



DRAINAGE STRATEGY

FOR
**LAND OFF FORGE LANE,
DEWSBURY**

ON BEHALF OF
HEBBLE HOMES LTD



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Drainage Strategy for land off Forge Lane, Dewsbury

2465/01r1

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1.0 INTRODUCTION

- 1.1 Hebble Homes Ltd are proposing the development of 2 commercial units at land to the east of Forge Lane, Dewsbury, which is referred henceforth as “the site”. The site classifies as major development and therefore a surface water drainage strategy is required.
- 1.2 ARP Associates have been appointed to prepare a Drainage Strategy for the development, undertaking appropriate assessments, and preparing a report to satisfy the requirements of the Planning Authority.
- 1.3 The initial site appraisal for this assessment was carried out between September and November 2024, with a review of these assessments undertaken in November 2024. A meeting was held with the Kirklees planning and LLFA in October 2025 and further assessment/review was made following.
- 1.4 The report has been initially prepared for the use and reliance of the Client only. The report shall not be relied upon or transferred to any other parties without the written agreement of ARP Associates. For the avoidance of any doubt, where ARP Associates enters into a letter of reliance for the benefit of a third party, that third party will be permitted to rely on the report. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party without ARP Associates consent.
- 1.5 Attention is drawn to the requirements of the Construction Design and Management Regulations 2015, and in particular, the duties and obligations of the Client.

2.0 SITE DESCRIPTION

General

- 2.1 The site, which is centred on Ordnance Survey Grid Reference 423724, 419734 and is located to the south of Dewsbury, off Forge Lane nearest postcode WF12 9HF. The site is to be accessed off Forge Lane and is to the north of the junction with Lees Road.
- 2.2 The site is a rectangular shaped piece of land extending to an area of approximately 4.43 hectares (ha), with overall dimensions of approximately 140m (north - south) by 350m (east - west).
- 2.3 A site location plan is presented in **Appendix A**, which shows the application site to which this report refers and the surrounding development for reference.

Current Use

- 2.4 The existing site comprises of heavily vegetated scrubland. The site contains an extensive area of existing hardstanding which has remained following the previous steelworks superstructure being demolished. The site is covered by a number of mature bushes, shrubs and trees across the site.

Topography

- 2.5 A topographical survey of the site was undertaken by Aecom in November 2009. A copy of the survey plan is included in **Appendix B** for reference. The site generally falls steeply from the western and southern boundaries where levels are of the order of 43.50 metres Above Ordnance Datum (m AOD) towards the canal along the northern boundary of the site. The levels are generally around 38.50mAOD along the northern boundary. There are various embankments and low spots across the site formed from the previous development and demolition. Levels along Forge Lane immediately adjacent to site entrance range from 43.57 – 43.65mAOD.

Development Proposals

- 2.6 The development proposals are for the construction of two commercial units within the western and central area of the site. Vehicular access will be provided from a new access point off Forge Lane. The proposed development proposals are shown in the Site Layout plan within **Appendix C.**

Boundaries

- 2.7 The western and northern boundaries of the site are formed by Forge Lane and the Calder and Hebble Navigation Canal respectively. The eastern and southern boundaries are defined by residential development, with allotments towards the south-west corner and a public open space/play area against the eastern boundary which was part of more recent housing development.

Hydrology

- 2.8 The nearest major watercourse to the site is the River Calder, which is approximately 400 metres to the north of the site. The River Calder is classified as an Environment Agency (EA) Main River. This main river flows in a meandering easterly direction past the north of the site. Land between the River Calder and the railway line to the north of the site is designated as flood storage area, which extends up to approximately 250m north of the site. The EA are responsible for any maintenance and construction work on main rivers and flood storage areas.
- 2.9 The nearest watercourse to the site is an unnamed ordinary watercourse/ditch which flows through the eastern extent of the site before turning in a westerly direction along the northern boundary. It is culverted but for two open sections on the development site. The watercourse is believed to serve a culvert draining land to the south and a number of roads and properties along Sovereign Way, Mortons Grove and Fiddler Hill. From existing surveys this culverted watercourse enters the site directly north of the road Fiddlers Hill and enters a small pond with an outlet to an open channel just before the site boundary, in the rear landscaped area to the property on the corner of Fiddlers Hill and Kimberley Street. The channel travels towards the

northern boundary and then along it west. Existing survey information has proved inconclusive as it only defines approximately 60m of open channel in the site from the southern boundary, but it is believed to travel north another 55m in a culvert, then west approximately 90m as open channel and then from client-based investigations north in a culvert that travels underneath the canal. It has been found that it doesn't enter the assumed 1200mm diameter culvert further west that travels another 130m to a manhole where it runs north-east under the canal as a siphon drain.

- 2.10 There is a low point that exists along the site boundary in a similar position to where the last section of open watercourse on site enters the culverted watercourse travelling north underneath the canal. This would allow overtopping into the canal if the open ordinary watercourse was exceeded. There is also another culverted watercourse/drain that connects on to the assumed 1200mm diameter culverted section of watercourse approximately 36m to the west of the open watercourse on the northern boundary. The connection is a drain that terminates around the marshy area, likely serving the old steelworks and pond.
- 2.11 The low-lying marshy area recorded within the topographic surveys historically appears to have originally been a gravel pit and later a pond potentially serving the former iron and steel forge and glassworks. According to survey information there was an assumed culverted watercourse draining land above coming from the south across Lees Hall Road under the footprint of plot 324a discharging to a headwall at the site boundary. However, no outfall has been found and assumed this has been blocked up. The water levels in this area are assumed to drain via a surface water drain/culvert (as described above) which discharges to the downstream culverted watercourse which outfalls from the site to the siphon drain under the canal towards the north-west corner of the site.

Ground Conditions

- 2.12 In previous correspondence with the LLFA, it has been acknowledged the site is unsuitable for soakaways due to the ground conditions being poor for infiltration (British Geological Survey rates the potential at level 4 – which is severe constraints).

