Wythenshawe Civic, Manchester – C2 The Birtles

Flood Risk Assessment and Drainage Strategy

November 2025

PREPARED FOR

Muse Places & Wythenshawe Community Housing Group

Flood Risk Assessment

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1. Introduction

1.1. Project Background

Civic has been appointed by Muse Places & Wythenshawe Community Housing Group to prepare a site-specific Flood Risk Assessment (FRA) and Drainage Strategy (DS) to support a full planning application for the revitalisation of Wythenshawe Civic at the location of the present Civic complex in Wythenshawe, Manchester, United Kingdom.

The wider Wythenshawe development forms part of a broader regeneration initiative aimed at enhancing the local area. The proposed masterplan development will involve around 2,000 new homes across a mixture of tenures and housing types to meet the needs of a diverse community.

This report specifically relates to C2 The Birtles, located on the northern boundary of the wider development area. The plot is currently entirely hardstanding, split between the building and hardstanding for car parking and deliveries and is part of the Birtles shopping centre. The proposed development for this plot comprises the erection of 81 no. residential apartments (Use Class C3a) with retail uses at ground floor (Use Class E), associated landscaping, servicing, car and cycle parking and other associated works following demolition of the existing buildings.

Whilst this report specifically addresses C2 The Birtles, consideration has been given to the wider development where there is insufficient data for plot specific areas.

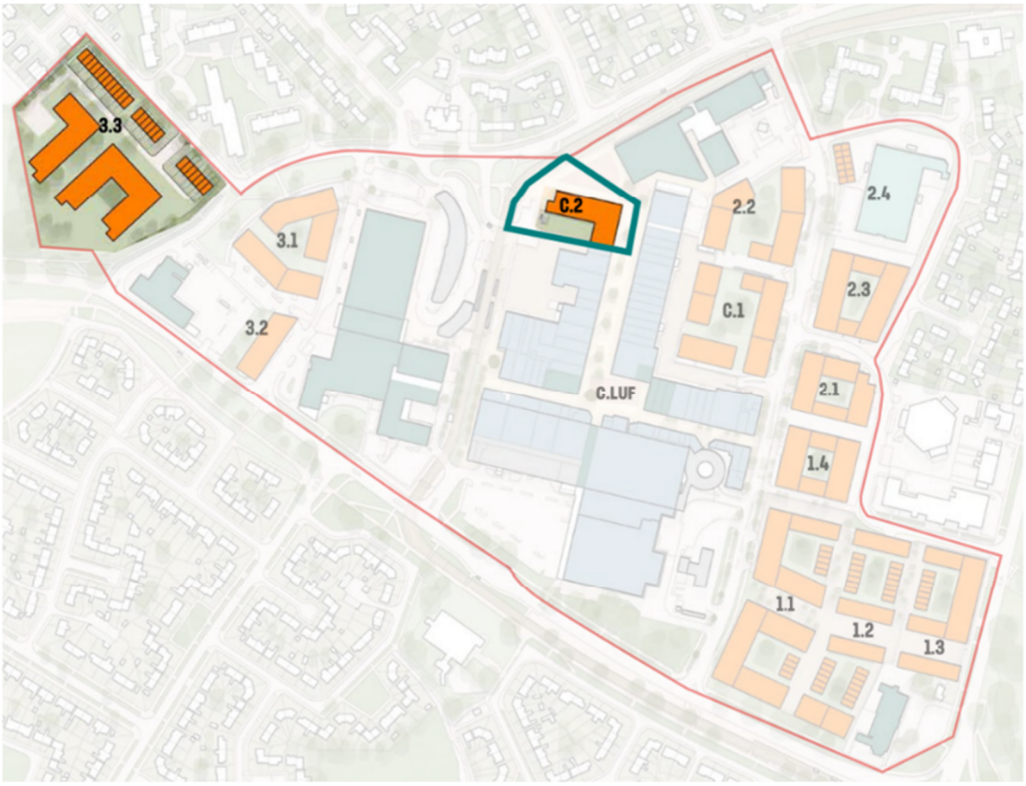

Figure 1: Plot Location in respect to wider development

1.2. Scope and Objectives

This report provides an overview of the nature of flood risk and the drainage strategy for the Site in line with relevant national and local guidance.

The report will detail how risk will be mitigated throughout the expected lifetime of the development whilst considering the context of the wider development.

In particular, this FRA and DS shall:

- Provide information on the existing hydrological aspects of the Site and identify any changes to this as a result of the proposed development.
- Provide an assessment of the existing and future risk of flooding to the Site from all sources, with specific regard to the effects of climate change, as well as the impact of proposals on flood risk outside of the Site.
- Outline and summarise the guidance and documentation used to inform the above assessment.
- Propose an outline drainage strategy and further measures to mitigate any residual risks of flooding.

This document is prepared for the exclusive use of Civic, the Client, Lead Local Flood Authority and Local Planning Authority. All comments and conclusions contained within are based upon the assumption that the sourced data is reliable. Civic accepts no liability for any inaccurate conclusions or assumptions resulting from inaccurate information.

2. Site Information

2.1. Location and Existing Site Description

The site address is as follows:

Birtles House, Unit 1 Market Place, Civic Centre, Wythenshawe, Manchester, M22 5RE

The Site measures approximately 0.3ha and comprises of Birtles House which is a vacant part two, part three storey L-shaped building with office space and storage uses on top of a retail ground floor. It is located to the top of The Birtles, next to the former Market Square at Etrop Way. The Site falls within the Wythenshawe Development Framework Area.

The site is situated within Wythenshawe Town Centre. To the north is a hard surfaced open market area at Etrop Way – an area with potential for improvement subject to funding – which is then bound by a footpath, Metrolink line, then Poundswick Lane; to the west is a controlled vehicle access route and beyond that the Metrolink line and Ainley Road; to the south is a servicing area, and existing retail units; and to the east The Birtles and further existing retail units.

A location plan is provided in 1.

