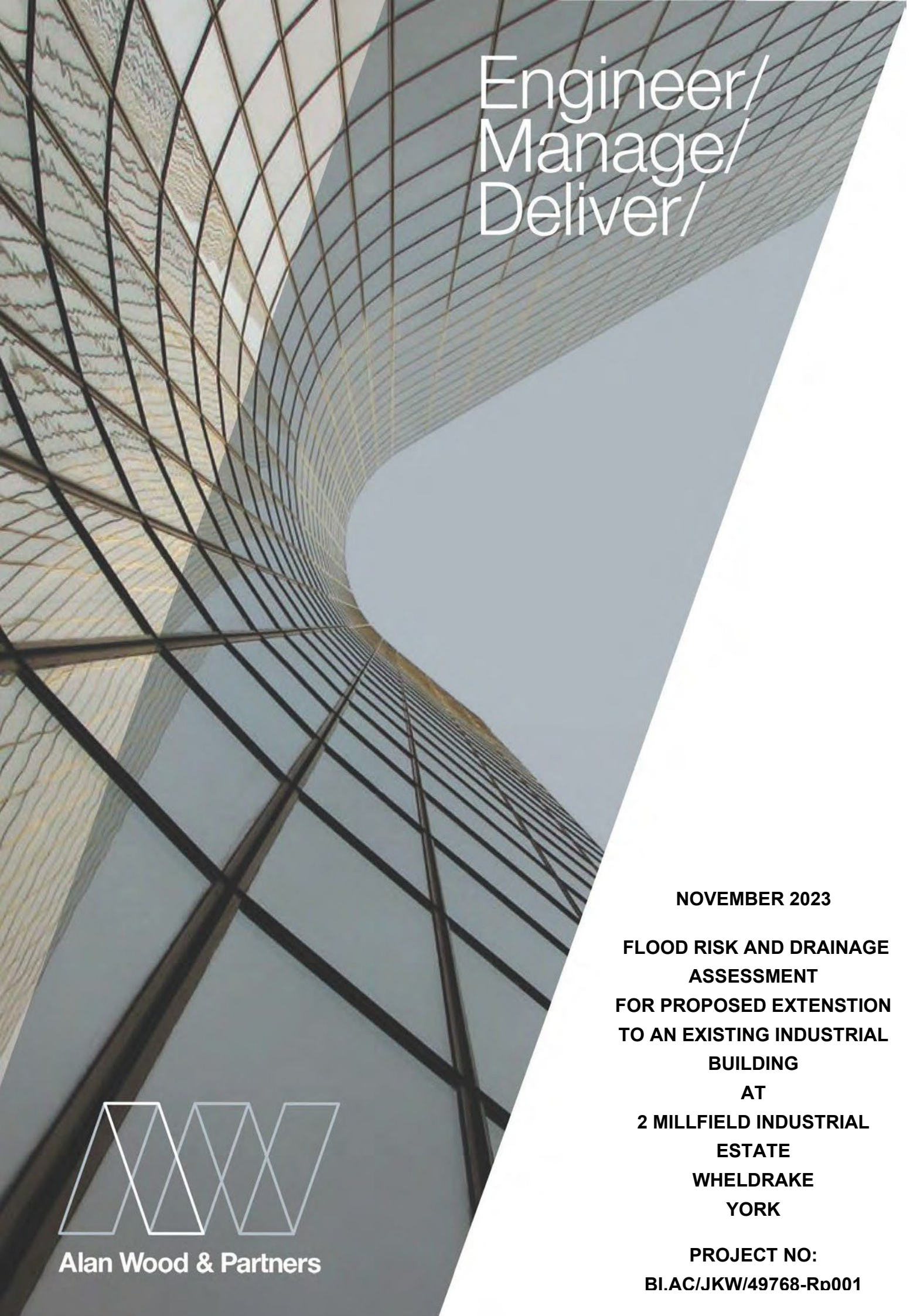

Alan Wood & Partners

NOVEMBER 2023

FLOOD RISK AND DRAINAGE ASSESSMENT FOR PROPOSED EXTENSTION TO AN EXISTING INDUSTRIAL BUILDING AT 2 MILLFIELD INDUSTRIAL ESTATE WHELDRAKE YORK

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FLOOD RISK AND DRAINAGE ASSESSMENT FOR PROPOSED EXTENSTION TO AN EXISTING INDUSTRIAL BUILDING AT 2 MILLFIELD INDUSTRIAL ESTATE, WHELDRAKE, YORK

Prepared by: **A Carroll, MEng (Hons)**
Engineer
For and on behalf of Alan Wood & Partners

Signed: ……
Date: 16th November 2023

Approved by: **B Ions, MEng (Hons), CEng, MICE**
Associate

Signed: ……
Date: 16th November 2023

Issue	Revision	Revised by	Approved by	Revised Date

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APPENDICES

1.0 INTRODUCTION

1.1 Background

1.1.1 Alan Wood & Partners were commissioned by Mercer Foods Ltd. to prepare a Flood Risk and Drainage Assessment for an extension to an existing agricultural building at 2 Millfield Industrial Estate, Wheldrake, York in support of an application for planning consent.

1.1.2 A Flood Risk and Drainage Assessment (FRDA) for the proposed development is required to assess the development's risk from flooding, the suitability of the site in terms of drainage and provide and outline drainage strategy for the proposed development.

1.2 Structure of Report

1.2.1 Section 1 provides an introduction to the FRDA, explains the structure of this FRDA and provides an introduction to flood risk and the latest guidance on development and flood risk in England.

1.2.2 Section 2 provides an introduction to the site. The site description is based upon a desktop study and information provided by the developer. In order to obtain further information on flood risk, consultation was undertaken with the Environment Agency.

1.2.3 Section 3 of this report details the information gathered through the consultation.

1.2.4 Section 4 of this report details the development proposals and considers the development proposals in relation to the current planning policy on development and flood risk in England (and what type of development is considered appropriate in different flood risk zones). National Planning Policy Framework (NPPF): and its associated Technical Guidance (Communities and Local Government, March 2012) is the current planning policy on flood risk in England, and an introduction to NPPF is provided below.

1.2.5 Section 5 of this report considers the flood risk to the site, and the potential for the development proposals to impact on flood risk. The assessment of flood risk is based on the latest planning policy and utilises all the information gathered in the preparation of the report.

1.2.6 Section 6 of this report provides details of any recommendations for further work to mitigate against possible flooding.

1.2.7 Section 7 considers the drainage arrangements for the proposed development.

1.2.8 Section 8 of this report provides a summary of the report.

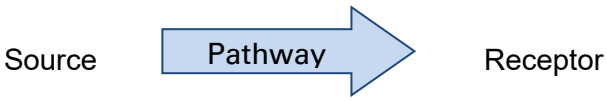
1.3 Flood Risk

1.3.1 Flood risk takes account of both the probability and the consequences of flooding.

1.3.2 Flood risk = probability of flooding x consequences of flooding

1.3.3 Probability is usually interpreted in terms of the return period, e.g. 1 in 100 and 1 in 200 year event, etc. In terms of probability, there is a 1 in 100 (1%) chance of one or more 1 in 100 year floods occurring in a given year. The consequences of flooding depends on how vulnerable a receptor is to flooding.

The components of flood risk can be considered using a source-pathway-receptor model.



1.3.4 Sources constitute flood hazards, which are anything with the potential to cause harm through flooding (e.g. rainfall extreme sea levels, river flows and canals). Pathways represent the mechanism by which the flood hazard would cause harm to a receptor (e.g. overtopping and failure of embankments and flood defences, inadequate drainage and inundation of floodplains). Receptors comprise the people, property, infrastructure and ecosystems that could potentially be affected should a flood occur.

1.4 National Planning Policy Framework

1.4.1 General

1.4.1.1 NPPF and its associated Technical Guidance replaces Planning Policy Statement 25 and provides guidance on how to evaluate sites with respect to flood risk.

1.4.1.2 A summary of the requirements of NPPF is provided below.

1.4.2 Sources of Flooding

1.4.2.1 NPPF requires an assessment of flood risk to consider all forms of flooding and lists six forms of flooding that should be considered as part of a flood risk assessment. These forms of flooding are listed in Table 1, along with an explanation of each form of flooding.

Table 1: Forms of Flooding

Flooding From Rivers (Fluvial Flooding)
Watercourses flood when the amount of water in them exceeds the flow capacity of the river channel. Flooding can either develop gradually or rapidly, depending on the characteristics of the catchment. Land use, topography and the development can have a strong influence on flooding from rivers.
Flooding From the Sea (Tidal Flooding)
Flooding to low-lying land from the sea and tidal estuaries is caused by storm surges and high tides. Where tidal defences exist, they can be overtopped or breached during a severe storm, which may be more likely with climate change.
Flooding from Land (Pluvial Flooding)
Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. In developed areas this flood water can be polluted with domestic sewage where foul sewers surcharge and overflow. Local topography and built form can have a strong influence on the direction and depth of flow. The design of development down to a micro-level can influence or exacerbate this. Overland flow paths should be taken into account in spatial planning for urban developments. Flooding can be exacerbated if development increases the percentage of impervious area.
Flooding from Groundwater
Groundwater flooding occurs when groundwater levels rise above ground levels (i.e. groundwater issues). Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). Chalk is the most extensive source of

groundwater flooding.
Flooding from Sewers
In urban areas, rainwater is frequently drained into sewers. Flooding can occur when sewers are overwhelmed by heavy rainfall, and become blocked. Sewer flooding continues until the water drains away.
Flooding from Other Artificial Sources (i.e. reservoirs, canals, lakes and ponds)
Non-natural or artificial sources of flooding can include reservoirs, canals and lakes. Reservoir or canal flooding may occur as a result of the facility being overwhelmed and /or as a result of dam or bank failure.

1.4.3 Flood Zones

1.4.3.1 For river and sea flooding, NPPF uses four Flood Zones to characterise flood risk. These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences, and are detailed in Table 2.

Table 2: Flood Zones

Flood Zone	Definition
1	Low probability (less than 1 in 1,000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium probability (between 1 in 100 and 1 in 1,000 annual probability of river flooding (1%-0.1%) or between 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5%-0.1%) in any year).
3a	High probability (1 in 100 or greater annual probability of river flooding (>1%) in any year or 1 in 200 or greater annual probability of sea flooding (>0.5%) in any given year).
3b	This zone comprises land where water has to flow or be stored in times flood. Land which would flood with an annual probability of 1 in 20 (5%), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

1.4.4 Vulnerability

1.4.4.1 NPPF classifies the vulnerability of developments to flooding into five categories. These categories are detailed in Table 3.

Table 3: Flood Risk Vulnerability Classification

Flood Risk Vulnerability Classification	Examples of Development Types
Essential Infrastructure	- Essential utility infrastructure including electricity generating power stations and grid and primary substations - Wind turbines
Highly Vulnerable	- Police stations, ambulance stations, fire stations, command centres and telecommunications installations required to be operational during flooding. - Emergency dispersal points. - Basement dwellings. - Caravans, mobile homes and park homes intended for permanent residential use.
More Vulnerable	- Hospitals. - Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. - Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. - Non-residential uses for health services, nurseries and educational establishments. - Sites used for holiday or short-let caravans and camping.
Less Vulnerable	- Building used for shops, financial, professional and other services, restaurants and cafes, hot foot takeaways, offices, general industry, storage and distribution, non-residential institutions not included in "more vulnerable" and assembly and leisure. - Land and buildings used for agriculture and forestry.
Water Compatible	- Docks, marinas and wharves. - Water based recreation (excluding sleeping accommodation). - Lifeguard and coastguard stations. - Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.

1.4.4.2 Based on the vulnerability of a development, NPPF states within what Flood Zones(s) the development is appropriate. The flood risk vulnerability and Flood Zone 'compatibility' of developments is summarised in Table 4.

Table 4: Flood Risk Vulnerability and Flood Zone Compatibility

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

1.4.5 The Sequential Test, Exception Test and Sequential Approach

1.4.5.1 The Sequential Test is a risk-based test that should be applied at all stages of development and aims to steer new development to areas with the lowest probability of flooding (Zone 1). This is applied by the Local Planning Authority by means of a Strategic Flood Assessment (SFRA).

1.4.5.2 The SFRA and NPPF may require the Exception Test to be applied to certain forms of new development. The test considers the vulnerability of the new development to flood risk and, to be passed, must demonstrate that:

- There are sustainability benefits that outweigh the flood risk and;
- The new development is safe and does not increase flood risk elsewhere.

1.4.5.3 The Sequential Approach is also a risk-based approach to development. In a development site located in several Flood Zones or with other flood risk, the sequential approach directs the most vulnerable types of development towards areas of least risk within the site.

1.4.6 Climate Change

1.4.6.1 This is a planning requirement to account for climate change in the proposed design. The recommended allowances should be based on the most relevant guidance from the Environment Agency and the Lead Local Flood Authority.

1.4.7 Sustainable Drainage

1.4.7.1 The key planning objectives in the NPPF are to appraise, manage and where possible, reduce flood risk. Sustainable Drainage Systems (SuDS) provide an effective way of achieving some of these objectives, and NPPF and Part H of the Building Regulations (DTLR 2002) direct developers towards the use of SuDS wherever possible.

1.4.7.2 The National Standards aim to ensure the design of SuDS mimics natural drainage, managing surface runoff at or close to the surface and as close to its source as practicable, controlling the flow (volume and rate of runoff) and providing a range of additional benefits. It contrasts with traditional drainage techniques, which are based on underground pipes to convey rainwater away from properties as quickly as possible. While pipes will often be used in SuDS drainage schemes, the construction of surface water drainage systems comprising solely of pipe sewers will be the exception.

1.4.7.3 The most effective SuDS use a series of various drainage components (where possible vegetative units), operating as close to the source of runoff as practicable. These should work as a SuDS management train to control flow rates and reduce volumes of runoff, providing treatment to protect water quality and opportunities to encourage biodiversity and amenity.

1.4.7.4 Well designed, easy to maintain SuDS will deliver a range of important benefits for the local environment, the development and local communities. They can:

- contribute to the delivery of Water Framework Directive, local flood risk management, Local Biodiversity Action Plan objectives and sustainable development consistent with the Planning (Wales) Act 2015;
- add social, economic and environmental value by improving the quality of urban design, adding enhanced amenity space and providing habitats and wildlife corridors;
- contribute to health and wellbeing through access to green space, reduced urban temperatures, improved air quality and noise buffering;
- help strengthen communities, providing a focus for environmental education and public engagement in environmental protection close to home;

- help improve the adaptability of the drainage system to development pressures; and support development resilience to climate change, reducing the risk of localised surface water flooding, mitigating pollution that may arise from surface water runoff and helping to safeguard water supplies.

1.4.7.5 SuDS schemes should be designed in accordance with current CIRIA C753 SuDS Manual guidelines and aim to:

- manage water on or close to the surface and as close to the source of the runoff as possible;
- treat rainfall as a valuable natural resource;
- ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;
- manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development;
- take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep;
- use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single “end of pipe” feature, such as a pond, to serve the whole development);
- maximise the delivery of benefits for amenity and biodiversity;
- seek to make the best use of available land through multifunctional usage of public spaces and the public realm;
- perform safely, reliably and effectively over the design life of the development taking into account the need for reasonable levels of maintenance;
- avoid the need for pumping where possible; and
- be affordable, taking into account both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.

2.0 EXISTING SITE DESCRIPTION

2.1 Location

2.2.1 The development is located at Millfield Industrial Estate which lies on the western edge of Wheldrake, York. The application site lies approximately on the west boundary of the village, off Wheldrake Lane. north west of the village of Wheldrake, approximately 5.5km south east of the village of Crockey Hill and approximately 10.1km south east from the centre of the City of York.

2.2.2 The site currently comprises of a brownfield site consisting mostly existing impermeable hardstanding used for access and car parking with existing industrial buildings. The existing site extends to approximately 0.237 hectares in area.

2.2.3 An aerial photograph and location plan are included in Figure 1 and Figure 2 below, which identify the location of the site.

Figure 1: Aerial Photograph

Figure 2: Site Location Plan

2.2.4 The Ordnance Survey grid reference for the centre of the development site is approximately 467459m (E), 444461m (N).

2.3 Surrounding Features

2.3.1 Immediately to the north of the site lies industiral development with residential beyond.

2.3.2 To west of the site lies an industrial development.

2.3.3 To the west, south of the site lies an extensive area of agricultural land.

2.3.4 The site is part of the Millfield Industrial Estate and is accessed from Wheledrake Lane, situated approx. 150m north of the proposed development site.

2.3.5 The impermeable areas of the current development site are positively drained. This was confirmed during a site visit which was also accompanying and approved by CoYC LLFA Flood Risk Engineer (date 31st October 2023). AW&P have been advised by the CoYC LLFA Flood Risk Engineer that local surface water drainage discharges to a watercourse to the south of the site.

2.3.6 It is assumed that the surface water will eventually discharge to an Ouse & Derwent IDB maintained watercourse. The watercourse have been identified on the Ouse & Serwent IDB map as either 103 Keldcarrs Drain (103) or Leonard Scales Drain (104). Leonard Scales Drain and Keldcarrs Drain is located to the south west of the site and are approximately 0.60km and 1.20km, respectively.