- 2.13 According to the BGS Geology Viewer online, the bedrock geology is Pennine Lower Coal Measures Formation – Mudstone, siltstone and sandstone. The superficial deposits are Alluvium – Clay, silt, sand and gravel. Further information was obtained from the LandIS Soilscales Viewer online and describes the soils as loamy and clayey floodplain soils for a majority of the site, and slowly permeable seasonally wet acid loamy and clayey soils surrounding the site to the south, which are known to impede infiltration. The site is not situated within a Source Protection Zone (SPZ).
- 2.14 The Environment Agency check long term flood risk service website states that groundwater is unlikely in this area. Therefore, the risk of groundwater flooding is considered to be low.

Existing Drainage

- 2.15 A topographical survey was produced by Bullen Consultants dated 7.10.1997 and shows the position of manholes as indicated on the site survey ref 97291/01 dated 07.10.1997. The onsite drainage routes were interpolated from Yorkshire Water records (a more current record is within **Appendix D**). The survey indicates a 500mm water main down the western side of the site, a 375mm foul water sewer crossing part of the site from the south-west corner and running along the southern boundary.
- 2.16 A 375mm diameter surface water sewer comes into the site from the south-west corner east along the southern boundary, then centrally turns directly north to where it increases in diameter to 450mm then connects into an assumed 1200mm diameter culverted watercourse which heads back west along the northern site boundary.
- 2.17 A culverted watercourse/sewer line appears from the central marshy area passing to the north which appeared to pick up a land drainage connection from the south and then runs along the western extent north towards the canal as described in the hydrology section of this report.
- 2.18 A headwall outfall is shown to the culverted watercourse that passes under 324a Lees Hall Road and discharges at the southern site boundary. A 450mm culvert marked as private passes

through a manhole then discharges to a headwall/piped outlet to a pond with outlet to the open ditch/ordinary watercourse to the rear of the property on the junction with Fiddler Hill and Kimberley Street.

- 2.19 Aecom carried out a CCTV drainage plan on behalf of Kirklees Council dated 17.02.2022 and it shows a similar record of drainage as described above, but for the sewer crossing the north-west corner as a 600mm diameter pipe and as abandoned, connecting to the manhole downstream where it meets the culverted watercourse (assumed 1200mm diameter) with an outfall to the siphon drain crossing under the canal.
- 2.20 The surface water generated on site appears to flow from the western and southern boundaries to the north. With flows coming on to site via the headwall as described above into the open ditch passing along the eastern extent of the site, with some flows passing into the marsh area before either discharging to the surface water sewer/culvert running centrally through the site or being carried overland towards the open ditch and then the downstream culverted watercourse. It is believed that in times of exceedance the last section of open watercourse on site can pond at the downstream end and then overtop into the canal, as there is a low spot of approximately 38.259m AOD approximately 90m from the eastern edge along the northern site boundary nearby.
- 2.21 No further land drainage has been picked up in the surveys available.

3.0 CONSULTATION AND DATA REVIEW

Water Authority

- 3.1 Yorkshire Water have not been formally consulted regarding drainage matters on this site. The sewer records (refer to **Appendix D**) show a number of public sewers crossing the site as described in **Section 2**. The proposed architect layout has positioned the buildings away from these sewers with the relevant easements. In the event of the routes of the sewers are found to be in different locations, S185 diversionary works, reduced or offset easements or build-over agreements may be necessary.
- 3.2 Yorkshire Water will highlight the Building Regulations Part H – Requirements for rainwater drainage in Section H3 are followed in order of priority, which is soakaway or infiltration, watercourse or where not reasonably practicable a sewer for means of disposal of surface water.
- 3.3 Further discussions should be undertaken with Yorkshire Water at the detailed design stage and following planning permission approval to determine the requirements for the proposed point of connection to the public combined sewer for the foul drainage. A S106 agreement will be required for the foul connection on to the combined public sewer.

Lead Local Flood Authority

- 3.4 A pre-application response was made by Kirklees Council, letter reference 2023/21634, which confirms an online meeting was held on 08.02.2024 with Paul Farndale (LLFA) and David Wordsworth (Development Management Group Leader) of Kirklees Council. It also outlined further correspondence between Paul Farndale and the applicant in regard to flood risk/drainage.
- 3.5 In summary of the correspondence and pre-application response, it confirmed the site is located in Flood Zone 2 (EA and SFRA). Also, there are number of points were raised about the

existing and proposed drainage and surface water drainage site which will be further addressed by subsequent sections of this report.

3.6 Further to the above, another meeting was held between Kirklees Council planning and the LLFA to discuss the application on 23.10.2025. The main points regarding the proposed drainage strategy that the LLFA would not like the surface water to be pumped, this report and drainage strategy has been updated to suit.

3.6 The Flood Risk Assessment report (ref: 2465-01r1) sets out measures to implement surface water volume compensation on the eastern side of the site to offset the loss of surface water flood volumes from the development footprint. The proposals around the existing watercourse and also the surface water connection to the culverted watercourse further downstream will require approval from the LLFA and a land drainage consent.

Climate Change

3.7 NPPF requires that the projected impacts of climate change are taken into account over the lifetime of a development. Studies have projected that the Global Sea level will continue to rise and there will be an increase in river flows and rainfall intensity across the country, with the degree of change depending on greenhouse gas emissions and the sensitivity of the climate system.

3.8 Recommended allowances for assessment are set out in Environment Agency publication 'Flood risk assessments: climate change allowances' (published February 2016; last updated May 2022). Within this guidance, a regionalised approach is adopted to climate change impacts based upon the river Management Catchment within which the proposed development site falls, and the intended design life of the development.

3.9 The site is situated within the 'Aire and Calder' Management Catchment. For commercial development, climate change impacts over a design life of at least 50 years should be considered.

