT FROM MODEL				
Security Classification			Scale	
OFFICIAL			1:200	
Author	Designer	Checker	Approver	
J. Moores	J. Moores	A. Mattiak	L. Virgo	
Suitability			Status	Revision
PUBLISHED DEFINITION			A3	C01
Information Container				
KNS-JBAU-XX-XX-DR-C-0001-General_Arrangement.dwg				
A1 Sheet Size				

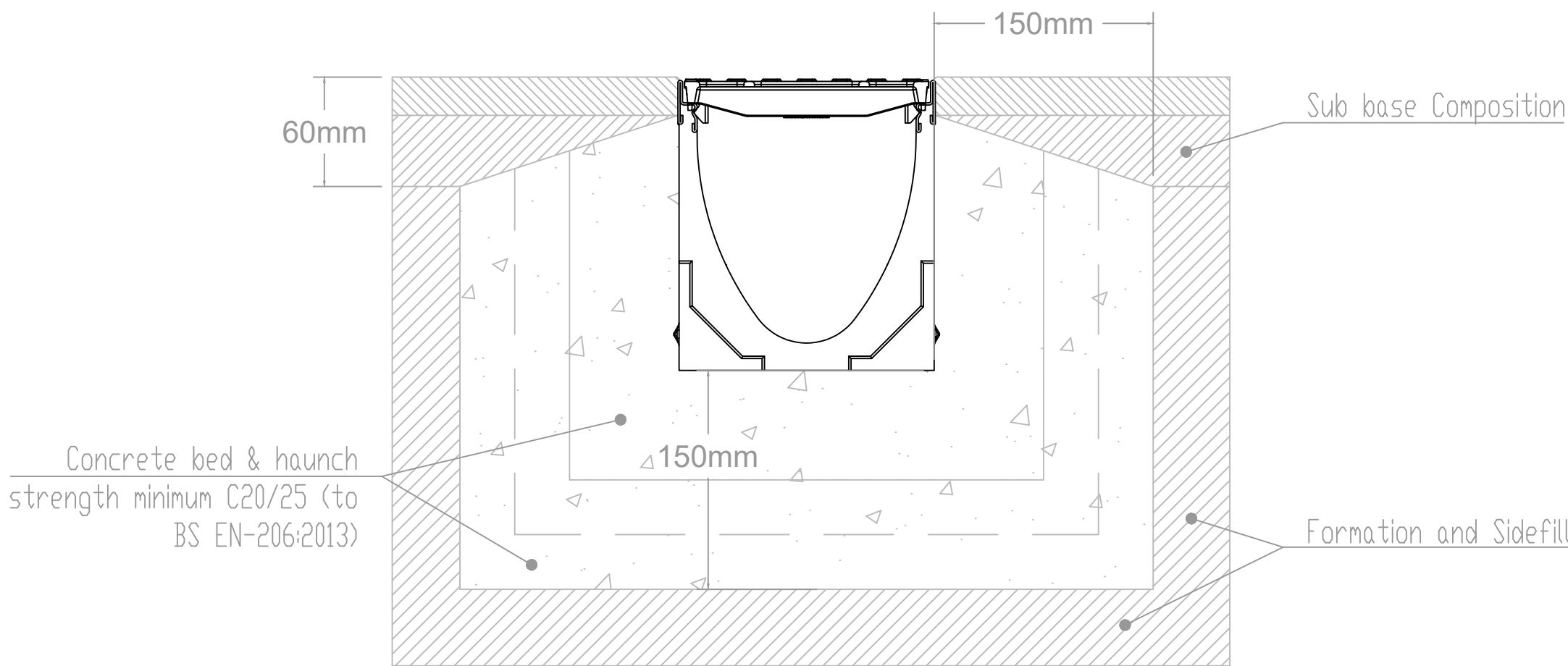
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1.001	IC 2	23.279	62.1	225	77.239	78.045	0.581	76.864	77.871	0.782
2.000	IC 3	14.569	64.8	225	77.091	77.666	0.350	76.866	77.871	0.780
1.002	MH 4	5.357	53.6	225	76.864	77.871	0.782	76.764	77.355	0.366