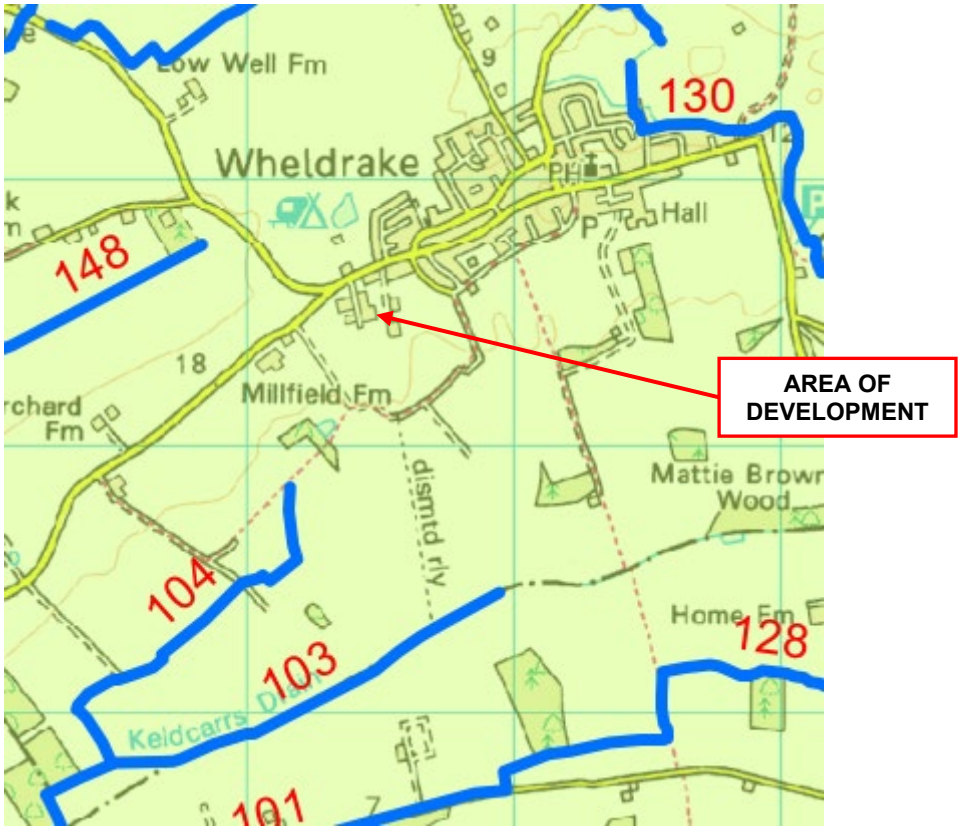


Figure 3: Extract from Ouse & Derwent IDB Map

2.4 Topography

2.4.1 A topographic survey of the site has not been undertaken however LiDAR information obtained indicates ground levels over the area of the development vary from approximately 12.384m AOD to approximately 13.550m AOD at the northern edge of the site. The LiDAR data suggests that the site generally falls to the south. The average level at the proposed area of development is approx. 12.500m AOD. A copy of the existing levels drawing is included in Appendix A.

2.5 Ground Conditions

2.5.1 A desktop study of the British Geological Survey map shows that the local superficial deposits consist of Escrick Moraine Member – Clay, Sandy, Gravelly. This is underlain by Bedrock geology consisting of Sherwood Sandstone Group.

2.5.2 A study of the local groundwater maps show that the site overlays a Principal Aquifer and lies in an area where the groundwater vulnerability classification is 'Medium - High'.

2.5.3 AW&P attended site with the CoYC LLFA Flood Risk Engineer to observe trial pits and soakaway testing (date 31st October 2023). Upon inspection of the trial pits, the LLFA confirmed that testing would not be required due to the evidence of clay strata underlying the site. Therefore, it was confirmed that ground conditions are unsuitable for soakaways / infiltration methods to be used as the means for disposal of surface water run-off. A report of the findings from the site investigation has been included in Appendix F of this report.

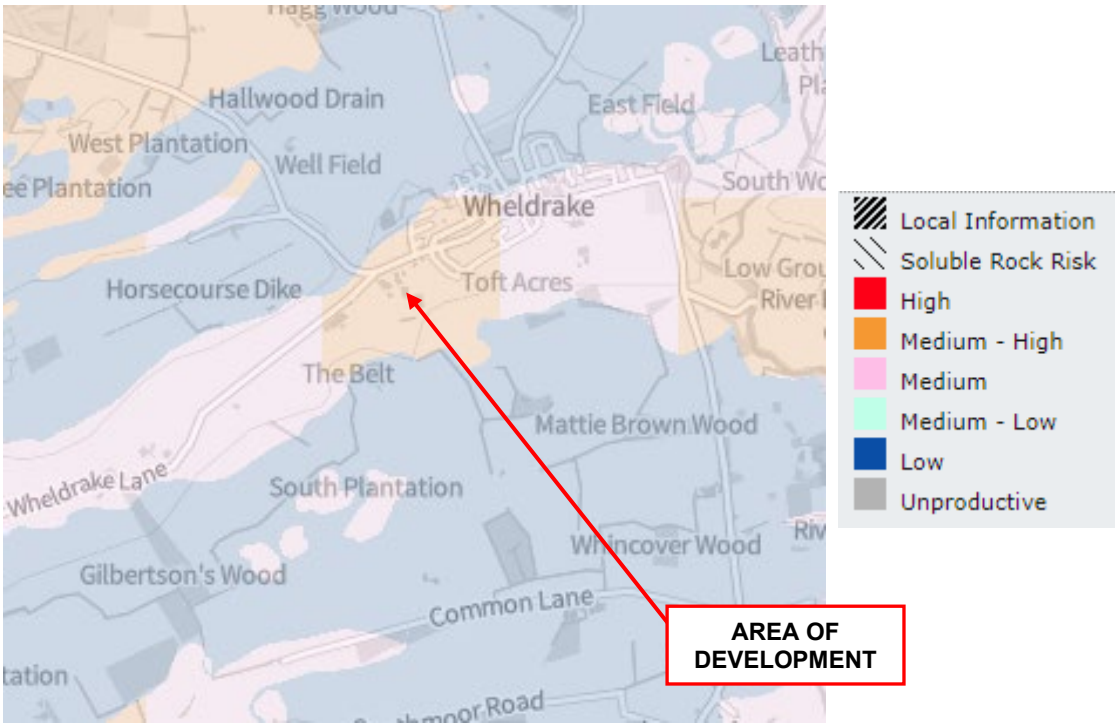


Figure 4: Extract Groundwater Vulnerability Map

3.0 CONSULTATION

3.1 Design Team

3.1.1 Consultation has taken place with the design team in order to obtain relevant information pertaining to the proposed development.

3.2 Environment Agency (EA)

3.2.1 The Flood and Water Management Act 2010 gives the Environment Agency a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. The Environment Agency is the statutory consultee with regards to flood risk and planning.

3.2.2 Consultation has taken place with the Environment Agency with regard to flood mapping, details of which are incorporated within this report.

3.3 Lead Local Flood Authority (LLFA)

3.3.1 City of York Council (CoYC) is the LLFA and has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by CoYC regarding flood risk was consulted to assess the mitigation policies in place. The City of York Council Strategic Flood Risk Assessment Revision 2 (SFRA) which covers the site has been reviewed.

3.4 Local Planning Authority (LPA)

3.4.1 City of York Council (CoYC) is the LPA. Planning guidance written by City of York Council regarding flood risk was consulted to assess the mitigation policies in place. The City of York Council Strategic Flood Risk Assessment (SFRA) which covers the site has been reviewed.

3.5 Sewerage Undertakers

3.5.1 Yorkshire Water is responsible for the disposal of wastewater and supply of clean water for this area. Information with regards to sewer and water main flooding contained within the City of York Council SFRA and PFRA have been consulted. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.

3.5.2 A Yorkshire Water Pre-Planning Enquiry has not been submitted as it is proposed that the surface water will be discharged to private drainage and subsequently into an IDB maintained watercourse.

3.6 IDB (Ouse & Derwent DB)

3.6.1 It was confirmed that the surface water from the development site dicharges to a watercourse to the south which AW&P have assumed will discharged (directly or indirectly) into a IDB maintained watercourse. The local IDB (Ouse & Derwent DB) will be consulted in the planning process as a consultee.

4.0 PROPOSED DEVELOPMENT

4.1 The proposed development comprises of an extension to an existing industrial building which will be used as additional storage. The building will consist of a steel framed cladded building of similar construction to the existing buildings on site.

4.2 The proposed site layout and general arrangement drawings for the scheme is included in Appendix B.

4.3 In relation to the proposed development the following information is relevant in a flood risk and drainage context:

- Other than the formation of the new building, no additional impermeable areas/hard standing is to be created as part of proposed for the development.
- All existing impremeable area is positively drained and a single outlet has been identified to the south of the site. The existing surface water outlet will be maintained and utilised by the new system.
- Some of the existing impermeable areas will be built over. The proposed buildings will be drained into the new surface water system therefore impremeable area is neither lost nor gained.
- All surface water run off is to be attenuated and flows restricted prior to connecting into the existing system.

4.4 In terms of flood risk vulnerability, the development is classed as ‘Less Vulnerable’ (Table 3).

4.5 In terms of flood zone compatibility, the construction of ‘Less Vulnerable’ development is considered to be appropriate in Flood Zone 1 (Table 4).

4.6 Existing foul drainage is to be modified to suit the new development. The existing discharge point from the site will be retained and no additional flows will be discharged.

5.0 FLOOD RISK ASSESSMENT

5.1 Flood Zone

5.1.1 A copy of the Environment Agency Flood Map for Planning is included in Figure 5 below which identifies the development site to be located within an area designated as Flood Zone 1, (low probability of flooding), with a less than 1 in 1000 annual probability of flooding in any year.

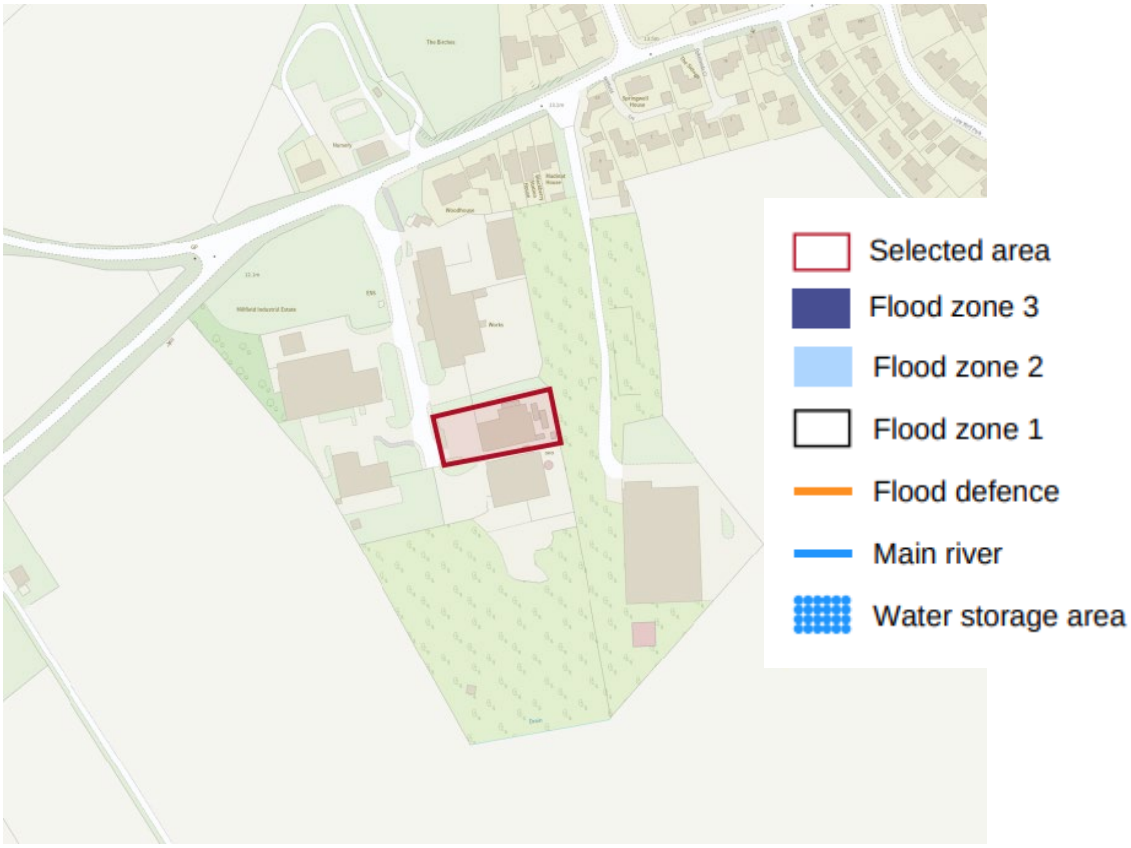


Figure 5: Environment Agency Flood Map for Planning dated July 2023

5.2 Fluvial Flooding

5.2.1 Figure 6 below shows that the site is not prone to flooding from any potential sources of fluvial flooding in the region.

5.2.2 The risk of flooding from this potential flood source is therefore considered to be low and acceptable.

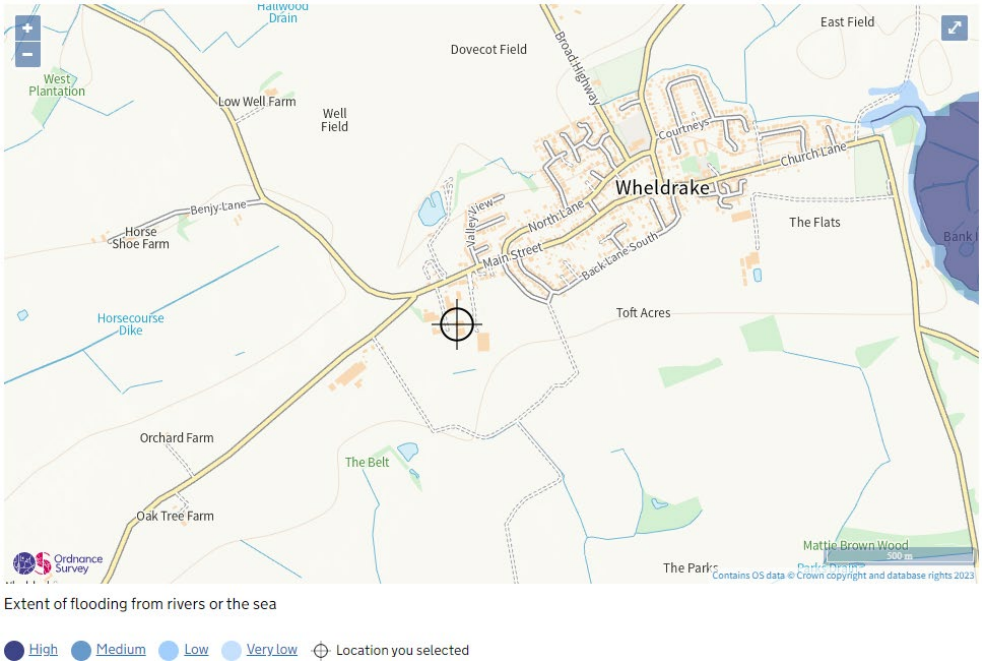


Figure 6: Environment Agency Flood Map for Risk of Flooding From Rivers or Sea dated July 2023

5.3 Surface Water (Pluvial) Flooding

5.3.1 A copy of the Environment Agency map showing the extent of flooding from surface water is included in Figure 7 below.

5.3.2 The map indicates that the development site has localised areas at ‘low risk’ to flooding from surface water flooding. This can can attirbuted to local low points in the external surfaces. Similar localised areas at low risk can be observed across Millfield Industrial Estate area.

5.3.3 The risk of flooding from this potential flood source is therefore considered to be low and acceptable.

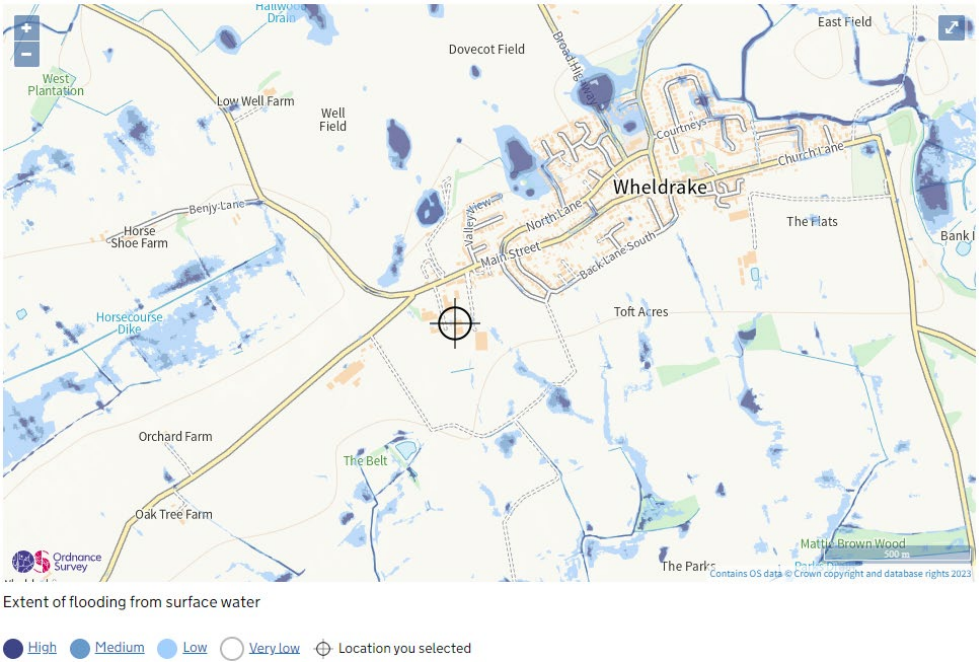


Figure 7: Environment Agency Map dated June 2022 showing the Extent of Flooding from Surface Water

5.4 Flooding from Open Drainage Ditches

5.4.1 Keldcarrs Drain, Leonard Scales Drain and Horsecourse Drain have been identified locally but they are not closer than 0.60km from the development site.