- 3.10 Impact on River Flooding - With respect to river flows, the applicable allowances are also influenced by the flood risk vulnerability of the proposed development and the present-day Flood Zone classification of the site. As the proposed development comes under general industry, storage and distribution this would be less vulnerable according to the NPPF Annex 3: Flood risk vulnerability classification. An applicable allowance for sites in Flood Zone 2 is specifically given by the current guidance, that the impacts of the central climate change allowance should be considered. Within this Management Catchment, the central climate change scenario is predicted to lead to an increase in peak river flows of up to 23% for the 2080's epoch (2070-2125).
- 3.11 Impact on Rainfall Intensity - In accordance with the current guidance, for a design life of at least 50 years the impacts of the 'central' climate change allowance with a lifetime of between 2061 and 2100 should use the 2070's epoch (2061 to 2125). Within this Management Catchment, this is predicted to lead to an increase in rainfall intensity of up to 25% in the 1 in 30 year (3.33% annual exceedance probability) rainfall event, and up to 30% in the 1 in 100 year (1% annual exceedance probability) rainfall event.

4.0 SURFACE WATER DRAINAGE STRATEGY

- 4.1 This section sets out the proposed means of managing surface water discharge from the proposed development of the site. This section should be read in conjunction with the ARP Drainage Strategy plan (drawing 2465/01/SK01.01) which has been prepared to illustrate the proposals and is shown within **Appendix E**.

Existing Surface Water Runoff

- 4.2 As set out in **Section 2**, it is assumed that surface water runoff generated within the site flows from the higher western side of the site (along Forge Lane) towards the marsh area located in the central area approximately 190m from Forge Lane just off the southern site boundary. Flows appear to pass through this area towards the open watercourse approximately 90m to the east of the marsh area.

During times of flood the site acts like a flood basin and it is thought that water overflows into the canal to the north.

The site is relatively level in places with some depressions particularly in the central northern areas and to the east, although the general falls are described as above there is opportunity for some flows to pond on site.

- 4.3 The greenfield runoff rate for the site has been calculated using the Source Control module of Micro Drainage. The site's development impermeable area is approximately 2.363 ha in area and the greenfield runoff rates are outlined below in **Table 1** and within **Appendix F**.

Table 1: Existing Runoff Rates

Return Period	Runoff Rates	
	Greenfield (l/s/ha)	Development Platform (2.363 ha)
1 in 1	1.7	4.1
QBAR	2.0	4.8
1 in 30	3.6	8.5
1 in 100	4.2	10.0

Proposed Surface Water Runoff Destination

- 4.4 The proposed means of managing surface water runoff from the proposed development has been considered with respect to the hierarchy set out in Building Regulations Part H (2015) as follows.
- 4.5 Consideration of the proposed means of surface water drainage should firstly be given to infiltration techniques (to ground). The potential for use of infiltration has been discounted due to the pre-planning application to Kirklees Council (not dated, reference 2023/21634) stating that the British Geological Survey rates the potential at level 4 (severe constraints). The site is located in Flood Zone 2 and a number of watercourses are present with some retaining water showing that infiltration is not feasible.
- 4.6 As infiltration is unfeasible, discharge to a watercourse is the next option in the hierarchy. As detailed in **Section 2**, there is a watercourse available on site. Therefore, surface water is to be directed to the existing manhole on the culverted watercourse where the public surface water sewer spanning the central area of the site also discharges into.

Proposed Surface Water Discharge Limit

- 4.7 In order to minimise the increase in flood volumes and flood risk elsewhere, it is proposed that the maximum post development surface water discharge rate will be based on the equivalent QBAR greenfield runoff rate for the proposed development area.
- 4.8 The development sites proposed impermeable area is approximately 2.363 ha and generates a greenfield runoff rate (QBAR) of approximately 4.8 l/s based on existing greenfield runoff rates.

Proposed Surface Water Attenuation Storage

- 4.9 All new proposed surface water drainage systems shall be designed to accommodate a 1 in 30 year storm event without flooding and, to accord with the requirements of the Lead Local Flood Authority, will need to accommodate the 1 in 100 year plus 30% climate change allowance event without causing flooding of property or third-party land.
- 4.10 The proposed development is indicated to be approximately 2.363ha of impermeable area. A 10% allowance for urban creep has not been applied to the calculations.
- 4.11 In order to accommodate the 1 in 100 year plus 30% climate change event, approximately 2,845m³ of storage would be required for the whole development site. It is proposed that most of the attenuation storage will be provided within attenuation tanks in the form of cellular/modular surface water attenuation crates. It is proposed to have two attenuation tanks, with each tank sized for their respective catchment and a proportion of the maximum discharge rate. As such each will have their own flow control device. The attenuation tanks will be located within the service yards in front of each unit. The preliminary attenuation storage calculations are provided within **Appendix G**. Due to the existing levels of the culverted watercourse and depth of the proposed drainage, the finished floor level of both units have been raised to allow a gravity drainage solution for the surface water (as requested by the LLFA in October 2025).

- 4.12 The attenuation storage calculations do not take into account the storage capacity within the pipe/manhole network and within the private drainage network. Details of SuDS features will be confirmed at detailed design.
- 4.13 The surface water drainage strategy is illustrated in the ARP Drainage Feasibility drawings 2465/01/SK01.01 which are included in **Appendix E** for reference. The strategy is subject to agreement with the LLFA and Yorkshire Water, and subject to detailed design.

Surface Water Quality

- 4.14 Appropriate measures will need be incorporated in the surface water drainage system to mitigate the risk of contaminated runoff from the site causing adverse impacts on surface water bodies downstream in accordance with local SuDS guidance.
- 4.15 As assessment of the pollution hazards posed by the site has been assessed using the CIRIA SuDS Manual C753 –Table 26.2 pollution hazard indices table. The site is to consist of industrial units with associated facilities, service yards and car parking. The pollution hazard level will likely be high according to SuDS manual, with a total suspended solids index of 0.8 a metal index of 0.8 and a hydrocarbon index of 0.9.
- 4.16 For the industrial roofs, these are generally considered to be relatively ‘clean’ surface water run-off and would be expected to have a very low level of potential contamination. On this basis no specific treatment for this run-off is proposed, except for suitable leaf debris traps and silt traps. Due to the scale of the units, a syphonic drainage system is likely to drain down the roof areas instead of traditional rainwater systems.
- 4.17 Areas subject to vehicular traffic will have the propensity to contain suspended solids, metals and hydrocarbons, and will require more treatment to reduce the risk to receiving waters, and therefore warrant further consideration at the detailed design stage.
- 4.18 The use of SuDS in surface water management is an effective means of managing surface water quality whilst providing other benefits (as discussed above), and it is recommended that

surface water drainage systems for parking areas should therefore be designed in accordance with the risk-based approach outlined in CIRIA C753 The SuDS Manual. The ‘simple index approach’, as discussed below, can be used to make a preliminary assessment of the likely pollution hazard and the likely requirements for mitigation.

