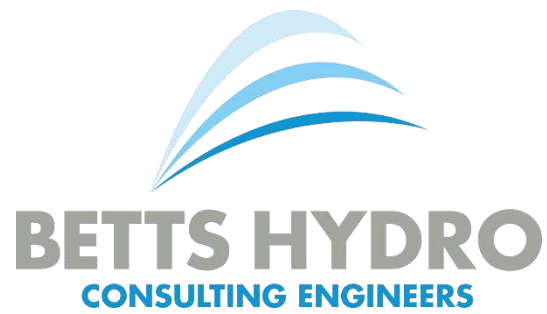




**FOX WOOD GARDEN VILLAGE
HALSNEAD
PHASE 3**

DRAINAGE MANAGEMENT STRATEGY



For

Taylor Wimpey North West
Washington House
Birchwood Park
WA3 6GR

**Taylor
Wimpey**

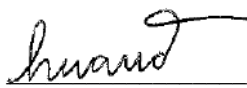
FEBRUARY 2026

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**FOX WOOD GARDEN VILLAGE
HALSNEAD
PHASE 3
DRAINAGE MANAGEMENT STRATEGY**

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EXECUTIVE SUMMARY

This Drainage Management Strategy was commissioned by Taylor Wimpey North West, referred to hereafter as 'the client'. This report has been prepared to support an application for Phase 3 of the Fox Wood Garden Village development, near Knowsley. This assessment has been completed in accordance with National Planning Policy Framework and Planning Practice Guidance to consider the most appropriate sustainable drainage options for the proposals in line with the National Standards.

There are three methods that have been reviewed for the management and discharge of surface water, these may be applied individually or collectively and should be applied in the order of priority 1. Surface water re-use, 2. Discharge via infiltration, 3. Discharge to watercourse and 4. Discharge to public sewer.

Based on the online datasets, the use of an infiltration-based solution is not likely to offer a suitable surface water management option for all the development proposals, due to cohesive underlying strata. It is understood that at present, any run-off generated onsite would naturally drain with the existing ground towards western boundary and ultimately into the adjacent waterbody known as Big Water.

Should infiltration not offer a full practical solution at the site, the proposals are to mimic the existing regime and discharge surface water run-off formally into Big Water, west of the site via a new formal connection. Whilst anticipated to be the case, detailed design will need to be carried out to confirm whether a site wide gravity solution can be achieved. The surface water scheme for this will be designed to cater for the run-off generated in the events up to and including the 1 in 100yr return period event with a 45% allowance for climate change.

It is recommended that permeable surfacing be considered where at all practical, considering site conditions and engineering constraints. If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753). In terms of water quality, the proposals are to incorporate polishing swales downstream of the proposed stormwater storage features. In terms of stormwater storage this will be above ground within attenuation basins.

In accordance with the SuDS Manual (CIRIA) and the National Standards for SuDS (July 2025) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the development area, the pre-development greenfield rate (QBar) is calculated to be 36.0l/s (based on 5.1l/s/ha). The LLFA (KMBC) will also need to agree to the proposed rates of discharge as part of their consultation. Restricting the overall rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. Detailed design will determine with accuracy the attenuation requirements in due course, a preliminary drainage design exercise is underway already to evidence deliverability of the overall scheme.

In terms of proposed foul water, a new formal connection into the wider Phase 1 scheme is proposed. Given the current ground levels and spatial considerations at play, there will likely be a requirement for a pumped foul water solution to serve this phase of development.

This Drainage Management Strategy has been prepared in consultation with the relevant interested parties. The report is commensurate with the scale and nature of the development and the development is appropriate in accordance with the National Standards.

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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.
-  QGIS (v.3.40.15) – Geospatial mapping and data visualisation.

Abbreviations & Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CC	Climate Change
CSAI	Cranfield Soil and Agrifood Institute
DMS	Drainage Management Strategy
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
KMBC	Knowsley Metropolitan Borough Council
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
mAOD	Metres Above Ordnance Datum
NH	National Highways
NPPF	National Planning Policy Framework
NSRI	National Soil Resources Institute
PPG	Planning Practice Guidance
PFRA	Preliminary Flood Risk Assessment
QBar	Mean Annual Flood
QSE	Quick Storage Estimate
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
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 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.
- 1.1.2 Government policy with respect to development in flood risk areas is contained within the NPPF and the supporting Planning Practice Guidance (PPG) (refer to extracts in **Appendix A**). This Drainage Management Strategy (DMS) has been completed in accordance with NPPF/PPG to consider the most appropriate sustainable surface water and foul water drainage options for the proposals.
- 1.1.3 The purpose of this report is to ensure that there is no increased flood risk because of the development in line with the NPPF guidance. The use of Sustainable Drainage Systems (SuDS) to manage surface water run-off has also been considered as part of the assessment in line with the National Standards.

1.2 Site Context

- 1.2.1 This DMS has been prepared to support a planning application for Phase 3 of the Fox Wood Garden Village residential development, Knowsley. The proposals will be complete with access, car parking, external works, boundary fencing, external services, and drainage.

1.3 Consultation

- 1.3.1 The NPPF advises that Knowsley Metropolitan Borough Council (KMBC) 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.
- 1.3.2 The preparation of this report has been undertaken in consultation with the Environment Agency (EA), United Utilities (UU), Knowsley Metropolitan Borough Council (KMBC) and National Highways (NH). The consultation responses can be seen in **Appendix B, C, D and E** respectively.

2.0 EXISTING SITE LOCATION

2.1 Location

- 2.1.1 The site is located west of the approved Phase 1 of the Fox Wood Garden Village residential scheme (Planning Ref: 24/00211/FUL). The nearest Ordnance Survey National Grid Reference is E: 347706, N: 390287 and the nearest postcode is L35 3QD (see Location Plan in **Appendix F**). The Phase 3 area covers 8.710ha, as edged in red in **Figure 1**, will be the focus of this assessment.
- 2.1.2 North of the site is existing residential development off Orchards Gardens, Woodend, Lake View, Old Hall and South Front (**Figure 1**). East of the site is currently undeveloped agricultural land subject to a separate residential planning approval (Phase 1 of the Fox Wood Garden Village Scheme) and the M62 runs along the southern site boundary. West of the site is Old Wood and Round Clump woodlands, along with Big Water Pond. An Ordinary Watercourse appears to flow southwards from a pond to the north-west, likely into Big Water and out further south through Old Wood.

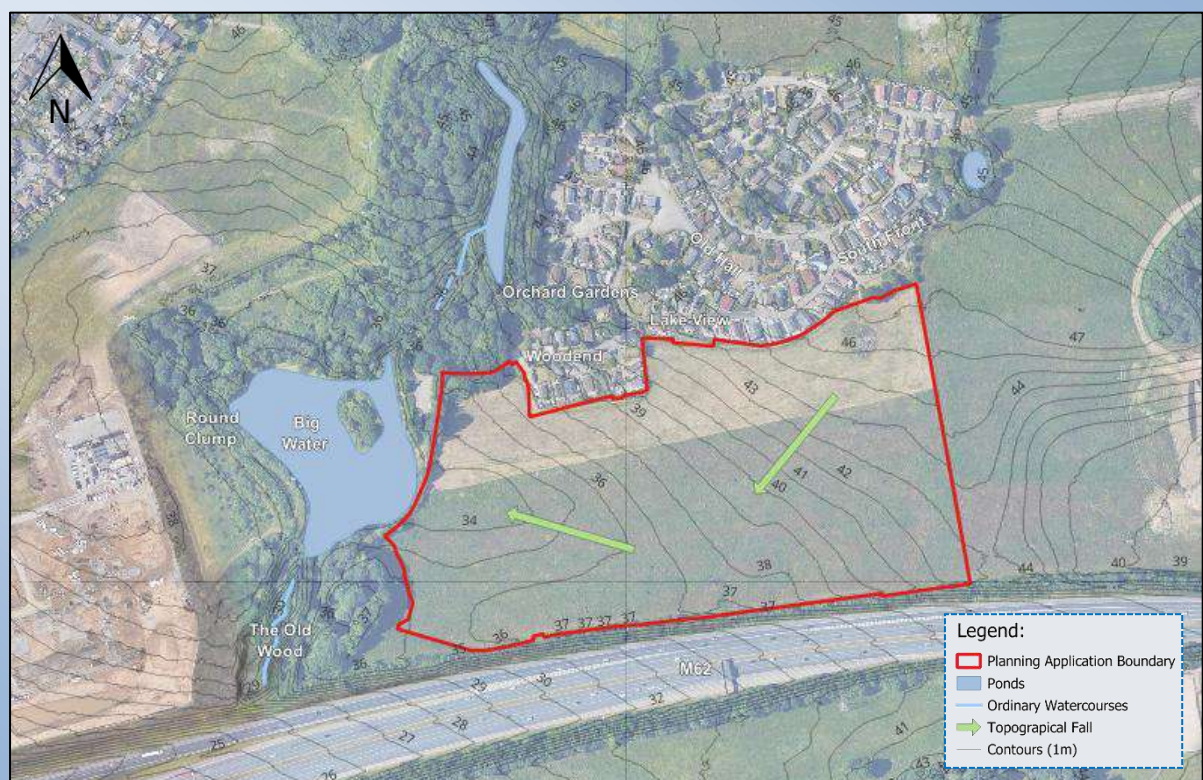


Figure 1: Existing Features Plan (Google Maps, 2026)

2.2 Existing and Historical Land Use

- 2.2.1 The site is currently undeveloped agricultural land, and comprises of low-density vegetation, with larger shrubs and trees located along the field boundaries to the west and south. No other historical land uses have been identified during the preparation of this report.

2.3 Topography

- 2.3.1 Two topographic surveys have been undertaken and are included within **Appendix G** for completeness. These include a survey covering the full site (dated 27/11/18) and a more recent survey with coverage in the northern part of the site (dated 04/08/22). Based on these surveys, levels onsite fall from a high point of 47.02mAOD in the north-east corner, down to 33.03mAOD in a low point near the western boundary. The arrows shown in **Figure 1** indicate the general falls across the site.

3.0 DEVELOPMENT PROPOSALS

3.1 Nature of the Development

- 3.1.1 This planning application is for Phase 3 of the Fox Wood Garden Village development, in Knowsley. The proposals will be complete with access, footpaths, car parking, external works, landscaping, boundary fencing, and drainage. The Planning Layout is included in **Figure 2** (see full plan in **Appendix H**).



Figure 2: Planning Layout (Taylor Wimpey North West, 2026)

- 3.1.2 Any run-off conveying through the site at present should be catered for through continued routing in an appropriate manner, this will ensure no increased run-off elsewhere because of the proposals. Safe avenues directing overland flow away from any existing/proposed buildings is advised.
- 3.1.3 The total Phase 3 area covers 8.710ha. The development area however covers a smaller 7.061ha and is understood to be 100% permeable at present. The impermeable areas are assumed to increase to 55% post-development. Betterment in the form of permeable surfaces opposed to external hardstanding should also be considered to reduce the surface water run-off.
- 3.1.4 It should also be noted that an additional 10% allowance has been applied as part of the design works to account for Urban Creep, as is often a requirement for residential schemes, resulting in a post-development impermeable area of 65%.
- 3.1.5 National and local policy identifies that SUDS should be incorporated into new development where feasible to manage surface water run-off generated.

Opportunities to provide soft landscaping on the site would provide added benefits to water quality and ecology.

4.0 SURFACE WATER MANAGEMENT

4.1 Pre-Development Surface Water Run-off

- 4.1.1 The total site covers 8.710ha. The development area covers a smaller 7.061ha and is understood to be 100% permeable at present. It is understood that at present, any run-off generated by the site would drain informally over land westwards toward Big Water.
- 4.1.2 The peak rates and volumes of run-off generated by the development area have been calculated for the peak events shown in **Table 1**. The surface water run-off rates have been calculated using the FEH Method. The full calculations in **Appendix I** are based on an area of 1ha and these rates and volumes are calculated pro-rata for the proposed development area of 7.061ha.

Dev. Area	Run-Off Rates				Run-Off Volumes	
	1 In 1yr	1 In 30yr	1 In 100yr	QBar	1 In 1yr	1 In 100yr
7.061ha	31.1l/s	60.7l/s	74.1l/s	36.0l/s	657.0cu.m	1714.4cu.m

Table 1: Pre-Development Surface Water Run-Off Rates (Betts Hydro, 2025)

4.2 Post Development Surface Water Run-Off

- 4.2.1 As previously discussed, we have estimated that the impermeable areas post-development will increase to 55% (equating to 3.884ha). As is commonly a requirement from Local Lead Flood Authorities, an additional 10% allowance has been added to the impermeable area to account for the potential for urban creep, totalling 4.590ha.
- 4.2.2 These proposed impermeable areas will however be refined as part of the drainage design work based on the specific contributing areas for the main drainage and plot drainage networks. The unrestricted post-development run-off rates have been detailed in **Table 2**.

Proposed Imp. Area (+10% UC)	Run-Off Rates			Run-Off Volumes	
	1 In 1yr	1 In 30yr	1 In 100yr + 45% CC	1 in 1yr	1 in 100yr
4.590ha	204.8l/s	367.0l/s	684.8l/s	657.0cu.m	1714.4cu.m

Table 2: Post-Development Un-Restricted Run-Off Rates (Betts Hydro, 2025)

- 4.2.3 In accordance with national and local planning policies, it is necessary to restrict surface water run-off rates, where at all practical, to mimic a pre-development greenfield situation. The pre-development rates are detailed in **Table 1**. Full details on the proposed rates of discharge can be found in section 4.6 subsequently.

4.3 Sustainable Drainage Systems (SuDS)

- 4.3.1 In accordance with national and local planning policy, including the National Standards for Sustainable Drainage Systems (July 2025) and the SuDS Manual (CIRIA 753), 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 wherever possible and practical.

- 4.3.2 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 of SuDS depend on the type of features being proposed; some typical examples relevant to residential schemes are illustrated in **Figure 3**.



- 4.3.3 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 therefore be recommended that permeable surfacing be considered where at all practical, considering site conditions and engineering constraints. If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).
- 4.3.4 Promoting SuDS to deal with surface water at the source, will limit the required attenuation and in turn reduce the volume of surface water in the nearby watercourse and sewer infrastructure. There may be scope to incorporate rainwater collection butts and/or rain garden style raised planters to provide added water quality, amenity, and biodiversity benefits.
- 4.3.5 In terms of water quality, the proposals are to incorporate polishing swales downstream of the proposed stormwater storage features. In terms of stormwater storage this will be above ground within attenuation basins. If designed appropriately these SuDS features such as those proposed can aid with attenuation and provide added benefits in terms of water quality, biodiversity, and amenity value. Detailed design should confirm suitability for incorporation of SuDS following more detailed analysis of levels, ground conditions and attenuation.

4.4 Methods of Surface Water Management

4.4.1 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:

- Surface water re-use
- Discharge via infiltration
- Discharge to watercourse
- Discharge to the public sewerage system

4.5 Surface Water Re-Use

4.5.1 The National Standards for Sustainable Drainage Systems (SuDS) require that the potential for rainwater re-use is considered as the first destination for surface water run-off. In accordance with this hierarchy, the feasibility of incorporating rainwater harvesting (RWH) within the proposed residential development has been assessed.

4.5.2 The proposed development comprises a traditional housing estate with standard domestic water demands. Whilst rainwater harvesting systems involving storage tanks and pumped networks are not considered proportionate or financially viable for this form of development, opportunities to incorporate passive rainwater re-use measures have been considered in response to the LLFA's preference for SuDS and Water Quality measures.

4.5.3 The drainage strategy will look to incorporate rainwater planters on roof downpipes where at all practical. These features will intercept roof runoff, provide temporary storage, and support biodiversity enhancements. Rainwater planters are a low-maintenance, cost-effective SuDS solution.

4.5.4 On this basis, whilst traditional rainwater harvesting systems are not proposed due to cost, complexity and long-term maintenance, rainwater planters will be implemented as a form of passive rainwater re-use and surface water management. This approach complies with the National Standards for SuDS and LLFA requirements while providing a practical and sustainable drainage solution.

4.6 Discharge via Infiltration

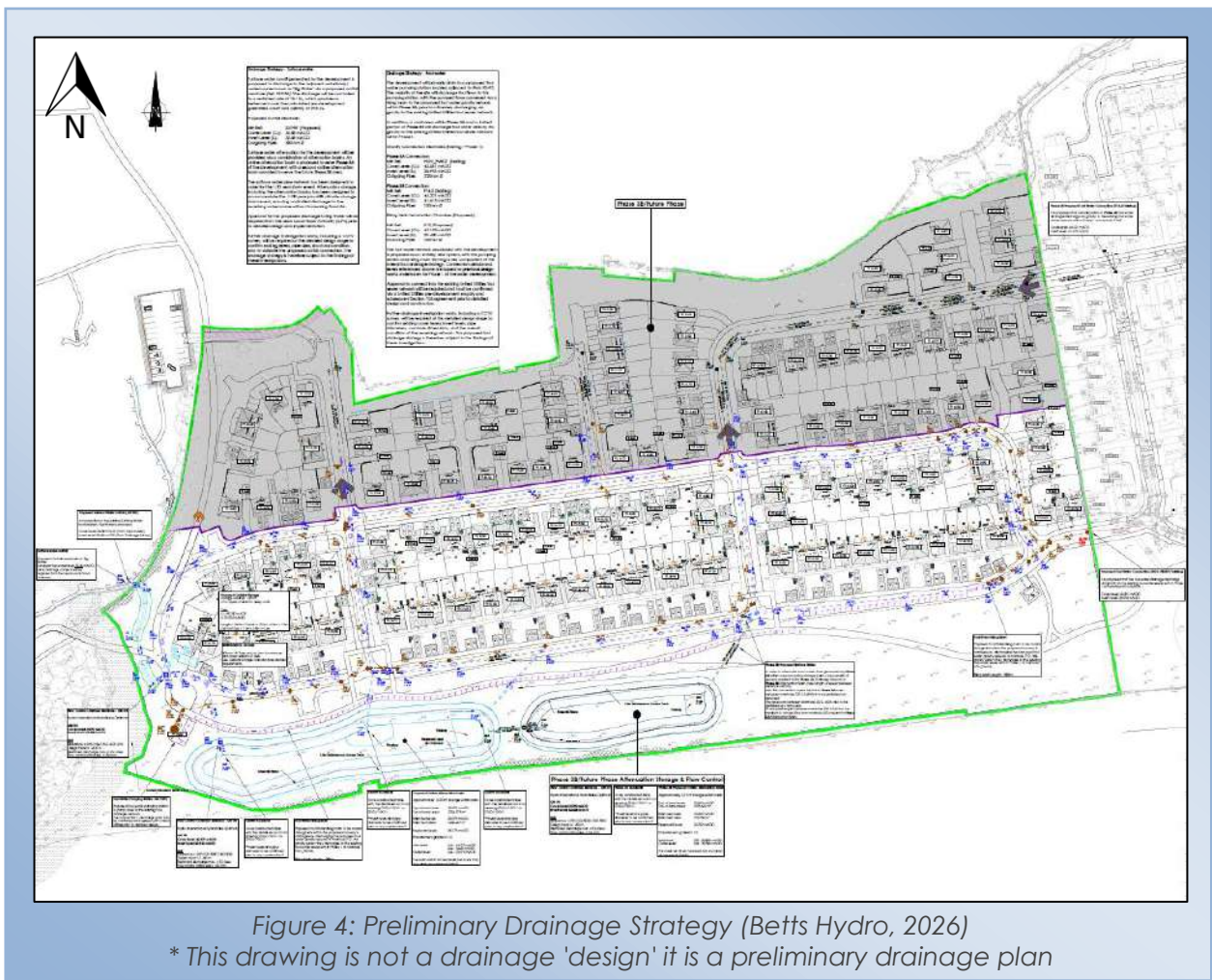
4.6.1 Any impermeable areas that can drain to soakaway or an alternative method of infiltration would significantly improve the sustainability of any new surface water systems. The published online datasets have been reviewed to consider how favourable the underlying strata is to support an infiltration-based solution at the site.

