

L'OREAL FACILITY, ROACH BANK ROAD, BURY

FLOOD RISK AND DRAINAGE ASSESSMENT

Final Report v1.0
August 2022

Report Title **L'Oreal Facility, Roach Bank Road, Bury**
Flood Risk and Drainage Assessment
Final Report v1.0

Client Star UK PAS I Propco Limited (UK)

Date of issue 26 August 2022

Prepared by Matthew Newbold BSc (Hons) MSc GradCIWEM, *Graduate Flood Risk Consultant*
Michael Darby MEng (Hons) GradCIWEM GMICE, *Assistant Engineer*

Checked by Keely Bonser BSc (Hons) MSc PhD MCIWEM, *Director*
Tim Brook BSc (Hons) *Technical Director*

Approved by Kevin Tilford BSc (Hons) MSc (Eng) PhD MBA C.WEM FCIWEM CEnv *Managing Director*

This document has been prepared solely as a Flood Risk and Drainage Assessment for Star UK PAS I Propco Limited (UK). This report is confidential to Star UK PAS I Propco Limited (UK) and Weetwood Services Ltd accepts no responsibility or liability for any use that is made of this document other than by Star UK PAS I Propco Limited (UK) for the purposes for which it was originally commissioned and prepared.

Contents

Signature Sheet	i
Contents	ii
List of Tables, Figures & Appendices	iii
1 Introduction	1
1.1 Purpose of Report	1
1.2 Structure of the Report	1
1.3 Relevant Documents	1
2 Site Details and Proposed Development	2
2.1 Site Location	2
2.2 Existing and Proposed Development	2
2.3 Waterbodies in the Vicinity of the Site	2
2.4 Ground Conditions	3
2.5 Site Levels	3
3 Planning Policy and Guidance	5
3.1 National Planning Policy and Guidance	5
3.2 Local Planning Policy and Guidance	7
3.3 Environmental Permitting and Land Drainage Consent	8
4 Review of Flood Risk	9
4.1 Historical Records of Flooding	9
4.2 Flood Risk from Rivers and from the Sea	9
4.3 Flood Risk from Surface Water	10
4.4 Flood Risk from Reservoirs, Canals and Other Artificial Sources	11
4.5 Flood Risk from Groundwater	11
4.6 Sequential Test and Exception Test	11
4.7 Flood Risk Mitigation Measures	12
5 Surface Water Management	13
5.1 Surface Water Drainage at the Existing Site	13
5.2 Surface Water Drainage at the Developed Site	13
6 Summary and Recommendations	16

List of Tables

Table 1: Peak Runoff Rate - Existing Site.....	13
Table 2: Peak Discharge Rate - Proposed Site.....	14
Table 3: Maintenance Requirements.....	15

List of Figures

Figure 1: Site Location.....	2
Figure 2: Digital Terrain Model from LiDAR Data.....	4
Figure 3: Flood Map for Planning.....	9
Figure 4: Flood Risk from Surface Water	10
Figure 5: Flood Risk from Surface Water - Depth	11
Figure 6: Flood Risk from Surface Water - Velocity	11

List of Appendices

Appendix A: Existing Site Plan	
Appendix B: Development Proposals	
Appendix C: Topographic Survey	
Appendix D: Existing Site Drainage Details	
Appendix E: Greenfield Runoff Calculations	
Appendix F: Existing Surface Water Network Model	
Appendix G: Surface Water Attenuation - Storage Volume Calculations	
Appendix H: Preliminary Surface Water Drainage Layout	
Appendix I: Bypass Separator Drainage Details	

1 INTRODUCTION

1.1 Purpose of Report

Weetwood Services Ltd ('Weetwood') has been instructed by Star UK PAS I Propco Limited (UK) to undertake a Flood Risk and Drainage Assessment report to accompany a full planning application for the *“Proposed Extension to Existing Building and Use of the Building for Class E(g) and / or Class B2 and / or Class B8 Purposes”*, at the existing L'Oreal Facility on land off Roach Bank Road, Bury.

The application proposal is for development and uses that accord with the Council's local plan.

The assessment has been undertaken in accordance with the requirements of the revised National Planning Policy Framework (NPPF) updated on 27 July 2021 and the Planning Practice Guidance (PPG) updated on 20 August 2021.

1.2 Structure of the Report

The report is structured as follows:

- Section 1** Introduction and report structure
- Section 2** Background information relating to the development site
- Section 3** National and local flood risk and drainage planning policy
- Section 4** Potential sources of flooding to the development site and flood risk mitigation measures based on the findings of the assessment
- Section 5** Presents the effect of the proposed development on surface water runoff and presents an illustrative surface water drainage scheme
- Section 6** Presents a summary of key findings and the recommendations

1.3 Relevant Documents

The assessment has been informed by the following documents:

- Bury, Rochdale and Oldham Strategic Flood Risk Assessment, JBA Consulting, November 2009
- Bury Council Preliminary Flood Risk Assessment, JBA Consulting, May 2011
- Greater Manchester Surface Water Management Plan, JBA Consulting, January 2012

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The approximately 2.4 hectare (ha) site is located to the south of Roach Bank Road, south-east of Bury, approximately 0.5 km west of Junction 3 of the M66 at Ordnance Survey National Grid Reference SD 815 090, as shown in **Figure 1**.

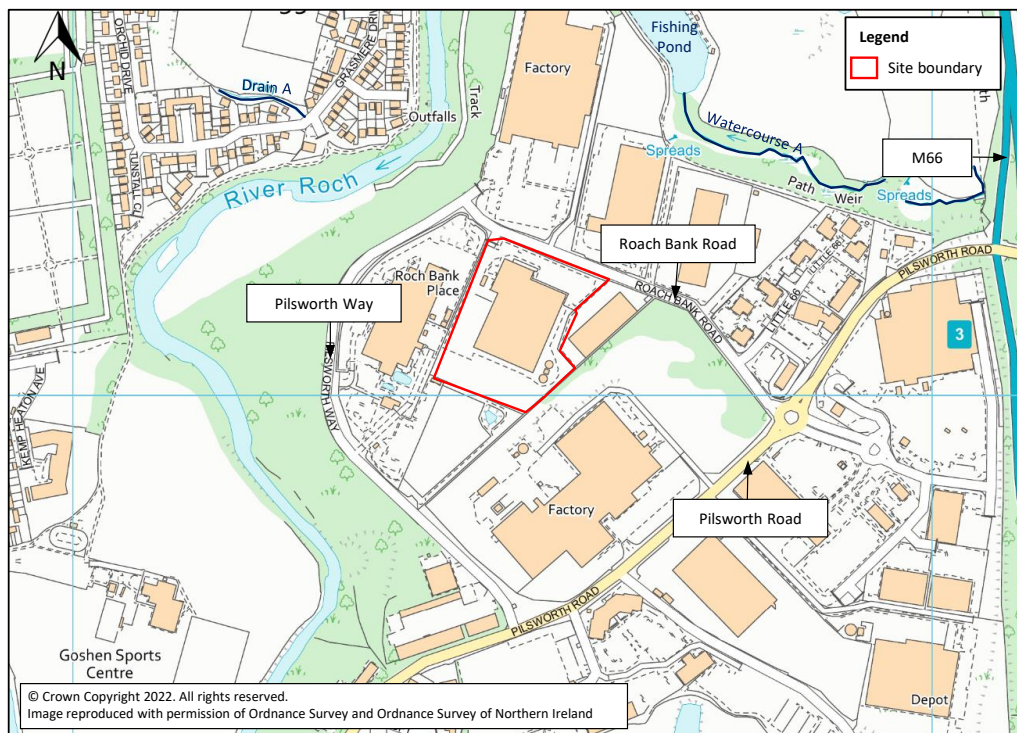


Figure 1: Site Location

2.2 Existing and Proposed Development

The site currently comprises a warehouse (88,920 sq ft) and associated car parking and hardstanding areas (**Appendix A**).

The proposals are for a 29,800 sq ft extension to the south of the existing building, with associated loading doors and service yard. Access and egress will continue to be provided via Roach Bank Road (**Appendix B**).

The PPG classifies commercial development (Class E(g) and / or Class B2 and / or Class B8) as Less Vulnerable to flood risk.

2.3 Waterbodies in the Vicinity of the Site

As per **Figure 1** the following waterbodies are indicated to be within the vicinity of the site:

- The River Roch flows predominantly in a southerly direction approximately 195 m north-west of the site.
- An un-named drain (Drain A) flows in a south-easterly direction and outfalls into the western bank (right) of the River Roch approximately 235 m north-west of the site.
- An un-named watercourse (Watercourse A) flows in a westerly direction approximately 250 m north-east of the site, before flowing into an unnamed fishing pond located 270 m north of the site.

According to the main river map the River Roch and Watercourse A are designated as main rivers.

The Environment Agency carries out maintenance, improvement and construction work on main rivers to manage flood risk. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses.

2.4 Ground Conditions

According to the Soilscape soils dataset produced by the Cranfield Soil and AgriFood Institute¹, soil conditions at the site and within the surrounding area are naturally wet very acid sandy and loamy soils.

British Geological Survey mapping of surface geology² indicates the underlying bedrock formation comprises Pennine Lower Coal Measures Formation (mudstone, siltstone, and sandstone), overlain by Devensian glacial deposits (diamicton).

A ground investigation was undertaken by RSA Geotechnics LTD in November 2003. The report indicates that the majority of the site is underlain by engineered fill consisting of compact and interlayered brown and grey firm to stiff sandy clay, clayey sandy gravels, and occasional boulder sized fragments of concrete, sandstone, and brick to a depth of 3.7 metres below ground level (m bgl). The engineered fill is underlain by glacial till to a depth of 11.4 m bgl, prior to lower coal measures being observed at the base of the boreholes to a maximum depth of 13.3 m bgl.

According to the MAGIC website³ the Devensian superficial deposits and underlying Pennine Lower Coal Measures Formation bedrock are classified as Secondary A aquifers. The site is not shown to be located within a designated groundwater source protection zone.

2.5 Site Levels

A topographic survey of the site has been undertaken by N D Oliver & Co and is provided in **Appendix C**. Site levels are indicated to range between 88.1 to 90.7 metres Above Ordnance Datum (m AOD) with levels rising towards the north of the site.

Access and egress is provided via Roach Bank Road along which levels fall east to west from 90.1 m AOD to 87.5 m AOD.

LiDAR data has been used to develop a digital terrain model of the site and surrounding area as illustrated in **Figure 2**.

¹ www.landis.org.uk/soilscape/

² <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

³ <https://magic.defra.gov.uk/MagicMap.aspx>

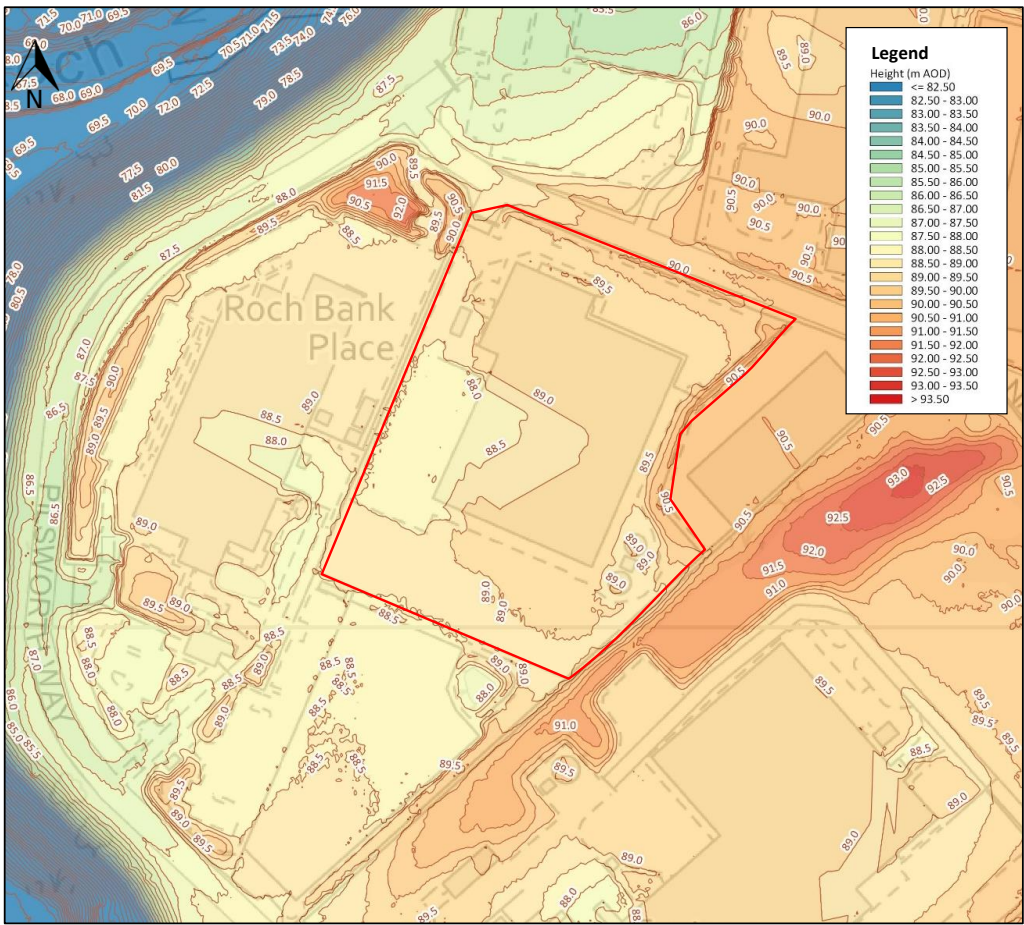


Figure 2: Digital Terrain Model from LiDAR Data

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Guidance

The thrust of national planning policy, as articulated in the NPPF is that inappropriate development in areas at risk of flooding should be avoided where possible, as summarised below:

- Inappropriate development in areas at risk of flooding should be avoided and that development should be directed away from areas at highest risk (whether existing or future), but where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere (NPPF para. 159).
- The policy of seeking to steer development to areas with the lowest risk of flooding, from any source, is implemented through the application of the flood risk sequential test. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development in areas with a lower risk of flooding. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding (NPPF para. 162).
- If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives) the exception test may have to be applied. The need for the test will depend on the potential vulnerability of the site and of the vulnerability of the development proposed (as set out in Annex 3 of NPPF; also PPG Table 2 and Table 3) (NPPF para. 163). For example, the exception test need not be applied for less vulnerable development in any flood zone, or for more vulnerable development in flood zones 1 or 2.
- Where the exception test must be applied, application of the test for development proposals at the application stage should be informed by a site-specific flood risk assessment. For the test to be passed it should be demonstrated that: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; (b) and the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall (NPPF para. 164). Both elements of the test should be satisfied for the development to be permitted (NPPF para. 165).
- Development should not increase flood risk elsewhere (NPPF para. 167).
- Where appropriate, planning applications should be supported by a site-specific flood risk assessment, and development should only be allowed in areas at risk of flooding where the flood risk assessment (and the sequential and exception tests, as required), demonstrate that: a) within the site, the most vulnerable development is located in areas of lowest flood risk (unless there are overriding reasons to prefer a different location); b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment; c) the development incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual (flood) risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan (NPPF para.167).
- NPPF para. 167 references Footnote 55. The footnote states that a site-specific flood risk assessment should be provided for all development in flood zones 2 and 3 [whilst] in flood zone 1, an assessment should accompany all proposals involving: sites of 1 ha or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use (NPPF para. 167).
- Applications for some minor development and changes of use should not be subject to the sequential or exception tests (NPPF para. 168). The exceptions are stated in Footnote 56.