- 4.19 The SuDS Manual sets out the ‘Pollution Hazard Indices’ for different proposed land uses. **Table 2** summarises the likely applicable indices for the areas of development subject to vehicular traffic.

Table 2: Pollution Hazard Indices for Proposed Development

Proposed Land Use	Pollution Hazard Level	Pollution Hazard Index		
		Total Suspended Solids	Metals	Hydro-carbons
Industrial Roofs	Low	0.30	0.20	0.05
Industrial Roads	High	0.80	0.80	0.90

Based on Table 26.2 of The SuDS Manual.

- 4.20 The SuDS Manual sets out a ‘Mitigation Index’ for different SuDS components. **Table 3** shows typical mitigation indices for the SuDS components proposed as part of the drainage strategy for the development.

Table 3: Indicative SuDS Mitigation Indices for Proposed SuDS Components

Proposed SuDS Component	Mitigation Index		
	Total Suspended Solids	Metals	Hydro-carbons
Permeable Pavement	0.70	0.60	0.70
Swale	0.50	0.60	0.60

Based on Table 26.3 of The SuDS Manual.

- 4.21 On this basis an appropriate SuDS strategy can provide the required mitigation for water quality impacts from the commercial roads, service yards and car parking and will also require the use

of oil separators. The water quality treatment should be reviewed at the detailed design stage and any required SuDS agreed with statutory consultees.

Exceedance Flow Routes

- 4.22 For rainfall events in excess of the design standard (i.e. greater than 1 in 100 year plus climate change event) the capacity of the drainage system is likely to be exceeded. There also remains a residual risk of flows leaving the surface water drainage system in the event of a blockage.
- 4.23 So that exceedance flows do not adversely affect properties on or off site, site levels should be designed to direct flows from hard-paved areas away from building entrances where possible, so that any flooding remains in areas such as landscaped areas, car parks, or roads, where the consequences of surface water flooding would be less significant.
- 4.24 Exceedance flow routes will be reviewed as part of the detailed drainage and levels design, however it is envisaged that any exceedance flows will likely be limited to shallow flow along roads and car parking/service yards.

Construction Stage Surface Water Management

- 4.25 During the construction stage, before the permanent drainage systems are installed, measures will need to be taken to mitigate the potential environmental risks posed by runoff from the development site. A detailed Temporary Surface Water Management Plan will be required to address these risks. Key issues which require consideration will include the potential for silt-laden or contaminated runoff to adversely affect flood risk and water quality, and the potential for uncontrolled runoff to cause flooding on or off site.
- 4.26 A more detailed assessment of the potential construction stage risks will be undertaken before formulating a site-specific Temporary Surface Water Management Plan to manage the risk. The plan will need to be approved by the LLFA prior to implementation.

5.0 FOUL WATER DRAINAGE STRATEGY

5.1 This section sets out the proposed means of managing foul water discharge from the proposed development of the site. This section should be read in conjunction with the ARP Drainage Strategy plan (drawing 2465/01/SK01.01) which has been prepared to illustrate the proposals and is shown within **Appendix E**.

Existing Foul Drainage

5.2 A review of the Yorkshire Water sewer records (**Appendix D**) indicates that the nearest accessible point of discharge for foul is the 375mm diameter public combined water sewer which spans across the south-western section of the site. The sewer flows from west to east. The point of connection is approximately 100 metres from the proposed site entrance on the southern boundary.

Proposed Foul Drainage

5.3 In accordance with the hierarchy of foul drainage options set out in Building Regulations (2015) Part H, foul drainage should be disposed to a public sewer if available. It is proposed that foul water from the proposed two commercial units be directed to the public combined water sewer via a new manhole.

5.4 The occupancy and peak foul loading for the development is not known at the time of writing. There are approximately 6 toilets and 4 sinks shown in the entrance area to Building 1 and 4 toilets and 2 sinks to the entrance area to Building 2. Foul generated from within the units is to be confirmed.

5.5 It is anticipated that due to the site levels and the location of the proposed outfall, foul water within the site will be able to drain via gravity to the existing sewer. Should the inverts of the receiving sewer be higher than expected, package pumping station(s) will be required to pump the foul flows generated within the development.

5.6 Due to site levels and the location of the eastern refuse storage area for Building 2 at the far corner of the service yard, a small package pump station may be required to drain the area

when being washed down in accordance with building regulations subject to detailed design. Building 1 refuse storage area/wash down may also require a similar form of pumping if levels are higher and subject to detailed design.

- 5.7 The proposals for foul drainage are subject to detailed design and subject to the approval of the Regulatory Authorities.

