FLOOD RISK ASSESSMENT AND SURFACE WATER DRAINAGE STRATEGY

290, Bradford Road

Batley, WF17 5PW

On behalf of NASA Design Studio
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Author: Jonathan Greene

Sign:

Approved: Kwaku Tano-Yeboah MSc. CEng FICE

Sign:

Contents

Figures

Tables

Appendices

1. Introduction

Background

1.1. KJG Consultancy Ltd has been appointed by NASA Design Studio to undertake a Flood Risk Assessment (FRA) and surface water drainage strategy for an application to create a new shop front and a extraction duct at 290 Bradford Road, WF17 5PW.

1.2. The proposed development comprises the change of use of the ground floor from a nightclub (sui generis) to Class E restaurant with ancillary Sui Generis takeaway, together with the installation of a new extract canopy to the side and a new shopfront, under planning application reference 2026/62/90966/E.

1.3. The proposal will not increase the building footprint and the impermeable area will remain as existing.

1.4. This assessment considers the risk of flooding from all sources including coastal, fluvial, surface water, groundwater, reservoirs, and drainage systems (sewers and culverts).

Relevant Policy and Guidance

1.5. Both the National Planning Policy Framework (NPPF) and the Lead Local Flood Authority – Kirklees Council (LLFA) state that a site-specific Flood Risk Assessment will be required for proposals:

- In flood zones 2 or 3 including minor development and change of use
- In flood zone 1 where:
  - Site is more than 1 hectare (Ha)
  - Land has been identified by the Environment Agency as having critical drainage problems.
  - Land identified in a strategic flood risk assessment as being at increased flood risk in future.
  - Land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

1.6. The site is less than 1 Hectare in size, with the entirety of the site located within flood zone 1.

1.7. In February 2016, the Environment Agency (EA) introduced new guidance relating to the climate change allowances that must be considered within an FRA. Since 2016, the allowances for sea level rise, peak river flow and peak rainfall have each been updated. These changes along with allowances for urban creep have been assessed in the following sections.

1.8. Given the above, any new planning application that requires an FRA will also require a surface water drainage strategy to be submitted. The drainage strategy must demonstrate the use of SuDS within the design and should be in line with the requirements as set out within the National Planning Policy Framework Technical Guidance (NPPFTG). The drainage strategy must also account for climate change over the lifetime of the development, in accordance with the climate change allowances published by the EA.

1.9. In addition to the requirements from the NPPF and EA, as discussed above, this assessment has also reviewed the information, and requirements included in the This report considers the recommendations and requirements outlined in The Kirklees Strategic Flood Risk Assessment.

1.10. The purpose of this document is to provide an FRA and Drainage Strategy for the proposal to support a planning application. The Drainage Strategy sets out how post-development surface and wastewater would be sustainably managed to mitigate potential flood risk.

1.11. Preparation of this FRA has been informed by a review of information held by the Environment Agency, Yorkshire Water and the Kirklees Council in their capacity as LLFA. These studies have identified technical and environmental constraints which have been considered and which have informed the development of the drainage strategy set out in the following sections.

1.12. The existing drainage will be re-used to minimise the impact of the change in use at the development, whilst being the most sustainable option. The drawings have been reviewed and provide the level information for the proposed drainage modifications.

2. Existing Site and Hydrology

<u>Site Location & Existing Conditions</u>

2.1. The site is located at 290 Bradford Road, Batley, WF17 5PW.

2.2. The existing hard standing area is approximately 0.0218ha and is bordered by Station Road to the east, Hick Lane to the north and Bradford Road to the west which is a two-way street. The existing site overlooks shops of various use and is adjacent to what appears to be residential living. The site is within Batley Town Centre and lies approximately 96km from the nearest beachfront and sea.

2.3. Approximate co-ordinates at the centre of the site are E:424736, N: 423890

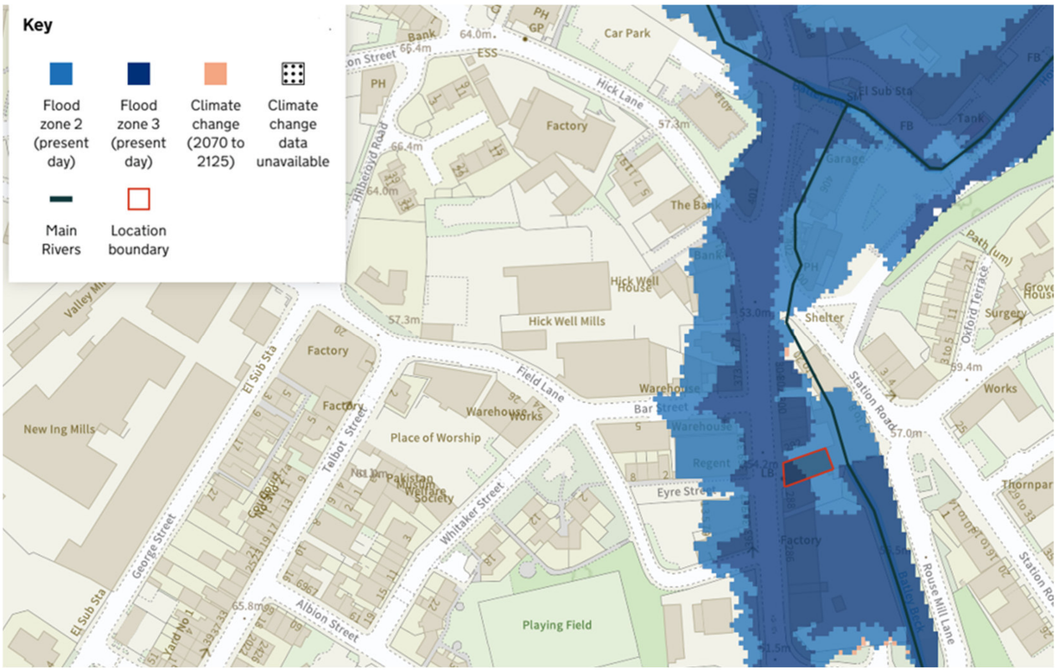
2.4. The site is currently vacant and is located on plan as shown in **Figure 2.1**.

Figure 2.1 – Site Location

2.5. The site falls entirely within flood zone 2 and 3a as seen in **Figure 2.2** below.

2.6. Although the site sits within flood zone 2 and 3a, the proposed shop front is town-centre dependent use and will be designed allowing the building to resist, tolerate, and recover from flooding while staying compliant with planning flood risk requirements.

Figure 2.2 – EA Flood Risk Map



2.7. The updated (2025) Environment Agency flood map shows the entirety of the site to be within Flood Zone 2 and 3 (1 in 100 year or greater probability of flooding).

2.8. There is no topography survey of the site provided, however based on topographic-map.com, the map shows levels to fall towards the west of the site with levels ranging from 60mAOD to a low point of approximately 52mAOD. The topographic map is included in **Appendix A**.

Existing Drainage and Hydrology

2.9. **Appendix C** presents the existing brownfield runoff rate for the site, derived using FEH methodology (ReFH2) based on the contributing catchment area and associated descriptors. For comparison, runoff rates have also been calculated using the IH124 method, which is commonly referenced by LLFAs for smaller sites. In accordance with best practice, the lower (more conservative) allowable discharge rates have been adopted to inform the site drainage strategy.

2.10. The hydraulic calculations provided using Causeway Flow modelling shows a site discharge rate of 10.4l/s for the 1 in 100 year storm duration and can be shown in **Appendix C.**

2.11. The Environment Agency defines one watercourse located to the east of the site which is the Batley Beck, as shown with a black line in **Figure 2.3.**

2.12. Geological data from the British Geological Survey (BGS) shows the site is underlain by Alluvium which consists of clay, silt, sand, and gravel that have been deposited by rivers (fluvial processes). These sediments are detrital (formed from broken pieces of pre-existing rocks) and range from coarse to fine grain sizes. They typically occur in layers or lens-shaped deposits that reflect the structure of river environments such as channels, floodplains, and levees. In coastal areas, similar deposits may also form in estuaries.