Guidance on application of the sequential and exception test is provided in the PPG. For example:

- This general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high flood risk areas (flood zones 2 and 3) and other areas affected by other sources of flooding where possible (PPG para. 18).
- Where there are no reasonably available sites in flood zone 1, local planning authorities in their decision making should take into account the flood risk vulnerability of land uses and consider reasonably available sites in flood zone 2 (areas with a medium probability of river or sea flooding), applying the Exception Test if required. Only where there are no reasonably available sites in flood zones 1 or 2 should the suitability of sites in flood zone 3 (areas with a high probability of river or sea flooding) be considered, taking into account the flood risk vulnerability of land uses and applying the exception test if required. Within each flood zone, surface water and other sources of flooding also need to be taken into account in applying the sequential approach to the location of development (PPG para. 19).
- The sequential test does not need to be applied for individual developments on sites which have been allocated in development plans through the sequential test, or for applications for minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site) (PPG para. 33)
- It should not normally be necessary to apply the sequential test to development proposals in flood zone 1, unless the Strategic Flood Risk Assessment for the area, or other more recent information, indicates there may be flooding issues now or in the future (for example, through the impact of climate change) (PPG para. 33).
- For individual planning applications where there has been no sequential testing of the allocations in the development plan, or where the use of the site being proposed is not in accordance with the development plan, the area to apply the sequential test across will be defined by local circumstances relating to the catchment area for the type of development proposed. For some developments this may be clear, for example, the catchment area for a school. In other cases it may be identified from other Local Plan policies, such as the need for affordable housing within a town centre, or a specific area identified for regeneration. For example, where there are large areas in flood zones 2 and 3 (medium to high probability of flooding) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives (PPG para. 33).
- When applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.
- Any development proposal should take into account the likelihood of flooding from other sources, as well as from rivers and the sea. The sequential approach to locating development in areas at lower flood risk should be applied to all sources of flooding, including development in an area which has critical drainage problems, as notified to the local planning authority by the Environment Agency, and where the proposed location of the development would increase flood risk elsewhere (PPG para. 33).

Non-statutory technical standards for sustainable drainage published by DEFRA in March 2015 set out how surface water runoff generated during the present day 1 in 30 and 1 in 100 AEP rainfall events and for events exceeding the present day 1 in 100 AEP event should be managed, how peak runoff rates should be restricted and how runoff volumes should be controlled.

3.2 Local Planning Policy and Guidance

3.2.1 Bury Local Plan

The Bury Local Plan Policy Directions was submitted for consultation in October 2018. The Local Plan will form a key part of Bury's overall development plan and, once adopted, these documents will both be used as the basis for determining future proposals for the next 20 years.

The following proposed policy direction is relevant in respect of flood risk and drainage:

Policy Direction OP5; Flood Risk Management

The Policy Direction states *"It is proposed that the Local Plan should include a policy that seeks to manage flood risk from all sources by ensuring that new development complies with the flood risk management hierarchy and is not subject to unacceptable levels of risk, does not result in increased flood risk elsewhere and, where possible, achieves reductions in flood risk overall."*

In addition, it should seek to ensure that all new development proposals minimise the impact of development on surface water run-off, and where possible, seek to reduce it."

3.2.2 Bury Unitary Development Plan

The Bury Unitary Development Plan (UDP) was adopted in August 1997 and currently acts as a guide for the future development or protection of land in the Borough.

The following policies are relevant in respect of flood risk and drainage:

Policy EN5; Flood Protection and Defence

The policy states that *"The Council will seek to control development in a manner consistent with flood protection and the maintenance of flood defence systems."*

Policy EN5/1; New Development and Flood Risk

The policy states that *"The Council will not permit new development, including the raising of land and the intensification of development, where such development would be at risk from flooding, would be likely to increase the risk of flooding elsewhere, or would adversely affect river flood defences. When assessing proposals against this policy, the following criteria will apply:*

- *The impact on the flood plain;*
- *The increase in surface water run-off as a result of the proposal;*
- *The impact on fluvial flood defences;*
- *The incorporation of mitigating works."*

EN7/5; Waste Water Management

The policy states that *"In seeking to limit surface water pollution the Council will not permit development which:*

- *does not have satisfactory arrangements for the disposal of foul sewage, trade effluent and contaminated surface water;*
- *will exacerbate existing problems, such as premature or increased frequency of discharges through storm sewer overflows due to inadequate infrastructure or lack of sewer capacity;*
- *would present an unacceptable risk of spillage or leakage of stored oils/chemicals or other potentially polluting substances."*

3.3 Environmental Permitting and Land Drainage Consent

Under the Environmental Permitting (England and Wales) Regulations 2016 an Environmental Permit for Flood Risk Activities⁴ is required from the Environment Agency for any permanent or temporary works, including works:

- In, over or under a designated main river
- Within 8 m of the top of bank of a designated main river or of the landward toe of a flood defence (16 m if it is a tidal main river or a sea defence).

In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. A permit is separate to and in addition to any planning permission granted.

Land drainage consent may be required from the lead local flood authority or drainage board for work to an ordinary watercourse.

Undertaking activities controlled by local byelaws also requires the relevant consent.

⁴ <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

4 REVIEW OF FLOOD RISK

4.1 Historical Records of Flooding

The Environment Agency historic flood map⁵ indicates that there are no records of flooding at the site.

4.2 Flood Risk from Rivers and from the Sea

The Environment Agency Flood Map for Planning (Rivers and Sea)⁶ (**Figure 3**) indicates the site to be located in flood zone 1. Table 1 of the PPG defines flood zones as follows⁷:

- Flood zone 1: Low Probability. Land having a less than 1 in 1,000 annual probability of river or sea flooding
- Flood zone 2: Medium Probability. Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding
- Flood zone 3a: High Probability. Land having a 1 in 100 or greater annual probability of river flooding or a 1 in 200 or greater annual probability of sea flooding
- Flood zone 3b: Functional Floodplain. Land where water has to flow or be stored in times of flood.

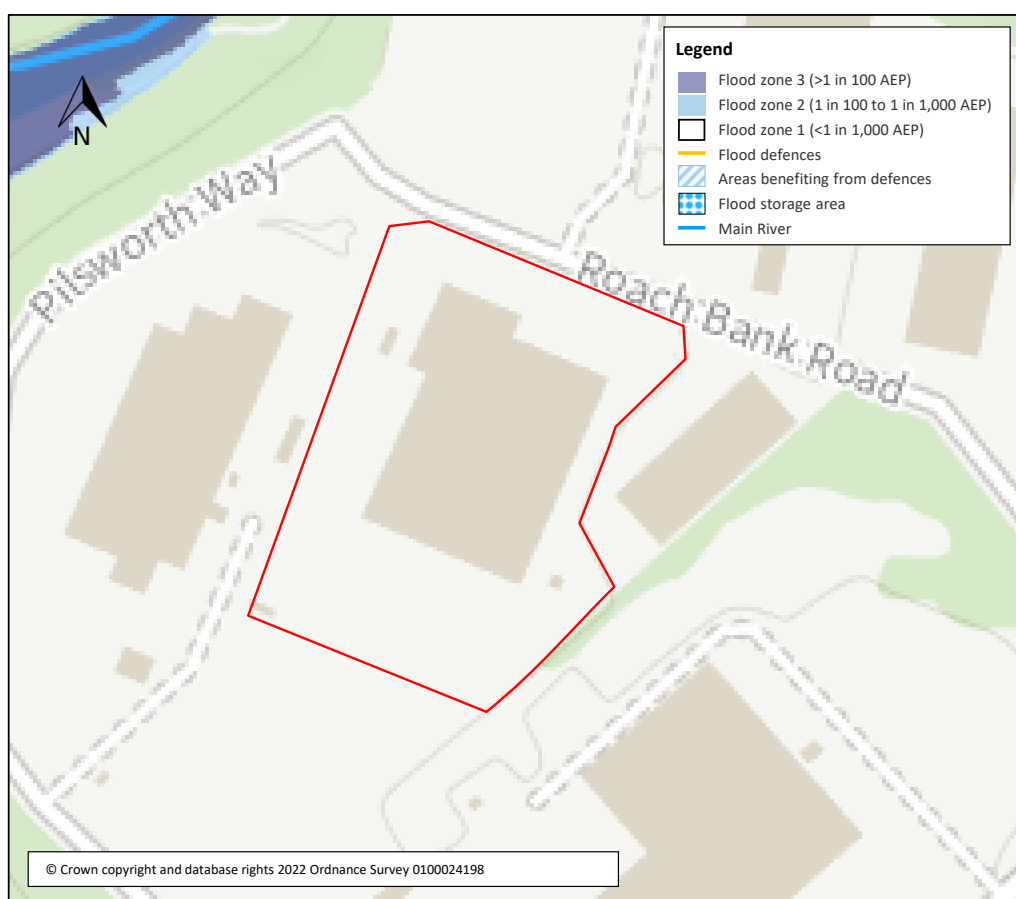


Figure 3: Flood Map for Planning

Source: gov.uk website; Accessed: August 2022

⁵ <https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map>

⁶ <https://flood-map-for-planning.service.gov.uk/>

⁷ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables>

4.2.1 The River Roch

As detailed in **Section 2.3**, the River Roch is located approximately 195 m to the west of the site. Ground levels adjacent to the River Roch are in the region of 70.0 m AOD; this is approximately 18.1 m lower than the lowest point surveyed at the site, and therefore, the site is assessed as not being at risk of flooding from the River Roch.

4.2.2 Watercourse A

As detailed in **Section 2.3**, Watercourse A is located approximately 250 m north-east of the site. The site is located approximately 5.1 m above ground levels adjacent to Watercourse A, and is therefore assessed as not being at risk of flooding from Watercourse A.

4.3 Flood Risk from Surface Water

Environment Agency mapping of Flood Risk from Surface Water (**Figure 4 to 6**) indicates that the risk of surface water flooding is generally Very Low, albeit with the potential for surface water to pond around the existing building during the medium frequency/medium severity (1 in 100 AEP) rainfall event and the low frequency/high severity (1 in 1,000 AEP) event. The mapping also indicates that an overland flow pathway may develop along the west and south boundaries of the site during the low frequency/high severity (1 in 1,000 AEP) event.