REFERENCE DRAWING SCHEDULE
KNS-JBAU-XX-XX-DR-C-0001 General Arrangement

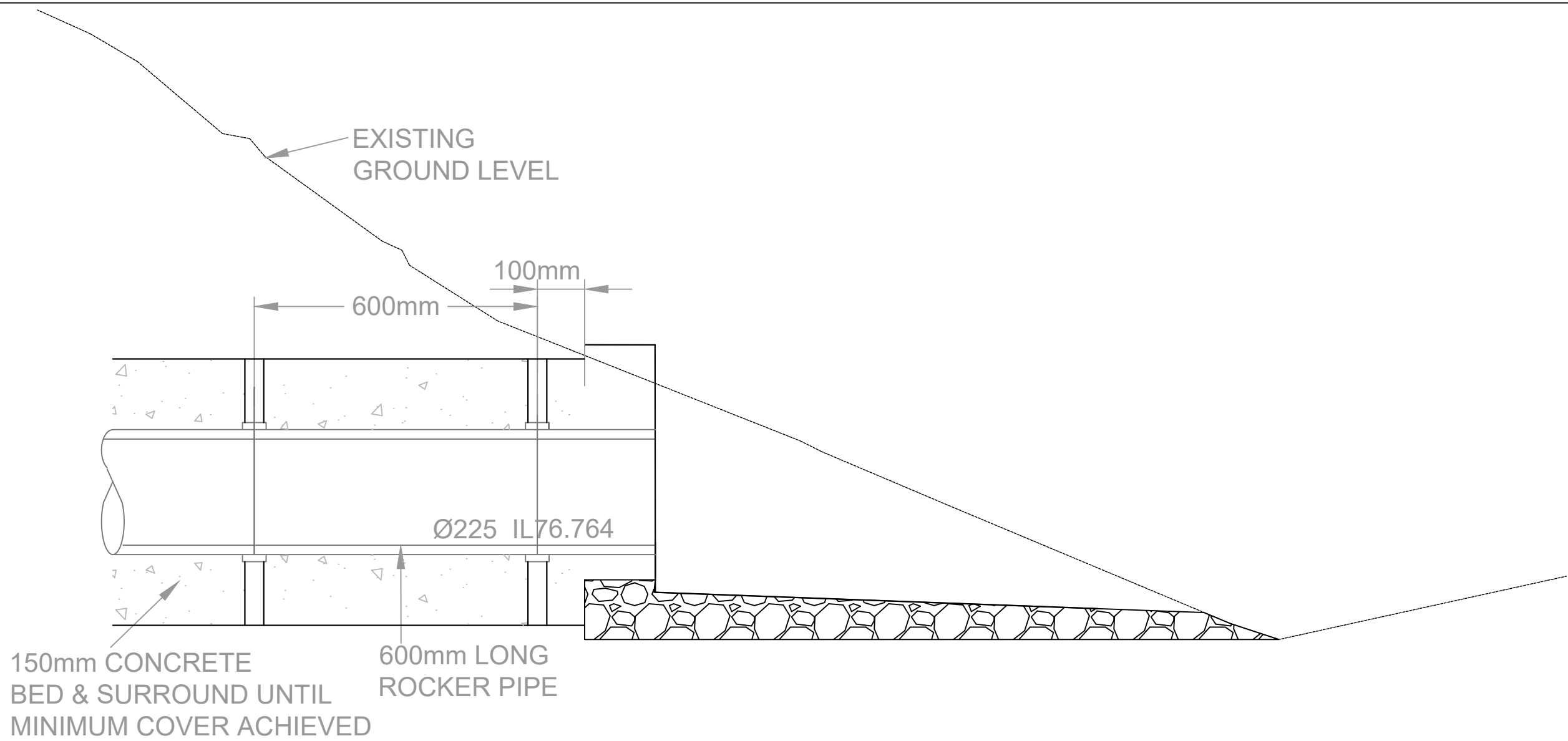


A3-C01	Final version	13/10/23	JM	JM	AM	LV
Rev.	Description	Date	Author	Designer	Checker	Approver
Document Control						
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Project Title						
Redgate Depot						
Drawing Title						
Typical drainage details (1 of 2)						
						
Parent Model						
NOT FROM MODEL						
Security Classification			Scale			
OFFICIAL			AS SHOWN			
Author	Designer	Checker	Approver			
J. Moores	J. Moores	A. Mattak	L. Virgo			
Suitability			Status		Revision	
FINAL			A3		C01	
Information Container						
KNS-JBAU-XX-XX-DR-C-0002-Typical_Details.dwg						
A1 Sheet Size						