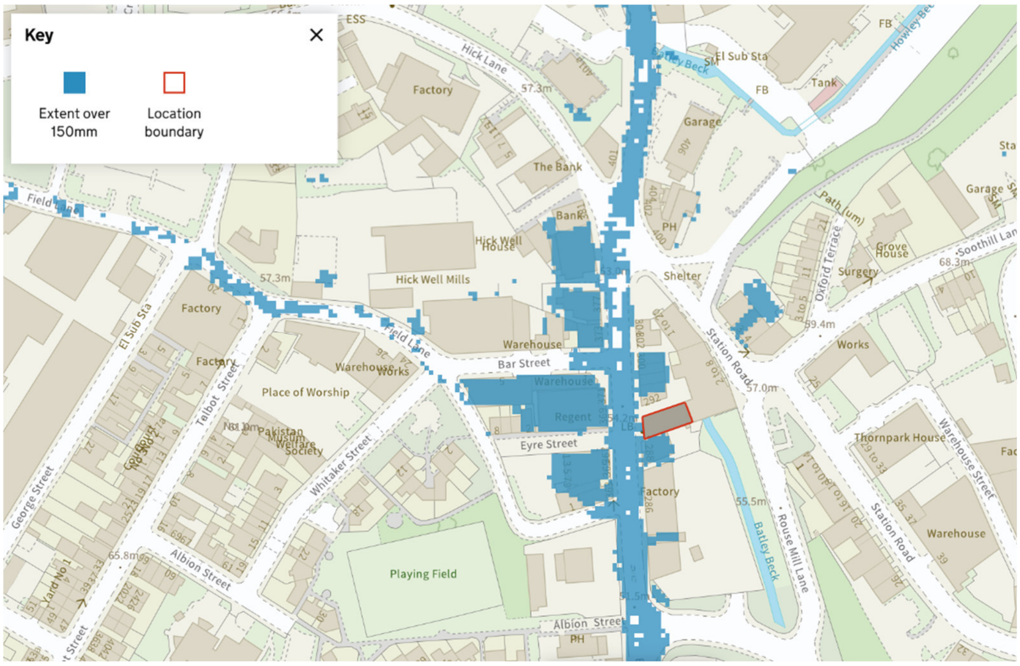
2.13. The BGS hydrogeological map of the UK defines the site to be underlain by Carboniferous Coal Measures/ Millstone Grit succession. Hydro-geologically, this is classified as a fractured aquifer of generally low–moderate productivity.

2.14. The BGS hydrogeological map groups rocks by how groundwater flows:

2.15. The site Coal Measures and Millstone Grit act as fissured (fractured) aquifers and typically have variable but generally limited permeability, while it yields groundwater mainly through joints, fractures, and sandstone beds, not through pore spaces.

2.16. **Figure 2.3 – Watercourses**

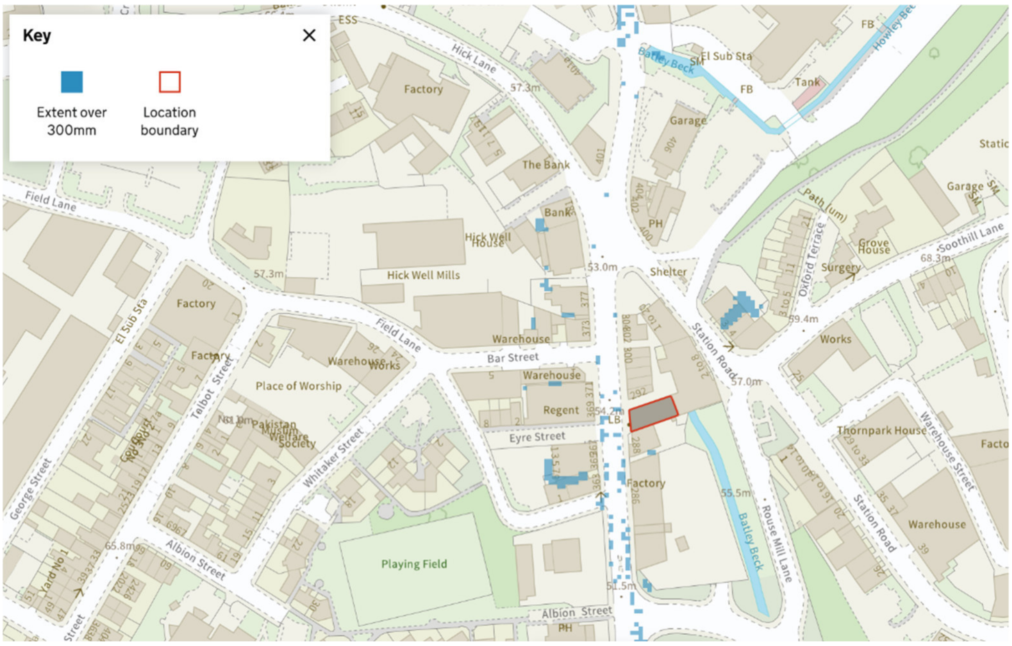
2.17. **Figure 2.4 – EA Surface Water Flood Map showing extent over 150mm**



2.18. As illustrated in **Figure 2.4**, only the western boundary of the site is affected by flood depths exceeding 150 mm during the 1 in 100-year flood event (including climate change allowance). Site levels slope gently towards the west, directing overland flow away from the main developable area. As a result, flood impacts are constrained to the site periphery, and the risk to the proposed development is considered to be low and manageable, subject to the implementation of appropriate mitigation measures.

2.19. Additionally **Figure 2.5** illustrates the site will not be effected by surface water flooding exceeding 300mm.

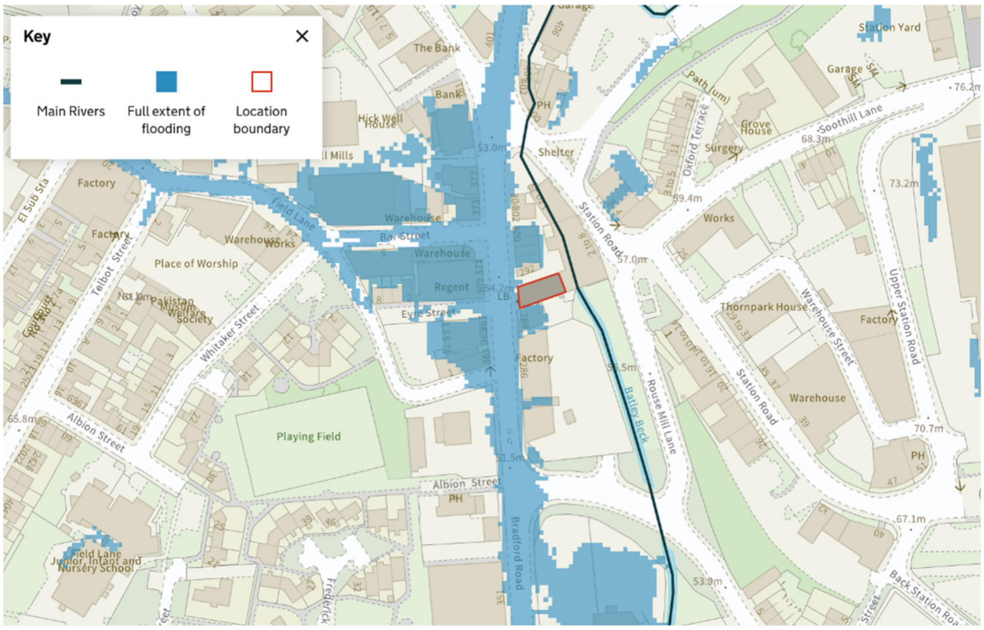
2.20. **Figure 2.5 – EA Surface Water Flood Map showing extent over 300mm**



<u>Flooding from Rivers and Sea</u>

2.21. **Figure 2.6** illustrates the full extent of flooding in relation to the site. Review of the Environment Agency Flood Map for Planning indicates that fluvial flood extents associated with Batley Beck to the east does not directly encroach upon the main developable area. As such, the site is considered to have small affect by fluvial flooding from Batley Beck, with any identified risk limited to adjacent low-lying areas.