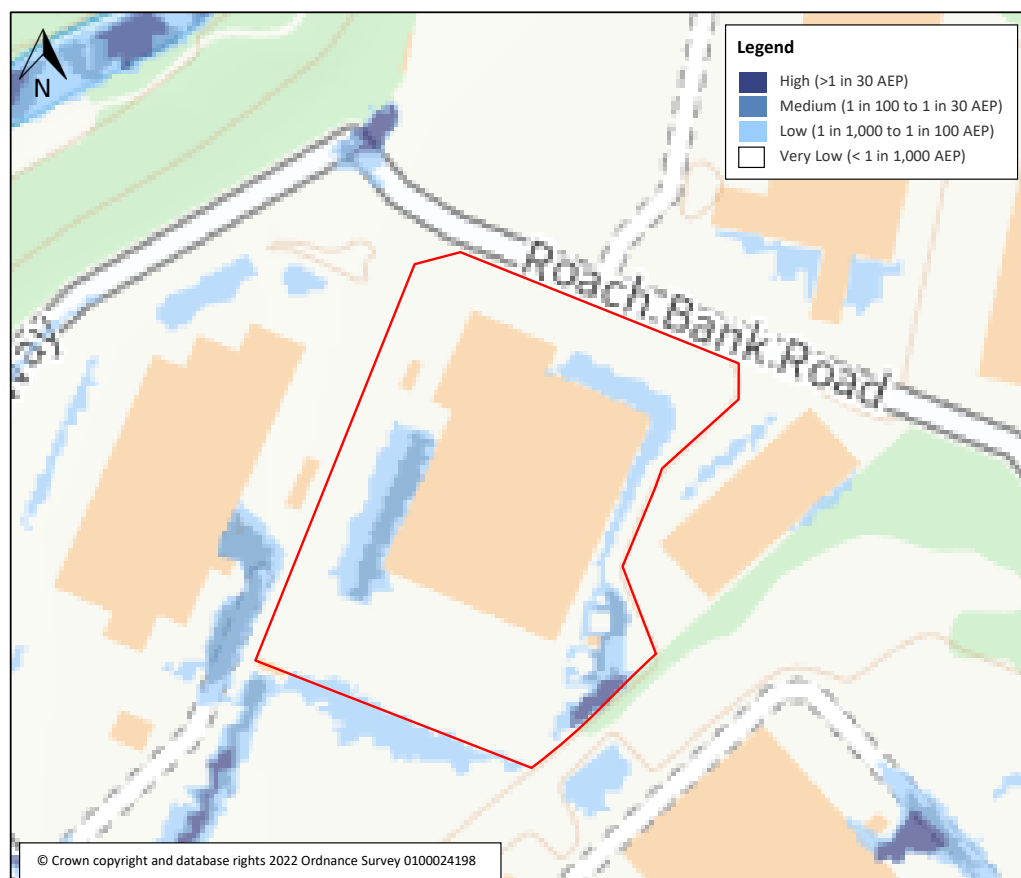


Figure 4: Flood Risk from Surface Water

Source: gov.uk website; Accessed: August 2022

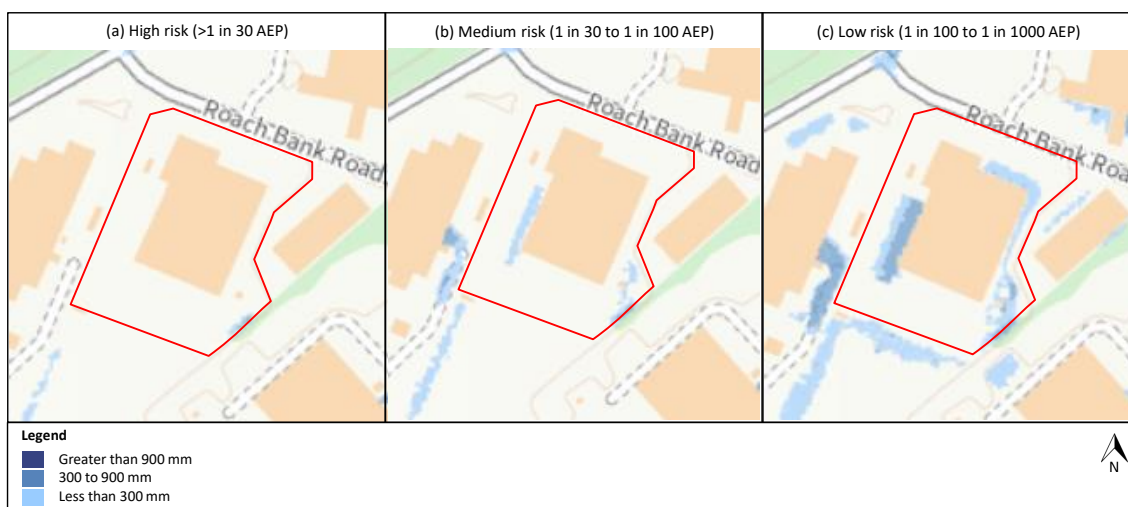


Figure 5: Flood Risk from Surface Water - Depth

Source: gov.uk website; Accessed: August 2022

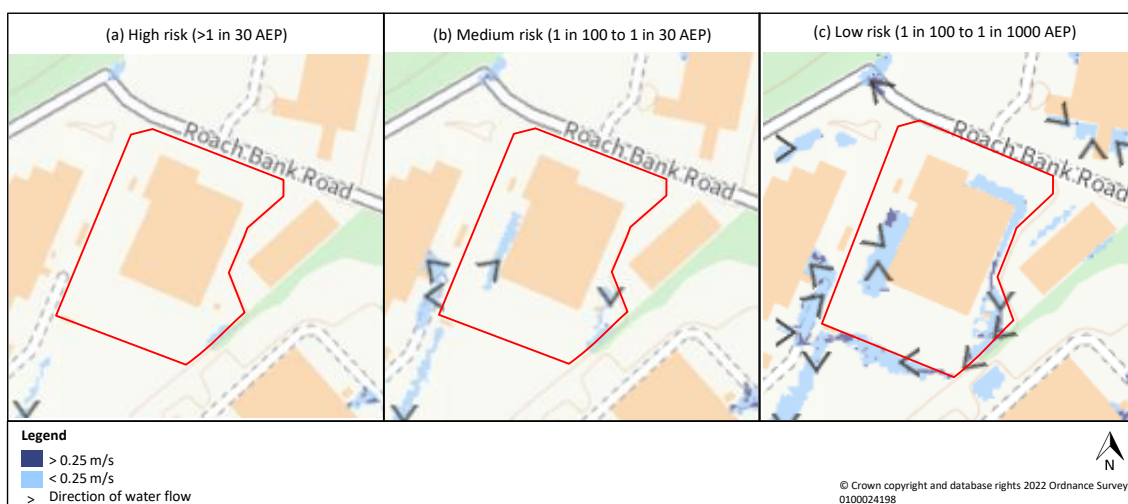


Figure 6: Flood Risk from Surface Water - Velocity

Source: gov.uk website; Accessed: August 2022

4.4 Flood Risk from Reservoirs, Canals and Other Artificial Sources

There are no canals or other impounded waterbodies located within the immediate vicinity of the site. The Flood Risk from Reservoirs map indicates that the site is not at risk of flooding from such sources. The site is therefore assessed to not be at risk of flooding from reservoirs, canals or other artificial sources.

4.5 Flood Risk from Groundwater

The JBA Groundwater Flood Risk Indicator map indicates that the site is not a risk of flooding from groundwater sources.

4.6 Sequential Test and Exception Test

The site is located within flood zone 1 and is at low/negligible risk of flooding from other sources. As such the proposals satisfy the requirements of the sequential test and the exception test need not be applied. Nevertheless, the proposals are still required to meet the requirements for site specific flood risk assessments.

4.7 Flood Risk Mitigation Measures

The risk of flooding to the proposed development from surface water would be mitigated by raising finished floor levels a minimum of 0.15 m above adjacent ground levels following any reprofiling of the site.

If this is not achievable due to the need for the finished floor levels of the extension to tie onto the finished floor levels of the existing unit, then the adjacent ground should slope away from the extension as far as is feasible.

This measure will, subject to the implementation of an appropriately designed surface water drainage scheme (**Section 5**), enable any potential overland flows to be conveyed safely across the site without affecting property in accordance with the approach promoted by government policy, without affecting the proposed development.

5 SURFACE WATER MANAGEMENT

5.1 Surface Water Drainage at the Existing Site

Drainage plans prepared by Burks Green in November 2004 (**Appendix D**) indicate that surface water runoff from the site discharges into the River Roch via 525 mm and 750 mm diameter surface water sewers located in Roach Bank Road and land north-west of Pilsworth Way.

Impermeable hardstanding at the facility is directed to a bypass separator and roof runoff discharges downstream of the separator before entering the 525 mm diameter surface water sewer in Roach Bank Road.

The site has a total area of 2.42 ha of which 1.47 ha currently comprises impermeable areas and 0.95 ha permeable areas. The greenfield runoff rate for the site has been calculated using the ICP SUDS method within MicroDrainage. Details of the input parameters and the output results are provided in **Appendix E**.

Runoff rates from existing impermeable areas have been modelled using the Network module of MicroDrainage (**Appendix F**) based on the Burks Green drainage plans. The runoff rates from the existing site are presented in **Table 1**.

Table 1: Peak Runoff Rate - Existing Site

AEP of rainfall event	Greenfield Runoff Rate l/s/ha	Impermeable Runoff Rate 1.47 ha (l/s)
1 in 1	6.6	158.4
QBAR/1 in 2	7.6	205.6
1 in 30	12.9	378.4
1 in 100	15.8	480.1

5.2 Surface Water Drainage at the Developed Site

5.2.1 Disposal of Surface Water

In accordance with the PPG⁸, surface water runoff should be disposed of according to the following hierarchy: Into the ground (infiltration); To a surface water body; To a surface water sewer, highway drain, or another drainage system; To a combined sewer.

As detailed in **Section 2.4** the site is underlain by soils with impeded drainage. In addition, the site investigation undertaken in 2003 determined that beneath the thick layer of made ground, there is the presence of shallow groundwater within the superficial geology. As such the disposal of surface water via infiltration is unlikely to be feasible.

It is subsequently proposed to direct all runoff from the proposed extension to the existing surface water sewers within the site that discharge ultimately to the River Roch.

5.2.2 Post Development Impermeable Area

The proposed roof extension is 0.32 ha and the proposed hardstanding area is 0.11 ha, based on the development proposals in **Appendix B**. The total area of impermeable surfaces within the site has been calculated to increase to approximately 1.89 ha.

5.2.3 Peak Flow Control

It is proposed to restrict surface water runoff from the proposed roof extension to the existing greenfield QBAR rate of 7.6 l/s/ha post development, as outlined in **Appendix E**. As such the additional 0.32 ha of roof area runoff will be restricted to 2.4 l/s discharge.

⁸ Paragraph 080, Reference ID: 7-080-20150323

It is not feasible to restrict the proposed hardstanding to QBAR given the existing drainage constraints at the site, e.g. shallow channel drainage and site levels. It is therefore proposed to restrict runoff from the proposed hardstanding area by introducing a 188 mm diameter orifice plate within existing manhole S12. This will ensure that discharge rates downstream do not exceed existing rates, refer to **Table 2** below.

Table 2: Peak Discharge Rate - Proposed Site

AEP of rainfall event	Existing Discharge Rate 1.47 ha (l/s)	Proposed Discharge Rate 1.89 ha (l/s)
1 in 1	158.4	155.6
1 in 30	378.4	378.1
1 in 100	480.1	471.0

5.2.4 Volume Control

Where reasonably practicable, for sites which have been previously developed, the runoff volume from the proposed development to any highway drain, sewer or surface water body in the 1 in 100 AEP, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

As outlined within the CIRIA SuDS Manual 2015 extra runoff volumes in extreme events may be managed by releasing all runoff (above the 1 in 1 AEP event) from the site at a maximum rate of 2 l/s/ha or QBAR, whichever is the higher value.

It is therefore proposed to restrict peak discharge rates from the proposed roof extension to the greenfield QBAR rate in up to the 1 in 100 annual probability event, including an allowance for climate change. Peak runoff rates from the additional hardstanding areas has been limited as far as reasonably practicable.

5.2.5 Attenuation Storage

Attenuation storage will be provided to restrict surface water runoff generated across the new roof and hardstanding.

The attenuation storage facility has been modelled using the Network module of MicroDrainage (**Appendix G**). The required storage volume has been sized to store the 1 in 100 AEP rainfall event including a 45% increase in rainfall intensity to allow for climate change in accordance with Environment Agency guidance⁹.

The additional 0.32 ha of roof area will be restricted to a peak discharge rate of 2.4 l/s, which would require a total storage volume of 232.6 m³. The storage volume could be accommodated within two geo-cellular storage tanks, with a combined area of 610 m² and a depth of 0.4 m.

The additional 0.11 ha of hardstanding would drain via an extended channel drain. With the introduction of a 188 mm diameter orifice plate, approximately 54.3 m³ of flooding occurs during the 1 in 100 AEP plus 45% allowance for climate change event. A flood depth of 60 mm over approximately 950 m² would be contained on the surface, within the loading bay area.

A preliminary surface water drainage layout is provided in **Appendix H**.

5.2.6 Exceedance Routes

Flows resulting from rainfall in excess of the 1 in 100 AEP rainfall event including an allowance for climate change will be managed in exceedance routes. It is assumed that as the development proposals progress, the design of the site would ensure flood flows are directed away from built development.

⁹ Flood Risk Assessments: climate change allowances (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>)

5.2.7 Pollution Control

The CIRIA SuDS Manual¹⁰ and Table G3.1 of the Statutory Standards for SuDS identifies commercial roofs and approaches to industrial estates as having low and high pollution hazard levels respectively.

Table 26.2 of the CIRIA SuDS Manual 2015 indicates that the pollution hazard indices associated with such uses for total suspended solids, metals and hydrocarbons are 0.30, 0.20 and 0.05, and 0.80, 0.80 and 0.90 for commercial roofs and approaches to industrial estates respectively.

The existing bypass separator will continue to provide water quality treatment prior to surface water runoff from hardstanding areas discharging off site. The existing bypass separator, Conder NS 15/1 (**Appendix I**), can accommodate a drainage area of 8,333 m². The unit previously served a drainage area of approximately 6,800 m² and can therefore accommodate the additional 1,060 m² of proposed hardstanding.

Additional SuDS features are not considered feasible at this stage due to the presence of high groundwater levels and the development extents.

5.2.8 Adoption and Maintenance of SuDS

SuDS elements within the site would be the responsibility of the owner of the property. An indicative maintenance schedule is presented in **Table 3**.

Table 3: Maintenance Requirements

Schedule	Required action	Frequency
Geo-cellular attenuation tank		
Regular maintenance	Inspect and identify any areas that are not operating correctly	Monthly for 3 months, then annually
	Remove debris from the catchment surface	Monthly
	Remove sediment from internal forebays	Annually, or as required
Remedial action	Repair inlet/outlet and vents	As required
Monitoring	Inspect inlet/outlet and vents to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years, or as required
Flow Control Unit		
Routine maintenance	Remove litter and debris and inspect for sediment accumulation	Six Monthly
	Remove sediment from sump	As necessary – Indicated by system inspections
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six Monthly
	Inspect flow control unit and establish appropriate replacement frequencies	Six Monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first year of operation, then every six months

¹⁰ Table 26.2

6 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Star UK PAS I Propco Limited (UK) and relates to the proposed redevelopment of the existing L’Oreal Facility, Roach Bank Road, Bury.

According to the Flood Map for Planning the proposed development is located outside the 1 in 1,000 AEP flood outline and is therefore defined by the NPPF as being situated within flood zone 1.