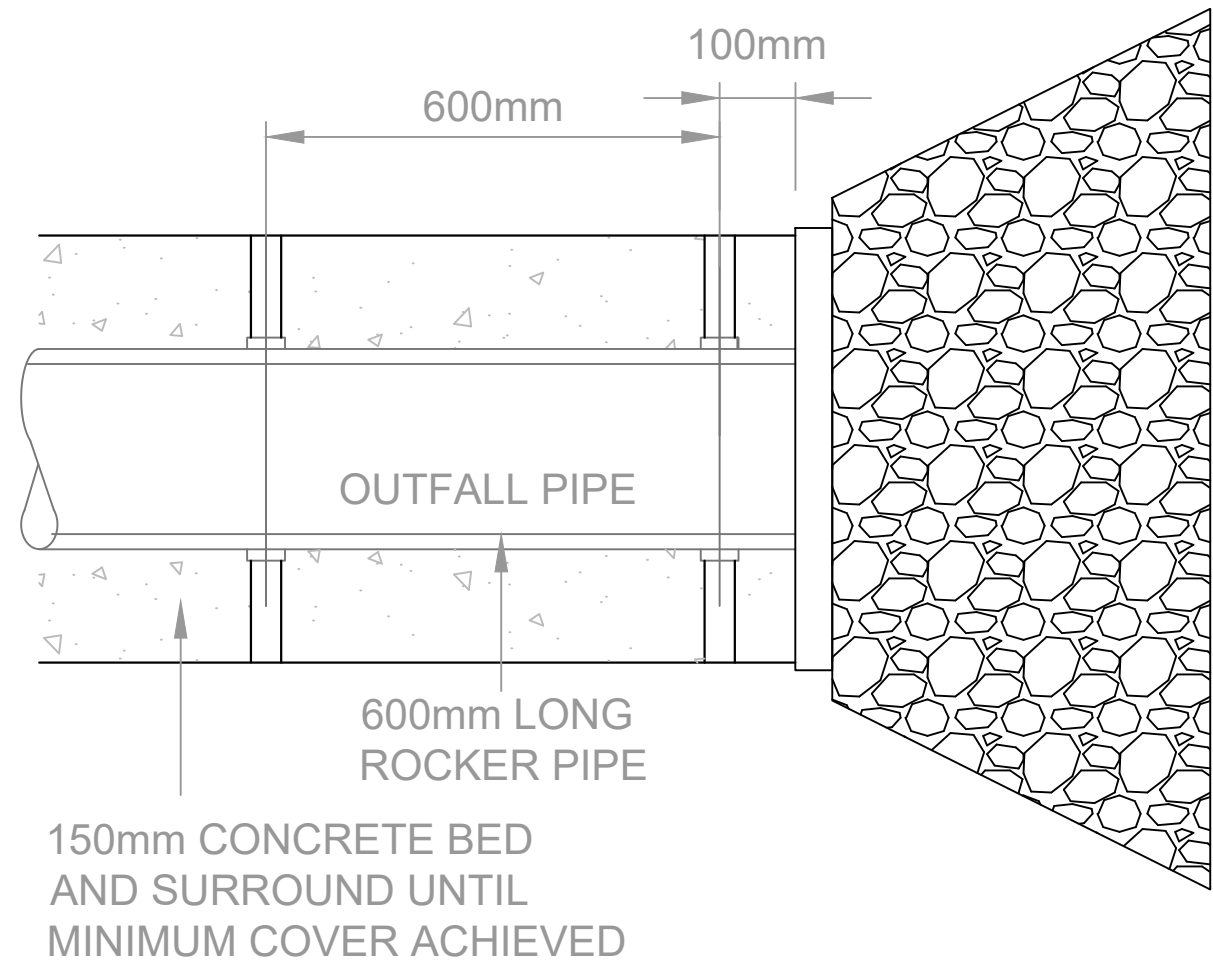
TYPICAL ACO LINEAR DRAIN (ACO MULTIDRAIN M200D)

Scale (1:5)



