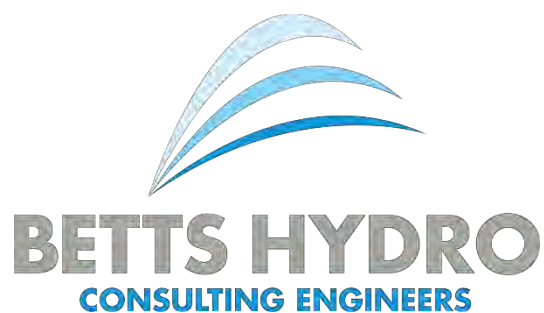


Land at Parkfield House, Manchester Old Road, Middleton

Flood Risk Assessment and Drainage Management Strategy

March 2023

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**PARKFIELD HOUSE
MIDDLETON**

**FLOOD RISK ASSESSMENT AND
DRAINAGE MANAGEMENT STRATEGY**



For

Muller Property Group
The Point
Crewe Road
Alsager
Cheshire
ST7 2GP



MARCH 2023

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**PARKFIELD HOUSE
MIDDLETON**

**FLOOD RISK ASSESSMENT AND
DRAINAGE MANAGEMENT STRATEGY**

Document Tracking Sheet

Document Reference: HYD803_PARKFIELD_HOUSE_FRA&DMS
Revision: 2.0
Date of Issue: 16th March 2023
Report Status: FINAL

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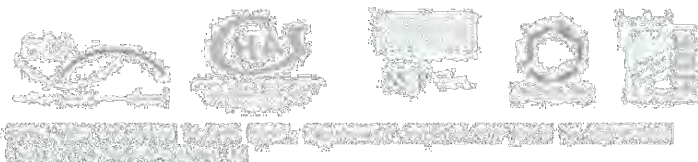
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Revision History:

Rev.:	Date:	Status:	Prepared by:	Checked by:	Issued by:
2.0	16/03/23	FINAL	HB	KH	HB
1.0	15/02/23	FINAL	PT	DK	PT
0	19/12/22	DRAFT	PT	DK	DK



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EXECUTIVE SUMMARY

This Flood Risk Assessment and Drainage Management Strategy was commissioned by Muller Property Group referred to hereafter as 'the client.' This report has been prepared to support a full planning application for the construction of a residential care home and 20no. residential dwellings at Parkfield House, Middleton. The proposals are confirmed to be 'more vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework; this also confirms that this type of development is appropriate when located within Flood Zone 1, providing there is no increase in flood risk elsewhere as a result.

Flood Risk

This report has reviewed all sources of flood risk both to and resulting from the proposed development. Consultation with the Environment Agency, United Utilities, and Rochdale Borough Council has not identified any historical flooding at the site or within the wider area.

The online flood risk datasets have also identified the site to be at low risk from fluvial/tidal flooding. The site is however shown to be at higher risk of surface water flooding given the existing land-use on the site and presence of existing hardstanding. This surface water flood risk will be reduced and sustainably managed post-development, following the implementation of mitigation measures proposed within this assessment including implementing a sustainable surface water management regime and considering appropriate levels design throughout.

Drainage Strategy

The key focus of this assessment is therefore on the sustainable management of surface water run-off to ensure no increased flood risk results from the development proposals. The surface water run-off management options have been assessed in accordance with the sustainable drainage hierarchy, which is to discharge to ground, followed by a waterbody or finally the public sewer.

As infiltration is unlikely to offer a full viable means of discharging surface water run-off generated by the proposals (based on the ground conditions published online and the previous drainage regime), this assessment has considered the alternative drainage options. The next discharge option in the hierarchy should be to discharge to a watercourse/waterbody. There are however no watercourses suitable for outfall within proximity of the site.

The alternative drainage method should infiltration not offer a full means of dealing with run-off would be to discharge surface water into the nearest surface water sewer network. It is proposed that surface water connects into the public surface water sewer within Alkrington Park Road to the south of the site. This sewer discharges into the River Irk downstream.

The proposals are to utilise permeable surface in external areas even if a full infiltration solution is not viable, the permeable surface will be lined with a connection to the proposed main drainage serving the new development. The presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).

The proposed discharge rate for the site is 11.5l/s as requested by United Utilities.

The restricted discharge rate will generate a stormwater storage requirement during the extreme storm events. Detailed design will determine with accuracy the attenuation requirements at the proper time. The proposed onsite surface water drainage system will need to be sized to contain the 1 in 30yr return period event below ground with exceedance from storm events up to and including the 1 in 100yr return period storm event with an allowance for climate change being contained onsite.

This Flood Risk Assessment and Drainage Management Strategy has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

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Specialist Software

- MicroDrainage WinDES (v.2020.1.3) – Calculation of Greenfield run-off volumes, rates of rainfall and stormwater storage estimates.

Abbreviations & Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CC	Climate Change
CSAI	Cranfield Soil and Agrifood Institute
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	Metres Above Ordnance Datum
NGR	National Grid Reference
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Practice Guidance
QSE	Quick Storage Estimate
QBAR	Mean Annual Flood
RBC	Rochdale Borough Council
SfA	Sewers for Adoption
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
TWL	Top Water Level
UU	United Utilities

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1.0 INTRODUCTION

1.1 Planning Policy Context

- 1.1.1 All forms of flooding and their impact on the natural and built environment are material planning considerations. The revised National Planning Policy Framework (NPPF) sets out the Government's objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. Government policy with respect to development in flood risk areas is contained within the revised NPPF and the supporting Planning Practice Guidance (PPG) (refer to extracts in **Appendix A**).
- 1.1.2 A Flood Risk Assessment and Drainage Management Strategy (FRA&DMS) has been completed in accordance with the revised NPPF and the PPG to review all sources of flood risk both to and from the proposed development. The report also considers the most appropriate drainage management options including the implementation of Sustainable Drainage Systems (SuDS) in line with national policy.
- 1.1.3 The proposals are residential in nature which is identified to be 'more vulnerable' in Annex 3: Flood Risk Vulnerability Classification within the National Planning Policy Framework (NPPF). The Planning Practice Guidance (PPG) confirms that this type of land-use is appropriate for Flood Zone 1, providing there is no increase in flood risk elsewhere due to the proposals.

1.2 Site Context

- 1.2.1 This FRA&DMS has been prepared to support a full planning application for the construction of an 80no. bed care home and 20no. residential dwellings on land at Parkfield House, Middleton. The proposals will be complete with access, car parking, boundary fencing and drainage.

1.3 Consultation

- 1.3.1 The preparation of this report has been undertaken in consultation with the Environment Agency (EA), United Utilities (UU) and Rochdale Borough Council (RBC). Consultation responses can be seen in **Appendix B, C, and D**, respectively. The NPPF advises that RBC as the Local Planning Authority (LPA) should consult with the EA who will provide advice and guidance on flood issues at a strategic level and in relation to planning applications.

2.0 EXISTING SITE LOCATION

2.1 Location

- 2.1.1 The development site is located on land off Old Manchester Road in Middleton. The Ordnance Survey National Grid Reference for the site is E: 386278, N: 405572 and the nearest postcode is M24 4FA (see Location Plan in **Appendix E**). The total site covers 1.16ha and is edged in red in **Figure 1**.
- 2.1.2 The site is bounded by football pitches to the north, Old Manchester Road to the south, a car park and building associated with the playing fields to the east and to the west by Middleton Cenotaph with houses located off Parkfield Drive further west as shown in **Figure 1**.



2.2 Existing and Historical Land Use

- 2.2.1 The site is currently developed and comprises of Parkfield House an office building with associated hardstanding for access and parking. No other historical uses have been identified during the preparation of this report.

2.3 Topography

- 2.3.1 A topographic survey has been undertaken and included within **Appendix F**. The topographic survey has identified that the site falls from 80mAOD in the north-eastern corner, down to 76mAOD adjacent to the south-western boundary of site. The arrows shown on **Figure 1** give a general indication of the fall across the site.

3.0 DEVELOPMENT PROPOSALS

3.1 Nature of the development

- 3.1.1 This assessment is to support to a full planning application for the construction of an 80no. bed residential care home and 20no. residential dwellings on land located off Manchester Old Road, Middleton. The proposals will be complete with access, car parking, external works and lighting, landscaping, boundary walls and fencing, external services, and drainage. A full planning layout is included in **Appendix G**.



Figure 2: Proposed Site Plan (Archi Scope, 2023)

- 3.1.2 The total site covers 1.16ha and is understood to be 75% impermeable at present. Due to the nature of the development the impermeable areas of the site will decrease to 54% post-development (which equates to 0.63ha).
- 3.1.3 National and local policy identifies that Sustainable Drainage Systems (SuDS) should be incorporated into new development where at all feasible. It is highly recommended that permeable surfacing be utilised where at all feasible for proposed developed areas, to minimise the surface water run-off generated. Given the scale and nature of the proposals there is likely to be scope to incorporate some smaller scale SuDS features onsite such as rain gardens, water butts and permeable surfacing. Detailed design will be required to confirm, subject to ground investigations and detailed levels review.
- 3.1.4 There is understood to be existing sewer infrastructure within the site associated with the office block and hard building. Any existing offsite connections should be maintained.

4.0 SOURCES OF FLOOD RISK

4.1 Fluvial Flood Risk

- 4.1.1 Information relating to flood risk at the site has been obtained from the Environment Agency and from the Gov.uk website. An extract of the EA's Flood Zone Map for Planning is shown in **Figure 3**, which illustrates that the site is located solely within Flood Zone 1. Flood Zone 1 is an area considered to be at little or no flood risk from rivers and/or the sea (as defined by the EA).



- 4.1.2 The nearest Main River to site is the River Irk located 190m south of the site. It is understood based on the surrounding topography in which levels slope down from Manchester Old Road to the River Irk, the risk from this Main River is very low. This is reflected in the national flood mapping data sets (see full mapping in **Appendix B**). Correspondence from the EA is currently outstanding; however, it is estimated that the 1 in 100 year event plus climate change would not be significantly greater than the 1 in 1000 year event (typically delineating Flood Zone 2).
- 4.1.3 Initial consultation with the EA, UU, and RBC also failed to highlight any historical flooding directly to the site or the surrounding area because of fluvial sources (see correspondence in **Appendix B, C and D**). This is further supported by the review of Rochdale Borough Council's Strategic Flood Risk Assessment, which does not identify the site to be at risk from fluvial sources.

4.2 Tidal Flood Risk

- 4.2.1 The Mersey Estuary is located over 50km west of the development site. Due to the distance from site, the tidal flood risk from these sources is 'low.' This is supported by the EA's Flood Zone Map for Planning also for the site being in Flood Zone 1.

4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility

- 4.3.1 The proposals are residential in nature and therefore considered to be 'more vulnerable' development in Annex 3: Flood Risk Vulnerability Classification within the NPPF. The PPG confirms that this type of land-use is appropriate for Flood Zone 1, providing there is no increase in flood risk elsewhere due to the proposals.

4.4 Surface Water Flood Risk

- 4.4.1 Surface water flooding occurs when rainwater is unable to drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. The risk associated with surface water flooding is indicated by the long-term flood mapping (extract shown in **Figure 4**).



- 4.4.2 As indicated in **Figure 4**, the site is predominantly at 'very low' risk from surface water flooding. Generally, areas at higher risk of surface water flooding correspond with low-lying depressions. In this case, the areas onsite at highest risk correspond with existing hardstanding areas located adjacent to the main building.
- 4.4.3 It should be noted that this mapping does not consider any existing formal surface water drainage infrastructure which might be present to deal with the surface water run-off generated in this area, so it does not accurately represent flood risk in all circumstances.
- 4.4.4 The risk to the proposals from surface water flooding will be managed and reduced, post-development through the design and implementation of a sustainable surface water management regime. To further mitigate for any residual risks, it is advised that (following any re-grade of the site) Finished Floor Levels of the care home and dwellings

are elevated above the external levels to provide safe overland flood routes for any excess surface water run-off.

Pluvial (Overland run-off) Flood Risk

- 4.4.5 Intense rainfall that is unable to soak into the ground or enter drainage systems can run-off land and result in flooding. Local topography and the land-use can have a strong influence on the direction and depth of flow. The topography of the site and surrounding developed areas means it is unlikely the site will be impacted by overland pluvial flows, as these are typically generated in undeveloped/undrained areas.
- 4.4.6 The volume and rate of overland flow from land can be exacerbated, if development increases the percentage of impermeable area. Any overland flows generated by the development must be carefully controlled with safe avenues directing overland flow away from adjacent development being advised.

Sewer Flood Risk

- 4.4.7 In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as "combined sewers". Foul water flooding often occurs in areas prone to overland flow and can result when the sewer is overwhelmed by heavy rainfall and will continue until the water drains away.
- 4.4.8 United Utilities sewer records have identified a public combined sewer located within Manchester Old Road to the east of site. Consultation with United Utilities has identified no records of flooding in the vicinity of the site that can be attributed to capacity limitations in the public sewerage system (see **Appendix C** for correspondence and sewer records).

4.5 Groundwater Flood Risk

- 4.5.1 High groundwater levels are usually the key source of groundwater flooding, which occurs when excess water emerges at the grounds surface (or within constructed underground structures such as basements). Groundwater flooding is often more insistent than surface water flooding and would typically last for weeks/months rather than days meaning the result to property is often more severe.
- 4.5.2 In general terms groundwater flooding can occur from three main sources:
- If groundwater levels are naturally close to the surface, then this can present a flood risk during times of intense rainfall.
 - Seepage and percolation occur where embankments above ground level hold water. In these cases, water travels through the embankment material and emerges on the opposite side of the embankment.
 - Groundwater recovery / rebound occurs where the water table has been artificially depressed by abstraction. When the abstraction stops the water, table makes a recovery to its original level. There is the potential for groundwater flooding in low lying areas where groundwater levels have been depressed below their pre-pumping conditions, where these were at or close to ground level.
- 4.5.3 The mapping data for groundwater shows that the site is underlain by Secondary A bedrock and superficial deposits. The site is also located within a Medium Groundwater Vulnerability Zone. No historical flooding at or within proximity of the site due to

groundwater related sources has however been identified as part of this assessment. Review of RBC's Strategic Flood Risk Assessment (SFRA) identifies that the site is located within an area with limited potential for groundwater flooding to occur (see mapping extracts within **Appendix H**).

- 4.5.4 Irrespective, it is advised that the Finished Floor Levels of the proposed buildings be raised sufficiently above the external levels where possible to safeguard dwellings (this is typically 150mm). The external levels should fall away from the proposed dwellings where practical to provide safe avenues for overland flows around/away from any proposed more vulnerable development.

4.6 Artificial Sources of Flood Risk

- 4.6.1 National policy states that an FRA should consider the potential risks from a variety of other flood sources including artificial sources (such as risks from reservoirs and canals).

Reservoirs

- 4.6.2 The EA recognises reservoirs as bodies of water over 25,000cu.m and the long-term flood mapping is included in **Appendix B** which shows the extents of flooding associated with reservoirs does not impact on or near to the development site.
- 4.6.3 Review of the online mapping has identified fish ponds located 300m to the west of the development site. It is understood that these ponds have not been considered within the online reservoir flood map due to the relatively small size (less than 25,000cu.m).

Canals

- 4.6.4 There are no canals located in proximity to site therefore the risk of flooding associated with canals is 'low'.
- 4.6.5 Irrespective, it is advised that external levels fall away from the proposed buildings, to minimise the flood risk from a variety of sources. By keeping the Finished Floor Levels elevated relative to the externals, this should help create an overland flood flow route in the event of a breach or any other source of flooding that could lead to overland flows including reservoir or canal flooding.

4.7 Historical and Anecdotal Flooding Information

- 4.7.1 No historical flooding has been identified during our review of online sources, including review of Rochdale Borough Council's Strategic Flood Risk Assessment (see general extracts in **Appendix H**).
- 4.7.2 Consultation with the Environment Agency, United Utilities and Rochdale Borough Council has also failed to identify any historic flooding directly to the site from the variety of sources reviewed (see **Appendix B, C and D** for correspondence).