Figure 2.6 – EA Map showing Fluvial Flooding

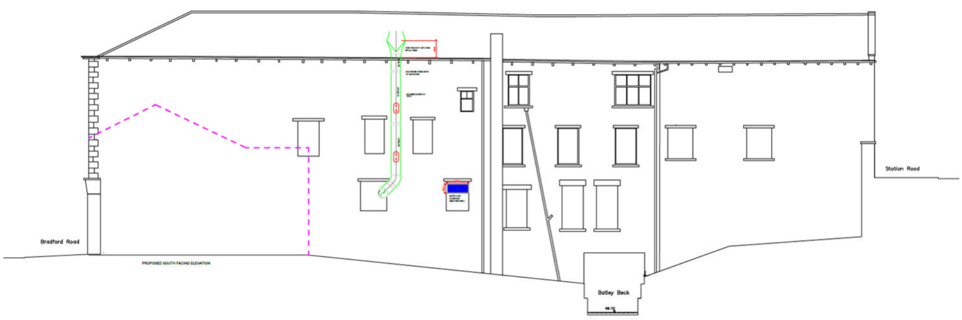


3. Proposed Development

3.1. The proposed development comprises the change of use of the ground floor from a nightclub (sui generis) to Class E restaurant with ancillary Sui Generis takeaway, together with the installation of a new extract canopy to the side and a new shopfront, under planning application reference 2026/62/90966/E.

3.2. The proposed site layout is included in **Appendix B** and shown in **Figure 3.1.**

Figure 3.1 – Proposed Elevation



4. Flood Risk and Land Use with Vulnerability Guidance

Local Flood Risk Management Strategy 2024

4.1. The LFRMS sets out how Kirklees Council (as a Lead Local Flood Authority) manages flood risk locally, in line with the Flood and Water Management Act 2010.

4.2. It replaces the previous 2012 strategy and aligns with the national flood and coastal erosion risk management strategy.

Key objectives of the LFRMS include:

- Establishing effective partnerships: Engaging with Risk Management Authorities, stakeholders, and local communities to share knowledge, best practices, and secure funding for flood risk management initiatives.

- Improving understanding of flood risks: Enhancing data collection and modelling to better comprehend local flood risks and inform decision-making.

- Encouraging proactive planning: Ensuring that spatial planning and development management consider flood risks, promoting the use of sustainable drainage systems (SuDS) in new developments.

- Promoting individual and community responsibility: Raising awareness and preparedness among residents and businesses regarding flood risks and resilience measures.

4.3. The strategy also emphasises the importance of sustainable drainage systems (SuDS) to manage surface water runoff, improve water quality, and enhance biodiversity. Kirklees Council, as the Lead Local Flood Authority, provides guidance on implementing SuDS in new developments to ensure they effectively mitigate flood risks.

4.4. To address specific areas at risk, the council has developed Surface Water Management Plans (SWMPs). These studies aim to understand flood risks from local sources and identify actions to reduce these risks.

4.5. The LFRMS is supported by a Delivery Plan that outlines specific actions and initiatives to be undertaken. This plan is regularly updated to reflect progress and emerging priorities in flood risk management.

4.6. Sequential Test (NPPF Policy):

- Ensures that developments prioritise sites in Flood Zone 1 before approving riskier locations.

4.7. Exception Test (Flood Zone 3a Policy):

- If no alternative site is available, a proposed development in Flood Zone 3a must pass an Exception Test, proving:

- It provides wider sustainability benefits.

- It can be built to be safe & flood-resistant.

4.8. Flood Risk Assessment (FRA) Requirement:

- Mandatory for all sites in Flood Zone 2, 3a, or 3b, and for any development larger than 1 hectare in Flood Zone 1.

4.9. Sustainable Drainage Systems (SuDS) Required for High-Risk Areas:

- Developers must incorporate SuDS (e.g., permeable surfaces, wetlands, rain gardens) to manage surface water.

4.10. There is no proposed development in Flood Zone 3b. Although the EA maps identify the site as being in Flood Zone 3, the actually detailed flood maps show the site between Flood Zone 2 and 3.

4.11. The shop development proposal (Class E) for the site is classified as Less Vulnerable. This is considered appropriate for all flood zones within the Flood Risk Vulnerability Classification matrix of the NPPF (see **Table 4.1**).

Table 4.1 – Flood Risk & Vulnerability Guidance

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

Sequential Test

4.12. According to the National Planning Framework (NPPF) Developers are to avoid proposals in high-risk flood areas by steering it towards areas with little or no flood risk (Flood Zone 1).

4.13. Flood risk from all sources is assessed in detail within Section 5.

Exception Test

4.14. The western part of the site lies within Flood Zone 3a. However, in accordance with Table 4.1 of the Planning Practice Guidance, the Exception Test is not required for development within Flood Zone 3a where the proposal relates to the alteration or change of use of an existing building, provided there is no increase in vulnerability classification or flood risk elsewhere.

4.15. In this case, the proposal relates to an existing building and does not introduce a more vulnerable use, nor does it increase flood risk on or off site. Therefore, the Exception Test is not triggered.

4.16. The Sequential Test and Exception Test were considered within this assessment but are not required for this proposal as shown below.

National Planning Framework (NPPF Para 176 and Footnote 62 and 63)

4.17. NPPF (December 2024) outlines:

- Applications for some minor development and changes of use 62 should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote 63.

- (Footnote 62) This includes householder development, small non-residential extensions (with a footprint of less than 250m2) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate

4.18. Local Planning Authorities, (LPA) have a statutory obligation to consult the Environment Agency (EA) on all applications in the flood zones. The EA will consider the effects of flood risk in accordance with the NPPF.

4.19. NPPF requires that, as part of the planning process:

- A ‘site specific’ Flood Risk Assessment will be undertaken for any site that has a flood risk potential.

- Flood risk potential is minimised by applying a 'sequential approach' to locating 'vulnerable' development.

- Sustainable drainage systems are used for surface water management where practical.
- Flood risk is managed through the use of flood resilient and resistant techniques.
- Residual risk is identified and safely managed.
- Safe access and escape routes are included where appropriate.

4.20. Developers must provide a Flood Risk Assessment (FRA) if:

i. The site is in Flood Zone 2 or 3

ii. The development is greater than 1 hectare, even in Flood Zone 1

iii. It is located in a Critical Drainage Area or an area prone to surface water flooding.

Land Use Vulnerability

4.21. The National Planning Policy Framework (NPPF – December 2024) defines land use vulnerability classifications to assess how different types of development respond to flooding & environmental risks. This helps ensure that highly vulnerable properties are not located in flood-prone areas.

4.22. Under the NPPF / PPG flood risk vulnerability classification (Annex 3):

- "Buildings used for shops; financial, professional and other services…" are explicitly listed as Less Vulnerable development.

Suitability of Proposed Development

4.23. As mentioned above, NPPF states that essential infrastructure would be supported in areas at risk of flooding "where the location is required for operational reasons". However, this site already has an existing two-storey house on site with no record of flooding.

4.24. The FRA assesses the risk of flooding to the site from all sources and it is concluded that the site is at Low risk of flooding from all sources. Where areas of flood risk have been identified, this has been assessed in accordance with NPPF.

Kirklees Strategic Flood Risk Assessment (SFRA)

4.25. The Kirklees Strategic Flood Risk Assessment (SFRA) forms a key part of the evidence base for identifying and assessing flood risk across Batley and the wider district. The SFRA, prepared jointly with Calderdale and Wakefield Councils, provides a strategic overview of flood risk from all sources and supports local planning authorities in applying the Sequential and Exception Tests, as well as informing decisions on development and infrastructure.

4.26. The SFRA mapping and guidance have been reviewed alongside the Environment Agency Flood Map for Planning to confirm the flood zone classification of the site and inform this site-specific Flood Risk Assessment.

4.27. The SFRA aims to:

- Identify areas at risk of flooding from rivers, surface water, groundwater, and coastal flooding.
- Guide development to lower flood risk areas (following the sequential test set out in the National Planning Policy Framework - NPPF).
- Support the preparation of Local Plans and neighbourhood plans by providing up-to-date flood risk data.
- Assess the potential impacts of climate change on future flooding risks.
- Inform emergency planning and flood mitigation strategies.

