



Birchinley Manor, Milnrow Sustainable Drainage Strategy

Job Number
FRA251243

Report Date
29th May 2026

Client
Paul Keighley

DOCUMENT QUALITY ASSURANCE

Site Address	Birchinley Manor, Milnrow, Rochdale, OL16 3DG
Report Title	Outline Sustainable Drainage Strategy
Job Number	FRA251243
Client	Paul Keighley

Revision	0	Date of Issue	29/05/2026
Document Ref:	FRA251243-SuDS-Birchinley Manor, Milnrow R0		
Status	Draft for Comment.		
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EXECUTIVE SUMMARY

Scope and Background

This Sustainable Drainage (SuDS) Strategy has been undertaken by LK Consult Ltd (LKC) to support a planning application for the development of land at Birchinley Manor, Milnrow. The proposed development comprises the construction of a new residential dwelling with associated landscaping, access and car parking.

LKC has prepared this SuDS Strategy in line with the NPPF and Technical Guidance where appropriate.

Drainage Strategy

It is proposed to restrict the surface water runoff generated by the proposed development to a rate of 1.0 l/s during all events up to and including the 1 in 100 year plus 45% climate change event. Attenuation will be provided in the form of an attenuation basin. Surface water will discharge into the existing ditch to the east of the site area subject to agreement with the LLFA.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1. Introduction.....	1
1.1. Background	1
1.2. Site Details	1
2. Site Setting	2
2.1. Environmental Setting.....	2
2.2. Site Topography.....	2
2.3. Site Reconnaissance.....	2
3. Consultation	6
4. Sustainable Drainage Strategy	7
4.1. Introduction	7
4.2. Sustainable Drainage Hierarchy	8
4.3. Surface Water Runoff Rate.....	8
4.4. Surface Water Attenuation Requirements	9
4.5. Consideration of SuDS.....	10
4.6. Surface Water Drainage Strategy.....	14
4.7. SuDS for Pollution Mitigation	14
4.8. Maintenance and Management Plan.....	15
5. Conclusions	16

Figures

Figure 1 – Site Location and Boundary Plan

Appendices

Appendix A – Proposed Development Plans

Appendix B – Topographic Survey

Appendix C – Indicative Mark-Up of Local Water Features

Appendix D – United Utilities Public Sewer Records

Appendix E – Site Composition

Appendix F – FEH Statistical Method (2025) Runoff Calculations

Appendix G – Conceptual Surface Water Drainage Strategy

Appendix H – Causeway Flow Calculations

Appendix I – References

1. Introduction

1.1. Background

LK Consult Ltd (LKC) was commissioned by Paul Keighley to carry out a Sustainable Drainage (SuDS) Strategy for Birchinley Manor, Milnrow. The report has been undertaken to support the construction of a new residential dwelling with associated access, parking and landscaping.

The report will consider the impact of the development on surface water runoff accounting for climate change. The sustainable drainage assessment in Section 4 will provide an overview of the SuDS techniques which could be considered on the site. The sustainable drainage assessment is presented with reference to the hydrological and hydrogeological context of the development.

The report findings are based upon professional judgement and are summarised below. The report includes baseline data from the Environment Agency (EA), rainfall data from the Wallingford Studies and hydrogeological information from the British Geological Survey (BGS).

Drainage on the site has been assessed by considering the following key constraints:

- Topography of the site.
- Local water features and hydrological context.
- Underlying geology, soil types and permeability; and
- Layout and geometry of the proposed development.

1.2. Site Details

A summary of the general site details is presented in Table 1-1. Figure 1 indicates the site location.

Location	Birchinley Manor, Milnrow, Rochdale, OL16 3DG Centred at National Grid Reference: 393025, 413796
Area	0.171 ha
Current Site Use	<u>Site</u> The site comprises a parcel of undeveloped land adjacent to Birchinley Manor. <u>Surrounding Area/ Boundary Treatment</u> The site is situated in a largely rural area. The land use surrounding the site is described below: • North and east and south: undeveloped land. • West is the existing Birchinley Manor and Wildhouse Lane.
Proposed Development	The proposal comprises the construction of a residential dwelling, with associated access, landscaping and parking. The site access will extend from the existing Birchinley Manor to the proposed dwelling. Proposed development plans are included as Appendix A.

Table 1-1: Summary of site details.

2. Site Setting

2.1. Environmental Setting

LKC have previously undertaken a Preliminary Risk Assessment for the site¹ (LKC241283-A1-PRA-Birchinley Manor R0, July 2024) and pertinent environmental information for the site is summarised in Table 2-1 below.

Summary of the Environmental Setting			
Geology	Artificial Ground		Made ground is indicated beneath the western area of the proposed development.
	Superficial Deposits		There are no BGS recorded superficial deposits across the site.
	Bedrock		The site is underlain by Helpet Edge Rock (sandstone).
	BGS Boreholes		There are no BGS Borehole logs within the vicinity of the site.
	Defra Soilscape Mapping		Type 17 - Slowly permeable seasonally wet acid loamy and clayey soils
Hydrogeology	Aquifer Designation	Superficial	Secondary (Undifferentiated)
		Bedrock	Secondary A Aquifer.
	Source Protection Zone (SPZ)		Outer Zone (Zone 2).
Hydrology	All adjacent and internal surface water		A review of OS mapping indicated the nearest watercourse is an ordinary watercourse located along the eastern boundary of the Applicant's wider land ownership. The watercourse appears to flow in a northerly direction.

Table 2-1: Summary of the Environmental Setting.

2.2. Site Topography

A Topographic Survey of the site has been provided by CJ Partnership within the Site Location Plan included as Appendix B. The Topographic Survey is described as follows:

- Ground levels in the vicinity of the site form a topographic high point with a maximum elevation of approximately 180m Above Ordnance Datum.
- Ground levels in the area of the proposed development are shown to range between approximately 179m AOD at the site entrance to a level of approximately 178m AOD along the northern boundary;
- Ground levels within the wider land ownership and to the east of the topographic highpoint are shown to generally slope downwards in an easterly direction towards the Ordinary watercourse along the eastern boundary of the wider land ownership.
- The Topographic Survey indicates the presence of a ditch to the south of the site which appears to intercept runoff from high ground immediately to the south. The ditch is shown to flow in an easterly direction.

2.3. Site Reconnaissance

A site walkover was undertaken by LKC representatives on 20th May 2026. During the site visit, weather conditions were overcast with periods of sunshine and no rainfall. Notwithstanding, recent rainfall was evident, as indicated by locally boggy ground conditions across the wider field area. A summary of the site walkover is provided below.

The walkover confirmed the presence of an existing ditch located to the south of the proposed development area. The upstream section of the ditch was observed to be relatively shallow with evidence of standing water and minimal flows. The ditch falls in an easterly direction with levels deepening further downstream. The ditch was observed to drain into a lower area of ground to the

east in which water ponds before spilling into a shallow ditch that extends in a northerly direction. This ditch was observed to drain into an area of lower lying ground to the north of the site (and outside the Applicant's land ownership boundary) in which water was observe to pond. An indicative mark up showing the route described above is provided in Appendix C.