4.6.2 The Cranfield Soil and AgriFood Institute (CSAI), Soilscape viewer identifies the soils to be 'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'. The British Geology Survey (BGS) mapping data indicates that the bedrock geology consists of Pennine Middle Coal Measures Formation (mudstone, siltstone and sandstone), with underlying superficial glaciofluvial deposits of Devensian Till. The soil factor of 0.386 suggests a low permeability (0.1 is very high and 0.5 is very low).

- 4.6.3 Based on the ground conditions identified by the published datasets above, infiltration is unlikely to offer a fully viable drainage management solution for the wider proposals. 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.
- 4.6.4 It would therefore be recommended that permeable surfacing be considered where at all practical, considering site conditions and engineering constraints. If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).
- 4.6.5 The south-east corner of the site is located in Source Protection Zone 3 (SPZ3). The SPZs show the risk of contamination from any activities that might cause pollution in the area. The maps show the extents of three main zones: the inner shown in red (SPZ1), outer shown in green (SPZ2) and total catchment in blue (SPZ3). Since the site is partially within SPZ3, consideration in terms of water quality improvement for any run-off proposed to drain directly to ground, in this location, would be required. The proposals are however not to discharge via infiltration, but to instead discharge to a nearby water body.

4.7 Discharge to Watercourse/Waterbody

- 4.7.1 As infiltration is unlikely to provide a full drainage solution due to the cohesive nature of the underlying ground conditions, this assessment has considered the alternative drainage options in accordance with the sustainable drainage hierarchy. The next method is to discharge surface water run-off to a nearby watercourse/waterbody.
- 4.7.2 The nearest waterbody to the site is Big Water which is a large body of water located around 3m west of the site boundary. As previously discussed, it is understood that at present, any run-off generated by the site would drain toward this existing waterbody and convey downstream (within the assumed connection from Big Water) into the Ordinary Watercourse within The Old Wood.
- 4.7.3 Should infiltration not offer a full practical solution at the site, the proposals are to mimic the existing regime and discharge surface water run-off to Big Water via a formal, newly constructed outfall structure, as illustrated in **Figure 4 (Appendix J)**. As the point of outfall appears to be outside of the planning application boundary consent will need to be obtained from any adjacent landowner to form the connection.
- 4.7.4 It would therefore be recommended that permeable surfacing be considered where at all practical, considering site conditions and engineering constraints. If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).



- 4.7.5 The drainage proposed to serve this development will likely be a combination of belowground pipe network for conveyance, and swales for water quality improvement where practical with the design constraints. Above ground attenuation basins are proposed to cater for the stormwater attenuation requirements in the design event.
- 4.7.6 Formal consent will be required for any works outside of the developer's land control, this includes routing offsite and formal outfall structures. Consent and formal agreement will likely be required in this case from KMBC (Knowsley Metropolitan Borough Council) for works to Big Water and any Riparian Owners for access to do such.
- 4.7.7 Detailed design will need to be carried out to confirm whether a site wide gravity solution can be achieved, at this time this is anticipated to be the case. A Preliminary Drainage Design exercise has however been commissioned to demonstrate the deliverability of the proposals, considering the potential future phasing given the hybrid nature of this planning application.

Phasing

- 4.7.8 The proposed development is intended to be delivered in phases to reflect current land ownership. The southern portion of the site, referred to as Phase 3A, forms the initial phase of the development (Detailed element of the application) and is within the

control of the developer. The northern portion of the site, referred to as Phase 3B, is shown as outline only at this stage as it may potentially be brought forward at a later date.

- 4.7.9 The drainage strategy has been designed holistically to accommodate the overall requirements in terms of discharge rates and onsite stormwater storage (discussed subsequently), but it is useful to understand the potential phasing split as part of this assessment to. The overall strategy will be as discussed previously, there will be a single outfall from the site serving both Phase 3a and 3b. Two attenuation ponds are proposed, with each pond primarily serving one phase of the development.
- 4.7.10 The Preliminary Drainage Design exercise has designed the attenuation as such that it can be split between the two phases, although spatially this will sit within the Phase 3a boundary due to density requirements and other factors. This allows Phase 3A to operate independently in the short term, while maintaining sufficient capacity and connectivity to integrate Phase 3B once it comes forward.
- 4.7.11 As part of Phase 3A, the southern attenuation pond will be constructed and made operational to manage surface water run-off from the initial development area. The attenuation pond serving Phase 3B will be delivered as part of the later phase, providing the additional storage required to accommodate run-off from the northern parcel. Both have however been shown on the planning layout, to show space for water has been considered holistically for the overall scheme.

Proposed Discharge Rates

- 4.7.12 In accordance with the SuDS Manual (CIRIA) and the National Standards for SuDS (July 2025) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the development area, the pre-development greenfield rate (QBar) is calculated to be 36.0l/s (based on 5.1l/s/ha). The LLFA (KMBC) will also need to agree to the proposed rates of discharge as part of their consultation.
- 4.7.13 The proposals are to ensure that the rate of surface water discharge from the overall site (Phase 3) does not exceed 36.0l/s (based on the above). Restricting the rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. The stormwater storage figures quoted in **Table 3 (Appendix K)** are estimates only based on a maximum discharge rate of 36.0l/s.
- 4.7.14 A Cv value of 1.0 has also been utilised within these stormwater estimates. Detailed design in due course will determine with accuracy the attenuation requirements considering engineering constraints and hydraulics.

Prop. Imp. Area (4.590ha)	1 In 1yr	1 In 30yr	1 in 30yr + 40% CC	1 In 100yr + 45% CC
Restricted Run-Off Rate	36.0l/s	36.0l/s	36.0l/s	36.0l/s
Est. Stormwater Storage Volume	554cu.m-936cu.m	1351cu.m-1896cu.m	2074cu.m-2936cu.m	3138cu.m-4180cu.m

Table 3: Estimated Stormwater Storage Requirements (Betts Hydro, 2025)

- 4.7.15 The surface water scheme for the development will need to 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 45% allowance for climate change. A below ground pipe network will be utilised for conveyance, with some areas of site using swales and the required onsite attenuation will be provided above ground within attenuation basins.

- 4.7.16 A Preliminary Drainage Layout has been prepared which refines the attenuation requirements and rate of discharge based on site constraints. Full detailed design will still be required in due course to support any future applications.

4.8 Discharge to the Public Sewer Network

- 4.8.1 UU sewer records have identified no sewer infrastructure within close proximity of the site. If infiltration is not feasible, then the surface water run-off should discharge into the nearest watercourse or waterbody, and not the existing public sewer network. Further dialogue with the water company can be undertaken at such a time when a connection to the watercourse is discounted due to design ability.

4.9 Climate Change

- 4.9.1 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 greatly by region. Expert 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.
- 4.9.2 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.
- 4.9.3 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.
- 4.9.4 In accordance with the Lower Mersey Management Catchment peak rainfall allowances, the upper end allowance (**Table 4**) for the 2070's has been utilised (based on 100yr design life).

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

Table 4: Change to Peak Rainfall Compared to 1981-2000 Baseline (Environment Agency, 2025)

5.0 FOUL WATER MANAGEMENT

- 5.1 With an absence of United Utilities sewer infrastructure in proximity to the site (sewer records included in **Appendix C**), the proposals are to pump foul water generated by Phase 3 towards the approved Phase 1 infrastructure to the east. Formal design has ensured sufficient capacity for conveyance through Phase 1 of the proposals via the foul water pumping station, which has been sized to accommodate up to 1,000 units. Further dialogue with UU will be needed to confirm available capacity within the downstream network when Phase 1 and the additional Phase 3 will ultimately connect to this.
- 5.2 The approximate peak foul water flows generated by the site will need to be calculated based on 4000 litres per dwelling per 24 hours as per the guidance contained within Sewers for Adoption.
- 5.3 Detailed design is required and needs to confirm the specific drainage solution including whether a gravity connection can be achieved. Based on the existing ground levels, a pumped system will be required. Design criteria (offsets and access requirements) from both United Utilities and the LLFA should be considered when locating any pumping station infrastructure within the wider site extents.
- 5.4 Formal consents will be required for any works to the public sewer network from UU prior to commencement of works including approval of discharge rates and any new point(s) of connection. A pre-development enquiry with UU can be undertaken if requested by the developer. Furthermore, if any offsite work is required to make new connections, then consents from the adjacent landowners would also be required.

6.0 SUMMARY AND CONCLUSIONS

- 6.1 The key focus of this assessment is 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.
- 6.2 Based on the online datasets, the use of an infiltration-based solution is not likely to offer a suitable surface water management option for the development proposals due to cohesive underlying strata. It is understood that at present, any run-off generated by the site would drain toward Big Water around 3m west of the site.
- 6.3 Should infiltration not offer a full practical solution at the site; the proposals are to mimic the existing regime and discharge surface water run-off to Big Water west of the site. A Preliminary Drainage Strategy has been prepared to demonstrate the proposals. Detailed design will need to be carried out to confirm whether a site wide gravity surface water solution can be achieved, at this time this is anticipated to be the case.
- 6.4 It is recommended that permeable surfacing be considered where at all practical, considering site conditions and engineering constraints. If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753). In terms of water quality, the proposals are to incorporate polishing swales downstream of the proposed stormwater storage features. In terms of stormwater storage this will be above ground within attenuation basins.
- 6.5 In accordance with the SuDS Manual (CIRIA) and the National Standards for SuDS (July 2025) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the development area, the pre-development greenfield rate (QBar) is calculated to be 36.0l/s (based on 5.1l/s/ha). The LLFA (KMBC) will also need to agree to the proposed rates of discharge as part of their consultation.
- 6.6 The surface water scheme for this 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 a 45% allowance for climate change. Restricting the overall rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. Detailed design will determine with accuracy the attenuation requirements in due course. A preliminary drainage design exercise is underway already to evidence deliverability of the overall scheme.
- 6.7 A new foul water connection to Phase 1 of the wider scheme, east of the site is proposed. Given the understanding of current ground levels and spatial considerations, there will likely be a requirement for a pumped foul water solution at the site.
- 6.8 This Drainage Management Strategy has been prepared in consultation with the relevant interested parties. The report is commensurate with the scale and nature of the development and the development is appropriate in accordance with the National Standards.

7.0 RECOMMENDATIONS

- 7.1 It is advised that external levels fall away from the proposed dwellings, 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 a safe overland flood flow route externally in the event of a flooding associated with a variety of sources, including residual groundwater and surface water flooding.
- 7.2 Any run-off conveying through the site at present should be catered for through continued routing in an appropriate manner, this will ensure no increased run-off elsewhere because of the proposals. Safe avenues directing overland flow away from any existing/proposed buildings is advised.
- 7.3 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).
- 7.4 The proposed onsite surface water drainage system will need to be sized to contain up to and including the 1 in 100yr return period storm event with a 45% allowance for climate change being contained onsite.
- 7.5 A pumped solution for foul water discharge (and the associated onsite infrastructure) will need to be allowed for within the planning proposals. Any offsite asset routing works will need to be considered in terms of consents with the relevant offsite landowners (Highways Authority). Furthermore, design criteria (offsets) for both United Utilities and the LLFA should be considered when locating any pumping station infrastructure within the wider site extents.
- 7.6 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 the Water Company or the Local Authority then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.
- 7.7 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 proposed development site if the capacity of the drainage system is exceeded.

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CIRIA – <http://www.ciria.org/>
Cranfield University – <http://www.landis.org.uk/soilscapes/>
Environment Agency – www.environment-agency.gov.uk/
FloodProBE – <http://www.floodprobe.eu/>
Flood Forum – <http://www.floodforum.org.uk/>
Google Maps – <http://maps.google.co.uk/>
Rainfall Climate Change Allowance - <https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall>
Streetmap – <http://www.streetmap.co.uk/>
United Utilities – <https://www.unitedutilities.com/>

APPENDIX A: NPPF + PPG EXTRACTS

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

161. The planning system should support the transition to net zero by 2050 and take full account of all climate impacts including overheating, water scarcity, storm and flood risks 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

162. 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 and drought from rising temperatures⁶¹. Policies should support appropriate measures to ensure the future health and 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.
163. The need to mitigate and adapt to climate change should also be considered in preparing and assessing planning applications, taking into account the full range of potential climate change impacts.
164. 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 incorporating green infrastructure and sustainable drainage systems; and
 - b) help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings in plans should reflect the Government's policy for national technical standards.
165. 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, and their future re-powering and life extension, while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts);

⁶¹ In line with the objectives and provisions of the Climate Change Act 2008.

- b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and
 - 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.
166. 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.
167. Local planning authorities should also give significant weight to the need to support energy efficiency and low carbon heating improvements to existing buildings, both domestic and non-domestic (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights). Where the proposals would affect conservation areas, listed buildings or other relevant designated heritage assets, local planning authorities should also apply the policies set out in chapter 16 of this Framework.
168. When determining planning applications for all forms of renewable and low carbon energy developments and their associated infrastructure, local planning authorities should:
- a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and give significant weight to the benefits associated with renewable and low carbon energy generation and the proposal's contribution to a net zero future;
 - b) recognise that small-scale and community-led projects provide a valuable contribution to cutting greenhouse gas emissions;
 - c) in the case of applications for the repowering and life-extension of existing renewable sites, give significant weight to the benefits of utilising an established site.
169. 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

170. 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.

171. 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.
172. 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.
173. A sequential risk-based approach should also be taken to individual applications in areas known to be at risk now or in future from any form of flooding, by following the steps set out below.
174. Within this context 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.
175. The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk).
176. Applications for some minor development and changes of use⁶² should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote 63.

⁶² This includes householder development, small non-residential extensions (with a footprint of less than 250m²) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park

177. Having applied the sequential test, 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.
178. 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.
179. Both elements of the exception test should be satisfied for development to be allocated or permitted.
180. 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.
181. 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 assessment⁶³. 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;

home site, where the sequential and exception tests should be applied as appropriate.

⁶³ 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.

- 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.

182. Applications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:
- a) take account of advice from the Lead Local Flood Authority;
 - b) have appropriate proposed minimum operational standards; and
 - c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.

Coastal change

183. 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.
184. 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.
185. 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 coast⁶⁴.

⁶⁴ As required by the Marine and Coastal Access Act 2009.

186. 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.

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 probability of sea flooding. (Land shown in light blue on the Flood Map)

Flood Zone	Definition
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.

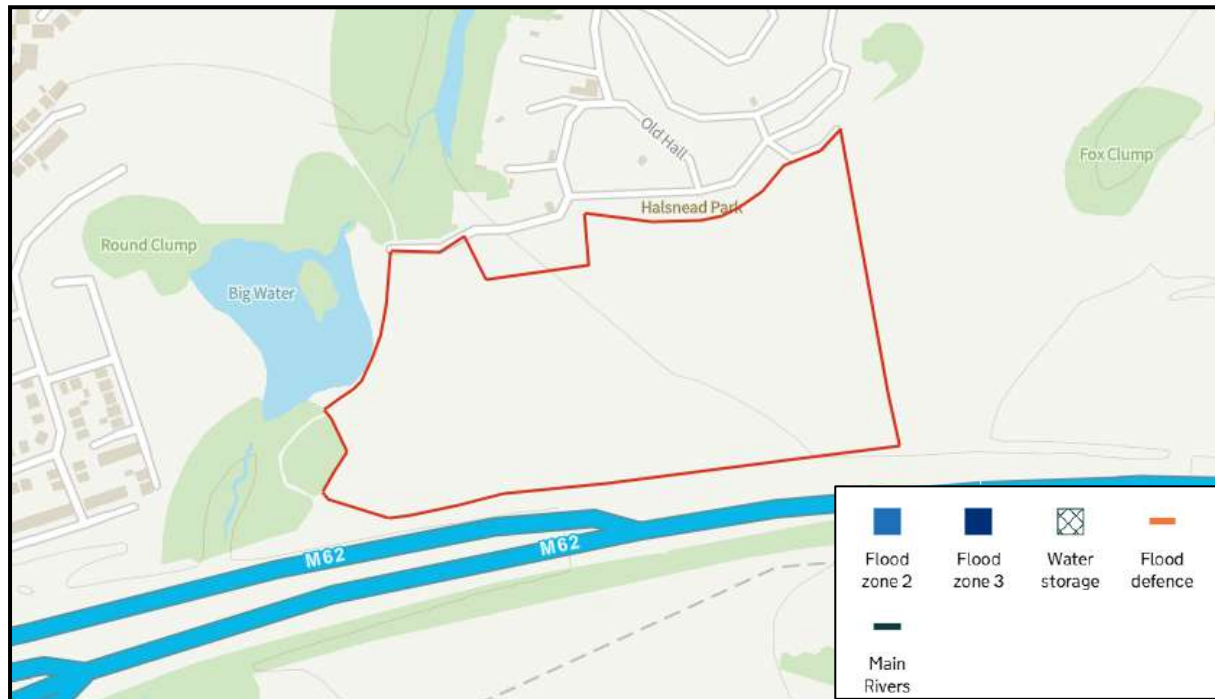
“†” In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

APPENDIX B: EA INFORMATION & CORRESPONDENCE

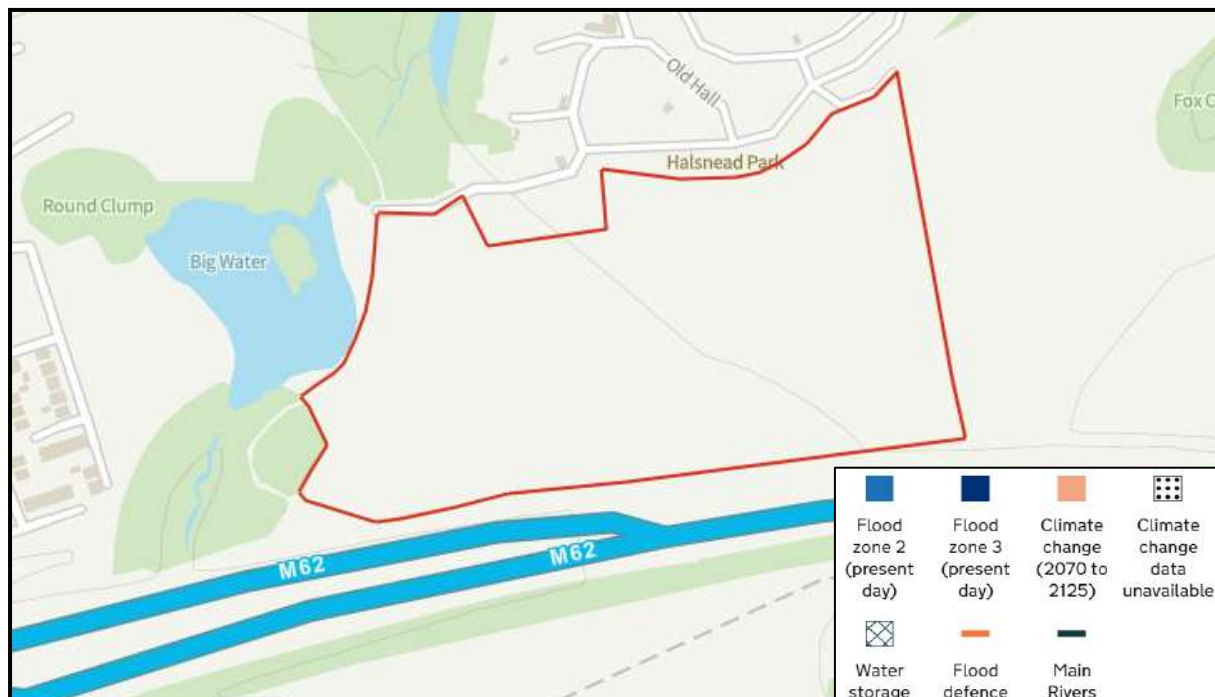
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FLOOD MAP FOR PLANNING