5. Site Specific Flood Risk

5.1. This Flood Risk Assessment considers the risk of flooding from all sources including:

a) Coastal Flooding – from the sea.

b) Fluvial Flooding – from rivers and streams.

c) Surface Water Flooding – overland surface water flow and exceedance.

d) Groundwater Flooding – from elevated groundwater levels or springs.

e) Drainage System Flooding – exceedance flows from an existing sewer system and culverts.

f) Reservoir Flooding and artificial sources– from failure of reservoir dams.

g) Historic Flooding - known historic flooding issues.

<u>Flood Risk Classification</u>

5.2. EA's flood maps define areas that are subject to a High, Medium or Low likelihood of flooding from coastal, fluvial and surface water sources. Table 5.1 below details the flood events associated with each of EA's likelihood categories.

Table 5.1 – EA Flood Map – Likelihood Classification

Flood Zone	Likelihood of Flooding Event	Flood Event Impacting the Area
Flood Zone 1	Low Risk	1 in 1000 year
Flood Zone 2	Medium Risk	1 in 100 year
Flood Zone 3a	High Risk	1 in 30 year

<u>Coastal Flooding</u>

5.3. EA's Future Flood Maps have been generated considering the potential effect of climate change for 2036-2069s and reflect the projected increases in mean sea levels. The Coastal Likelihood future flood map predicts the site to be at **Low risk** with the nearest coast located over 96km both to the east and west.

5.4. Overall, the site is considered to have '**low risk**' of coastal flooding.

Fluvial Flooding

5.5. EA's River Flooding flood map defines the entire site to be at Low risk of flooding, however, predicted to be impacted by a 1 in 1000-year fluvial flood event.

5.6. EA's Future Flood Maps have been generated taking into account the potential effect of climate change for 2040-2060s and reflect the projected increases in peak river flows. The future River flood map predicts the site to be at low risk.

5.7. As also discussed in Section 2, there is one watercourse located near the site, as recorded by the topographic survey. There are no known records of flooding from the River Batley Beck.

5.8. Overall, the site is considered to be at **Low** to **Medium probability** of fluvial flooding.

Surface Water Flooding

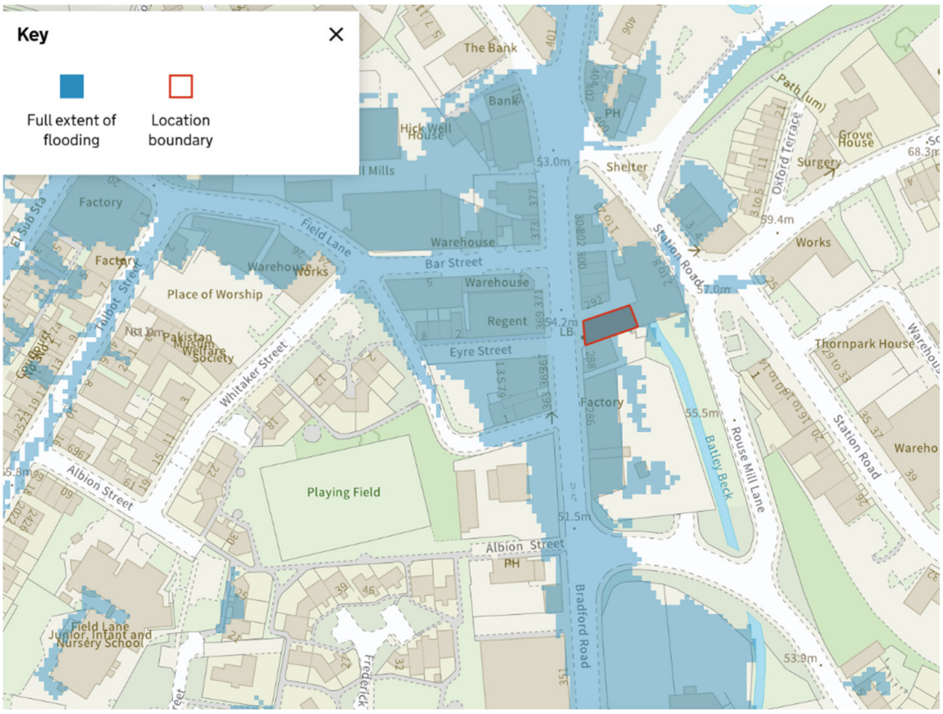
5.9. EA's Surface Water flood map defines the majority of the site to be at High Risk of flooding but predicted to be impacted by a 1 in 100-year rainfall event (see **Figure 2.4**). The site falls between Flood Zones 2 and 3a.

5.10. **Figure 2.4** shows the EA Surface Water flood map and the proposed site layout. The proposal falls within an area predicted to have a high chance of surface water flooding for the 1 in 1000 year rainfall event (see **Figure 5.1**).

5.11. Between 2061 and 2125 the chance of surface water flooding at this location could be 3.3% (1 in 30) each year.

5.12. Present day chance of flooding - The chance of surface water flooding at this location could be more than 3.3% (1 in 30) each year.

5.13. **Figure 5.1 – EA Maps showing full extent of surface water flooding for the 1 in 1000 year rainfall event**



5.14. In addition, following a review of the topographic maps (**Appendix A**) and ground levels in the area are predicted to be at low likelihood of surface water flooding, it is noted that there is no evident depression on site where EA defines a high-risk area. As discussed in Section 2, ground levels on site generally fall west away from the site boundary. Ground levels around the site area predicted to be at low risk of surface water flooding exhibit this same pattern.

5.15. Furthermore, surface water predicted to accumulate on site by EA arises entirely at the north, south and west of the site boundary. This surface water will therefore be managed with the proposed surface water drainage strategy (presented in **Section 6**). The surface water drainage strategy will ensure that proposals are in accordance with NPPF (2024) which states Under the National Planning Policy Framework (NPPF - December 2024), developments must be planned to avoid increasing the risk of surface water flooding to neighbouring properties, infrastructure, and the environment.".

5.16. Given the above, the site is considered to be at **Medium to High** risk of surface water flooding and with the proposed Surface Water Drainage Strategy in place, the development is considered to be safe from surface water flooding during its lifetime and be in accordance with NPPF (2024).

Groundwater Flooding

5.17. British Geological Survey mapping indicates that the site is underlain by Carboniferous Coal Measures and Millstone Grit strata. Hydro-geologically, these deposits are classified as a fractured aquifer of generally low to moderate productivity. Groundwater flow within these formations is largely restricted to fractures and discontinuities, resulting in variable and locally controlled groundwater conditions.

5.18. Groundwater levels are typically not shallow or continuous, and the aquifer has limited storage capacity. As such, whilst groundwater levels may respond to prolonged periods of rainfall, any rise in groundwater is expected to be localised and short-lived.

5.19. Overall, the risk of groundwater flooding at the site is considered to be low, with surface water and fluvial flooding representing the primary sources of flood risk in the area.

5.20. The Keetley Local Plan and Flood Policy include measures to address groundwater as part of flood risk management and sustainable development planning. The Local Plan & Flood Policy (LP27) also addresses groundwater risks by incorporating sustainable development requirements, flood risk assessments (FRAs), and SuDS strategies.

5.21. The site topography is not considered conducive to groundwater flooding. The natural fall of the land towards the west would direct any groundwater emerging on-site away from the site boundary, preventing accumulation to significant depths within the site.

5.22. Overall, the site is considered to be at **Low** risk of flooding from groundwater.

Existing Drainage System Flooding

5.23. The Kirklees Local Plan and associated flood risk policies require comprehensive flood risk assessments for sites potentially affected by sewer flooding. These policies emphasise the incorporation of sustainable drainage solutions and close collaboration with the relevant statutory undertaker (e.g., Yorkshire Water). Developers must demonstrate that the existing or proposed sewerage infrastructure can accommodate additional demand without increasing flood risk to the surrounding area.

5.24. The SFRA mandates Flood Risk Assessments (FRAs) stating:

- for developments in flood-prone areas, aligning with national flood planning policies. Developers must demonstrate that projects mitigate flood risks and incorporate resilient drainage measures.

5.25. The site generally falls west without exhibiting any significant dips in local topography. As a result, site topography is not considered to be conducive to sewer flooding, with any flood waters from the local sewer network is expected to flow west, in accordance with site topography.