As the site is in flood zone 1, the sequential test is deemed to have been addressed and the exception test need not be addressed.

The site is indicated to not be at risk of fluvial flooding, from reservoirs, canals or other artificial sources or from groundwater.

The Flood Risk from Surface Water map indicates potential areas of surface water accumulation adjacent to the existing building, however, it is assessed that there is very low risk of surface water flooding in the location of the proposed development.

The proposed development is not expected to impact flood risk elsewhere and access and egress to the site should remain dry in all aforementioned storm events.

This report has demonstrated that the proposed development may be completed in accordance with the requirements of planning policy subject to the following:

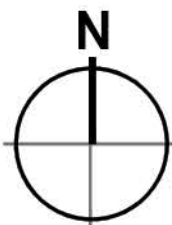
- Either finished floor levels to be set 0.15 m above adjacent ground levels, or ground to slope away from the extension as far as is feasible.
- The detailed drainage design to be submitted to and approved by the local planning authority prior to the commencement of development

APPENDIX A

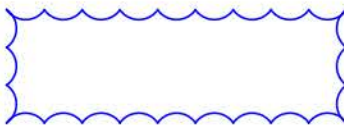
Existing Site Plan



Existing Site Layout Scale 1:500



- Dimensions are in millimeters, unless stated otherwise.
- Scaling of this drawing is not recommended.
- It is the recipient's responsibility to print this document to the correct scale.
- All relevant drawings and specifications should be read in conjunction with this drawing.

 - Layout to be confirmed

C1  - Revision reference

SCHEDULE OF ACCOMMODATION

Unit 1	
Warehouse Area	- 75,354 sq ft (7,000m²)
Office Area	- 13,566 sq ft (1,260m²)
Total GIA	- 88,920 sq ft (8,260m²)
(above areas taken from the scheme requirements document)	
Loading Docks	- 11
Level Access	- 2
Car Parking	- 90
Site Area	- 5.76 Acres (2.33 Hectares)

A	Initial Issue	LF	DEB	25.07.22
rev	amendments	by	ckd	date

Unit 3 - Pilsworth Ind Est

Existing Site Plan



Drawing Status:		Feasibility	
Drawn / Checked:	LF / DEB		
Date:	25.07.2022		
Scale:	1:500	A1	
Drawing no:		Revision:	
21663	F0001	A	



APPENDIX B

Proposed Site Plan



Proposed Site Layout Scale 1:500



- Dimensions are in millimeters, unless stated otherwise.
- Scaling of this drawing is not recommended.
- It is the recipient's responsibility to print this document to the correct scale.
- All structural drawings and specifications should be read in conjunction with this drawing.

- Layout to be confirmed

C1 - Revision reference

SCHEDULE OF ACCOMMODATION

Unit 1	
Warehouse Area	- 75,354 sq ft (7,000m ²)
Office Area	- 13,566 sq ft (1,260m ²)
Warehouse Expansion	- 33,000 sq ft (3,095m ²)
Total GIA	- 121,919 sq ft (11,325m²)
(above areas taken from the scheme requirements document)	
GEA (Warehouse Expansion)	- 34,220 sq ft (3,179m²)
Loading Docks	- 10
Level Access	- 2
Car Parking	- 90
Site Area	- 5.97 Acres (2.41 Hectares)

B Areas increased to suit latest site plan C:ED DEB 04.08.22

A Initial Issue LF DEB 25.07.22
rev amendments by chd date

Unit 3 - Pilsworth Ind Est

Proposed Site Plan



Network Division, Carlisle Way, Newark, Nottinghamshire NG24 2TN
+44 (0)1663 650221 - info@umcarchitects.com

Drawing Status: Feasibility
Drawn / Checked: LF / DEB
Date: 25.07.2022
Scale: 1:500 A1

Drawing no: 21663 F0002
Revision: B

10m SCALE 1:500

APPENDIX C

Topographic Survey



NOTES

KEY

Grid & Datum - Local Plane Grid related to OS National Grid & Datum
By GNSS RTK Observations

STANDARD ABBREVIATIONS

STRUCTURE

[illegible][illegible][illegible]

SYMBOLS

	HEDGE		GATE		BUILDING
	THREE CANOPY		CONTROL STATION		
	TREE				

SHEET LAYOUT



Rev	Date	Drawn	Descriptive	Check	As



Jupiter House, 21 Roebuck Lane, Sale, Manchester, M33 7SY
T: 0161 973 3495 F: 0161 962 6819
E: mail@ndoliver.com www.ndoliver.com

Client

SAVILLS
3 WELLINGTON PLACE
LEEDS
LS1 4AP

Title	Date	Page

UNIT 3 (L'OREAL DISTRIBUTION CENTRE)
PILSWORTH INDUSTRIAL ESTATE
ROACH BANK ROAD, BURY
TOPOGRAPHICAL SURVEY
SHEET 1 OF 2

Surveyed	PG	Drawn	PG	Drawn Date
Checked	JP	Approved	NDD	08/07/2022
Scale 1:250 @ A1		Project 11903 CAD File 11903_001.dwg		Status ORIGINAL
Drawing No.		11903 / 001 / 1		Rev 0

APPENDIX D

Existing Site Drainage Details

notes :

1. IF THIS DRAWING HAS BEEN RECEIVED ELECTRONICALLY
IT IS THE RECIPIENTS RESPONSIBILITY TO PRINT THE
DOCUMENT TO THE CORRECT SCALE
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS
STATED OTHERWISE. IT IS RECOMMENDED THAT
INFORMATION IS NOT SCALED OFF THIS DRAWING
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION
WITH ALL OTHER RELEVANT DRAWINGS AND
SPECIFICATIONS

key :

- 150mm Ø

150mm Ø

150mm Ø

SURFACE WATER DRAIN

SURFACE WATER
ROOF DRAIN

FOUL WATER DRAIN
- ●

⊠

□

■

G

○ RWP

○ RE

○ SVP

CL

SL

IL

BD

○ SRWP

SURFACE WATER MANHOLE

FOUL WATER MANHOLE

LAND DRAIN MANHOLE

CATCHPIT MANHOLE

GULLY

RAINWATER PIPE

RODDING EYE

SOIL VENT PIPE

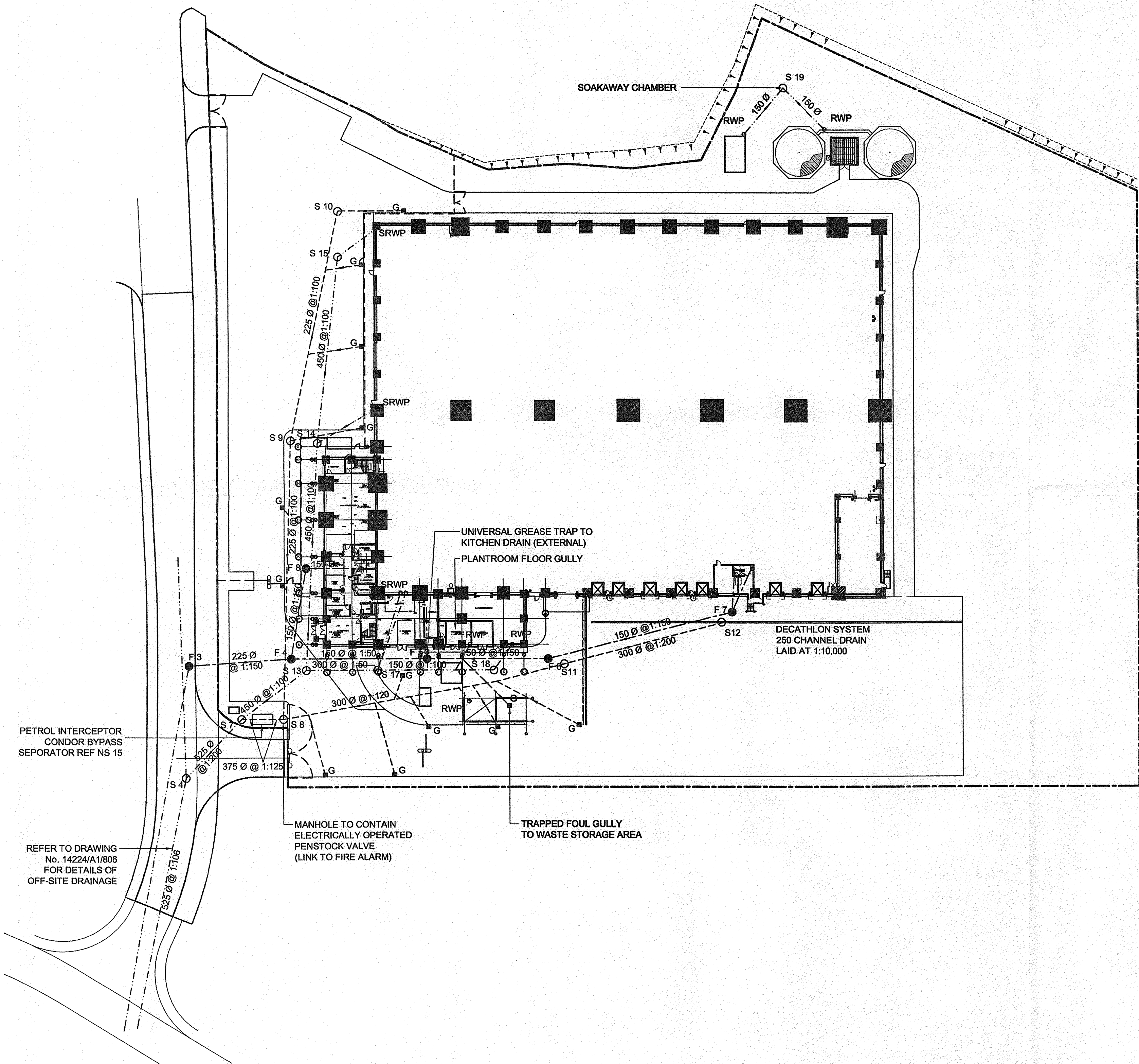
COVER LEVEL

SOFFIT LEVEL

INVERT LEVEL

BACK DROP

SIPHONIC RAINWATER PIPE



MANHOLE SCHEDULE							
MANHOLE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH (m)	TYPE	CHAMBER DIAMETER (mm)	COVER TYPE	COMMENTS
S 4	88.518	86.145	2.373	B	1500	D400	
S 7	89.150	86.225 (5250 OUT) 86.790 (4500 IN)	2.925	B	1200	B125	
S 8	89.250	88.515 (3750 OUT) 87.110 (2250 IN)	2.735	B	1350	B125	PENSTOCK CHAMBER
S 9	89.500	87.650	1.850	B	1200	B125	
S 10	89.100	88.100	1.000	B	1200	C250	
S 11	88.800	87.040	1.760	B	1200	D400	
S 12	87.950	87.200	0.750	B	1200	D400	
S 13	89.100	86.940 (4500 OUT) 87.237 (3000 IN)	1.600	B	1350	C250	
S 14	89.350	87.380	1.970	B	1350	C125	
S 15	89.100	87.750	1.350	B	1350	C250	VENTED COVER
S 16	DELETED	DELETED	DELETED	DELETED	DELETED	DELETED	DELETED
S 17	89.100	87.520	1.580	E	1200	B125	VENTED COVER
S 18	88.900	87.900	1.000	B	1200	D400	VENTED COVER
S 19	88.400	87.200 MIN	1.200MIN	N/A	2400	B125	SOAKAWAY CHAMBER
F 3	88.955	86.302	2.653	B	1200	D400	
F 4	89.100	86.510	2.590	B	1200	C250	
F 5	89.100	86.690	2.410	B	1200	B125	
F 6	88.800	86.850	1.950	B	1200	D400	
F 7	88.000	87.100	0.900	B	1200	D400	
F 8	89.250	86.630	2.620	B	1200	B125	

NOTE:
INVERT LEVELS GIVEN
ARE FOR THE LOWEST
PIPE IN MANHOLES

D

Status Amended

GB

17.11.2004

C

Status amended
Drainage layout revised to contractors
comments. Manhole schedule updated.