Flood Zones – Present Day



Flood Zones – Future



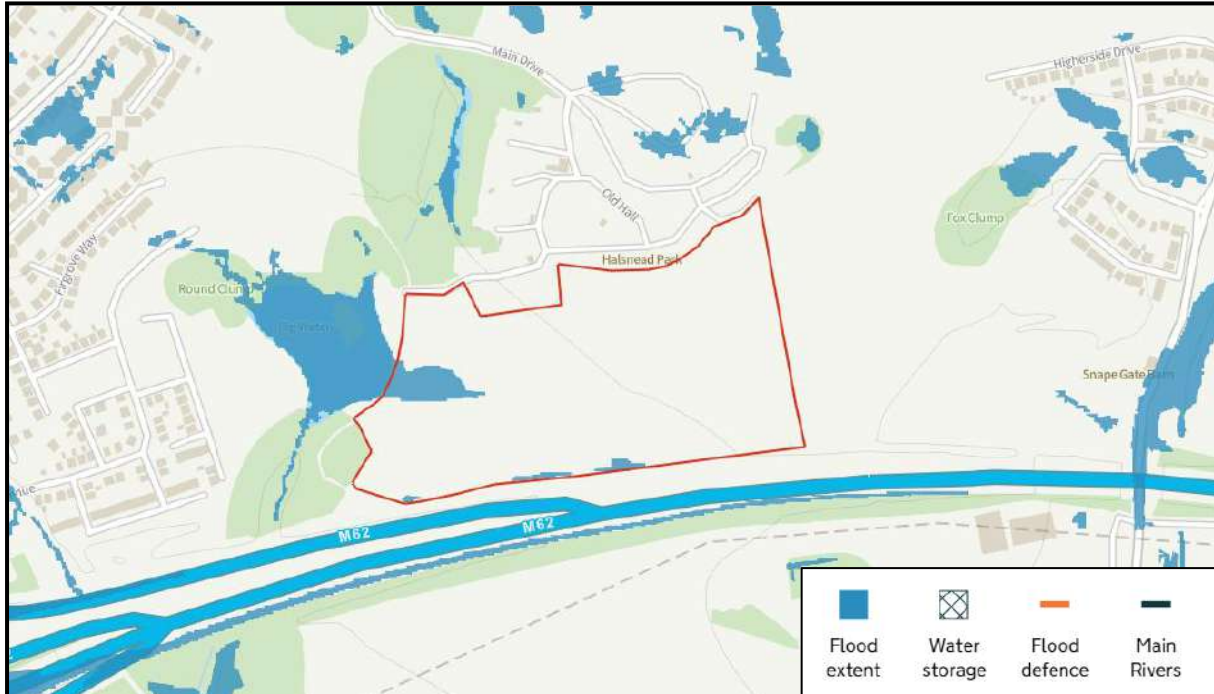
Surface Water Annual Likelihood of Flooding - 1 in 30yr



Surface Water Annual Likelihood of Flooding - 1 in 100yr

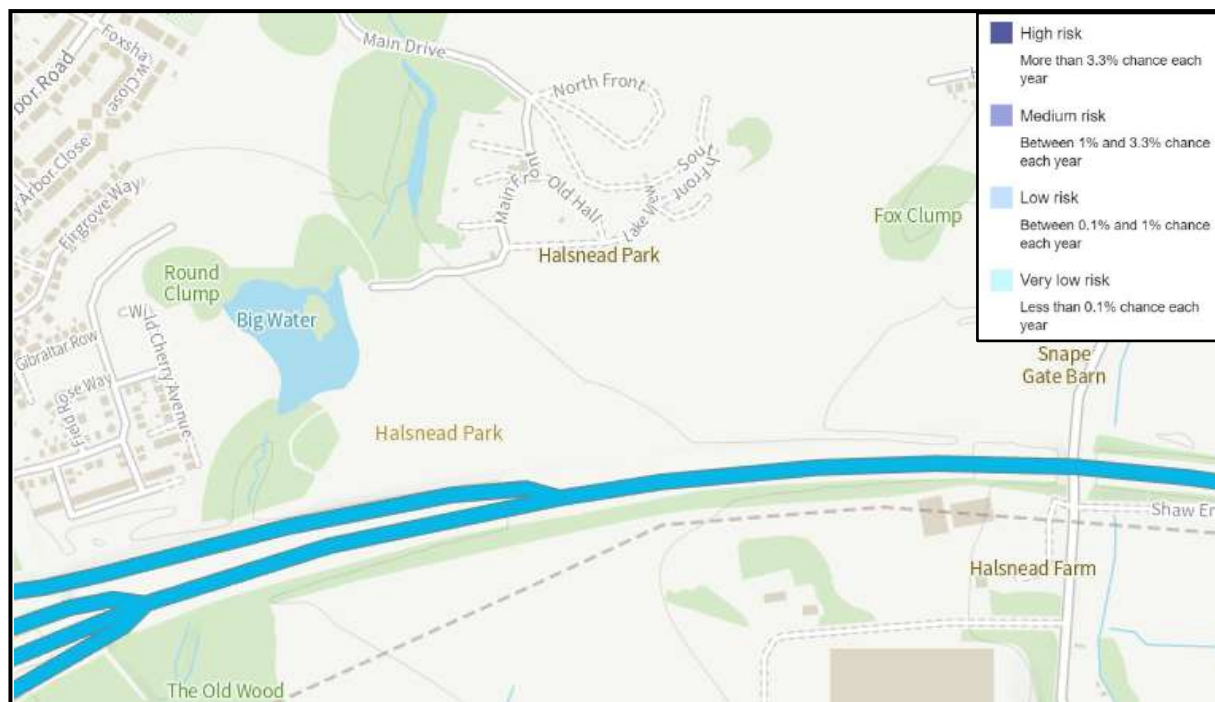


Surface Water Annual Likelihood of Flooding - 1 in 1000yr

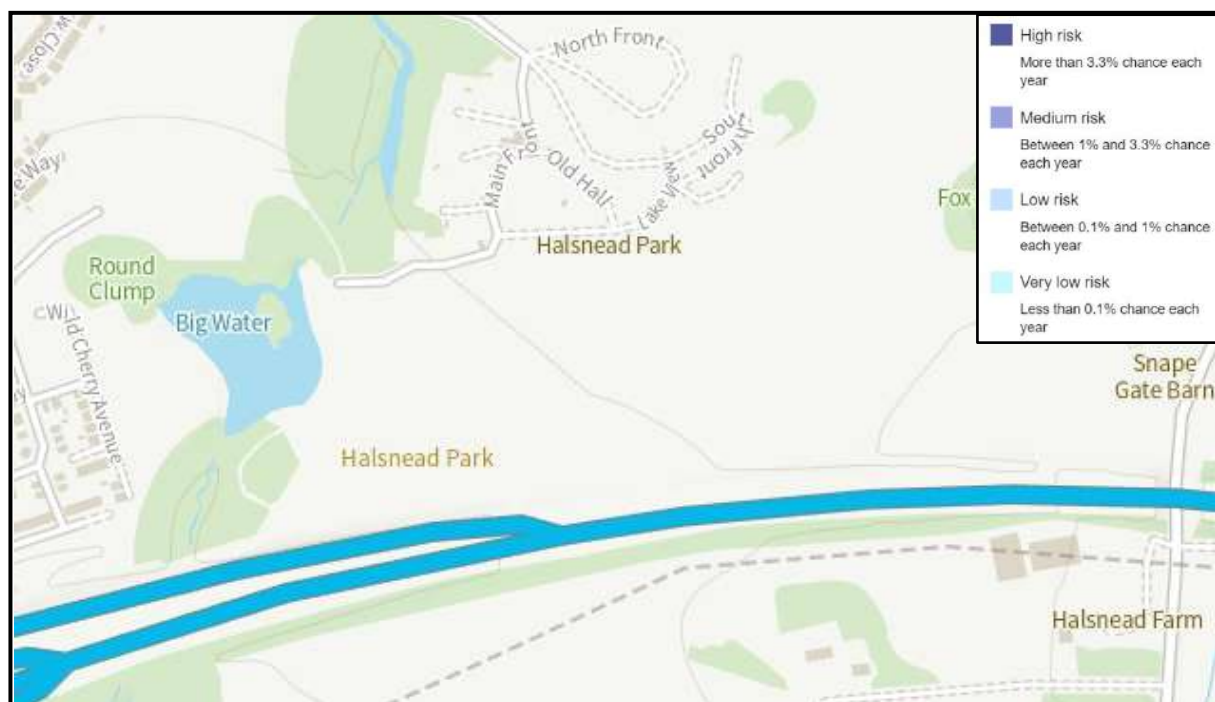


LONG TERM RISK OF FLOODING MAPPING

Rivers or Sea – Current



Rivers or Sea – Future (2036-2069)



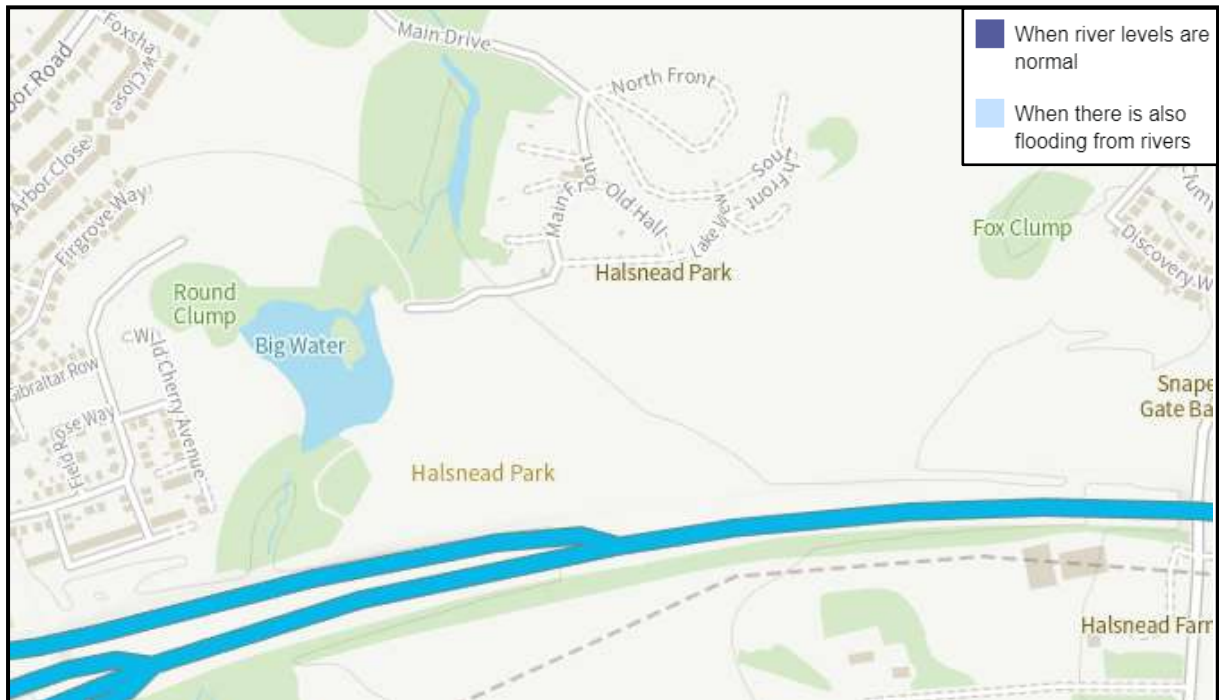
Surface Water – Current



Future (2040-2060)



Long Term Flood Risk - Reservoirs



Jabez Thomas

From: Jabez Thomas
Sent: 08 May 2025 15:12
To: inforequests.gmmc@environment-agency.gov.uk
Subject: RE: GMMC361456SW Response attached from the Environment Agency [Filed 08 May 2025 15:12]
Attachments: Location Plan.pdf
Categories: Filed by Mail Manager

To whom it may concern,

Fox Wood Garden Village (Phase 3)

We carried out an information request for this site in May 2024, and the site is now being looked into again. Please could you confirm whether you have any updated information (where available, 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,

Jabez Thomas BSc (Hons) GradCIWEM
Graduate Flood Risk Analyst

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Please consider the environment before printing this email

From: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
Sent: 29 May 2024 16:06

To: Hannah Buchanan <hannahbuchanan@betts-associates.co.uk>
Subject: GMMC361456SW Response attached from the Environment Agency

Dear Hannah,

Thank you for your enquiry which was received on 24/05/24.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose the data requested, please see supporting comments from my colleague.
Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

We have no records of flooding affecting the site.
However, this does not mean flooding has not occurred in the past or that it will not flood in future.

We recommend that you also contact United Utilities and Knowsley Council who may hold additional information (the former especially in relation to sewer flooding).

There are no flood defences in the vicinity of the site.

There are no 2D levels available for this site.

Knowsley Council is responsible for issues relating to surface water and hold information on surface water flooding.

Please be aware you can check your risk of flooding on our external website <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

Here are some useful links below:

<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Please see the ShareFile link below;

<https://ea.sharefile.com/public/share/web-s03e0971a570342b1a0a91e3499276d01>

The ShareFile links contains the following data:

Longwood Mill Brook 2012 Report (P5) Outputs (P6) Mapedit (P6)

Please can you advise that the link will expire in 30 days from 29/05/2024.
It is therefore advisable that the client saves this data to their own system.

Product 5/6/7

1. You may use the Information for your internal or personal purposes and may only sublicense others to use it if you do so under a written licence which includes the terms of these conditions and the agreement and in particular may not allow any period of use longer than the period licensed to you.
2. Notwithstanding the fact that the standard wording of the Environment Agency Conditional Licence indicates that it is perpetual, this Licence has a limited duration of 5 years at the end of which it will terminate automatically without notice.
3. We have restricted use of the Information as a result of legal restrictions placed upon us to protect the rights or confidentiality of others. In this instance it is because of third party data. If you contact us in writing (this includes email) we will, as far as confidentiality rules allow, provide you with details including, if available, how you might seek permission from a third party to extend your use rights.
- 4.1 The Information may contain some data that we believe is within the definition of "personal data" under the Data Protection Act 1998 but we consider that we will not be in breach of the Act if we disclose it to you with conditions set out in this condition and the conditions above. This personal data

comprises names of individuals or commentary relating to property that may be owned by an individual or commentary relating to the activities of an individual.

4.2 Under the Act a person who holds and uses or passes to others personal data is responsible for any compliance with the Act and so we have no option but to warn you that this means you have responsibility to check that you are compliant with the Act in respect of this personal data.

5 The location of public water supply abstraction sources must not be published to a resolution more detailed than 1km². Information about the operation of flood assets should not be published.

6 .1 Where we have supplied model data which may include model inputs or outputs you agree to supply to the Environment Agency copies of any assessments/studies and related outputs, modifications or derivatives created pursuant to the supply to you of the Information, all of which are hereinafter referred to as "the Data".

6.2 You agree, in the public interest to grant to the Environment Agency a perpetual royalty free non-exclusive licence to use the Data or any part thereof for its internal purposes or to use it in any way as part of Environment Agency derivative products which it supplies free of charge to others such as incorporation into the Environment Agency's Open Data mapping products.

We are supplying this information to you under the Environment Agency Conditional Licence Please check the special conditions above to determine If the conditions on the use are suitable for your purposes. If they are not, this information is not provided with a licence for use, and the data is provided for read right only.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Sarah Walters

Customer and Engagement Officer

Greater Manchester, Merseyside and Cheshire

Email: InfoRequests.gmmc@environment-agency.gov.uk

From: Hannah Buchanan <hannahbuchanan@betts-associates.co.uk>

Sent: Friday, May 24, 2024 4:03 PM

To: GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>

Subject: GMMC361456SW Flood Risk Information Request - Products 4, 5, 6, & 7

To whom it may concern,

Fox Wood Garden Village (Phase 3)

Please could you confirm whether you have any information (where relevant 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

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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Jabez Thomas

From: Greater Manchester, Merseyside and Cheshire Enquiries <no.reply@ea.ecase.co.uk>
Sent: 13 May 2025 13:43
To: Jabez Thomas
Subject: Request for information - Ref: EIR2025/08339
Attachments: Location Plan.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Dear Jabez,

Thank you for your enquiry which was received on 08/05/2025

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose the below response from our relevant officer

We can confirm that we do not hold any updated information for the site location.