6.0 SUMMARY

- 6.1 This report details the drainage strategy for the development of two large commercial units with associated reception/office areas to the side. The proposed development will be served by separate surface and foul water drainage systems.
- 6.2 Sustainable surface water drainage systems shall be provided to manage surface water run-off from the site itself up to the 1 in 100 year plus 30% climate change event.
- 6.3 It is proposed in accordance with the drainage hierarchy that surface water runoff will be directed to the nearest watercourse, which is the unnamed ordinary watercourse at a point which is culverted running along the northern boundary. The existing manhole will be utilised for the connection if possible. The culverted watercourse carries discharges into an existing manhole in the north-west corner of the site under the canal to the north.
- 6.4 Surface water runoff generated from the site will be restricted to a greenfield runoff rate of 4.8 l/s for the proposed development impermeable area. Surface water runoff will be controlled by the use of underground attenuation tanks and vortex flow controls.
- 6.5 It is proposed that surface water drainage will be put under the maintenance of a management company on completion. The attenuation storage will be provided within attenuation tanks, pipes and manhole networks.
- 6.6 It is proposed that foul water drainage will also be put under the maintenance of a management company. It is proposed that foul water will be discharge via gravity to the existing combined sewer via a new manhole at the south-western part of the site. Small package pumping station(s) may be needed for pumping the refuse storage/wash down area (foul) back up to the main foul drainage.
- 6.7 A detailed temporary surface water management plan will need to be prepared and submitted to the LLFA for approval to demonstrate how surface water will be managed during

construction and the intervening period prior to the surface water drainage being maintained by the management company.

- 6.8 The findings of this report are subject to the approval of the Regulatory Authorities. The detailed drainage design and calculations shall be submitted to the Planning Authority for approval prior to construction on the development site.
- 6.9 Subject to compliance with the above, and subject to the further approvals of Regulatory Authorities, it is anticipated that the proposed development can satisfy the requirements of the National Planning Policy Framework and the Planning Practice Guidance in relation to flood risk and drainage.

APPENDIX A

SITE LOCATION PLAN

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 M

Forge Lane Bridge

41.9m

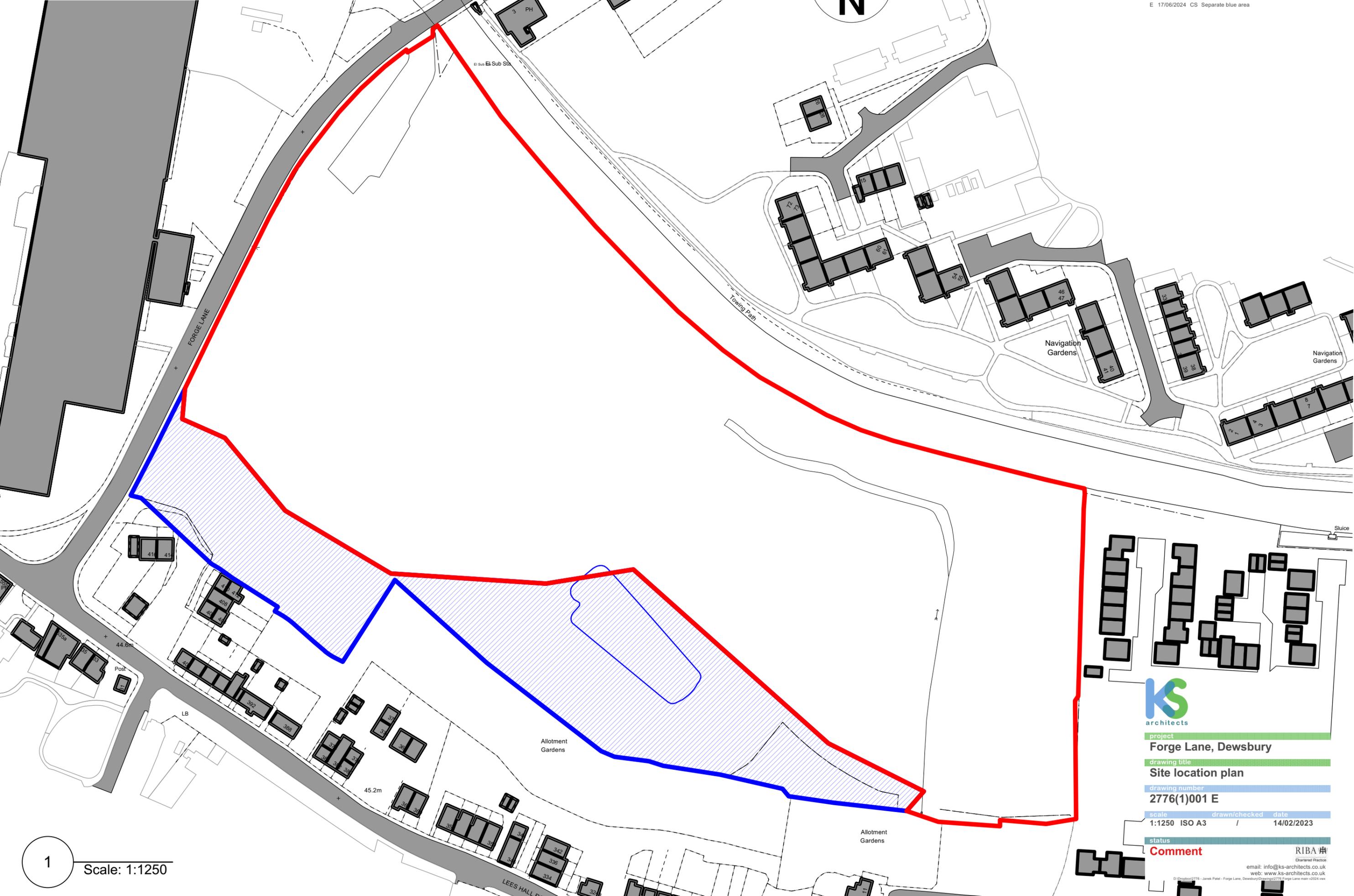
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Do not scale from this drawing. If in doubt please contact the architect.