GB

28.03.2004

B

1. Positions of Smoker's Shelter, Gas Meter
House and Generator House amended

GD

18.12.2003

A

Drainage layout and levels revised
in loading dock area

GB

02.12.2003

rev

amendments

by

date

burksgreen

Burks Green
Sherwood House,
Newark, Nottinghamshire,
NG24 1QQ

T +44 (0) 1636 605 700
F +44 (0) 1636 610 696
W www.burksgreen.com
E mail@burksgreen.com

Client:

Bowmer
& Kirkland
Limited

Project:

Roach Bank Farm

Title:

Co-ordinated Drainage Layout

Drawing Status:

Final Issue

Date Created:

14.10.2003

Drawing Scale:

1:500

Drawing Number:

14224 /A1 / 310

Rev:

D

Project Leader:

DD

Drawn By:

DW

Initial Review:

GB

FINAL ISSUE

notes :

1. IF THIS DRAWING HAS BEEN RECEIVED ELECTRONICALLY IT IS THE RECIPIENTS RESPONSIBILITY TO PRINT THE DOCUMENT TO THE CORRECT SCALE
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE IT IS RECOMMENDED THAT INFORMATION IS NOT SCALED OFF THIS DRAWING
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS

MANHOLE SCHEDULE							
MANHOLE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH (m)	TYPE	CHAMBER DIAMETER (mm)	COVER TYPE	COMMENTS
S 2	86.700	84.679	2.021	B	1800	B125	
S 3	87.554	84.795	2.759	B	1500	D400	
F 1A	86.700	83.240	3.460	A	1200	B125	
F 1	86.700	83.740	2.960	B	1200	B125	
F 2	87.489	84.000	3.489	A	1200	D400	

NOTE:
INVERT LEVELS GIVEN
ARE FOR THE LOWEST
PIPE IN MANHOLES

KEY - DRAINAGE

- FOUL WATER DRAINAGE
- HIGHWAY DRAINAGE
- SURFACE WATER DRAINAGE

H	Status Amended	GB	17.11.2004
G	Drainage System Revised from MH S2 to River outfall Manhole S2 levels and pipe diameter revised	GB	01.10.2004
F	Surface water drainage route revised between MH S1 to S3.	GB	09.09.2004
E	Drainage layout revised.	GB	23.04.2004
D	Status amended. Manhole schedule added. Outfall head-wall detail deleted. Foul drainage levels revised.	GB	29.03.04
C	Section A-A added.	GB	30.12.2003
B	Outfall detail added. Drainage revised to Bury MBC comments.	GB	25.11.2003
A	F4 - F3, F3 - F2 & S5 - S4 amended. Unit 4 Spurs added.	DJW	21.10.2003

rev	amendments	by	date
-----	------------	----	------

burksgreen

Burks Green
Sherwood House,
Newark, Nottinghamshire,
NG24 1QQ

T +44 (0) 1636 605 700
F +44 (0) 1636 610 696
W www.burksgreen.com
E mail@burksgreen.com

Client:



Project:

Roach Bank Farm

Title:

Overall Site Drainage

Drawing Status:	Date Created:	Drawing Scale:
Final Issue	09.10.2003	1:500

Drawing Number	Rev
14224 /A1 / 806	H

Project Leader:	Drawn By:	Initial Review:
TG	GD	GB

FINAL ISSUE

10m SCALE 1:500

APPENDIX E

Greenfield Runoff Calculations

Weetwood		Page 1
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 09/08/2022 12:44 File	Designed by MichaelDarby Checked by	
XP Solutions Source Control 2020.1		
<u>ICP SUDS Mean Annual Flood</u> Input Return Period (years) 100 Soil 0.450 Area (ha) 1.000 Urban 0.000 SAAR (mm) 1118 Region Number Region 10 Results l/s QBAR Rural 7.6 QBAR Urban 7.6 Q100 years 15.8 Q1 year 6.6 Q30 years 12.9 Q100 years 15.8		
©1982-2020 Innovyze		

APPENDIX F

Existing Surface Water Network Model

Weetwood		Page 1
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 5655 Ex SW Network revA

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.304	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for 5655 Ex SW Network revA

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.037	4-8	0.433

Total Area Contributing (ha) = 1.470

Total Pipe Volume (m³) = 30.789

Network Design Table for 5655 Ex SW Network revA

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
S1.000	29.136	0.160	182.1	0.250	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	56.343	0.450	125.2	0.130	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	42.760	0.450	95.0	0.200	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	53.904	0.540	99.8	0.100	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	7.515	0.060	125.0	0.000	0.00	0.0	0.600	o	375	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)
S1.000	50.00	5.42	87.200	0.250	0.0	0.0	0.0	1.16	82.1	33.9
S1.001	50.00	6.09	87.040	0.380	0.0	0.0	0.0	1.40	99.2	51.5
S2.000	50.00	5.53	88.100	0.200	0.0	0.0	0.0	1.34	53.3	27.1
S2.001	50.00	6.22	87.650	0.300	0.0	0.0	0.0	1.31	52.0	40.6
S1.002	50.00	6.30	86.515	0.680	0.0	0.0	0.0	1.62	178.8	92.1

Weetwood		Page 3
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Manhole Schedules for 5655 Ex SW Network revA

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S12	87.950	0.750	Open Manhole	1200	S1.000	87.200	300				
S11	88.800	1.760	Open Manhole	1200	S1.001	87.040	300	S1.000	87.040	300	
S10	89.100	1.000	Open Manhole	1200	S2.000	88.100	225				
S9	89.500	1.850	Open Manhole	1200	S2.001	87.650	225	S2.000	87.650	225	
S8	89.250	2.735	Open Manhole	1350	S1.002	86.515	375	S1.001	86.590	300	
								S2.001	87.110	225	445
S18	88.900	1.000	Open Manhole	1200	S3.000	87.900	150				
S17	89.100	1.580	Open Manhole	1200	S3.001	87.520	300	S3.000	87.670	150	
S15	89.100	1.350	Open Manhole	1350	S4.000	87.750	450				
S14	89.350	1.970	Open Manhole	1350	S4.001	87.380	450	S4.000	87.380	450	
S13	89.100	2.160	Open Manhole	1350	S3.002	86.940	450	S3.001	87.237	300	147
								S4.001	86.940	450	
S7	89.150	2.925	Open Manhole	1500	S1.003	86.225	525	S1.002	86.455	375	80
								S3.002	86.790	450	490
SS4	88.518	2.373	Open Manhole	1500		OUTFALL		S1.003	86.145	525	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S12	381474.378	409088.261	381474.378	409088.261	Required	
S11	381479.184	409116.998	381479.184	409116.998	Required	
S10	381579.031	409128.226	381579.031	409128.226	Required	
S9	381541.770	409149.203	381541.770	409149.203	Required	
S8	381492.774	409171.678	381492.774	409171.678	Required	
S18	381484.361	409131.047	381484.361	409131.047	Required	
S17	381492.673	409148.399	381492.673	409148.399	Required	

Weetwood					Page 4																																											
Joseph's Well Hanover Walk Leeds, LS3 1AB																																																
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...																																																
XP Solutions			Designed by MichaelDarby Checked by Network 2020.1																																													
<u>Manhole Schedules for 5655 Ex SW Network revA</u> <table><thead><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr></thead><tbody><tr><td>S15</td><td>381572.307</td><td>409126.318</td><td>381572.307</td><td>409126.318</td><td>Required</td><td></td></tr><tr><td>S14</td><td>381539.277</td><td>409145.387</td><td>381539.277</td><td>409145.387</td><td>Required</td><td></td></tr><tr><td>S13</td><td>381500.507</td><td>409164.322</td><td>381500.507</td><td>409164.322</td><td>Required</td><td></td></tr><tr><td>S7</td><td>381497.507</td><td>409177.515</td><td>381497.507</td><td>409177.515</td><td>Required</td><td></td></tr><tr><td>SS4</td><td>381492.094</td><td>409192.255</td><td></td><td></td><td>No Entry</td><td></td></tr></tbody></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S15	381572.307	409126.318	381572.307	409126.318	Required		S14	381539.277	409145.387	381539.277	409145.387	Required		S13	381500.507	409164.322	381500.507	409164.322	Required		S7	381497.507	409177.515	381497.507	409177.515	Required		SS4	381492.094	409192.255			No Entry	
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)																																										
S15	381572.307	409126.318	381572.307	409126.318	Required																																											
S14	381539.277	409145.387	381539.277	409145.387	Required																																											
S13	381500.507	409164.322	381500.507	409164.322	Required																																											
S7	381497.507	409177.515	381497.507	409177.515	Required																																											
SS4	381492.094	409192.255			No Entry																																											
©1982-2020 Innovyze																																																

Weetwood		Page 5
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

PIPELINE SCHEDULES for 5655 Ex SW Network revA

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S12	87.950	87.200	0.450	Open Manhole	1200
S1.001	o	300	S11	88.800	87.040	1.460	Open Manhole	1200
S2.000	o	225	S10	89.100	88.100	0.775	Open Manhole	1200
S2.001	o	225	S9	89.500	87.650	1.625	Open Manhole	1200
S1.002	o	375	S8	89.250	86.515	2.360	Open Manhole	1350
S3.000	o	150	S18	88.900	87.900	0.850	Open Manhole	1200
S3.001	o	300	S17	89.100	87.520	1.280	Open Manhole	1200
S4.000	o	450	S15	89.100	87.750	0.900	Open Manhole	1350
S4.001	o	450	S14	89.350	87.380	1.520	Open Manhole	1350
S3.002	o	450	S13	89.100	86.940	1.710	Open Manhole	1350
S1.003	o	525	S7	89.150	86.225	2.400	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	29.136	182.1	S11	88.800	87.040	1.460	Open Manhole	1200
S1.001	56.343	125.2	S8	89.250	86.590	2.360	Open Manhole	1350
S2.000	42.760	95.0	S9	89.500	87.650	1.625	Open Manhole	1200
S2.001	53.904	99.8	S8	89.250	87.110	1.915	Open Manhole	1350
S1.002	7.515	125.0	S7	89.150	86.455	2.320	Open Manhole	1500
S3.000	19.240	83.7	S17	89.100	87.670	1.280	Open Manhole	1200
S3.001	17.746	62.7	S13	89.100	87.237	1.563	Open Manhole	1350
S4.000	38.140	103.1	S14	89.350	87.380	1.520	Open Manhole	1350
S4.001	43.147	98.1	S13	89.100	86.940	1.710	Open Manhole	1350
S3.002	13.529	90.2	S7	89.150	86.790	1.910	Open Manhole	1500
S1.003	15.703	196.3	SS4	88.518	86.145	1.848	Open Manhole	1500

Weetwood		Page 6
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions Network 2020.1		

Setting Out Information - Site Coordinates (5655 Ex SW Network revA)

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S12	1200		381474.378	409088.261	381474.378	409088.261	
S1.001	S11	1200		381479.184	409116.998	381479.184	409116.998	
S2.000	S10	1200		381579.031	409128.226	381579.031	409128.226	
S2.001	S9	1200		381541.770	409149.203	381541.770	409149.203	
S1.002	S8	1350		381492.774	409171.678	381492.774	409171.678	
S3.000	S18	1200		381484.361	409131.047	381484.361	409131.047	
S3.001	S17	1200		381492.673	409148.399	381492.673	409148.399	
S4.000	S15	1350		381572.307	409126.318	381572.307	409126.318	
S4.001	S14	1350		381539.277	409145.387	381539.277	409145.387	
S3.002	S13	1350		381500.507	409164.322	381500.507	409164.322	
S1.003	S7	1500		381497.507	409177.515	381497.507	409177.515	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.003	SS4	1500		381492.094	409192.255	

Free Flowing Outfall Details for 5655 Ex SW Network revA

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.003	SS4	88.518	86.145	0.000	1500	0

Weetwood		Page 7
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S1.000	S12	0.848	1.975	0.000	2.823
S1.001	S11	1.991	3.893	0.000	5.883
S2.000	S10	1.131	1.652	0.000	2.783
S2.001	S9	2.092	2.093	0.000	4.185
S1.002	S8	3.915	0.673	0.000	4.587
S3.000	S18	1.131	0.319	0.000	1.450
S3.001	S17	1.787	1.164	0.000	2.951
S4.000	S15	1.932	5.851	0.000	7.784
S4.001	S14	2.820	6.648	0.000	9.467
S3.002	S13	3.092	1.925	0.000	5.017
S1.003	S7	5.169	3.075	0.000	8.244
Total		25.908	29.266	0.000	55.174

Weetwood		Page 9
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 5655 Ex SW Network revA

					Total			Maximum	Half Drain
	US/MH	Flow /	Infil.	Infil.	Infil.	Maximum	Discharge	Velocity	
PN	Name	Cap.	Flow (l/s)	Vol (m³)	Vol (m³)	Vol (m³)	Vol (m³)	(m/s)	Time (mins)
S2.000	S10	0.47				0.119	11.281	1.3	
S2.001	S9	0.67				0.294	16.922	1.3	
S1.002	S8	0.71				0.655	38.356	1.0	
S3.000	S18	0.26				0.054	2.256	0.9	
S3.001	S17	0.29				0.121	19.178	1.5	
S4.000	S15	0.09				0.126	12.410	1.1	
S4.001	S14	0.17				0.370	25.383	1.4	
S3.002	S13	0.39				0.773	44.561	1.3	
S1.003	S7	0.64				0.568	82.917	1.2	

PN	US/MH Name	Pipe	Status
		Flow (l/s)	
S1.000	S12	29.7	OK
S1.001	S11	41.6	OK
S2.000	S10	23.7	OK
S2.001	S9	33.6	OK
S1.002	S8	75.6	OK
S3.000	S18	4.7	OK
S3.001	S17	35.2	OK
S4.000	S15	26.0	OK
S4.001	S14	49.6	OK
S3.002	S13	85.2	OK
S1.003	S7	158.4	OK

Page 10

Micro Drainage

Joseph's Well
Hanover Walk
Leeds, LS3 1AB

Date 24/08/2022 10:01
File 5655 Ex SW Network revA...