The Ordinary Watercourse along the eastern boundary of the Applicant's land ownership was observed during the site walkover, however, it is understood there is no formal connection between this watercourse and the lower lying area in which water ponds, as described above. It is anticipated that water from this area informally drains towards Hollingworth Lake.

There are also existing ponds located to the southeast of the site, adjacent to the existing watercourse. Anecdotal information provided by the Applicant indicate these features were constructed by Tameside Council as a part of a Great Crested Newt District Level Licensing scheme and assist in helping to manage flooding associated with the watercourse and nearby public footpaths along the eastern boundary of the wider land ownership.

Relevant photographs are provided in Plate 2-1 below.

	
Photograph 1: Upstream section of the ditch located to the south of the proposed dwelling.	Photograph 2: Naturally seeded maple tree within the eastern and deeper section of the ditch.



Photograph 3: A view of the ditch, facing southwest, taken to the southeast of the site



Photograph 4: A view of the existing ditch, facing south east, taken directly east of the site.



Photograph 5: The northern field is at a lower elevation and typically contains standing water from surrounding runoff.



Photograph 6: A manmade pond in the eastern area of the wider land ownership boundary

Plate 2-1: Site photographs.

3. Consultation

Information from all relevant consultees is summarised in Table 3-1 below.

Source	Details
Rochdale Borough Council (RBC): Lead Local Flood Authority (LLFA)	Consultation has been undertaken with the LLFA, however, a response has not been received at the time of writing this report.
United Utilities (UU) Sewer Map	Consultation has been undertaken with United Utilities to obtain public sewer records (included as Appendix D) which indicate the following sewers within the vicinity of the site: • A 1200mm diameter public surface water sewer is shown to be located c.170m to the west of the site, flowing in a northerly direction. Node 9801 is shown to have a CL: 172.74m AOD, IL: 169.90m AOD and a depth of 2.84m. • A 150mm diameter foul sewer is located.225m to the southwest of the site and Node 8611 is shown to have a CL: 177.23m AOD IL: 174.74m AOD and a depth of 2.49m.

Table 3-1: Summary consultee information.

4. Sustainable Drainage Strategy

4.1. Introduction

The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface run-off from development sites through the use of Sustainable Drainage Systems (SuDS), this being complementary to the control of development within the floodplain.

The site is located within the administrative boundary of Rochdale Borough Council. In March 2024, the Council adopted the Places for Everyone Joint Development Plan which sets out the framework for sustainable growth across Greater Manchester. Policy JP-S4 'Flood Risk and Water Environment' sets out the Plan's approach to flood risk and water management. Policy JP-S4 states that proposed development should achieve greenfield runoff rates unless it is demonstrated to be impracticable.

The anticipated design life of residential buildings is in excess of 100 years. The EA climate change guidance for peak rainfall intensity (published in May 2022) identifies that development with a lifespan beyond 2100 should consider the upper end climate change allowance. According to the EA Peak Rainfall Allowances map, the site is located within the Irwell Management Catchment in which the upper end allowance equates to a 45% increase in peak rainfall intensity.

The accepted principles are that surface water arising from a developed area should, as far as practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

The Planning Practice guidance identifies that surface water runoff should be disposed of in the following order of preference:

1. Into the ground (infiltration);
2. To a surface water body;
3. To a surface water sewer, highway drain, or another drainage system; or
4. To a combined sewer

Suitability of different SuDS will be governed by prevailing site conditions, such as the type and scale of development, topography, ground conditions (soil permeability, ground stability, depth to water table), local hydrogeology and risk of groundwater contamination (presence of sensitive aquifers and source protection zones) etc.

4.2. Sustainable Drainage Hierarchy

4.2.1. Infiltration

Publicly available geological information, described in Table 2-1, indicates there are no superficial deposits underlying the site. However, observations made during the site visit identified locally saturated and boggy ground conditions, suggesting the presence of low permeability soils near the surface. In particular, areas where ponds have been constructed revealed exposed clay strata beneath the topsoil.

The presence of clay is likely to significantly limit the effectiveness of infiltration-based drainage methods due to the low permeability and limited storage capacity of the underlying soils. As such, infiltration techniques are not considered feasible at this stage and have been scoped out of further consideration.

Furthermore, the site is situated adjacent to a slope, and the introduction of infiltration systems could potentially have adverse implications for slope stability, subject to consultation with a geotechnical engineer. On this basis, infiltration drainage methods are not considered appropriate for the proposed development.

4.2.2. Watercourses

An existing ditch is located c.40m to the south of the proposed dwelling, flowing from the southwest to the northeast of the site area. The presence of this ditch was confirmed as part of the site walkover during which the ditch was observed to flow in an easterly direction, draining into an area of lower lying land before spilling into a shallow ditch located downgradient of the steep slope to the east of the site. This section of ditch was observed to drain into an area of low lying land to the north of the site in which water ponds before informally draining into Hollingworth Lake.

Based on a review of site topography, it is anticipated that runoff generated within the existing site drains into the lower lying land to the north at uncontrolled rates.

It is proposed to discharge runoff generated by the proposed development into the ditch down gradient of the slope and ultimately into the land to the north which broadly mimics the existing situation.

4.2.3. To a surface water sewer, highway drain or another drainage system

United Utilities (UU) sewer records indicate the presence of a public surface water sewer located within the Wildhouse Meadow residential development to the south west of the site. It is proposed to discharge surface water runoff generated by the proposed development to an existing ditch therefore discharge to the public sewer network has not been considered further at this stage.

4.2.4. Combined Sewers

UU public sewer records indicate there are no combined sewers within the vicinity of the site.

4.3. Surface Water Runoff Rate

Based on the policy contained within the adopted Local Plan, an assessment of the greenfield runoff rates has been undertaken.

4.3.1. Greenfield runoff rates

Greenfield runoff rates have been calculated using the FEH Statistical Method (2025) for a contributing catchment area of 0.0586 ha.

The contributing catchment comprises the roof area of the proposed dwelling (including the green roof) and the proposed access road.

In accordance with CIRIA The SuDS Manual (C753), Section 12.4.1, although green roofs can provide interception and temporary storage during frequent rainfall events, their hydraulic performance once saturated is “*fairly similar to standard roofs*”. Therefore, during critical design storm events, green roofs are assumed to generate runoff comparable to impermeable roof surfaces.

On this basis, and to ensure a conservative assessment in line with CIRIA guidance, the green roof has been included within the impermeable area for hydraulic modelling. The proposed catchment excludes the landscaped spaces as these have been confirmed as designed to be permeable.

While the access road may be constructed using a crushed stone or other permeable surface, it is recognised that permeable materials can lose effectiveness over time due to compaction and clogging. As a precautionary approach, the access road has therefore been treated as impermeable for the purposes of runoff calculations.