5.4.2 It is not considered that the volume of any such overtopping would be significant and the risk of flooding from these potential flood sources is considered to be acceptable.

5.5 Groundwater Flooding

5.5.1 Groundwater flooding can occur when the sub-surface water levels are high and emerges above ground level. Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).

5.5.2 There are no proposals to create any basements within the development and the construction works should not involve excessively deep excavation works. Therefore, the risk to the development from this potential flood source is considered to be acceptable.

5.6 Flood Risk from Existing Water Mains

5.6.1 There are likely to be existing water mains present in the public highways to the west of the development.

5.6.2 There are no known issues with regard to the condition of any such water mains. Further, flooding associated with damage to these pipelines would tend to be of a restricted nature with much lower volume than weather generated events, therefore, the risk to the development from this potential flood source is considered to be acceptable.

5.7 Flood Risk from Existing Drainage Services

5.7.1 Flooding from existing drainage services occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or due to capacity issues. Sewer flooding tends to occur sporadically in both location and time and such flood flows would tend to be confined to the streets around the development site.

5.7.2 Given its rural location, existing drainage services present in the vicinity of the site will be limited. However, any public sewer located within the vicinity of the site will inevitably have a limited capacity and in extreme conditions could surcharge, which may in turn may cause flooding.

5.7.3 Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 20 years.

5.7.4 The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, the risk to the development from this potential flood source is therefore considered to be low and acceptable.

5.8 Flood Risk from New Drainage Services

5.8.1 The new drainage will be designed to current standards, generally as set out in Section 7 of this report. Therefore, the risk to the development from this potential source is therefore considered to be low and acceptable.

5.9 Flooding from Reservoirs, Canals and Other Artificial Sources

5.9.1 Investigation indicate that there are no structures in the immediate vicinity of the development which are likely to pose a risk of flooding.

5.9.2 A copy of the map produced by the Environment Agency showing the extent of flooding from reservoirs is included in Figure 8 below.

5.9.3 The map shows that the development site is not considered to be at risk from reservoir flooding.

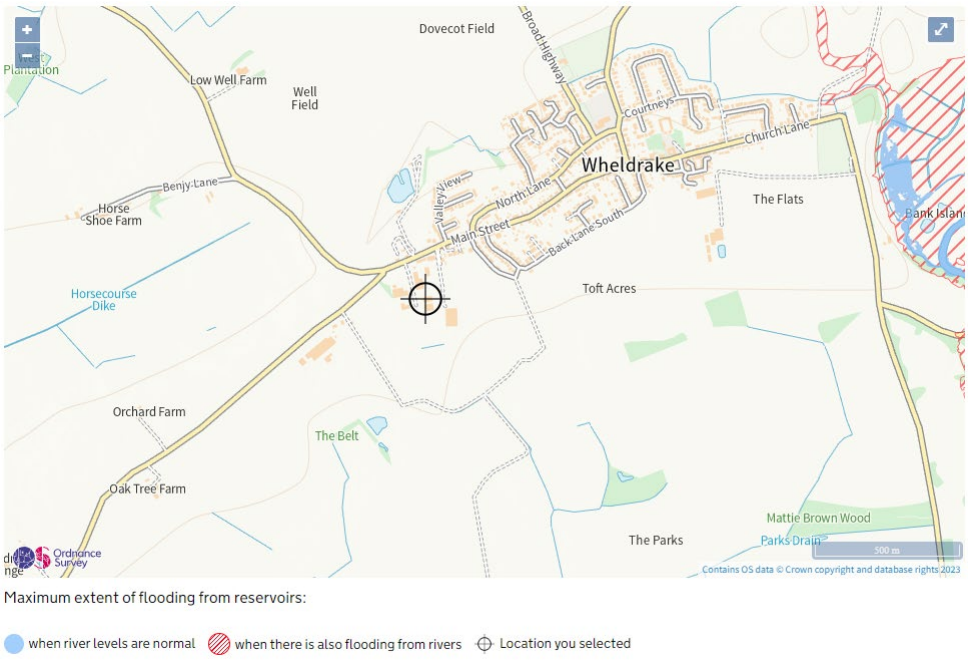


Figure 8: Environment Agency Map dated July 2023 showing the Extent of Flooding from Reservoirs

5.9.4 The risk to the development from reservoir flooding is considered to be low and acceptable.

5.10 Sequential Approach

5.10.1 The Sequential Test is required to assess flood risk and Planning Practice Guidance NPPF recommends that the test be applied at all stages of the planning process to direct new development to areas with the lowest probability of flooding (Flood Zone 1).

5.10.2 According to NPPF, if there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

5.10.3 As the development is located within Flood Zone 1 the Sequential Test has been satisfied.

6.0 FLOOD MITIGATION

6.1 Flood Zone / Finished Floor Levels

6.1.1 The development site is shown to lie within an area classified as 'low probability of flooding' on the maps produced by the Environment Agency.

6.1.2 No specific risk of flooding to the development has been identified in the preparation of this report.

6.1.3 As the development is not considered to be at risk from fluvial flood sources, there is no requirement to elevate the flood construction level above traditional levels of construction or to incorporate any flood resilient measures within the design of the development.

6.1.4 Finished floor levels are to be set a minimum of 150mm above the surrounding site levels.

6.2 External Ground Levels

6.2.1 The external finished ground levels shall be designed generally to ensure rainfall is channeled away from buildings to ensure there is no localised risk of overland surface water flooding to the building during an extreme rainfall event.

6.3 Safe Access/Egress

6.3.1 The assessment indicates the site, and its access, will not be flooded during the 1 in 100 year (plus climate change) event. Therefore, safe access and egress can be maintained for all events up to and including the 1 in 100 year (plus climate change) event in accordance with the NPPF and Environment Agency guidance.

6.3.2 The site is at such a ground level that it would only flood in the most extreme flood event. Likewise, the access and egress route will remain dry in all but the most extreme scenarios. Therefore, a safe access and egress route with minimum water depths would be possible for many hours if not days and would therefore provide an adequate amount of time for the site to be evacuated, if required.

6.4 Surface Water Drainage

6.4.1 The surface water drainage will be attenuated in accordance with Section 7 of this report in order to ensure the development does not pose a risk of flooding to other parties.

6.4.2 The volume of surface water storage required to balance excess flows between the 1 in 30 year and 1 in 100 year plus climate change storm event will be stored in a number of structures across the site, designed such that it does not pose a risk of flooding to the buildings or to other parties beyond the boundary of the development, before ultimately discharge into a local watercourse.

6.5 Flood Routing

6.5.1 The development has been designed such that the surface water runoff from new impermeable surfaces will be directed into a positive drainage system and excess volume will be attenuated on site.

6.5.2 Generally, overland flood routes will also be controlled by roughly maintaining existing site levels were possible to mitigate alterations to existing flood routing.

6.5.3 Flood routing drawings have been included in Appendix E of this report.

7.0 DRAINAGE ASSESSMENT

7.1 General

7.1.1 The surface water drainage has been designed in accordance with current CIRIA C753 SuDS Manual guidelines.

7.2 Surface Water Drainage

7.2.1 Existing Site

7.2.1.1 The site currently comprises a brownfield site consisting mostly of concrete hardstanding and existing industrial buildings consisting of a workshop, offices and storage. Car parking and road access is located to the west of the site.

7.2.1.2 The existing site extends to approximately 0.237 hectares in area.

7.2.1.3 The existing site is currently positively drained, which has been confirmed by site investigation with approval from CoYC LLFA Flood Risk Engineers.

7.2.2 Proposed Development Area

7.2.2.1 From the aerial photograph included in Section 2.0, it can be seen that the development area previously comprised almost entirely of brownfield development. No additional impermeable areas will be created during the development, therefore the design will assume that all of the existing and proposed site will consist of the same area of brownfield. The proposed development will drain into the same outlet utilised by the current system.

7.2.2.2 Existing surface water run-off has been calculated from the existing impermeable area of the site which outfalls to the south connection, based on BS EN 752, using a rainfall intensity of 50mm per hour:

SW run-off, $Q = \Psi i A$

Where,

Ψ	= 1.0 (for impermeable areas)
i	= 140 l/s/ha *
A	= 0.237 ha
Q	= 1.0 x 140 x 0.237 = <u>33.18 l/s</u>
*	140 l/s/ha as per City of York Council Sustainable Drainage Systems Guidance for Developers

7.2.3 Run-off Destination

7.2.3.1 Planning policy, i.e. National Planning Policy Framework (NPPF), establishes a preferred hierarchy for the disposal of surface water. Consideration should firstly be given to soakaway/infiltration, watercourse and sewer in that priority order.

7.2.3.2 The local ground conditions have been confirmed to be unsuitable for soakaways to be used as the means of disposal of surface water run-off from the new development (see Section 2.5).

7.2.3.3 A trial pit was excavated to an approximate depth of 1900mm below ground level and was located to the west of the of the site adjacent to the proposed extension. The natural ground consisted of sandy orange-brown clay, which was in accordance with the BGS data.

7.2.3.4 Due to the cohesive ground conditions, it was agreed with the CoYC LLFA Flood Risk Engineers that infiltration is not considered suitable for the disposal of surface water run-off from the development site. Therefore, it is was agreed to discharge surface water indirectly to the watercourses to the south of the site via an existing connection which serves the site.

7.2.3.5 We know the development site and the outfall is in Third Party ownership and we understand riparian ownership consent exists.

7.2.3.6 The watercourse is within the catchment of the Ouse and Derwent Internal Drainage Board (IDB) and is managed by the IDB (Leonard Scales Drain and Keldcarrs Drain).

7.2.4 Peak Flow Control

7.2.4.1 Based upon the impermeable areas from the site layout. It is proposed that the existing surface water will remain unchanged due to no new impermeable area being created.

7.2.4.2 The proposed impermeable area for the development has been calculated and subsequently the uncontrolled surface water run-off from the site based on BS EN 752 calculations using a rainfall intensity of 50mm per hour has also been calculated. The impermeable area has been calculated based on the proposed site plan.

7.2.4.3 The impermeable area and estimated uncontrolled surface water run-off are as follows:

- Total impermeable area for proposed development = 2370m^2
- SW run-off, Q = Ψ i A = 33.18 l/s

7.2.4.4 To meet the flood risk planning requirements it is unacceptable to discharge flows from new development sites at unrestricted rates.

7.2.4.5 It is therefore proposed that the curtilage surface water will discharge to the existing watercourse and will be restricted to the level of run-off to that from the existing use of the site, less a 30% reduction in the existing discharge rate.

7.2.4.6 The total proposed surface water discharge rates for the new development (applying the 30% reduction to the existing rate) is as follows:

- SW run-off = 33.18 l/s x 0.70 = 23 l/s

7.2.4.7 In order to ensure the discharge of surface water will not increase the risk of flooding to other properties, it will be necessary to attenuate the drainage by restricting the discharge and providing storage as required. The required storage will be provided by below ground cellular storage located beneath the car park to the west of the site. Attenuation storage is designed to store surface water run-off for storms up to and including a 1 in 100 year storm event with an allowance for +30% climate change (CC).

7.2.4.8 It is proposed that the restricted surface water will be conveyed to the watercourse via the existing surface water connection. The required restriction to the surface water run-off would be provided by means of a suitable flow control in the below ground drainage.

7.2.4.9 Based upon the above design criteria, calculations have been undertaken to determine the volume of surface water storage which would be required. A summary of the storage volumes required is set out in Table 5 below. Copies of the surface water storage calculations are included in Appendix C.

Table 5: Indicative Volume of Surface Water Storage Required

Storm Event	30 Year Storm	100 Year Storm + 30%
Storage Volume Required	38.8 m^3	70 m^3
Max. Permitted Outflow	23 l/s	23 l/s

7.2.4.10 A conceptual drainage layout drawing of the proposed drainage regime is included in Appendix D.

7.2.4.11 Due to the existing levels of the drainage on site and required depths of the proposed attenuation tank, the surface water will need to be pumped prior to discharge back into the existing system. A dual pump system will be utilised so that a stand by pump will always be available incase of pump failures. The pump system will utilise alarm/notification system to notify operators or pump failures so appropriate maintenace can be carried out as soon as possible. The pump station will be used to limit the discharge rate of the surface back to the existing system.

7.2.5 Volume Control

7.2.5.1 Due to no additional impermeable area being created, the run-off volume post development will be essentially the same as pre-development.

7.2.5.2 Due to the limitations on infiltrations methods of disposal and the fact that the surface water drainage system will be designed and constructed to meet Building Regulations requirements standards, the opportunity to reduce the surface water discharge volume is limited.

7.2.6 Climate Change

7.2.6.1 For new developments, the current design criteria required for the surface water drainage will need to be based upon the critical 1 in 100 year storm event, with an additional allowance to account for climate change resulting from global warming. There should be no above ground flooding for the 1 in 30 year return period and no property flooding or off site flooding from the critical 1 in 100 year storm event, with the additional allowance to account for climate change.

7.2.6.2 Table 2.1 of European Standard EN 1990:2002 sets out the minimum design working life for structures (see Table 6 below). Further, Table 7 shows The Environment Agency publication 'Flood Risk Assessment: climate change allowances (2017)' sets out the central and upper end anticipated changes to peak rainfall intensity for small and urban catchments.

7.2.6.3 The Lead Local Flood Authority require an allowance to be included for climate change. The lifetime of the proposed development is estimated at 30 years, therefore, the design rainfall event for the proposed development is the 1 in 100 year plus 30% climate change.

Table 6: Table 2.1 of European Standard EN 1990:2002: Indicative Design Working Life

Design working life category	Indicative design working life (years)	Examples
1	10	Temporary structures (1)
2	10 to 25	Replace structural parts, e.g. gantry girders, bearings
3	15 to 30	Agricultural and similar structures
4	50	Building structures and other common structures
5	100	Monumental building structures, bridges and other civil engineering structures

(1) Structures or parts of structures that can be dismantled with a view to being re-used should not be considered as temporary.

Table 7: Environment Agency Publication 'Flood Risk Assessment: Climate Change Allowances (2017)'

Applies across all of England	Total potential changes anticipated for '2020s' (2040 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

7.2.7 Pollution Control & Water Quality

7.2.7.1 It is a requirement to ensure that the quality of any receiving body is not adversely affected by the development.

7.2.7.2 Investigations have revealed that the development site does not lie within a Groundwater Source Protection Zone.

7.2.7.3 Investigations have revealed that the development site overlays a Principal Aquifer and within a Groundwater Vulnerability Zone (Medium - High). The site is not located within a Source Protection Zone. The point of discharge from site at the Leonard Scales Drain or Keldcarrs Drain, the Groundwater Vulnerability Zone is designated as Low.

7.2.7.4 In order to minimise the risk of pollution entering the ground water and any final watercourse, the rainfall run-off from the roof areas of the new buildings should discharge directly to the sealed below ground drainage network (i.e. no gullies). Consequently, the risk of pollutants being discharged to the ground water is extremely remote.

7.2.7.5 In order to minimise the risk of pollutants entering the ground water from the areas of hardstanding and vehicle parking, it is recommended that the final inspection chamber prior to discharge to the attenuation tank should contain a silt trap and filter.

7.2.7.6 There is a single car parking area to the west of the proposed development (area approx. 710m^2). The area is less than 800m^2 there is no requirement for a by-pass separator.

7.2.8 Future Development / Urban Creep

7.2.8.1 Should additional impermeable areas be proposed in the future (over and above that already allowed), then run-off will need to be controlled such that discharge rates exiting the site do not exceed agreed run-off rates.

7.2.9 Designing for Exceedance

7.2.9.1 Current best practice guidance on flood risk requires an evaluation of how rainfall event beyond the design capacity of the proposed drainage system would be managed and what effects they are likely to have on flood risk at the site or surrounding areas.

7.2.9.2 The existing overland flow routes will generally be maintained within the final layout of the development site without increasing the flood risk to off-site parties.

7.2.9.3 As described above, overland flood risk from exceedance flows and from off-site sources will be mitigated to a large extent by the creation of the new drainage system, as described above. This will prevent prolonged periods of ground saturation and thus reduce the risk of increased run-off in situations where the level of saturation precludes absorption.

7.2.9.4 It should however be noted that any existing flood risk may reduce by the creation of a formal surface water drainage system but cannot be entirely removed.

7.2.9.5 The fact that overland flood routing is shown going off site does not mean that the flood risk to off-site parties is increased. This flood risk already exists, and whilst the proposed development should not increase this risk, it cannot remove this risk entirely.

7.2.9.6 A copy of the schematic layouts indicating proposed flow routing for the development is included in Appendix E.

7.2.10 Operation and Maintenance

7.2.10.1 The proposed drainage design consists of traditional manholes and pipes, silt traps and below ground attenuation tank.