- Revisions**
- C 03/05/2023 CS Boundary adjusted
 - D 29/11/2023 CS Scale bar added
 - E 17/06/2024 CS Separate blue area



1

Scale: 1:1250



project
Forge Lane, Dewsbury

drawing title
Site location plan

drawing number
2776(1)001 E

scale	drawn/checked	date
1:1250 ISO A3	/	14/02/2023

status
Comment



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APPENDIX B

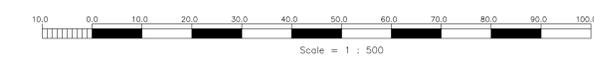
TOPOGRAPHIC SURVEY



STATION	EASTING	NORTHING	HEIGHT
STNB	423695.418	419949.970	42.052
STNA	423672.919	419935.889	43.020
STNC	423681.239	419931.801	43.000
STNK	423632.092	419908.475	43.610
STNH	423659.572	419899.919	41.155
STND	423563.799	419788.977	43.630
STNO	423530.803	419729.222	43.980
STNP	423536.900	419718.318	43.928
STNF	423686.639	419783.245	38.305
STNE	423689.873	419827.153	38.578
STND	423707.853	419840.384	38.564
STNJ	423651.061	419875.776	39.930
STAF	423755.219	419808.431	38.580
STAH	423741.390	419773.475	38.399
STAG	423776.065	419734.957	38.152
STAJ	423825.148	419701.107	39.044
STAK	423843.455	419669.963	39.069
STAL	423836.610	419653.424	37.714
STNF	423686.680	419793.228	38.278
STNN	423548.910	419738.826	43.618
STNQ	423604.329	419868.282	44.298
STNL	423588.622	419839.488	43.832
STNS	423682.683	419897.733	39.154
STNR	423708.239	419869.353	38.658
STNX	423602.897	419760.817	38.752
STAO	423770.985	419700.300	40.631
STAN	423755.571	419899.076	38.184
STAM	423795.298	419664.271	37.899
STNG	423639.561	419757.063	38.188
STNV	423597.332	419730.274	39.452
STNY	423584.906	419748.900	41.031
STAA	423605.844	419833.892	39.747
STAC	423625.045	419860.029	39.769
STAB	423640.188	419836.455	38.541
STAU	423635.191	419791.856	38.303
STAV	423601.860	419789.735	40.281
STAZ	423588.584	419790.849	40.271
STAT	423662.538	419734.305	38.148
STAE	423728.426	419666.026	39.823
STAD	423694.407	419691.469	38.747

- NOTES**
- ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM NEWLYN BY MEANS OF ORDNANCE SURVEY LEICA SMARTNET.
 - DO NOT SCALE FROM THIS DRAWING.
- KEY**
- ±0.000 GROUND LEVEL (m.A.O.D)
 - 0.000 LEVEL TOP OF WALL (m.A.O.D)
 - BO BOLLARD
 - GU GULLY
 - GV GAS VALVE
 - LP LAMP POST
 - MH MANHOLE
 - WH WATER HYDRANT
- LINE KEY**
- BUILDING
 - HEDGE LINE
 - FENCE
 - ROAD CHANNEL WITH KERB
 - ROAD CHANNEL WITH DROP KERB
 - TOP OF BANK
 - BOTTOM OF BANK
 - WALL
 - DENSE CLUSTER OF TREES & BRAMBLES

SECTION AA ADDED		K	K
Rev	Date	Drawn	Checked
DRAFT COPY			
Client:			
Project:			
FORGE LANE DEWSBURY			
Title:			
TOPOGRAPHICAL SURVEY PLAN			
Eng: IK	CAD: IK		
Chkd:	App'd:		
Date: 25/11/2009	Scale: AS SHOWN @ A0		
AECOM			
5th Floor 2 City Walk LEEDS, LS11 5AB		Tel: +44 (0) 113 391 8900 Fax: +44 (0) 113 391 8999 www.aecom.co.uk	
No. 60140787_LS01 3D			



APPENDIX C

PROPOSED SITE LAYOUT

Footpath widened to 3m

Hatched area denotes extent of road adoption



APPENDIX D

YORKSHIRE WATER SEWER RECORDS

APPENDIX E

PRELIMINARY DRAINAGE LAYOUT

APPENDIX F

GREENFIELD RUNOFF CALCULATIONS

ARP Associates		Page 1
Northwest House	2465/01 Forge Lane	
Servia Hill	Dewsbury	
Leeds LS6 2QH	Existing greenfield runoff	
Date 22/10/2024 4:09pm	Designed by IC	
File	Checked by	
Innovyze	Source Control 2020.1.3	

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	2.363	Urban	0.000
SAAR (mm)	771	Region Number	Region 3

Results 1/s

QBAR Rural	4.8
QBAR Urban	4.8
Q100 years	10.0
Q1 year	4.1
Q30 years	8.5
Q100 years	10.0

APPENDIX G

PRELIMINARY ATTENUATION STORAGE CALCULATIONS

ARP Associates		Page 1
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 1 SW attenuation calculations	
Date 16/12/2025 12:59pm File 2465 01 Building 1 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	37.780	0.300	2.0	438.0	O K
30 min Summer	37.884	0.404	2.0	588.4	O K
60 min Summer	37.997	0.517	2.0	753.6	O K
120 min Summer	38.118	0.638	2.0	930.8	O K
180 min Summer	38.190	0.710	2.0	1035.9	O K
240 min Summer	38.240	0.760	2.0	1108.3	O K
360 min Summer	38.312	0.832	2.0	1212.8	O K
480 min Summer	38.365	0.885	2.0	1289.9	O K
600 min Summer	38.406	0.926	2.0	1350.0	Flood Risk
720 min Summer	38.439	0.959	2.0	1398.7	Flood Risk
960 min Summer	38.491	1.011	2.1	1474.1	Flood Risk
1440 min Summer	38.559	1.079	2.1	1573.2	Flood Risk
2160 min Summer	38.616	1.136	2.2	1655.9	Flood Risk
2880 min Summer	38.645	1.165	2.2	1698.2	Flood Risk
4320 min Summer	38.661	1.181	2.2	1721.8	Flood Risk
5760 min Summer	38.648	1.168	2.2	1703.3	Flood Risk
7200 min Summer	38.628	1.148	2.2	1673.7	Flood Risk
8640 min Summer	38.609	1.129	2.2	1646.4	Flood Risk
10080 min Summer	38.591	1.111	2.1	1619.1	Flood Risk
15 min Winter	37.780	0.300	2.0	438.0	O K
30 min Winter	37.884	0.404	2.0	588.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	115.731	0.0	170.8	27
30 min Summer	77.804	0.0	171.3	42
60 min Summer	49.937	0.0	337.2	72
120 min Summer	30.956	0.0	307.8	132
180 min Summer	23.058	0.0	294.0	192
240 min Summer	18.577	0.0	292.4	252
360 min Summer	13.656	0.0	301.9	370
480 min Summer	10.974	0.0	309.4	490
600 min Summer	9.254	0.0	314.5	610
720 min Summer	8.046	0.0	318.1	730
960 min Summer	6.447	0.0	322.1	970
1440 min Summer	4.709	0.0	323.0	1448
2160 min Summer	3.432	0.0	660.6	2168
2880 min Summer	2.739	0.0	660.2	2884
4320 min Summer	1.989	0.0	641.3	4324
5760 min Summer	1.583	0.0	1289.0	5704
7200 min Summer	1.325	0.0	1275.2	6264
8640 min Summer	1.147	0.0	1250.5	7000
10080 min Summer	1.015	0.0	1216.3	7768
15 min Winter	115.731	0.0	170.9	27
30 min Winter	77.804	0.0	171.3	41