On this basis, the proposed contributing hardstanding area used within the calculations is 0.0586 ha (see Appendix E).

The greenfield runoff rate calculations are provided in Appendix F and are summarised in Table 4-1 below:

Return period	Greenfield Runoff Rate (l/s)
1 in 1 year	0.5
QBAR	0.6
1 in 30 year	0.9
1 in 100 year	1.3

Table 4-1: Summary of the greenfield runoff rates.

Based on the calculations above, it is proposed to restrict surface water runoff rates during all events up to and including the 1 in 100 year plus 45% climate change scenario to a rate of 1.0l/s which represents the minimum effective rate for self-cleansing of a Hydrobrake or similar flow control device.

4.4. Surface Water Attenuation Requirements

An initial Quick Storage Estimate (QSE) has been undertaken using Causeway Flow modelling software to determine the attenuation volume required to achieve the proposed discharge rate of 1.0l/s. Based on a proposed contributing hardstanding area of 0.0586ha, which excludes the landscaped areas and green roof, the QSE indicates that between 37-67m³ of attenuation will be required for the 1 in 100 year plus 45% climate change event.

4.5. Consideration of SuDS

Table 4-2 provides a summary of the SuDS options appraisal with consideration of CIRIA C753 (The SUDS Manual)² for the development:

SuDS Option	Description	Benefits	Comments	Appropriate to Development
Infiltration				
Soakaways	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge. Runoff is treated by physical filtration to remove solids, by absorption into the soil and removal and by biochemical reactions involving micro-organisms growing on the soil.	Water quantity: Attenuation, treatment, and recharge. Water quality: Filtration and biochemical treatment.	Likely to be unsuitable based on underlying ground conditions, proposed site layout plans and SPZ categorisation.	X
Infiltration Basin	Infiltration basin reduces the volume of runoff from a drainage area, can be very effective at pollutant removal via filtering through the soils, contributes to groundwater recharge and baseflow augmentation. Runoff is treated by physical filtration to remove solids, by absorption into the soil and removal and by biochemical reactions involving micro-organisms growing on the soil.	Water quantity: Reduces runoff volume. Water quality: Effective pollutant removal. Biodiversity & Amenity: Potential if space allows.	Likely to be unsuitable based on underlying ground conditions, proposed site layout plans and SPZ categorisation.	X
Infiltration Trench	An Infiltration trench can create temporary subsurface storage of stormwater runoff, thereby enhancing the natural capacity of the ground to store and drain water. Infiltration trenches allow water to dissipate into the surrounding soils from the bottom and sides of the trench where runoff is treated by physical filtration, adsorption and biochemical reactions involving micro-organisms growing in the soil. Infiltration trenches are easy to integrate into a site. They are ideal for use around playing fields, recreational areas, or public open space.	Water quantity: Subsurface storage. Water quality: Filtration and biochemical treatment. Amenity: Can be integrated into open spaces.	Likely to be unsuitable based on underlying ground conditions, proposed site layout plans and SPZ categorisation.	X
Infiltration Rain Gardens	Attractive features that can help to improve open space. Can be planned as landscaping features. Flexible layout to fit into landscape. Runoff can be treated by physical filtration to remove solids, by absorption and removal by biochemical reactions involving micro-organisms growing on the soil. They can reduce rate of run off and provide some volume reduction.	Amenity: Attractive and flexible. Water quality: Filtration and microbial treatment. Water quantity: Some reduction. Biodiversity: Supports planting.	Likely to be unsuitable based on underlying ground conditions, proposed site layout plans and SPZ categorisation.	X

Table 4-2: Summary of the SuDS options appraisal

Filtration				
Filter Drain / Trench	Filter trenches create temporary subsurface storage of stormwater runoff and provide stormwater treatment. These trenches can be used to filter and convey stormwater to downstream SuDS components.	Water quantity: Subsurface storage and conveyance. Water quality: Filtration.	Unsuitable due to insufficient storage capacity.	X
Filter Strip	A filter strip offers no storage and is used solely to remove pollutants from surface water. The vegetation traps organic and mineral particles that are then incorporated into the soil, while the vegetation takes up any nutrients. A filter strip features medium amenity potential. Local wild grass and flower species can be introduced for visual interest and to provide a wildlife habitat.	Water quality: Pollutant removal via vegetation. Amenity & Biodiversity: Moderate potential.	Unsuitable due to lack of storage capacity.	X
Retention & Detention				
Detention Basin	Detention basins provide flow control through attenuation of stormwater runoff for a wide range of rainfall events. Basins treat runoff in a variety of ways: settlement of solids in still or slow-moving water, adsorption by the soil, biological activity. Basins offer many opportunities for the landscape designer. Basins should not be built on but can be used for sports and recreation. Basins can be part of public open space.	Water quantity: Flow control. Water quality: Sediment removal. Amenity & Biodiversity: High potential.	Suitable for surface water storage, and amenity provision.	✓
Attenuation Ponds	Ponds will attenuate the surface water flow prior to discharging to the public surface water sewers. The storage volume afforded by these features should not include any permanent water in the pond. Ponds treat runoff in a variety of ways: settlement of solids in still water (having plants in the water enhances calm conditions and promotes settlement), adsorption by aquatic vegetation, biological activity. Permanently wet ponds can be used to store water for reuse and offer excellent opportunities for the provision of wildlife habitats. Ponds can be part of public open space.	Water quantity: Attenuation. Water quality: Sediment and pollutant removal. Amenity & Biodiversity: High.	Suitable for surface water storage, and amenity provision.	✓
Geo-cellular Storage Systems	Geo-cellular systems can be used to control and manage rainwater surface water runoff either as a soakaway or as a storage tank. Geo-cellular storage systems provide high storage volume capacity High void ratios (up to 96%). Capable of managing high flow events.	Water quantity: High-capacity storage. Suitable for high flow events. Can be used as soakaway or tank.	Suitable for underground storage. High void ratio and compact footprint.	✓
Oversized Pipes	Oversized pipes can reduce rate of run off and provide some volume reduction.	Water quantity: Reduces runoff rate and provides volume reduction.	May be suitable to surface water storage.	*
Tanks	Storage tanks can be used to control and manage rainwater surface water runoff providing high storage volume capacity. Tanks are capable of managing high flow events.	Water quantity: High-volume control. Suitable for high flow events.	Suitable for high-capacity underground storage.	✓

Table 4-2: Summary of the SuDS options appraisal (continued)