5.26. There is existing sewer infrastructure serving the existing building and connects onto infrastructure located within Bradford Road.

Reservoir Flooding – Artificial Sources

5.27. The closest reservoir to the site is the Ardsley Reservoir located 4.33km to the east.

5.28. The Ardsley Reservoir is owned and operated by Yorkshire Water. Some background information is as follows:

- Approximate size: ~120 acres (≈48 ha)
- It is a man-made reservoir, constructed in 1880
- Not a typical impounding reservoir – it is an "en-route storage reservoir", meaning It is not primarily fed by local rivers or streams
- Instead, it stores water transferred from other sources before treatment.

5.29. Overall, the site is considered to be at Low risk of flooding from reservoirs.

Historic Flooding

5.30. The site has no historical data records showing any flooding.

Access & Egress

5.31. During operation, the site is proposed to be accessed via the main frontage off Bradford Road. This access point is predicted to be at risk of surface water flooding; however, the prevailing topography, which falls to the west, would encourage overland flow away from the site and reduce the potential for significant ponding at the access location. In exceedance events, where rainfall exceeds the design capacity of the drainage system, surface water would preferentially follow the natural topographic gradient and be directed westwards across the site. This provides an informal exceedance flow route, limiting flow depths and duration at the site access and preventing uncontrolled discharge towards adjacent receptors or the highway network. As such, residual flood risk is expected to remain localised and manageable.

Flood Risk Summary

5.32. The risk of flooding from all sources is summarised in Table 5.2:

Table 5.2 – Flood Risk to the Site from All Sources

Flood Source	Flood Risk	Mitigation/Comments
Coastal	Low	• EA does predict the site to be impacted by a 1 in 1000 year coastal flood event.

Fluvial	Moderate to High	• EA does predict the site to be impacted by a 1 in 1000 year fluvial flood event.
Surface Water	Moderate to High	• Across the north, east and south of the site, EA does predict the site to be impacted by a 1 in 1000-year surface water flood event. • Areas identified to be at risk that are associated with surface water arising on site will be managed with the Proposed Surface Water Drainage Strategy. • The topographic survey shows that site falls in a western direction. There are no notable depressions on site.
Groundwater	Low	• Geological data from the British Geological Survey (BGS) shows the site is underlain by Carboniferous Coal Measures/ Millstone Grit succession. Hydro-geologically, this is classified as a fractured aquifer of generally low–moderate productivity. • Site topography is not considered conducive to groundwater flooding.
Drainage Systems	Low	• No records were obtainable relating to the existing drainage system flooding in this area. • Site topography is not considered conducive to drainage system flooding.
Reservoirs	Low	• EA's Reservoir maps highlight the site to be at risk of reservoir flooding and the likelihood of a reservoir breach is considered to be low.

6. Surface Water Drainage Strategy

Surface Water Management

6.1. The SuDS hierarchy demands that surface water run off should be disposed of as high up the following list as practically possible:

• Into the ground (infiltration) and re-use, or then;

• To a surface water body, or then;

• To a surface water sewer, highway drain or another drainage system, or then;

• To a combined sewer.

6.2. In order to determine the most suitable method of surface water disposal from the site the options listed above have been considered as follows:

Infiltration

6.3. Geological data from the British Geological Survey (BGS) shows the site is underlain with Carboniferous Coal Measures/ Millstone Grit succession. Hydro-geologically, this is classified as a fractured aquifer of generally low–moderate productivity.

6.4. Based on the above, it is considered that infiltration-based SuDS have generally been ruled out at the site, and it is assumed that the existing drainage infrastructure discharges to the existing system in Bradford Road.

Surface Water Body

6.5. The next option in the SuDS hierarchy is to discharge surface water runoff into an existing surface water body.

6.6. It is not proposed to discharge surface water runoff into any water body, as the nearest does not make financial or construction sense and is located approximately over 30m at a higher point to the site.

SuDS selection process

6.7. Various methods of SuDS (Sustainable Drainage Systems) should be considered for use as different methods have constraints attached to them and may not be suitable for this development.

6.8. An assessment of the suitability of different SuDS techniques is summarised in **Table 6.1** below. Guidance from 'The SuDS manual' C753 has been used to form the basis of this assessment.

Table 6.1 – Assessment of SuDS Suitability

SuDS Technique	Potentially suitable for this development	Justification
Rainwater Harvesting	Yes	Can be considered suitable for development
Green Roofs	No	Not considered suitable for development as it is existing
Infiltration Systems (Soakaways, etc.)	No	Ground conditions not suitable for infiltration techniques.
Filter Drains	No	Ground conditions not suitable for infiltration techniques.
Swales	No	Site location would deem this not suitable
Bioretention Systems	No	Not considered suitable given the need to store contaminated water in the event of a fire.
Trees	No	Site location would deem this not suitable
Underground storage	Yes	Could be considered for attenuation
Detention basins & ponds	No	Site location would deem this not suitable
Wetlands	No	Not considered suitable due to natural watercourses nearby.
Permeable Paving	No	Compound constructed from gravel with similar properties to permeable paving subbase material. No parking spaces.

Surface Water Drainage Strategy

6.9. The current site is served by existing drainage infrastructure with foul and surface water discharging to sewers in Bradford Road, as levels fall towards the westerly direction. It is proposed to connect to the existing infrastructure and the existing catchment area to discharge in the same manner as the proposal is a change of use and there is no increase in impermeable area.

6.10. The brownfield runoff rate has been modelled in Causeway Flow Rates with a catchment of 0.0218ha, resulting in a discharge rate of 10.4l/s.

6.11. The proposal aims to mitigate existing flood risk; resulting from development by utilising a SuDS system that will attenuate post development run off by restricting the rate (and volume) of run off as far as feasible for the scope of development works in order to create a betterment as requested by the LLFA.

6.12. In respect of these objectives, an assessment has been made, to ensure that even when allowing for climate change allowance (+40%), the contributing hardstanding area will not exceed the predevelopment scenario, but instead create a betterment and improve the existing drainage scenario.

6.13. The Proposed drainage strategy provides a betterment greater than 50% on the existing discharge rates.

6.14. An indicative drainage strategy can be shown in **Appendix D** with Hydraulic Calculations using Causeway Flow**.**

Water Quality

6.15. The SuDS Manual (CIRIA C753) states that the design of surface water drainage should consider minimising contaminants in surface water runoff discharged from the site. The level of treatment required depends on the proposed land use, according to the pollution hazard indices.

6.16. **Table 6.2** shows the indicative SuDs Mitigation indices for the proposed development although the attenuation tanks should not receive runoff from areas where hydrocarbons (oils, fuels, grease) are present.

6.17. If onsite attenuation is considered, storage tanks would be the chosen method of SuDs application.

Foul Water

6.16 It is proposed that for any foul water and waste, this is to be disposed of using the existing method on-site. No drainage CCTV Survey has been commissioned at this time.

Table 6.2 – Indicative SuDS Mitigation Indices

Type of SuDs component	Total suspended solids (TSS)	Metals	Hydrocarbons
Attenuation Storage units	0.7	0.6	0.7
Total	**0.7**	**0.6**	**0.7**

7. Summary and Conclusion

7.1. The proposed development comprises the change of use of the ground floor from a nightclub (sui generis) to Class E restaurant with ancillary Sui Generis takeaway, together with the installation of a new extract canopy to the side and a new shopfront, under planning application reference 2026/62/90966/E.

7.2. The proposed development (Essential Infrastructure) is in accordance with NPPF (2024) Policy 22 "flood risk and water management".

7.3. The development proposals have been assessed against the Kirklees Local Plan (adopted February 2019), which forms part of the statutory development plan for the area. Policy LP27 (Flood Risk) requires development to be directed to areas of lowest flood risk, supported by a site-specific Flood Risk Assessment, and to demonstrate that it will be safe for its lifetime without increasing flood risk elsewhere.

7.4. This Flood Risk Assessment has been prepared in accordance with these requirements and has considered all sources of flooding, including fluvial, surface water, and groundwater, alongside the potential impacts of climate change.