4.8 Flood Risk Mitigation Measures & Residual Risks

- 4.8.1 The development parcels are located wholly within Flood Zone 1 and are at negligible risk of fluvial/tidal flooding. To observe a conservative approach however, mitigation measures have been proposed below to safeguard against other potential residual

sources of flood risk. The mitigation measures also consider the uncertainties of climate change in accordance with the revised NPPF and PPG.

Mitigation Measures

- 4.8.2 For 'more vulnerable' development located within Flood Zone 1, it is typical to set the Finished Floor Levels (FFL) of the proposed buildings, a minimum of 150mm above the existing ground levels. By ensuring the FFLs are raised sufficiently above the external levels (following any re-grade) should mitigate any risk of flooding from a variety of sources, including groundwater and surface water risks.
- 4.8.3 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised.
- 4.8.4 To minimise the flood risk to the neighbouring properties it is recommended that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted to the equivalent of the pre-development situation (with betterment where required).
- 4.8.5 The proposed onsite surface water drainage system will need to be sized to contain the 1 in 30yr return period event below ground with exceedance from storm events up to and including the 1 in 100yr return period storm event with an allowance for climate change being contained onsite.
- 4.8.6 As with any drainage system blockages within either the foul or surface water system have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either AW or SBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

Residual Risks

- 4.8.7 If an extreme rainfall event exceeds the design criteria for the drainage system it is likely that there will be some overland flows that are unable to enter the system, it is important that these potential overland flows are catered for within the development site if the capacity of the drainage system is exceeded.

5.0 SURFACE WATER MANAGEMENT

- 5.0.1 The total site covers 1.16ha and is understood to be approximately 75% impermeable at present. Due to the nature of the development the impermeable areas of the site will decrease post-development, we have assumed based on the planning layout to be 54% of the site area (which equates to 0.63ha).
- 5.0.2 At present the site is developed and therefore it is understood that there is existing drainage infrastructure catering for the existing development located onsite currently. The topographic survey has identified that there is separate surface water and foul water sewer infrastructure which combines in the south-west corner of the site.
- 5.0.3 Based on the topographic survey it is likely the onsite combined sewer connects into a public combined sewer within Manchester Old Road. This connection should be surveyed to evidence capacity, condition, and connectivity.

5.1 Pre-Development Surface Water Run-off

- 5.1.1 The peak rates and volumes of run-off generated by the existing impermeable areas and existing permeable areas have been calculated for the key storm events using the Modified Rational Method. Details of the pre-development rates and volumes are included in **Table 1** (full details can be found in **Appendix I**). The greenfield rates have been calculated using the FEH method within the UK SuDS tool.

Existing Imp. Areas	Run-Off Rates				Run-Off Volumes	
	1 In 1 Year	1 In 30 Year	1 In 100 Year	50mm/hr	1 In 1 Year	1 In 100 Year
0.79ha	37.3l/s	74.0l/s	99.4l/s	109.7l/s	172.1cu.m	548.8cu.m
Greenfield Areas	1 In 1 Year	1 In 30 Year	1 In 100 Year	QBAR	1 In 1 Year	1 In 100 Year
0.37ha	3.4l/s	6.6l/s	8.1l/s	3.9l/s	34.5cu.m	107.7cu.m

Table 1: Pre-Development Surface Water Run-Off Rates (Betts Hydro, 2022)

- 5.1.2 The brownfield rates shown within **Table 1** are calculated based on the existing impermeable areas onsite during the 50mm/hr event and the greenfield rates for the existing greenfield rates. The rates in **Table 1** are not based on the existing rate conveying off the site in the existing pipe connection from the site to the public sewer network, as full details on the outgoing pipe connection are not currently known.

5.2 Post Development Surface Water Run-Off

- 5.2.1 As previously discussed due to the nature of the development the impermeable areas of the site post-development will decrease. It is understood that the site will be 54% impermeable post-development based on the planning layout which equates to 0.63ha. The unrestricted post-development run-off rates generated by this proposed impermeable area have been detailed in **Table 2**.

Prop. Imp. Areas	Run-Off Rates		
	1 In 1 Yr	1 In 30 Yr	1 In 100 Yr CC
0.63ha	29.8l/s	59l/s	111l/s

Table 2: Post-Development Un-Restricted Run-Off Rates (Betts Hydro, 2022)

- 5.2.2 In accordance with the SuDS Manual (CIRIA) and the Non-Technical Standards for SuDS (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. The guidance however acknowledges that it is not always feasible to restrict a brownfield site to the greenfield equivalent. In these cases, it is usually acceptable to offer betterment on the pre-development brownfield rates as an alternative proposal.

5.3 Sustainable Drainage Systems (SuDS)

- 5.3.1 In accordance with national and local planning policy, peak surface water discharge rates from new development should be appropriately managed and where possible reduced. To manage surface water run-off policy shows that preference should always be given to Sustainable Drainage Systems (SuDS) over the traditional methods of buried sewers wherever possible and practical.
- 5.3.2 SuDS can (if designed and situated appropriately) address the four key sustainability objectives embedded in planning policy including providing space for water (water quantity), improving water quality and biodiversity, along with providing valuable amenity/recreational space within new development sites. These benefits depend on the type of SuDS features being proposed, some examples are illustrated in **Figure 5**.
- 5.3.3 Opportunities should also be taken to provide soft landscaping where at all possible on site to assist in minimising surface water run-off. It would be recommended that permeable surfacing and bio-filtration be considered where at all feasible. By including measures such as these the surface water run-off is being dealt with at source and this will assist locally with surface water management (subject to optimum ground conditions).



Figure 5: SuDS Photographs (SusDrain, 2012)

- 5.3.4 If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753). Detailed design should confirm whether this site would be suitable for incorporation of SuDS following more detailed analysis of levels, ground conditions and attenuation requirements.

5.4 Methods of Surface Water Management

- 5.4.1 There are three methods that have been reviewed for the management and discharge of surface water. These may be applied individually or collectively to form a complete strategy and should be applied in the order of priority listed below:

-  Discharge via infiltration
-  Discharge to watercourse
-  Discharge to public sewerage system

5.5 Discharge via Infiltration

- 5.5.1 Any impermeable areas that can drain to soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water system onsite. At this time there has been no onsite infiltration testing to support this assessment, therefore the ground conditions have been identified based on the online datasets.
- 5.5.2 The online Cranfield Soil and AgriFood Institute (CSAI), Soilscales viewer identifies freely draining, slightly acid, but base-rich soils. The British Geology Survey (BGS) mapping data indicates that the bedrock geology consists of Pennine Lower Coal Measures Formation, with superficial deposits of glacio-fluvial sand and gravel).
- 5.5.3 The underlying strata appears to suggest that permeability is low based on the ground conditions identified by the published online datasets and the soil classification the use of an infiltration-based solution at the site would not appear to be favourable.
- 5.5.4 To confirm whether infiltration rates at the site would promote the use of permeable surfacing and other infiltration solutions, it is recommended that Soakaway Testing (to BRE365) is undertaken at an early stage to ascertain the specific onsite underlying ground conditions and suitability of such to achieve an infiltration-based drainage solution at the site.

5.6 Discharge to Watercourse/Waterbody

- 5.6.1 The next discharge option in the sustainable drainage hierarchy should be to discharge to the watercourse, the River Irk is located 190m to the south of the site. This is shown to be a long distance for a direct connection, given there are surface water sewers outfalling into the River Irk located closer to the site.

5.7 Discharge to Public Sewer Network

- 5.7.1 United Utilities sewer records have identified a public surface water sewer located at the bottom of Alkington Park Road, 80m to the south of the site. This public surface water sewer outfalls to the River Irk further west.

- 5.7.2 At present the site is developed and therefore it is understood that there is existing drainage infrastructure catering for the existing development located onsite. The topographic survey has identified that there are separate surface water and foul water sewer infrastructure which connect into a combined sewer length located onsite and runs offsite connecting into the public combined sewer.
- 5.7.3 The proposals are to discharge surface water run-off, into the public surface water sewer located within Alkrington Park Road, via a new connection (as illustrated in **Figure 7**). The proposals are to utilise permeable surface in external areas even if a full infiltration solution is not viable, the permeable surface will be lined with a connection to the proposed main drainage serving the new development. The presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).



- 5.7.4 Detailed design will be required to confirm the feasibility of the strategy and consents for works to the public sewer network will be required from United Utilities.

- 5.7.5 Early discussion with United Utilities has identified the proposed surface water sewer is their preferred option for connection, if infiltration is not feasible. Any offsite works be required to secure a new connection then these will need to be discussed with relevant parties (including the Highways Authority and United Utilities) during the detailed design stage.

Proposed Discharge Rates

- 5.7.6 Review of the LLFA Guidance for Developers identified that their expectations for brownfield sites is a 50% reduction in the 50mm/hour rate. The 50% factor only applies to the existing impermeable footprint of the site. The rest of the permeable areas of the site shall be added as Greenfield runoff rates (see **Appendix J**). However United Utilities request that any agreed rate does not exceed 11.5l/s (see correspondence within **Appendix C**). Therefore, the proposed discharge rate for the site is 11.5l/s.
- 5.7.7 The restricted discharge rate will generate a stormwater storage requirement during the extreme storm events. The stormwater storage figures quoted in **Table 3 (Appendix L)** are estimates only. Detailed design will determine with accuracy the attenuation requirements at the proper time.

Impermeable Area (0.63ha)	1 In 1 Year	1 In 30 Year	1 In 100 Year + 45% CC
Restricted Run-Off Rate	11.5l/s	11.5l/s	11.5l/s
Estimated Stormwater Storage Volume	36cu.m-75cu.m	123cu.m-201cu.m	323cu.m-487cu.m

Table 3: Estimated Stormwater Storage Requirements (Betts Hydro, 2023)

- 5.7.8 As discussed previously, restricting the rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. Given the scale and nature of the development this will be provided via underground storage, the specific means are to be determined during the detailed design stage and it is likely storage will be divided for the different development types. The surface water scheme for the development will be designed to cater for the surface water run-off generated in the events up to and including the 1 in 100yr return period event with allowance for climate change.

5.8 Climate Change

- 5.8.1 There are indications that the climate in the UK is changing significantly, and it is widely believed that the nature of climate change will vary by region. Current opinion indicates the likelihood that future climate change would produce more frequent short duration and high intensity rainfall events with the addition of more frequent periods of long duration rainfall. It is believed that the impact of climate change means there is likely to be a long-term increase in the average sea levels, with an expectation that sea levels will rise gradually. An increase in flood water levels means that future flooding events will occur more frequently and will have a greater impact.
- 5.8.2 In light of the future uncertainties Climate Change should be accounted for within the design of all new developments. Climate change factors have been considered and any increase in the level of flood risk (to the site) from climate change is likely to be

related to the increase in rainfall intensity and duration and its impact upon the surface water drainage system.

- 5.8.3 In accordance with the Irwell Management Catchment peak rainfall allowances, the upper end allowance (**Table 5**) for the 2070's has been utilised (based on development with a lifetime beyond 2100).

PROJECTIONS	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE 2070'S
Upper End Allowance	45%
Central Allowance	30%

Table 5: Change to Peak Rainfall Compared to 1981-2000 Baseline (Environment Agency, 2022)

6.0 FOUL WATER MANAGEMENT

- 6.1 Review of the UU sewer records identify there to be public sewer infrastructure to the south of the site. The nearest foul water compatible public sewer is a public combined water sewer located within Manchester Old Road adjacent to the southern boundary of the site (refer to sewer records within **Appendix C**).
- 6.2 As previously discussed, at this stage it is assumed that the onsite private surface water and foul water systems connect into the public combined sewer located within Manchester Old Road. A full drainage connectivity survey will need to be undertaken at the proper time to confirm this assumption although at this stage this is the most likely point for outfall given the site characteristics and the drainage infrastructure reviewed on the topographic survey.
- 6.3 Based on the proposals for the construction of an 80no. bed care home, the approximate peak foul water flows generated by the site have been calculated at 3.7l/s, based on 4000 litres per dwelling per 24 hours as per the guidance contained within Sewers for Adoption. Based on the proposals for the construction of a 20no. residential dwellings, the approximate peak foul water flows generated by the site have been calculated at 0.9l/s.
- 6.4 The proposals are to connect to the 900mm dia. Public combined sewer within Old Manchester Road adjacent to the eastern access point as illustrated in **Figure 6** (on page 23). This is United Utilities preferred point of connection.
- 6.5 Detailed design will be required to confirm feasibility of the strategy and to confirm whether a full gravity connection can be achieved. Based on the existing drainage systems onsite and an initial review of the topographic survey, a gravity connection is understood to be feasible at this stage.

7.0 SUMMARY AND CONCLUSIONS

- 7.1 This report has been prepared to support an outline planning application for the construction of an 80no. bed residential care home and 20no. residential dwellings at Parkfield House, Middleton. The proposals are confirmed to be 'more vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework; this also confirms that this type of development is appropriate when located within Flood Zone 1, providing there is no increase in flood risk elsewhere as a result.

Flood Risk

- 7.2 This report has reviewed all sources of flood risk both to and resulting from the proposed development. Consultation with the Environment Agency, United Utilities and Rochdale Borough Council has not identified any historical flooding at the site or within the wider area.

- 7.3 The online flood risk datasets have also identified the site to be at low risk from fluvial/tidal flooding. The site is also shown to be at low risk of surface water flooding in general, given the existing land-use on the site and presence of existing hardstanding. This surface water flood risk will be reduced and sustainably managed post-development, following the implementation of mitigation measures proposed within this assessment including implementing a sustainable surface water management regime and considering appropriate levels design throughout.

Drainage Strategy

- 7.4 The key focus of this assessment is therefore on the sustainable management of surface water run-off to ensure no increased flood risk results from the development proposals. The surface water run-off management options have been assessed in accordance with the sustainable drainage hierarchy, which is to discharge to ground, followed by a waterbody or finally the public sewer.
- 7.5 As infiltration is unlikely to offer a full viable means of discharging surface water run-off generated by the proposals (based on the ground conditions published online and the previous drainage regime), this assessment has considered the alternative drainage options. The next discharge option in the hierarchy should be to discharge to a watercourse/waterbody. There are however no watercourses suitable for outfall within proximity of the site.
- 7.6 The alternative drainage method should infiltration not offer a full means of dealing with run-off would be to discharge surface water into the nearest surface water sewer network. It is proposed that surface water connects into the public surface water sewer within Alkrington Park Road to the south of the site. This sewer discharges into the River Irk downstream.
- 7.7 The proposals are to utilise permeable surface in external areas even if a full infiltration solution is not viable, the permeable surface will be lined with a connection to the proposed main drainage serving the new development. The presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).

- 7.8 The discharge rate for the site is 11.5l/s as requested by United Utilities.
- 7.9 The restricted discharge rate will generate a stormwater storage requirement during the extreme storm events. Detailed design will determine with accuracy the attenuation requirements at the proper time. The proposed onsite surface water drainage system will need to be sized to contain the 1 in 30yr return period event below ground with exceedance from storm events up to and including the 1 in 100yr return period storm event with an allowance for climate change being contained onsite.
- 7.10 This Flood Risk Assessment and Drainage Management Strategy has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

8.0 RECOMMENDATIONS

- 8.1 For 'more vulnerable' development located within Flood Zone 1, it is typical to set the Finished Floor Levels (FFL) of the proposed buildings, a minimum of 150mm above the existing ground levels. By ensuring the FFLs are raised sufficiently above the external levels (following any re-grade) should mitigate any risk of flooding from a variety of sources, including groundwater and surface water risks.
- 8.2 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised.
- 8.3 To minimise the flood risk to the neighbouring properties it is recommended that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted to the equivalent of the pre-development situation (with betterment where required).
- 8.4 The proposed onsite surface water drainage system will need to be sized to contain the 1 in 30yr return period event below ground with exceedance from storm events up to and including the 1 in 100yr return period storm event with an allowance for climate change being contained onsite.
- 8.5 As with any drainage system blockages within either the foul or surface water system have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either UU or RBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.
- 8.6 If an extreme rainfall event exceeds the design criteria for the drainage system it is likely that there will be some overland flows that are unable to enter the system, it is important that these potential overland flows are catered for within the development site if the capacity of the drainage system is exceeded.