Figure 2: Site boundary (solid red line) within indicative wider Wythenshawe development (dashed red line)

The Plot is comprised of two distinct areas, shown in in Figure 3.

The northern red segment is an existing building, the eastern section of this building is 3-storys and the western section is 2-storeys. The purple area to the south is the parking and hardstanding area and there is an existing substation present.

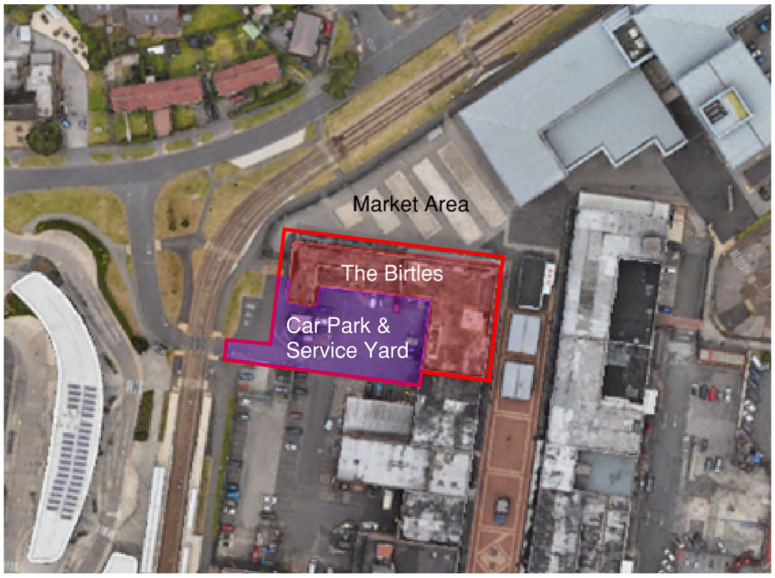

Figure 3: Existing buildings located on the Plot

2.2. Existing Topography

A topographical survey was produced by ND Oliver & Co Ltd in April 2025. The existing topography of C2 The Birtles varies across the site, with ground levels ranging from approximately 60.58m AOD at the south west corner of the site, beyond the substation, to approximately 59.37m AOD at the north-east corner. Overall, the site slopes generally South to North, with a fall of around 1.21m across the plot. There are no pronounced depressions or elevated areas that would influence water flow.

The full topographical survey, including all spot levels, and details, is provided in Appendix B.

2.3. Existing Ground Conditions

Civic Earth produced a *Preliminary Ground Conditions Assessment* (51143-CE-XX-XX-R-G-1008: 11/04/25) for C2 The Birtles, based on a review of historical mapping, published and unpublished geotechnical records, and desk study information`.

The plot is underlain by superficial deposits of Glacial Till over the Bollin Mudstone Member bedrock, with the Tarporley Siltstone formation beneath. “Made ground was recorded across the area, up to approximately 1.4m in thickness,” overlaying the Glacial Till. The Plot is located “within an area at very low risk from-shrink-swell clays, running sands, collapsible deposits, landslides and a negligible risk from compressible deposits and ground dissolution.” Potential contamination sources are associated with historical and current uses both on and near the plot. Likely contaminants include heavy metals, hydrocarbons, asbestos, and ground gas arising from Made Ground.

Intrusive site investigations (August.25), partially confirm the ground conditions previously identified in the *Preliminary Ground Conditions Assessment* due to early termination from potential services. Made Ground was recorded across the site, with thickness varying between approximately 1.0m and 1.5m, overlaying the Bollin Mudstone Member with extends to depths of around 15mbgl. Glacial Till also encountered at depths between 0.6m and 2.6m with an increase in sand content at greater depths, consistent with historical mapping. Materials identified within the Made Ground included concrete with rebar, tarmacadam and minor occurrences of brick, rare fragments, ceramic and plastic membrane. Overall, the intrusive testing is consistent with the initial assessment, indicating very low to negligible geotechnical risk, with the understanding of early terminations in the site investigation.

From BGS online view, the bedrock geology is Bollin Mudstone Member - Mudstone. Sedimentary bedrock formed between 247.1 and 241.5 million years ago during the Triassic period. There are also Superficial

deposits of Till, Devensian - Diamicton. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

2.4. Existing Drainage and Hydrology

The Plot is currently occupied by a mixture of buildings, and hardstanding areas, which are largely impermeable. United Utilities (UU) records **(shown in Appendix C)**, supported by a GPR survey conducted by ND Oliver & Co Ltd in (April.25), establish the existing drainage in and around C2 The Birtles. UU records, indicate that no dedicated surface water sewers are present in the immediate vicinity of the Plot.

UU records show a 375mm diameter combined sewer translating flows in a northeast direction, from the bus and metrolink interchange located west of the plot. This travels under the corner of the development before continuing under Etrop Way and increasing in size to a 450mm diameter sewer. The sewer then goes in a south east direction, to the northern edge of the central footway in the Birtles shopping area. It then takes flows north, through Etrop Court, then north east towards the metrolink, adjacent to Poundswick Lane. This information is derived from a combination of ND Oliver & Co Ltd and UU sewer records. The ND Oliver & Co Ltd information is shown in Figure 4.