7.2.10.2 Operation and maintenance requirements of the drainage components, as listed above, will be undertaken in accordance with Chapter 32 of the CIRIA SuDS Manual and any relevant manufacturer's recommendations. See also BS 8582:2013 Code of Practice for Surface Water Management for Development Sites Section 11 and Susdrain Fact Sheet on SuDS Maintenance and Adoption Options (England) dated September 2015.

7.2.10.3 The responsibility for the operation and maintenance of the drainage and SuDS will lie with the appointed contractor for the full duration of construction and throughout the maintenance period. Following this maintenance period, ownership (and therefore operation and maintenance responsibilities) of the full system will pass to the site owner / operator.

7.2.10.4 The personnel undertaking the maintenance should have appropriate experience of SuDS and drainage maintenance and should be capable of keeping sufficiently detailed records of any inspections. An example of a checklist for SuDS maintenance can be found within Appendix B of the CIRIA C753 SuDS Manual v2. If personnel do not have appropriate experience, then specific inspection visits may be necessary.

7.2.10.5 An initial inspection should be undertaken once construction is complete, to ensure that it has been constructed as designed. An as-built survey and handover inspection should be undertaken at the end of the contractors initial maintenance period. It should supplement the final construction inspection and is not a replacement of construction inspections.

7.2.10.6 During the first year of operations of SuDS, inspections should usually be carried out at monthly intervals (and after significant storm events) to ensure that the system is functioning as designed and that no damage is evident. Thereafter, an appropriate inspection regime, as noted in the following tables, should be implemented.

7.2.10.7 Operation and maintenance requirements for the silt traps are set out in Table 8 below.

Table 8: Operation and Maintenance Requirements for Silt Traps (Based on CIRIA C753 Table 14.2)

Maintenance schedule	Required action	Typical Frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	6 monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	6 monthly

	Inspect filter media and establish appropriate replacement frequencies	6 monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every 6 months

7.2.10.8 Operation and maintenance requirements for the traditional pipes and manholes are set out in Table 9 below.

Table 9: Operation and Maintenance Requirements for Traditional Pipes and Manholes (Based on CIRIA C714 and CIRIA C753 Section 32)

Maintenance schedule	Required action	Typical Frequency
Remedial actions	Replace malfunctioning parts or structures	As required, based on inspections
	Remove litter and debris	As required, based on inspections
	Root cutting	As required, based on inspections
	Repair or replace pipework	As required if structural collapse / failure occurs
Monitoring	Inspect for evidence of poor operation / pollution	Monthly during first year of operation, then annually
	Inspect for sediment or debris	As required, after significant storm events or if blockage reported
	Inspect structural condition of pipework/manholes	Monthly during first year of operation, then five yearly, or as required if blockage reported

7.2.10.9 Operation and maintenance requirements for attenuation tanks are set out in Table 10 below.

Table 10: Operation and Maintenance Requirements for Attenuation Tanks (Based on CIRIA C753 Table 21.3)

Maintenance schedule	Required action	Typical frequency
Regular	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually

maintenance	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows 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*

7.2.10.10 Maintenance regimes will be regularly assessed (e.g. once per year) to make sure that the approach is still meeting the drainage, landscape and any other objectives. This may result in changes to the maintenance of a feature or area.

7.2.10.11 Maintenance of pump station equipment will be provided by the pump manufacturer and suppliers. This should be obtained once the pump is installed and commissioned.

7.2.10.12 All SuDS maintenance shall take into account the protection of habitats and associated ecology as Chapter 6 of the CIRIA C753 SuDS Manual v2.

7.2.11 Timetable for Implementation

7.2.11 It is essential to consider the timetable for implementation of SuDS features during the construction phase of the works, as this phase of the project can be critical in terms of on and off-site flooding and pollution. Consideration shall therefore be given to installing the SuDS features as early as possible during the construction phase of the works, after any site strip.

7.2.12 Temporary measures to mitigate increased run-off and pollution during the construction phase shall be considered by the appointed contractor and agreed with all relevant stakeholders via a Construction and Environmental Management Plan (CEMP). This may include the use of temporary attenuation, silt and sediment holding tanks / matting.

7.3 Foul Water Drainage

7.3.1 It is proposed that foul water waste from the development will be discharged to the same outlet currently utilised by the site.

7.3.3 Since the proposed use of the additional building area is for storage only, it is assumed that the occupancy of the site will not change from the currently number/usage.

7.3.4 At this point in time, the invert level of the point of connection is unknown. However, based on existing foul drainage drawings of the site, it is expected that the new fould drainage system will be able to connect into the existing and discharge at the existing outlet downstream.

7.3.5 A concept drainage strategy drawing for the project is included in Appendix D showing a proposed arrangement of the foul water drainage.

8.0 SUMMARY

8.1 This report has been prepared to assess the flood risk and drainage implications for a proposed a new extension to an agricultural building at 2 Millfield Industrial Estate, Wheldrake, York.

8.2 This report has considered other potential sources of flooding to the site, including fluvial, groundwater, surface water, existing sewers, water mains and other artificial sources.

8.3 No other specific issues in respect of flood risk have been identified in the preparation of this report.

8.4 No specific flood mitigation measures are considered to be required within the design of the development proposals.

8.5 The overall risk of flooding to the development is considered to be low and acceptable.

8.6 Overall, this report also demonstrates that the site can be suitably, safely and sustainably drained, with the development being designed and constructed to meet the required standards.

8.7 Surface water run-off will be suitably restricted and discharged to the adjacent watercourse, via the proposed drainage system at an approved/acceptable rate.

8.8 The risk of pollution to the adjacent watercourse and underlying aquifer have been adequately assessed and appropriate measures have been implemented in the drainage design.

8.9 The risk of drainage system failure has been adequately assessed and appropriate measures have been implemented into the design of the scheme.

8.10 Based on the details incorporated within our report, it is considered that planning consent can be granted for the proposed development in terms of the flood risk and drainage aspects of the project.

APPENDIX A

Topographic Survey Drawing

NOTES:

1. THESE NOTES ARE INTENDED TO AUGMENT DRAWINGS AND SPECIFICATIONS. WHERE CONFLICT OF REQUIREMENTS EXIST THE ORDER OF PRECEDENCE SHALL BE AS SHOWN IN THE SPECIFICATION. OTHERWISE THE STRICTEST PROVISION SHALL GOVERN.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
3. DRAWINGS NOT TO BE SCALED. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER AND FURTHER INSTRUCTIONS OBTAINED BEFORE WORK IS COMMENCED.
4. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE AND ENSURE THAT THE BUILDING AND ITS COMPONENTS ARE SAFE DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE-DOWNS WHICH MAY BE NECESSARY, SUCH MATERIAL REMAINING THE THE PROPERTY OF THE CONTRACTOR ON COMPLETION, AND FOR ENSURING THAT THE WORKS AND ANY ADJACENT PROPERTIES ARE SAFE IN THE TEMPORARY CONDITION.

Rev	Description	Date	By	Chk	App
P1	FIRST ISSUE	DD.MM.YY	--	--	--

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Project: We Jar It Ltd, Wheldrale, York

Client: Mercer Foods Ltd.

Drawing: Topographical Survey

Role: Civil Engineer

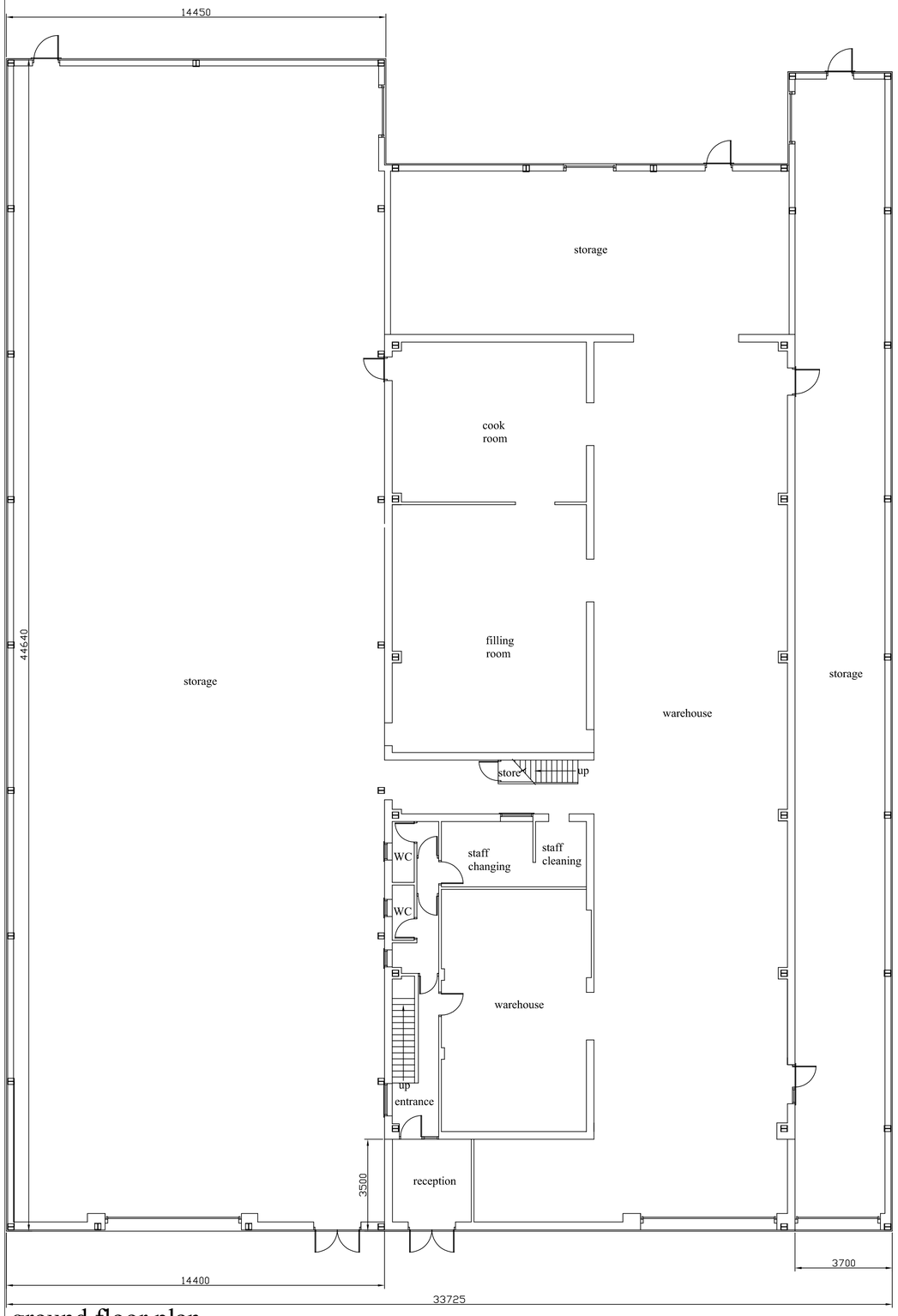
Drawing Status: Status | Suitability Code: S3

Job. no. 49768 | Scale@ A1: As Noted | Rev. P01

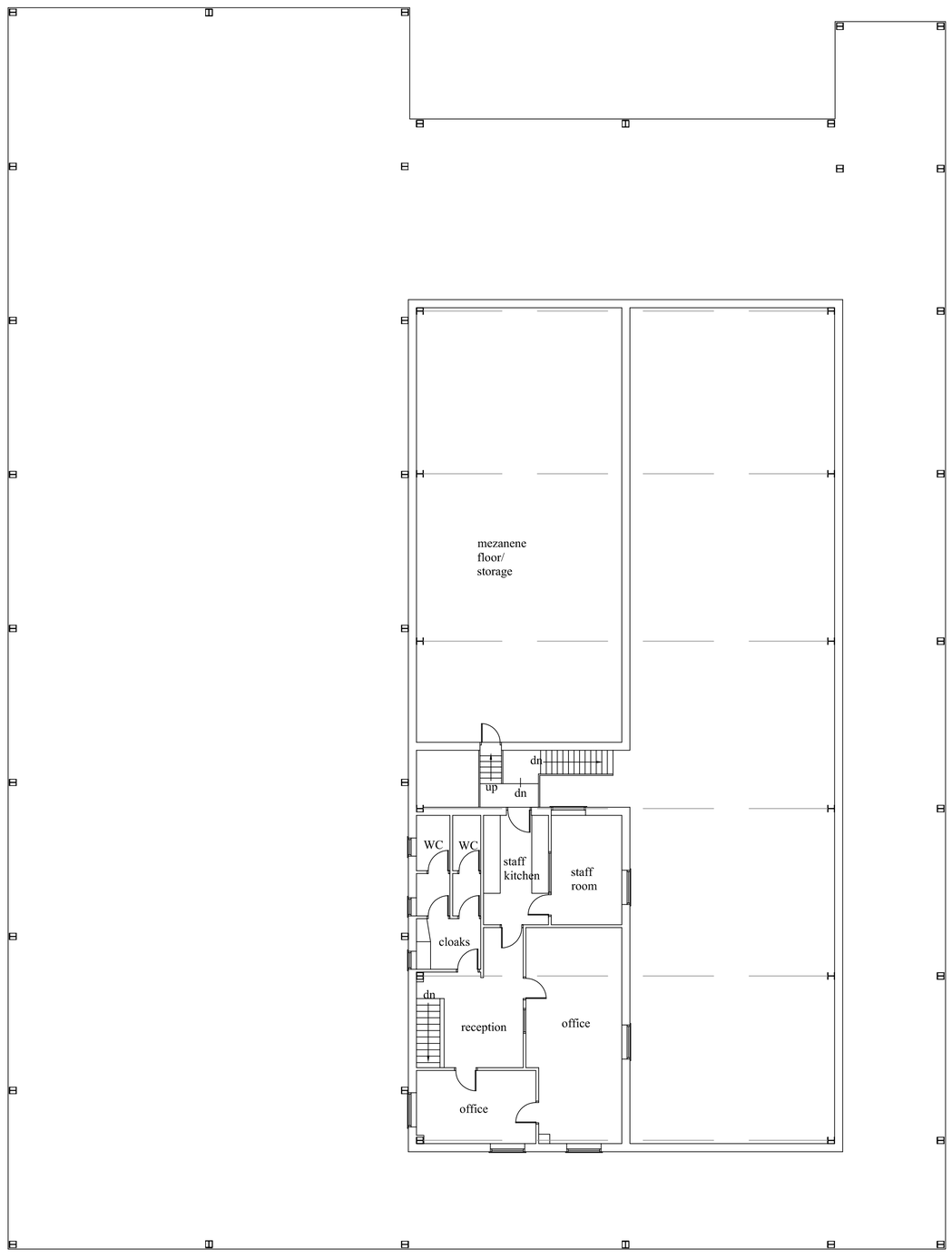
Project	Originator	Zone	Level	Type	Role	Number
WJI	AWP	ZZ	XX	D	C	0001