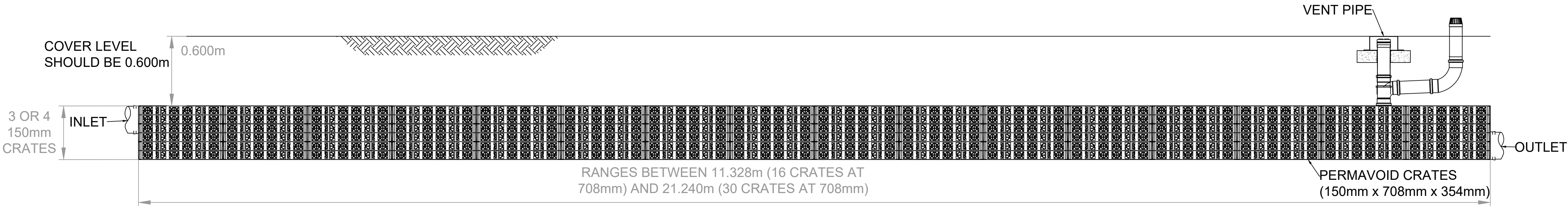
WATERCOURSE OUTFALL - SECTION

Scale 1:10



WATERCOURSE OUTFALL - PLAN

Scale 1:10



TYPICAL GEOCELLULAR TANK DETAIL

Scale (1:25)

GENERAL NOTES

- All dimensions are in millimetres unless noted otherwise.
- All levels are in metres relative to Ordnance Datum Newlyn (OD) unless noted otherwise.
- All coordinates are in metres relative to Ordnance Survey National Grid.
- Do not scale from this drawing. All dimensions must be checked/verified on site.
- No geotechnical and structural analysis of the proposed drainage system has been carried out at this stage.
- This drawing is for consultation only and does not constitute a "for construction" design. The design for construction must independently verify and further develop all elements to a suitable level of detail. JBA cannot accept liability for the design for construction or the scheme as-constructed.

REFERENCE DRAWING SCHEDULE

KNS-JBAU-XX-XX-DR-C-0001 General Arrangement

A3-C01	Final version	13/10/23	JM	JM	AM	LV
Rev.	Description	Date	Author	Designer	Checker	Approver

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JBA
consulting

Project Title

Redgate Depot

Drawing Title

Typical drainage details (2 of 2)



Parent Model
NOT FROM MODEL

Security Classification
OFFICIAL

Scale
AS SHOWN

Author J. Moores	Designer J. Moores	Checker A. Matlak	Approver L. Virgo
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Suitability FINAL	Status A3	Revision C01
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Information Container
KNS-JBAU-XX-XX-DR-C-0002-Typical_Details.dwg

A1 Sheet Size

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment



Document control					
Contributing designers	Revision	Purpose of issue	Checked	Reviewed	Date
Samuel Hotchkiss	P01	Issued for comments	A. Matlak	L. Virgo	12/10/2023
Jordan Moores	C01	Issued for planning	A. Matlak	L. Virgo	13/10/2023