ARP Associates		Page 2
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 1 SW attenuation calculations	
Date 16/12/2025 12:59pm File 2465 01 Building 1 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	37.997	0.517	2.0	753.6	O K
120 min Winter	38.118	0.638	2.0	930.8	O K
180 min Winter	38.191	0.711	2.0	1035.9	O K
240 min Winter	38.240	0.760	2.0	1108.5	O K
360 min Winter	38.312	0.832	2.0	1213.1	O K
480 min Winter	38.365	0.885	2.0	1290.4	O K
600 min Winter	38.406	0.926	2.0	1350.7	Flood Risk
720 min Winter	38.440	0.960	2.0	1399.8	Flood Risk
960 min Winter	38.492	1.012	2.1	1475.7	Flood Risk
1440 min Winter	38.561	1.081	2.1	1576.0	Flood Risk
2160 min Winter	38.619	1.139	2.2	1661.0	Flood Risk
2880 min Winter	38.650	1.170	2.2	1705.8	Flood Risk
4320 min Winter	38.670	1.190	2.2	1735.5	Flood Risk
5760 min Winter	38.662	1.182	2.2	1724.0	Flood Risk
7200 min Winter	38.640	1.160	2.2	1692.0	Flood Risk
8640 min Winter	38.614	1.134	2.2	1653.4	Flood Risk
10080 min Winter	38.593	1.113	2.1	1622.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	49.937	0.0	337.3	72
120 min Winter	30.956	0.0	308.0	130
180 min Winter	23.058	0.0	294.1	190
240 min Winter	18.577	0.0	292.5	248
360 min Winter	13.656	0.0	302.0	366
480 min Winter	10.974	0.0	309.4	484
600 min Winter	9.254	0.0	314.4	602
720 min Winter	8.046	0.0	317.8	722
960 min Winter	6.447	0.0	321.6	958
1440 min Winter	4.709	0.0	321.8	1428
2160 min Winter	3.432	0.0	658.7	2124
2880 min Winter	2.739	0.0	657.5	2824
4320 min Winter	1.989	0.0	637.2	4192
5760 min Winter	1.583	0.0	1285.0	5480
7200 min Winter	1.325	0.0	1270.8	6768
8640 min Winter	1.147	0.0	1246.4	7192
10080 min Winter	1.015	0.0	1213.1	7968

ARP Associates		Page 3
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 1 SW attenuation calculations	
Date 16/12/2025 12:59pm File 2465 01 Building 1 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 1.521

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From:	To:	(ha)	From:	To:	(ha)
0	4	0.507	4	8	0.507
			8	12	0.507

ARP Associates		Page 4
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 1 SW attenuation calculations	
Date 16/12/2025 12:59pm File 2465 01 Building 1 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 38.680

Tank or Pond Structure

Invert Level (m) 37.480

Depth (m)	Area (m ²)						
0.000	1458.0	1.201	0.0	2.800	0.0	4.200	0.0
0.200	1458.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	1458.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	1458.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	1458.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	1458.0	2.400	0.0	3.800	0.0		
1.200	1458.0	2.600	0.0	4.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0068-3000-2300-3000
Design Head (m)	2.300
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	68
Invert Level (m)	37.480
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.300	3.0
Flush-Flo™	0.299	2.0
Kick-Flo®	0.605	1.6
Mean Flow over Head Range	-	2.2

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

Depth (m)	Flow (l/s)						
0.100	1.7	1.200	2.2	3.000	3.4	7.000	5.0
0.200	2.0	1.400	2.4	3.500	3.6	7.500	5.2
0.300	2.0	1.600	2.5	4.000	3.9	8.000	5.4
0.400	2.0	1.800	2.7	4.500	4.1	8.500	5.5
0.500	1.9	2.000	2.8	5.000	4.3	9.000	5.7
0.600	1.7	2.200	2.9	5.500	4.5	9.500	5.8
0.800	1.9	2.400	3.1	6.000	4.7		
1.000	2.0	2.600	3.2	6.500	4.9		