APPENDIX B

General Arrangement Drawings



ground floor plan



first floor plan

0 1m 2m 3m

SCALE 1:50

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client

Mercers Foods

site

2 Millfield Industrial Estate Wheldrake York

job

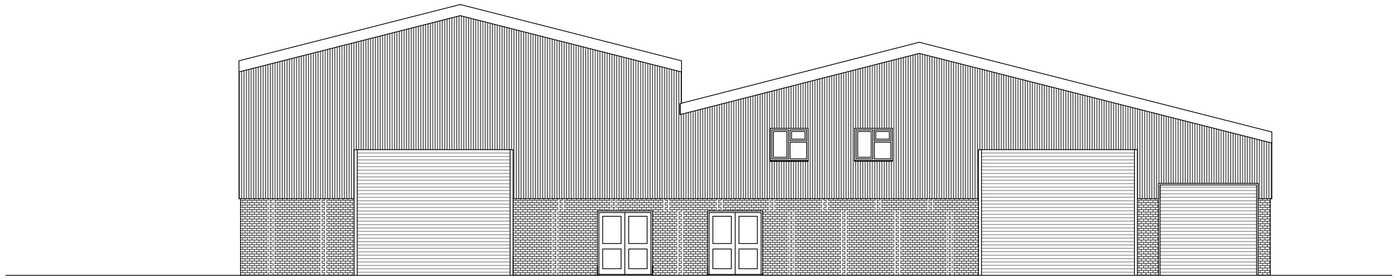
Erection of various extensions to replace existing structures

drawing

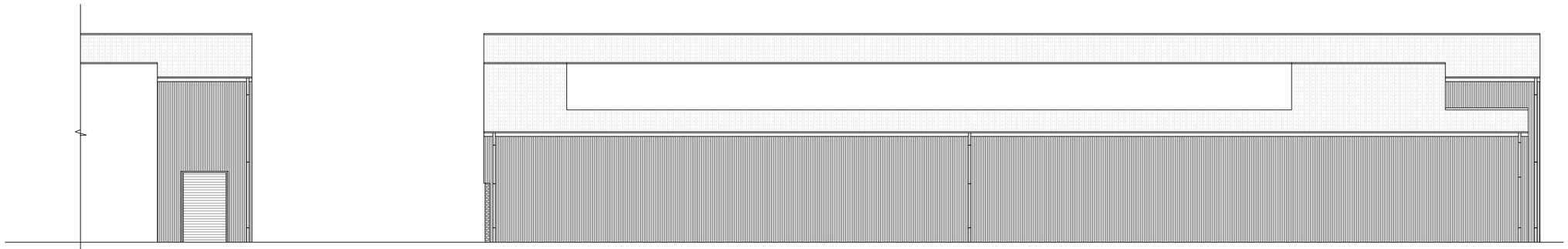
Proposed floor plans

date	drwn by
August 2023	Rob Room
scale 1:100,	rev

drwg no. M04 / 2058 / 03

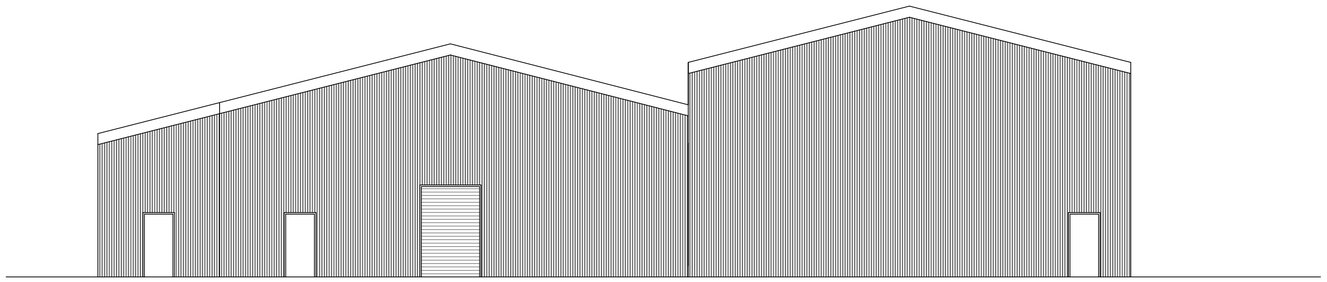


West elevation

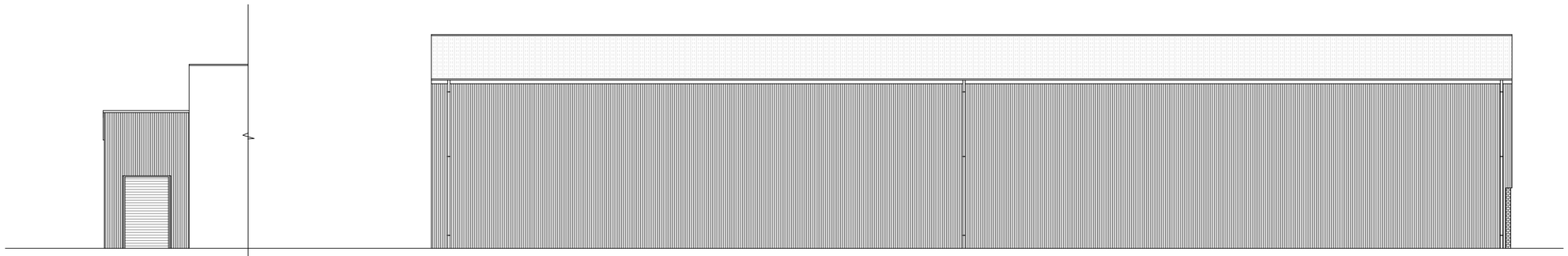


South elevation

South elevation



East elevation



North elevation

North elevation

0 1m 2m 3m 4m 5m 6m

SCALE 1:100

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client

Mercers Foods

site

2 Millfield Industrial Estate Wheldrake York

job

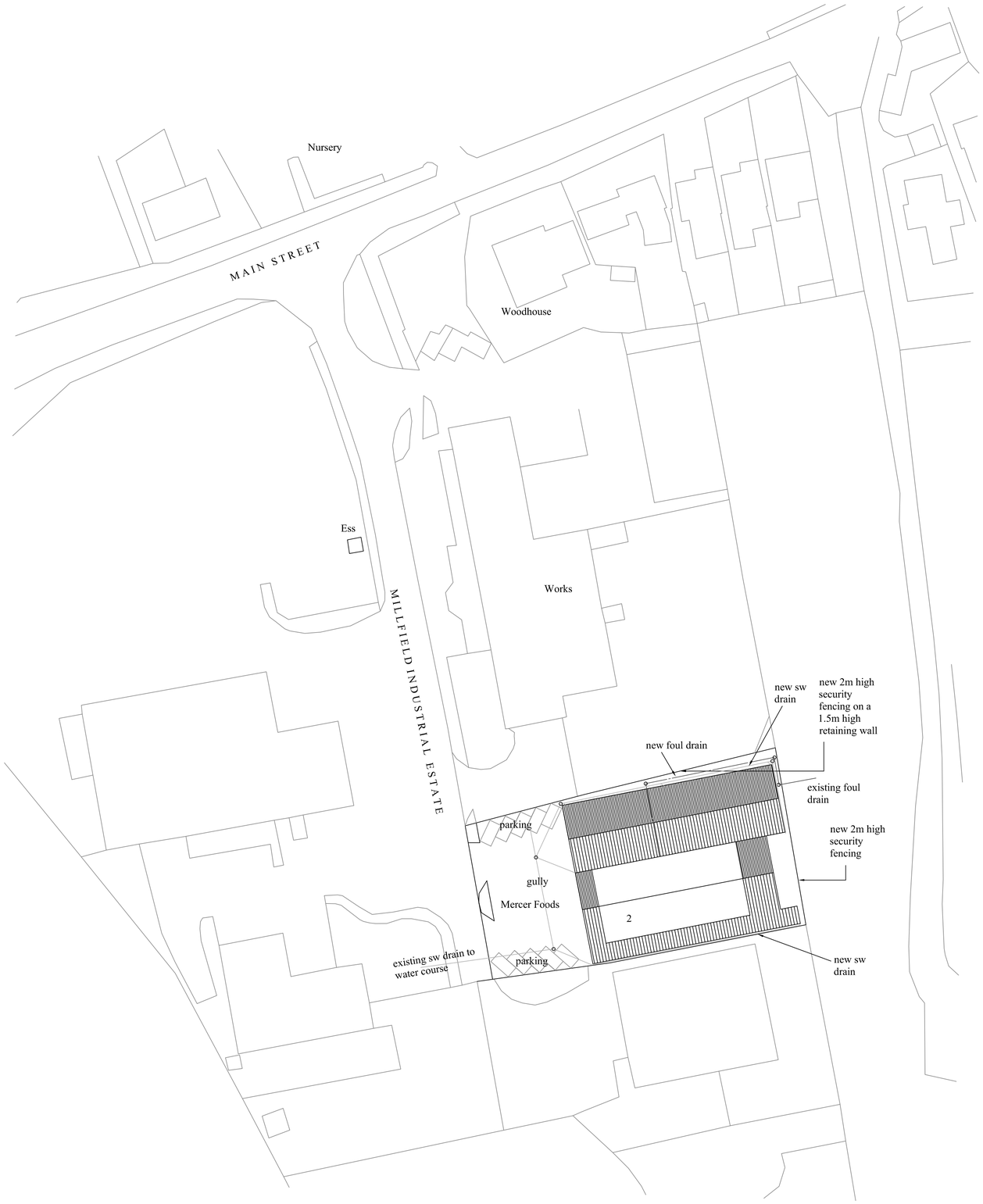
Erection of various extensions to replace existing structures

drawing

Proposed Elevations

date	drwn by
August 2023	Rob Room
scale 1:100,	rev

drwg no. M04 / 2058 / 04



proposed site plan

0 10m 20m 30m

SCALE 1:500

N

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Erection of various extensions to replace existing structures

drawing
Proposed site plan

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APPENDIX C

Surface Water Storage Calculations

Summary of Results for 30 year Return Period

Half Drain Time : 38 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control Σ (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	10.961	0.311	0.0	8.9	8.9	27.2	O K
30 min Summer	11.012	0.362	0.0	10.4	10.4	31.6	O K
60 min Summer	11.039	0.389	0.0	11.2	11.2	34.0	O K
120 min Summer	11.034	0.384	0.0	11.0	11.0	33.5	O K
180 min Summer	11.012	0.362	0.0	10.4	10.4	31.6	O K
240 min Summer	10.988	0.338	0.0	9.7	9.7	29.5	O K
360 min Summer	10.947	0.297	0.0	8.5	8.5	25.9	O K
480 min Summer	10.915	0.265	0.0	7.6	7.6	23.2	O K
600 min Summer	10.890	0.240	0.0	6.9	6.9	21.0	O K
720 min Summer	10.870	0.220	0.0	6.3	6.3	19.3	O K
960 min Summer	10.840	0.190	0.0	5.5	5.5	16.6	O K
1440 min Summer	10.800	0.150	0.0	4.3	4.3	13.1	O K
2160 min Summer	10.765	0.115	0.0	3.3	3.3	10.1	O K
2880 min Summer	10.745	0.095	0.0	2.7	2.7	8.3	O K
4320 min Summer	10.721	0.071	0.0	2.0	2.0	6.2	O K
5760 min Summer	10.708	0.058	0.0	1.7	1.7	5.0	O K
7200 min Summer	10.699	0.049	0.0	1.4	1.4	4.2	O K
8640 min Summer	10.692	0.042	0.0	1.2	1.2	3.7	O K
10080 min Summer	10.687	0.037	0.0	1.1	1.1	3.3	O K
15 min Winter	11.000	0.350	0.0	10.1	10.1	30.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.014	0.0	31.8	16
30 min Summer	46.909	0.0	41.5	26
60 min Summer	29.238	0.0	51.7	42
120 min Summer	17.704	0.0	62.6	76
180 min Summer	13.070	0.0	69.4	110
240 min Summer	10.495	0.0	74.3	142
360 min Summer	7.666	0.0	81.4	206
480 min Summer	6.135	0.0	86.8	268
600 min Summer	5.158	0.0	91.3	330
720 min Summer	4.475	0.0	95.0	390
960 min Summer	3.575	0.0	101.2	512
1440 min Summer	2.602	0.0	110.5	752
2160 min Summer	1.892	0.0	120.5	1120
2880 min Summer	1.508	0.0	128.0	1472
4320 min Summer	1.094	0.0	139.4	2204
5760 min Summer	0.871	0.0	147.9	2936
7200 min Summer	0.729	0.0	154.9	3672
8640 min Summer	0.631	0.0	160.7	4400
10080 min Summer	0.558	0.0	165.9	5136
15 min Winter	72.014	0.0	35.6	16

Summary of Results for 30 year Return Period

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	11.056	0.406	0.0	11.7	11.7	35.5	O K
60 min Winter	11.080	0.430	0.0	12.4	12.4	37.6	O K
120 min Winter	11.057	0.407	0.0	11.7	11.7	35.6	O K
180 min Winter	11.021	0.371	0.0	10.7	10.7	32.4	O K
240 min Winter	10.987	0.337	0.0	9.7	9.7	29.5	O K
360 min Winter	10.933	0.283	0.0	8.1	8.1	24.8	O K
480 min Winter	10.894	0.244	0.0	7.0	7.0	21.4	O K
600 min Winter	10.865	0.215	0.0	6.2	6.2	18.8	O K
720 min Winter	10.843	0.193	0.0	5.5	5.5	16.8	O K
960 min Winter	10.810	0.160	0.0	4.6	4.6	14.0	O K
1440 min Winter	10.771	0.121	0.0	3.5	3.5	10.6	O K
2160 min Winter	10.740	0.090	0.0	2.6	2.6	7.8	O K
2880 min Winter	10.722	0.072	0.0	2.1	2.1	6.3	O K
4320 min Winter	10.703	0.053	0.0	1.5	1.5	4.6	O K
5760 min Winter	10.692	0.042	0.0	1.2	1.2	3.7	O K
7200 min Winter	10.685	0.035	0.0	1.0	1.0	3.1	O K
8640 min Winter	10.681	0.031	0.0	0.9	0.9	2.7	O K
10080 min Winter	10.677	0.027	0.0	0.8	0.8	2.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	46.909	0.0	46.5	28
60 min Winter	29.238	0.0	57.9	46
120 min Winter	17.704	0.0	70.2	82
180 min Winter	13.070	0.0	77.7	116
240 min Winter	10.495	0.0	83.2	150
360 min Winter	7.666	0.0	91.1	214
480 min Winter	6.135	0.0	97.3	278
600 min Winter	5.158	0.0	102.2	340
720 min Winter	4.475	0.0	106.4	400
960 min Winter	3.575	0.0	113.3	522
1440 min Winter	2.602	0.0	123.7	764
2160 min Winter	1.892	0.0	134.9	1124
2880 min Winter	1.508	0.0	143.4	1480
4320 min Winter	1.094	0.0	156.1	2204
5760 min Winter	0.871	0.0	165.7	2912
7200 min Winter	0.729	0.0	173.4	3672
8640 min Winter	0.631	0.0	180.0	4328
10080 min Winter	0.558	0.0	185.8	5056

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.236

Time (mins) From:	To:	Area (ha)
0	4	0.236

Model Details

Storage is Online Cover Level (m) 12.650

Cellular Storage Structure

Invert Level (m) 10.650 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	92.0	0.0	0.801	0.0	0.0
0.800	92.0	0.0			

Pump Outflow Control

Invert Level (m) 10.650

Depth (m)	Flow (l/s)
0.800	23.0000

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 38 minutes.

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	11.174	0.524	0.0	15.1	15.1	45.8	O K
30 min Summer	11.265	0.615	0.0	17.7	17.7	53.7	O K
60 min Summer	11.315	0.665	0.0	19.1	19.1	58.1	O K
120 min Summer	11.306	0.656	0.0	18.9	18.9	57.4	O K
180 min Summer	11.267	0.617	0.0	17.7	17.7	54.0	O K
240 min Summer	11.225	0.575	0.0	16.5	16.5	50.3	O K
360 min Summer	11.152	0.502	0.0	14.4	14.4	43.9	O K
480 min Summer	11.097	0.447	0.0	12.8	12.8	39.1	O K
600 min Summer	11.054	0.404	0.0	11.6	11.6	35.3	O K
720 min Summer	11.019	0.369	0.0	10.6	10.6	32.3	O K
960 min Summer	10.966	0.316	0.0	9.1	9.1	27.6	O K
1440 min Summer	10.898	0.248	0.0	7.1	7.1	21.7	O K
2160 min Summer	10.840	0.190	0.0	5.5	5.5	16.6	O K
2880 min Summer	10.806	0.156	0.0	4.5	4.5	13.6	O K
4320 min Summer	10.766	0.116	0.0	3.3	3.3	10.1	O K
5760 min Summer	10.743	0.093	0.0	2.7	2.7	8.1	O K
7200 min Summer	10.728	0.078	0.0	2.2	2.2	6.8	O K
8640 min Summer	10.717	0.067	0.0	1.9	1.9	5.9	O K
10080 min Summer	10.710	0.060	0.0	1.7	1.7	5.2	O K
15 min Winter	11.239	0.589	0.0	16.9	16.9	51.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	121.269	0.0	53.6	16
30 min Summer	79.695	0.0	70.5	26
60 min Summer	49.937	0.0	88.3	42
120 min Summer	30.267	0.0	107.1	76
180 min Summer	22.297	0.0	118.4	110
240 min Summer	17.851	0.0	126.3	142
360 min Summer	12.957	0.0	137.6	206
480 min Summer	10.330	0.0	146.2	268
600 min Summer	8.659	0.0	153.2	330
720 min Summer	7.492	0.0	159.1	390
960 min Summer	5.959	0.0	168.7	512
1440 min Summer	4.309	0.0	183.0	752
2160 min Summer	3.110	0.0	198.2	1120
2880 min Summer	2.466	0.0	209.5	1472
4320 min Summer	1.775	0.0	226.2	2204
5760 min Summer	1.405	0.0	238.6	2936
7200 min Summer	1.171	0.0	248.6	3672
8640 min Summer	1.008	0.0	257.0	4400
10080 min Summer	0.889	0.0	264.2	5136
15 min Winter	121.269	0.0	60.1	16

Summary of Results for 100 year Return Period (+30%)

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	11.340	0.690	0.0	19.8	19.8	60.3	O K
60 min Winter	11.384	0.734	0.0	21.1	21.1	64.1	O K
120 min Winter	11.346	0.696	0.0	20.0	20.0	60.9	O K
180 min Winter	11.283	0.633	0.0	18.2	18.2	55.3	O K
240 min Winter	11.224	0.574	0.0	16.5	16.5	50.1	O K
360 min Winter	11.129	0.479	0.0	13.8	13.8	41.8	O K
480 min Winter	11.062	0.412	0.0	11.8	11.8	36.0	O K
600 min Winter	11.012	0.362	0.0	10.4	10.4	31.6	O K
720 min Winter	10.973	0.323	0.0	9.3	9.3	28.2	O K
960 min Winter	10.917	0.267	0.0	7.7	7.7	23.3	O K
1440 min Winter	10.850	0.200	0.0	5.7	5.7	17.5	O K
2160 min Winter	10.797	0.147	0.0	4.2	4.2	12.9	O K
2880 min Winter	10.768	0.118	0.0	3.4	3.4	10.3	O K
4320 min Winter	10.736	0.086	0.0	2.5	2.5	7.5	O K
5760 min Winter	10.718	0.068	0.0	1.9	1.9	5.9	O K
7200 min Winter	10.707	0.057	0.0	1.6	1.6	4.9	O K
8640 min Winter	10.699	0.049	0.0	1.4	1.4	4.3	O K
10080 min Winter	10.693	0.043	0.0	1.2	1.2	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	79.695	0.0	79.0	28
60 min Winter	49.937	0.0	99.0	46
120 min Winter	30.267	0.0	120.0	82
180 min Winter	22.297	0.0	132.6	116
240 min Winter	17.851	0.0	141.5	150
360 min Winter	12.957	0.0	154.1	214
480 min Winter	10.330	0.0	163.8	278
600 min Winter	8.659	0.0	171.6	338
720 min Winter	7.492	0.0	178.2	400
960 min Winter	5.959	0.0	189.0	522
1440 min Winter	4.309	0.0	205.0	766
2160 min Winter	3.110	0.0	221.9	1124
2880 min Winter	2.466	0.0	234.6	1496
4320 min Winter	1.775	0.0	253.3	2204
5760 min Winter	1.405	0.0	267.3	2936
7200 min Winter	1.171	0.0	278.4	3616
8640 min Winter	1.008	0.0	287.8	4408
10080 min Winter	0.889	0.0	295.9	5080