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform	Stage 4 Control		
Ref. no.	Project element, material, or activity	Key health and safety hazards and their possible effects	People at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Significant residual hazards and risks	Communication method	Risk owner(s)	Proposed control measures
Guidance	Consider all aspects involved in each stage of interface with the site, environment, and structure(s).	Record the key hazards and their potential consequences.	Identify the categories of people at risk.	Include obtaining adequate data for design certainty and any further studies carried out during the risk evaluation process. Proposed measures to be taken by constructors and operators are to be included in Stage 4.	Provide details of residual hazards and risks that will need to be communicated and managed.	Record how information is provided, whether on drawings, pre-construction information, buildability statement, specification, reports, or H&S File	Record the name of designers, contractors, the client, or other stakeholders who are to ensure the significant residual risk is minimised and controlled.	Recommend measures to be taken by the risk owner(s) to minimise and control the significant residual risk.
Design								
Des1	Design of the drainage system (incl. hydraulic and spatial)	Hazard (underground services): -surface water drainage systems associated with the previous development. - street lighting and other potential services along Watling Street (A5). -proposed utilities (e.g., water mains, electrical, etc.) which details of are not yet available, Risks: - striking services/ damage to existing infrastructure, - injury/death.	-Site personnel -Existing infrastructure	Topographical survey and available existing utilities survey was reviewed at this stage to check for potential clashes with proposed surface water drainage system. Known services mapped in relation to the proposed drainage infrastructure. Design considering the existing services/ clashes checked.	Underground services (including the unknown services)	DSWDS Report, General Arrangement Drawing no. KNS-JBAU-XX-XX-DR-C-0001	Designer (identifying and communicating any known hazards)/ Contractor (construction of the scheme)	Detailed utility survey to be conducted prior to construction commencing to confirm the location and details of the existing services and check for any unidentified services. Care to be taken when excavating around existing services/ structures to minimise the risk of structural damage. Location of electrical cables to be confirmed using detection equipment before any excavation takes place.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key health and safety hazards and their possible effects	People at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Significant residual hazards and risks	Communication method	Risk owner(s)	Proposed control measures
Des2	Design of the drainage system (incl. hydraulic and spatial)	Hazard (ground conditions) - potential high groundwater levels --clay topsoil/subsoil underlain by Alluvial Deposits with Mercia Mudstone Group underneath. Risks: - potential for liner uplift due to high groundwater table. - collapse of drainage systems due to soil stability issues. - pollution to water environment.	-Site personnel -Site users -Infrastructure	Review of the site existing land use, historical use, site location, EA flood maps. Impermeable liner proposed.	Ground and groundwater conditions	DSWDS Report, General Arrangement Drawing no. KNS-JBAU-XX-XX-DR-C-0001	Designer (identifying and communicating any known hazards)/ Contractor (construction of the scheme)	Long term groundwater monitoring, further testing of geotechnical properties of soils/ contaminants to confirm design parameters. Analysis of the potential risk of 'floatation' of the drainage system to be undertaken.
Des3	Design of the drainage system (spatial)	Hazard: Unexploded Ordnance Risk: -Injury /death, damage to infrastructure.	-Site personnel -Existing infrastructure	A regional 'unexploded bomb (UXB) risk map' for Leicestershire has been reviewed through www.zetica.com website. The map shows that the area has low UXB risk.	Unexploded Ordnance	DSWDS Report	Designer (identifying and communicating any known hazards)/ Contractor (construction of the scheme)	The risk of UXB should be investigated further at the construction stage.
Construction								
Con1	Plant/ material delivery	Hazard: vehicular access to the site through the existing residential development to the east of the site-- parked cars, pedestrians. Risks: -collisions and injury/ damage to people/vehicles.	-Site personnel -Public	Hazard cannot be eliminated by design. Hazard not specific to drainage construction but applicable to the wider site construction.	Site access	Should be included in the full pre-construction and construction package	Appointed contractor for the works	Site managed to minimise risks, applies to all aspects of construction. Traffic management to be prepared prior to construction activities commencing. Public to be notified of construction activities to take place.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key health and safety hazards and their possible effects	People at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Significant residual hazards and risks	Communication method	Risk owner(s)	Proposed control measures