Please be aware you can check your risk of flooding on our external website <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

Here are some useful links below:

<https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities>

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

For surface information please use link: <https://check-long-term-flood-risk.service.gov.uk/map?easting=362125.07&northing=388310.97&map=SurfaceWater>

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Lauren Blackley

Customer and Engagement Officer

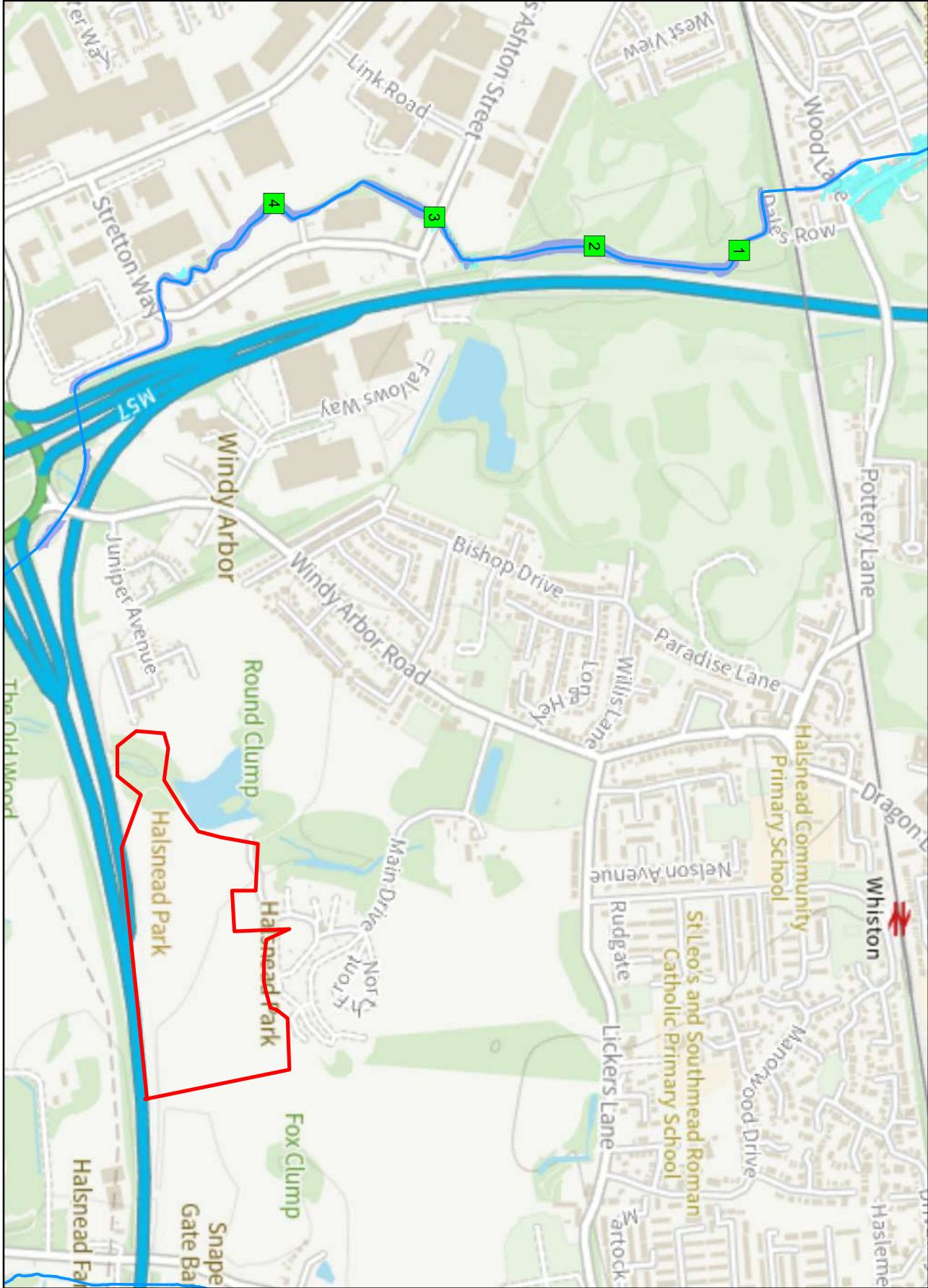
Greater Manchester, Merseyside and Cheshire

Email: Inforequests.gmmc@environment-agency.gov.uk

Office address: Richard Fairclough House, Knutsford Road, Latchford, Warrington, WA4 1HT

Detailed Flood Map Centred on Windy Arbour Road, Whiston, L35 3PB.

Created 29/05/2024 [GMMMC361456SW]



1:10,001



Legend

 Site Location

 Model Measurements

 Main Rivers

 Flood Zone 2

 Flood Zone 3

Map Reference	Model Node Reference	Easting	Northing	Data	Undertested								
					10 % AEP (1 in 10 year)	4 % AEP (1 in 25 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)
1	ea013_0168_LOGW01_3601	345947	390789	Modelled Water Level (m aodN)	27.36	27.45	27.56	27.58	27.69	27.70	27.78	27.65	27.82
				Modelled Flow (cumecs)	2.76	3.37	4.27	4.49	5.41	5.57	6.35	5.06	6.77
2	ea013_0168_LOGW01_3313	345927	390516	Modelled Water Level (m aodN)	25.92	26.05	26.20	26.23	26.37	26.39	26.51	26.31	26.52
				Modelled Flow (cumecs)	3.00	3.68	4.67	4.90	5.97	6.15	7.06	5.54	7.35
3	ea013_0168_LOGW01_2992Z	345869	390234	Modelled Water Level (m aodN)	24.82	24.93	25.10	25.14	25.35	25.38	25.58	25.28	25.63
				Modelled Flow (cumecs)	4.59	5.58	7.15	7.59	9.97	10.38	13.10	9.17	13.89
4	ea013_0168_LOGW01_2638	345849	389931	Modelled Water Level (m aodN)	22.56	22.65	22.78	22.82	22.95	22.98	23.15	22.90	23.19
				Modelled Flow (cumecs)	5.08	6.14	7.81	8.39	10.79	11.21	14.11	9.84	14.94

Model data taken from Longwood Mill Brook 2012
AEP - Annual Exceedence Probability
m aodN - metres above ordance datum Newlyn
cumecs - cubic metres per second

Notes: "Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

APPENDIX C: UU CORRESPONDENCE

This page has been left intentionally blank.

Jabez Thomas

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 09 May 2025 14:06
To: Jabez Thomas
Subject: RE: 05782714 Sewer Flood Risk Information Request

Hi Jabez

There is no change to the information provided last year

Kind regards



Nicola Pilkington
Developer Engineer
Developer Services & Metering
Customer Services
T: 01925 429 096
unitedutilities.com

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

Visit: unitedutilities.com/wow

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

From: Jabez Thomas [jabezthomas@betts-associates.co.uk]
Sent: 08/05/2025 15:12
To: wastewaterdeveloperservices@uuplc.co.uk
Subject: RE: 05782714 Sewer Flood Risk Information Request

To whom it may concern,

Fox Wood Garden Village (Phase 3)

We carried out an information request for this site in May 2024, and the site is now being looked into again. We have been instructed to prepare a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached). Please could you confirm whether you have any updated records of sewer flooding impacting on or within proximity of the site?

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

Kind Regards,

Jabez Thomas BSc (Hons) GradCIWEM

Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

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

Chester +44 (0)1244 289041

jabezthomas@betts-associates.co.uk

www.betts-associates.co.uk

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Please consider the environment before printing this email

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

Sent: 28 May 2024 15:49

To: Hannah Buchanan <hannahbuchanan@betts-associates.co.uk>

Subject: 05782714 Sewer Flood Risk Information Request

Good afternoon Hannah,

I can confirm that we do not have modelled flood risk within the vicinity of the proposed development.

Please note that United Utilities Water Limited (Uuw) 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.

Our response does not include:

- 1. any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which Uuw has no control and not a facet of sewer capacity; or*

- 1. any historical sewer flooding events that have been resolved 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.

Many thanks and Kind regards

If you feel I have given you a great service, I would greatly appreciate if you could take the time to give me some feedback <http://unitedutilities.thewowawards.co.uk/nominate>



Ashleigh Bellerby
Assistant Developer Engineer
Developer Services & Metering
Customer Services
T: 07826891650
unitedutilities.com

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

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

Sent: 28/05/2024 14:05

To: hannahbuchanan@betts-associates.co.uk

Subject: 05782714 Sewer Flood Risk Information Request

Good Afternoon,

Thank you for your enquiry.

This has been logged to the Assistant Engineer who will be in touch on or before 31/05/2024.

Kind regards



Lois Williams

Developer Services Assistant
Developer Services & Metering
Customer Services
unitedutilities.com

Tel: 0345 072 6067 Option 2 for Wastewater
Services)

Direct Tel:

If you feel you have received a good service from myself, please can you take two minutes to fill in the survey below. This will be much appreciated



Visit: <https://unitedutilities.thewowawards.co.uk/nominate>

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

From: Hannah Buchanan [hannahbuchanan@betts-associates.co.uk]

Sent: 24/05/2024 16:02

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: Sewer Flood Risk Information Request

To whom it may concern,

Fox Wood Garden Village (Phase 3)

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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www.unitedutilities.com/subsidiaries



Betts-Associates

Unit 6 Old Marsh Farm Barns
Welsh Road, Garden City
Sealand, 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: HYD318 Halsnead Garden Village
Our Ref: UUPS-ORD-26915
Date: 25/04/2018**

Dear Sirs

Location: Halsnead Garden Village

I acknowledge with thanks your request dated 25/04/2018 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,



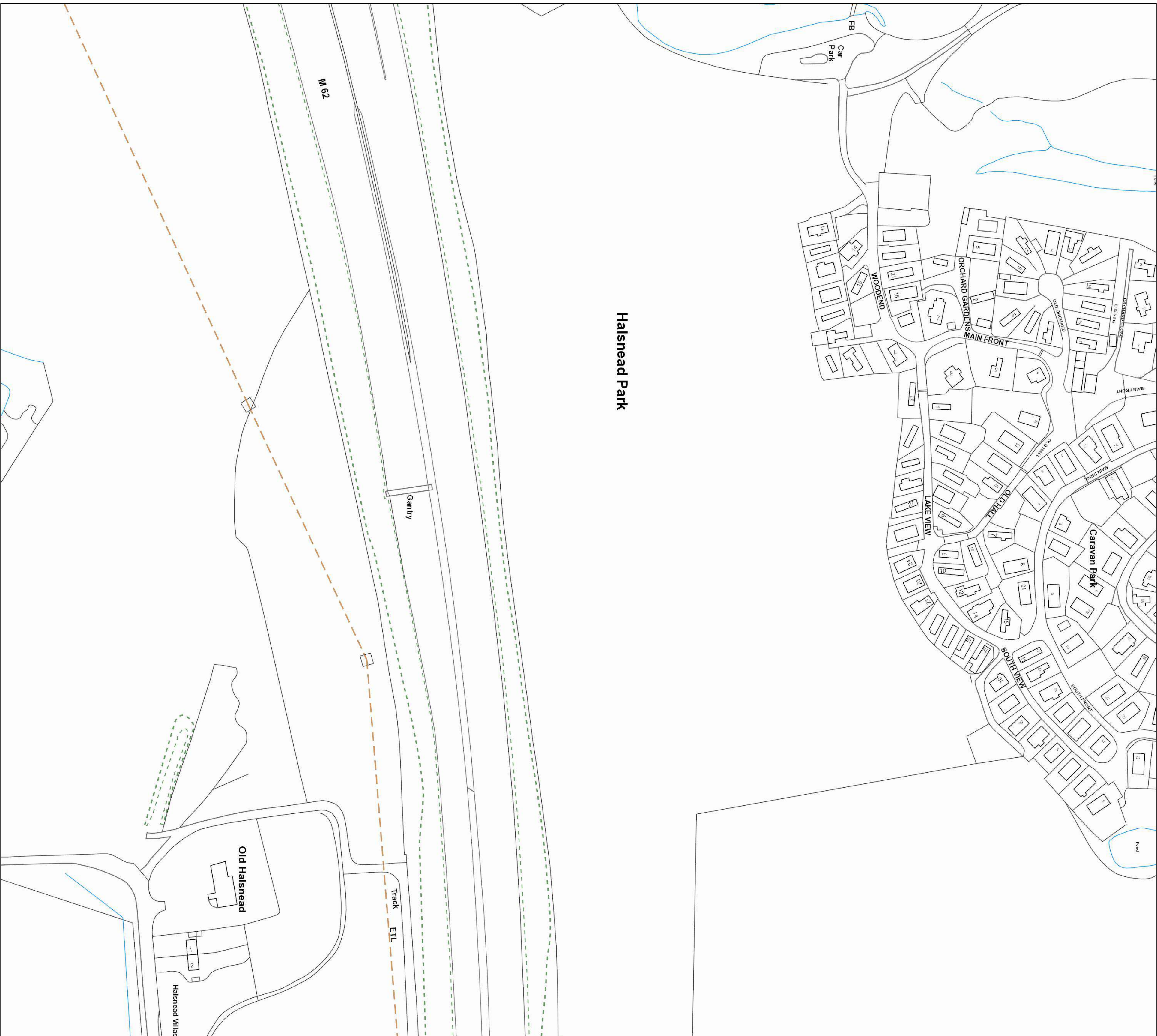
Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTERWATER 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.

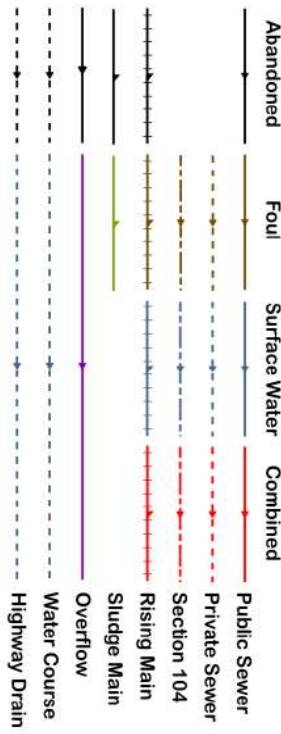


Halsnead Park

Ratio Cover Func Invert Size x Size y Shape Mass Length Grad

Ratio Cover Func Invert Size x Size y Shape Mass Length Grad

LEGEND



All point assets follow the standard colour convention:

red - combined
blue - surface water
brown - foul
purple - overflow

- Manhole
- Head of system
- Extent of survey
- Redding Eye
- Inlet
- Discharge Point
- Vortex
- Prestock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Seakeway
- Gully
- Cascade
- Flow Meter
- Flush Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Site Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Valve Chamber
- Caltrap
- Vertical Chamber
- Vertical Column
- Prestock Chamber
- Network Storage Tank
- Sewer Overflow
- WW Treatment Works
- WW Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

- FO Foul
- SW Surface Water
- CO Combined
- OV Overflow

SEWER SHAPE

- CI Circular
- TR Trapezoidal
- EG Egg
- AE Arch
- OV Oval
- BA Barrel
- FT Flat Top
- HO Horseshoe
- RE Rectangular
- UN Unspecified
- SO Square

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bored
- CSU Concrete Segment Unbored
- CC Concrete Box Culverted
- PSC Plastic Steel Composite
- GRC Glass Reinforced Plastic
- D Ductile Iron
- PVC Polyvinyl Chloride
- C Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Curved
- MAK Masonry, Random
- U Unspecified

Address or Site Reference:

Halsnead Garden Village,

OS sheet SJ4789NW

Number: 1:1250 Date: 25/04/2018

Nodes: 0

Sheet: 1 of 4

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SEWER RECORDS



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Abandoned

Foul

Surface Water

Combined

Public Sewer

Private Sewer

Section 104

Retaining Wall

Overhead

Water Course

Highway Drain

LEGEND

All point assets follow the standard colour convention:
red - combined
brown - foul
blue - surface water
purple - overflow

Manhole

Head of System

Extent of Survey

Redding Eye

Inlet

Discharge Point

Vertice

Prestack

Washout Chamber

Valve

Air Valve

Non Return Valve

Seaway

Gully

WW Treatment Works

Flow Meter

Septic Tank

Oil Interceptor

Summit

Drop Shaft

Orifice Plate

Site Entry Manhole

Cutfall

Screen Chamber

Inspection Chamber

Bifurcation Chamber

Lamp Hole

T Junction / Saddle

Catchpit

Valve Chamber

Vertic Chamber

Network Storage Tank

Sewer Overflow

WW Pumping Station

Septic Tank

Control Kiosk

Change of Characteristic

MANHOLE FUNCTION

FQ Foul

SW Surface Water

CO Combined

OV Overflow

SEWER SHAPE

CI Circular

TR Trapezoidal

EG Egg

AE Arch

OV Oval

BA Barrel

FT Flat Top

HO Horseshoe

RE Rectangular

UN Unspecified

SQ Square

SEWER MATERIAL

AC Asbestos Cement

BR Brick

PE Polyethylene

RP Reinforced Plastic Matrix

CO Concrete

CSB Concrete Segment Bored

CSU Concrete Segment Unbored

CC Concrete Box Culverted

PSC Plastic Steel Composite

GRC Glass Reinforced Plastic

D Ductile Iron

PVC Polyvinyl Chloride

C Cast Iron

SI Spun Iron

ST Steel

VC Vitlified Clay

PP Polypropylene

PF Pitch Fibre

MAC Masonry, Curbed

MAR Masonry, Random

U Unspecified

Address or Site Reference:

Halshead Garden Village,

SEWER RECORDS

Helping life flow smoothly

OS sheet SJ4790SE

Number: 24

Scale: 1:1250

Nodes: 24

Sheet: 3 of 4

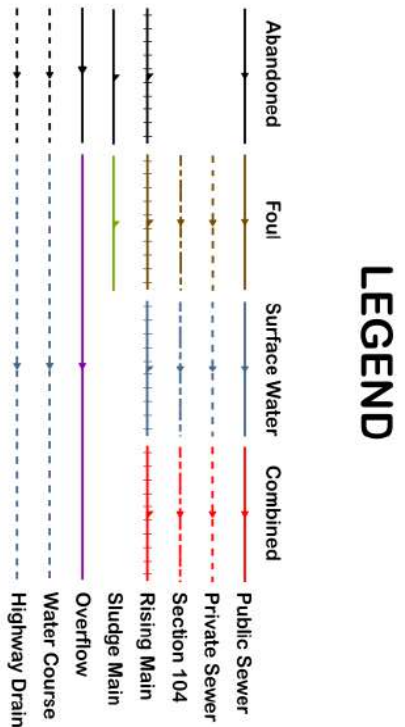
Date: 25/04/2018

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Ratio	Cover	Func	Invert	Size X	Size Y	Shape	Matl	Length	Grid	Notes
4500	50.91	FO	46.88	225	225	VC	VC	23.20018	116.333	
4500	50.97	FO	46.97	225	225	VC	VC	13.82243	116.172	
4500	50.84	SW	46.81	675	675	CO	CO	15.41318	116.172	
4500	51.05	FO	46.85	225	225	VC	VC	84.48977	116.148	
4500	51.41	FO	46.92	225	225	VC	VC	36.29349	116.144	
4500	50.78	SW	0	675	675	CO	CO	33.70279	116.125	
4500	50.78	SW	0	675	675	CO	CO	53.22279	116.125	
4500	51.4	SW	47.45	100	100	VC	VC	1.712688	116.14	
4500	51.1	FO	47.25	225	225	VC	VC	1.43214	116.138	
4500	50.98	FO	48.40	225	225	VC	VC	73.38308	116.138	
4500	51.00	SW	47.40	600	600	VC	VC	4.466641	116.18	
4500	50.98	FO	48.40	225	225	VC	VC	33.01515	116.138	
4500	51.1	FO	48.40	225	225	VC	VC	18.40207	116.138	
4500	50.94	SW	48.8	150	150	VC	VC	16.40207	116.410	
4500	51.17	FO				VC	VC	20.35736	116.410	

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- Manhole
- Head of System
- Extent of Survey
- Redding Eye
- Inlet
- Discharge Point
- Valve
- Parastock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Skewway
- Gully
- Cascade
- Flow Meter
- Septic Tank
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Change of Characteristic
- Site Entry Manhole
- Cutfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vertical Chamber
- Parastock Chamber
- Network Storage Tank
- Sewer Overflow
- WW Treatment Works
- WW Pumping Station
- Septic Tank
- Control Kiosk
- Summit
- Drop Shaft
- Orifice Plate

- MANHOLE FUNCTION**
- FO Foul
 - SW Surface Water
 - CO Combined
 - OV Overflow

- SEWER SHAPE**
- CI Circular
 - TR Trapezoidal
 - EG Egg
 - AR Arch
 - OV Oval
 - BA Barrel
 - FT Flat Top
 - HO Horseshoe
 - RE Rectangular
 - UN Unspecified
 - SO Square

- SEWER MATERIAL**
- AC Asbestos Cement
 - BR Brick
 - PE Polyethylene
 - RP Reinforced Plastic Matrix
 - CO Concrete
 - CSB Concrete Segment Bored
 - CSU Concrete Segment Unbored
 - CC Concrete Box Culverted
 - PSC Plastic Steel Composite
 - GRC Glass Reinforced Plastic
 - D Ductile Iron
 - PVC Polyvinyl Chloride
 - C Cast Iron
 - SI Spun Iron
 - ST Steel
 - VC Vitrified Clay
 - PP Polypropylene
 - PF Pitch Fibre
 - MAC Masonry Curbed
 - MAR Masonry Bandon
 - U Unspecified

Address or Site Reference:
Halshead Garden Village,

OS sheet S14790SW
Number:
Scale: 1:1250
Nodes: 41
Sheet: 4 of 4
Date: 25/04/2018
Printed by: Property Searches



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APPENDIX D: LPA/LLFA CORRESPONDENCE

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Hannah Buchanan

From: Hannah Buchanan
Sent: 24 May 2024 16:03
To: LLFA@knowsley.gov.uk
Subject: Historic Flood Risk and Drainage Information Request
Attachments: Location Plan.pdf

To whom it may concern,

Fox Wood Garden Village (Phase 3)

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

CIVIL | STRUCTURAL | GEO-ENVIRONMENTAL | HYDROLOGY | FLOOD RISK MANAGEMENT
SUDS | STRUCTURAL SURVEYS | PARTY WALL DUTIES | INFILTRATION | GEOTECHNICAL

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Please consider the environment before printing this email

Jabez Thomas

From: Jabez Thomas
Sent: 08 May 2025 15:13
To: 'LLFA@knowsley.gov.uk'
Subject: Historic Flood Risk and Drainage Information Request [Filed 08 May 2025 15:12]
Attachments: Location Plan.pdf

Categories: Filed by Mail Manager

To whom it may concern,

Fox Wood Garden Village (Phase 3)

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,

Jabez Thomas BSc (Hons) GradCIWEM
Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
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jabezthomas@betts-associates.co.uk
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APPENDIX E: NATIONAL HIGHWAYS CORRESPONDENCE

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Jabez Thomas

From: Jabez Thomas
Sent: 08 May 2025 15:13
To: 'info@nationalhighways.co.uk'
Subject: Historic Flood Risk and Drainage Information Request [Filed 08 May 2025 15:12]
Attachments: Location Plan.pdf

Categories: Filed by Mail Manager

To whom it may concern,

Fox Wood Garden Village (Phase 3)

We have recently been instructed to prepare a Flood Risk Assessment and Drainage Management Strategy for the above site (location plan attached). Would you be able to provide any information on any culverted systems or highway drainage beneath the M62 immediately south of the site?