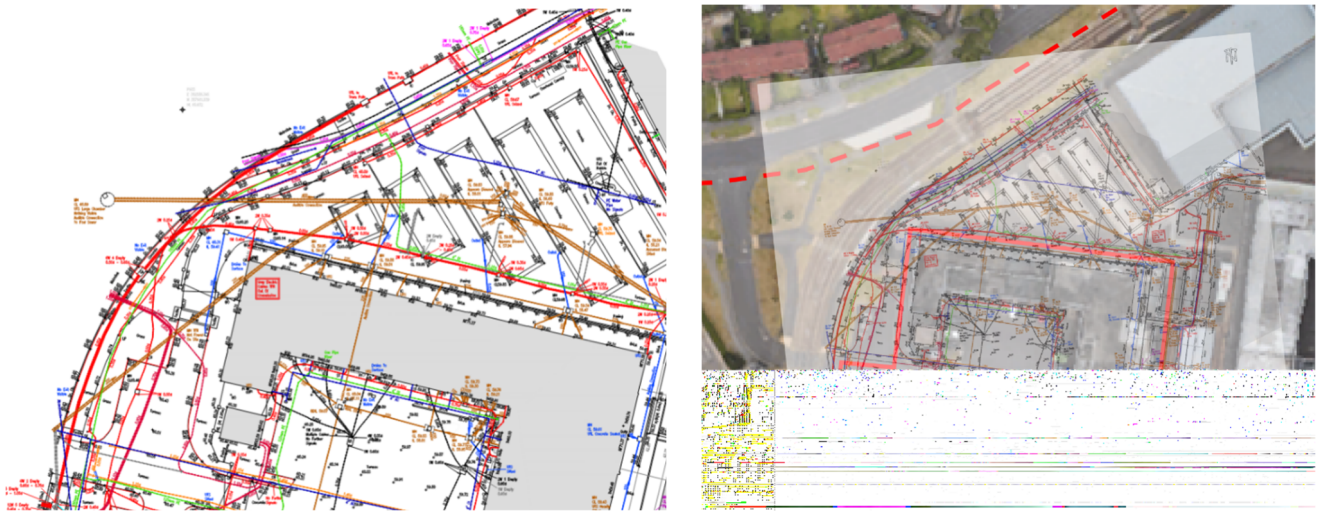

Figure 4: GPR Survey with map overlay

It is important to note that the Market area currently drains to a combination of channel drains adjacent to the concrete hard standings, these are being retained, and a channel drain on the northern boundary of the existing site, this is being removed. The Drainage Strategy section, 7, will inform how this is off-site catchment will be drained.

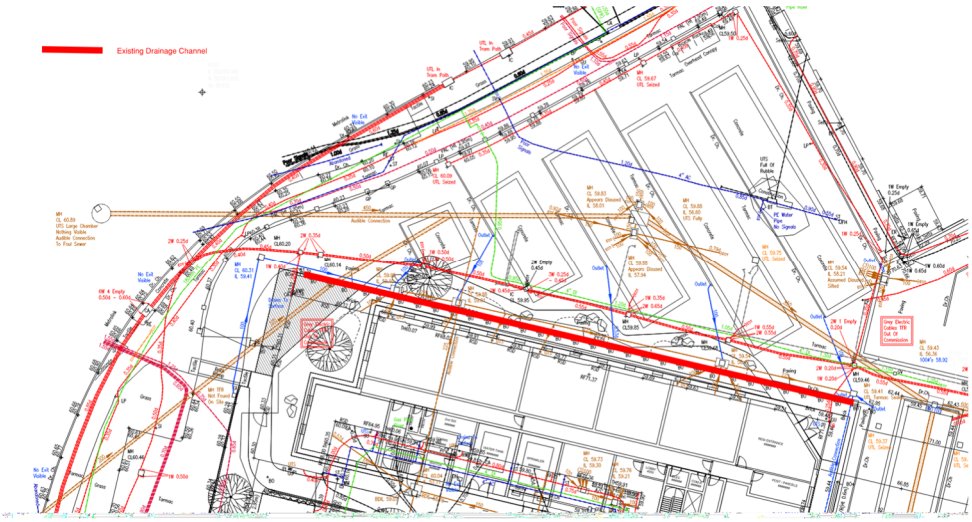

Figure 5: Existing drainage channel being removed

2.5. Existing Watercourses and Waterbodies

The nearest waterbody to the site is within Park woods, 0.48km northeast of the site. 0.75km to the west is an open section of the Statutory Main River, Baguley Brook, which is culverted until it is approximately 1.13km to the southwest of the site and connected to the artificial lake in Painswick Park. 1.33km to the east of the site is another Statutory Main River, Gately Brook, see Figure 6.

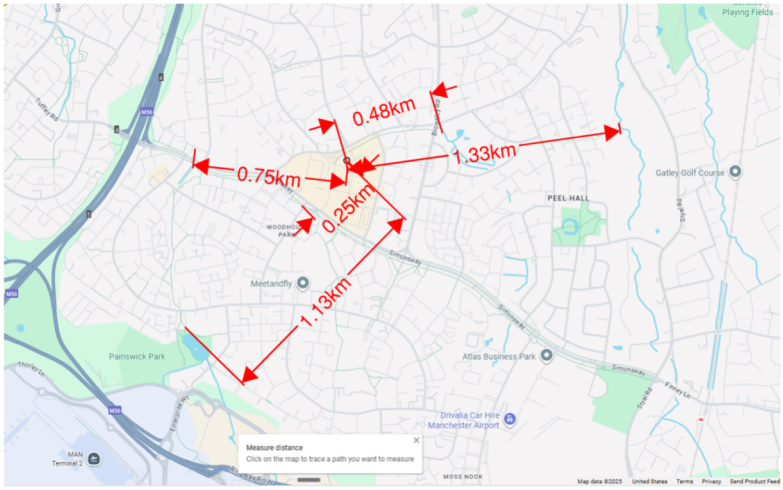

Figure 6: Proximity to Existing Watercourses and Waterbodies

In a pre-development enquiry, UU identified a culverted watercourse c.250m to the south of the site. From UU records, the 825mm diameter culverted watercourse, ref 5801 has an invert level of 59.02, this manhole is south of Simonsway and south of the metrolink line. The other, closer smaller culverted watercourse, a 225mm diameter section, ref 5802 has an invert level 59.84. This is south of Simonsway but north of the metrolink line.

See Figure 7 from UU pre-development enquiry.