ARP Associates		Page 1
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 2 SW attenuation calculations	
Date 16/12/2025 12:40pm File 2465 01 Building 2 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
15 min Summer	37.513	0.213	1.5	242.1	O K
30 min Summer	37.585	0.285	1.5	325.1	O K
60 min Summer	37.665	0.365	1.5	416.0	O K
120 min Summer	37.750	0.450	1.5	512.8	O K
180 min Summer	37.800	0.500	1.5	570.0	Flood Risk
240 min Summer	37.835	0.535	1.5	609.4	Flood Risk
360 min Summer	37.885	0.585	1.5	665.9	Flood Risk
480 min Summer	37.921	0.621	1.5	707.0	Flood Risk
600 min Summer	37.948	0.648	1.5	738.6	Flood Risk
720 min Summer	37.971	0.671	1.5	763.9	Flood Risk
960 min Summer	38.004	0.704	1.5	802.1	Flood Risk
1440 min Summer	38.046	0.746	1.5	849.9	Flood Risk
2160 min Summer	38.077	0.777	1.5	885.2	Flood Risk
2880 min Summer	38.089	0.789	1.5	898.5	Flood Risk
4320 min Summer	38.083	0.783	1.5	892.4	Flood Risk
5760 min Summer	38.066	0.766	1.5	871.9	Flood Risk
7200 min Summer	38.047	0.747	1.5	850.9	Flood Risk
8640 min Summer	38.029	0.729	1.5	830.8	Flood Risk
10080 min Summer	38.012	0.712	1.5	811.3	Flood Risk
15 min Winter	37.513	0.213	1.5	242.1	O K
30 min Winter	37.585	0.285	1.5	325.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
15 min Summer	115.731	0.0	125.7	27
30 min Summer	77.804	0.0	131.2	42
60 min Summer	49.937	0.0	261.5	72
120 min Summer	30.956	0.0	258.9	132
180 min Summer	23.058	0.0	251.9	192
240 min Summer	18.577	0.0	243.8	250
360 min Summer	13.656	0.0	230.2	370
480 min Summer	10.974	0.0	223.0	490
600 min Summer	9.254	0.0	219.6	610
720 min Summer	8.046	0.0	218.8	730
960 min Summer	6.447	0.0	221.0	968
1440 min Summer	4.709	0.0	222.1	1448
2160 min Summer	3.432	0.0	448.3	2164
2880 min Summer	2.739	0.0	448.1	2884
4320 min Summer	1.989	0.0	436.8	4320
5760 min Summer	1.583	0.0	896.7	4960
7200 min Summer	1.325	0.0	865.1	5696
8640 min Summer	1.147	0.0	834.4	6480
10080 min Summer	1.015	0.0	807.6	7264
15 min Winter	115.731	0.0	125.7	27
30 min Winter	77.804	0.0	131.2	41

ARP Associates		Page 2
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 2 SW attenuation calculations	
Date 16/12/2025 12:40pm File 2465 01 Building 2 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m ³)	Status
60 min Winter	37.665	0.365	1.5	416.0	O K
120 min Winter	37.750	0.450	1.5	512.8	O K
180 min Winter	37.800	0.500	1.5	570.1	Flood Risk
240 min Winter	37.835	0.535	1.5	609.4	Flood Risk
360 min Winter	37.885	0.585	1.5	665.9	Flood Risk
480 min Winter	37.921	0.621	1.5	707.1	Flood Risk
600 min Winter	37.949	0.649	1.5	738.7	Flood Risk
720 min Winter	37.971	0.671	1.5	764.1	Flood Risk
960 min Winter	38.005	0.705	1.5	802.6	Flood Risk
1440 min Winter	38.047	0.747	1.5	850.9	Flood Risk
2160 min Winter	38.079	0.779	1.5	887.5	Flood Risk
2880 min Winter	38.092	0.792	1.5	902.2	Flood Risk
4320 min Winter	38.090	0.790	1.5	899.7	Flood Risk
5760 min Winter	38.070	0.770	1.5	876.9	Flood Risk
7200 min Winter	38.045	0.745	1.5	848.3	Flood Risk
8640 min Winter	38.023	0.723	1.5	823.8	Flood Risk
10080 min Winter	38.001	0.701	1.5	798.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
60 min Winter	49.937	0.0	261.5	70
120 min Winter	30.956	0.0	259.0	130
180 min Winter	23.058	0.0	252.0	188
240 min Winter	18.577	0.0	244.0	248
360 min Winter	13.656	0.0	230.5	366
480 min Winter	10.974	0.0	223.3	484
600 min Winter	9.254	0.0	219.9	602
720 min Winter	8.046	0.0	219.1	720
960 min Winter	6.447	0.0	221.3	954
1440 min Winter	4.709	0.0	222.3	1424
2160 min Winter	3.432	0.0	448.4	2120
2880 min Winter	2.739	0.0	448.1	2800
4320 min Winter	1.989	0.0	437.1	4148
5760 min Winter	1.583	0.0	898.0	5368
7200 min Winter	1.325	0.0	868.2	5840
8640 min Winter	1.147	0.0	839.7	6736
10080 min Winter	1.015	0.0	815.1	7664

ARP Associates		Page 3
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 2 SW attenuation calculations	
Date 16/12/2025 12:40pm File 2465 01 Building 2 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.842

Time (mins) Area			Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)	From:	To:	(ha)
0	4	0.281	4	8	0.281	8	12	0.280

ARP Associates		Page 4
Northwest House Servia Hill Leeds LS6 2QH	2465 01 Forge Lane Building 2 SW attenuation calculations	
Date 16/12/2025 12:40pm File 2465 01 Building 2 SW a...	Designed by IC Checked by	
Innovyze	Source Control 2020.1.3	

Model Details

Storage is Online Cover Level (m) 38.100

Tank or Pond Structure

Invert Level (m) 37.300

Depth (m)	Area (m ²)						
0.000	1139.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	1139.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	1139.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	1139.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	1139.0	2.200	0.0	3.600	0.0	5.000	0.0
0.801	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0061-1800-1200-1800
Design Head (m)	1.200
Design Flow (l/s)	1.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	61
Invert Level (m)	37.300
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	1.8
Flush-Flo™	0.265	1.5
Kick-Flo®	0.542	1.3
Mean Flow over Head Range	-	1.4

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

Depth (m)	Flow (l/s)						
0.100	1.3	1.200	1.8	3.000	2.7	7.000	4.1
0.200	1.5	1.400	1.9	3.500	2.9	7.500	4.2
0.300	1.5	1.600	2.0	4.000	3.1	8.000	4.3
0.400	1.5	1.800	2.2	4.500	3.3	8.500	4.4
0.500	1.4	2.000	2.3	5.000	3.5	9.000	4.6
0.600	1.3	2.200	2.4	5.500	3.6	9.500	4.7
0.800	1.5	2.400	2.5	6.000	3.8		
1.000	1.7	2.600	2.6	6.500	3.9		