Additionally, please could you provide any key constraints that should be considered with regard to development near the M62?

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

Kind Regards,

Jabez Thomas BSc (Hons) GradCIWEM
Graduate Flood Risk Analyst

BETTS HYDRO

Consulting Engineers

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

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APPENDIX F: LOCATION PLAN

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LOCATION PLAN

Fox Wood Garden Village (Phase 3)

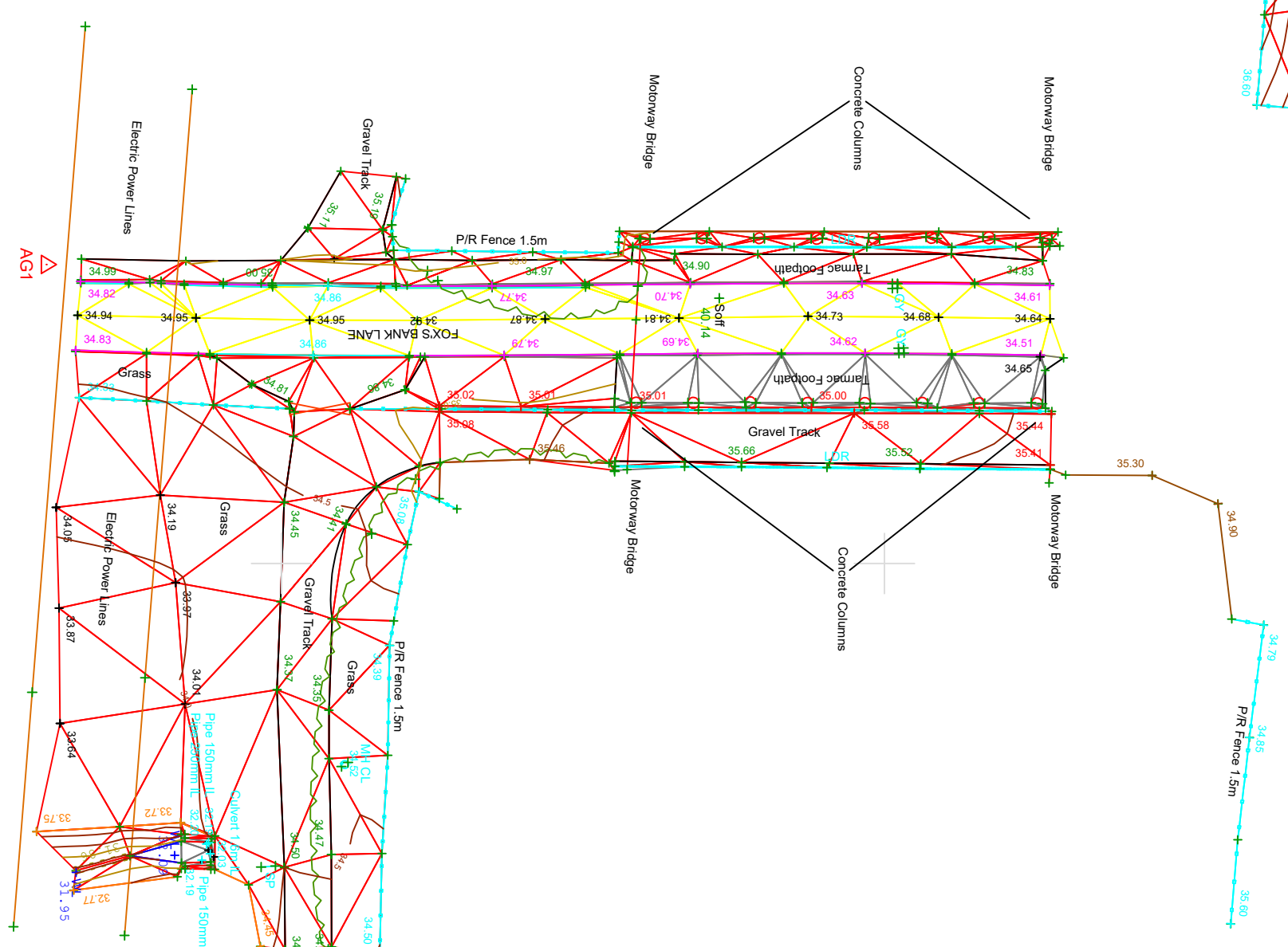
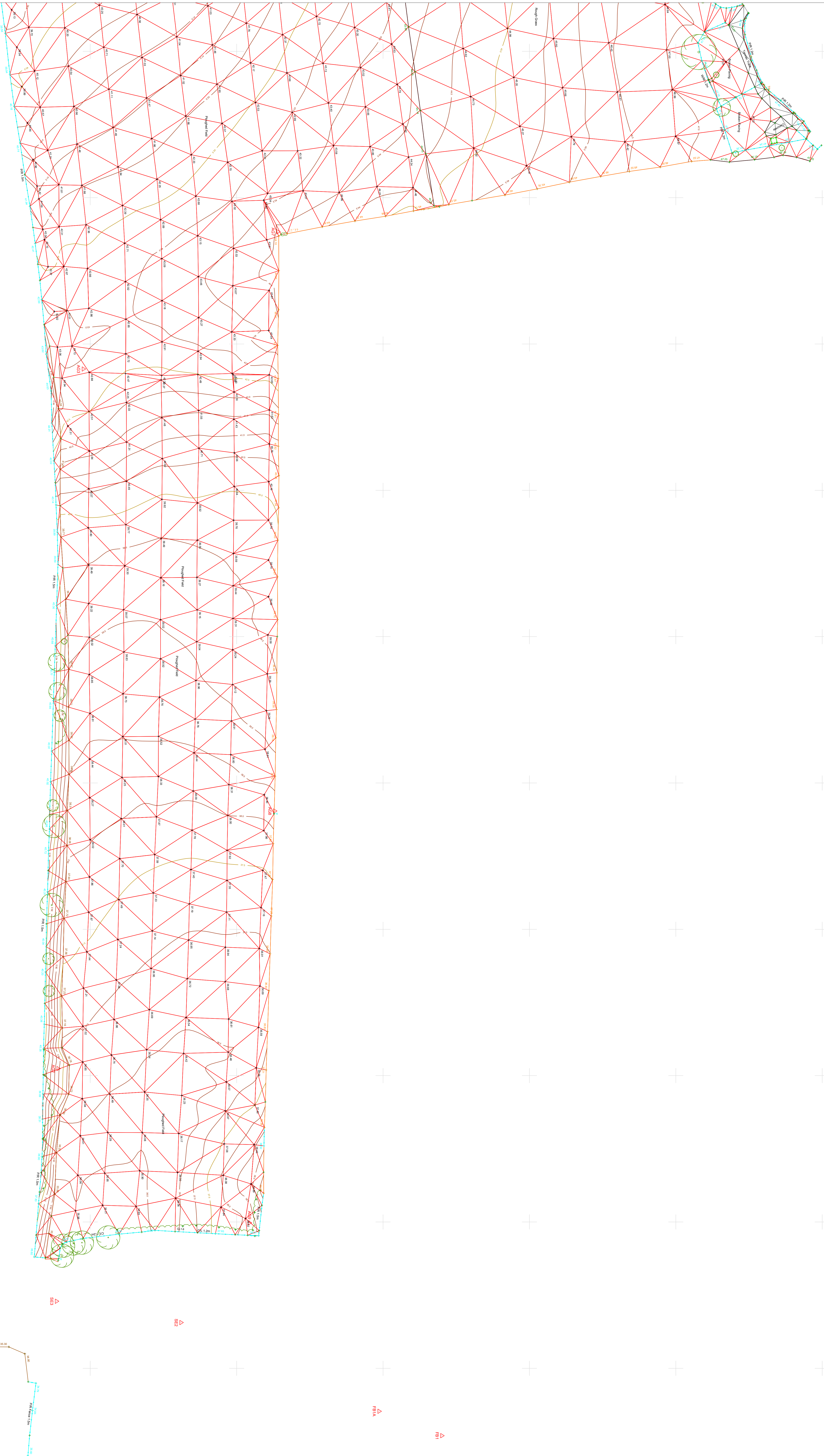


OS X (Eastings)	347706
OS Y (Northings)	390287
Nat Grid	SJ477902 / SJ4770690287
Nearest Post Code	L35 3QD
Lat (WGS84)	N53:24:24 (53.40679457488399)
Long (WGS84)	W2:47:17 (-2.788086407563479)
Lat, Long (WGS84)	53.40679457488399,-2.788086407563479
Lat (OSGB36)	N53:24:24 (53.40654531179801)
Long (OSGB36)	W2:47:12 (-2.786715698588826)
Lat, Long (OSGB36)	53.40654531179801,-2.786715698588826



APPENDIX G: TOPOGRAPHIC SURVEY

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LEGEND	
CONTROL	△ A02
STATION	
BUSH	
TREE	
DRAINAGE	
ROADWAY	
ORIGINALLY ELECTRICITY LINE	
TELEPHONE LINE	
FOOTPATH	
POW	
HEDGE	
POULDER	
EXISTING BUILDING	
CONTOUR	

[illegible][illegible]

3D Co-ordinate System is Based on Control Point
Reference Drawing Number: TWMW/TS/22.1

SHEET LAYOUT

Sheet 3	Sheet
Sheet 2	Sheet

AIRD GROUP
 CHARTERED SURVEYORS & CONSULTING ENGINEERS
 INCORPORATING AIRD GEOTECHNICAL LTD, AIRD ASSOCIATA
 AIRD CONSULTING ENGINEERS LTD AND AIRD DEVELOP-
 ME NTS AND ROAD
 SALE
 CHESTER AND JMG
 Tel: 0161 783 8600
 Fax: 0161 783 8605
 Email: info@airdgroup.co.uk
 Website: www.airdgroup.co.uk
 E-mail: gseniors@airdgroup.co.uk
 EDINBURGH
 Tel: 0131 332 6068 Fax: 0131
 332 6069
 GLASGOW
 Tel: 0141 664 1728 Fax: 0141

CLIENT	TAYLOR WIMP		
PROJECT	FOX'S BANK LA WHISTON		
TITLE	WORKING DRAW		
PROJECT NO.	M/TW/NW/18/0		
DRAWN BY	PW	SCALE	
CHECKED BY:	SJB	1:500@ A0	



DRAINAGE DISCLAIMER
ONLY DRAINAGE DISCOVERED WHILST ON SITE IS DISPLAYED ON THIS DRAWING
FURTHER INVESTIGATIONS MAY NEED TO BE CARRIED OUT TO ASCERTAIN
THE FULL EXTENT OF THE DRAINAGE FOR THE SITE

**KEY DIMENSIONS SHOULD BE CHECKED ON SITE
BEFORE COMMENCEMENT OF ANY WORKS**

NOTE

Grid and Level related to OS
using active GPS data network OSGB36
and transformations OSTN15/OSGM15

Amendments	
Date	Description of work



58/60 Hilsdale Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powersillman.co.uk
www.powersillman.co.uk

Halsnead Caravan Park

Whiston, Liverpool

Topographical Survey

Client : Taylor Wimpey North We

Surveyed By : JL	Date : 04/08/22	Scale
Drawn By : JL	Drawing No : FP-5651/02	1:500
Checked By : PB	Amendment :	

[illegible]

DRAINAGE DISCLAIMER

ONLY DRAINAGE DISCOVERED WHILST ON SITE IS DISPLAYED ON THIS DRAWING
FURTHER INVESTIGATIONS MAY NEED TO BE CARRIED OUT TO ASCERTAIN
THE FULL EXTENT OF THE DRAINAGE FOR THE SITE

KEY DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCEMENT OF ANY WORKS

NOTE

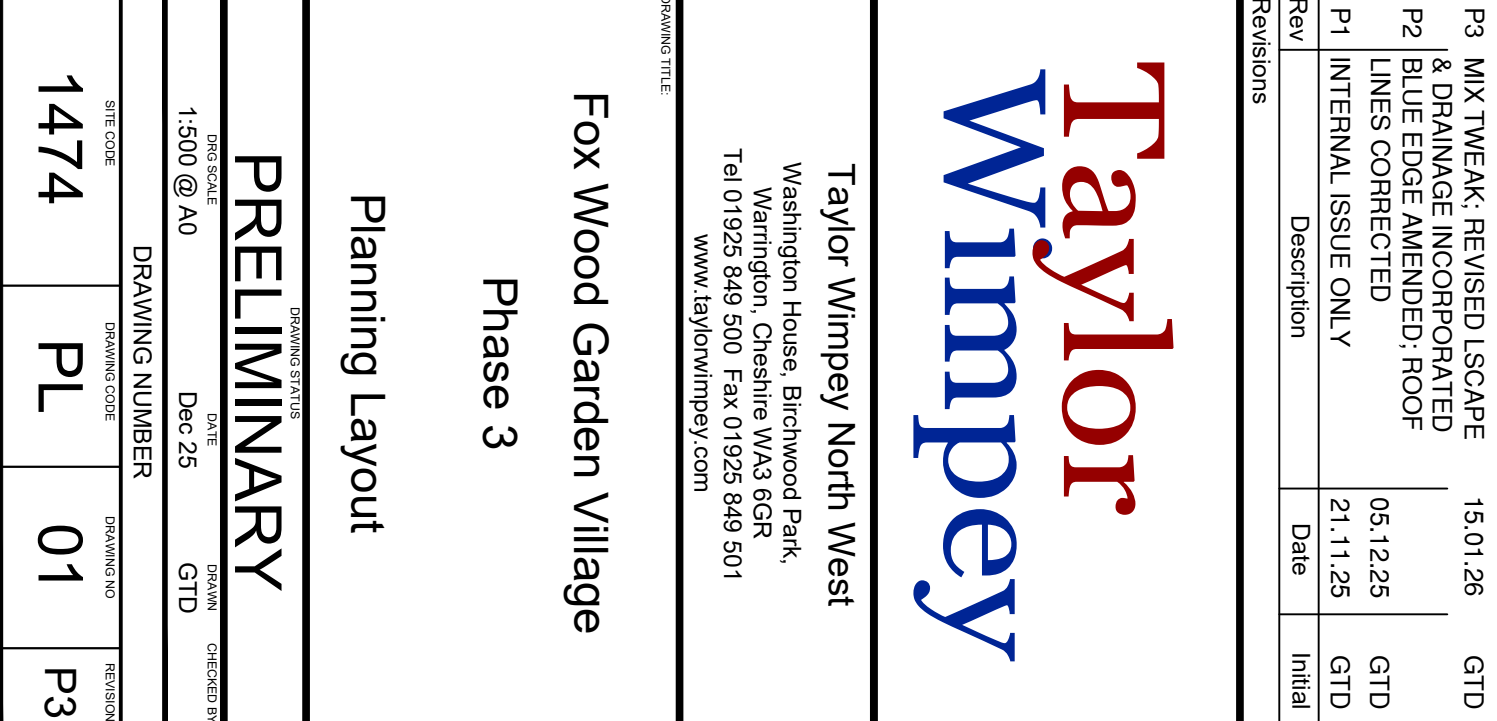
Grid and Level related to OS
using active GPS data network OSGB36
and transformations OSTN15/OSGM15