Con2	Excavations	Hazards: underground services. See Des1 for details. Risks: - striking services/ damage to existing infrastructure, - injury/death.	-Site personnel -Existing infrastructure	Hazard cannot be eliminated by design. The proposed drainage system has been designed to achieve the required hydraulic conditions.	Underground services	Consideration of this should be given in future full pre-construction and construction packages	Appointed contractor for the works	Detailed utility survey to be conducted prior to construction commencing to confirm the location and details of the existing services and check for any unidentified services. Care to be taken when excavating around existing services to minimise the risk of structural damage.
Con3	Excavations	Hazards: ground & groundwater conditions. See Des2 for details. Risks: - falls into excavation/ overturning plant, trench collapse, injury, damage/ill health - potential for liner uplift due to high groundwater table. - collapse of drainage systems due to soil stability issues. - pollution to surface water and watercourse	- Site personnel - Site plant	Hazard cannot be eliminated by design. The proposed drainage system has been designed to achieve the required hydraulic conditions whilst minimising depth of excavation.	Ground and groundwater conditions	Consideration of this should be given in future full pre-construction and construction packages	Appointed contractor for the works	Trench supports as required. Long term groundwater monitoring. Analysis of the potential risk of 'floatation' of the drainage system to be undertaken.
Con4	Proposed surface water drainage connection to existing ditch. / Outfall construction.	Hazards: working at height, inundation. Risk: - fall into excavation, injury.	- Site personnel	Hazard cannot be eliminated by design. The proposed drainage system has been designed to achieve the required hydraulic conditions whilst minimising depth of excavation. Weather conditions shall be frequently monitored during construction.	Working at height, inundation.	Consideration of this should be given in future full pre-construction and construction packages	Appointed contractor for the works	Works to be conducted during dry weather period. Trench support as required. Minimise man entry to confined spaces (staff to be confined space trained if undertaking work in confined spaces). Method Statement and safe working practice to be developed.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key health and safety hazards and their possible effects	People at risk from the hazard	Design measures taken to eliminate the hazard or reduce the risk	Significant residual hazards and risks	Communication method	Risk owner(s)	Proposed control measures
Con5	General construction activities	Hazards: working near water, ordinary watercourse (ditch) located along southern boundary of the site. Risk: - inundation, drowning.	- Site personnel - Site plant	Hazard cannot be eliminated by design. Weather conditions shall be frequently monitored during construction.	Working near water/ flood risk	Consideration of this should be given in future full pre-construction and construction packages	Appointed contractor for the works	Undertake the works during 'drier' seasons. Visually monitor the water level in the ordinary watercourse (ditch) located along south boundary of site and regularly check the Met Office flood warnings.
Con6	General construction activities	Hazards: Overhead services, located at the entrance of existing site. Risk: striking services/ damage to existing infrastructure, - injury/death.	Site personnel - Site plant	Available topographical survey was reviewed at this stage. Hazard cannot be eliminated by design.	Overhead service	Consideration of this should be given in future full pre-construction and construction packages	Appointed contractor for the works	Detailed utility survey to be conducted prior to construction. Care to be taken when delivering plant/materials to the site.
Operation & Maintenance								
O&M1	Maintenance and inspection of drainage system	Hazards: water, working at height, confined space. Risk: -drowning, injury, suffocation.	-Maintenance personnel	Only one, man entry manhole (flow restriction chamber) has been proposed to eliminate confined space entry.	Water, risk of inundation/ drowning	Drainage system owner shall instruct the maintenance contractor about the drainage system details prior to maintenance activities commencing	Maintenance contractor	Regular maintenance, normal site safety controls.
O&M2	Failure of drainage systems due to blockage or capacity exceedance	Hazard: backing up water Risk: -site inundation	-Site occupiers / users -Public -Maintenance personnel	Hazard cannot be eliminated by design. Appropriate ground level setting recommended to ensure overland flow is managed in a safe manner. Preparation of long-term management plan recommended.	Minimal – if levels set appropriately and maintenance regime is implemented.	Drainage system owner shall instruct the maintenance contractor about the drainage system details prior to maintenance activities commencing	Maintenance contractor	Regular maintenance, normal site safety controls.
O&M3	Operation of watercourse during storm events	Hazard: water Risk: -injury/ drowning	-Site occupiers / users -Public	Hazard cannot be eliminated by design. Maintenance contractor to monitor weather forecasts during maintenance activities periods.	Water	Signage informing of intermittent wetting the watercourse should be implemented.	Appointed contractor for the works/ Maintenance contractor	Signage informing of intermittent wetting the watercourse should be implemented. Vegetation along the edge of the watercourse may be required to discourage direct access to the watercourse.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment

Health and Safety Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key health and safety <u>hazards</u> and their possible effects	<u>People</u> at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Demolition								
Dem1	Removal of the drainage system	Hazards and risks: as per the construction stage, except that the removal of the drainage system will increase a risk of flooding to the site and the local area.	- Site personnel - Site plant - Site occupiers / users - Public	It is recommended to reinstate the site to greenfield condition or install replacement SuDS based drainage in line with the current guidance.	Increased flood risk		Demolition contractor	Reinstate the site to greenfield condition or install replacement SuDS based drainage in line with the current guidance.

Environmental Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key environmental <u>hazards</u> and their possible effects	<u>Who or what</u> is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Guidance	Consider all aspects involved in each stage of interface with the site, environment, and structure(s).	Record the key hazards and their potential consequences.	Identify the categories of people, animals, or environments at risk.	Include obtaining adequate data for design certainty and any further studies carried out during the risk evaluation process. Proposed measures to be taken by constructors and operators are to be included in Stage 4.	Provide details of residual hazards and risks that will need to be communicated and managed.	Record how information is provided, whether on drawings, pre-construction information, buildability statement, specification, reports, or H&S File	Record the name of designers, contractors, the client, or other stakeholders who are to ensure the significant residual risk is minimised and controlled.	Recommend measures to be taken by the risk owner(s) to minimise and control the significant residual risk.
Design								
EDes1	Design of drainage system	Hazard (ground conditions): ground and water contamination See Des2 for details. Risks: pollution	-Environment	Ground investigation information reviewed to check for contamination. Impermeable liner proposed.	Ground contamination	See Des2 .	Designer (identifying and communicating any known hazards)/ Contractor (construction of the scheme)	See Des2 .
EDes2	Design of drainage system	Hazard: Proposed hedge and future trees. Risk: root growth into the pipework, leaves drop.	-Proposed drainage system	Recommendation: remove existing trees from the area of proposed drainage. No trees should be planted within the immediate vicinity of the underground drainage system to prevent damage due to root ingress.	Trees	DSWDS Report	Designer (identifying and communicating any known hazards)/ Contractor (construction of the scheme)	No trees should be planted within the immediate vicinity of the underground drainage system to prevent damage due to root ingress.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment



Environmental Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key environmental <u>hazards</u> and their possible effects	Who or what is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Construction								
ECon1	Excavations and topsoil strip	Hazards: -oil/ fuel spills on the existing surface -oil leak from the site plant Risk: ground and water environment pollution	- Site personnel - Underlying soils - Water environment	Hazard cannot be eliminated by design.	Oil/ fuel pollution	Consideration of this should be given in future full pre-construction and construction packages, required method statements to be developed	Appointed contractor for the works	Spill pollution kit to be present on site. Any contaminated material to be treated on site prior to re-use or disposed off to a licenced waste management facility.
ECon2	General construction works	Hazard: sediment washed into the watercourse Risk: pollution	- Water environment	Hazard cannot be eliminated by design. Hazard not specific to drainage construction but applicable to the wider site construction.	Sediment	Consideration of this should be given in future full pre-construction and construction packages, required method statements to be developed	Appointed contractor for the works	Silt curtain to be used as required along the southern boundary of the site.
ECon3	Oil/ petrol storage	Hazards: oil/ fuel Risk: pollution	- Site personnel - Underlying soils - Water environment	Hazard cannot be eliminated by design.	Oil/ fuel pollution	Consideration of this should be given in future full pre-construction and construction packages, required method statements to be developed	Appointed contractor for the works	Storage tanks to be bunded / spill pollution kit to be present on site.
ECon4	General site clearance	Hazard: removal of existing trees Risk: decrease of amenity value	-Environment	Green space to be provided/ shrubs planted to provide amenity value and enhance the environment and compensate for any trees removed as part of the site clearance.	Existing trees	Consideration of this should be given in future full pre-construction and construction packages, required method statements to be developed	Landscape Architect/ appointed contractor for the works	Green space to be provided/ shrubs planted to maintain maximum biodiversity value of the site.
Operation & Maintenance								
EO&M1	Inspection and clearance of linear drainage/ gutters / downpipes / manholes and vegetation clearance from watercourse	Hazards: sediment, contaminated vegetation. Risk: pollution	-Environment	Hazard cannot be eliminated by design.	Pollution		Maintenance contractor	Any vegetation and sediment / debris removed from the drainage system should be considered as contaminated and disposed off to a licenced waste management facility.

2023s0603 – Redgate Depot DSWDS - Design Risk Assessment

Environmental Considerations

Stage 1 Identify				Stage 2 Eliminate / Reduce	Stage 3 Inform		Stage 4 Control	
Ref. no.	Project element, material, or activity	Key environmental <u>hazards</u> and their possible effects	Who or what is at risk from the hazard	<u>Design</u> measures taken to eliminate the hazard or reduce the risk	Significant <u>residual</u> hazards and risks	<u>Communication</u> method	Risk owner(s)	Proposed <u>control</u> measures
Demolition								
EDem 1	Removal of the drainage system/ general demolition activities	Hazards and risks: as per the construction stage, except that the removal of the drainage system will increase a risk of pollution to the water and ground environment.	- Water and ground environment	It is recommended to reinstate the site to greenfield condition or install replacement SuDS based drainage in line with the current guidance.	Increased pollution risk		Demolition contractor	Silt curtain to be used as required along the western boundary of the site. Spill pollution kit to be present on site