Swales & Conveyance Channels				
Swales	Swales are effective at removing polluting suspended solids through filtration and sedimentation. The vegetation traps organic and mineral particles that are then incorporated into the soil, while the vegetation takes up any nutrients. Swales are often integrated into the surrounding land use. Local wild grass and flower species can be introduced for visual interest and to provide a wildlife habitat. Swales are usually designed as conveyance systems but can also be designed with check dams to increase attenuation and, where applicable, infiltration.	Water quality: Filtration and sedimentation. Amenity & Biodiversity: High. Water quantity: Some attenuation.	Unsuitable due to the topographic context of the site. However, swales could be considered further at the detailed design stage.	X
Channels & Rills	Effective in water & pollution treatment. Can act as pre-treatment to remove silt before water is conveyed into further SuDS features. Can be visually appealing in urban landscapes. Amenity value for the local community and biodiversity value (design dependant).	Water quality: Pre-treatment. Amenity & Biodiversity: High (design dependent). Water quantity: Some attenuation.	Unsuitable due to space and permanent water management requirements.	X
Control Structures				
Flow Control Devices	Control the peak flow. Complex controls can reduce upstream storage requirements.	Water quantity: Peak flow control.	Suitable for managing peak flows and reducing upstream storage needs.	✓
Inlets, Outlets and Other Control Structures	Inlets, outlets and other control structures are key elements of well-designed SuDS. Inlet and outlet features allow water to flow into and out of features and also limit the rate at which water flows along and out of the system. There are many different approaches and products available, and they can be easily designed to add interest to the urban landscape. Can provide accurate flow control from one SuDS feature to another.	Water quantity: Peak flow control. Water quality Amenity	Suitable for managing peak flows and reducing upstream storage needs.	✓

Table 4-2: Summary of the SuDS options appraisal (continued)

Source Control				
Green Roofs	Green roof installations can help to reduce surface water runoff from roof areas depending on the system specified. Good removal capability of atmospherically deposited urban pollutants. Ecological, aesthetic and amenity benefits.	Water quality: Pollutant removal. Water quantity: Reduces runoff. Amenity & Biodiversity: High.	Green roofs have been implemented in the design.	✓
Blue Roofs	Blue roofs are designed to attenuate and manage stormwater on a flat roof in urban areas where options for ground-based attenuation systems are limited, and in particular, where construction is being carried out within flood sensitive areas. Amenity value for the local community	Water quantity: Attenuation on roofs. Amenity & Biodiversity: Moderate.	Unsuitable due to proposed pitched roofs.	X
Rainwater Harvesting	In the process, a volume of water is kept out of the storm-water management system, thereby helping to reduce flooding risks. When required, the water is pumped to the point of use, thus displacing what would otherwise be a demand for mains-water. Reduces demand on mains water.	Water quantity: Reduces demand on drainage and mains water.	May be suitable depending on demand for non-potable water, however, the attenuation benefits provided by rainwater harvesting are considered to be limited and are only realised when tanks are empty. Rainwater harvesting has been excluded for the purposes of the outline drainage strategy; however, further consideration may be required at the detailed design stage.	*
Permeable Pavements (with storage)	Reduced peak flows to watercourses, reducing the risk of flooding downstream. Reduced effects of pollution in runoff on the environment.	Water quality: Pollutant reduction. Water quantity: Attenuation and volume reduction.	Suitable for parking areas. Provides both surface and subsurface storage. However, due to the slope across the site, permeable paving would be subject to the detailed design stage to confirm finished ground levels of the parking area and determine feasibility of surface water infiltration.	*
Wetlands				
Wetlands	Wetlands provide both stormwater attenuation and treatment. Wetlands detain flows for an extended period to allow sediments to settle, and to remove contaminants by facilitating adhesion to vegetation and aerobic decomposition. They also provide significant ecological benefits.	Water quality: High treatment potential. Water quantity: Attenuation and volume reduction.	Unsuitable due to space and maintenance requirements.	X

Table 4-2: Summary of the SuDS options appraisal (continued)

Notes

✓ Suitable for use given the nature and scale of the development.

* Possibly suitable for use – not included in the client and architect design proposal at present.

X Not suitable.

4.6. Surface Water Drainage Strategy

It is proposed to restrict surface water runoff generated by the proposed development to a rate of 1.0 /s, during all events up to and including the 1 in 100 year plus 45% climate change scenario.

To achieve the required discharge rate, it is proposed to provide attenuation in the form of an attenuation basin, as shown on the Conceptual Surface Water Drainage Strategy included as Appendix G.

Storage will be provided within an attenuation basin which has been indicatively sized using Causeway Flow modelling software (see Appendix H). It is proposed that the attenuation basin will measure an area of 102m² x 1.3m deep (1.0m of storage and a 0.3m freeboard) with a slope of 1:3 which will provide approximately 40.3m³ of attenuation. Causeway flow calculations indicate the proposed storage basin provides the required storage volume to ensure there is no flooding on site during all events up to and including the 1 in 100 year plus 45% climate change event.

Surface water runoff is proposed to discharge into the existing ditch to the east of the site via a Hydrobrake or similar flow control, subject to agreement with the LLFA. Land drainage consent will be required for any proposed outfall into the existing ditch.

Assuming that the conceptual surface water drainage strategy outlined above is acceptable to the Local Authority, a more detailed design can be presented and agreed with the appropriate regulatory bodies during the detailed design phase.

4.7. SuDS for Pollution Mitigation

The proposals for the site have been assessed against the CIRIA SuDS Manual C753 to determine the requirements for the treatment of surface water prior to its discharge from the site to the infiltration component. The SuDS features incorporated within the site should be designed to have a total pollution mitigation index that is equal to or greater than the pollution hazard index. The pollution hazard level associated with the proposed development is considered within Table 4-3 below.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons (HCs)
Residential Roofs	Very Low	0.2	0.2	0.05
Individual Driveways	Low	0.5	0.4	0.4

Table 4-3. Pollution Hazard Index adopted from Table 26.2 CIRIA SuDS Manual C753.

A Simple Index Approach has been undertaken to determine Sufficiency of Pollution Mitigation Indices for selected SuDS components, based on the land use featuring the highest pollution hazard level.

The SuDS pollution mitigation indices provided by the proposed attenuation basin (TSS: 0.5, Metals: 0.5, HCs: 0.6) are greater than (or equal to) the pollution hazard index for each land use within the proposal thus demonstrating that sufficient treatment of surface water runoff will be provided as part of the proposed development.

4.8. Maintenance and Management Plan

Maintenance of proposed SuDS features will be required to ensure these remain operational over the lifetime of the proposed development. An indicative maintenance plan for the proposed SuDS and associated features is provided in Table 4-4 below. The SuDS maintenance and inspections responsibility rests with the owners or could be arranged through appointment of a site management company.

Maintenance Schedule	Required Action	Typical Frequency
Attenuation Pond		
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework, etc for evidence of blockage and/or physical damage/	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates and establish appropriate removal frequencies; undertake contamination testing once some build up has occurred to inform management and disposal options	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; including max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from waters edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season	Annually
	Remove sediment and planting from one quadrant of the main body of the pond	Every 5 years or as required
Occasional maintenance	Remove sediment from main body of pond when pool volume is reduced by 20%	Required rarely, e.g. every 25 – 50 years
Remedial Actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required

Table 4-4: Indicative maintenance and management plan adopted from CIRIA SuDS Manual C753.