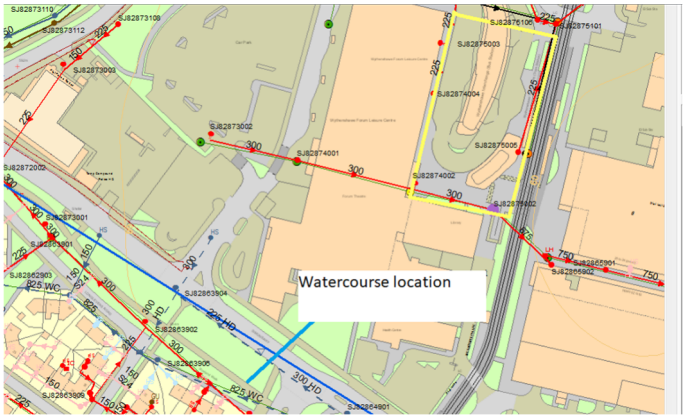

Figure 7: UU pre development enquiry - culverted watercourse

3. Development Proposals

The proposed development for this plot comprises the erection of 81 no. residential apartments (Use Class C3a) with retail uses at ground floor (Use Class E), associated landscaping, servicing, car and cycle parking and other associated works following demolition of the existing buildings.

4. Planning Policy Context

The Environment Agency's (EA) Flood Map for Planning has been consulted and the Site is shown to lie within Flood Zone 1, as shown in Figure 8.

Figure 8: Flood zone mapping for planning

The National Planning Policy Framework (NPPF) 2024 states that a Flood Risk Assessment (FRA) is only required for sites within Flood Zone 1 where one or more of the following points apply:

- The development has a site area of 1 ha or more.
- The site lies within an area with critical drainage problems (areas of critical drainage problems are currently only located within Devon and Cornwall).
- The local planning authority's Strategic Flood Risk Assessment (SFRA) shows it will be at increased flood risk in future.
- The site is at risk from other sources of flooding and its development would increase its vulnerability classification.

Local planning authorities may stipulate individual requirements for FRAs for developments within their administrative area. Policy EN14 (Flood Risk) of the Manchester Core Strategy 2012 requires that developments with an area of greater than 0.5ha residing in Critical Drainage Areas (CDA) identified in the Manchester, Salford, Trafford SFRA 2011will require submission of an FRA. The site lies within a Critical Drainage Area and is greater than 0.5ha in size.

Sections of Policy EN14 and Policy EN17 (Water Quality) of the Manchester Core Strategy have been superseded by Places for Everyone (PfE) Policy JP-S4, outlined in the Places for Everyone Joint Development Plan Document for Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan 2022 to 2039, which was adopted by Manchester City Council on 21st March 2024.

The following points detailed in PfE Policy JP-S4 are relevant to this planning application:

- Locating and designing development so as to minimise the impacts of current and future flood risk,

including retrofitting or relocating existing developments, infrastructure and places to increase resilience to flooding;

- Expecting developments to manage surface water run-off through sustainable drainage systems and as close to source as possible. Development should achieve greenfield run-off rates unless it is demonstrated to be impracticable. District local plans should consider setting more detailed surface water drainage policies to reflect local circumstances, including alternative surface water discharge rates, such as in areas with critical drainage issues;

- Ensuring that sustainable drainage systems:
    - Are designed to provide multifunctional benefits wherever possible,
    - including for water quality, nature conservation and recreation;
    - Avoid adverse impacts on water quality and any possibility of discharging hazardous substances to ground;
    - Are delivered in a holistic and integrated manner, including on larger sites split into different phases; and
    - Are managed and maintained appropriately to ensure their proper functioning over the lifetime of the development.

5. Relevant Legislation, Policies and Guidance

This statement has been produced following the requirements of the NPPF and Planning Practice Guidance (PPG), as well as complying with or referencing the following regional or local policy and documentation:

- Greater Manchester Combined Authority (GMCA) Level 1 Strategic Flood Risk Assessment (SFRA) 2019
- GMCA Hybrid Level 2 SFRA 2021
- Greater Manchester Surface Water Management Plan 2012
- Manchester Core Strategy Development Plan 2024
- Places for Everyone (PfE) Policy JP-S4 Flood Risk and the Water Environment
- Policy EN8 Adapting to Climate Change

Particularly relevant guidance provided within these documents and frameworks is presented below.

5.1. National Planning Policy Framework (NPPF)

The NPPF outlines planning policies within England and provides information on their application. The framework is supported by the Planning Practice Guidance, which includes advice on the assessment and management of flood risk during the planning and development process.

With regard to flood risk, the NPPF primarily aims to steer development away from areas with an unacceptable risk of flooding and relocate them in areas deemed more appropriate. The NPPF refers to the Flood Zones which are shown on the Environment Agency Flood Map, and establishes the range of uses which are appropriate, or compatible, land uses for each Flood Zone.

Annex 3 of the National Planning Policy Framework (NPPF) lists these land uses in the context of their flood risk vulnerability. The following extract below outlines the NPPF Flood Risk Vulnerability Classifications and their associated land uses:

- ESSENTIAL INFRASTRUCTURE
- HIGHLY VULENERABLE
- MORE VULNERABLE
- LESS VULNERABLE
- WATER-COMPATIBLE DEVELOPMENT

The Flood Zones can be summarised as follows:

- Zone 1: Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any one year. (<0.1%)

- Zone 2: Medium Probability. This zone comprises land assessed as having between 1 in 100 and 1 in 1000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.

- Zone 3a: High Probability. This zone comprises land assessed as having 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

- Zone 3b: Functional Flood Plain. This zone comprises land where water must flow or be stored in times of flood. Strategic Flood Risk Assessments should identify this zone.

The flood risk vulnerability and flood zone 'compatibility' has been summarised in Table 1 below. The EA presents a set of recommendations based on the level of vulnerability of a proposed structure and its flood zone.

Table 1: Flood Risk vulnerability and Flood Zone compatibility from NPPF Technical Guide

Flood Risk Vulnerability Classification		Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone (See Table 1)	Zone 1	√	√	√	√	√
	Zone 2	√	Exception Test Required	√	√	√
	Zone 3a	Exception Test Required	×	Exception Test Required	√	√
	Zone 3b (functional floodplain)	Exception Test Required	×	×	×	√
	√ Development is appropriate × Development should not be permitted.					