XP Solutions

Designed by MichaelDarby
Checked by

Network 2020.1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 5655 Ex SW Network revA

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 0
Number of Offline Controls 0

Number of Storage Structures 0
Number of Time/Area Diagrams 0
Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

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

PN	US/MH Name	Event	Duration (mins)	Storm Rank	US/CL (m)	Water Level (m)	Surcharged Depth (m)
S1.000	S12	15 minute 30 year Winter I+0%	15	1	87.950	87.602	0.102
S1.001	S11	15 minute 30 year Winter I+0%	15	1	88.800	87.498	0.158
S2.000	S10	15 minute 30 year Winter I+0%	15	1	89.100	88.692	0.367
S2.001	S9	15 minute 30 year Winter I+0%	15	1	89.500	88.327	0.452
S1.002	S8	15 minute 30 year Winter I+0%	15	1	89.250	87.056	0.166
S3.000	S18	15 minute 30 year Winter I+0%	15	1	88.900	87.989	-0.061
S3.001	S17	15 minute 30 year Winter I+0%	15	1	89.100	87.739	-0.081
S4.000	S15	15 minute 30 year Winter I+0%	15	1	89.100	87.897	-0.303
S4.001	S14	15 minute 30 year Winter I+0%	15	1	89.350	87.597	-0.233
S3.002	S13	15 minute 30 year Winter I+0%	15	1	89.100	87.393	0.003
S1.003	S7	15 minute 30 year Winter I+0%	15	1	89.150	86.886	0.136

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Infil. Flow (l/s)	Infil. Vol (m³)	Total Infil. Vol (m³)	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)
S1.000	S12	0.000	0.84				0.450	34.510	1.1
S1.001	S11	0.000	0.97				2.466	52.447	1.5

©1982-2020 Innovyze

Weetwood		Page 11
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 5655 Ex SW Network revA

PN	US/MH Name	Flooded		Infil. Flow (l/s)	Infil. Vol (m³)	Total		Discharge Vol (m³)	Maximum Velocity (m/s)
		Volume (m³)	Flow / Cap.			Infil. Vol (m³)	Maximum Vol (m³)		
S2.000	S10	0.000	0.93				0.664	27.599	1.4
S2.001	S9	0.000	1.35				2.403	41.398	1.7
S1.002	S8	0.000	1.55				3.444	93.845	1.5
S3.000	S18	0.000	0.64				0.095	5.520	1.1
S3.001	S17	0.000	0.88				0.265	46.915	1.9
S4.000	S15	0.000	0.23				0.203	30.358	1.5
S4.001	S14	0.000	0.45				0.983	62.094	1.8
S3.002	S13	0.000	1.06				4.170	109.009	1.6
S1.003	S7	0.000	1.52				1.915	202.854	1.7

		Half Drain	Pipe	Status
	US/MH	Time	Flow	
PN	Name	(mins)	(l/s)	
S1.000	S12		62.5	SURCHARGED
S1.001	S11		91.1	SURCHARGED
S2.000	S10		47.2	SURCHARGED
S2.001	S9		67.3	SURCHARGED
S1.002	S8		165.7	SURCHARGED
S3.000	S18		11.6	OK
S3.001	S17		106.4	OK
S4.000	S15		63.8	OK
S4.001	S14		133.0	OK
S3.002	S13		231.2	SURCHARGED
S1.003	S7		378.4	SURCHARGED

Weetwood		Page 13
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 24/08/2022 10:01 File 5655 Ex SW Network revA...	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank
1) for 5655 Ex SW Network revA

PN	US/MH Name	Flooded		Infil. Flow (l/s)	Infil. Vol (m³)	Total		Discharge Vol (m³)	Maximum Velocity (m/s)
		Volume (m³)	Flow / Cap.			Infil. Vol (m³)	Maximum Vol (m³)		
S2.000	S10	1.620	1.14				2.746	35.631	1.5
S2.001	S9	0.000	1.57				2.849	53.444	2.0
S1.002	S8	0.000	1.80				5.039	121.163	1.8
S3.000	S18	0.000	0.85				0.151	7.127	1.1
S3.001	S17	0.000	1.10				0.604	60.572	2.0
S4.000	S15	0.000	0.29				0.234	39.195	1.6
S4.001	S14	0.000	0.57				1.674	80.166	1.9
S3.002	S13	0.000	1.39				6.235	140.738	1.9
S1.003	S7	0.000	1.93				2.794	261.901	2.2

PN	US/MH Name	Half Drain Pipe		Status
		Time (mins)	Flow (l/s)	
S1.000	S12		76.2	FLOOD
S1.001	S11		104.8	SURCHARGED
S2.000	S10		58.1	FLOOD
S2.001	S9		78.6	SURCHARGED
S1.002	S8		193.3	SURCHARGED
S3.000	S18		15.5	OK
S3.001	S17		132.8	SURCHARGED
S4.000	S15		82.4	OK
S4.001	S14		168.1	OK
S3.002	S13		302.9	SURCHARGED
S1.003	S7		480.1	SURCHARGED

APPENDIX G

Surface Water Attenuation - Storage Volume Calculations

Weetwood		Page 1
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revP1.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 5655 Ex SW Network revA

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.304	Minimum Backdrop Height (m)	0.600
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for 5655 Ex SW Network revA

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.251	4-8	0.641

Total Area Contributing (ha) = 1.892

Total Pipe Volume (m³) = 38.967

Network Design Table for 5655 Ex SW Network revA

- Indicates pipe length does not match coordinates

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
S1.000	1.000#	0.050	20.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
S1.001	29.136	0.160	182.1	0.356	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	56.343	0.450	125.2	0.130	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	42.760	0.450	95.0	0.200	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)
S1.000	50.00	5.01	87.400	0.000	0.0	0.0	0.0	2.26	40.0	0.0
S1.001	50.00	5.43	87.200	0.356	0.0	0.0	0.0	1.16	82.1	48.2
S1.002	50.00	6.09	87.040	0.486	0.0	0.0	0.0	1.40	99.2	65.8
S2.000	50.00	5.53	88.100	0.200	0.0	0.0	0.0	1.34	53.3	27.1

Weetwood		Page 2
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Network Design Table for 5655 Ex SW Network revA

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
S2.001	53.904	0.540	99.8	0.100	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	7.515	0.060	125.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S3.000	19.240	0.230	83.7	0.040	5.00	0.0	0.600	o	150	Pipe/Conduit	
S3.001	17.746	0.283	62.7	0.300	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.000	52.500	0.230	228.3	0.316	5.00	0.0	0.600	o	300	Pipe/Conduit	
S4.001	52.500	0.230	228.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.002	10.449	0.050	209.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.003	38.140	0.370	103.1	0.220	0.00	0.0	0.600	o	450	Pipe/Conduit	
S4.004	43.147	0.440	98.1	0.230	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.002	13.529	0.150	90.2	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	15.703	0.080	196.3	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.001	50.00	6.22	87.650	0.300	0.0	0.0	0.0	1.31	52.0	40.6
S1.003	50.00	6.30	86.515	0.786	0.0	0.0	0.0	1.62	178.8	106.4
S3.000	50.00	5.29	87.900	0.040	0.0	0.0	0.0	1.10	19.4	5.4
S3.001	50.00	5.44	87.520	0.340	0.0	0.0	0.0	1.99	140.6	46.0
S4.000	50.00	5.84	88.410	0.316	0.0	0.0	0.0	1.04	73.3	42.8
S4.001	50.00	6.69	88.180	0.316	0.0	0.0	0.0	1.04	73.3	42.8
S4.002	50.00	6.85	87.950	0.316	0.0	0.0	0.0	1.08	76.6	42.8
S4.003	50.00	7.17	87.750	0.536	0.0	0.0	0.0	2.00	318.5	72.6
S4.004	50.00	7.52	87.380	0.766	0.0	0.0	0.0	2.05	326.6	103.7
S3.002	50.00	7.62	86.940	1.106	0.0	0.0	0.0	2.14	340.6	149.8
S1.004	50.00	7.79	86.225	1.892	0.0	0.0	0.0	1.60	345.3	256.2

Weetwood		Page 3
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Manhole Schedules for 5655 Ex SW Network revA

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S-DUMMY	88.000	0.600	Junction		S1.000	87.400	150				
S12	87.950	0.750	Open Manhole	1200	S1.001	87.200	300	S1.000	87.350	150	
S11	88.800	1.760	Open Manhole	1200	S1.002	87.040	300	S1.001	87.040	300	
S10	89.100	1.000	Open Manhole	1200	S2.000	88.100	225				
S9	89.500	1.850	Open Manhole	1200	S2.001	87.650	225	S2.000	87.650	225	
S8	89.250	2.735	Open Manhole	1350	S1.003	86.515	375	S1.002	86.590	300	
								S2.001	87.110	225	445
S18	88.900	1.000	Open Manhole	1200	S3.000	87.900	150				
S17	89.100	1.580	Open Manhole	1200	S3.001	87.520	300	S3.000	87.670	150	
S15A	89.150	0.740	Open Manhole	1200	S4.000	88.410	300				
S15B	89.150	0.970	Open Manhole	1200	S4.001	88.180	300	S4.000	88.180	300	
S15C	89.100	1.150	Open Manhole	1200	S4.002	87.950	300	S4.001	87.950	300	
S15	89.100	1.350	Open Manhole	1350	S4.003	87.750	450	S4.002	87.900	300	
S14	89.350	1.970	Open Manhole	1350	S4.004	87.380	450	S4.003	87.380	450	
S13	89.100	2.160	Open Manhole	1350	S3.002	86.940	450	S3.001	87.237	300	145
								S4.004	86.940	450	
S7	89.150	2.925	Open Manhole	1500	S1.004	86.225	525	S1.003	86.455	375	80
								S3.002	86.790	450	490
SS4	88.518	2.373	Open Manhole	1500		OUTFALL		S1.004	86.145	525	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S-DUMMY	381455.611	409044.481			No Entry	
S12	381474.378	409088.261	381474.378	409088.261	Required	
S11	381479.184	409116.998	381479.184	409116.998	Required	
S10	381579.031	409128.226	381579.031	409128.226	Required	
S9	381541.770	409149.203	381541.770	409149.203	Required	

Weetwood

Joseph's Well

Hanover Walk

Leeds, LS3 1AB

Date 26/08/2022 14:07

File 5655 SW Network revP1.mdx

XP Solutions

Designed by MichaelDarby

Checked by

Network 2020.1

Page 5



PIPELINE SCHEDULES for 5655 Ex SW Network revA

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	150	S-DUMMY	88.000	87.400	0.450	Junction	
S1.001	o	300	S12	87.950	87.200	0.450	Open Manhole	1200
S1.002	o	300	S11	88.800	87.040	1.460	Open Manhole	1200
S2.000	o	225	S10	89.100	88.100	0.775	Open Manhole	1200
S2.001	o	225	S9	89.500	87.650	1.625	Open Manhole	1200
S1.003	o	375	S8	89.250	86.515	2.360	Open Manhole	1350
S3.000	o	150	S18	88.900	87.900	0.850	Open Manhole	1200
S3.001	o	300	S17	89.100	87.520	1.280	Open Manhole	1200
S4.000	o	300	S15A	89.150	88.410	0.440	Open Manhole	1200
S4.001	o	300	S15B	89.150	88.180	0.670	Open Manhole	1200
S4.002	o	300	S15C	89.100	87.950	0.850	Open Manhole	1200
S4.003	o	450	S15	89.100	87.750	0.900	Open Manhole	1350
S4.004	o	450	S14	89.350	87.380	1.520	Open Manhole	1350
S3.002	o	450	S13	89.100	86.940	1.710	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	1.000#	20.0	S12	87.950	87.350	0.450	Open Manhole	1200
S1.001	29.136	182.1	S11	88.800	87.040	1.460	Open Manhole	1200
S1.002	56.343	125.2	S8	89.250	86.590	2.360	Open Manhole	1350
S2.000	42.760	95.0	S9	89.500	87.650	1.625	Open Manhole	1200
S2.001	53.904	99.8	S8	89.250	87.110	1.915	Open Manhole	1350
S1.003	7.515	125.0	S7	89.150	86.455	2.320	Open Manhole	1500
S3.000	19.240	83.7	S17	89.100	87.670	1.280	Open Manhole	1200
S3.001	17.746	62.7	S13	89.100	87.237	1.563	Open Manhole	1350
S4.000	52.500	228.3	S15B	89.150	88.180	0.670	Open Manhole	1200
S4.001	52.500	228.3	S15C	89.100	87.950	0.850	Open Manhole	1200
S4.002	10.449	209.0	S15	89.100	87.900	0.900	Open Manhole	1350
S4.003	38.140	103.1	S14	89.350	87.380	1.520	Open Manhole	1350
S4.004	43.147	98.1	S13	89.100	86.940	1.710	Open Manhole	1350
S3.002	13.529	90.2	S7	89.150	86.790	1.910	Open Manhole	1500

©1982-2020 Innovyze

Weetwood		Page 6
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

PIPELINE SCHEDULES for 5655 Ex SW Network revA

Upstream Manhole

PN	Hyd	Diam	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	Sect	(mm)	Name	(m)	(m)	(m)	Connection	(mm)
S1.004	o	525	S7	89.150	86.225	2.400	Open Manhole	1500

Downstream Manhole

PN	Length	Slope	MH	C.Level	I.Level	D.Depth	MH	MH DIAM., L*W
	(m)	(1:X)	Name	(m)	(m)	(m)	Connection	(mm)
S1.004	15.703	196.3	SS4	88.518	86.145	1.848	Open Manhole	1500

Weetwood		Page 7
Joseph's Well Hanover Walk Leeds, LS3 1AB		 Micro Drainage
Date 26/08/2022 14:07 File 5655 SW Network revP1.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Network 2020.1

Area Summary for 5655 Ex SW Network revA

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.356	0.356	0.356
1.002	-	-	100	0.130	0.130	0.130
2.000	-	-	100	0.200	0.200	0.200
2.001	-	-	100	0.100	0.100	0.100
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.040	0.040	0.040
3.001	-	-	100	0.300	0.300	0.300
4.000	-	-	100	0.316	0.316	0.316
4.001	-	-	100	0.000	0.000	0.000
4.002	-	-	100	0.000	0.000	0.000
4.003	-	-	100	0.220	0.220	0.220
4.004	-	-	100	0.230	0.230	0.230
3.002	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				1.892	1.892	1.892

Free Flowing Outfall Details for 5655 Ex SW Network revA

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	SS4	88.518	86.145	0.000	1500	0

Weetwood		Page 8
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

Online Controls for 5655 Ex SW Network revA

Orifice Manhole: S12, DS/PN: S1.001, Volume (m³): 0.9

Diameter (m) 0.188 Discharge Coefficient 0.600 Invert Level (m) 87.200

Hydro-Brake® Optimum Manhole: S15C, DS/PN: S4.002, Volume (m³): 4.9

Unit Reference	MD-SHE-0075-2400-0900-2400
Design Head (m)	0.900
Design Flow (l/s)	2.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	75
Invert Level (m)	87.950
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.900	2.4
Flush-Flo™	0.269	2.4
Kick-Flo®	0.565	1.9
Mean Flow over Head Range	-	2.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.1	1.200	2.7	3.000	4.2	7.000	6.2
0.200	2.4	1.400	2.9	3.500	4.5	7.500	6.4
0.300	2.4	1.600	3.1	4.000	4.8	8.000	6.6
0.400	2.3	1.800	3.3	4.500	5.1	8.500	6.8
0.500	2.2	2.000	3.5	5.000	5.3	9.000	7.0
0.600	2.0	2.200	3.6	5.500	5.6	9.500	7.2
0.800	2.3	2.400	3.8	6.000	5.8		
1.000	2.5	2.600	3.9	6.500	6.0		