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APPENDIX H: PLANNING LAYOUT

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APPENDIX I: SURFACE WATER RUN-OFF CALCULATIONS

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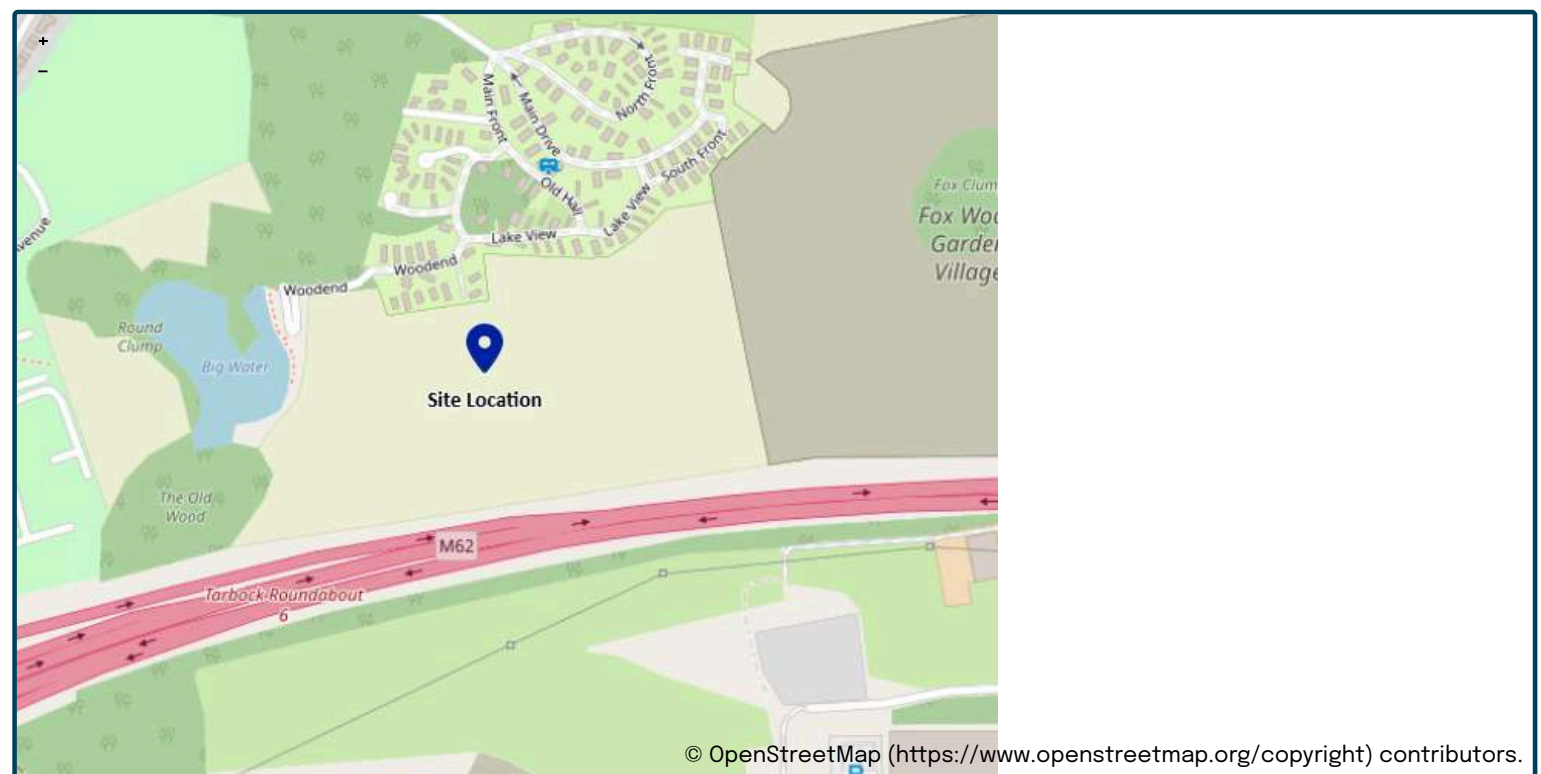
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	11/12/2025
Calculated by	HW
Reference	HYD956
Model version	2.2.2

Location

Site name	Fox Wood Garden Village (Phase 3)
Site location	Halsnead



Site easting (British National Grid)	347171
Site northing (British National Grid)	389798

Site details

Total site area (ha)	1	ha
----------------------	--------------------------------	----

Greenfield runoff

Method

Method	FEH statistical (2025)
--------	------------------------

FEH statistical (2025)

	<u>My value</u>	<u>Map value</u>
SAAR9120 (mm)	903	mm
BFIHOST19scaled	0.502	
QMed-QBar conversion	1.075	1.075
QMed (l/s)	4.7	l/s
QBar (FEH statistical 2025) (l/s)	5.1	l/s

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	10	10
1 year growth factor	0.87	
2 year growth factor	0.93	
10 year growth factor	1.38	
30 year growth factor	1.7	
100 year growth factor	2.08	
200 year growth factor	2.37	

Results

Method	FEH statistical (2025)
Flow rate 1 year (l/s)	4.4
Flow rate 2 year (l/s)	4.7
Flow rate 10 years (l/s)	7.0
Flow rate 30 years (l/s)	8.6
Flow rate 100 years (l/s)	10.5
Flow rate 200 years (l/s)	12.0

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (<https://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 uksuds.com/terms-conditions (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

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.

Project details

Date	11/12/2025
Calculated by	HW
Reference	HYD956
Model version	2.2.2

Location

Site name	Fox Wood Garden Village (Phase 3)
Site location	Halsnead



Site easting (British National Grid)	347171
Site northing (British National Grid)	389798

Site details

Total site area (ha)	1	ha
----------------------	--------------------------------	----

Greenfield runoff

Method

Method	IH124
--------	-------

IH124

	<u>My value</u>	<u>Map value</u>
SAAR (mm)	903 mm	860
How should SPR be derived?	Estimate using BFI	
BFIHOST	0.502	
SPR	0.386	
QBar (IH124) (l/s)	4.2 l/s	

Growth curve factors

	<u>My value</u>	<u>Map value</u>
Hydrological region	10	10
1 year growth factor	0.87	
2 year growth factor	0.93	
10 year growth factor	1.38	
30 year growth factor	1.7	
100 year growth factor	2.08	
200 year growth factor	2.37	

Results

Method	IH124
Flow rate 1 year (l/s)	3.7 l/s
Flow rate 2 year (l/s)	3.9 l/s
Flow rate 10 years (l/s)	5.9 l/s
Flow rate 30 years (l/s)	7.2 l/s
Flow rate 100 years (l/s)	8.8 l/s
Flow rate 200 years (l/s)	10.1 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent ‘zero’ figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

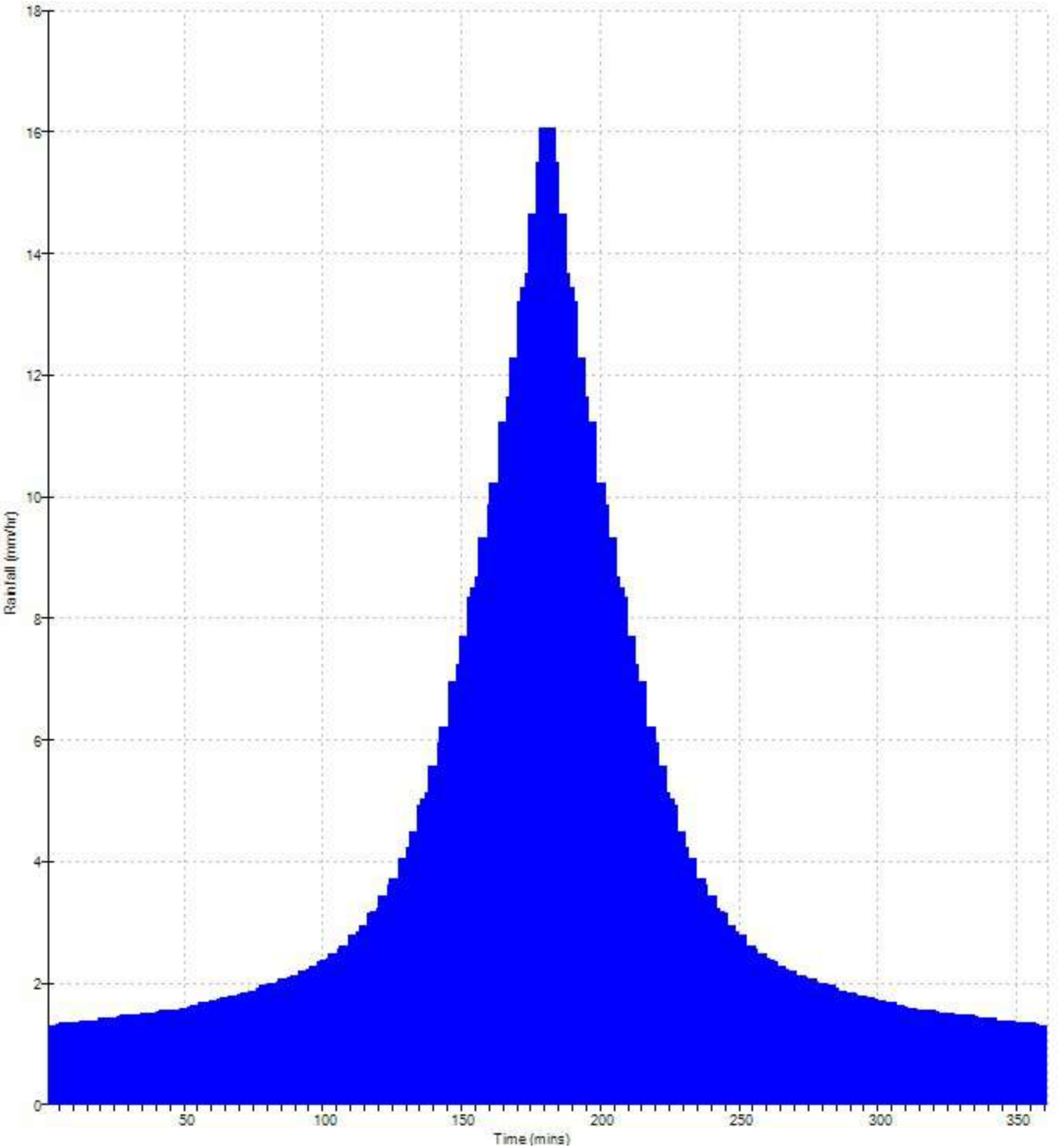
This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at [uksuds.com](https://www.uksuds.com) (<https://www.uksuds.com/>). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at [uksuds.com/terms-conditions](https://www.uksuds.com/terms-conditions) (<https://www.uksuds.com/terms-conditions>). The outputs from this tool have been used to estimate 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, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

Betts Associates Ltd		Page 1
Old Marsh Farm Barns Welsh Road Sealand Flintshire CH5 2LY	Fox Wood Garden Village Halsnead (Phase 3)	
Date 09/05/2025	Designed by JT	
File	Checked by HB	
Micro Drainage	Network 2020.1.3	

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Peak Intensity (mm/hr)	16.059
Ave. Intensity (mm/hr)	4.097
Return Period (years)	2.0

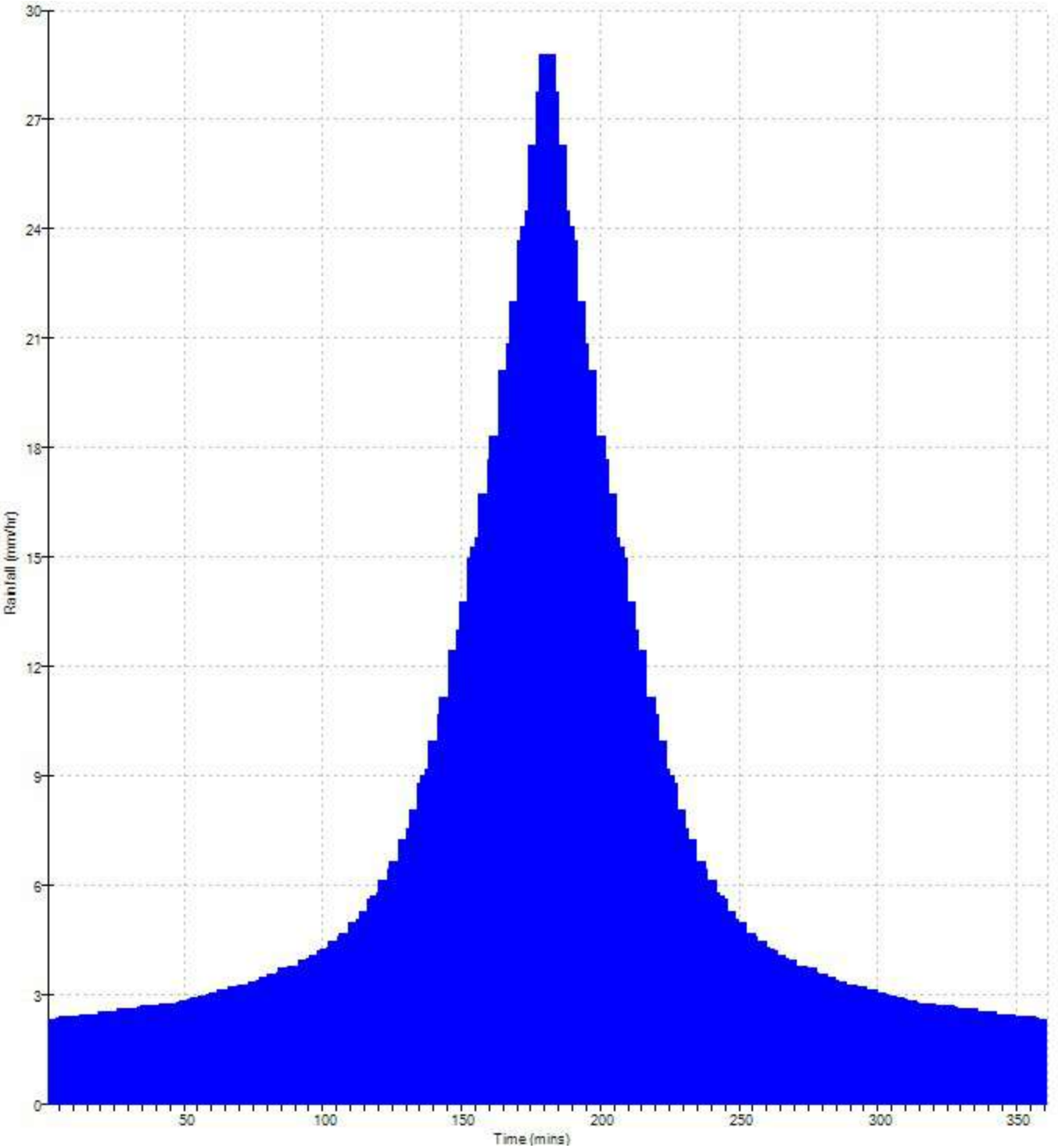


Betts Associates Ltd		Page 1
Old Marsh Farm Barns Welsh Road Sealand Flintshire CH5 2LY	Fox Wood Garden Village Halsnead (Phase 3)	
Date 09/05/2025	Designed by JT	
File	Checked by HB	
Micro Drainage	Network 2020.1.3	

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Peak Intensity (mm/hr)	28.788
Ave. Intensity (mm/hr)	7.344
Return Period (years)	30.0

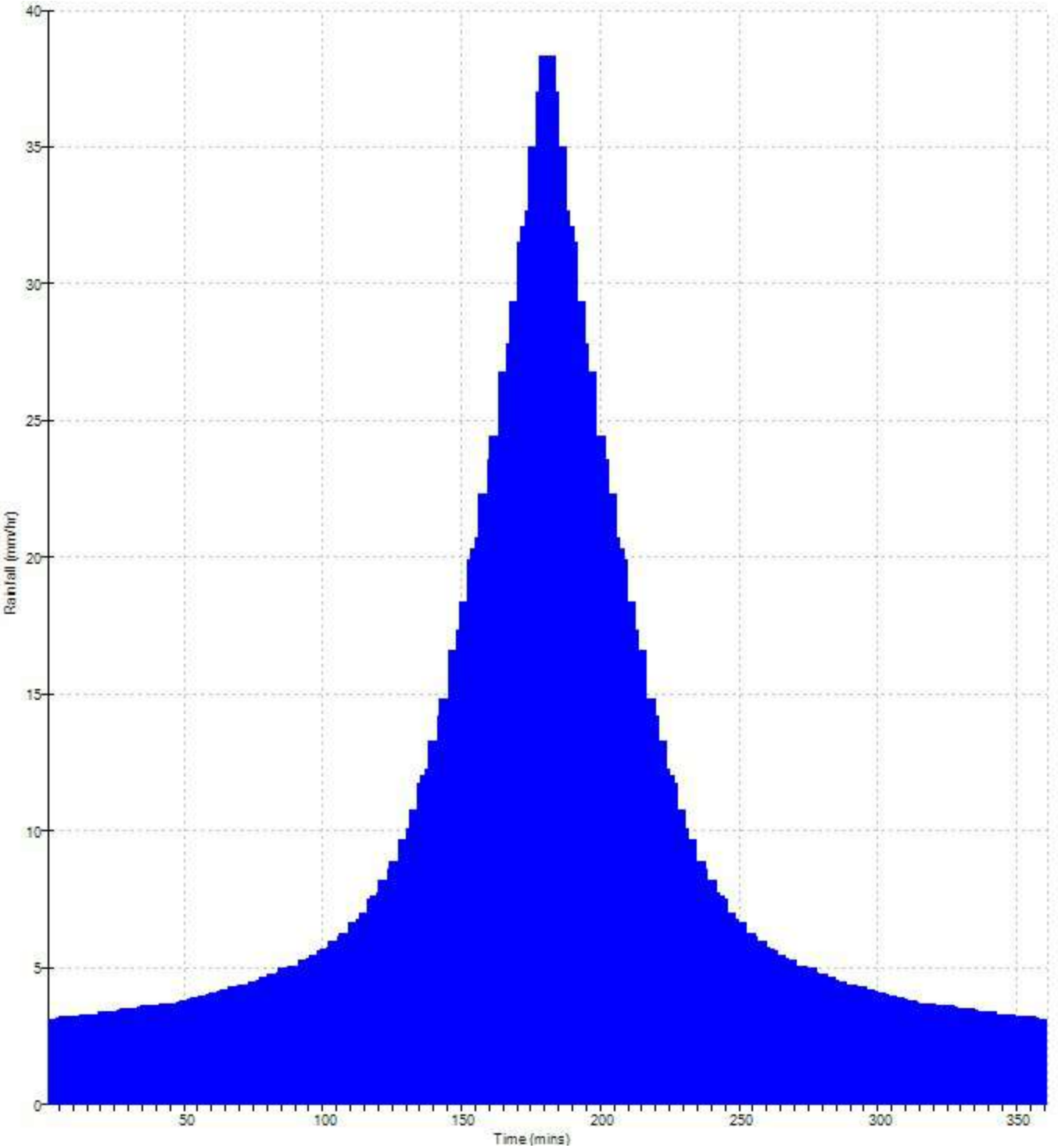


Betts Associates Ltd		Page 1
Old Marsh Farm Barns Welsh Road Sealand Flintshire CH5 2LY	Fox Wood Garden Village Halsnead (Phase 3)	
Date 09/05/2025	Designed by JT	
File	Checked by HB	
Micro Drainage	Network 2020.1.3	

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Peak Intensity (mm/hr)	38.362
Ave. Intensity (mm/hr)	9.786
Return Period (years)	100.0



Betts Associates Ltd		Page 1
6 Old Marsh Farm Barns Welsh Road, Sealand Flintshire, CH5 2LY	Fox Wood Garden Village (Phase 3) Halsnead	
Date 11/12/2025	Designed by HW	
File	Checked by KH	
Innovyze	Source Control 2020.1.3	

Greenfield Runoff Volume

FEH Data

Return Period (years)	2
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Areal Reduction Factor	1.00
Area (ha)	7.061
SAAR (mm)	903
CWI	122.009
SPR Host	38.600
URBEXT (1990)	0.0000

Results

Percentage Runoff (%)	37.85
Greenfield Runoff Volume (m³)	656.970

Betts Associates Ltd		Page 1
6 Old Marsh Farm Barns Welsh Road, Sealand Flintshire, CH5 2LY	Fox Wood Garden Village (Phase 3) Halsnead	
Date 11/12/2025	Designed by HW	
File	Checked by KH	
Innovyze	Source Control 2020.1.3	

Greenfield Runoff Volume

FEH Data

Return Period (years)	30
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Areal Reduction Factor	1.00
Area (ha)	7.061
SAAR (mm)	903
CWI	122.009
SPR Host	38.600
URBEXT (1990)	0.0000

Results

Percentage Runoff (%)	39.05
Greenfield Runoff Volume (m³)	1215.038

Betts Associates Ltd		Page 1
6 Old Marsh Farm Barns Welsh Road, Sealand Flintshire, CH5 2LY	Fox Wood Garden Village (Phase 3) Halsnead	
Date 11/12/2025	Designed by HW	
File	Checked by KH	
Innovyze	Source Control 2020.1.3	

Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 347186 389819 SJ 47186 89819
Data Type	Point
Areal Reduction Factor	1.00
Area (ha)	7.061
SAAR (mm)	903
CWI	122.009
SPR Host	38.600
URBEXT (1990)	0.0000

Results

Percentage Runoff (%)	41.35
Greenfield Runoff Volume (m³)	1714.362

SURFACE WATER RUN-OFF CALCULATION SHEET



Development	Fox Wood Garden Village (Phase 3)
Project No.	HYD956

Revision	B	Completed by	HW
Date	11/12/2025	Checked by	KH

Areas			
Total Site	8.710	ha	
Development Area ¹	3.146	ha	
Existing Impermeable		ha	
Existing Impermeable ²		ha	
Existing Pervious	8.710	ha	
Existing Pervious ²	0.000	ha	
Proposed total impermeable	2.045	ha	65%
*Additional 10% added for Urban Creep			

Catchment Characteristics			
SAAR	903	mm	
SPR	0.386		
BFI19	0.502		
i ₁	16.1	mm/hr	d ₁ 22.2 mm
i ₃₀	28.8	mm/hr	d ₃₀ 40.2 mm
i ₁₀₀	38.4	mm/hr	d ₁₀₀ 49.3 mm

Run-off Rates			
Pre-development			
Impermeable -----	1yr	0.0	l/s
	30yr	0.0	l/s
	100yr	0.0	l/s
	50mm/hr ³	0.0	l/s
Pervious ⁴ -----	1yr	13.8	l/s
	30yr	27.1	l/s
	100yr	33.0	l/s
	QBar ⁵	16.0	l/s
Total -----	1yr	13.8	l/s
	30yr	27.1	l/s
	100yr	33.0	l/s
Post-development (without control)			
Impermeable ⁶ -----	1yr	91.2	l/s
	30yr	163.5	l/s
	100yr+45%CC	305.0	l/s

Volumes			
Pre-development			
Impermeable -----	1yr	0.0	cu.m
	30yr	0.0	cu.m
	100yr	0.0	cu.m
Pervious ⁴ -----	1yr	292.7	cu.m
	30yr	541.4	cu.m
	100yr	763.8	cu.m
Total -----	1yr	292.7	cu.m
	30yr	541.4	cu.m
	100yr	763.8	cu.m
Post-development			
Impermeable ⁶ -----	1yr	454.7	cu.m
	30yr	822.0	cu.m
	100yr	1008.6	cu.m

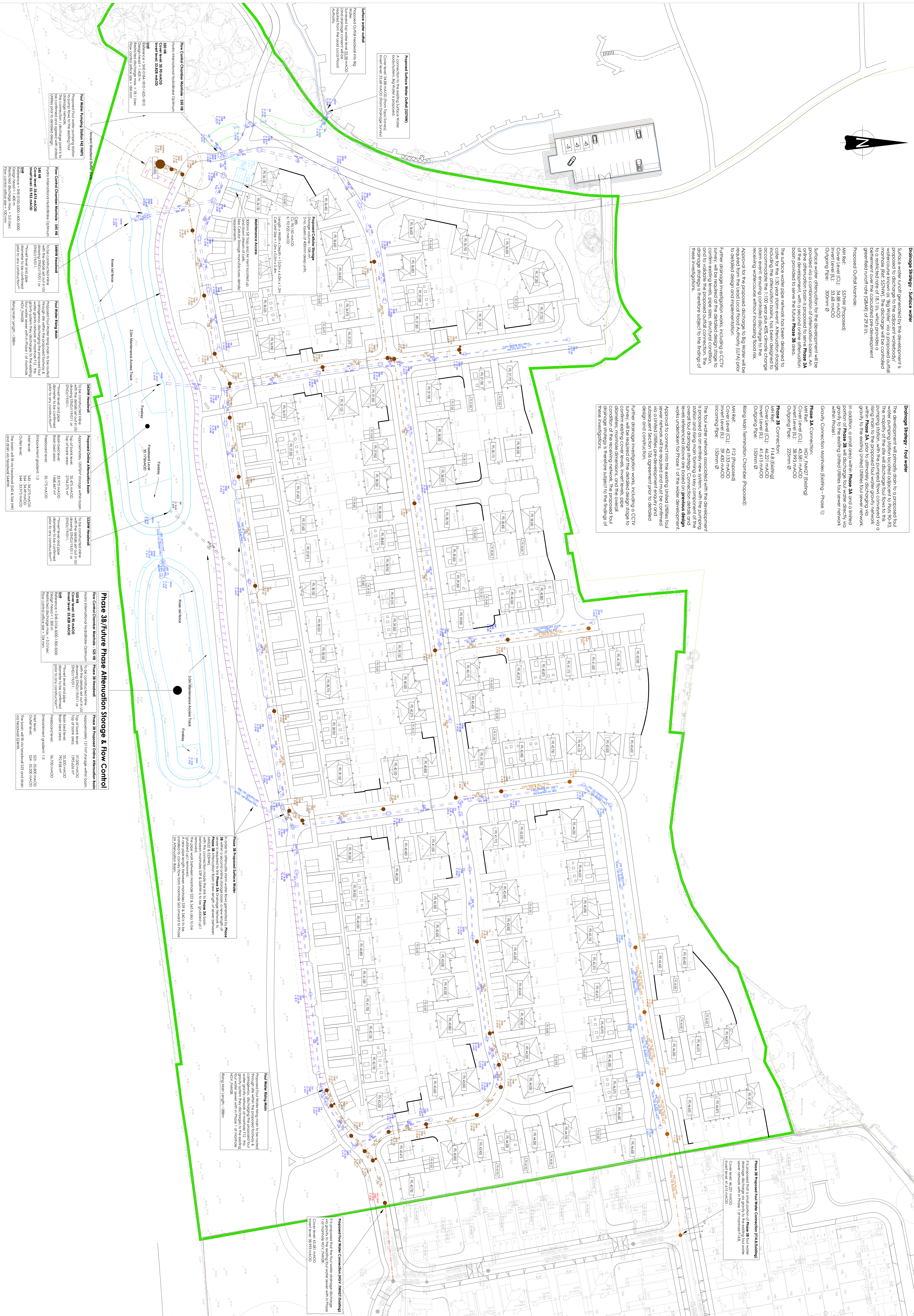
Stormwater Storage Estimates				
Based on Greenfield run-off QBar				
Microdrainage Quick Storage Estimates (using FEH catchment data)				
Return Period	Rate	lower	upper	mean
1yr	16.0 l/s	247	418	332.5 cu.m
30yr	16.0 l/s	602	845	723.5 cu.m
30yr+40%CC	16.0 l/s	925	1309	1117 cu.m
100yr+45%CC	16.0 l/s	1399	1863	1631 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)

APPENDIX J: PRELIMINARY DRAINAGE LAYOUT

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Drainage Strategy - Surface water

Surface water runoff generated by the development is proposed to discharge to the adjacent waterbody/watercourse known as 'Big Water' via a proposed outfall manhole (Ref: S57HW1). The discharge will be controlled to a restricted rate of 18 l/s, which provides a benefit over the calculated pre-development greenfield runoff rate (QBAR) of 29.8 l/s.

MH Ref:	557HW (Proposed)
Cover Level (CL):	34.88 mAO D
Invert Level (IL):	33.68 mAO D
Outgoing Pipe:	300mm Ø

The surface water pipe network has been designed to cater for the 1:30 year storm event. Attenuation storage, including the attenuation basins, has been designed to accommodate the 1:100 year 485 mm rise change in water level. The design of the attenuation basins, including watercourse without increasing flood risk, is provided to save the future Phase 3b costs.

Surface water attenuation for the development will be provided via a combination of attenuation basins, an attenuation storage tank and a series of attenuation basins of the development, with a second online attenuation basin provided to save the future Phase 3b costs.

Approval for the proposed discharge to Big Water will be required from the local local Food Authority (LFA) prior to detailed design and implementation.

Further, drainage investigation works, including a CLIV survey, will be required at the detailed design stage to confirm existing levels, pipe sizes, structural condition, and to validate the proposed outfall connection. The drainage strategy is therefore subject to the findings of these investigations.

Drainage Strategy - Foul water

The development will primarily drain to a proposed foul water pumping station located adjacent to Plots 90-93. The majority of the site will discharge foul flows to this pumping station, with the pumped flows conveyed via a rising main to the proposed foul water gravity network within **Phase 3A**, prior to ultimately discharging via access to the existing United Utilities foul sewer network.

In addition, a small area within **Phase 3A** and a limited portion of **Phase 3B** will discharge foul water directly via gravity to the existing United Utilities foul sewer network within Phase 1.

Phase 3A Connection:
 MH Ref: HGV_FMH27 (Existing)
 Cover Level (CL): 43.581 mAOD
 Invert Level (IL): 38.993 mAOD
 Outgoing Pipe: 225mm Ø

MH Ref:	F14.8 (Existing)
Cover Level (CL):	46.221 mAOD
Invert Level (IL):	41.615 mAOD
Outgoing Pipe:	150mm Ø

MH Ref:	F12 (Proposed)
Cover Level (CL):	421.33 mAOD
Invert Level (IL):	39.430 mAOD
Incoming Pipe:	150mm Ø

is proposed as an entirely new system, with the pumping station and rising main forming a key component of the overall foul drainage strategy. Connection details and levels referenced above are based on **previous design** works undertaken for Phase 1 of the wider development.

Further, damage investigation works, including a CCTV survey, will be required of the selected design stage to confirm existing cover levels, invert levels, pipe diameters, manhole dimensions, and the overall condition of the receiving network. The proposed foul drainage strategy is therefore subject to the findings of these investigations.

[illegible]

Phase 3a: Proposed Surface Water

In order to attenuate the storm water generated by **Phase 3a** through the existing 18" storm sewer, a second 18" storm sewer is to be installed to take **Phase 3a** storm water to **Phase 3b**. A 10' x 10' box manhole (new length of sewer between M252.2 and M252.3) will be installed to house the box manhole. The pipe to house **Phase 3a** both between manholes CS9 & S54H is to be graded up/removed.

The pipe work between manhole S52 & S53 is to be bracketed up/removed.

The pipe work between manholes CS9 & S53 is to be bracketed to house flow from manhole S54 toward to Phase 3a. A storm water drain from manhole S54 toward to Phase 3a. A storm water drain.

Foul Water Rising Main

Proposed Foul Water rising main to be routed through site within the proposed footway & carriageway, discharging the proposed foul water gravity network at manhole F12. Its gravity system then discharges to the existing foul water sewer within Phase 1 of manhole HC5V_F12H2B.

Rising Main Length: ~390m

Proposed Foul Water Connection (HCV_FWH27/Exiting)
It is proposed that the foul water discharge pipe and gravity to the existing foul water sewer with in Process at manhole HCV_FWH28.

Cover level: 43.58 m AOD
Invert level: 38.993 m AOD

Phase 3B Proposed foul water Connection (714.8/Existing)

It is proposed that a small portion of **Phase 3B** foul water discharge discharges via gravity to the existing foul water sewer network with in Phase 1 at manhole F14/5.

Consil level: 46.221 mAOOD
 Invert level: 41.615 mAOOD

- [illegible]

NOTE: ALL CONNECTIONS ON THE ADAPTABLE SEWER WORKS MUST BE SOPFIT TO SOPFIT CONNECTIONS

The adoptable drainage and highway works are subject to technical approval by **United Utilities** and **St Helens Borough Council** respectively and may therefore change

MANHOLE TYPES:	
TYPE 1	(U) MANHOLE TYPE 1 (STD)/ (900) A)
TYPE 4	(U) MANHOLE TYPE 4 (STD)/ (900) A)
RA	U/S SHALLOW MANHOLE (STD) (900) A)
RA	ALTERNATIVE MANHOLE A-FLUSHION SYSTEM
SPEC	SPECIFIC MANHOLE TYPE AND SECTION NUMBER (FOR MANHOLES 4-6 MM. CONVERT TO OPT. SEE SPECIFIC DETAILS)
HB	HYDROBATIC MANHOLE (SEE SPECIFIC MANHOLE DETAILS)
HW	HEAD WALL (SEE SPECIFIC DETAILS)
HW/S	SOIL WATER BARRIER STATION (SEE SPECIFIC DETAILS)
FS	SOIL WATER BARRIER MANHOLE (SEE SPECIFIC DETAILS)

APPENDIX K: PHASE 3B DRAINAGE LAYOUT

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APPENDIX L: STORMWATER STORAGE ESTIMATES

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QUICK STORAGE ESTIMATES

FOX WOOD GARDEN VILLAGE, HALSNEAD (PHASE 3)

2 YEAR RETURN PERIOD STORM EVENT

Variables	
FEH Rainfall	Cv (Summer) 1.000
Return Period (years) 2	Cv (Winter) 1.000
Version 2013	Impervious Area (ha) 4.590
Point	Maximum Allowable Discharge (l/s) 36.0
Site GB 347186 389819 SJ 47186 89819	Infiltration Coefficient (m/hr) 0.00000
	Safety Factor 2.0
	Climate Change (%) 0

Results
Global Variables require approximate storage of between 554 m ³ and 936 m ³ .
These values are estimates only and should not be used for design purposes.

30 YEAR RETURN PERIOD STORM EVENT

Variables	
FEH Rainfall	Cv (Summer) 1.000
Return Period (years) 30	Cv (Winter) 1.000
Version 2013	Impervious Area (ha) 4.590
Point	Maximum Allowable Discharge (l/s) 36.0
Site GB 347186 389819 SJ 47186 89819	Infiltration Coefficient (m/hr) 0.00000
	Safety Factor 2.0
	Climate Change (%) 0

Results
Global Variables require approximate storage of between 1351 m ³ and 1896 m ³ .
These values are estimates only and should not be used for design purposes.

QUICK STORAGE ESTIMATES

FOX WOOD GARDEN VILLAGE, HALSNEAD (PHASE 3)

30 YEAR RETURN PERIOD STORM EVENT + 40% CLIMATE CHANGE

Variables	
FEH Rainfall	Cv (Summer) 1.000
Return Period (years) 30	Cv (Winter) 1.000
Version: 2013 Point	Impervious Area (ha) 4.590
Site GB 347186 389819 SJ 47186 89819	Maximum Allowable Discharge (l/s) 36.0
	Infiltration Coefficient (m/hr) 0.00000
	Safety Factor 2.0
	Climate Change (%) 40

Results	
Global Variables require approximate storage of between 2074 m ³ and 2936 m ³ .	
These values are estimates only and should not be used for design purposes.	

100 YEAR RETURN PERIOD STORM EVENT + 45% CLIMATE CHANGE

Variables	
FEH Rainfall	Cv (Summer) 1.000
Return Period (years) 100	Cv (Winter) 1.000
Version: 2013 Point	Impervious Area (ha) 4.590
Site GB 347186 389819 SJ 47186 89819	Maximum Allowable Discharge (l/s) 36.0
	Infiltration Coefficient (m/hr) 0.00000
	Safety Factor 2.0
	Climate Change (%) 45

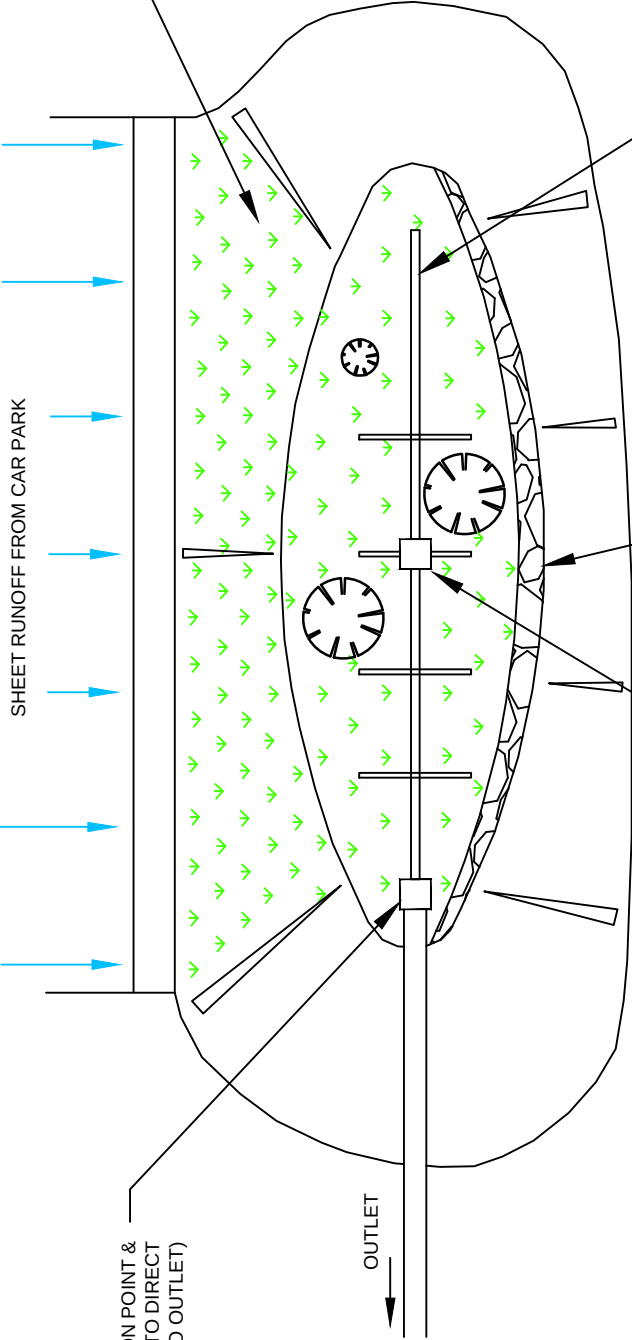
Results	
Global Variables require approximate storage of between 3138 m ³ and 4180 m ³ .	
These values are estimates only and should not be used for design purposes.	