The flood zone categorisation for the site and evaluation of whether the development is appropriate is carried out in Section 5.3.

5.2. Sequential Test

A sequential test is one of the primary measures of mitigating flood risk and considers alternative available sites within the vicinity of a proposed development, assessing whether these have a lower risk of flooding than the currently proposed development location with the intention of prioritising development within areas

with reduced flood risk.

5.3. Development Suitability

Where a sequential test has been passed or is not required, a comparison of a Site's flood risk probability and vulnerability, informed by the EA's Flood Map for Planning and a classification of vulnerability based on land use, determines the suitability of a development within a given location.

Flood Vulnerability Classification

The Planning Practice Guidance defines five classifications of flood vulnerability based on development usage: 'Water-Compatible', 'Less Vulnerable', 'More Vulnerable', 'Highly Vulnerable' and 'Essential Infrastructure'. Descriptions of developments encompassed by the classifications are provided in Section 3.2. The development is categorised as more vulnerable based on its planned use ('Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs, and hotels').

Assessment

To assess the suitability of a particular development within a given location, Table 1 is used to compare the proposed development's flood risk vulnerability classification with its Flood Zone and defines whether the development is considered appropriate, as well as outlining whether an Exception Test is required. A more vulnerable development within Flood Zone 1 is deemed appropriate.

5.4. Manchester City Council Strategic Flood Risk Assessment (SFRA) and Manchester Core Strategy 2024

Manchester City Council SFRA states:

"Development should aim for a minimum reduction in surface water runoff rates of 50% for Brownfield sites, with an aim of reducing runoff to Greenfield rates up to a 1 in 100 year storm event, considering climate change.

Development should be designed so that there is no flooding to the development in a 1 in 30 year event and so that there is no property flooding in a 1 in 100 year plus climate change event.

Policy EN 8 (Adapting to Climate Change) of the Manchester Core Strategy requires that:

- Expecting developments to manage surface water run-off through sustainable drainage systems and as close to source as possible.
- Development should achieve greenfield run-off rates unless it is demonstrated to be impracticable. District local plans should consider setting more detailed surface water drainage policies to reflect local circumstances, including alternative surface water discharge rates, such as in areas with critical drainage issues.

5.5. Places for Everyone Joint Development Plan 2024 Policy JP-S4

The Places for Everyone Joint Development Plan is the Development Plan of nine Greater Manchester local authorities. It forms part of the council's statutory development plan following its adoption on 13th March 2024. Policy JP-S4 (Flood Risk and the Water Environment) does not provide additional requirements for FRAs, however, the following aspects of the policy are relevant to the development of the drainage strategy for the proposed development.

- Developments are expected to utilise SuDS and source control, working with natural processes and adopting a natural flood management approach to slow runoff and intercept pollutants.
- SuDS should be designed to:
    - Provide multifunctional benefits (e.g., for water quality, nature conservation and recreation), wherever possible,
    - Be delivered in a holistic and integrated manner, including on larger sites split into separate phases, and
    - Be managed and maintained appropriately over the lifetime of the development.

6. Flood Risk Assessment

6.1. Criteria for Assessment

6.1.1. Design Flood

Estimation of probable flood levels across the site following a flood event is based on the 'design flood'. This is considered to be the following flood events with associated annual probabilities:

- River flooding with an annual probability of 1 in 100 (1%) in any given year.
- Tidal flooding with an annual probability of 1 in 200 (0.5%) in any given year.
- Surface water flooding with an annual probability of 1 in 100 (1%) in any given year.

The above events should include an allowance for 45% climate change as detailed in the following section.

As the Site is located in Flood Zone 1 and has less than 1 in 1000 (<0.1%) annual probability of flooding from rivers and seas, the design flood is considered to at very low risk f flooding from rivers or sea.

Note, the drainage channel to the north of the site is being reinstated beyond the northern boundary of the site. This replaces the existing infrastructure and will not increase the likelihood of flooding to the development or surrounding areas. Further detail on this in Section 7.

6.1.2. Climate Change Allowances

To account for changes to peak river flow, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height as a result of climate change, the EA publishes climate change allowances to enable future flood risk to sites to be assessed and to facilitate resilient design of developments.

The site is located within the Upper Mersey Catchment, as defined by the Department for Environment, Food and Rural Affairs (Defra) Peak Rainfall Climate Change Allowances map.

The proposed development is expected to have a minimum lifespan of 100 years, as it is a residential development, which means that the 2070s epoch applies. To comply with the guidance, the surface water drainage system will be designed with a 45% climate change allowance for the 1% annual exceedance rainfall event, ensuring there is no increase in flood risk elsewhere and that the development is protected from surface water flooding.

EA guidance on the application of climate change allowances provides the following recommendations:

- Residential development should be considered to have a minimum lifetime of 100 years.
- FRAs should assess the upper-end allowances for peak rainfall for events with an annual probability of 1 in 30 (3.3%) and 1 in 100 (1%) in any given year.
- Assessment of peak river flow allowances is not required where a development is located in Flood Zone 1 and is not at an increased risk of flooding from rivers and seas in the future.
- Developments should be designed to be safe from surface water flooding and not increase flood risk elsewhere based on the upper-end allowance for peak rainfall for events with an annual probability of 1 in 100 (1%) in any given year.

The peak river flow (supplied for reference) and rainfall allowances for the site are provided in Table 2 and Table 3 below, respectively.

An upper-end allowance of 40% is adopted for peak rainfall in the assessment of surface water flood risk in the 1 in 30-year event, with an upper-end allowance of 45% adopted for peak rainfall in the assessment of surface water flood risk in the 1 in 100-year event.

Furthermore, an upper-end allowance of 45% is adopted for peak rainfall in the design of the proposed drainage system for the 1 in 100-year.