Weetwood			Page 9																																																																																																								
Joseph's Well Hanover Walk Leeds, LS3 1AB																																																																																																											
Date 26/08/2022 14:07																																																																																																											
File 5655 SW Network revPl.mdx																																																																																																											
XP Solutions																																																																																																											
			Designed by MichaelDarby																																																																																																								
			Checked by																																																																																																								
			Network 2020.1																																																																																																								
<u>Storage Structures for 5655 Ex SW Network revA</u>																																																																																																											
<u>Cellular Storage Manhole: S15A, DS/PN: S4.000</u>																																																																																																											
Invert Level (m)88.410Safety Factor2.0																																																																																																											
Infiltration Coefficient Base (m/hr)0.00000Porosity0.95																																																																																																											
Infiltration Coefficient Side (m/hr)0.00000																																																																																																											
<table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td></tr><tr><td>0.000</td><td>450.0</td><td>0.0</td><td>0.401</td><td>0.0</td><td>0.0</td></tr><tr><td>0.400</td><td>450.0</td><td>0.0</td><td></td><td></td><td></td></tr></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	450.0	0.0	0.401	0.0	0.0	0.400	450.0	0.0																																																																																							
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																																						
0.000	450.0	0.0	0.401	0.0	0.0																																																																																																						
0.400	450.0	0.0																																																																																																									
<u>Cellular Storage Manhole: S15C, DS/PN: S4.002</u>																																																																																																											
Invert Level (m)87.950Safety Factor2.0																																																																																																											
Infiltration Coefficient Base (m/hr)0.00000Porosity0.95																																																																																																											
Infiltration Coefficient Side (m/hr)0.00000																																																																																																											
<table><tr><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td><td>Depth (m)</td><td>Area (m²)</td><td>Inf. Area (m²)</td></tr><tr><td>0.000</td><td>160.0</td><td>0.0</td><td>0.401</td><td>0.0</td><td>0.0</td></tr><tr><td>0.400</td><td>160.0</td><td>0.0</td><td></td><td></td><td></td></tr></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	160.0	0.0	0.401	0.0	0.0	0.400	160.0	0.0																																																																																							
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																																																						
0.000	160.0	0.0	0.401	0.0	0.0																																																																																																						
0.400	160.0	0.0																																																																																																									
<u>Volume Summary (Static)</u>																																																																																																											
Length Calculations based on True Length																																																																																																											
<table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>S1.000</td><td>S-DUMMY</td><td>0.000</td><td>0.007</td><td>0.000</td><td>0.007</td></tr><tr><td>S1.001</td><td>S12</td><td>0.848</td><td>1.975</td><td>0.000</td><td>2.823</td></tr><tr><td>S1.002</td><td>S11</td><td>1.991</td><td>3.893</td><td>0.000</td><td>5.883</td></tr><tr><td>S2.000</td><td>S10</td><td>1.131</td><td>1.652</td><td>0.000</td><td>2.783</td></tr><tr><td>S2.001</td><td>S9</td><td>2.092</td><td>2.093</td><td>0.000</td><td>4.185</td></tr><tr><td>S1.003</td><td>S8</td><td>3.915</td><td>0.673</td><td>0.000</td><td>4.587</td></tr><tr><td>S3.000</td><td>S18</td><td>1.131</td><td>0.319</td><td>0.000</td><td>1.450</td></tr><tr><td>S3.001</td><td>S17</td><td>1.787</td><td>1.164</td><td>0.000</td><td>2.951</td></tr><tr><td>S4.000</td><td>S15A</td><td>0.837</td><td>3.626</td><td>171.143</td><td>175.606</td></tr><tr><td>S4.001</td><td>S15B</td><td>1.097</td><td>3.626</td><td>0.000</td><td>4.723</td></tr><tr><td>S4.002</td><td>S15C</td><td>1.301</td><td>0.648</td><td>60.851</td><td>62.800</td></tr><tr><td>S4.003</td><td>S15</td><td>1.932</td><td>5.851</td><td>0.000</td><td>7.784</td></tr><tr><td>S4.004</td><td>S14</td><td>2.820</td><td>6.648</td><td>0.000</td><td>9.467</td></tr><tr><td>S3.002</td><td>S13</td><td>3.092</td><td>1.925</td><td>0.000</td><td>5.017</td></tr><tr><td>S1.004</td><td>S7</td><td>5.169</td><td>3.075</td><td>0.000</td><td>8.244</td></tr><tr><td colspan="2">Total</td><td>29.142</td><td>37.174</td><td>231.993</td><td>298.310</td></tr></table>						Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	S1.000	S-DUMMY	0.000	0.007	0.000	0.007	S1.001	S12	0.848	1.975	0.000	2.823	S1.002	S11	1.991	3.893	0.000	5.883	S2.000	S10	1.131	1.652	0.000	2.783	S2.001	S9	2.092	2.093	0.000	4.185	S1.003	S8	3.915	0.673	0.000	4.587	S3.000	S18	1.131	0.319	0.000	1.450	S3.001	S17	1.787	1.164	0.000	2.951	S4.000	S15A	0.837	3.626	171.143	175.606	S4.001	S15B	1.097	3.626	0.000	4.723	S4.002	S15C	1.301	0.648	60.851	62.800	S4.003	S15	1.932	5.851	0.000	7.784	S4.004	S14	2.820	6.648	0.000	9.467	S3.002	S13	3.092	1.925	0.000	5.017	S1.004	S7	5.169	3.075	0.000	8.244	Total		29.142	37.174	231.993	298.310
Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)																																																																																																						
S1.000	S-DUMMY	0.000	0.007	0.000	0.007																																																																																																						
S1.001	S12	0.848	1.975	0.000	2.823																																																																																																						
S1.002	S11	1.991	3.893	0.000	5.883																																																																																																						
S2.000	S10	1.131	1.652	0.000	2.783																																																																																																						
S2.001	S9	2.092	2.093	0.000	4.185																																																																																																						
S1.003	S8	3.915	0.673	0.000	4.587																																																																																																						
S3.000	S18	1.131	0.319	0.000	1.450																																																																																																						
S3.001	S17	1.787	1.164	0.000	2.951																																																																																																						
S4.000	S15A	0.837	3.626	171.143	175.606																																																																																																						
S4.001	S15B	1.097	3.626	0.000	4.723																																																																																																						
S4.002	S15C	1.301	0.648	60.851	62.800																																																																																																						
S4.003	S15	1.932	5.851	0.000	7.784																																																																																																						
S4.004	S14	2.820	6.648	0.000	9.467																																																																																																						
S3.002	S13	3.092	1.925	0.000	5.017																																																																																																						
S1.004	S7	5.169	3.075	0.000	8.244																																																																																																						
Total		29.142	37.174	231.993	298.310																																																																																																						
©1982-2020 Innovyze																																																																																																											

Weetwood		Page 11
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 5655 Ex SW Network revA

PN	US/MH Name	Flooded		Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
		Volume (m³)	Flow / Cap.						
S1.000	S-DUMMY	0.000	0.03	0.087	0.001	0.3		0.4	OK*
S1.001	S12	0.000	0.44	0.331	20.046	1.1		32.6	OK
S1.002	S11	0.000	0.47	0.554	27.377	1.3		43.9	OK
S2.000	S10	0.000	0.47	0.119	11.281	1.3		23.7	OK
S2.001	S9	0.000	0.67	0.294	16.922	1.3		33.6	OK
S1.003	S8	0.000	0.72	0.676	44.298	1.1		76.9	OK
S3.000	S18	0.000	0.26	0.054	2.256	0.9		4.7	OK
S3.001	S17	0.000	0.29	0.121	19.178	1.5		35.2	OK
S4.000	S15A	0.000	0.09	25.423	33.644	0.6	90	6.0	OK
S4.001	S15B	0.000	0.09	0.165	33.550	0.6		6.0	OK
S4.002	S15C	0.000	0.04	26.709	65.960	0.5	224	2.3	OK
S4.003	S15	0.000	0.08	0.115	12.973	1.1		22.4	OK
S4.004	S14	0.000	0.16	0.335	25.924	1.4		45.8	OK
S3.002	S13	0.000	0.37	0.746	45.090	1.3		81.3	OK
S1.004	S7	0.000	0.63	0.557	89.375	1.2		155.6	OK

Weetwood		Page 13
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:07 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for 5655 Ex SW Network revA

PN	US/MH Name	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S-DUMMY	0.000	0.21	0.552	0.002	0.3		3.0	SURCHARGED*
S1.001	S12	9.309	0.75	10.146	49.086	1.2		55.9	FLOOD
S1.002	S11	0.000	0.89	2.205	67.022	1.5		84.1	SURCHARGED
S2.000	S10	0.000	0.93	0.664	27.599	1.4		47.2	SURCHARGED
S2.001	S9	0.000	1.35	2.403	41.398	1.7		67.3	SURCHARGED
S1.003	S8	0.000	1.49	3.387	108.419	1.5		159.4	SURCHARGED
S3.000	S18	0.000	0.64	0.095	5.520	1.1		11.6	OK
S3.001	S17	0.000	0.88	0.265	46.915	1.9		106.4	OK
S4.000	S15A	0.000	0.31	48.677	59.838	0.9	49	21.3	OK
S4.001	S15B	0.000	0.17	2.799	145.974	0.7		11.6	SURCHARGED
S4.002	S15C	0.000	0.04	65.086	105.754	0.5		2.4	SURCHARGED
S4.003	S15	0.000	0.25	0.220	34.623	1.5		69.4	OK
S4.004	S14	0.000	0.48	1.027	66.250	1.8		140.2	OK
S3.002	S13	0.000	1.11	4.533	113.107	1.6		242.1	SURCHARGED
S1.004	S7	0.000	1.52	1.935	221.474	1.8		378.1	SURCHARGED

Weetwood		Page 2
Joseph's Well Hanover Walk Leeds, LS3 1AB		
Date 26/08/2022 14:09 File 5655 SW Network revPl.mdx	Designed by MichaelDarby Checked by	
XP Solutions	Network 2020.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 5655 Ex SW Network revA

PN	US/MH Name	Flooded		Maximum Vol (m³)	Discharge Vol (m³)	Maximum Velocity (m/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
		Volume (m³)	Flow / Cap.						
S1.000	S-DUMMY	0.000	0.27	0.587	0.002	0.3		3.7	SURCHARGED*
S1.001	S12	54.262	0.78	55.097	126.342	1.3		57.7	FLOOD
S1.002	S11	0.000	1.08	2.944	125.454	1.5		101.5	SURCHARGED
S2.000	S10	16.073	1.31	17.199	51.662	1.7		66.7	FLOOD
S2.001	S9	0.000	1.69	3.198	69.194	2.2		84.7	SURCHARGED
S1.003	S8	0.000	1.67	6.028	202.951	1.6		179.5	SURCHARGED
S3.000	S18	0.000	1.34	0.835	10.332	1.4		24.5	FLOOD RISK
S3.001	S17	0.000	1.48	1.314	87.828	2.5		177.9	SURCHARGED
S4.000	S15A	0.000	0.41	162.263	289.779	0.8	674	28.3	SURCHARGED
S4.001	S15B	0.000	0.17	4.563	286.874	0.7		11.6	FLOOD RISK
S4.002	S15C	0.000	0.04	65.756	221.772	0.5		2.5	FLOOD RISK
S4.003	S15	0.000	0.43	0.925	62.557	1.7		121.6	OK
S4.004	S14	0.000	0.78	6.314	121.861	1.8		227.8	SURCHARGED
S3.002	S13	0.000	1.86	8.864	209.624	2.6		405.6	SURCHARGED
S1.004	S7	0.000	2.34	4.055	412.516	2.7		582.8	SURCHARGED