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.236

Time (mins) From:	To:	Area (ha)
0	4	0.236

Model Details

Storage is Online Cover Level (m) 12.650

Cellular Storage Structure

Invert Level (m) 10.650 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	92.0	0.0	0.801	0.0	0.0
0.800	92.0	0.0			

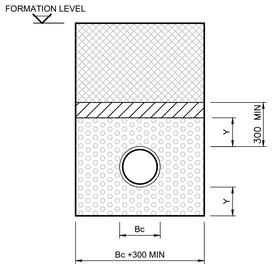
Pump Outflow Control

Invert Level (m) 10.650

Depth (m)	Flow (l/s)
0.800	23.0000

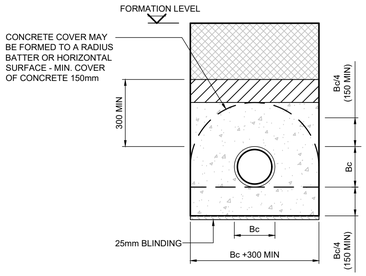
APPENDIX D

Proposed Drainage Drawings



CLASS S BEDDING DETAIL

SCALE 1:20



CLASS Z CONCRETE BEDDING DETAIL

(EXTERNALLY AS PER NOTE 15 OF DRAINAGE NOTES)

SCALE 1:20

4/20 COARSE GRADED AGGREGATE GRADING TABLE	
SIEVE SIZE (mm)	PERCENTAGE PASSING (%)
40	100
31.5	98 - 100
20	90 - 99
10	25 - 70
4	0 - 15
2	0 - 5

TABLE 2: 4/20 COARSE GRADED AGGREGATE GRADING TABLE

NOMINAL PIPE DIA (mm)	SINGLE SIZED (mm)	GRADED (mm)
100	10	N/A
OVER 100 TO 150	10 OR 14	14 TO 5
OVER 150 TO 300	10,14 OR 20	14 TO 5 OR 20 TO 5
OVER 300 TO 525	14 OR 20	14 TO 5 OR 20 TO 5
GREATER THAN 525	14,20 OR 40	14 TO 5,20 TO 5 OR 40 TO 5

GRANULAR BEDDING MATERIAL TABLE.

(ALL AGGREGATES TO BS EN 13242, PD 6682-6:2003 & BS EN 13055-2)

NOTES

A) Bc = OUTSIDE DIAMETER OF PIPE BARREL.

B) Y = FOR UNIFORM SOILS:

SLEEVE JOINTED PIPES, MIN. 50mm OR 1/6Bc, WHICHEVER IS THE GREATER. SOCKETED PIPE, MIN. 100mm OR 1/6Bc, WHICHEVER IS THE GREATER UNDER BARRELS, NOT LESS THAN 50mm UNDER SOCKETS. FOR ROCK OR MIXED SOILS CONTAINING ROCK BANDS, BOULDERS, STONES OR OTHER IRREGULAR HARD SPOTS: SLEEVE JOINTED PIPES, MIN. 150mm OR 1/4Bc, WHICHEVER IS THE GREATER. SOCKETED PIPE, MIN. 200mm OR 1/4Bc, WHICHEVER IS THE GREATER UNDER BARRELS, NOT LESS THAN 150mm UNDER SOCKETS.

CONCRETE BED AND SURROUND TO BE DISCONTINUED AT EVERY PIPE JOINT (NOT TO EXCEED 5m) USING COMPRESSIBLE FILLER. COMPRESSIBLE FILLER TO BE 18mm THICK FOR PIPEWORK UPTO 450mm DIAMETER, FOR PIPES OVER 450mm FLEXCELL JOINTS TO BE 36mm THICK

PIPE BEDDING DETAIL KEY

SELECTED BACKFILL - SEE NOTE B2.

BACK FILL - TO STRUCTURAL ENGINEERS SPECIFICATION UNDER BUILDING & NOTES B3, B4 ELSEWHERE

GRANULAR MATERIAL - REFER TO GRANULAR BEDDING MATERIAL TABLE & NOTE B1

CONCRETE BEDDING - DESIGNATION GEN 3 - SEE NOTE B5.

CONCRETE BLINDING - DESIGNATION GEN 1 - SEE NOTE B5.

BEDDING NOTES:

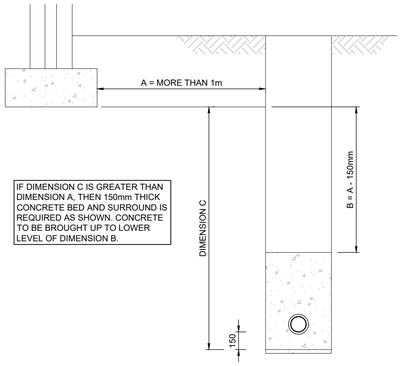
B1. PIPE BEDDING MATERIALS TO COMPLY GENERALLY WITH SHW - SERIES 500 - CLAUSE 503. GRANULAR BEDDING MATERIALS TO ALSO COMPLY WITH BS EN 13242 & THE GRANULAR BEDDING MATERIAL TABLE ON THIS DRAWING.

B2. SELECTED BACKFILL MATERIAL TO BE PROVIDED ABOVE THE PIPE SURROUND TO A HEIGHT OF 300mm MINIMUM ABOVE THE TOP OF THE PIPE. SELECTED BACKFILL MATERIAL TO BE CLASS 8 - LOWER TRENCH FILL MATERIAL IN ACCORDANCE WITH SHW - SERIES 600 TABLE 6/1 & TO COMPRISE OF UNIFORM SOIL, FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL & VEGETABLE MATTER. SELECTED BACKFILL MATERIAL TO BE PLACED & COMPACTED IN LAYERS NOT EXCEEDING 150mm IN THICKNESS. SHOULD THE MATERIAL BE UNSUITABLE OR WEATHER CONDITIONS AFFECT THE MATERIALS STABILITY, THEN A SUITABLE HARD GRANULAR MATERIAL SHALL BE USED.

B3. GENERAL BACKFILL TO DRAINAGE TRENCHES [OTHER THAN FILTER DRAINS] IN VEHICULAR TRAFFICKED AREAS ABOVE THE PIPE BEDDING & SELECTED BACKFILL SHALL BE CLASS 1, 2 OR 3 GENERAL FILL MATERIAL IN ACCORDANCE WITH SHW - SERIES 600.

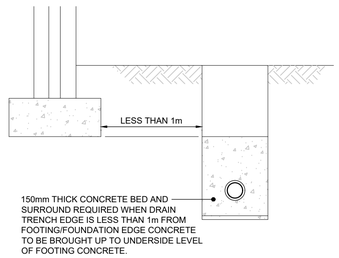
B4. GENERAL BACKFILL UNDER NON-VEHICULAR TRAFFICED AREAS TO BE SUITABLE AS-DUG MATERIAL COMPACTED IN ACCORDANCE WITH SHW - SERIES 600 IN LAYERS NOT EXCEEDING 225mm, EACH LAYER COMPACTED TO FORM A STABLE TRENCH BACKFILL, SHOULD THE MATERIAL BE UNSUITABLE OR WEATHER CONDITIONS AFFECT THE MATERIALS STABILITY, THEN A HARD GRANULAR MATERIAL SHALL BE USED UP TO FORMATION LEVEL.

B5. ALL CONCRETE TO BE DESIGNATED CONCRETE TO CONFORM TO BS 8500-2.



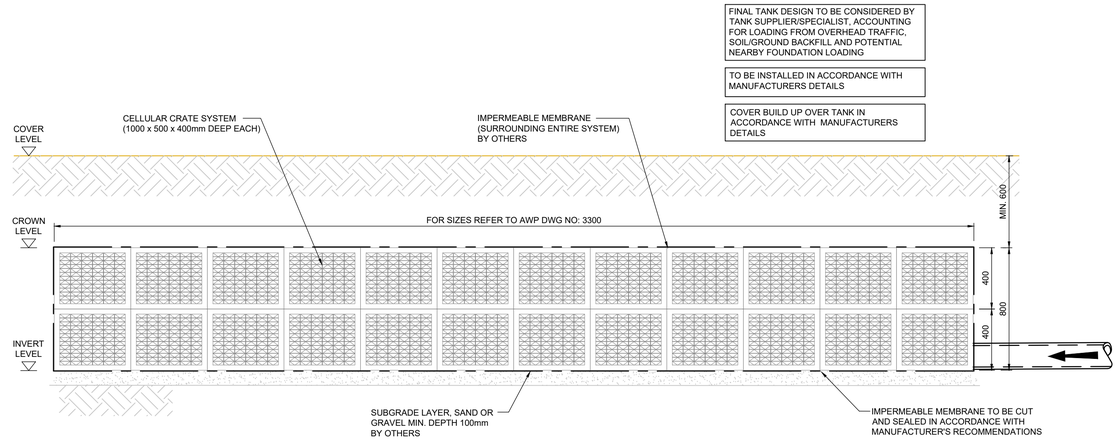
DRAIN TRENCH EDGE MORE THAN 1.0m FROM FOOTING/FOUNDATION EDGE

SCALE 1:20



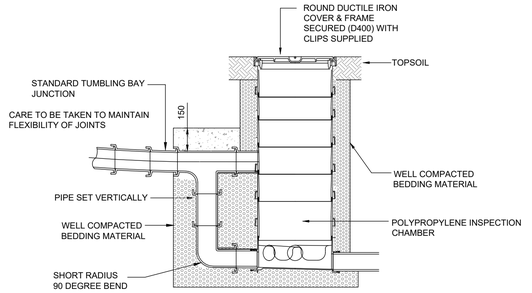
DRAIN TRENCH EDGE LESS THAN 1.0m FROM FOOTING/FOUNDATION EDGE

SCALE 1:20



TYPICAL ATTENUATION TANK DETAIL

SCALE 1:20



BACKDROP SITED IN SOFT LANDSCAPED AREAS WITH STANDARD ROUND COVER

(SCALE 1:20)

HEALTH & SAFETY RISKS

IN ADDITION TO THE STANDARD HAZARDS AND RISKS NORMALLY ASSOCIATED WITH THE TYPE OF WORK DETAILED ON THIS DRAWING, PLEASE NOTE THE FOLLOWING RESIDUAL HEALTH AND SAFETY RISKS

CONSTRUCTION RISKS

CR01. SERVICES ASSOCIATED WITH PREVIOUS USE

EXISTING SERVICES PRESENT WITHIN THE CONSTRUCTION SITE. M&E CONSULTANT TO ADVISE ON STATUS (LIVE OR DEAD) OF ABOVE AND BELOW GROUND SERVICES. EXCAVATIONS TO BE COMPLY WITH HSG47 (AVOIDING DANGER FROM UNDERGROUND SERVICES). CONTRACTOR TO OBTAIN PERMIT TO DIG, UNDERTAKE TRIAL HOLES AND CAT SCAN OF WORK SITE PRIOR TO EXCAVATION. HAND DIG WHERE NECESSARY. LIVE SERVICES TO BE DIVERTED AND/OR PROTECTED WHERE THEY ARE TO REMAIN AND BE BUILT INTO THE PROPOSED WORKS. CARE TO BE TAKEN WHILST WORKING AROUND LIVE SERVICES.

CR02. EXCAVATION SUPPORT AND TEMPORARY WORKS

GROUND INVESTIGATIONS UNDERAKEN IDENTIFY POTENTIALLY UNSTABLE GROUND AND HIGH GROUND WATER LEVELS. DUE TO THE NATURE OF THE GROUND, EXCAVATIONS WILL REQUIRE TEMPORARY SUPPORT AND EDGE PROTECTION. CONTRACTOR TO UTILISE APPROPRIATE TEMPORARY WORKS, DESIGNED BY A TEMPORARY WORKS DESIGNER, AS NECESSARY TO ENSURE THE SAFETY OF ALL OPERATIVES.

CR03. DEEP EXCAVATIONS

NO PERSON TO ENTER ANY UNSUPPORTED EXCAVATION DEEPER THAN 1.20m OR LESS IF GROUND IS UNSTABLE.

CR04. CONTAMINATED GROUND

UNFORESEEN POTENTIAL BURIED HAZARDOUS MATERIALS AND SUBSTANCES INCLUDING ASBESTOS. SIMILAR MATERIALS MAY BE PRESENT IN EXISTING STRUCTURE TO BE DEMOLISHED. CONTRACTOR TO MAKE ALLOWANCE FOR REMOVAL OF SUCH SUBSTANCES.

CR05. CONSTRUCTION ADJACENT TO PUBLIC HIGHWAY

SITE SITUATED NEXT TO PUBLIC HIGHWAY AND FOOPATH WHICH WILL REAMIN IN USE DURING CONSTRUCTION. CONTRACTOR TO ENSURE EXCAVATON AND SITE ARE MADE SECURE SO ACCESS CAN NOT BE ACHIEVED.

OPERATION & MAINTENANCE RISKS

THERE ARE NO UNUSUAL / ONEROUS RESIDUAL HAZARDS ASSOCIATED WITH THE OPERATION AND MAINTENANCE OF THE WORKS HIGHLIGHTED ON THIS DRAWINGS WHICH A COMPETENT USER / MAINTAINER WOULD NOT ORDINARILY BE REASONABLY AWARE OF.

DEMOLITION RISKS

THERE ARE NO UNUSUAL / ONEROUS RESIDUAL HAZARDS ASSOCIATED WITH THE DEMOLITION OF THE WORKS HIGHLIGHTED ON THIS DRAWINGS WHICH A COMPETENT DEMOLITION CONTRACTOR WOULD NOT ORDINARILY BE REASONABLY AWARE OF.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING IN ACCORDANCE WITH THE REQUIREMENTS DEFINED IN THE CDM REGULATIONS.

NOTES:

1. THESE NOTES ARE INTENDED TO AUGMENT DRAWINGS AND SPECIFICATIONS. WHERE CONFLICT OF REQUIREMENTS EXIST THE ORDER OF PRECEDENCE SHALL BE AS SHOWN IN THE SPECIFICATION. OTHERWISE THE STRICTEST PROVISION SHALL GOVERN.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
3. DRAWINGS NOT TO BE SCALED. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER AND FURTHER INSTRUCTIONS OBTAINED BEFORE WORK IS COMMENCED.
4. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE AND ENSURE THAT THE BUILDING AND ITS COMPONENTS ARE SAFE DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE-DOWNS WHICH MAY BE NECESSARY, SUCH MATERIAL REMAINING THE THE PROPERTY OF THE CONTRACTOR ON COMPLETION, AND FOR ENSURING THAT THE WORKS AND ANY ADJACENT PROPERTIES ARE SAFE IN THE TEMPORARY CONDITION.

Rev	Description	Date	By	Chk	App
P1	FIRST ISSUE	16.11.23	AC	BI	--

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Leeds T. 01135 311098

Project: We Jar It Ltd., Wheldrake, York

Client: Mercer Foods Ltd.