Table 2: Peak river flow allowances for the Upper Mersey Catchment

ALLOWANCE CATEGORY	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2020s' (2015 TO 2039)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2050s' (2040 TO 2069)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE '2080s' (2070 TO 2115)
Central	13%	22%	41%
Higher	17%	31%	53%
Upper	27%	51%	85%

Table 3: Peak rainfall allowances for the Upper Mersey Catchment

ALLOWANCE CATEGORY	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE 2050s (UP TO 2060)	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE 2070s (UP TO 2125)
3.3% AEP rainfall event		
Central	20%	30%
Upper end	35%	40%
1% AEP rainfall event		
Central	25%	30%
Upper end	40%	45%

Environment Agency datasets and mapping contained within the SFRA have been consulted to provide a brief overview of the Site's existing flood risk. The potential sources of flooding to the development have been assessed and are discussed below.

6.2. Tidal / Fluvial (Rivers and Sea) Flood Risk

Fluvial (main river) flooding occurs when the capacity of a main river is exceeded, resulting in water overtopping its banks. Heavy or prolonged rainfall, melting of ice and snow and – in rivers subjected to tidal processes – high tides and storm surges are the primary causes of this source of flooding.

- Where a site is in a dark blue shaded zone, this indicates that the site is within high flood risk where there is a chance of flooding of greater than 1 in 30 (3.3%)
- Where a site is in a blue shaded zone, this indicates that the site is within a medium flood risk where

there is a chance of flooding between 1 in 100 (1%) and a in 30 (3.3%)

- Where a site is in lighter blue shaded colour zone, this indicates that the site is within low flood risk where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100(1%)
- Where a site is in the lightest blue shaded zone, this indicates that the site is within very low flood risk where there is a chance of flooding of less than 1 in 1000 (0.1%)

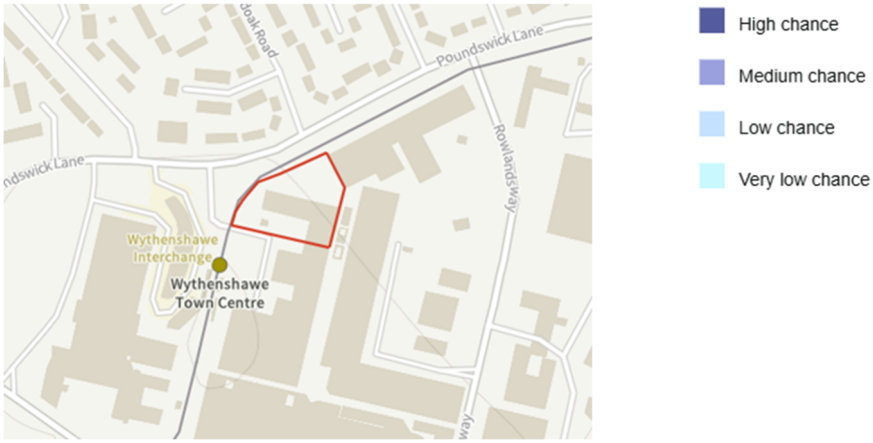

Figure 9: Risk of flooding rivers and sea © Environment Agency

The nearest significant surface water feature is a lake in Painswick Park located approximately 1.13km to the southwest. This lake is fed by the Baguley Brook, which flows within a culverted channel and runs North-South around 750m West of the development site. In addition, unnamed streams and a small pond approximately 450m Northeast of the plot within Park Wood, and a further stream located about 650m Southeast of the site within Hatchetts Wood.

Figure 10: Existing Watercourses and Waterbodies

Flood risk for the site from rivers and seen is indicated in Figure 14, shows there is no risk of flooding from rivers and sea.

6.3. Surface Water Flooding to the Site / Pluvial

Surface water flooding can be caused when rainwater, during extreme rainfall events, does not drain away through the normal drainage system or soak into the ground. Surcharging sewers can result in overland flows which if originating at a higher elevation than a development site can potentially pose a flood risk.

Surface water flooding is dependent primarily on topography, which dictates either the flow path of overland flow which is not contained within public sewers, or areas in which ponding may occur. Surface water flooding is more difficult to predict than the risk of flooding from Rivers or Sea as it is dependent on the amount of rain which will fall in a very localised area, the specific topography of that region and the capacity

and functionality of the drainage network within that section.

From the UK Government's Flood Risk from Surface Water (extent of flooding) map.

- Where a site is in a dark blue shaded zone, this indicates that the site is at high risk of flooding where there is a chance of flooding of greater than 1 in 30 (3.3%).
- Where a site is in a mid-blue shaded zone, this indicates that the site is at medium risk of flooding where there is a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).
- Where a site is in a light blue shaded zone; this indicates that the site is at low risk of flooding where there is a chance of flooding between 1 in 1000 (0.1%) and 1 in 100 (1%).
- Where a site is in a white (unshaded) area; this indicates that the site is at very low risk of flooding where there is a chance of flooding of less than 1 in 1000 (0.1%).

The EA's Risk of Flooding from Surface Water map (Figure 11) shows the majority of the Site is at risk of pluvial flooding. A detailed drainage strategy, supported by hydraulic calculations, has been prepared to demonstrate clearly that the proposed layout, design and mitigation measures would ensure there would be minimal risk of surface water flooding to occupiers and users throughout the lifetime of the development, without increasing flood risk elsewhere. Therefore, a sequential test need not be applied.