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APPENDIX A: NPPF & PPG EXTRACTS

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14. Meeting the challenge of climate change, flooding and coastal change

152. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

Planning for climate change

153. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures⁵³. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.
154. New development should be planned for in ways that:
- a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
 - b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
155. To help increase the use and supply of renewable and low carbon energy and heat, plans should:
- a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);
 - b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

⁵³ In line with the objectives and provisions of the Climate Change Act 2008.

- c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.
156. Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.
157. In determining planning applications, local planning authorities should expect new development to:
- a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and
 - b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.
158. When determining planning applications for renewable and low carbon development, local planning authorities should:
- a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and
 - b) approve the application if its impacts are (or can be made) acceptable⁵⁴. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

Planning and flood risk

159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
160. Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

⁵⁴ Except for applications for the repowering of existing wind turbines, a proposed wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been fully addressed and the proposal has their backing.

161. All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:
- a) applying the sequential test and then, if necessary, the exception test as set out below;
 - b) safeguarding land from development that is required, or likely to be required, for current or future flood management;
 - c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, (making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and
 - d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.
162. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.
163. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.
164. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:
- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
165. Both elements of the exception test should be satisfied for development to be allocated or permitted.
166. Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-

making stage, or if more recent information about existing or potential flood risk should be taken into account.

167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment⁵⁵. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:
- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
 - b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
 - c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
 - d) any residual risk can be safely managed; and
 - e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.
168. Applications for some minor development and changes of use⁵⁶ should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.
169. Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:
- a) take account of advice from the lead local flood authority;
 - b) have appropriate proposed minimum operational standards;
 - c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - d) where possible, provide multifunctional benefits.

Coastal change

⁵⁵ A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

⁵⁶ 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.

170. In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.
171. Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast. They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and:
- a) be clear as to what development will be appropriate in such areas and in what circumstances; and
 - b) make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.
172. Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:
- a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;
 - b) the character of the coast including designations is not compromised;
 - c) the development provides wider sustainability benefits; and
 - d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast⁵⁷.
173. Local planning authorities should limit the planned lifetime of development in a Coastal Change Management Area through temporary permission and restoration conditions, where this is necessary to reduce a potentially unacceptable level of future risk to people and the development.

⁵⁷ As required by the Marine and Coastal Access Act 2009.

(<http://www.legislation.gov.uk/ukxi/2015/596/article/4/made>) to require planning permission to be sought in each case.

Paragraph: 075 Reference ID: 7-075-20220825

Revision date: 25 08 2022

How can neighbourhood plans and neighbourhood development/community right to build orders take account of coastal change?

In any instance where a Neighbourhood Area is proposed in a Coastal Change Management Area, careful attention should be paid to the guidance on [what development would be appropriate in such an area](#), including whether [time-limiting planning permissions](#) are needed. The local planning authority will need to be consulted about existing and anticipated levels of risk, and the types of development that may or may not be appropriate.

See related policy in [paragraphs 170 to 173 of the National Planning Policy Framework](#) (<https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change>).

Paragraph: 076 Reference ID: 7-076-20220825

Revision date: 25 08 2022

Flood Zone and flood risk tables

- Table 1: Flood Zones
- [National Planning Policy Framework Annex 3 - Flood risk vulnerability classification](#) (<https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification>)
- [Table 2: Flood risk vulnerability and flood zone 'incompatibility'](#)

Paragraph: 077 Reference ID: 7-077-20220825

Revision date: 25 08 2022

Table 1: Flood Zones

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual

Flood Zone	Definition
	probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the [Strategic Flood Risk Assessment](https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment) (<https://www.gov.uk/guidance/local-planning-authorities-strategic-flood-risk-assessment>) when considering location and potential future flood risks to developments and land uses.

Paragraph: 078 Reference ID: 7-078-20220825

Revision date: 25 08 2022

Table 2: Flood risk vulnerability and flood zone 'incompatibility'

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 †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓ *

Key:

✓ Exception test is not required

X Development should not be permitted

Notes to table 2:

- This table does not show the application of the [Sequential Test](#) which should be applied first to guide development to the lowest flood risk areas; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and [Exception Tests](#) do not need to be applied to those developments set out in [National Planning Policy Framework footnote 56](#) (<https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change>). The Sequential and Exception Tests should be applied to ‘major’ and ‘non major’ development;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

“†” In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

“*” In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;

- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

Paragraph: 079 Reference ID: 7-079-20220825

Revision date: 25 08 2022

Site-specific flood risk assessment: Checklist

1 - Development site and location

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

- a. Where is the development site located? (e.g. postal address or national grid reference)
- b. What is the current use of the site? (e.g. undeveloped land, housing, shops, offices)
- c. Which Flood Zone (for river or sea flooding) is the site within? (i.e. Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the [Flood Map for Planning \(https://flood-map-for-planning.service.gov.uk/\)](https://flood-map-for-planning.service.gov.uk/). Check the Strategic Flood Risk Assessment for the area available from the local planning authority to identify if the site is within Flood Zone 1 but at increased risk of flooding in future due to climate change
- d. Also check the Strategic Flood Risk Assessment to identify if there are any other sources of flooding that may affect the site now or in the future.

2 - Development proposals

You can use this section to provide a general summary of the development proposals. It would be helpful to include, or make reference to, an existing block plan and a proposed block plan, where appropriate.

- a. What are the development proposal(s) for this site? Will this involve a change of use of the site and, if so, what will that change be?
- b. In terms of vulnerability to flooding, what is the vulnerability classification of the proposed development? See [National Planning Policy Framework Annex 3 \(https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification\)](https://www.gov.uk/guidance/national-planning-policy-framework/annex-3-flood-risk-vulnerability-classification) for an explanation of the vulnerability classifications.
- c. What is the expected or estimated lifetime of the proposed development likely to be (e.g. 100 years or 75 years)? See [paragraph 006](#) of this guidance for further advice on how to assess the lifetime of developments for flood risk and coastal

APPENDIX B: EA INFORMATION & CORRESPONDENCE

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Hannah Buchanan

From: Hannah Buchanan
Sent: 14 December 2022 09:57
To: GMMC Info Requests
Subject: Flood Risk Information Request - Products 4, 5, 6 & 7
Attachments: Location Plan.pdf

To whom it may concern,

Parkfield House, Old Manchester Road, Middleton

Please could you confirm whether you have any information (where appropriate, Products 4, 5, 6 & 7) that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached), including details of historical flooding and specific drainage requirements; this would be greatly appreciated. If there are any other specific requirements that you require in a scope of works for this site, please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards,

Hannah Buchanan BSc (Hons) MSc GradCIWEM
Graduate Flood Risk Analyst

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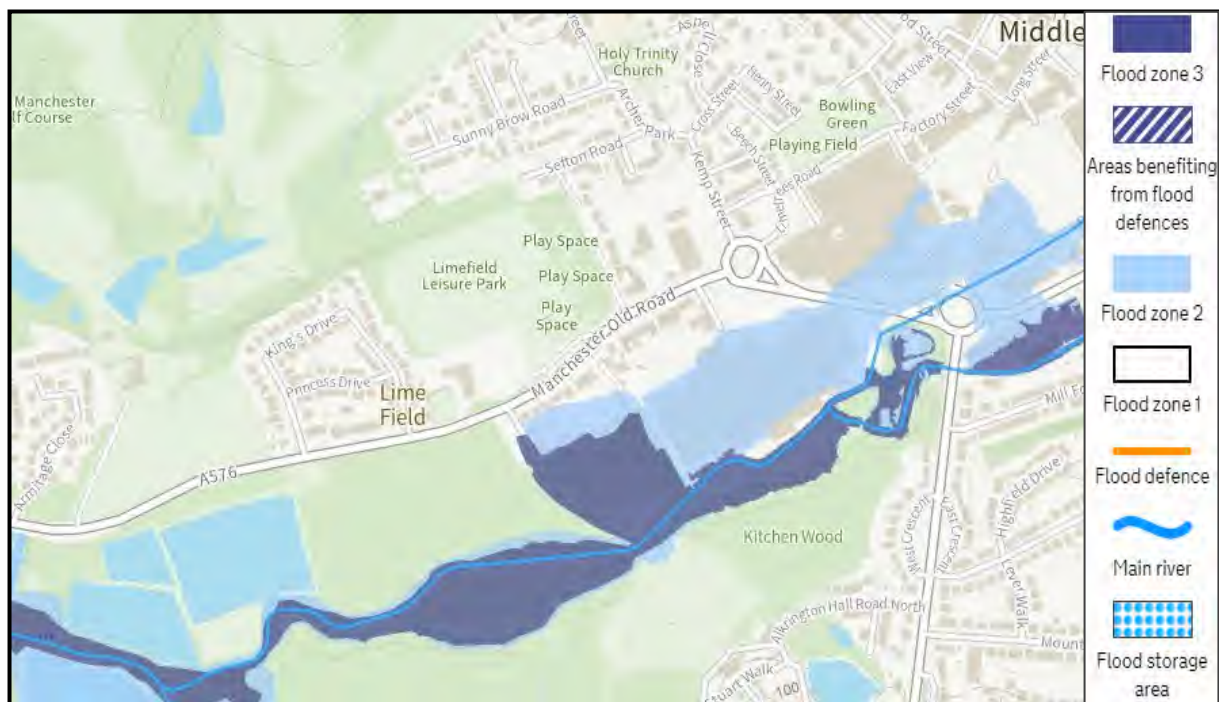
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Flood Map for Planning



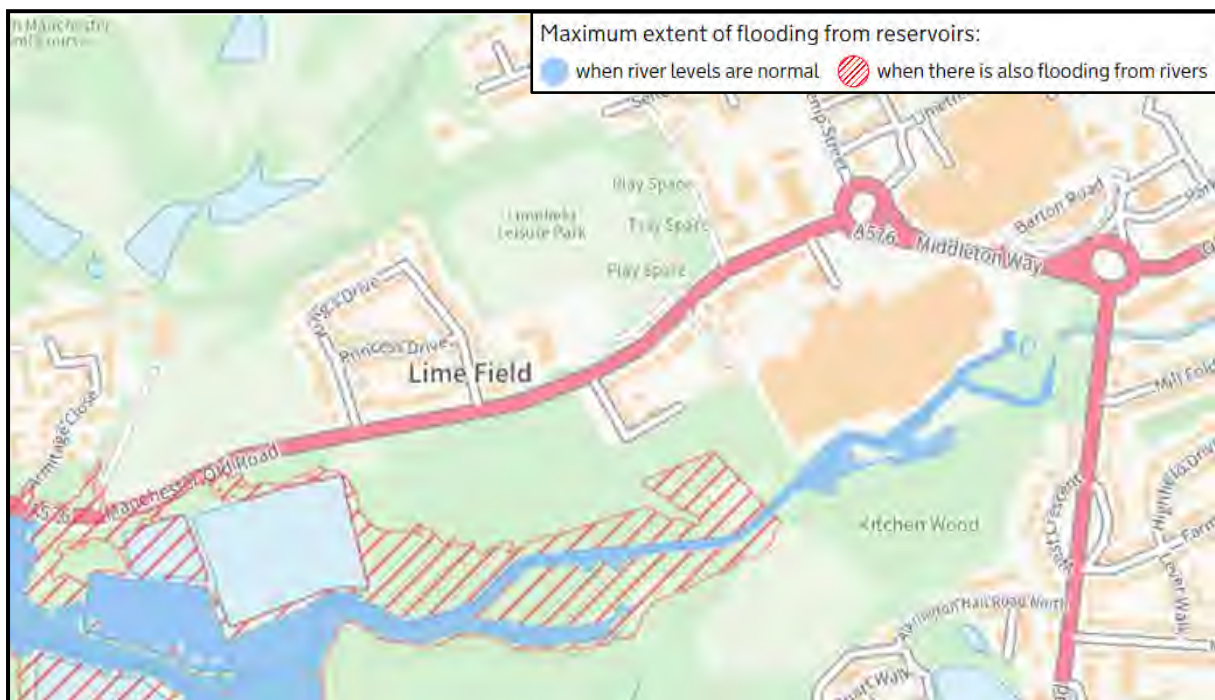
Long Term Flood Risk – Rivers or Sea



Long Term Flood Risk – Surface Water



Long Term Flood Risk - Reservoirs



APPENDIX C: UU CORRESPONDENCE

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Patrick Taylor

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 30 January 2023 14:23
To: Patrick Taylor
Subject: RE: PDE for: Parkfield House, Middleton UU Ref: 03408382

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon Patrick,
Thanks for your email, please find below the response to your questions:

Please can I check that you have received the attached information previously. It was over 10mb so maybe didn't get through.
Unfortunately, we did not receive the files or the email, we advise you to resend the email using a we-transfer website.

As there would be two entrances we would likely require connection to two separate combined sewers for the foul water. Would that be acceptable?
Yes, that will be acceptable as long as the foul water network is separate from the surface water network, and the total surface water discharge rate to the public combined sewer does not exceed 11.5l/s.

It is also likely that the existing office buildings connects both foul and surface water into the combined to the south west on Old Manchester Road. Would the discharge for SW still be required to be 11.5l/s based on this?
As this is a brownfield site, this rate has been calculated utilising soil type 5 (most impermeable) to give the peak greenfield flow rate (11.5l/s).

If the applicant would like to challenge the given rate, the applicant will be required to provide the following to our assessment:

1. Existing Drainage Layout Plan – this must include all drainage runs, cover and invert levels, pipe sizes and gradients, and existing discharge points.
2. Photographic and CCTV evidence confirming the existing drainage layout.
3. A topographic survey
4. A contributing area plan, confirming all positively drained areas.
5. A micro drainage or similar modelling simulation, confirming the performance of the existing drainage system – storm events must be run against 1m surcharge level– you must also ensure that the simulation is run against zero mad factor, realistic roughness coefficient depending on condition of pipes, and a realistic time of entry given the size of the roof areas.
6. The LPA will require applying 50% betterment for brownfield sites.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,



Mohammed Aljafarwi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

If you have received a great service today why not tell us?

Visit: unitedutilities.com/wow

----- Original Message -----

From: Patrick Taylor [patricktaylor@betts-associates.co.uk]

Sent: 26/01/2023 13:43

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: RE: PDE for: Parkfield House, Middleton UU Ref: 03408382

EXTERNAL EMAIL This email originated outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Good afternoon,

Have you had time to review the additional documents?

Kind Regards,

Patrick Taylor BSc(Hons) FRGS

Flood Risk Modeller

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY

Chester +44 (0)1244 289041

patricktaylor@betts-associates.co.uk

www.betts-associates.co.uk



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From: Patrick Taylor
Sent: 20 January 2023 15:37
To: wastewaterdeveloperservices@uuplc.co.uk
Subject: RE: PDE for: Parkfield House, Middleton UU Ref: 03408382

Good afternoon Mohammed,

Please can I check that you have received the attached information previously. It was over 10mb so maybe didn't get through.

As there would be two entrances we would likely require connection to two separate combined sewers for the foul water. Would that be acceptable?

It is also likely that the existing office buildings connects both foul and surface water into the combined to the south west on Old Manchester Road. Would the discharge for SW still be required to be 11.5l/s based on this?

Kind Regards,

Patrick Taylor BSc(Hons) FRGS

Flood Risk Modeller

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY

Chester +44 (0)1244 289041

patricktaylor@betts-associates.co.uk

www.betts-associates.co.uk

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From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>

Sent: 16 January 2023 17:04

To: Patrick Taylor <patricktaylor@betts-associates.co.uk>

Subject: RE: PDE for: Parkfield House, Middleton UU Ref: 03408382

Good afternoon Patrick,

Following my previous email, please find the attached file.

kind regards,



Mohammed Aljafarwi (He/Him)

Developer Engineer

Developer Services & Metering

Customer Services

M: 07950474499

unitedutilities.com

----- Original Message -----

From: wastewaterdeveloperservices@uuplc.co.uk [wastewaterdeveloperservices@uuplc.co.uk]

Sent: 16/01/2023 17:02

To: patricktaylor@betts-associates.co.uk

Subject: PDE for: Parkfield House, Middleton UU Ref: 03408382

Good afternoon Patrick,

Pre Development Enquiry for: Parkfield House, Middleton UU Reference Number : 03408382

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 900mm diameter public combined sewer within Manchester Old Road located to the south of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

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

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where

feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 900mm diameter public surface water sewer within Alkington Park Road located south of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 11.5l/s.