Drawing: Drainage Details (Sheet 1)

Role: Civil Engineer

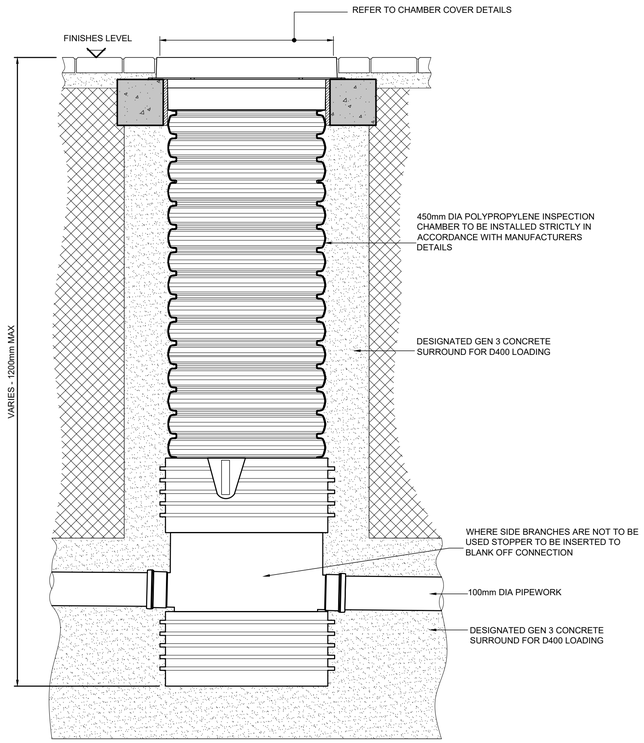
Drawing Status: Work In Progress | Suitability Code: S1

Job. no. 49768 | Scale@ A1: As Noted | Rev. P1

Project Originator Volume Level Type Role Number

WJI - AWP - ZZ -XX - D - C - 3700

100mm at A1

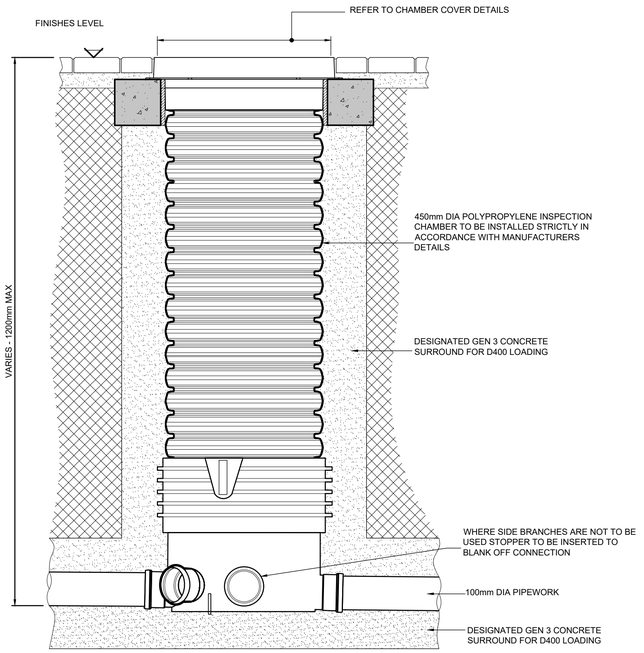


SECTIONAL ELEVATION

POLYPROPYLENE INSPECTION CHAMBER WITH CATCHPIT (CPPIC)
MAXIMUM CHAMBER DEPTH 1.2m

SCALE 1:10

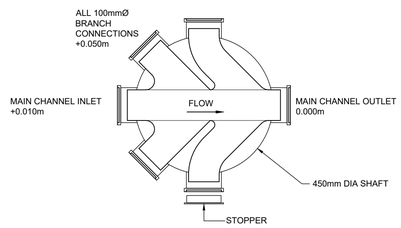
NOTES;
[1]. ALL COVER LEVELS ARE APPROXIMATE ONLY & SHOULD BE SET TO SUIT FINAL SURFACING LEVELS ON SITE.
[2]. MANUFACTURERS STOPPER PIECES TO BE USED ON ALL UNUSED INLETS ON ALL INSPECTION CHAMBERS.
[3].THE MAIN THROUGH CHANNEL MUST BE USED ON ALL INSPECTION CHAMBERS.
[4]. MAXIMUM 45 DEGREE BENDS MAY BE USED ON ANY INSPECTION CHAMBER INLET OR OUTLET TO SUIT PIPE ORIENTATION ON SITE.
[5]. AWP SHOULD BE INFORMED OF ANY DEVIATIONS FROM THE CHAMBER BASE AS SHOWN ON AWP 'PLAN CHAMBER' DETAILS, AS THIS WILL EFFECT GRADIENTS AND INVERT LEVELS OF CHAMBERS AND PIPE RUNS



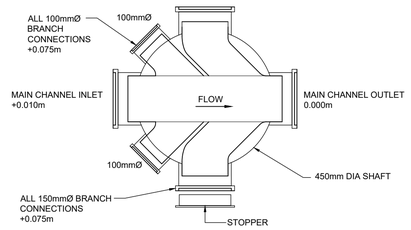
SECTIONAL ELEVATION

POLYPROPYLENE INSPECTION CHAMBER (PPIC)
MAXIMUM CHAMBER DEPTH 1.2m

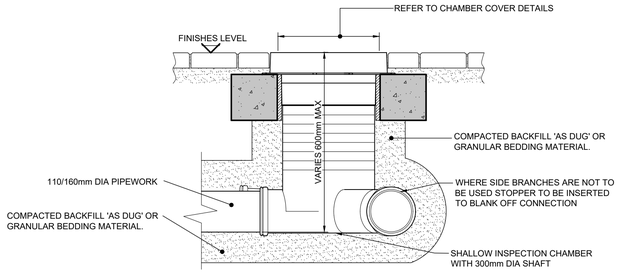
SCALE 1:10



PLAN - CHAMBER (100mm PIPEWORK)

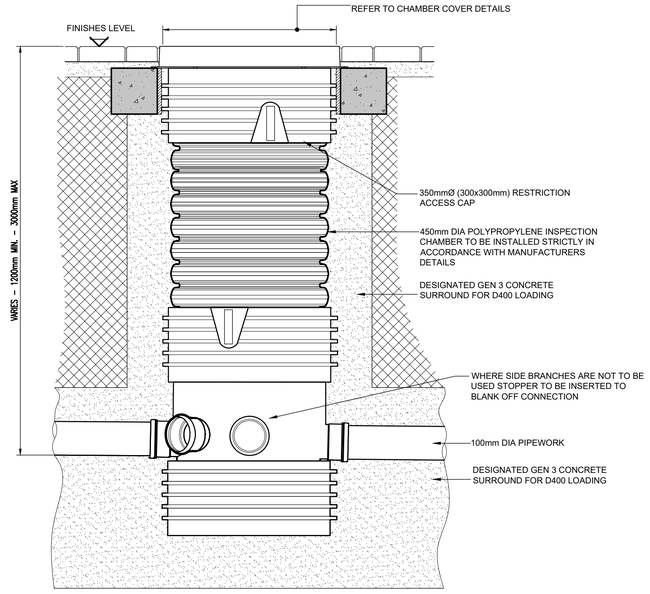


PLAN - CHAMBER (150mm PIPEWORK U.N.O)



TYPICAL MINI ACCESS CHAMBER CONSTRUCTION DETAIL
MAXIMUM CHAMBER DEPTH 0.6m

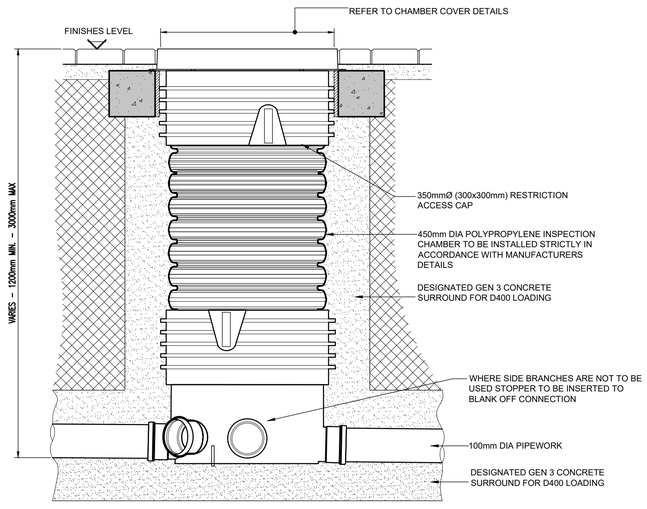
SCALE 1:10



SECTIONAL ELEVATION

REDUCED ACCESS POLYPROPYLENE INSPECTION CHAMBER WITH
CATCHPIT (CPPIC) CHAMBER DEPTH > 1.2m < 3.0m

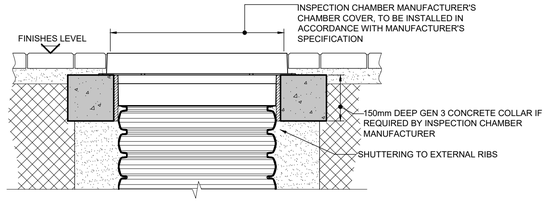
SCALE 1:10



SECTIONAL ELEVATION

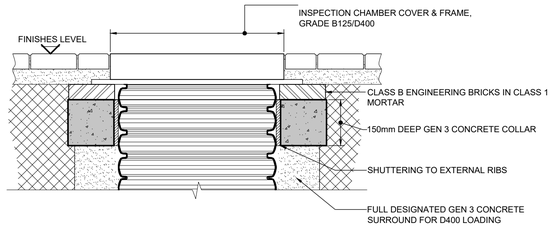
REDUCED ACCESS POLYPROPYLENE INSPECTION CHAMBER (PPIC)
CHAMBER DEPTH > 1.2m < 3.0m

SCALE 1:10



INSPECTION CHAMBER COVER DETAIL -
A15 GRADE: USE IN AREAS INACCESSIBLE TO VEHICLES ONLY

SCALE 1:10



INSPECTION CHAMBER COVER DETAIL -
B125 GRADE: USE IN CAR PARKS/PEDESTRIAN AREAS WITH OCCASIONAL VEHICULAR USE
D400 GRADE: USE IN FREQUENTLY VEHICULAR TRAFFICKED AREAS

SCALE 1:10

100mm at A1

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CR02. EXCAVATION SUPPORT AND TEMPORARY WORKS

GROUND INVESTIGATIONS UNDERAKEN IDENTIFY POTENTIALLY UNSTABLE GROUND AND HIGH GROUND WATER LEVELS. DUE TO THE NATURE OF THE GROUND, EXCAVATIONS WILL REQUIRE TEMPORARY SUPPORT AND EDGE PROTECTION. CONTRACTOR TO UTILISE APPROPRIATE TEMPORARY WORKS, DESIGNED BY A TEMPORARY WORKS DESIGNER, AS NECESSARY TO ENSURE THE SAFETY OF ALL OPERATIVES.

CR03. DEEP EXCAVATIONS

NO PERSON TO ENTER ANY UNSUPPORTED EXCAVATION DEEPER THAN 1.20m OR LESS IF GROUND IS UNSTABLE.

CR04. CONTAMINATED GROUND

UNFORESEEN POTENTIAL BURIED HAZARDOUS MATERIALS AND SUBSTANCES INCLUDING ASBESTOS. SIMILAR MATERIALS MAY BE PRESENT IN EXISTING STRUCTURE TO BE DEMOLISHED. CONTRACTOR TO MAKE ALLOWANCE FOR REMOVAL OF SUCH SUBSTANCES.

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SITE SITUATED NEXT TO PUBLIC HIGHWAY AND FOOPATH WHICH WILL REAMIN IN USE DURING CONSTRUCTION. CONTRACTOR TO ENSURE EXCAVATON AND SITE ARE MADE SECURE SO ACCESS CAN NOT BE ACHIEVED.

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P1	FIRST ISSUE	16.11.23	AC	BI	--

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Project: We Jar It Ltd., Wheldrake, York

Client: Mercer Foods Ltd.

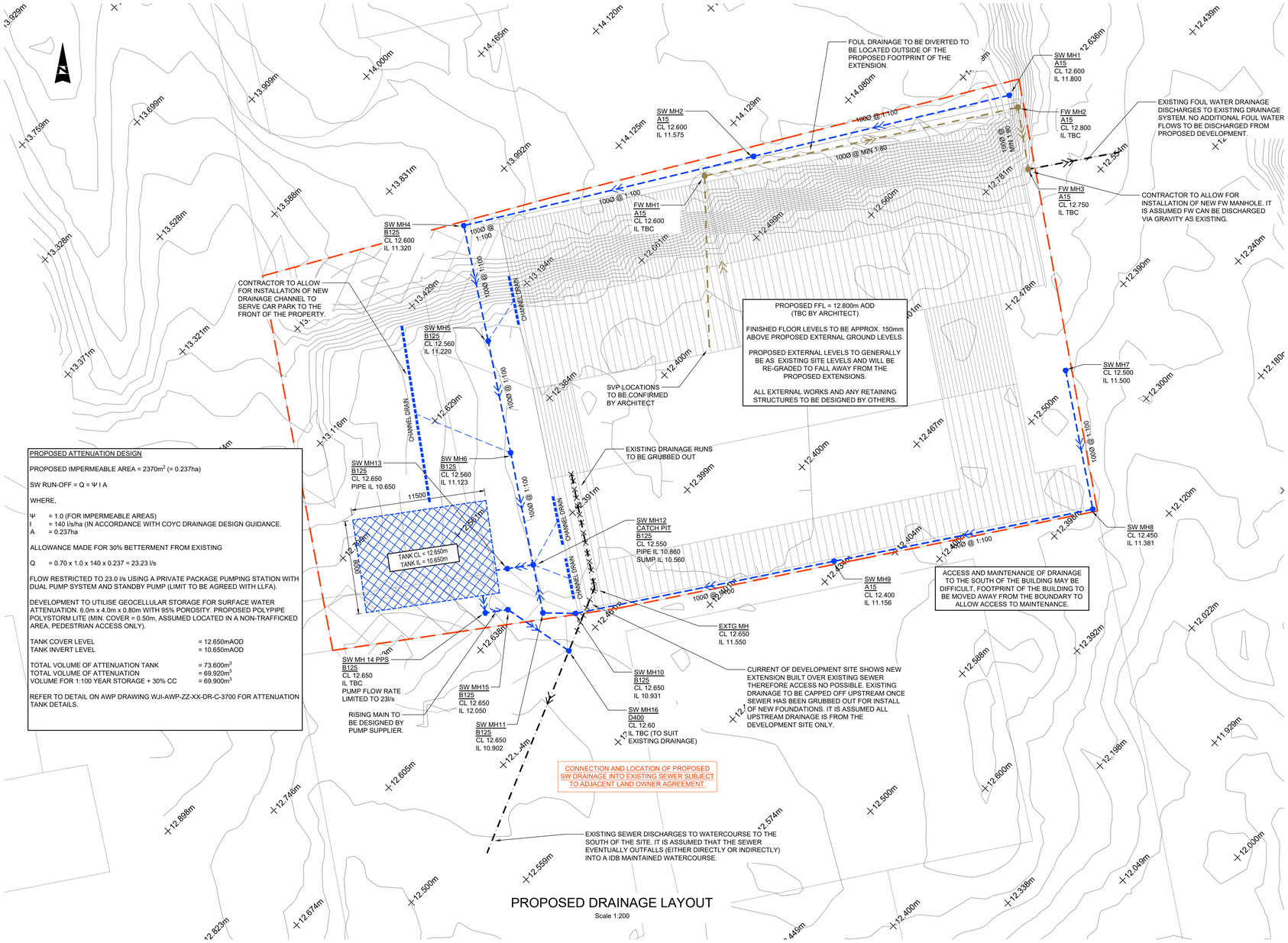
Drawing: Drainage Details (Sheet 2)

Role: Civil Engineer

Drawing Status: Work In Progress | Suitability Code: S1

Job. no. 49768 | Scale@ A1: As Noted | Rev. P1

Project Originator Volume Level Type Role Number
WJI - AWP - ZZ - XX - D - C - 3701



PROPOSED DRAINAGE LAYOUT

Scale 1:200

100mm at A1

PROPOSED ATTENUATION DESIGN

PROPOSED IMPERMEABLE AREA = 2370m² (= 0.237ha)

SW RUN-OFF = Q = Ψ I A

WHERE,

Ψ = 1.0 (FOR IMPERMEABLE AREAS)
I = 140 l/s/ha (IN ACCORDANCE WITH COYC DRAINAGE DESIGN GUIDANCE.
A = 0.237ha

ALLOWANCE MADE FOR 30% BETTERMENT FROM EXISTING

Q = 0.70 x 1.0 x 140 x 0.237 = 23.23 l/s

FLOW RESTRICTED TO 23.0 l/s USING A PRIVATE PACKAGE PUMPING STATION WITH DUAL PUMP SYSTEM AND STANDBY PUMP (LIMIT TO BE AGREED WITH LLFA).

DEVELOPMENT TO UTILISE GEOCELLULAR STORAGE FOR SURFACE WATER ATTENUATION. 6.0m x 4.0m x 0.80m WITH 95% POROSITY. PROPOSED POLYPIPE POLYSTORM LITE (MIN. COVER = 0.50m, ASSUMED LOCATED IN A NON-TRAFFICKED AREA, PEDESTRIAN ACCESS ONLY).

TANK COVER LEVEL	= 12.650mAOD
TANK INVERT LEVEL	= 10.650mAOD
TOTAL VOLUME OF ATTENUATION TANK	= 73.600m³
TOTAL VOLUME OF ATTENUATION	= 69.920m³
VOLUME FOR 1:100 YEAR STORAGE + 30% CC	= 69.900m³

REFER TO DETAIL ON AWP DRAWING WJI-AWP-ZZ-XX-DR-C-3700 FOR ATTENUATION TANK DETAILS.

KEY

- 100Ø SURFACE WATER SEWER
- 100Ø FOUL WATER SEWER
- EXISTING SEWER
- DEMOLISHED/GRUBBED OUT DRAINAGE
- SURFACE WATER 450mm DIA PPIC
- FOUL WATER 450mm DIA PPIC
- 12.000m — EXISTING SITE LEVEL (LIDAR DATA)
- EXISTING SITE BOUNDARY

NOTE: DRAINAGE DESIGN IS SUBJECT TO LLFA AND IDB APPROVAL.

NOTE: CONTRACTOR TO ALLOW FOR GPR SURVEY TO ASCERTAIN LOCATIONS OF ALL EXISTING SERVICES BEFORE ANY EXCAVATIONS ARE TO BE UNDERTAKEN.

NOTE: SETTING OUT OF PROPOSED WORKSHOP BUILDING TO BE CONFIRMED BY ARCHITECT.

NOTE: FINISHED FLOOR LEVELS (FFL) ARE PRELIMINARY. ALL FINISHED FLOOR LEVELS TO BE CONFIRMED BY ARCHITECT.