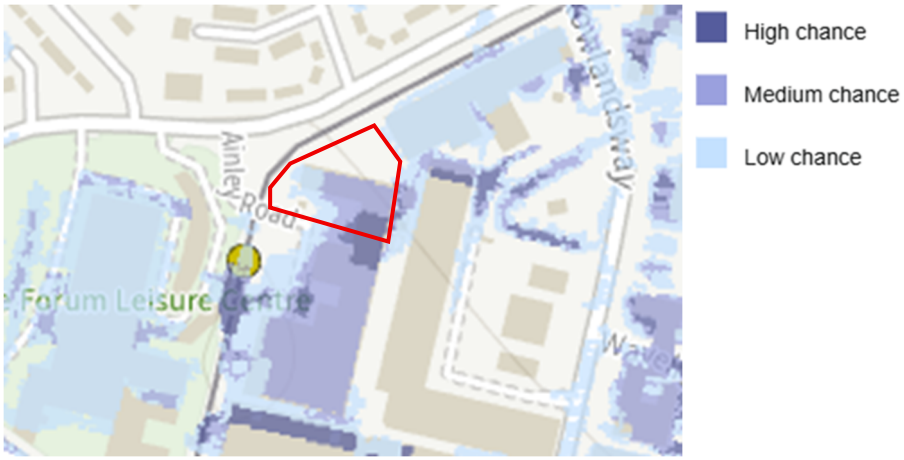

Figure 11: Surface Water Flood Risk Map

6.4. Canals Flood Risk

In comparison to rivers, canals are generally less susceptible to significant changes in water level due to rainfall. The Bridgewater Canal is located approximately 5.83km from the site and based on this distance, the risk of flooding from canals is considered to be extremely low.

6.5. Groundwater

Groundwater flooding is the result of an elevated underground water table enabling water to permeate to the surface. The risk to life is generally insignificant owing to the slow rate at which flooding takes place, although substantial damage to property can occur.

The EA magic Map: Ground Vulnerability maps (Figure 8) suggest that C2 The Birtles is located in an area considered to be a medium to low risk of groundwater vulnerability.

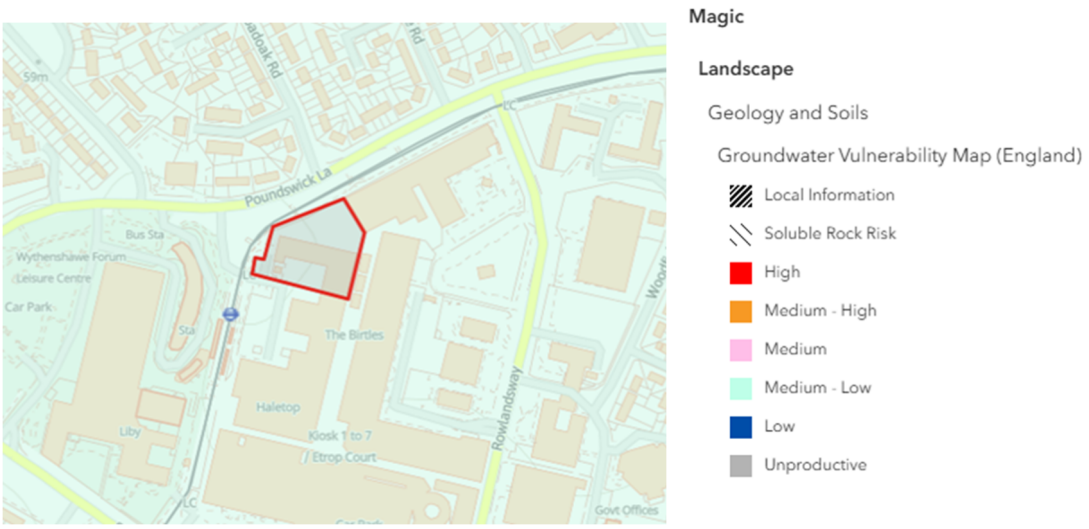

Figure 12: EA Magic Map: Ground Water Vulnerability Extract

A recent intrusive site investigation (conducted by Civic Earth) recorded one groundwater strike at approximately 5.0mbgl. The recorded groundwater aligns with the underlying Bollin Mudstone Member bedrock and indicates and overall medium to low ground water flood risk.

6.6. Reservoir Flooding

Reservoirs may flood in the event of a dam collapse resulting in the release of a significantly large volume of water, however, reservoirs in the UK have an excellent safety record and the probability of such an event is considered extremely low as there has been no recorded loss of life in the UK from reservoirs flooding since 1925.

Flood risk to the site from reservoirs is indicated in Figure 13, there is very low extent of reservoir flooding around or near this site therefore the overall risk of flooding is considered low.

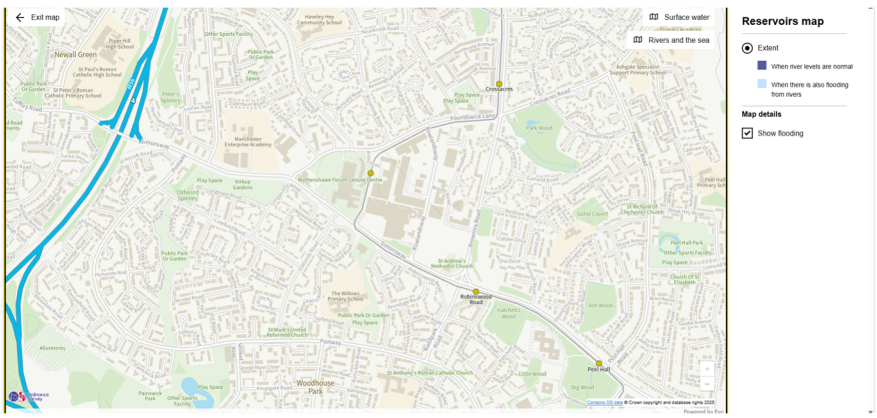

Figure 13: Extent of flooding in event of reservoir failure © Environment Agency.

6.7. Risk of Flooding from Sewers

In relation to the wider development the surrounding sewers are presumed to be adopted assets maintained by United Utilities. No recorded incidents of flooding of these assets have been found. It is presumed that the risk of sewer flooding is very low provided the statutory undertaker carry out their responsibilities to minor and regularly maintain these assets.

6.8. Summary of Flood Risk

From the evidence collected, the flood risk proposed to the development can be summarised as follows:

- Rivers and Sea – Very Low Risk
- Reservoir – Very Low Risk
- Ground Water – Medium to Low Risk
- Sewers – Very Low Risk
- Surface Water – Medium to High Risk

Although the EA's Risk of Flooding from Surface Water map (Figure 11) shows the majority of the Site is at risk of pluvial flooding. A detailed drainage strategy, supported by hydraulic calculations, has been prepared to demonstrate clearly that the proposed layout, design and mitigation measures would ensure there would be minimal risk of surface water flooding to occupiers and users throughout the lifetime of the development, without increasing flood risk elsewhere. Therefore, a sequential test need not be applied.