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APPENDIX M: SUDS EXAMPLES

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DO NOT SCALE



75mm MULCH

GEOTEXTILE FILTER FABRIC

1200mm PLANTING SOIL

300mm SAND LAYER

PERFORATED PIPE/ UNDERDRAIN SYSTEM MIN Ø150mm

PONDING MAX DEPTH 150mm

PEA GRAVEL MIN DEPTH 200mm

TYPICAL SECTION

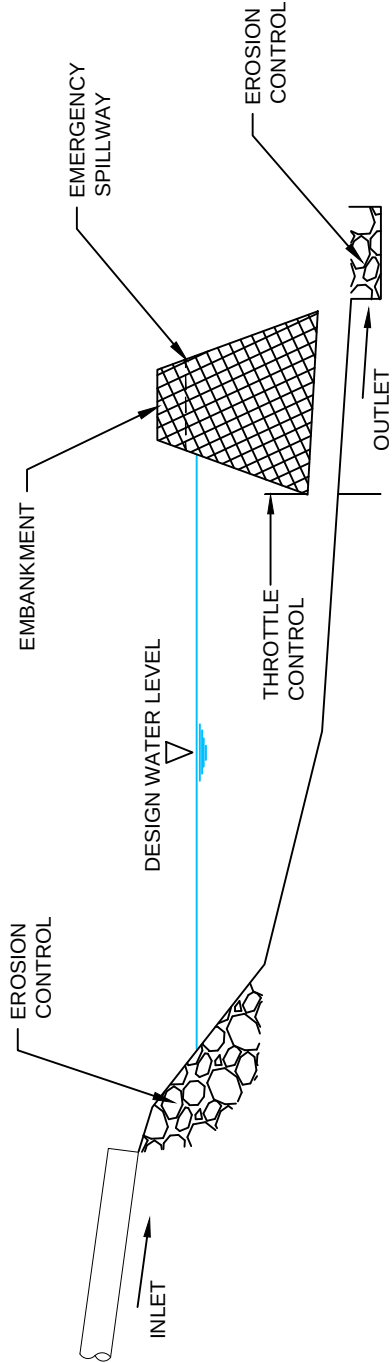
TYPICAL SUDS DETAIL

TITLE:

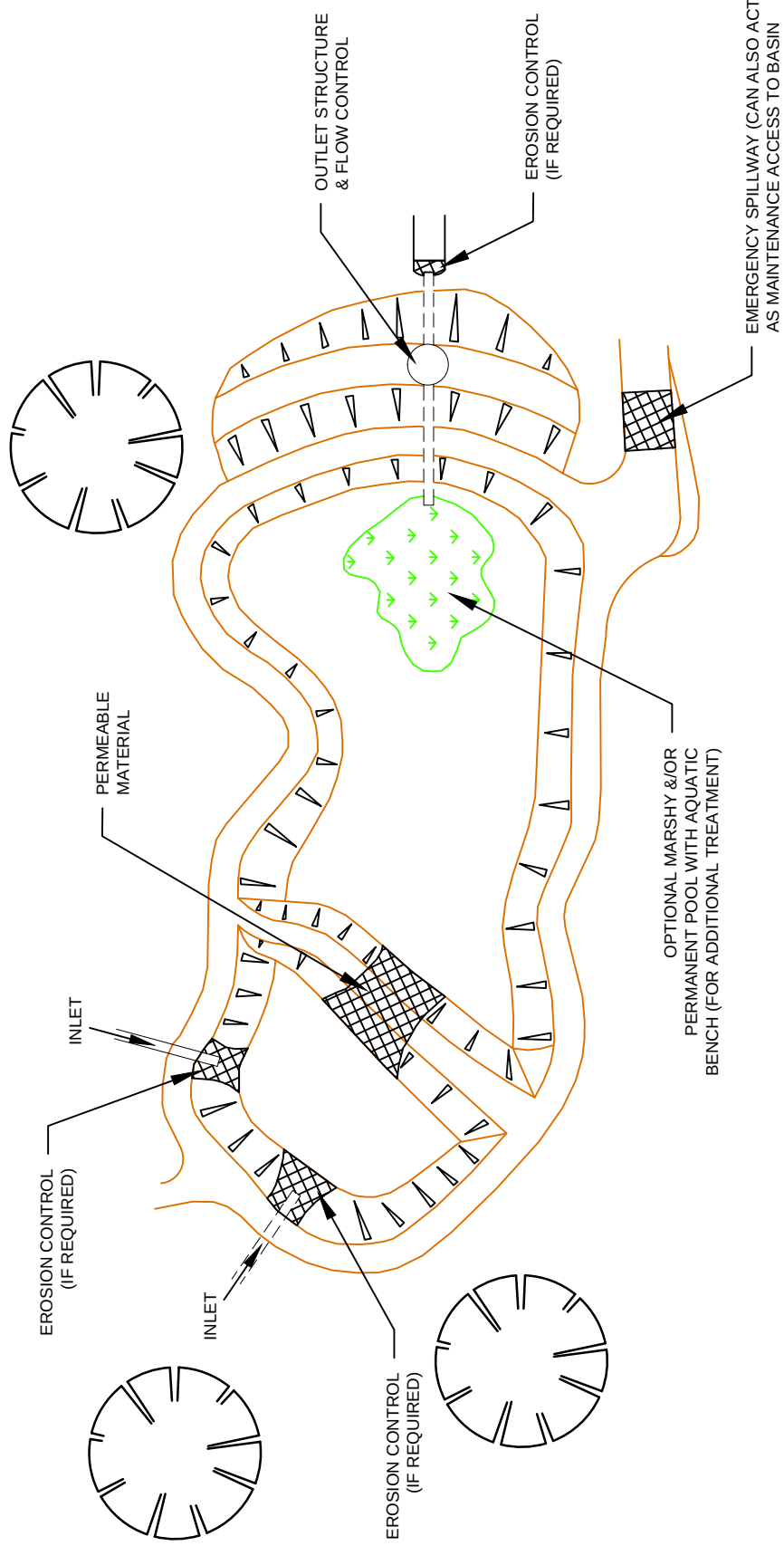
BIORETENTION APPLICATIONS

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

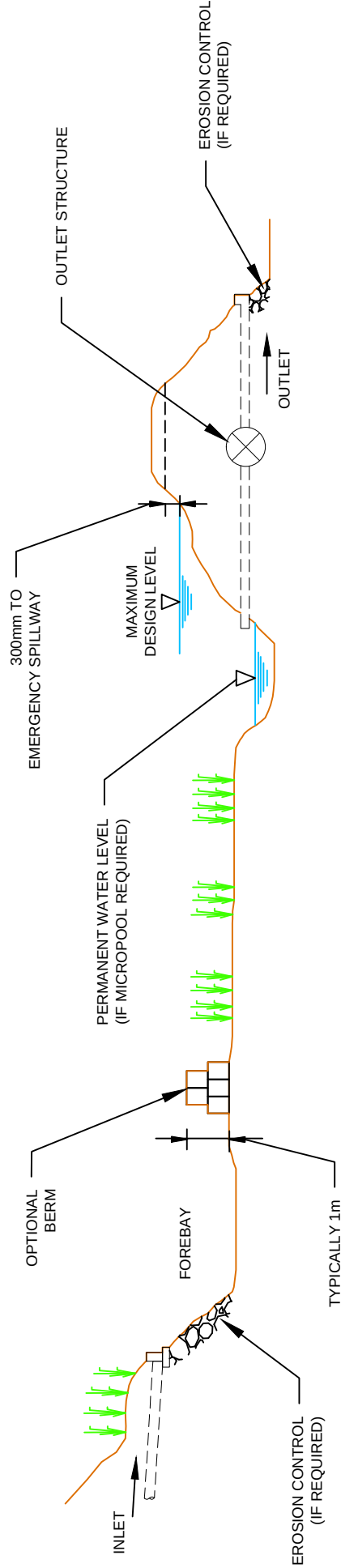
DO NOT SCALE



SCHEMATIC OF DETENTION
BASIN PROFILE



PLAN VIEW



ELEVATION

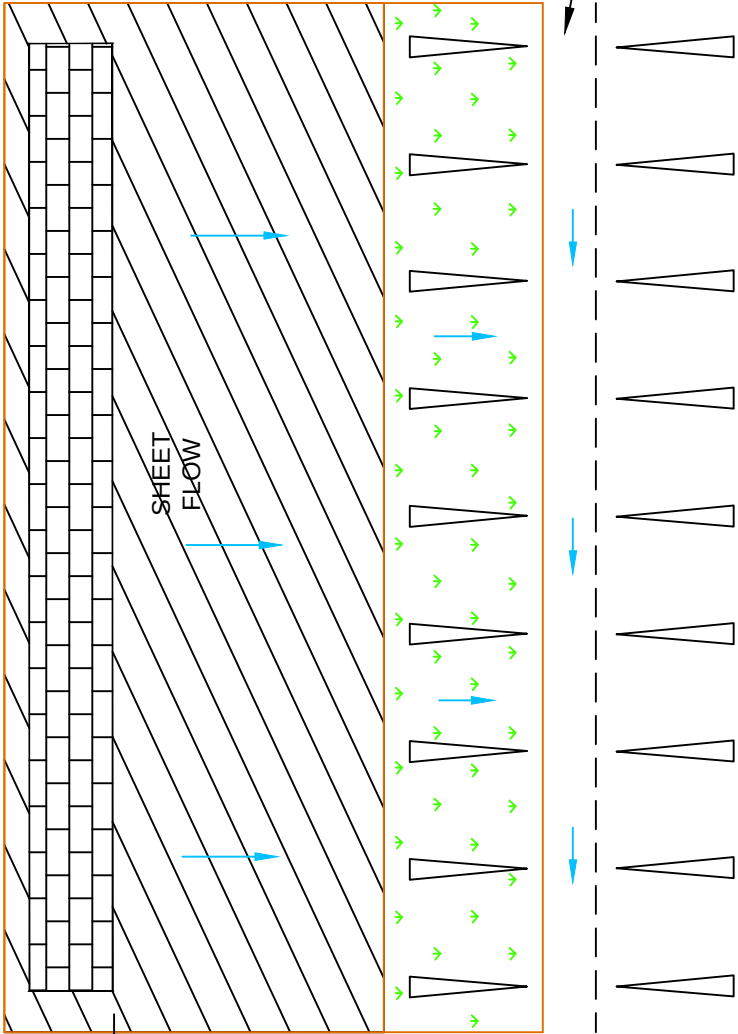
REV	DATE	BY	DESCRIPTION	CHK
DRAWING STATUS: PRELIMINARY				



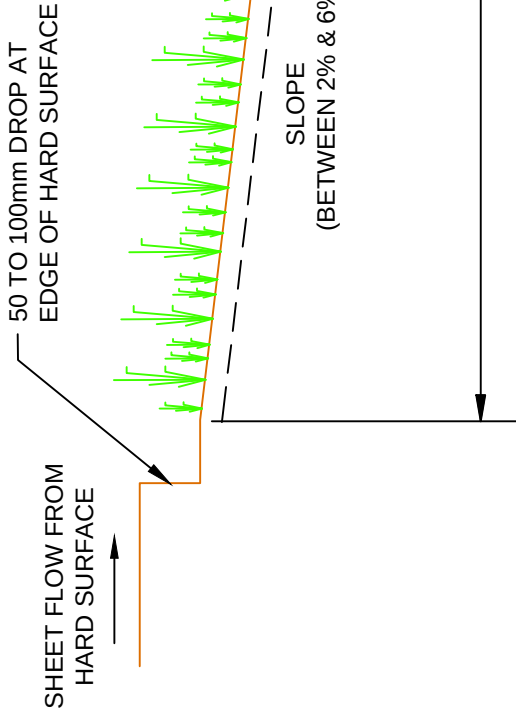
BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT:	TYPICAL SUDS DETAIL			
TITLE:	DETENTION BASINS			
DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN	REV: A
PROJECT No: BETTS	DRAWING No: 110	REV: A		

DO NOT SCALE



PLAN



ELEVATION

REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS:

PRELIMINARY



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

PROJECT:

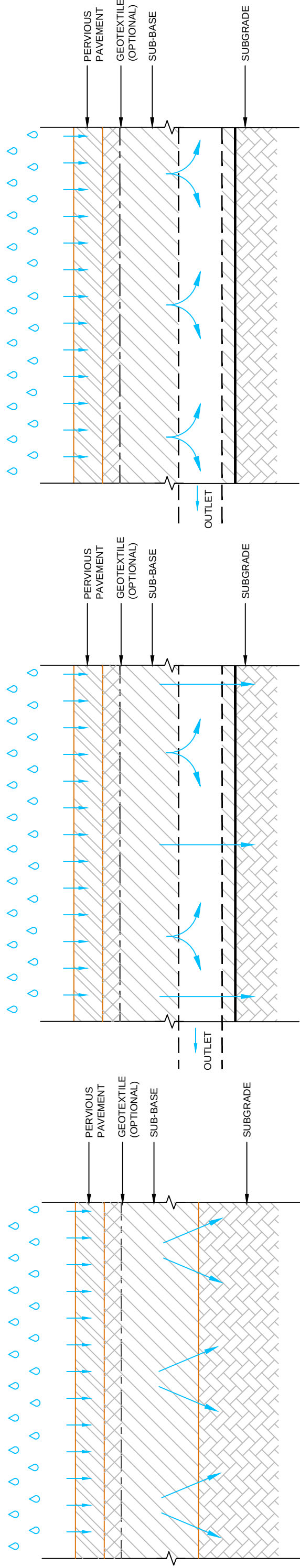
TYPICAL SUDS DETAIL

TITLE:

FILTER STRIPS

DATE: SEP 2014	SCALE @ SIZE: @ A3	DRAWN: CP	CHECKED: RDN
PROJECT No: BETTS		DRAWING No: 107	REV: A

	DO NOT SCALE
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TYPE A: TOTAL INFILTRATION

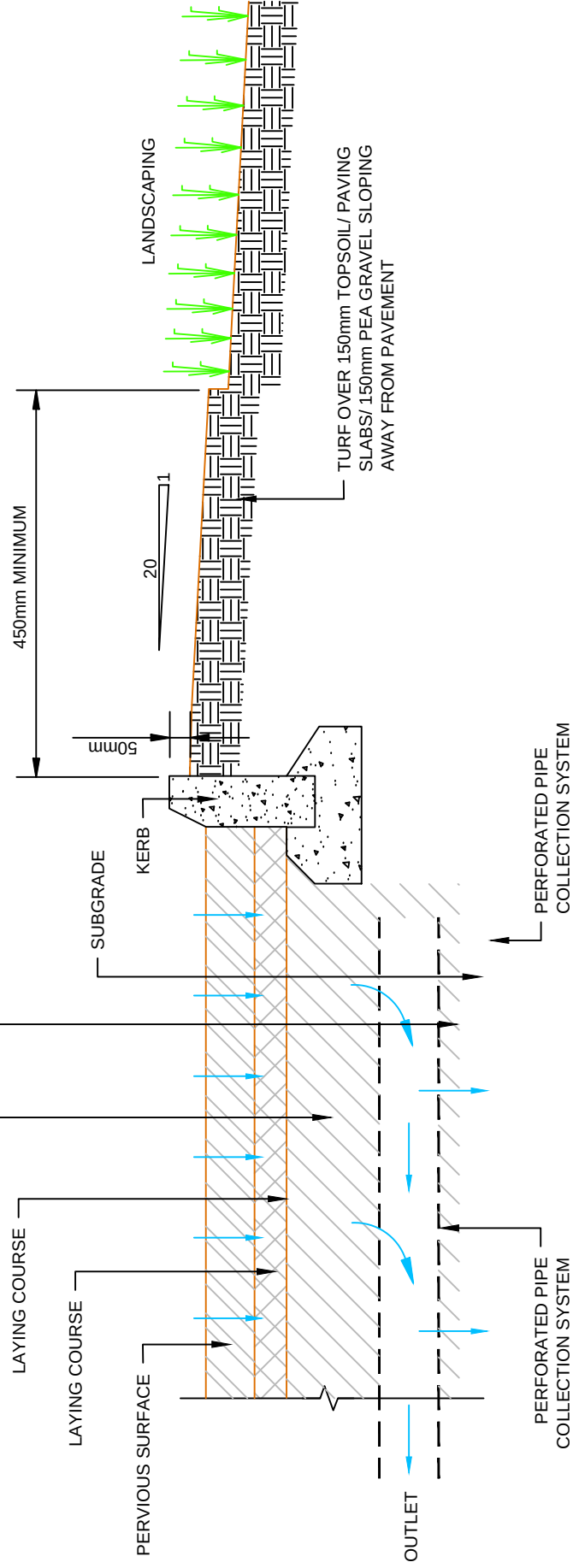
TYPE B: PARTIAL INFILTRATION

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

PRELIMINARY



PROJECT:

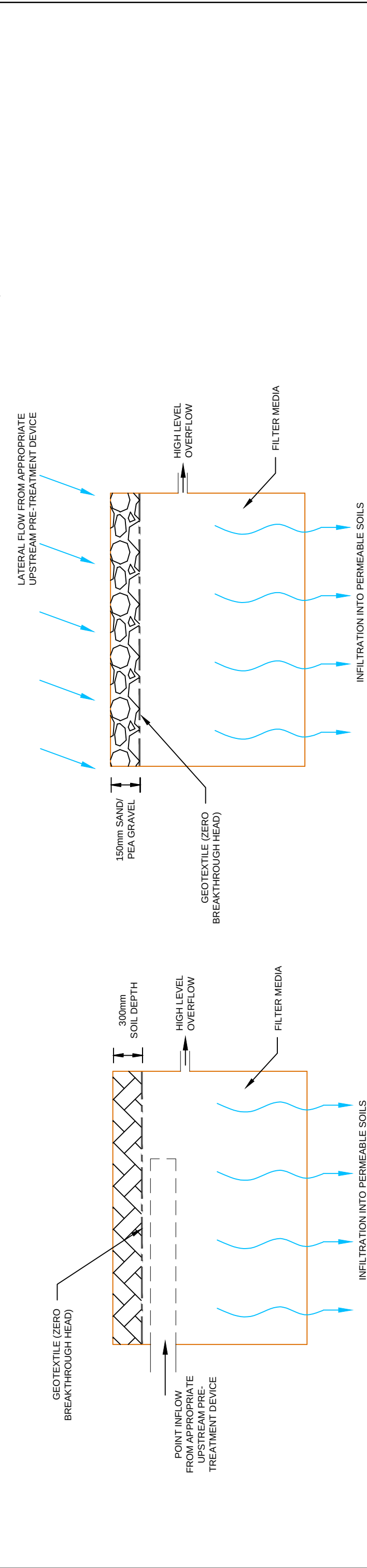
TYPICAL SUDS DETAIL

TITLE:

PERVIOUS PAVEMENTS

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

	DO NOT SCALE
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REV	DATE	BY	DESCRIPTION	CHK

DRAWING STATUS: PRELIMINARY



PROJECT:

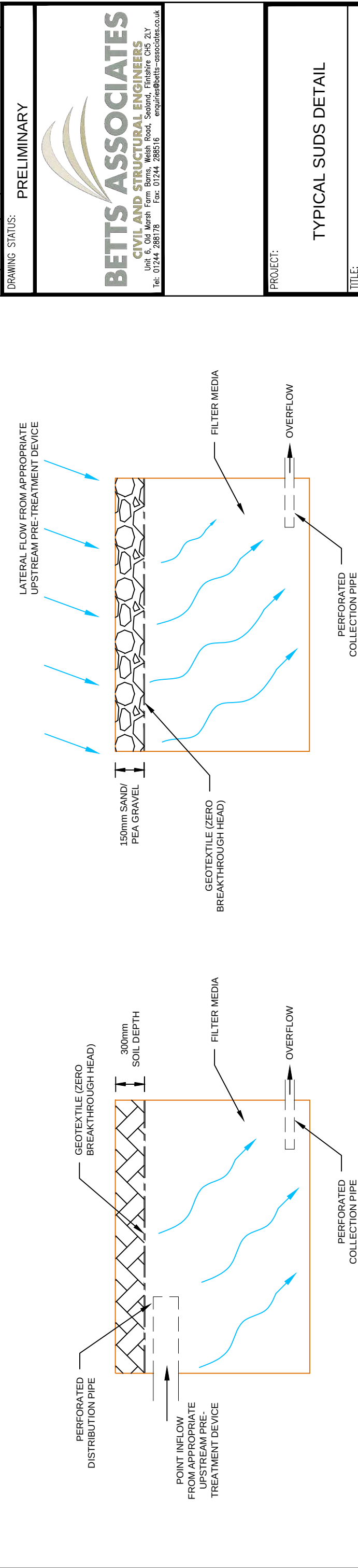
PROJECT: _____

TYPICAL SUDS DETAIL

TITLE:

TRENCHES

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



FILTER TRENCH SCHEMATICS

APPENDIX N: NOTES OF LIMITATIONS

The data essentially 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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