In accordance with the North West Suds Proforma, all sites should strive to meet greenfield rates. As this is a brownfield site, this rate has been calculated utilising soil type 5 (most impermeable) to give the peak greenfield flow rate (file attached).

In accordance with the Ciria SuDS manual which states the rational method can only be used for very simple sites, or for an indicative design, we would not accept the proposed rates in this instance.

For me to fully assess the performance of the existing drainage system, so that I can establish a realistic discharge rate I will need the following:

1. Existing Drainage Layout Plan – this must include all drainage runs, cover and invert levels, pipe sizes and gradients, and existing discharge points.
2. Photographic and CCTV evidence confirming the existing drainage layout.
3. A topographic survey
4. A contributing area plan, confirming all positively drained areas.
5. A micro drainage or similar modelling simulation, confirming the performance of the existing drainage system – storm events must be run against 1m surcharge level– you must also ensure that the simulation is run against zero mad factor, realistic roughness coefficient depending on condition of pipes, and a realistic time of entry given the size of the roof areas.

Please note the given discharge rate is based on the full site area as the specifics of the area being developed are not yet clear. If there are significant areas of the site that will not be developed, the discharge rate should be reduced accordingly.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However,

should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address:

DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Sewer Adoptions

You have indicated on your application form that you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-adoptions/>

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long

term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

<https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/>

A free copy of the new Design & Construction Guidance can be downloaded via the link below:

<https://www.water.org.uk/sewerage-sector-guidance-approved-documents/>

Many thanks and kind regards,

	Mohammed Aljafarwi (He/Him) Developer Engineer Developer Services & Metering Customer Services M: 07950474499 unitedutilities.com
--	--

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Hannah Buchanan

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 19 December 2022 14:10
To: Hannah Buchanan
Subject: Sewer Flood Risk Information Request

Good Afternoon,

I can confirm that we have no current record of sewer flooding within the vicinity of the proposed development.

Please note that United Utilities Water Limited (U UW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.

Our response does not include:

- any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which U UW has no control and not a facet of sewer capacity; or
- any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.

As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.

<https://www.unitedutilities.com/services/builders-developers/>

Should you require any further information please do not hesitate to contact me.'

Kind regards



Louise Dack
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 01925 233063 (33063 internal)
[unitedutilities.com](https://www.unitedutilities.com)

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at WastewaterDeveloperServices@uuplc.co.uk

Betts-Associates

Old Marsh Farm Barns
Old Marsh Farm Barns,
Flintshire,
CH5 2LY

FAO:

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Your Ref: HYD803
Our Ref: UUPS-ORD-453084
Date: 15/12/2022

Dear Sirs

Location: Parkfield House Manchester Road Middleton

I acknowledge with thanks your request dated 14/12/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

APPENDIX D: LLFA/LPA CORRESPONDENCE

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Hannah Buchanan

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 14 December 2022 12:28
To: Hannah Buchanan
Cc: Development Management
Subject: RE: Historic Flood Risk Information Request - Parkfield House, Manchester Old Rd Rochdale
Attachments: RBC Drainage Planning Advice.docx

Hello Hannah,

I have no record of flooding at this site, for the 5 years I've worked for the Council.
I have appended some Drainage Planning advice.

Stephen McCann

Drainage & Flooding Engineer
Highways, Property & Strategic Housing



☎ 01706 924606

📠 07552 570262

✉ stephen.mccann@rochdale.gov.uk

From: Hannah Buchanan <hannahbuchanan@betts-associates.co.uk>
Sent: 14 December 2022 10:00
To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Cc: Mailbox Council <Mailbox.Council@Rochdale.Gov.UK>
Subject: Historic Flood Risk Information Request

To whom it may concern,

Please forward this on to the correct department;

Parkfield House, Old Manchester Road, Middleton

Please could you confirm whether you have any information that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached), including details of historical flooding and specific drainage requirements; this would be greatly appreciated. If there are any other specific requirements that you require in a scope of works for this site, please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards,

Hannah Buchanan *BSc (Hons) MSc GradCIWEM*
Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Chester +44 (0)1244 289041

hannahbuchanan@betts-associates.co.uk

www.betts-associates.co.uk

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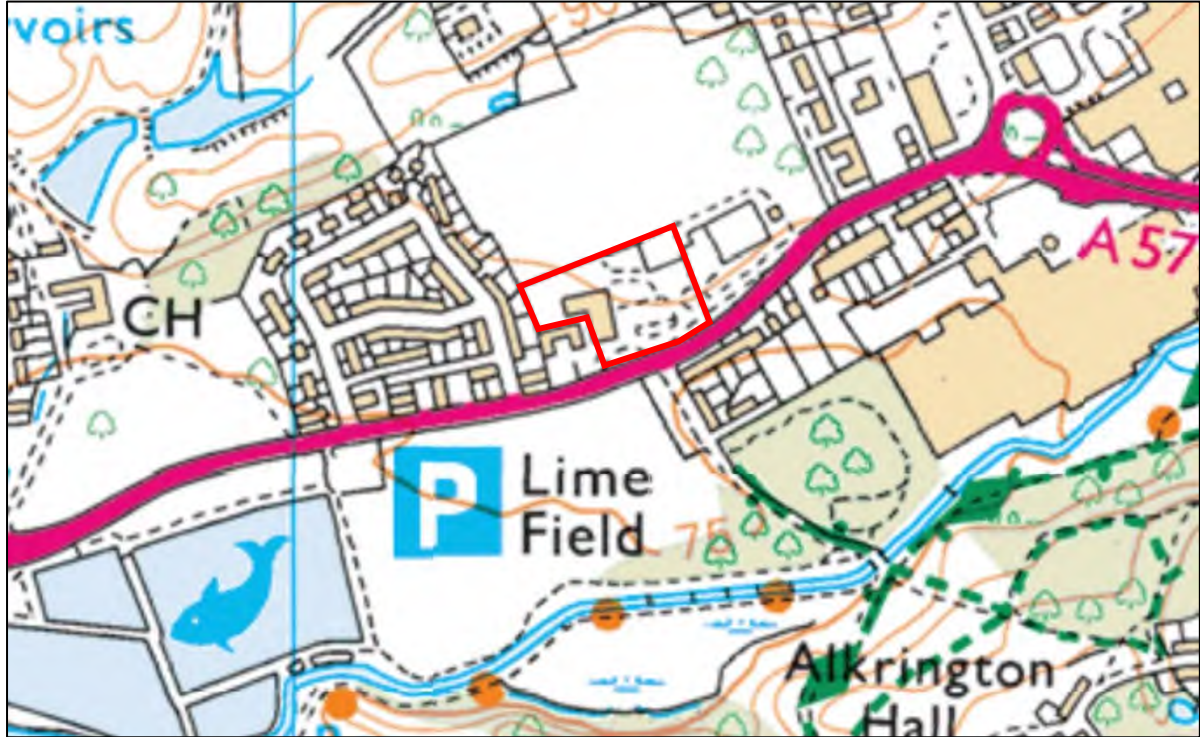
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APPENDIX E: LOCATION PLAN

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LOCATION PLAN

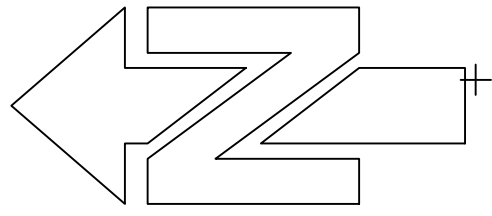
Parkfield House, Manchester Old Road, Middleton



OS X (Eastings)	386278
OS Y (Northings)	405572
Nat Grid	SD862055 / SD8627805572
Nearest Post Code	M24 4FA
Lat (WGS84)	N53:32:48 (53.54660266951086)
Long (WGS84)	W2:12:31 (-2.208558920473483)
Lat, Long (WGS84)	53.54660266951086, -2.208558920473483
Lat (OSGB36)	N53:32:47 (53.54636174785961)
Long (OSGB36)	W2:12:26 (-2.2071129786360966)
Lat, Long (OSGB36)	53.54636174785961, -2.2071129786360966

APPENDIX F: TOPOGRAPHIC SURVEY

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• **Please Note:**
Private Telecom Provider's Utility routes are shown with company name in line style
Utility routes shown in dark gray & with line type (2L+D) are from existing records.
Example: ——— E ——— B-3 ——— E ——— B-1 ——— E ——— B-3 ———

[illegible]

NOTES

Read in conjunction with existing records.
Utility routes and test shown in dark gray are from existing records.
For copies contact 4522/VEN.
Nonusers of this data summary materials should be notified to be exhausting.

40SEVEN



LEEDS LONDON
011 251 7700 01753 500046
80-81, The Grand Sharncliffe Inn

1257

PROJECT TITLE:
PARKFIELD HOUSE
MIDDLETON

DRAWING TITLE

TOPOGRAPHIC, CCTV
& UNDERGROUND
UTILITY SURVEY

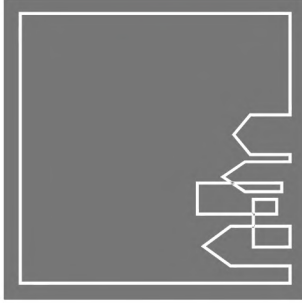
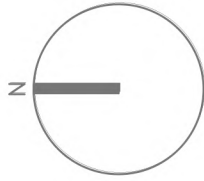
SURVEYED BY: GS / DS	DRAWN BY: WC	APPROVED BY: GJ
SCALE: 1:200 @ A0		SURVEY DATE: 09/2021

RAWING NUMBER:	Parkfield House Middleton - Topography And Drainage Report (Rev	REV:	
SHEET NUMBER:	1 of 1 AD		

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APPENDIX G: PROPOSED PLANNING LAYOUT

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Client:
MÜLLER
PROPERTY GROUP

Project Name:
Parkfield House

Project Number:
01-123-0012

Project Status:
Stage 3 - Spatial Coordination

Project Address:
Parkfield House,
Manchester Old Road,
Middletown

Date:
08/02/2023

Drawing Title:
Coloured Detailed Site Layout

Drawing Number:
MFG-PH-CDSLO1

Drawn By:
JD

Scale:
1:500
@A2

Rev:
-



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APPENDIX H: PFRA/SFRA PLANNING EXTRACTS

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Figure 2-2: Flooding of the River Roch at Smith Street



2.2.3 River Spodden

The total area of the River Spodden catchment at the confluence with the Roch is 25.8km². The catchment spans both rural areas and urban areas, from moorland in the upper headwaters to Rochdale town centre. The maximum altitude in the catchment is 474m AOD, found on the extreme western point.

Two of the tributaries of the River Spodden are dominated by reservoirs, Cowm and Spring Mill, and others have smaller reservoirs in their catchments. These tributaries generally drain from the high moorland into the valley, traversing rural and urban areas.

The study reach of the River Spodden is statutory Main River and is subject to a maintenance regime by the Environment Agency consisting of debris removal, un-blocking culvert inlets, de-silting and cutting back vegetation. Culvert inspections occur annually on 14 culverts considered at greatest risk and every two years on one other, although these are not necessarily those related to flooding.

Figure 2-3: River Spodden through Rochdale and its Confluence with the Roch



Given the urban nature of much of the catchment and the nearby larger River Roch, flood history in this area has proved to be difficult to link specifically to the River Spodden. Much reported flooding following intense rain storms has probably been from surface water.

2.2.4 River Irk

The River Irk rises near Shaw in Oldham. It passes through Oldham Council district before flowing through Middleton (Rochdale Council district) and then southwards towards Manchester city centre, where it joins the River Irwell.

There are known surface water flooding issues in Ramsbottom, Radcliffe, Littleborough, Kirkholt (Rochdale) and Heywood. These are discussed in more detail in Section 5.3.1.

2.4 Flooding from Groundwater

There are relatively few reported incidents of groundwater flooding in Bury, Rochdale and Oldham. The Environment Agency water resources team were consulted in the Greater Manchester sub-regional SFRA and stated that 'the risk posed by groundwater flooding is likely to remain remote within the sub-region; however, the impacts of increased development in Greater Manchester must be carefully assessed.'

Bury lies over an aquifer with geology consisting predominantly of sands and gravels which have a high permeability. The Environment Agency has identified groundwater recharge as a result of ceasing mine dewatering.

There are a number of flood defences along the River Irwell and Roch through Ramsbottom, Littleborough and Rochdale which elevate river levels above the floodplain. There is the possibility that alluvial groundwater flooding could occur in these areas.

2.5 Flooding from Sewers

United Utilities DG5 database (June 2007) was provided to AGMA during the Greater Manchester sub-regional SFRA detailing the total number of flood incidents that have been internal to and external to properties.

In Greater Manchester, Bury, Rochdale and Oldham had three of the bottom five local authorities with the least number of recorded flood incidents with a total of 51, 83 and 56 properties respectively.

Whilst this data can give an idea of those areas with limited drainage capacity, it must be acknowledged that it is a register of properties that have already been flooded due to exceedance or the blockage or failure of sewer systems, not properties at risk of flooding. In addition to this, sewer flooding problems may have been investigated and resolved since the register was compiled. For these reasons the DG5 register has limited usefulness in predicting future flooding locations.

More useful indicators of risk are associated with the data generated using hydraulic sewer network models, which should be investigated during a Surface Water Management Plan.

2.6 Flooding from Reservoirs

This SFRA was not able to obtain a copy of the Environment Agency Reservoir Register, which identifies those reservoirs under the Act due to "implications for national security".

However, OS mapping shows that there are a number of large reservoirs upstream of major urban areas. Table 2-3 identifies a number of the largest reservoirs in Bury, Rochdale and Oldham by area and main urban area at risk immediately downstream.

Whilst those reservoirs identified in Table 2-3 are some of the largest by area, the risk associated with them maybe lower than smaller local reservoirs (located around old mills) or water bodies for which the ownership is unclear as they are inspected and maintained by the undertaker and reservoir engineers.

Reservoir inundation mapping for reservoirs under the 1975 Reservoirs Act is covered by the Civil Contingencies Act and the information has a national security status. The National Protocol for the Handling, Transmission and Storage of Reservoir Inundation (Flood) Maps for England and Wales classifies reservoir inundation mapping according to map types and reservoir inundation mapping would not be available for public release. For this reason the SFRA has not taken the analysis of reservoir flood risk forward (within the Level 2 SFRA), including mapping the extent of inundation that may be expected following a reservoir breach.

Table 2-3: Key reservoirs in Bury, Rochdale and Oldham

Reservoir Name	Local authority	Downstream Urban Area
Elton Reservoir	Bury	Bury
Heaton Park Reservoir	Bury	Prestwich
Greenbooth Reservoir	Rochdale	Rochdale
Watergrove Reservoir	Rochdale	Wardle

Figure 2-4: The 1936 canal breach from the North Bank



http://en.wikipedia.org/wiki/File:Manchester_Bolton_and_Bury_Canal_breach.jpg

2.8 Historical Flooding

Records of past flooding are useful for looking at the sources, seasonality, frequency and intensity of flooding. Table 2-4 provides an overview of significant historical flood events in Rochdale, Bury and from the River Beal in Oldham. Historical records are often anecdotal and incomplete and it can be difficult to determine accurately the frequency and consequences of events, but they are useful for providing background information. More recent gauged records and registers of flooded properties are more valuable for estimating flood frequency and severity at different locations.

Flood risk can change over time because of natural variations in climate, changes in land use and the changes in flood risk management activity. Over the last few hundred years, developments have been increasingly built on the floodplain and farming practices that promote rapid run-off of rainwater into rivers have become widespread. Due to these changes, flood risk might be higher today than it was in the past, although any flood risk management work that is undertaken helps to reduce this.