5. Conclusions

The proposed development comprises the redevelopment of the site to provide a new residential dwelling with improved access, a rear garden area and associated car parking.

It is proposed to discharge surface water runoff generated by the proposed development at a rate of 1.0 l/s which represents the minimum rate required for effective self-cleansing for a Hydrobrake or similar flow control device. Surface water attenuation will be provided in the form of an attenuation basin that will provide additional SuDS benefits in addition to the storage of water including treatment of runoff and improvements to local amenity and biodiversity. It is proposed to discharge surface water runoff generated by the proposed development to the existing drainage ditch to the east of the site, subject to agreement with the LLFA.

Assuming that the conceptual surface water drainage strategy outlined above is acceptable to the Local Authority a more detailed design can be presented and agreed with the appropriate regulatory bodies during the detailed design phase.

Figures

Figure 1 – Site Location Plan



Client: CJ Partnership Ltd				Title: Site Location & Boundary Plan		 LK CONSULT	
Site: Birchinley Manor, Milnrow				Scale (see scale bar): 1:15,000 & 1:1250 @ A4			
Drawing No.: FRA251243	Drawn By: AY	Checked By: DP	Drawn: May 2026	Figure: 1	Revision:		

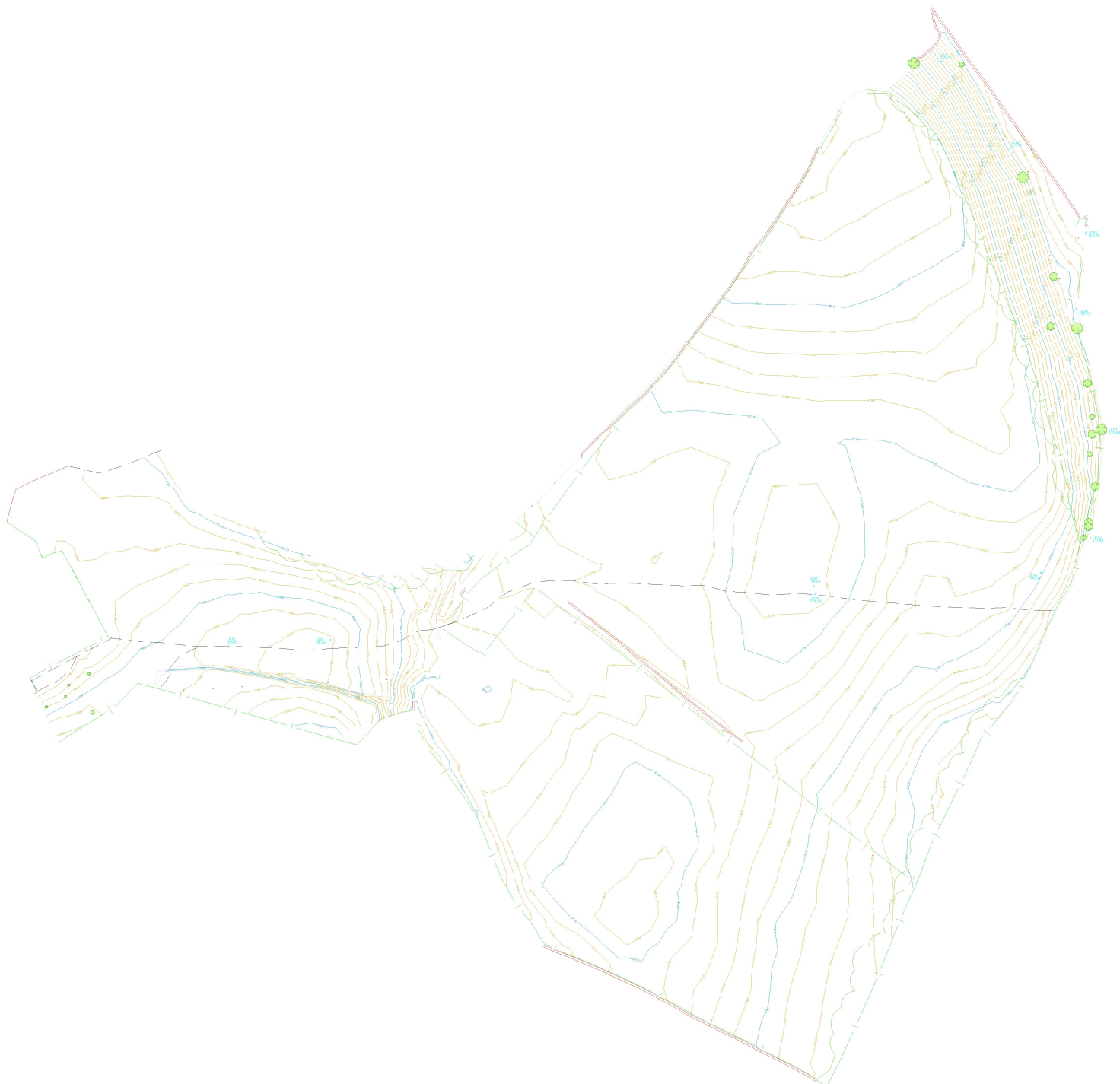
Appendices

Appendix A – Proposed Development Plans



Paul Keighley and Sarah Mcdowell Land at Birchinley Manor Wildhouse Lane Milnrow Rochdale	Site Plan as Proposed SK01	contract no	drawing no	revision	Revisions: A. Layout and position amended, PDC, July 2025 B. House sited closer to Birchinley Manor grouping, August 2025	Blue Pit Mill Queensway Castleton Rochdale OL11 2PG +44 (0)1706 631347 info@cjpartnership.com www.cjpartnership.com	
	work to figured dimensions	3611	03	B			
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			June 2024	1:1000			

Appendix B – Topographic Survey



Appendix C – Indicative Mark-Up of Local Water Features



Paul Keighley and Sarah Mcdowell
Land at Birchinley Manor
Wildhouse Lane
Milnrow
Rochdale

Site Location Plan
Aerial View

work to figured dimensions

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contract no
3611

drawn by

drawing no
21

date
August 2022

revision
B

scale @ A3
1:2500

Revisions:
A. Layout and position amended July 2025
B. Building position rotated, January 2026

Blue Pit Mill Queensway
Castleton Rochdale OL11 2PG

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CJPARTNERSHIP

ENVIRONMENTAL ARCHITECTS

Appendix D – United Utilities Public Sewer Records

LKGroup**Unit 29
Eton Hill Road,
Radcliffe,
m26 2zs****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: FRA251243 Birchinley Manor, Milnrow
Our Ref: UUPS-ORD-718241
Date: 26/03/2026****Dear Sirs****Location: FRA251243 Birchinley Manor Milnrow**

I acknowledge with thanks your request dated 23/03/2026 for information on the location of our services.