7.5. In line with the requirements of the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG), a range of mitigation measures have been incorporated into the proposed development to ensure its safety and sustainability, including:

7.6. Safe access and egress routes will be maintained, aligned with the Environment Agency's requirements for dry access during the 1 in 100-year plus climate change event, where practical.

7.7. The proposed discharge rates from the site represent a 50% improvement over the existing conditions, reflecting that the site footprint is not being increased and that SuDS features have been incorporated to attenuate runoff. This approach aligns with LLFA guidance for brownfield sites where achieving greenfield runoff rates is not considered feasible.

7.8. With the implementation of these strategies, the proposed development is considered to be at Medium risk of flooding and will not increase flood risk to neighbouring properties or land. The development is compliant with the aims of the NPPF to steer new development toward areas of lowest risk and is considered appropriate in flood risk terms.

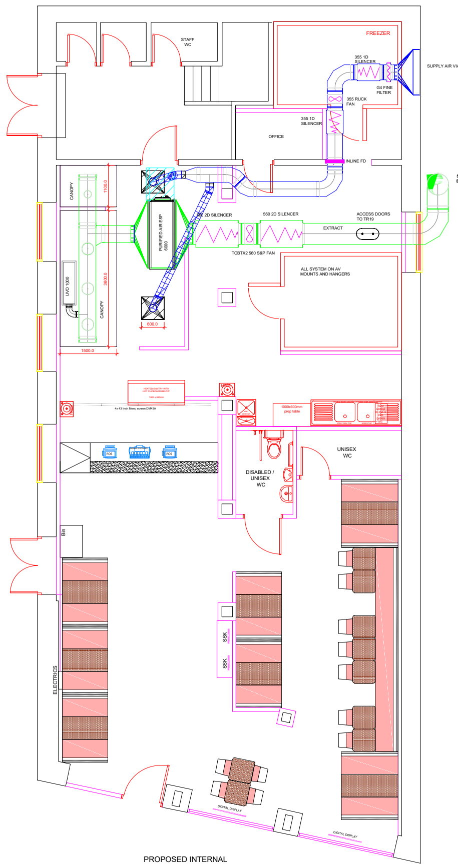
Appendix A – Topographic Map

Appendix B – Proposed Site Layout

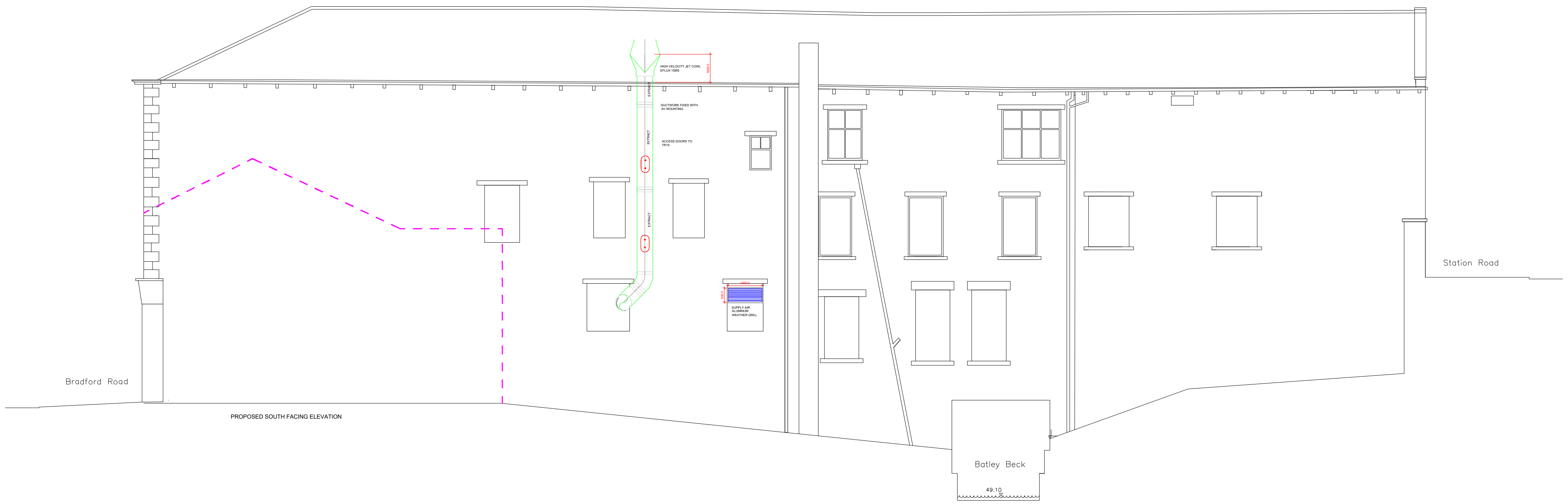
Contractor and furniture manufacturers to take on site measurements before commencing any work, architect will not be held responsible for any mis-fits on site

Any internal layout changes will need to be approved by client / architect prior to commencement

NOTES


PROPOSED INTERNAL

PROPOSED BRADFORD ROAD ELEVATION



PROPOSED SOUTH FACING ELEVATION

1:200

4m 0 4m 8m 12m 16m 20m

REVISION	DATE

PROJECT

290 BRADFORD ROAD
BATLEY - WF17 5PW

TITLE

3.0 PROPOSED PLAN - ELEVATIONS

SCALE @ A3	1:200
DATE	02.04.2026
JOB NO.	2026-086

N.A.S.A
DESIGN STUDIO

info@nasadesignstudio.co.uk

Appendix C – Existing Discharge Rates

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Circular Link Type

Shape	Circular	Barrels	1	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

100	150

Links (Results)

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.172	56.1	2.3	0.750	0.976	0.022	0.0	21	1.568

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	186.531	18.020	59.000	0.900	600	0	1.000	58.100	150
Outfall in Bradford Road	186.432	5.509	58.000	1.126	1200	1	1.000	56.874	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)		100 year (l/s)	0.0
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Summer CV	0.750	Drain Down Time (mins)	240	1 year (l/s)	0.0		
Winter CV	0.840	Additional Storage (m³/ha)	0.0	30 year (l/s)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0				

Pre-development Discharge Rate

Site Makeup	Greenfield	Soil Index	1	Growth Factor 30 year	1.95	Q 1 year (l/s)	
Greenfield Method	IH124	SPR	0.10	Growth Factor 100 year	2.48	Q 30 year (l/s)	
Positively Drained Area (ha)		Region	1	Betterment (%)	0	Q 100 year (l/s)	
SAAR (mm)		Growth Factor 1 year	0.85	QBar			

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	75.900	21.477	1 year 240 minute winter	10.660	4.240	1 year 1440 minute summer	4.308	1.155
1 year 15 minute winter	53.263	21.477	1 year 360 minute summer	12.669	3.260	1 year 1440 minute winter	2.895	1.155
1 year 30 minute summer	48.769	13.800	1 year 360 minute winter	8.235	3.260	30 year 15 minute summer	280.035	79.240
1 year 30 minute winter	34.224	13.800	1 year 480 minute summer	10.099	2.669	30 year 15 minute winter	196.516	79.240
1 year 60 minute summer	32.426	8.569	1 year 480 minute winter	6.710	2.669	30 year 30 minute summer	181.542	51.370
1 year 60 minute winter	21.543	8.569	1 year 600 minute summer	8.300	2.270	30 year 30 minute winter	127.398	51.370
1 year 120 minute summer	23.635	6.246	1 year 600 minute winter	5.671	2.270	30 year 60 minute summer	121.059	31.992
1 year 120 minute winter	15.702	6.246	1 year 720 minute summer	7.394	1.982	30 year 60 minute winter	80.429	31.992
1 year 180 minute summer	19.524	5.024	1 year 720 minute winter	4.970	1.982	30 year 120 minute summer	75.548	19.965
1 year 180 minute winter	12.691	5.024	1 year 960 minute summer	6.035	1.589	30 year 120 minute winter	50.192	19.965
1 year 240 minute summer	16.045	4.240	1 year 960 minute winter	3.998	1.589	30 year 180 minute summer	58.371	15.021