Table 2-4: Historical flood events

Date	Council	Source	Consequences	Data source
2008	Bury	Elton Reservoir	70 properties flooded	River Irwell CFMP (Environment Agency, 2008) Bury MBC
2008	Rochdale	River and surface water	Estimated 1 in 25 year event in Rochdale and 1 in 50 year event in Littleborough. Flood defences overtopped in Littleborough. Property flooding in Littleborough and Rochdale	Review River Roch FAS (Hydrology and Hydraulics) (Environment Agency, 2009)
2007	Bury	Surface water	Bury and Summerseat, gardens and roads flooded	Bury Times
2006	Bury	Surface water	Basements and gardens flooded in Bury and Ainsworth	Bury Times
2006	Rochdale	Surface water	20 properties flooded in Heywood	River Irwell CFMP Rochdale MBC Manchester Evening News

Local Authority	Area	Description	Take forward as CDA?
		new development can help to reduce flood risk downstream.	
Rochdale	Littleborough	National surface water map shows a risk of property flooding Known issues at Calder Avenue and Harehills Park Development planned for this area	Yes – known issues and national Areas Susceptible to Surface Water Flooding map suggest significant risk
Rochdale	Kirkholt	National Areas Susceptible to Surface Water Flooding map shows a risk of property flooding Known issues with surface water flooding Regeneration is planned for this area	No – a detailed drainage study was undertaken here in 2006. Refining the surface water flood risk in this location will not be of any further benefit to identifying problems in this area, since the detailed drainage study has already done this and this has led to maintenance improvements which should reduce the likelihood of surface water flooding in the future.
Rochdale	Heywood	National Areas Susceptible to Surface Water Flooding map shows a risk of property flooding 20 properties flooded from surface water in 2006 Known issues on Pilsworth Road and from Millers Brook Known issues with sewer capacity Development planned for this area	Yes – known issues and national Areas Susceptible to Surface Water Flooding map suggest significant risk Sewer system is at capacity which may suggest that surface water flooding happens frequently.
Bury	Ramsbottom	National Areas Susceptible to Surface Water Flooding map shows a risk of property flooding Known issues on Dick Field Clough and stream to south with surface water flowing along roads and through development areas Development planned for this area Known issues with sewer capacity	Yes – known issues and national Areas Susceptible to Surface Water Flooding map suggest significant risk Sewer system is at capacity which may suggest that surface water flooding happens frequently.
Bury	Radcliffe	National Areas Susceptible to Surface Water Flooding map shows a risk of property flooding Known issues on Water Street and Pilkington Way Known issues with sewer capacity Development planned for this area	Yes – known issues and national Areas Susceptible to Surface Water Flooding map suggest significant risk Sewer system is at capacity which may suggest that surface water flooding happens frequently.

It is recommended that more detailed surface water modelling is undertaken for the six selected CDAs at Level 2 assessment. The National Surface Water Map provides a good indication of areas at risk of surface water flooding but this should be refined so that it picks up flow paths along roads and around buildings. The risk to properties can then be assessed with more confidence to provide recommendations for SWMPs.

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APPENDIX I: SURFACE WATER RUN-OFF CALCULATIONS

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SURFACE WATER RUN-OFF CALCULATION SHEET



Development	PARKFIELD HOUSE
Project No.	HYD803

Revision	D	Completed by	HB
Date	16/03/2023	Checked by	KH

Areas			
Total Site	1.160	ha	
Development Area ¹	1.160	ha	
Existing Impermeable	0.790	ha	
Existing Impermeable ²	0.790	ha	
Existing Pervious	0.370	ha	
Existing Pervious ²	0.000	ha	
Proposed total impermeable	0.630	ha	54%

Catchment Characteristics			
SAAR	1016	mm	
SPR	0.47		
BFI	0.356		
i_1	17.0	mm/hr	d_1 21.8 mm
i_{30}	33.7	mm/hr	d_{30} 51.7 mm
i_{100}	45.3	mm/hr	d_{100} 69.5 mm

Run-off Rates			
Pre-development			
Impermeable -----	1yr	37.3	l/s
	30yr	74.0	l/s
	100yr	99.4	l/s
	50mm/hr ³	109.7	l/s
Pervious ⁴ -----	1yr	3.411	l/s
	30yr	6.66	l/s
	100yr	8.14	l/s
	QBar ⁵	3.922	l/s
Total -----	1yr	40.7	l/s
	30yr	80.6	l/s
	100yr	107.5	l/s
Post-development (without control)			
Impermeable ⁶ -----	1yr	29.8	l/s
	30yr	59.0	l/s
	100yr+45%CC	114.9	l/s

Volumes			
Pre-development			
Impermeable -----	1yr	172.1	cu.m
	30yr	408.0	cu.m
	100yr	548.8	cu.m
Pervious ⁴ -----	1yr	34.5	cu.m
	30yr	79.4	cu.m
	100yr	107.7	cu.m
Total -----	1yr	206.7	cu.m
	30yr	487.4	cu.m
	100yr	656.5	cu.m
Post-development			
Impermeable ⁶ -----	1yr	137.3	cu.m
	30yr	325.4	cu.m
	100yr	437.7	cu.m

Stormwater Storage Estimates			
Based on 11.5l/s specified by UU			
Microdrainage Quick Storage Estimates (using FEH catchment data)			
Return Period	Rate	lower	upper
1yr	11.5 l/s	36	75
30yr	11.5 l/s	123	201
100yr+45%CC	11.5 l/s	323	487
			mean
			55.5 cu.m
			162 cu.m
			405 cu.m

1/ The 'development area' removes areas of POS and/or landscaped areas of the wider site that are to remain as existing.
 2/ On occasion the existing impermeable area cannot be evidenced to connect and a reduction is applied.
 3/ 50mm/hr is used for BRegs calculations and often used by Water Companies when considering allowable post-development rates of discharge. (Rational Method)
 4/ The Greenfield rates and of run-off have been calculated using the UK SUDS Calculator
 5/ QBar is the estimated flood flow for the 2.33yr return period event and is often used as a post-development rate restriction.
 6/ Post-development run-off is only considered from the impermeable area when the proposed post-development impermeable area >50% in accordance with the EA Guidance Preliminary rainfall runoff management for developments (WS-074/A/TR1/1 rev E (2012)).

NB. The catchment characteristics are from the FEH catchment, the UK SUDS Calculator and Microdrainage.
 NB. The rainfall intensities and depths are calculated for the 6hr duration rainfall event (peak summer intensity)

Calculated by: Patrick Taylor

Site name: Parkfield

Site location: Middleton

Site Details

Latitude: 53.54645° N

Longitude: 2.20894° W

Reference: 3182591831

Date: Dec 14 2022 16:54

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

Runoff estimation approach: FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

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

BFI and SPR method: Specify BFI manually

HOST class: N/A

BFI / BFIHOST: 0.356

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor: 1.08

Hydrological characteristics

SAAR (mm): 1009 1016

Hydrological region: 10 10

Growth curve factor 1 year: 0.87 0.87

Growth curve factor 30 years: 1.7 1.7

Growth curve factor 100 years: 2.08 2.08

Growth curve factor 200 years: 2.37 2.37

Notes

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

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

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

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

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

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

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s): 10.6

1 in 1 year (l/s): 9.22

1 in 30 years (l/s): 18.02

1 in 100 year (l/s): 22.05

1 in 200 years (l/s): 25.13

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

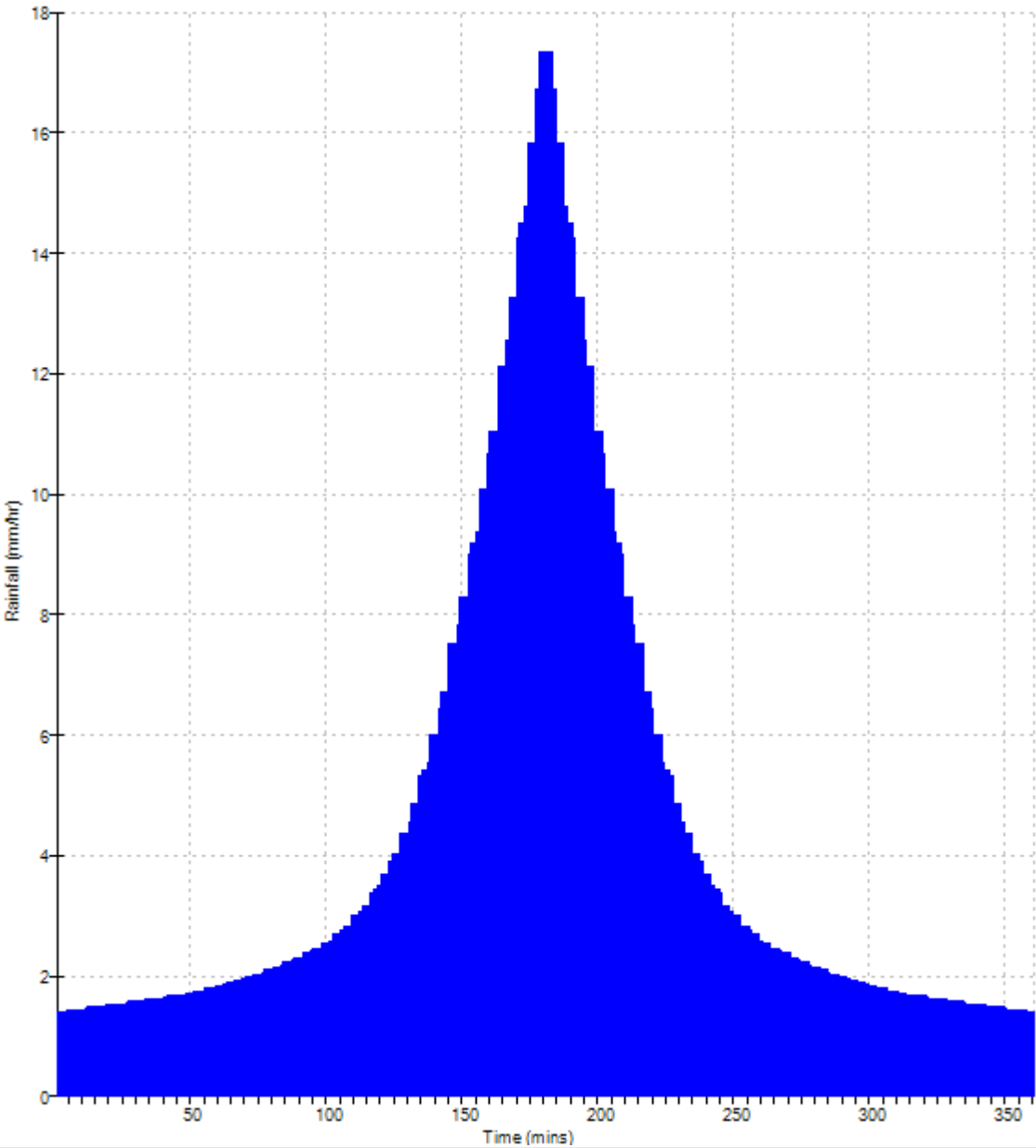
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Old Marsh Farm Barns		
Welsh Road Sealand		
Flintshire CH5 2LY		
Date 14/12/2022 16:21	Designed by patricktaylor	
File	Checked by	
Micro Drainage	Network 2018.1	

Rainfall profile

Storm duration (mins) 360

FEH Data

FEH Rainfall Version	2013
Site Location	GB 386246 405556 SD 86246 05556
Data Type	Point
Peak Intensity (mm/hr)	17.337
Ave. Intensity (mm/hr)	4.423
Return Period (years)	2.0

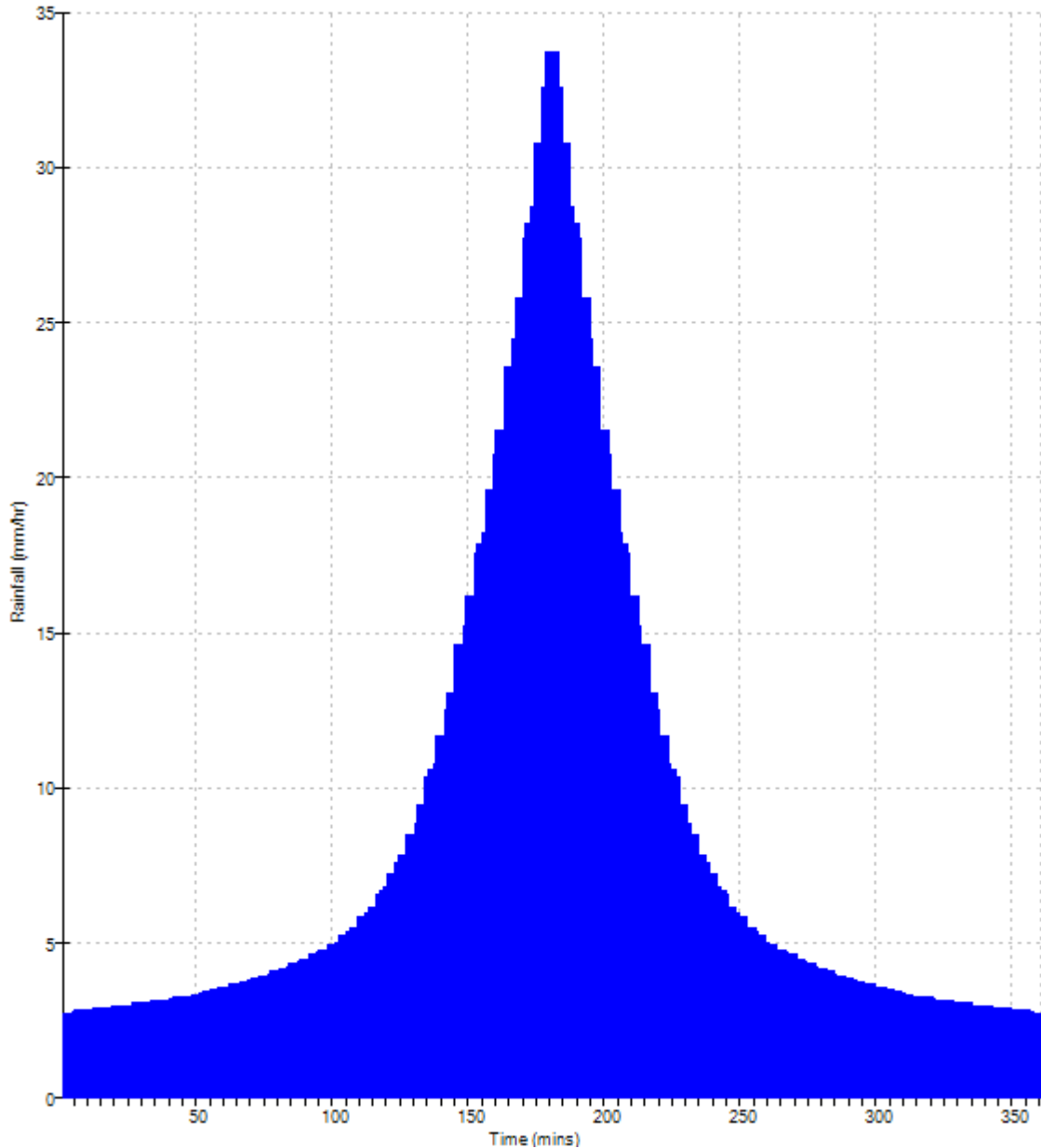


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Micro Drainage	Network 2018.1	

Rainfall profile

Storm duration (mins) 360

	FEH Data	
FEH Rainfall Version		2013
Site Location	GB 386246 405556 SD 86246 05556	
Data Type		Point
Peak Intensity (mm/hr)		33.744
Ave. Intensity (mm/hr)		8.608
Return Period (years)		30.0