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

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

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

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

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

Yours Faithfully,



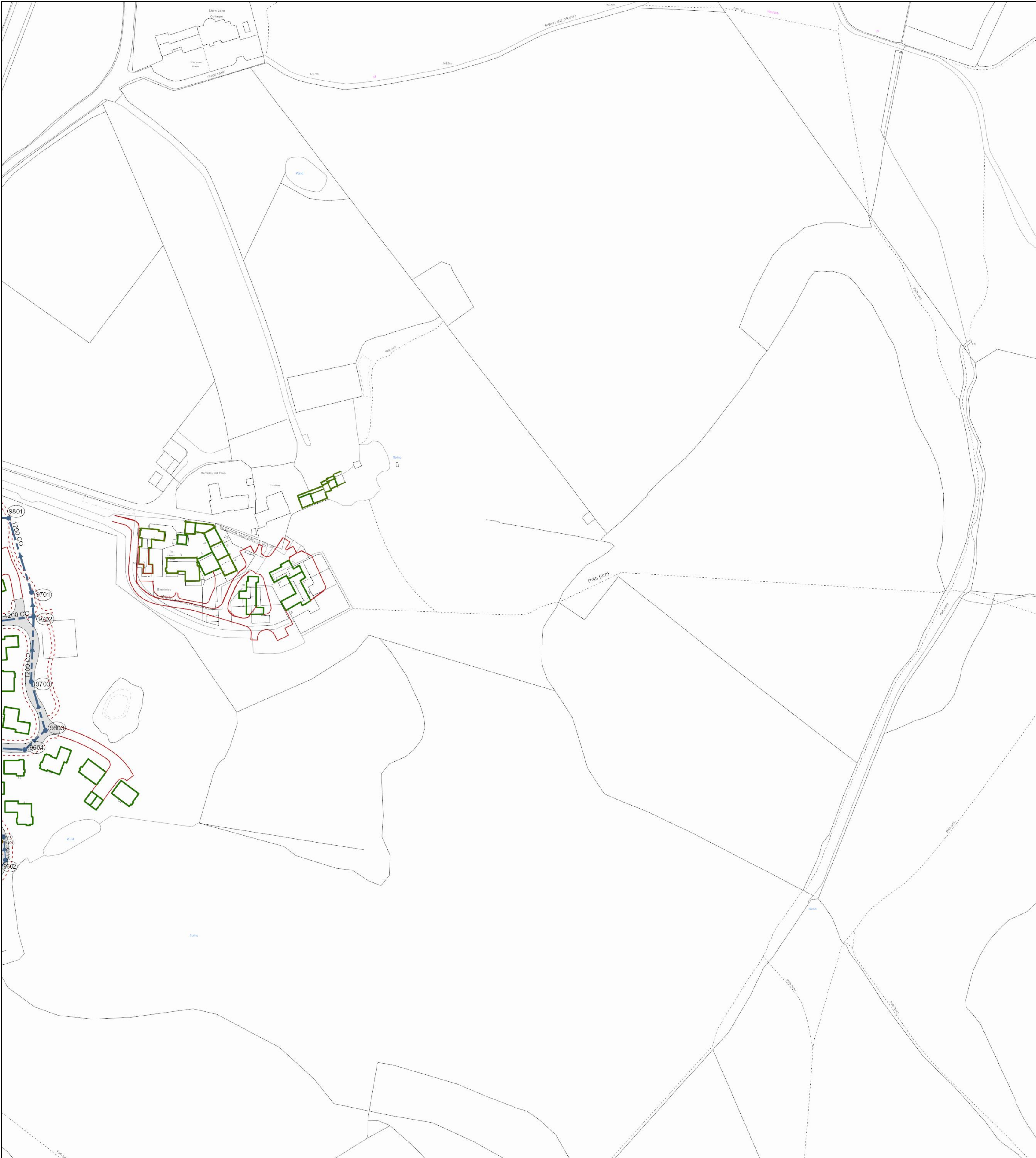
Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

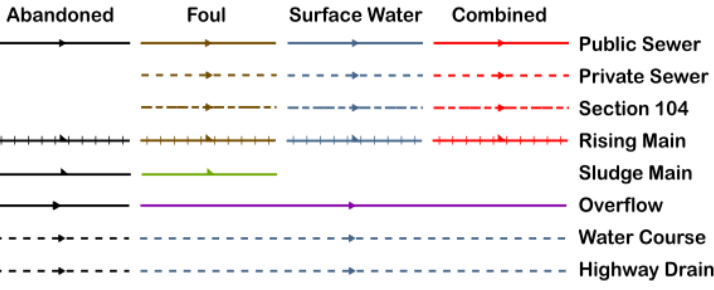
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out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



Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
9604	174.8	SW	170.25	1200		CO	15.53384	1 in 311	
9601	177.14	SW	174.6	300		VC	11.93458	1 in 25	
9602	177.7	SW	175.11	300		VC	12.63426	1 in 25	
8611	177.23	FO	174.74	150		VC	10.8742	1 in 58	
9603	174.82	SW	170.2	1200		CO	27.88292	1 in 279	
9702	173.8	SW	168.98	1200		CO	13.57451	1 in 675	
9703	174.3	SW	170.1	1200		CO	35.73454	1 in 298	
9801	173.74	SW	169.9	1200		CO	59.6973	1 in 749	
9701	174.08	SW	169.96	1200		CO	42.61289	1 in 710	

Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	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

Rodding Eye

Inlet

Discharge Point

Vortex

Penstock

Washout Chamber

Valve

Air Valve

Non Return Valve

Soakaway

Gully

Cascade

Flow Meter

Hatch Box

Oil Interceptor

Summit

Drop Shaft

Orifice Plate
- Side Entry Manhole

Outfall

Screen Chamber

Inspection Chamber

Bifurcation Chamber

Lamp Hole

T Junction / Saddle

Catchpit

Valve Chamber

Vent Column

Vortex Chamber

Penstock Chamber

Network Storage Tank

Sewer Overflow

Ww Treatment Works

Ww Pumping Station

Septic Tank

Control Kiosk

DNM Network Monitoring Point

Change of Characteristic

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
- SQ Square

SEWER MATERIAL

- AC Asbestos Cement
- BR Brick
- PE Polyethylene
- RP Reinforced Plastic Matrix
- CO Concrete
- CSB Concrete Segment Bolted
- CSU Concrete Segment Unbolted
- CC Concrete Box Culverted
- PSC Plastic / Steel Composite
- GRC Glass Reinforced Plastic
- DI Ductile Iron
- PVC Polyvinyl Chloride
- CI Cast Iron
- SI Spun Iron
- ST Steel
- VC Vitrified Clay
- PP Polypropylene
- PF Pitch Fibre
- MAC Masonry, Coursed
- MAR Masonry, Random
- U Unspecified

Address or Site Reference:

FRA251243 Birchlinley Manor Milnrow,

Scale: 1:1250 Date: 26/03/2026

Sheet: 1 of 1

Printed by: Property Searches

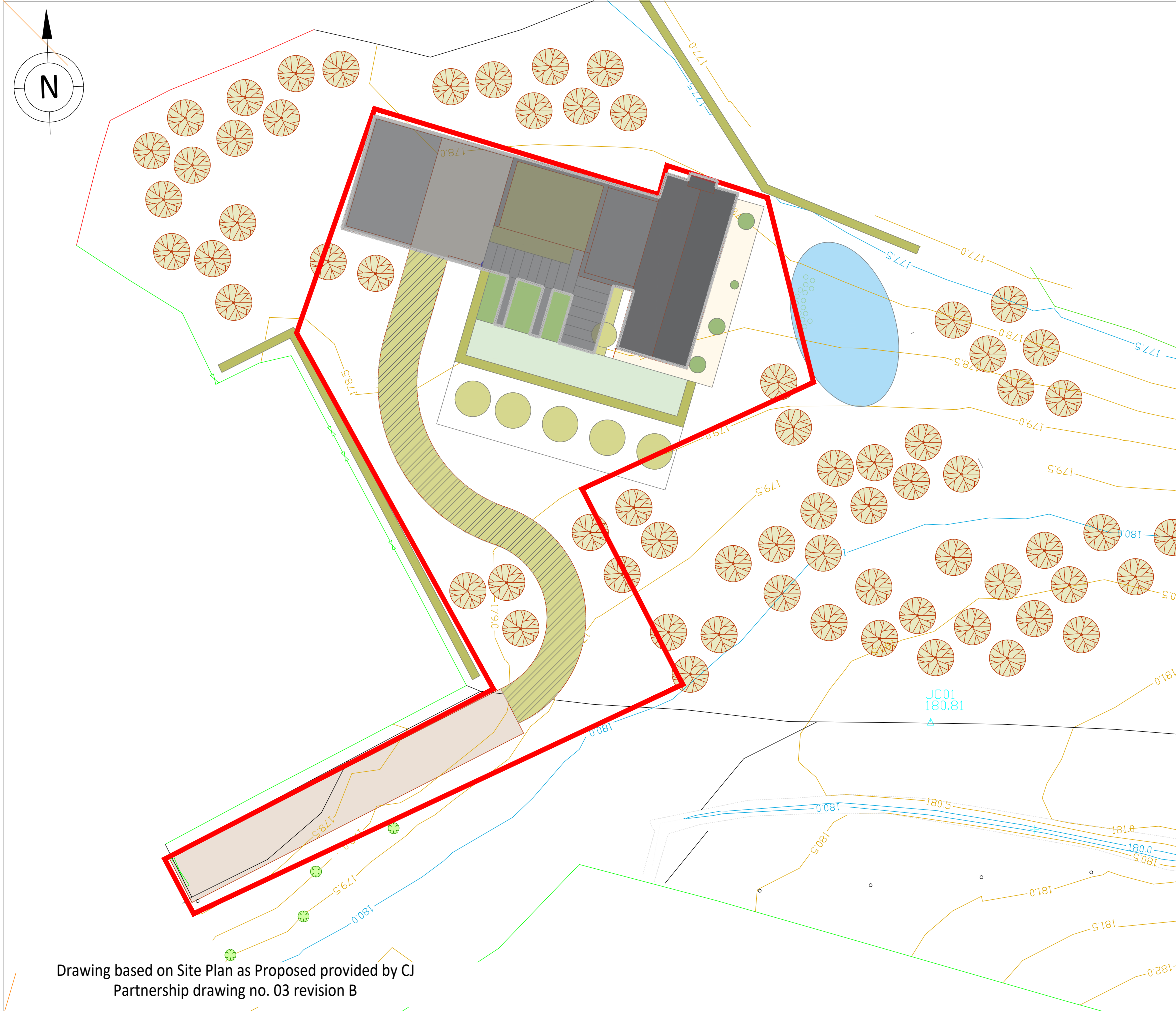
SEWER
RECORDS



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix E – Site Composition



KEY:

Site Boundary
(Area = 0.171 ha)

Access
(Area = 0.0174 ha)

Impermeable Area
(Area = 0.0412 ha)

NOTES:

Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information. Subject to detailed design.



LK GROUP

Client:

Paul Keighley

Site:

Birchinley Manor, Milnrow

Title:

Site Composition

Job No.:

FRA251243

Scale (See Scale Bar):

NTS

App:

E

Revision:

0

Drawn By:

AY

Checked By:

DP

Drawn:

May 2026

Drawing based on Site Plan as Proposed provided by CJ Partnership drawing no. 03 revision B

Appendix F – FEH Statistical Method (2025) Runoff Calculations

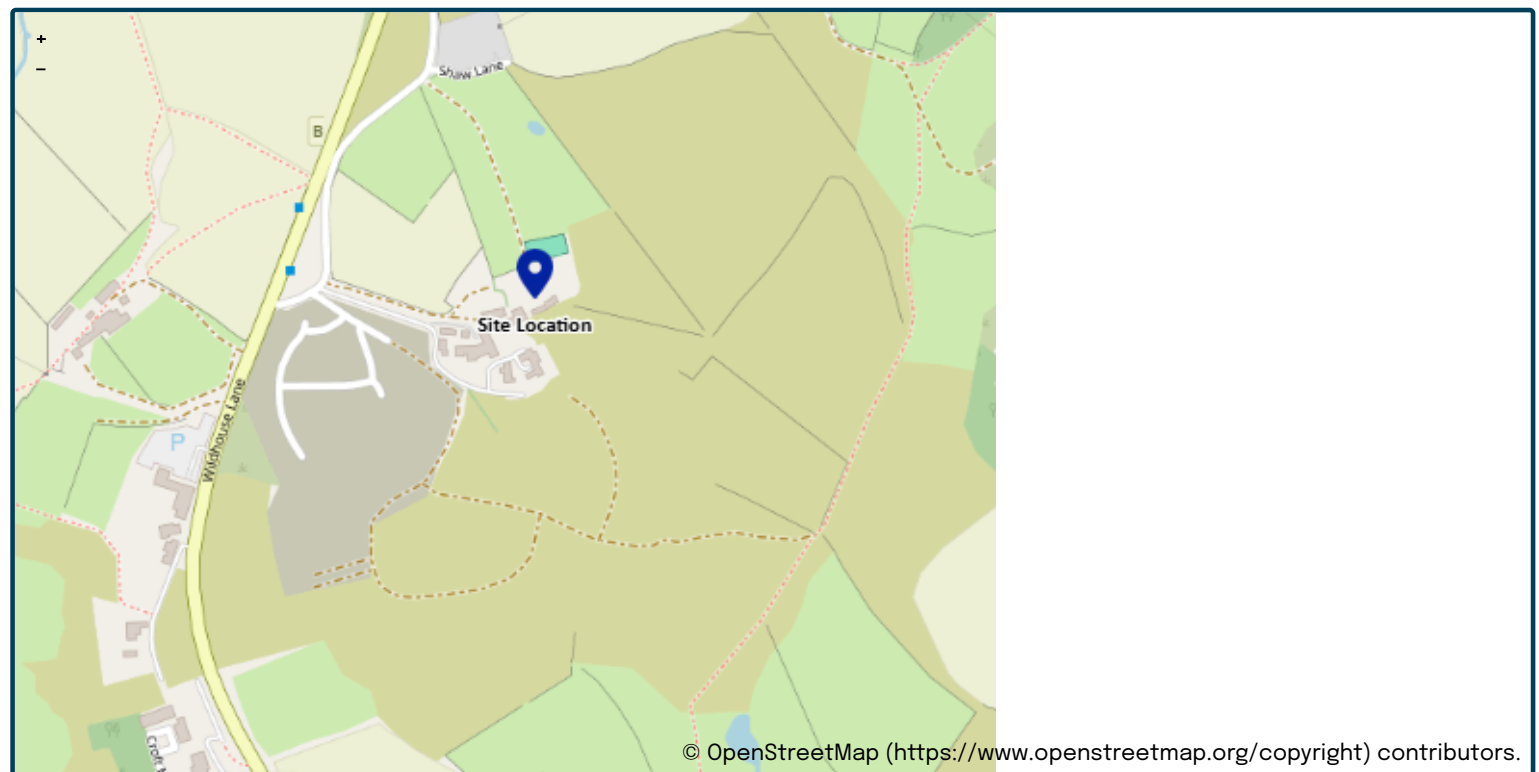
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	26/05/2026
Calculated by	
Reference	
Model version	2.2.3