NOTE: SETTING OUT OF PROPOSED SVPs AND RWPs TO BE CONFIRMED BY ARCHITECT.

NOTE: TOPOGRAPHIC INFORMATION IS BASED ON LIDAR DATA.

NOTE: DRAINAGE DESIGN TO BE REVIEWED AGAINST CLIENT'S EXTERNAL WORKS DRAWINGS.

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DRAINAGE

1. DRAINAGE SYSTEMS TO COMPLY WITH THE FOLLOWING STANDARDS:
   - BS EN 752:2008
   - BUILDING REGULATIONS APPROVED DOCUMENT PART H, 2015 EDITION
2. ALL COMPONENTS USED IN DRAINAGE SYSTEMS TO COMPLY WITH THE FOLLOWING: BS EN 476:2011
3. ALL DRAINAGE SYSTEMS AND COMPONENTS TO BE CONSTRUCTED AND TESTED TO THE FULL SATISFACTION OF BOTH BUILDING REGULATIONS AND WARRANTY PROVIDER INSPECTORS
4. ALL DRAINAGE TO BE CONSTRUCTED AND TESTED IN ACCORDANCE WITH BS EN 1610:2015.
5. V.C. DENOTES VITRIFIED CLAY. VITRIFIED CLAY PIPES AND FITTINGS TO COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295-1:2013,-2:2013,-3:2012 AND BS 65 RESPECTIVELY AND BE KITEMARKED. ALL PIPES SHALL BE EXTRA STRENGTH TO BS 65 OR EQUIVALENT BS EN295 PIPE CRUSHING STRENGTH.
6. LATERAL DRAIN CONNECTIONS (PIPES CONNECTING INTO ADOPTABLE SEWERS) TO BE VITRIFIED CLAY. WHERE COVER IS LESS THAN 1.2m TO GROUND LEVEL PIPE PROTECTION IS REQUIRED IN THE FORM OF A CONCRETE COVER SLAB.
7. PVC-U DENOTES UNPLASTISED POLYVINYL CHLORIDE. PVC-U PIPES AND FITTINGS TO COMPLY WITH THE RELEVANT PROVISIONS OF BS EN1401, BS EN13476-2 AND BS4660:1989/2000 RESPECTIVELY AND BE KITEMARKED.
8. PRECAST CONCRETE MANHOLES TO BE IN ACCORDANCE WITH BS EN 1917:2002 AND BS 5911-3:2010,-4:2002 AND TO BE KITEMARKED. PRECAST CONCRETE RINGS AND COVER SLABS TO CONCRETE PIPES TO BE JOINTED WITH CEMENT MORTAR UNLESS NOTED OTHERWISE.
9. INSITU AND PRECAST CONCRETE UNITS SHALL HAVE SULPHATE RESISTING PORTLAND CEMENT TO BS EN 197-1:2011.
10. POLYPROPYLENE INSPECTION CHAMBERS TO COMPLY WITH BS EN 13598-1:2010,-2:2016 AND BS 7158:2001 AND TO BE KITEMARKED.
11. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015. MANHOLE COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITH CUSHION INSERTS AND KITEMARKED. LOAD CLASS A15 COVERS TO BE USED IN AREAS INACCESSIBLE TO VEHICLES; LOAD CLASS B125 COVERS TO BE USED IN PRIVATE DRIVES; LOAD CLASS D400 COVERS TO BE USED IN PRIVATE ROADS. ALL COVERS TO BE BADGED "FW" OR "SW" AS APPROPRIATE. MANHOLE COVER SLABS AND ACCESS TO BE IN ACCORDANCE WITH CONCRETE PIPE ASSOCIATION TECHNICAL BULLETIN ISSUED SEPTEMBER 2001.
12. POLYPROPYLENE INSPECTION CHAMBER COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015. COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITH CUSHION INSERTS AND KITEMARKED. LOAD CLASS A15 COVERS TO BE USED IN AREAS INACCESSIBLE TO VEHICLES; LOAD CLASS B125 COVERS TO BE USED IN PRIVATE DRIVES; LOAD CLASS D400 COVERS TO BE USED IN PRIVATE ROADS.
13. ROAD GULLY GRATES AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015 AND BE OF A NON-ROCKING DESIGN WITH LEFT HANDED CAPTIVE HINGE ACCESS AND BE KITEMARKED. LOAD CLASS D400 GRATES TO BE USED IN PRIVATE ROADS. TYPE D400-450 GRATE AND FRAME. MINIMUM AREA OF WATERWAY TO BE 1010cm².
14. DRAINAGE CHANNELS TO BE AS NOTED (O.S.A.) FITTED WITH SLOTTED DUCTILE IRON GRATING. GRATES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015 AND BE KITEMARKED. LOAD CLASS A15 GRATES TO BE USED IN AREAS INACCESSIBLE TO VEHICLES; LOAD CLASS B125 GRATES TO BE USED IN PRIVATE DRIVES; LOAD CLASS D400 GRATES TO BE USED IN PRIVATE ROADS. SUMP UNIT AND SILT BUCKET UNITS TO BE USED ON ALL GULLIES.
15. CLASS Z BEDDING DETAIL SHALL BE PROVIDED:
   - WHERE COVER TO PIPE BARREL IS;
     i) <1.2m IN VEHICULAR TRAFFICKED AREAS
     ii) <0.9m IN AREAS INACCESSIBLE TO VEHICLES.
   - AT ALL ROAD GULLY, YARD GULLY, KWP, SVP AND DRAINAGE CHANNEL BRANCHES.
   - AREAS OF DEEP ROOTING VEGETATION.
   - PIPE RUNS NEAR BUILDINGS IN ACCORDANCE WITH TYPICAL SECTIONS ON AWP DRAWINGS.
   - WHERE TWO PIPES CROSS WITH A CLEAR GAP OF <300mm, CLASS Z SURROUND TO EXTEND A MINIMUM OF 1.0m FROM THE CENTRE OF THE CROSSING POINT & EXTENDED TO WITHIN 150mm OF THE NEAREST FLEXIBLE JOINT, WHERE REQUIRED.
20. NO MECHANICAL COMPACTION OF FILL MATERIAL WITHIN 300mm OF THE CROWN OF ANY PIPE.

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Project: We Jar It Ltd, Wheldrale, York

Client: Mercer Foods Ltd.

Drawing: Proposed Drainage Plan

Role: Civil Engineer

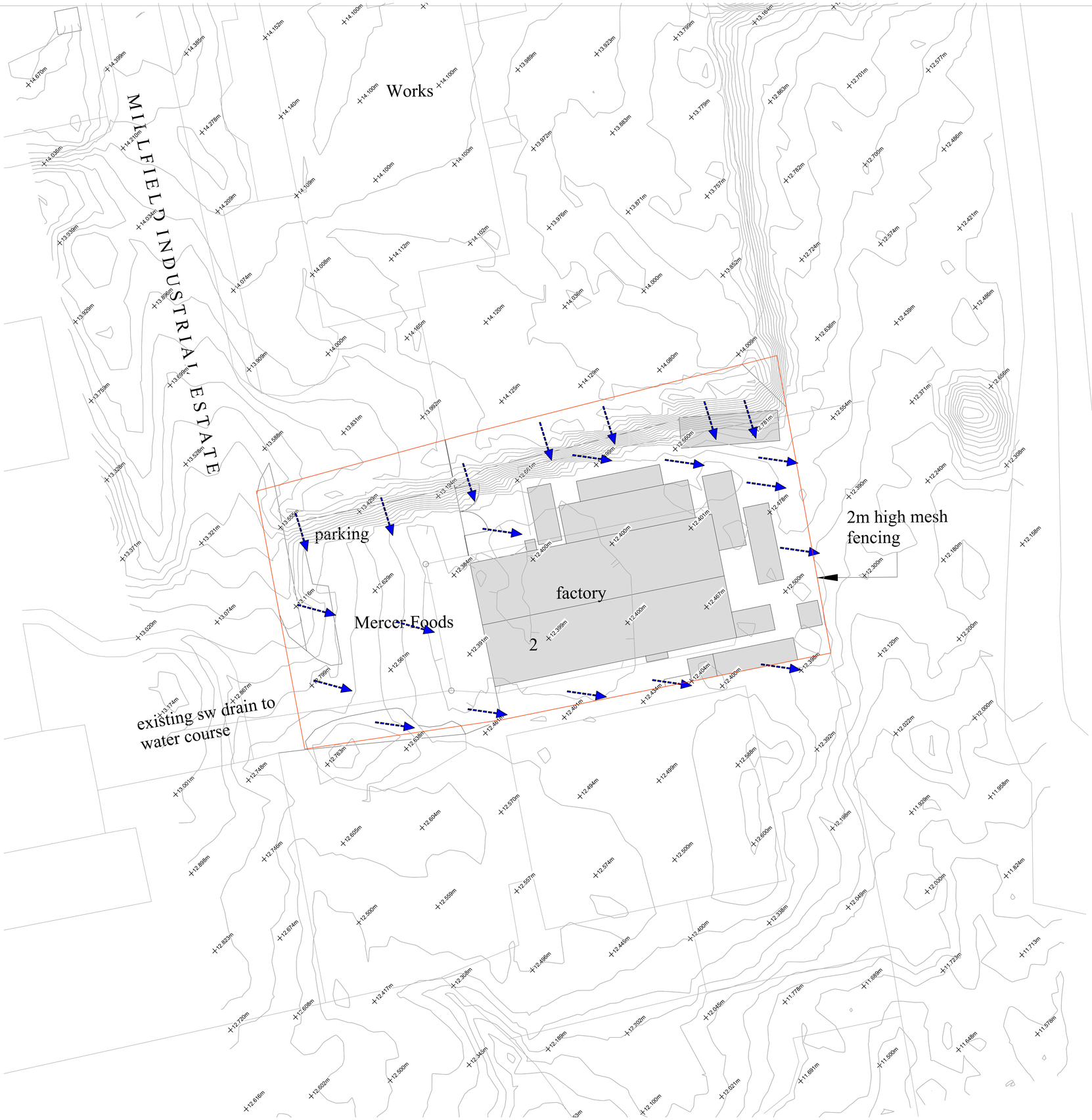
Drawing Status: Work In Progress | Suitability Code: S1

Job. no. 49768 | Scale@ A1: As Noted | Rev. P01

Project Originator Zone Level Type Role Number
WJI - AWP - ZZ - XX - D - C - 3300

APPENDIX E

Existing & Proposed Exceedance Flood Flow Drawings



100mm at A1

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Project: We Jar It Ltd, Wheldrale, York

Client: Mercer Foods Ltd.

Drawing: Exceedance Overland Flows (Existing)

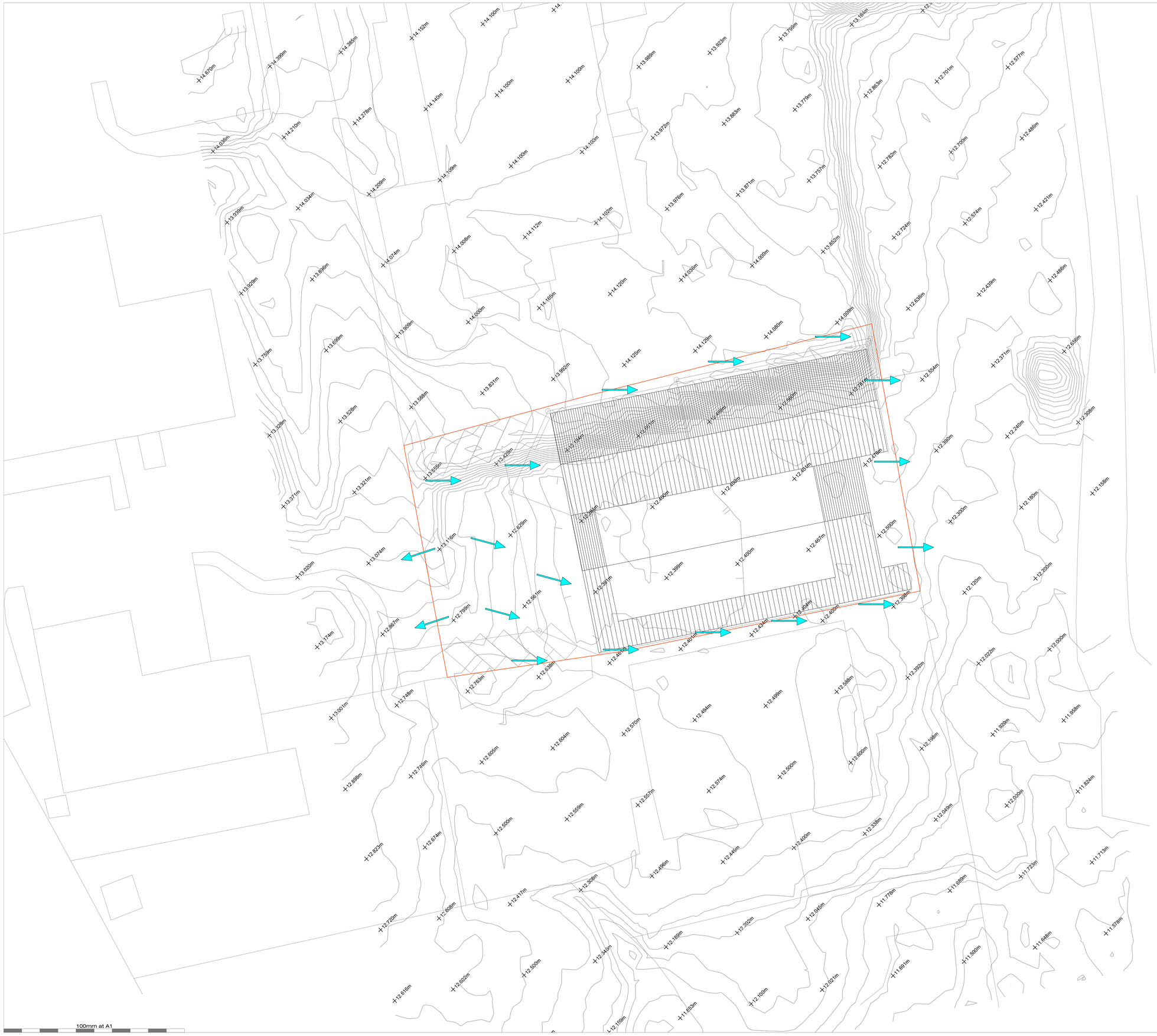
Role: Civil Engineer

Drawing Status: Status | Suitability Code: S1

Job. no. 49768 | Scale@ A1: As Noted | Rev. P01

Project Originator Zone Level Type Role Number

WJI - AWP - ZZ - XX - D - C - 3310



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Leeds	T. 01135 311098

Project:
We Jar It Ltd, Wheldrale, York

Client:
Mercer Foods Ltd.

Drawing:
Exceedance Overland Flows (Proposed)

Role: Civil Engineer

Drawing Status: Status

Suitability Code: S1

Job. no. 49768

Scale@ A1: As Noted

Rev. P01

Project	Originator	Zone	Level	Type	Role	Number
WJI	AWP	ZZ	XX	D	C	3311

100mm at A1

APPENDIX F

Soakaway Test Report

Our Ref: 0016/G
Your Ref: Village Green Preserves, Wheldrake
Date: 2nd November 2023

Alan Wood & Partners Ltd
341 Beverley Road
Hull
HU5 1LD

Humberside Materials Laboratory LTD
Atherton Way, Brigg
North Lincs DN20 8AR
Tel & fax 01652 652753
Email: info@humbersidematerialslab.co.uk

Dear Ben Ions

Village Green Preserves, Millfield Industrial Estate, Wheldrake

Further to your instruction a trial pit site investigation to assess soil infiltration rates was undertaken within the existing property of Village Green Preserves located on Millfield Industrial Estate, Wheldrake. The site investigation included one trial pit (TP1) utilised for soakaway testing. The trial pit location was agreed with the site owner, Alan Wood & Partners site representative (Alex Carroll) and City of York drainage engineer (Richard Wells) and positioned by the Humberside Materials Laboratory Technician. Location is indicated on the plan below.

Trial pit

The trial pit was excavated utilising a wheeled rear hoe excavator equipped with a 300mm width bucket. Encountered strata was logged on site as the trial pit was advanced. Encountered strata is summarised below within table 1. Photographs are enclosed.

Table 1: Summary of revealed ground conditions	
	Exploratory hole
	TP1
Strata descriptions	*Depth to base of stratum (m bgl)*
Brown slightly sandy silty TOPSOIL with many rootelts	0.25
Light brown and light grey silty sand with much fine to coarse gravels of various lithologies and rare cobble paving slab – MADE GROUND	0.90
Firm orange-brown, brown, light grey sandy SILT/CLAY	1.15
Firm to stiff brown, orange-brown and grey mottled slightly sandy CLAY with very occasional fine to medium gravels	1.87
Notes: no water seepages or ingresses were noted during or on completion of the excavations	

The encountered soils below the made ground (below 0.90m depth) comprised silt/clay and slightly sandy clay which typically are very low permeability soils. With the encountered soils within the trial pit mainly comprising of clay the City of York drainage engineer deemed that no water was required within the trial pit to deemed the site as unsuitable for the inclusion of soakaways.

If you require any further information, please contact the laboratory.

Yours Sincerely

D. Driver *Director*

Enclosed: Photographs

Trial Pit 1 – after excavation

Trial pit 1 - spoil

Alan Wood & Partners

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