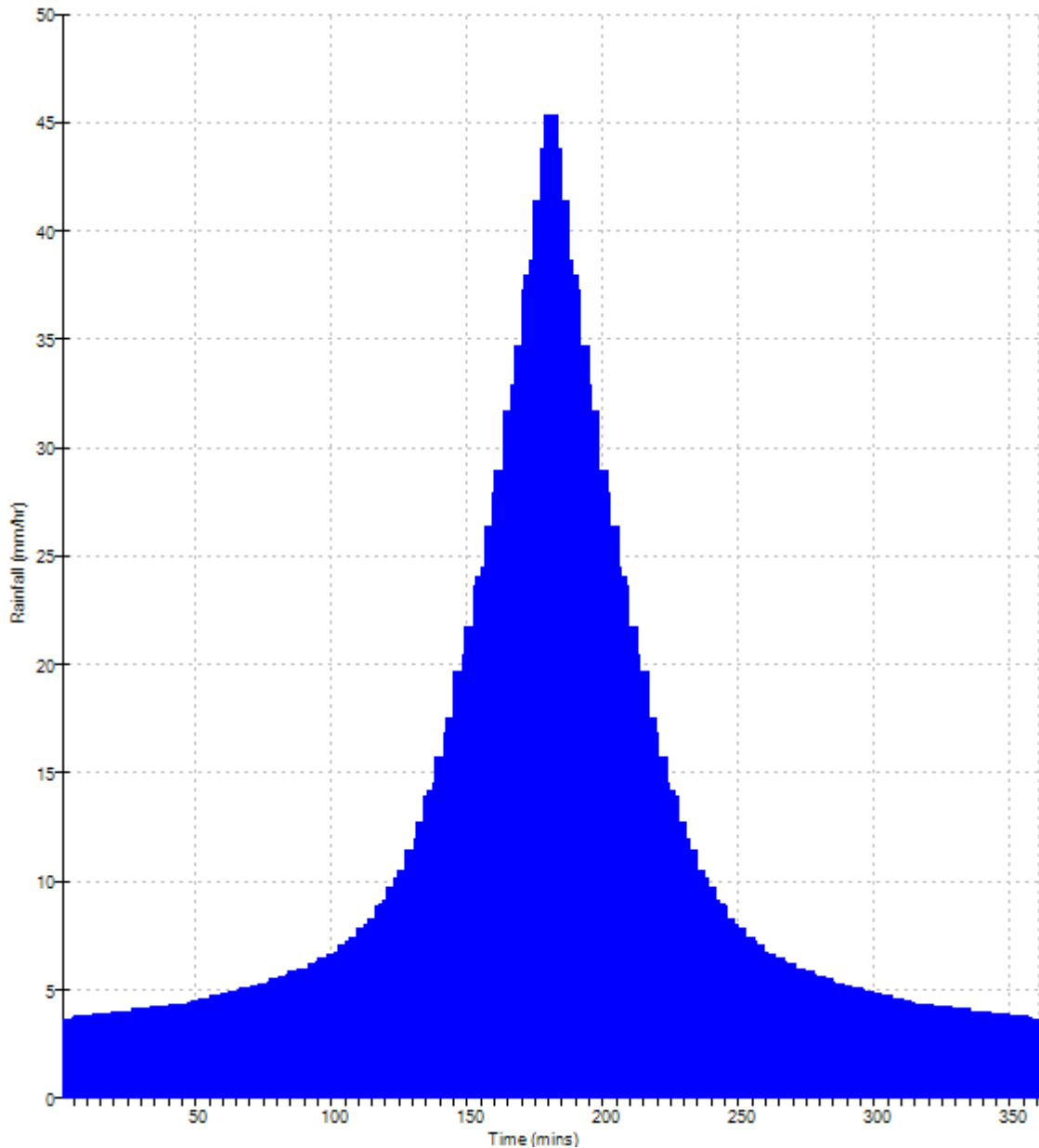


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Micro Drainage	Network 2018.1	

Rainfall profile

Storm duration (mins) 360

	FEH Data	
FEH Rainfall Version		2013
Site Location	GB 386246 405556 SD 86246 05556	
Data Type		Point
Peak Intensity (mm/hr)		45.388
Ave. Intensity (mm/hr)		11.579
Return Period (years)		100.0



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Micro Drainage		Source Control 2018.1																										
<u>Greenfield Runoff Volume</u> FSR Data <table> <tr> <td>Return Period (years)</td> <td>1</td> </tr> <tr> <td>Storm Duration (mins)</td> <td>360</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.000</td> </tr> <tr> <td>Ratio R</td> <td>0.359</td> </tr> <tr> <td>Areal Reduction Factor</td> <td>1.00</td> </tr> <tr> <td>Area (ha)</td> <td>0.360</td> </tr> <tr> <td>SAAR (mm)</td> <td>1016</td> </tr> <tr> <td>CWI</td> <td>123.401</td> </tr> <tr> <td>Urban</td> <td>0.000</td> </tr> <tr> <td>SPR</td> <td>47.000</td> </tr> </table> Results <table> <tr> <td>Percentage Runoff (%)</td> <td>46.60</td> </tr> <tr> <td>Greenfield Runoff Volume (m³)</td> <td>34.525</td> </tr> </table>			Return Period (years)	1	Storm Duration (mins)	360	Region	England and Wales	M5-60 (mm)	18.000	Ratio R	0.359	Areal Reduction Factor	1.00	Area (ha)	0.360	SAAR (mm)	1016	CWI	123.401	Urban	0.000	SPR	47.000	Percentage Runoff (%)	46.60	Greenfield Runoff Volume (m³)	34.525
Return Period (years)	1																											
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CWI	123.401																											
Urban	0.000																											
SPR	47.000																											
Percentage Runoff (%)	46.60																											
Greenfield Runoff Volume (m³)	34.525																											
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Micro Drainage Source Control 2018.1		

Greenfield Runoff Volume

FSR Data

Return Period (years)	30
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	18.000
Ratio R	0.359
Areal Reduction Factor	1.00
Area (ha)	0.360
SAAR (mm)	1016
CWI	123.401
Urban	0.000
SPR	47.000

Results

Percentage Runoff (%)	48.14
Greenfield Runoff Volume (m³)	79.367

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Micro Drainage		Source Control 2018.1																										
<u>Greenfield Runoff Volume</u> FSR Data <table> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>Storm Duration (mins)</td> <td>360</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> </tr> <tr> <td>M5-60 (mm)</td> <td>18.000</td> </tr> <tr> <td>Ratio R</td> <td>0.359</td> </tr> <tr> <td>Areal Reduction Factor</td> <td>1.00</td> </tr> <tr> <td>Area (ha)</td> <td>0.360</td> </tr> <tr> <td>SAAR (mm)</td> <td>1016</td> </tr> <tr> <td>CWI</td> <td>123.401</td> </tr> <tr> <td>Urban</td> <td>0.000</td> </tr> <tr> <td>SPR</td> <td>47.000</td> </tr> </table> Results <table> <tr> <td>Percentage Runoff (%)</td> <td>50.21</td> </tr> <tr> <td>Greenfield Runoff Volume (m³)</td> <td>107.653</td> </tr> </table>			Return Period (years)	100	Storm Duration (mins)	360	Region	England and Wales	M5-60 (mm)	18.000	Ratio R	0.359	Areal Reduction Factor	1.00	Area (ha)	0.360	SAAR (mm)	1016	CWI	123.401	Urban	0.000	SPR	47.000	Percentage Runoff (%)	50.21	Greenfield Runoff Volume (m³)	107.653
Return Period (years)	100																											
Storm Duration (mins)	360																											
Region	England and Wales																											
M5-60 (mm)	18.000																											
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SAAR (mm)	1016																											
CWI	123.401																											
Urban	0.000																											
SPR	47.000																											
Percentage Runoff (%)	50.21																											
Greenfield Runoff Volume (m³)	107.653																											
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APPENDIX J: LLFA SUMMARY GUIDANCE FOR DEVELOPERS

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FLOOD & DRAINAGE GUIDANCE

For greenfield sites, rainfall runoff should be attenuated such that any rainfall discharges from the developed site are not increased. Greenfield runoff rate of 5 l/s/ha shall be applied, unless an assessment conclusively demonstrates greenfield runoff to be greater than this.

Our minimum expectation on a brownfield site is a 50% reduction in the rate of discharge for the average annual storm i.e. Qbar 1 in 2.3 year storm. The 50% factor only applies to the existing impermeable footprint of the site. The rest of the permeable areas of the site shall be added as Greenfield runoff rates.

In accordance with the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG), the site should be drained in the most sustainable way. The drainage scheme for the development shall be in accordance with the National Planning Policy Framework (NPPG) hierarchy, in the following order of priority:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

United Utilities need to minimise surface water flows entering the foul sewerage network to avoid a detrimental impact on the public sewer network. You should refer to:- <https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/wastewater-pre-dev/>

FLOW CONTROL

A flow control of 5 l/s is generally accepted as a minimum practical flow control value, using a vortex flow control, such that the outlet diameter of the flow control does not block.

Orifice plates may be suitable in some circumstances in providing flow control but have limitations. They tend to over-restrict flows at low heads when it is not required, resulting in inefficient use of upstream storage, and if have increased liability to blockage, when compared to a vortex flow control which will have larger orifice for the same flow control value. A vortex flow control can allow for an attenuation volume reductions of 20% when compared to a system with an orifice plate.

Some authorities regard 75mm dia. as the lowest limit to avoid blockage and others may agree to 50mm dia. To restrict flows to 5l/s, an orifice plate will need to be as small as 50mm, depending upon the assumed driving head.

At the detailed design stage the Applicant's Drainage Designer should look at a vortex flow control option which will be less prone to blockage with an orifice $\geq 75\text{mm}$. Although the control will cost more, the attenuation volume required will be less, with a cost saving offset.

CLIMATE CHANGE ALLOWANCE - SURFACE WATER RUNOFF CALCULATIONS

The UK's National Planning Policy Framework (NPPF) requires new developments to take account of the effects of climate change. Table 5 of the NPPF indicates increases in peak rainfall intensity of up to 30% by 2085.

Following the flooding events experienced nationally in 2015, new climate change allowances and criteria were introduced by the Environment Agency in February 2016. This recommends that a 40% upper end climate change allowance should be used to assess the potential flood risk implications arising from the critical duration design rainfall event. New development drainage and attenuation features will take account of this potential 40% increase in order to mitigate surface water flooding within the proposed development.



ROOF DRAINAGE

If an applicant wishes to connect roof drainage to the public sewer system, United Utilities who manage the public sewer system usually require developers to have carried out infiltration testing to BRE365 to either provide soakaway solution for roof drainage and hard-standing, or demonstrate that roof drainage cannot be sent to soakaway. Three infiltration testing methods are:-

- BRE Digest 365 issued by the Building Research Establishment. It has become the standard methodology for soakaway design in the UK.
- Building Regulations 2010 Part H Drainage & Waste Disposal.
- BS 6297:2007 Code of practice for design and installation of drainage fields for use in wastewater treatment.

Building Regulations Part H advises that any roof drainage soakaway must be at least 5 meters from a building or public road and at least 2.5 meters from the boundary. This means that soakaways for roof drainage may not be practical for dwellings located in an urban area unless it has a large garden. The distance separation does not apply to permeable driveways, because this type of driveway mimics a grassed area and does not concentrate runoff from a larger area into a small soakaway.

PLANNING ISSUES REGARDING PAVING OF DRIVEWAYS/ PARKING

Any new hardstanding areas for driveway & car parking contributes to rainfall runoff from new developments so permeable paving can be used to reducing the runoff to public sewer. UK Government Guidance on driveways:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7728/paving_gfrontgardens.pdf *You will not need planning permission if a new or replacement driveway of any size uses permeable (or porous) surfacing which allows water to drain through, such as gravel, permeable concrete block paving or porous asphalt, or if the rainwater is directed to a lawn or border to drain naturally.*

If the surface to be covered is more than five square metres planning permission will be needed for laying traditional, impermeable driveways that do not provide for the water to run to a permeable area.

A permeable pavement allows rainwater to drain through the gaps or pores in the paving and into the voids within the sub-base (approx. 30%) where water is temporarily stored until it gradually soaks into the sub-soil. Permeable paving works well for soils with infiltration rate greater than 1×10^{-6} m/s but can also work for soil infiltration rate between 1×10^{-8} and 1×10^{-6} m/s. Soil infiltration rate is tested on site by digging hole(s), filling with water and timing the rate of infiltration. A brief explanation is provided on https://www.pavingexpert.com/drain08#google_vignette but more comprehensive testing details are included in either British Standard BS EN 752:2008 or BRE digest 365. The latter document is available from the Authority's Drainage Officer upon request.

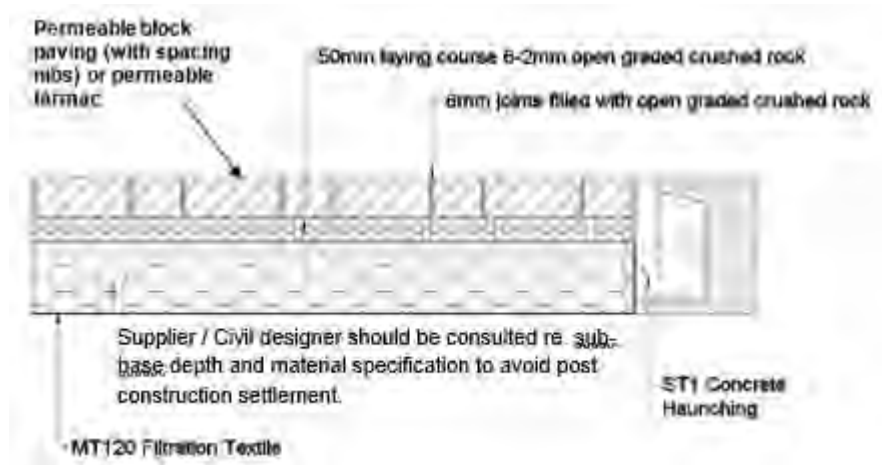
PERMEABLE SUPPLIER'S RECOMMENDATIONS AND APPROVED CONTRACTORS

Although gravel driveways are usually permeable, they are not appropriate for most urban settings because the some of the gravel gets onto the public highway and unless very well maintained suffers from weeds.

Permeable block paving and permeable tarmac (different specification to normal tarmac) are appropriate SUDs methods. Permeable block paving is manufactured with nibs so that the blocks interlock but leave 6mm gaps which are filled with 3mm gravel but allows rain to percolate. Permeable resin bound paving is another option. Non permeable resin drive types are not appropriate.

Applicants should consult Suppliers, who can provide very detailed technical advice so that the permeable paving is structurally designed for long-life without rutting – they will also advise on geotextile requirements. The installation of such driveways is better done by approved contractors who have certification / training provided by Suppliers.

The subbase to any permeable paving must be open graded gravels with reduced amount of fines; suppliers of permeable block paving often supply suitably graded angular gravels that can be compacted yet retain 30% voids.



Guidance provided by Stephen McCann

Drainage & Flooding Officer

☎ 01706 924606 / 07552 570262 ✉ stephen.mccann@rochdale.gov.uk

APPENDIX K: DRAINAGE PLANS

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Legend:

- | | |
|---|------------------------------------|
|  | Planning Application Boundary |
|  | Public Surface Water Sewer |
|  | Public Surface Water Sewer Manhole |
|  | Public Combined Sewer |
|  | Public Combined Sewer Manhole |
|  | Proposed Surface Water Sewer |
|  | Proposed Surface Water Manhole |
|  | Below Ground Attenuation |
|  | Flow Control Device |
|  | Rainwater Garden |
|  | Permeable Paving |
|  | Proposed Foul Water Sewer |
|  | Proposed Foul Water Manhole |

REV	DATE	BY	DESCRIPTION	CHK
D	16/03/23	HB	PRELIMINARY FOR ISSUE	KH
B	25/01/22	PT	PRELIMINARY FOR ISSUE	KW
A	15/12/22	PT	PRELIMINARY FOR ISSUE	KW

DRAWING STATUS:



Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk



PROJECT:

PARKFIELD HOUSE
MIDDLETON

TITLE:	
--------	--

PRELIMINARY DRAINAGE STRATEGY

DATE: MARCH 23	SCALE @ SIZE: 1:750@A3	DRAWN: HB	CHECKED: KH
PROJECT No: HYD803		DRAWING No: 104	REV: D

SURFACE WATER MANAGEMENT

- As infiltration will not offer a practical solution at the site, then the proposals are to discharge surface water to the River Irk via a public surface water sewer to the south of Alkington Park Road.
- The proposals are to utilise permeable surface in external areas even if a full infiltration solution is not viable, the permeable surface will be lined with a connection to the proposed main drainage serving the new development. The presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).

FOUL WATER MANAGEMENT

- The proposals are to continue to discharge foul water flows from the site into the public Combined Sewer located Manchester Old Road, via a new connection.

New foul water connection to public combined sewer.

New connection to public surface water sewer



APPENDIX L: STORMWATER STORAGE ESTIMATES

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1 YEAR RETURN PERIOD STORM EVENT



Variables		
FEH Rainfall	CV (Summer)	0.750
Return Period (years)	CV (Winter)	0.840
Version: 2013	Point	
Site: 38 800245 4000000 00 80016 10000	Impermeable Area (ha)	0.630
	Maximum Allowable Discharge (l/s)	11.5
	Infiltration Coefficient (m/hr)	0.00000
	Safety Factor	2.0
	Climate Change (%)	0

Variables

Results

Design

Overview 2D

Overview 3D

1/1



Results
Global Variables require approximate storage of between 36 m ³ and 75 m ³ .