Location

Site name	Birchinley Manor, Milnrow
Site location	



Site easting (British National Grid)	393067
Site northing (British National Grid)	413810

Site details

Total site area (ha)	0.0586	ha
----------------------	-------------------------------------	----

Greenfield runoff

Method

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

IH124

	<u>My value</u>		<u>Map value</u>
SAAR (mm)	1239	mm	1229
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	0.6	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

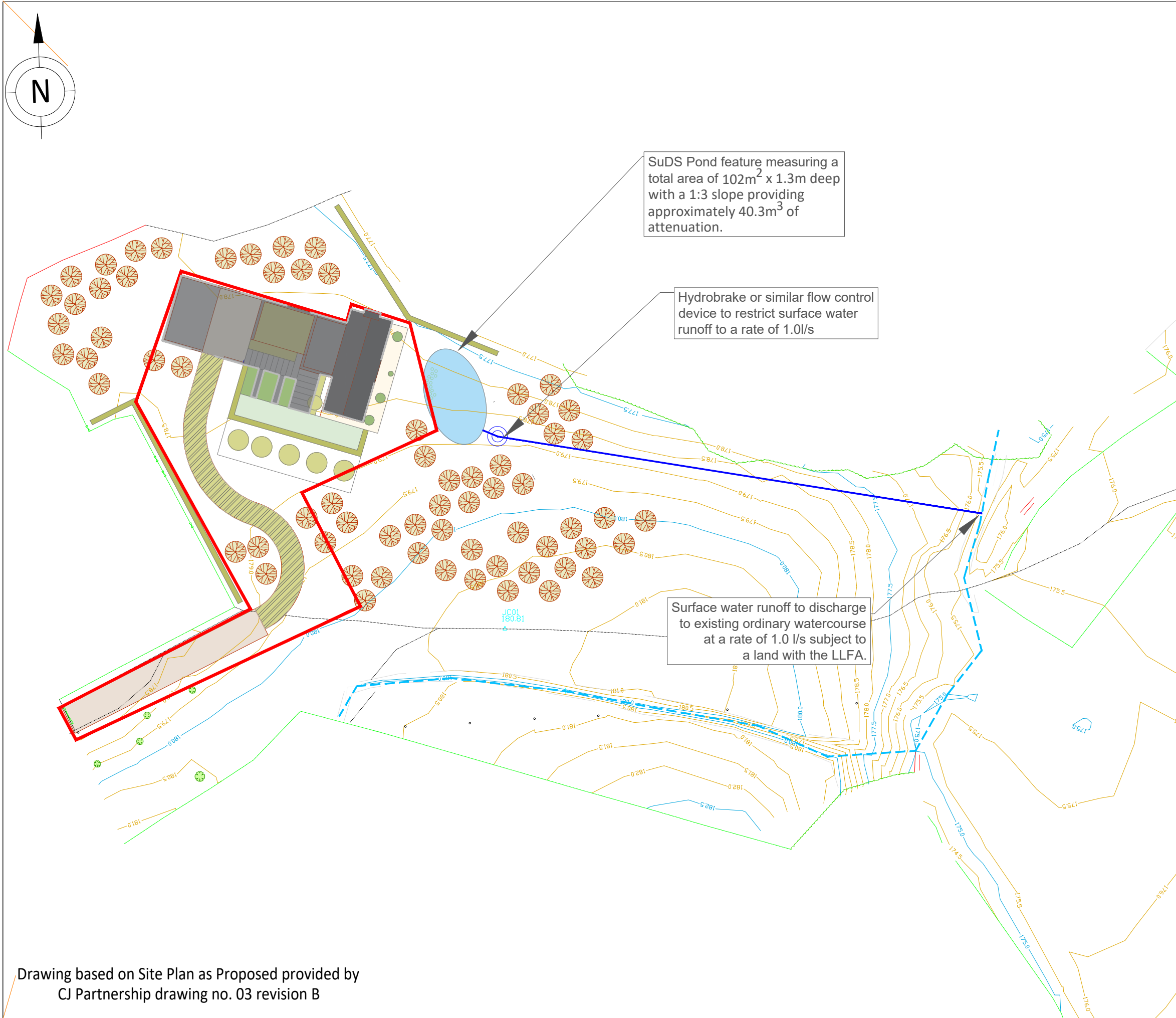
Method	IH124	
Flow rate 1 year (l/s)	0.5	l/s
Flow rate 2 year (l/s)	0.5	l/s
Flow rate 10 years (l/s)	0.8	l/s
Flow rate 30 years (l/s)	0.9	l/s
Flow rate 100 years (l/s)	1.1	l/s
Flow rate 200 years (l/s)	1.3	l/s

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 (2.2.3) 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.

Appendix G – Conceptual Surface Water Drainage Strategy



Drawing based on Site Plan as Proposed provided by
CJ Partnership drawing no. 03 revision B

Appendix H – Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Depth/Area 1	0.059	100.000	20.916	87.665	1.300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node Depth/Area 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	98.700	Product Number	CTL-SHE-0047-1000-1000-1000
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.0	Min Node Diameter (mm)	1200

Node Depth/Area 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	555

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	10.0	10.0	1.000	71.9	75.2	1.300	101.5	106.4

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
960 minute summer	Depth/Area 1	660	99.687	0.987	5.2	40.0175	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
960 minute summer	Depth/Area 1	Hydro-Brake®	1.0	79.4

Appendix I – References

¹ LKC, LKC241283-A1-PRA-Birchinley Manor R0, July 2024, Phase 1 Preliminary Risk Assessment

² CIRIA, December 2015, "The SUDS Manual", C753.

Based across the UK with
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