National Highways Planning Response (NHPR 22-12) Formal Recommendation to an Application for Planning Permission

From: Andy Jinks (Regional Director)
Operations Directorate
Midlands Region
National Highways
PlanningM@nationalhighways.co.uk

To: Hinckley & Bosworth Borough Council
planning@hinckley-bosworth.gov.uk

CC: transportplanning@dft.gov.uk
spatialplanning@highwaysengland.co.uk

Council's Reference: 21/1492/FUL

Location: Countrywide Store Watling Street Caldecote Nuneaton Warwickshire CV10 0RY

Proposal: Extension of existing storage building

National Highways Ref: NH/23/02862

Referring to the consultation on a planning application dated 25 September 2023, in the vicinity of the A5 that forms part of the Strategic Road Network, notice is hereby given that National Highways' formal recommendation is that we:

- ~~a) offer no objection (see reasons at Annex A);~~
- ~~b) recommend that conditions should be attached to any planning permission that may be granted (see Annex A – National Highways recommended Planning Conditions & reasons);~~
- c) recommend that planning permission not be granted for a specified period (see reasons at Annex A);
- ~~d) recommend that the application be refused (see reasons at Annex A)~~

Highways Act 1980 Section 175B is relevant to this application.¹

This represents National Highways' formal recommendation and is copied to the Department for Transport as per the terms of our Licence.

Should the Local Planning Authority not propose to determine the application in accordance with this recommendation they are required to consult the Secretary of State for Transport, as set out in the [Town and Country Planning \(Development Affecting Trunk Roads\) Direction 2018](#), via transportplanning@dft.gov.uk and may not determine the application until the consultation process is complete.

The Local Planning Authority must also copy any consultation under the 2018 Direction to PlanningM@nationalhighways.co.uk.

Signature:

Date: 9 October 2023

A large black rectangular box redacting the signature.

Name: Babatunde Adekoya-Serrano

Position: Assistant Spatial Planner

**National Highways
199 Wharfside Street,
Birmingham, B1 1RN**

¹ Where relevant, further information will be provided within Annex A.

Annex A National Highways' assessment of the proposed development.

National Highways has been appointed by the Secretary of State for Transport as a strategic highway company under the provisions of the Infrastructure Act 2015 and is the highway authority, traffic authority and street authority for the Strategic Road Network (SRN). The SRN is a critical national asset and as such we work to ensure that it operates and is managed in the public interest, both in respect of current activities and needs as well as in providing effective stewardship of its long-term operation and integrity.

Development Proposal

Extension of existing storage building.

Reason for Decision

National Highways recommends that a holding response be placed on this proposed development as there are matters for clarification that require resolution.

Access and Egress

The A5 direct access will require further detail as to how it operates. There is no clear mechanism for entrance or exit. It is unclear whether it is in frequent or unrestricted use for access or egress, and how this access it to be used under the proposed development use.

Lighting

The applicant will need to provide further detail of lighting proposals and design for review by National Highways.

CTMP

There would need to be a Construction Traffic Management Plan to ensure the continued safe and efficient use of the SRN.

Drainage

There will need to be details of the applicant's drainage plans including surface water runoff and foul water. These details will need to confirm that drainage plans are in accordance with DfT Circular 01/22 paragraph 59.

Environmental

Our environmental team are assessing the suitability for the proposal for vegetation bordering the A5.

Standing advice to the local planning authority

The Climate Change Committee's [2022 Report to Parliament notes](#) that for the UK to achieve net zero carbon status by 2050, action is needed to support a modal shift away from car travel. The NPPF supports this position, with paragraphs 73 and 105 prescribing that significant development should offer a genuine choice of transport modes, while paragraphs 104 and 110 advise that appropriate opportunities to promote walking, cycling and public transport should be taken up.

Moreover, the build clever and build efficiently criteria as set out in clause 6.1.4 of [PAS2080](#) promote the use of low carbon materials and products, innovative design solutions and construction methods to minimise resource consumption.

These considerations should be weighed alongside any relevant Local Plan policies to ensure that planning decisions are in line with the necessary transition to net zero carbon.