30 YEAR RETURN PERIOD STORM EVENT



Variables		
FEH Rainfall	CV (Summer)	0.750
Return Period (years)	CV (Winter)	0.840
Version: 2013	Point	
Site: 38 800245 4000000 00 80016 10000	Impermeable Area (ha)	0.630
	Maximum Allowable Discharge (l/s)	11.5
	Infiltration Coefficient (m/hr)	0.00000
	Safety Factor	2.0
	Climate Change (%)	0

Variables

Results

Design

Overview 2D

Overview 3D

1/1



Results
Global Variables require approximate storage of between 123 m ³ and 201 m ³ .

100 YEAR RETURN PERIOD STORM EVENT + 45% CLIMATE CHANGE

Micro Drainage		Variables		
Variables	FEH Rainfall	Cv (Summer)	0.750	
	Return Period (years)	100	Cv (Winter)	0.840
	Version	2013	Point	...
	Site	GB 386246 405556 SD 86246 05555	Impervious Area (ha)	0.630
		Maximum Allowable Discharge (l/s)	11.5	
		Infiltration Coefficient (m/hr)	0.00000	
		Safety Factor	2.0	
Results		Climate Change (%)	45	
Design				
Overview 2D				
Overview 3D				
Vt				

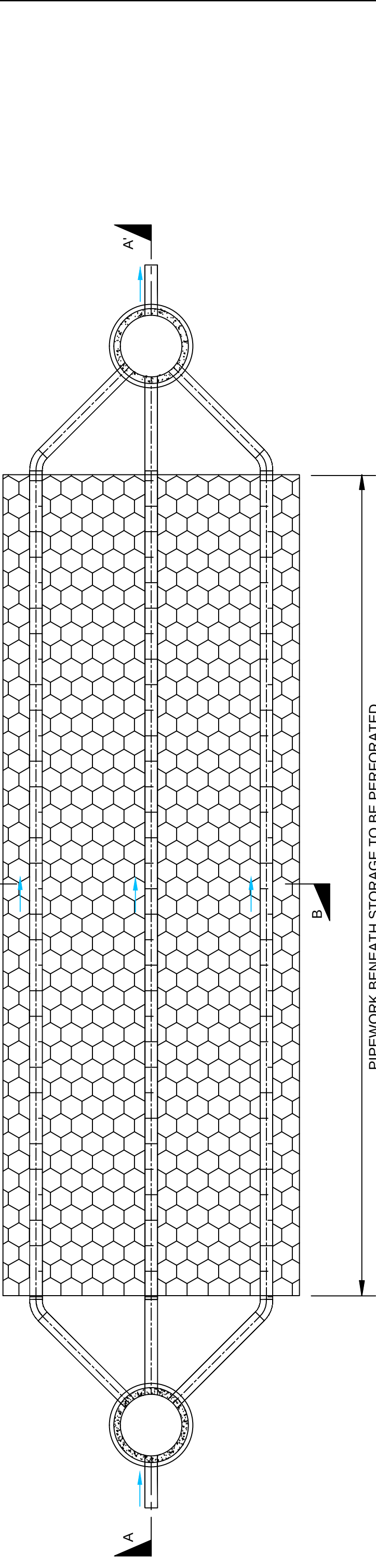
Micro Drainage		Results
Variables	Global Variables require approximate storage of between 323 m³ and 487 m³.	
	These values are estimates only and should not be used for design purposes.	

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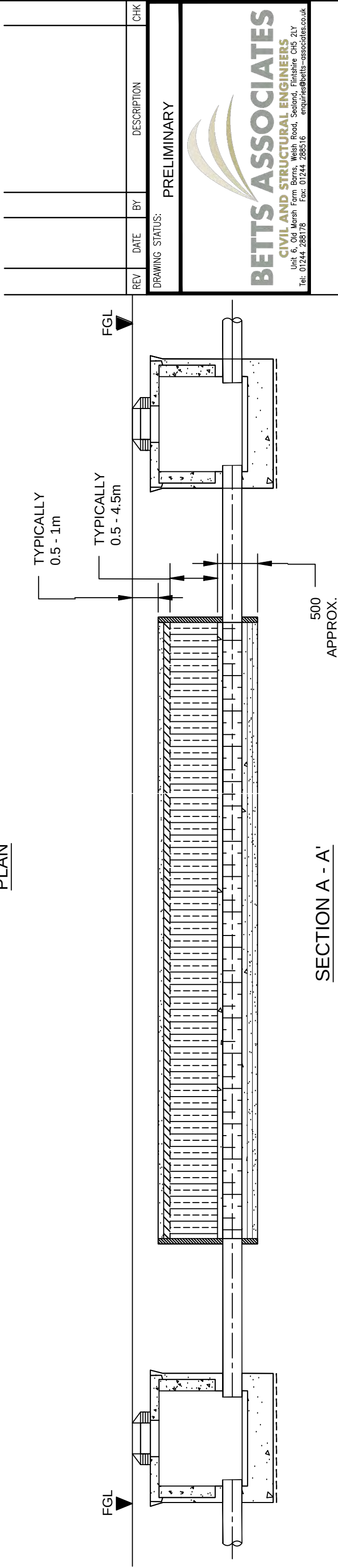
APPENDIX M: TYPICAL SUDS DETAILS

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DO NOT SCALE



PLAN



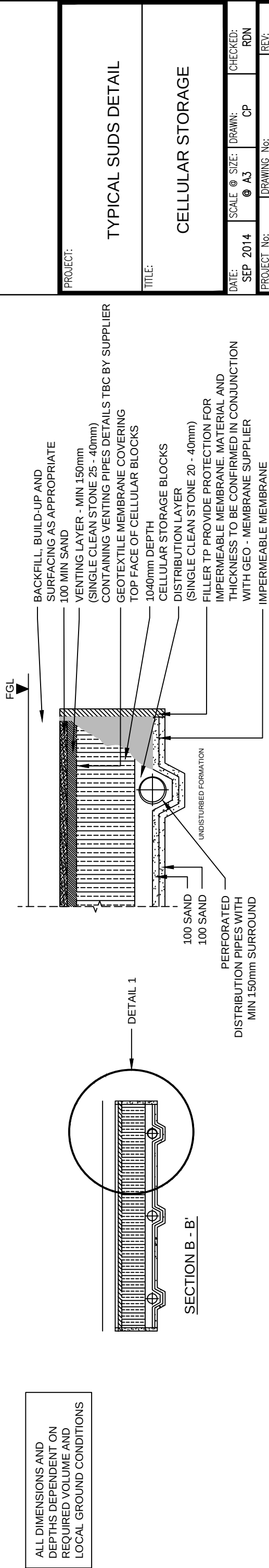
ALL DIMENSIONS AND DEPTHS DEPENDENT ON REQUIRED VOLUME AND LOCAL GROUND CONDITIONS

BACKFILL, BUILD-UP AND SURFACING AS APPROPRIATE

100 MIN SAND

VENTING LAYER - MIN 150mm

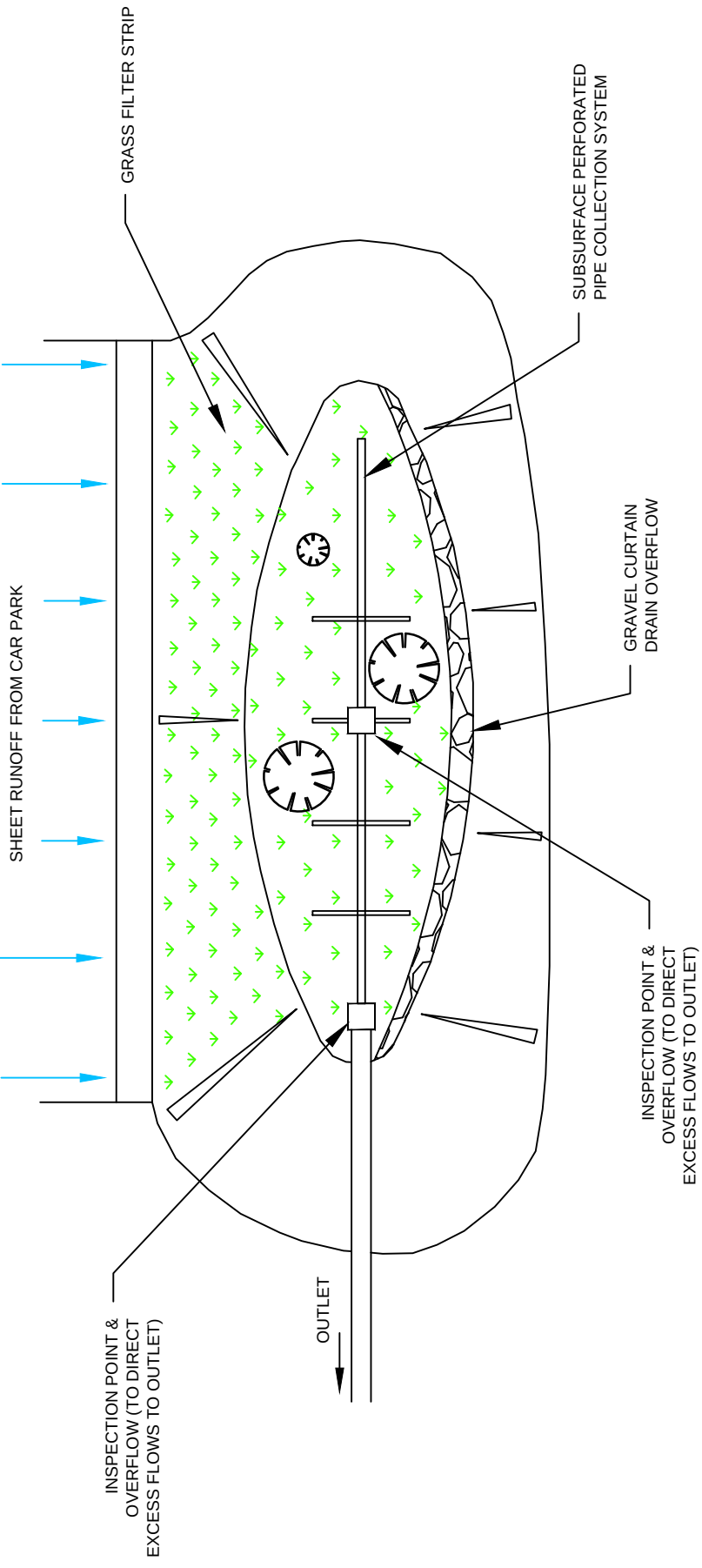
(CIRCULAR MANHOLE OF 150mm)



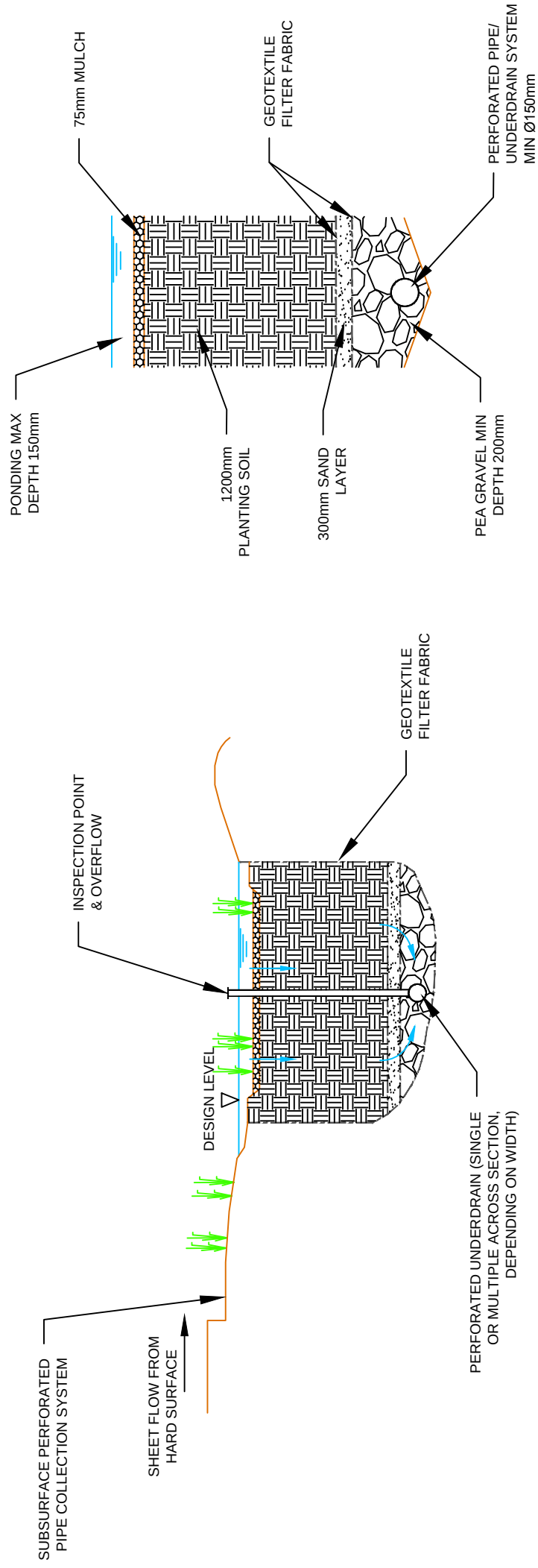
DETAIL 1

[illegible]

DO NOT SCALE



PLAN VIEW



PROFILE

TYPICAL SECTION

PROJECT:

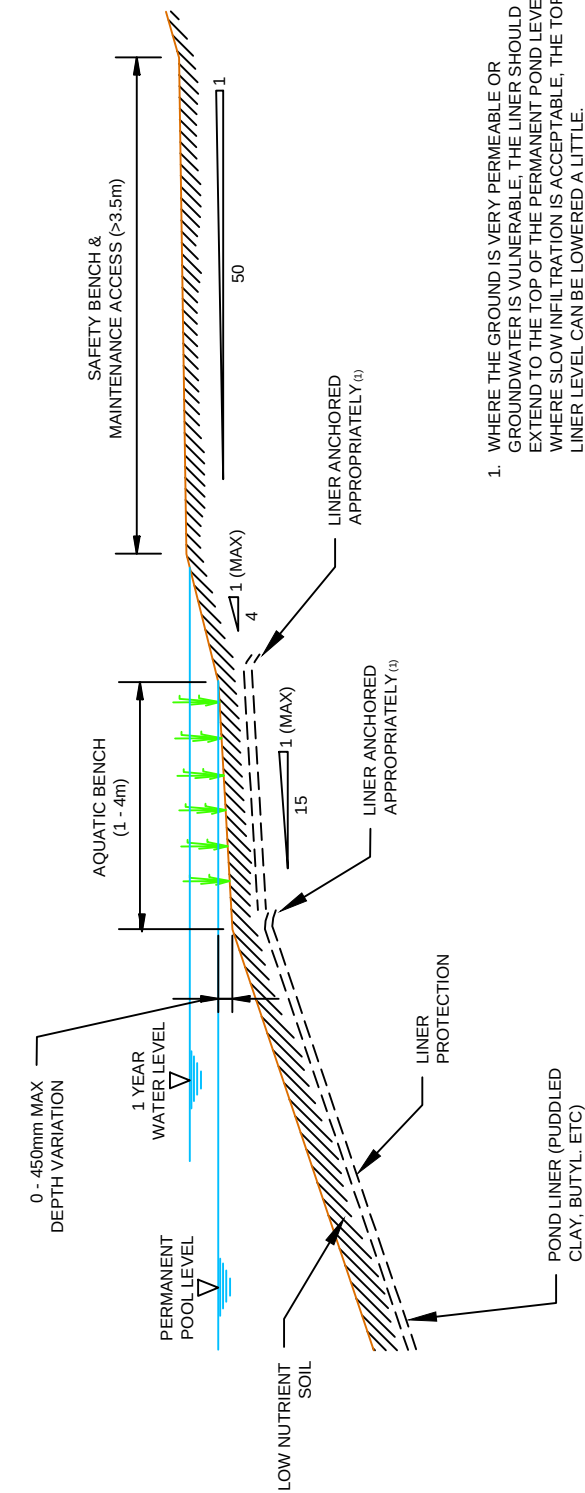
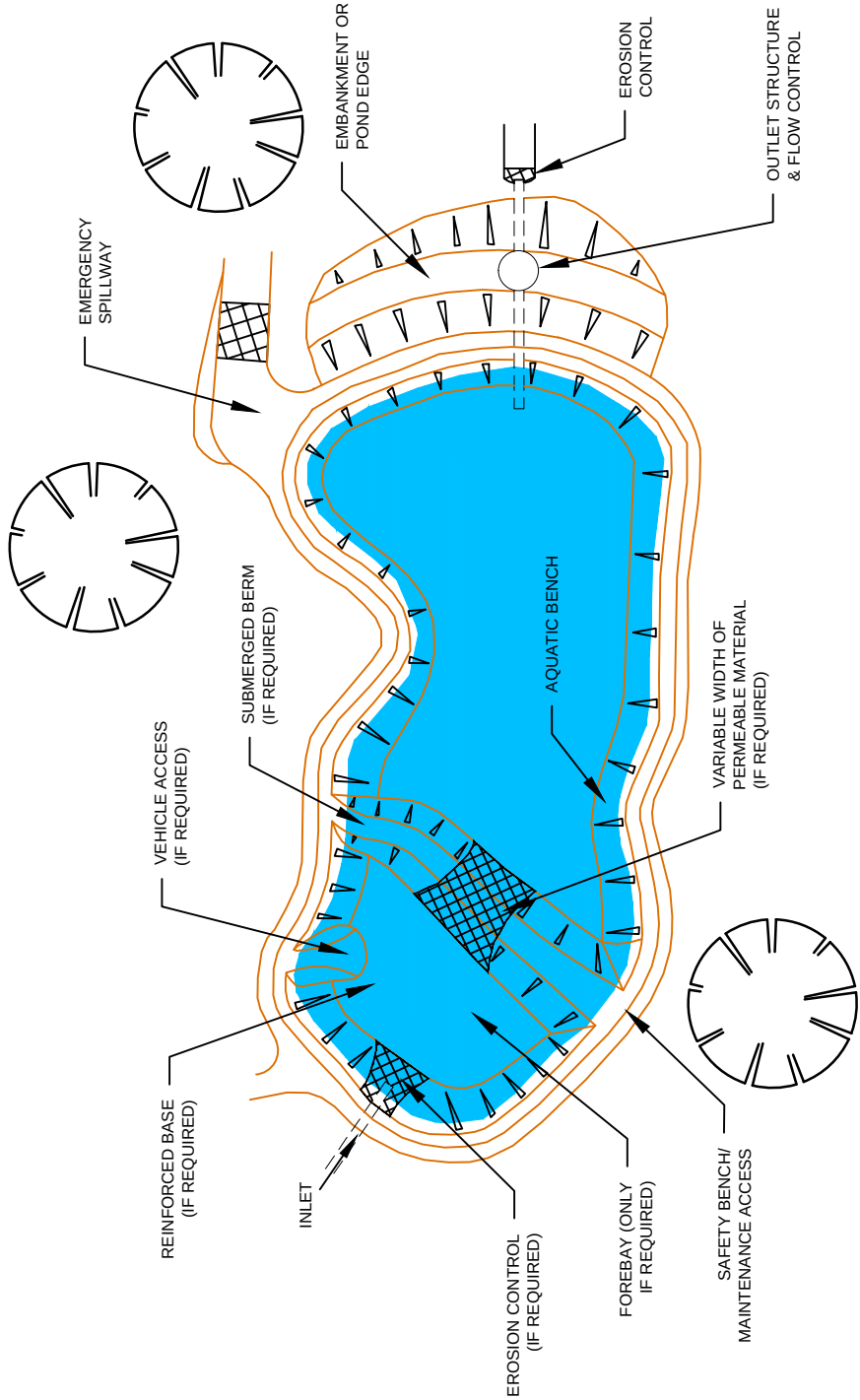
TYPICAL SUDS DETAIL

TITLE:

BIORETENTION APPLICATIONS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS		DRAWING No: 112	REV: A

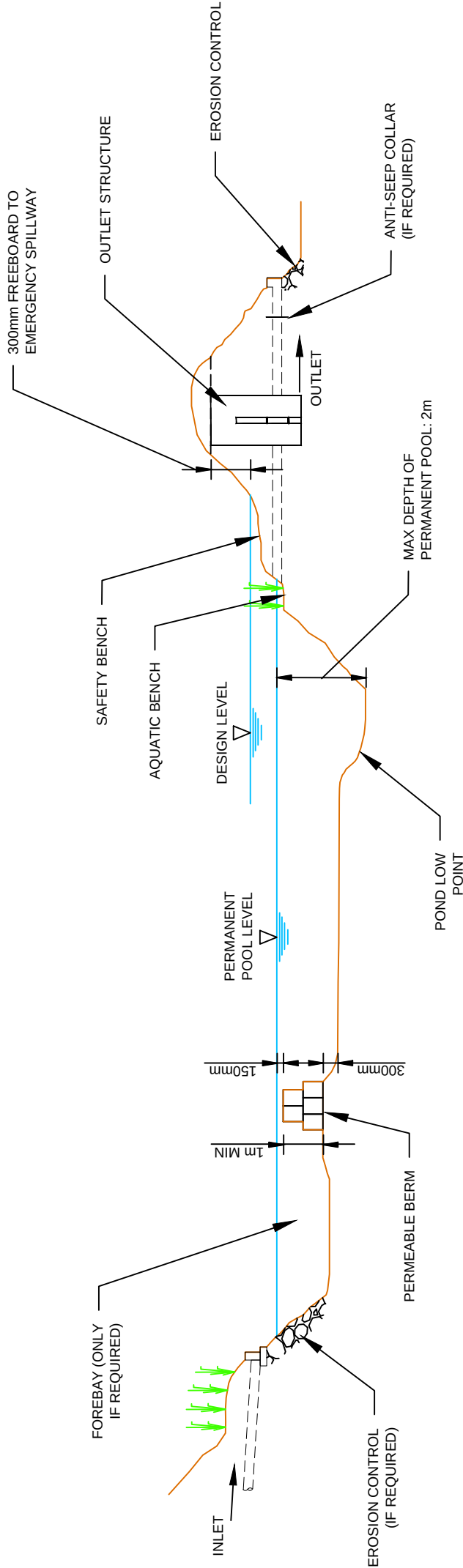
DO NOT SCALE



1. WHERE THE GROUND IS VERY PERMEABLE OR GROUNDWATER IS VULNERABLE, THE LINER SHOULD EXTEND TO THE TOP OF THE PERMANENT POND LEVEL. WHERE SLOW INFILTRATION IS ACCEPTABLE, THE TOP LINER LEVEL CAN BE LOWERED A LITTLE.

TYPICAL POND EDGE GEOMETRY

PLAN VIEW



PROFILE

REV	DATE	BY	DESCRIPTION	CHK
-----	------	----	-------------	-----

DRAWING STATUS:

PRELIMINARY



BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

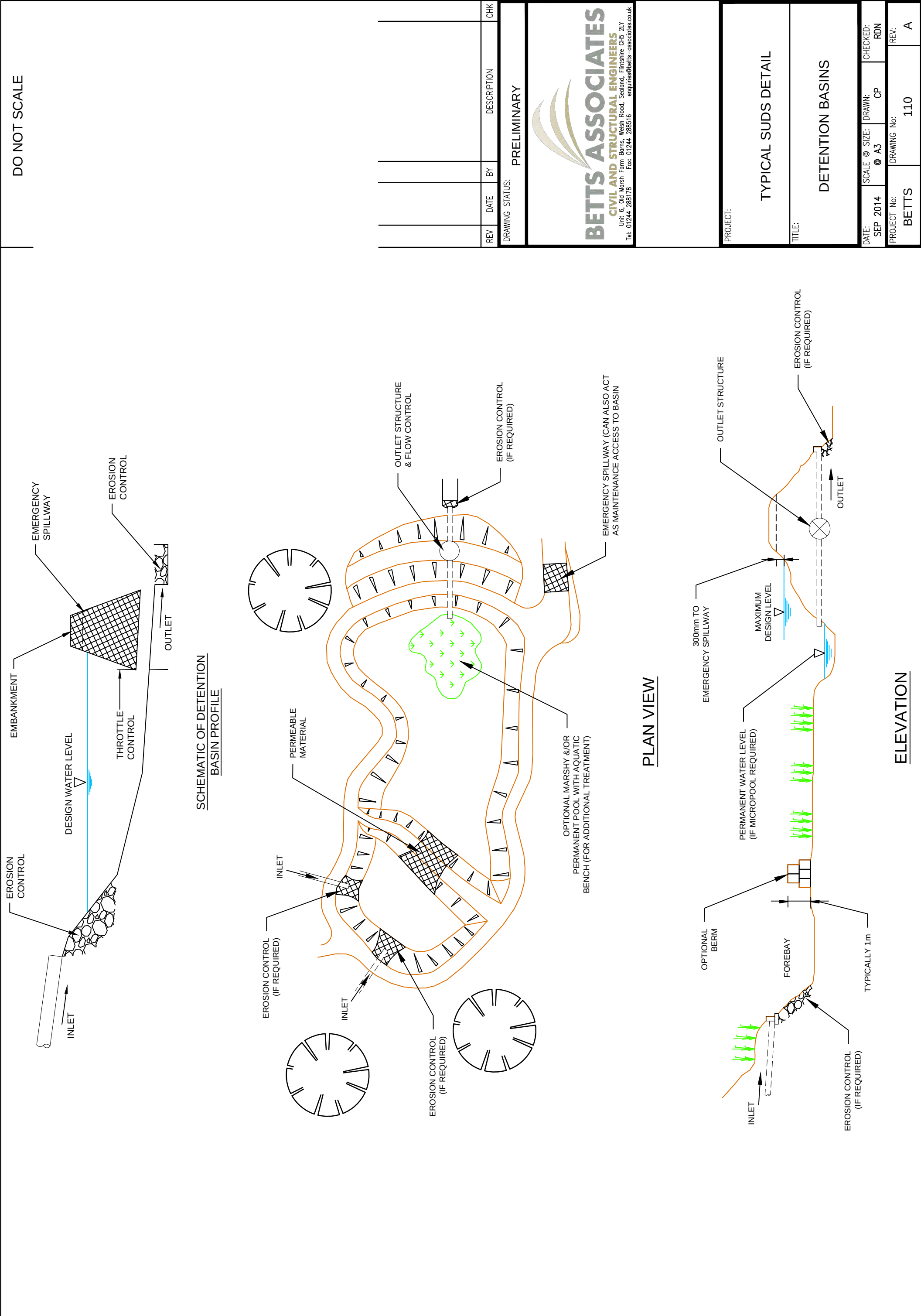
PROJECT:

TYPICAL SUDS DETAIL

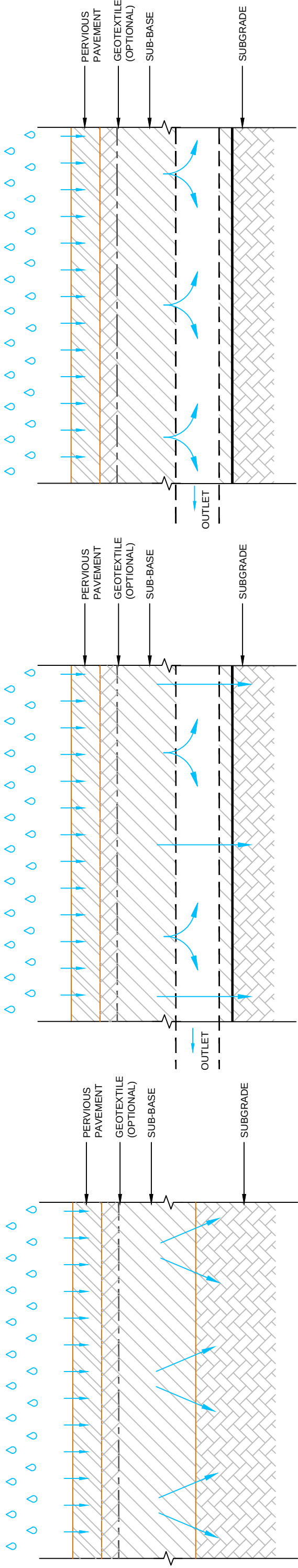
TITLE:

WET PONDS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS	DRAWING No: 111	REV: A	



	DO NOT SCALE
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TYPE A: TOTAL INFILTRATION

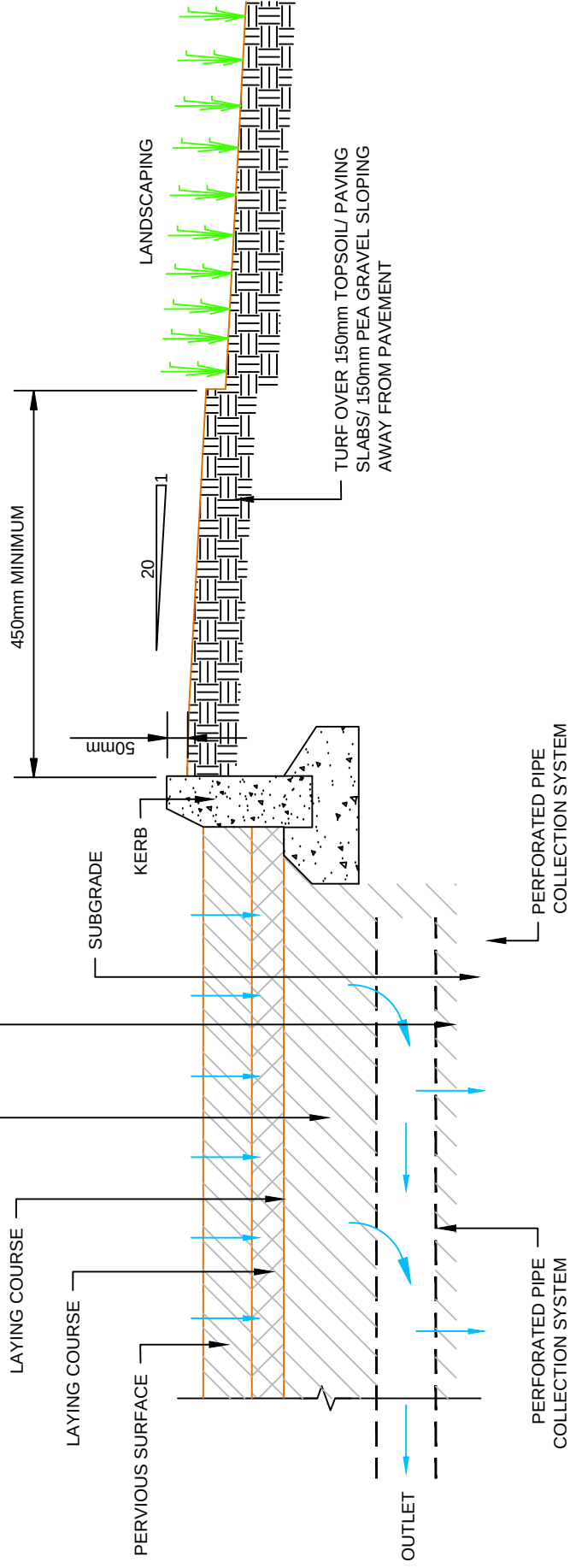
TYPE B: PARTIAL INFILTRATION

TYPE C: NO INFILTRATION

REV	DATE	BY	DESCRIPTION	CHK

AGGREGATE SUB-BASE (MAY BE REPLACED WITH GEOCELLULAR BLOCKS)

— GEOTEXTILE (OPTIONAL - TYPES A & B) OR GEOMEMBRANE (TYPE C)



LANDSCAPING DETAIL

DRAWING STATUS: PRELIMINARY



PROJECT:

PROJECT: _____

TYPICAL SUDS DETAIL

TITLE: _____

TITLE: PERVIOUS PAVEMENTS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS		DRAWING No: 105	REV: A

APPENDIX N: NOTES OF LIMITATIONS

The data comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information.

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MÜLLER