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 180 minute winter	37.943	15.021	30 year 1440 minute summer	10.414	2.791	100 year 240 minute winter	41.367	16.455
30 year 240 minute summer	46.100	12.183	30 year 1440 minute winter	6.999	2.791	100 year 360 minute summer	46.714	12.021
30 year 240 minute winter	30.628	12.183	100 year 15 minute summer	371.229	105.045	100 year 360 minute winter	30.365	12.021
30 year 360 minute summer	34.714	8.933	100 year 15 minute winter	260.512	105.045	100 year 480 minute summer	36.008	9.516
30 year 360 minute winter	22.565	8.933	100 year 30 minute summer	243.572	68.923	100 year 480 minute winter	23.923	9.516
30 year 480 minute summer	26.839	7.093	100 year 30 minute winter	170.928	68.923	100 year 600 minute summer	28.854	7.892
30 year 480 minute winter	17.831	7.093	100 year 60 minute summer	163.206	43.131	100 year 600 minute winter	19.715	7.892
30 year 600 minute summer	21.578	5.902	100 year 60 minute winter	108.430	43.131	100 year 720 minute summer	25.191	6.752
30 year 600 minute winter	14.744	5.902	100 year 120 minute summer	102.222	27.014	100 year 720 minute winter	16.930	6.752
30 year 720 minute summer	18.902	5.066	100 year 120 minute winter	67.914	27.014	100 year 960 minute summer	19.922	5.246
30 year 720 minute winter	12.703	5.066	100 year 180 minute summer	78.955	20.318	100 year 960 minute winter	13.197	5.246
30 year 960 minute summer	15.051	3.963	100 year 180 minute winter	51.323	20.318	100 year 1440 minute summer	13.627	3.652
30 year 960 minute winter	9.970	3.963	100 year 240 minute summer	62.264	16.455	100 year 1440 minute winter	9.158	3.652

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	58.120	0.020	2.1	0.0057	0.0000	OK
15 minute winter	Outfall in Bradford Road	10	56.894	0.020	2.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Outfall in Bradford Road	2.1	1.502	0.037	0.0174	1.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	58.139	0.039	7.9	0.0111	0.0000	OK
15 minute winter	Outfall in Bradford Road	10	56.912	0.038	7.9	0.0000	0.0000	OK

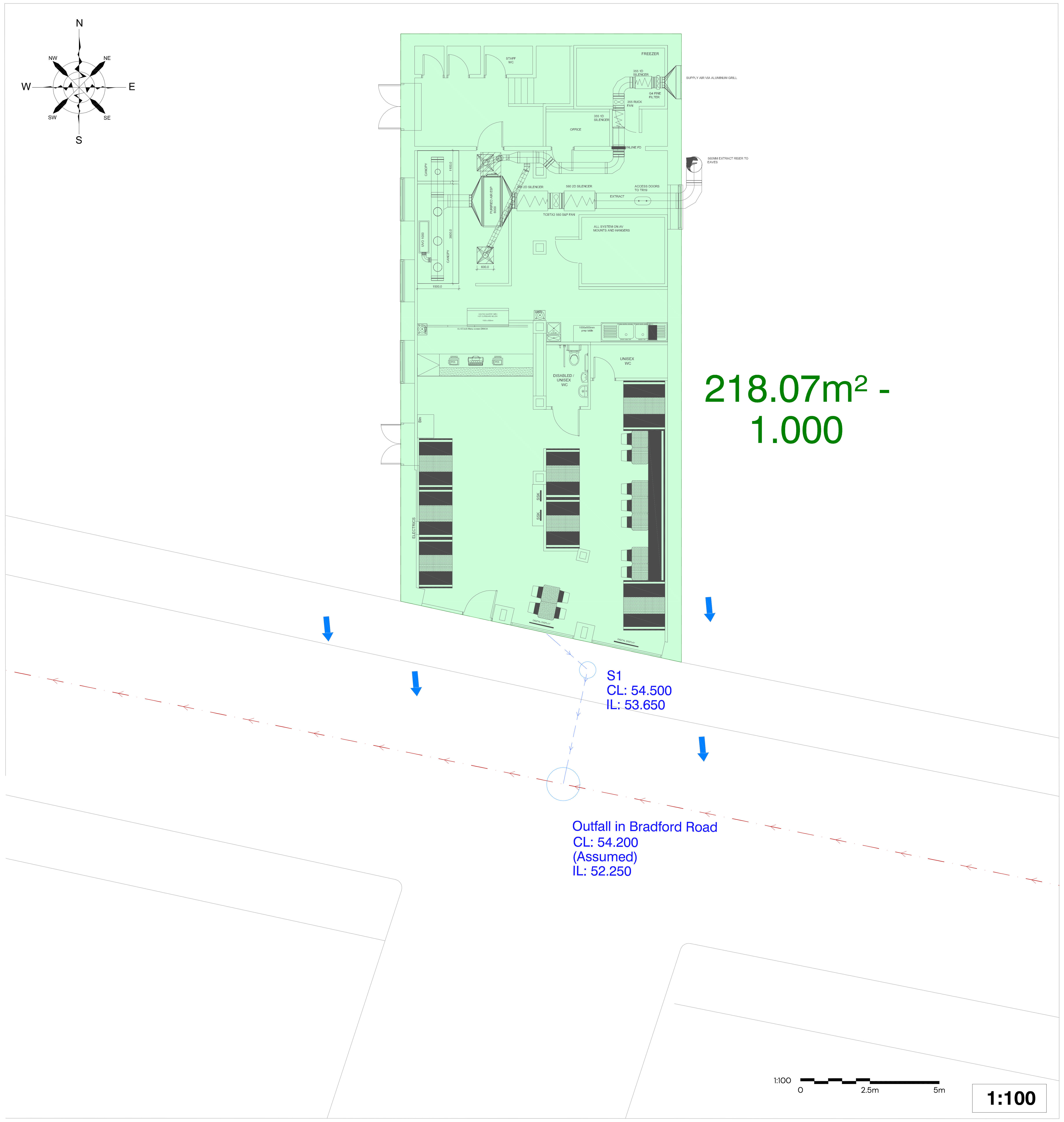
Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Outfall in Bradford Road	7.9	2.193	0.140	0.0449	3.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	58.146	0.045	10.4	0.0129	0.0000	OK
15 minute winter	Outfall in Bradford Road	10	56.918	0.044	10.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Outfall in Bradford Road	10.4	2.364	0.185	0.0548	4.8

Appendix D – Proposed Drainage Strategy Sketch and Calculations



1:100

KEY:

- SITE BOUNDARY
- PRIVATE SURFACE WATER DRAIN AND INSPECTION CHAMBER
- EXISTING FOUL SEWER
- FLOOD FLOW ROUTING
- CATCHMENT AREA

Storm Design Catchments
Attenuated Area:
Roof Area = 218m²
Total = 218.m² - 0.0218ha

Existing Discharge Rate

Outfall in Bradford Road - 10.4l/s

Proposed Discharge Rate

Outfall in Bradford Road - 5l/s

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REV.	REVISION NOTE/COMMENT					
	DRW BY	DATE	CCK BY	DATE	APP BY	DATE
P1	FIRST_ISSUE					
	JG	23.06.26	DT	23.06.26	KTY	23.06.26

Revisions

KJG Consultancy Ltd

MOBILE: 07534298311
EMAIL: info.kjgconsultancy@gmail.com

Client
AABA Enterprises Ltd

Project
290 Bradford Road, Batley

Drawing
Proposed Drainage Strategy

Scales As Shown At original size A1

Drawn JG
Date 23.06.26
Checked DT

Status INFORMATION

Drawing No. 10230-XX-DR-XX-C-0501 Rev. P1

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	✓
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Circular Link Type

Shape	Circular	Barrels	1	Auto Increment (mm)	75	Follow Ground	x

Available Diameters (mm)

100	150

Links (Results)

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.812	14.3	2.3	0.700	0.628	0.022	0.0	41	0.597
1.001	0.823	14.5	2.3	0.628	0.550	0.022	0.0	40	0.601
1.002	5.279	93.3	2.3	0.550	1.800	0.022	0.0	16	2.220

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	186.531	18.020	54.500	0.850	600	0	1.000	53.650	150
Attenuation Tank	186.508	13.757	54.400	0.778	1350	1	1.000	53.622	150
						0	1.001	53.622	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
Flow Control	186.522	10.498	54.300	0.700	1200	1	1.001	53.600	150
						0	1.002	53.600	150
Outfall in Bradford Road	186.432	5.509	54.200	1.950	1200	1	1.002	52.250	150

Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	0.840	Drain Down Time (mins)	1440	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0	Check Discharge Volume	x
Summer CV	0.750	Skip Steady State	x	Starting Level (m)			

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	0	0	0
30	0	0	0	100	40	0	0

Node Flow Control Online Hydro -Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	53.600	Product Number	CTL-SHE-0106-5000-1000-5000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node Attenuation Tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	53.622
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	14

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2.5	0.0	0.400	2.5	0.0	0.401	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	75.900	21.477	30 year 15 minute summer	280.035	79.240
1 year 15 minute winter	53.263	21.477	30 year 15 minute winter	196.516	79.240
1 year 30 minute summer	48.769	13.800	30 year 30 minute summer	181.542	51.370
1 year 30 minute winter	34.224	13.800	30 year 30 minute winter	127.398	51.370
1 year 60 minute summer	32.426	8.569	30 year 60 minute summer	121.059	31.992
1 year 60 minute winter	21.543	8.569	30 year 60 minute winter	80.429	31.992
1 year 120 minute summer	23.635	6.246	30 year 120 minute summer	75.548	19.965
1 year 120 minute winter	15.702	6.246	30 year 120 minute winter	50.192	19.965
1 year 180 minute summer	19.524	5.024	30 year 180 minute summer	58.371	15.021
1 year 180 minute winter	12.691	5.024	30 year 180 minute winter	37.943	15.021
1 year 240 minute summer	16.045	4.240	30 year 240 minute summer	46.100	12.183
1 year 240 minute winter	10.660	4.240	30 year 240 minute winter	30.628	12.183
1 year 360 minute summer	12.669	3.260	30 year 360 minute summer	34.714	8.933
1 year 360 minute winter	8.235	3.260	30 year 360 minute winter	22.565	8.933
1 year 480 minute summer	10.099	2.669	30 year 480 minute summer	26.839	7.093
1 year 480 minute winter	6.710	2.669	30 year 480 minute winter	17.831	7.093
1 year 600 minute summer	8.300	2.270	30 year 600 minute summer	21.578	5.902
1 year 600 minute winter	5.671	2.270	30 year 600 minute winter	14.744	5.902
1 year 720 minute summer	7.394	1.982	30 year 720 minute summer	18.902	5.066
1 year 720 minute winter	4.970	1.982	30 year 720 minute winter	12.703	5.066
1 year 960 minute summer	6.035	1.589	30 year 960 minute summer	15.051	3.963
1 year 960 minute winter	3.998	1.589	30 year 960 minute winter	9.970	3.963
1 year 1440 minute summer	4.308	1.155	30 year 1440 minute summer	10.414	2.791
1 year 1440 minute winter	2.895	1.155	30 year 1440 minute winter	6.999	2.791

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 15 minute summer	371.229	105.045	100 year +40% CC 15 minute summer	519.721	147.063
100 year 15 minute winter	260.512	105.045	100 year +40% CC 15 minute winter	364.716	147.063
100 year 30 minute summer	243.572	68.923	100 year +40% CC 30 minute summer	341.001	96.492
100 year 30 minute winter	170.928	68.923	100 year +40% CC 30 minute winter	239.299	96.492
100 year 60 minute summer	163.206	43.131	100 year +40% CC 60 minute summer	228.488	60.383
100 year 60 minute winter	108.430	43.131	100 year +40% CC 60 minute winter	151.802	60.383
100 year 120 minute summer	102.222	27.014	100 year +40% CC 120 minute summer	143.111	37.820
100 year 120 minute winter	67.914	27.014	100 year +40% CC 120 minute winter	95.080	37.820
100 year 180 minute summer	78.955	20.318	100 year +40% CC 180 minute summer	110.537	28.445
100 year 180 minute winter	51.323	20.318	100 year +40% CC 180 minute winter	71.852	28.445
100 year 240 minute summer	62.264	16.455	100 year +40% CC 240 minute summer	87.170	23.037
100 year 240 minute winter	41.367	16.455	100 year +40% CC 240 minute winter	57.914	23.037
100 year 360 minute summer	46.714	12.021	100 year +40% CC 360 minute summer	65.400	16.830
100 year 360 minute winter	30.365	12.021	100 year +40% CC 360 minute winter	42.511	16.830
100 year 480 minute summer	36.008	9.516	100 year +40% CC 480 minute summer	50.411	13.322
100 year 480 minute winter	23.923	9.516	100 year +40% CC 480 minute winter	33.492	13.322
100 year 600 minute summer	28.854	7.892	100 year +40% CC 600 minute summer	40.396	11.049
100 year 600 minute winter	19.715	7.892	100 year +40% CC 600 minute winter	27.601	11.049
100 year 720 minute summer	25.191	6.752	100 year +40% CC 720 minute summer	35.268	9.452
100 year 720 minute winter	16.930	6.752	100 year +40% CC 720 minute winter	23.702	9.452
100 year 960 minute summer	19.922	5.246	100 year +40% CC 960 minute summer	27.891	7.344
100 year 960 minute winter	13.197	5.246	100 year +40% CC 960 minute winter	18.476	7.344
100 year 1440 minute summer	13.627	3.652	100 year +40% CC 1440 minute summer	19.077	5.113
100 year 1440 minute winter	9.158	3.652	100 year +40% CC 1440 minute winter	12.821	5.113

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	53.692	0.042	2.1	0.0118	0.0000	OK
15 minute winter	Attenuation Tank	12	53.676	0.054	2.1	0.2039	0.0000	OK
15 minute winter	Flow Control	12	53.674	0.074	1.7	0.0842	0.0000	OK
15 minute winter	Outfall in Bradford Road	12	52.264	0.014	1.7	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Attenuation Tank	2.1	0.569	0.144	0.0195	
15 minute winter	Attenuation Tank	1.001	Flow Control	1.7	0.437	0.119	0.0234	
15 minute winter	Flow Control	1.002	Outfall in Bradford Road	1.7	2.010	0.018	0.0042	1.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	13	53.829	0.179	7.9	0.0507	0.0000	SURCHARGED
15 minute winter	Attenuation Tank	13	53.825	0.203	7.2	0.7722	0.0000	SURCHARGED
15 minute winter	Flow Control	13	53.821	0.221	5.2	0.2495	0.0000	SURCHARGED
15 minute winter	Outfall in Bradford Road	13	52.273	0.023	4.8	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Attenuation Tank	7.2	0.706	0.503	0.0750	
15 minute winter	Attenuation Tank	1.001	Flow Control	5.2	0.520	0.359	0.0574	
15 minute winter	Flow Control	1.002	Outfall in Bradford Road	4.8	2.711	0.052	0.0089	3.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	13	53.956	0.306	10.4	0.0865	0.0000	SURCHARGED
15 minute winter	Attenuation Tank	14	53.950	0.328	9.4	1.2496	0.0000	SURCHARGED
15 minute winter	Flow Control	14	53.946	0.346	5.9	0.3912	0.0000	SURCHARGED
15 minute winter	Outfall in Bradford Road	12	52.273	0.023	5.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Attenuation Tank	9.4	0.725	0.658	0.0750	
15 minute winter	Attenuation Tank	1.001	Flow Control	5.9	0.493	0.405	0.0574	
15 minute winter	Flow Control	1.002	Outfall in Bradford Road	5.0	2.732	0.053	0.0091	4.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	14	54.313	0.663	14.6	0.1876	0.0000	FLOOD RISK
15 minute winter	Attenuation Tank	14	54.306	0.684	12.9	1.9301	0.0000	FLOOD RISK
15 minute winter	Flow Control	14	54.300	0.700	7.7	0.7917	0.1260	FLOOD
60 minute winter	Outfall in Bradford Road	35	52.273	0.023	5.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	Attenuation Tank	12.9	0.735	0.900	0.0750	
15 minute winter	Attenuation Tank	1.001	Flow Control	7.7	0.543	0.531	0.0574	
60 minute winter	Flow Control	1.002	Outfall in Bradford Road	5.0	2.732	0.053	0.0091	11.1