APPENDIX H

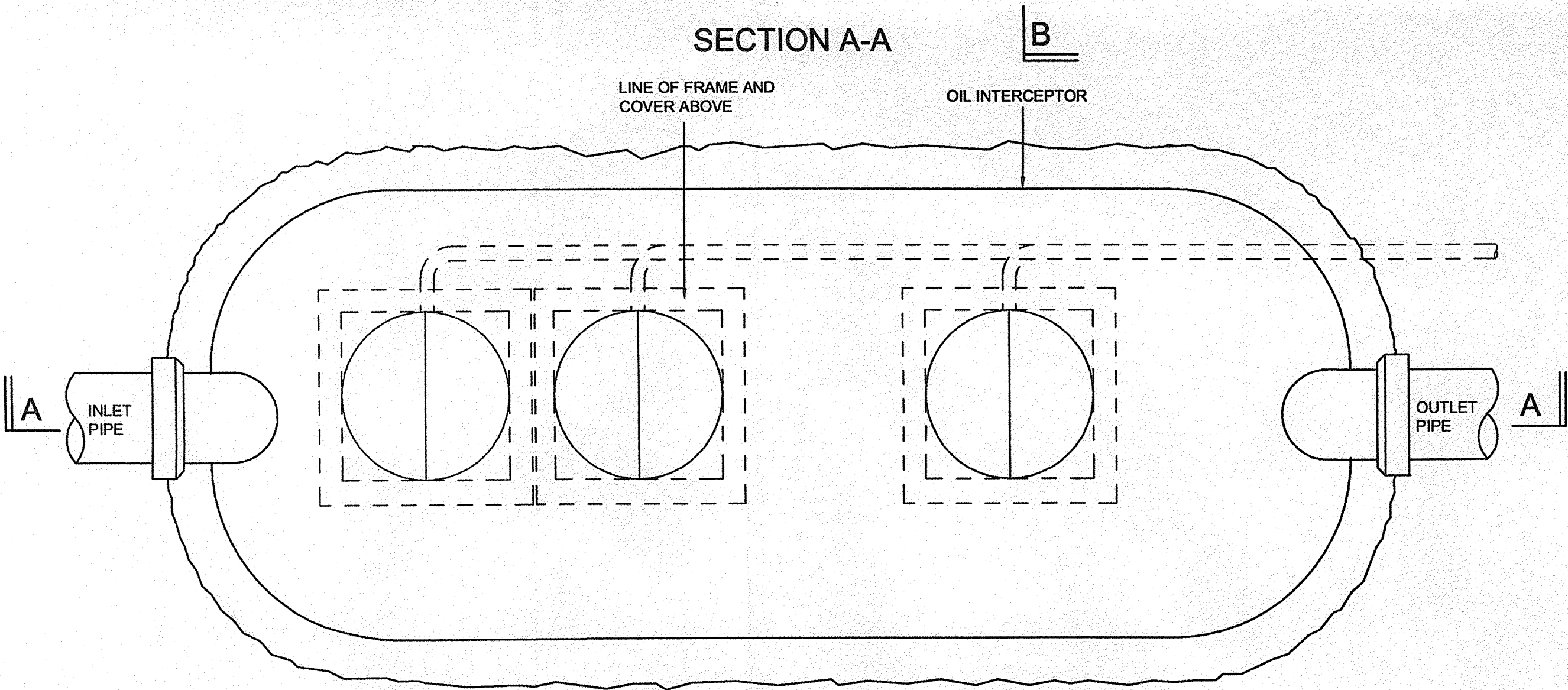
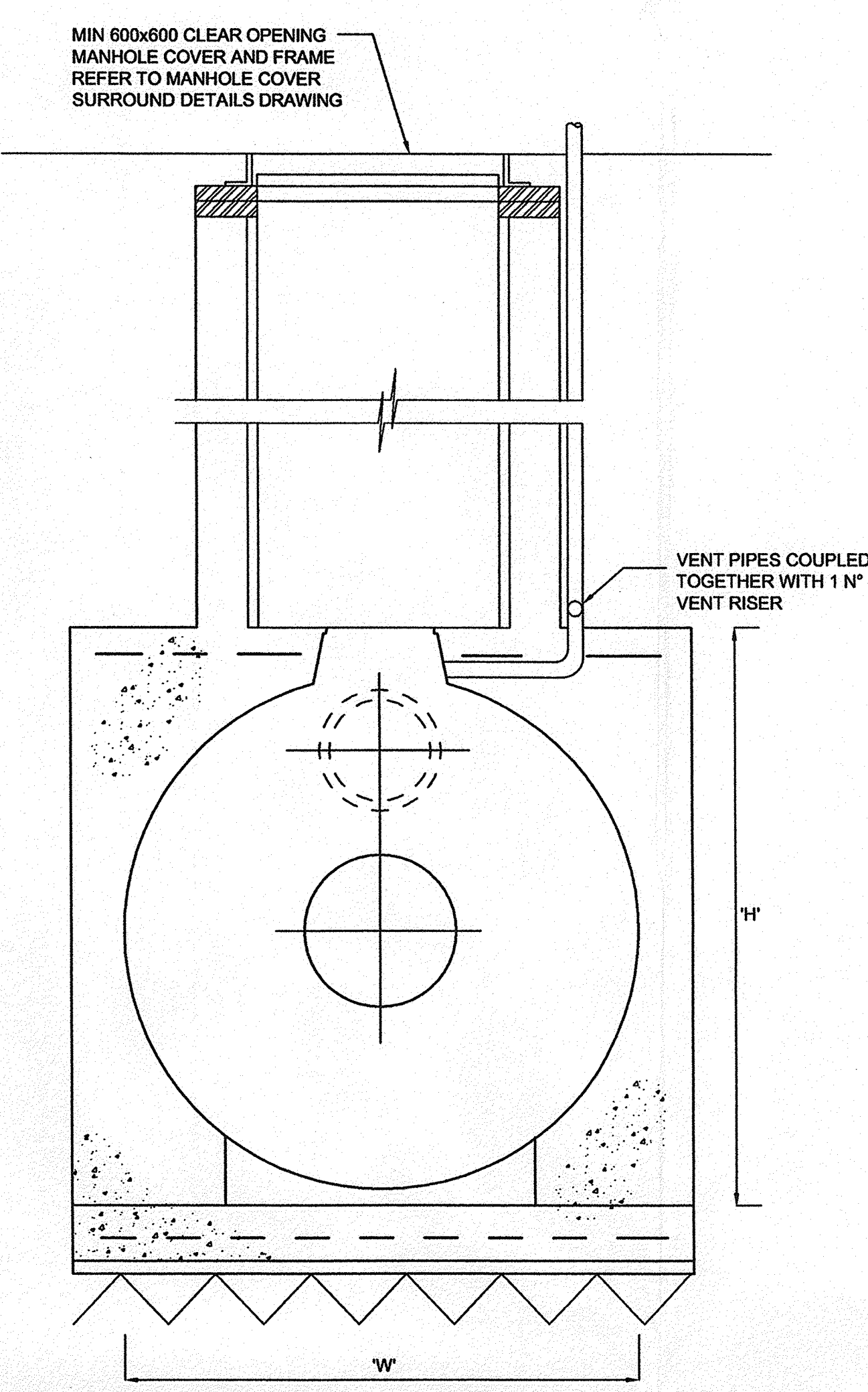
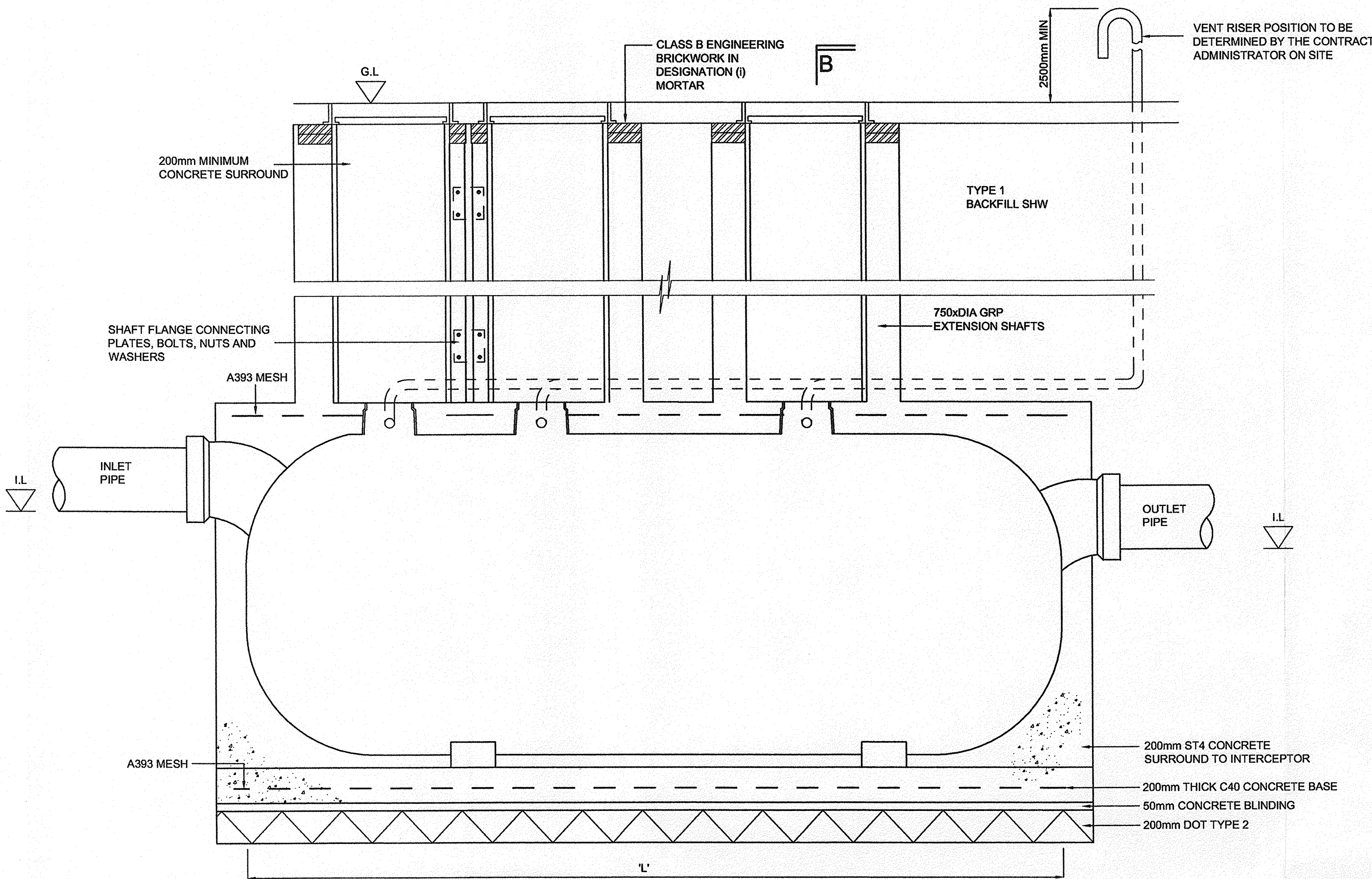
Preliminary Surface Water Drainage Layout

APPENDIX I

Existing Bypass Separator Details

notes :

1. IF THIS DRAWING HAS BEEN RECEIVED ELECTRONICALLY IT IS THE RECIPIENTS RESPONSIBILITY TO PRINT THE DOCUMENT TO THE CORRECT SCALE
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE IT IS RECOMMENDED THAT INFORMATION IS NOT SCALED OFF THIS DRAWING
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS
4. ALL CONCRETE TO HAVE A CHARACTERISTIC COMPRESSIVE STRENGTH OF 40N/mm AT 28 DAYS
MAXIMUM FREE WATER / CEMENT RATIO = 0.55
NOMINAL MAXIMUM AGGREGATE SIZE = 20mm
5. MINIMUM COVER TO REINFORCEMENT TO BE 50mm UNLESS STATED OTHERWISE.
6. ALL CONCRETE TO BE VIBRATED TO FORM A DENSE MASS FREE OF VOIDS.
7. THE INSTALLATION AND CONCRETE SURROUND TO THE INTERCEPTOR ARE TO BE CARRIED OUT STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS.
8. WHERE PROPRIETARY PRODUCTS ARE SPECIFIED, THE CONTRACTOR MAY OFFER AN EQUAL OR SUPERIOR QUALITY ALTERNATIVE FOR APPROVAL BY THE CONTRACT ADMINISTRATOR.
9. ALL EXTERNAL GULLY GRATINGS AND FRAMES TO BE MANUFACTURED TO MEET THE LOAD REQUIREMENTS OF BS EN 124/FAC1A:
CLASS A15/A - PEDESTRIAN AREAS;
CLASS C250/C - CARRIAGEWAYS (WITHIN 0.5m OF KERBLINE);
CLASS D400/D - CARRIAGEWAYS.
ALL COVERS IN CARRIAGEWAYS TO INCORPORATE AN ANTI-ROCKING DEVICE.
10. FOR DETAILS OF EXTERNAL MANHOLE COVER SURROUNDS, PLEASE REFER TO DRAWING NO 14224/A1/255
ALL MANHOLE COVERS ARE TO BE SEATED ON DESIGNATION (I) MORTAR IN ACCORDANCE WITH THE SPECIFICATION.
11. ALL INTERCEPTORS TO COMPLY WITH PPG3 GUIDELINES.
12. ALL INTERCEPTORS ARE TO BE FITTED WITH OIL LEVEL ALARM AND SILT LEVEL ALARM RELAYED TO BMS.
13. VENT PIPES TO BE 75mm Ø GALVANISED STEEL WRAPPED IN DENSOTAPE BELOW GROUND.



INTERCEPTOR DIMENSIONS TABLE													
INTERCEPTOR REFERENCE No.	NSB VALUE	MANUFACTURER AND MODEL *	TYPE AND CLASS	SILT CAPACITY	PIPE ORIENTATION	INCOMING PIPE DIAMETER (mm)	INCOMING PIPE INVERT LEVEL (m)	OUTGOING PIPE DIAMETER (mm)	OUTGOING PIPE INVERT LEVEL (m)	FALL ACROSS INTERCEPTOR (mm)	INTERCEPTOR LENGTH (mm)	INTERCEPTOR WIDTH (mm)	APPROXIMATE GROUND LEVEL
315	15	CONDER NS 15/1	1	1500	A	375	86.495	375	86.395	50	3844	1500	89.250

* OR SIMILAR APPROVED

100mm SCALE 1:20

FINAL ISSUE

A	Status Amended Interceptor Manufacturer revised	GB	17.11.2004
rev	amendments	by	date
Burks Green Sherwood House, Newark, Nottinghamshire, NG24 1QQ			
T +44 (0) 1636 605 700 F +44 (0) 1636 610 695 W www.burksgreen.com E mail@burksgreen.com			
Client: 			
Project: Roach Bank Farm			
Title: Interceptor Details			
Drawing Status: Final Issue	Date Created: 29.03.04	Drawing Scale: 1:20	
Drawing Number: 14224 /A1 / 315		Rev: A	
Project Leader: TG	Drawn By: JM	Initial Review: GB	

Delivering client focussed services nationally

Flood Risk Assessments
Flood Consequences Assessments
Surface Water Drainage
Foul Water Drainage
Environmental Impact Assessments
River Realignment and Restoration
Water Framework Directive Assessments
Environmental Permit and Land Drainage Applications
Sequential, Justification and Exception Tests
Utility Assessments
Expert Witness and Planning Appeals
Discharge of Planning Conditions

www.weetwood.net