7. Proposed Drainage Strategy

7.1. Surface Water Management

Currently the site is completely a hardstanding or building. There is no soft landscaping within the site boundary.

The site has an area of 0.284ha, and the greenfield discharge rate is equivalent to 1.3l/s. However, restricting the flow down to this rate utilising a vortex flow control device or an orifice plate is likely to result in blockages which would require a disproportionate amount of reactive maintenance to the development proposals. It is therefore proposed to discharge at 4.2l/s to reduce the risk of blockages.

At 4.2l/s approximately 116m^3 storage is required on site to attenuate the surface water flows in a 100 + 45% climate change storm event.

It is proposed to attenuate these flows in permeable paving and geo-cellular storage tanks.

This area is all positively drained to the local UU combined sewer network.

The offsite catchment within the Market area currently drains to a combination of channel drains adjacent to the concrete hard standings, these are being retained, and a channel drain on the northern boundary of the existing site, this is being removed. Proposals for this are to divert this channel drain beyond the northern extent of the site, avoid existing services and utilise an Aco Qmax, or equivalent, the same size and capacity as the existing channel drain. The route for this is indicatively shown below. The route avoids existing services but will need coordination with UU as it encroaches on the combined sewer easement.

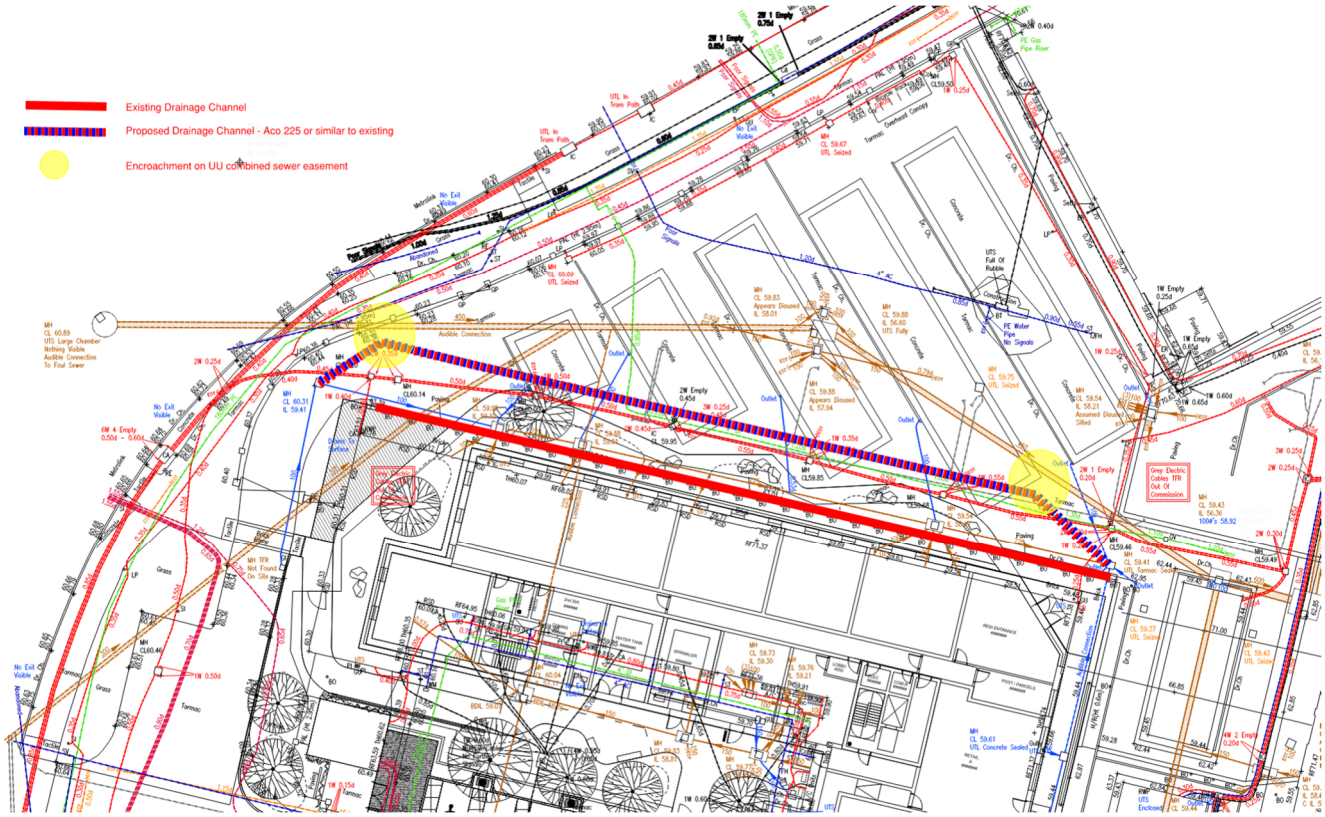

Figure 184: Market area drainage proposal

7.2. Post-Development Runoff and Attenuation

In accordance with the requirements of The Places for Everyone Joint Development Plan, the site was assessed to understand what the greenfield run-off rate was and therefore what the site constraints would be.

The greenfield runoff rate is 1.3l/s, however constraining the discharge at this rate would've required a orifice or flow control device with an aperture of less than 75mm. This is a significant blockage risk and the required frequency to maintain the flow control in an appropriate state is unrealistic. Therefore the flow rate has been assessed based on the minimum flow rate resulting from a 75mm aperture in a flow control device. The subsequent discharge rate is 4.2l/s.

All surface water run-off from the development shall be restricted to 4.2l/s and all excess rainwater will contained within the site demise for storm events up to the 1 in 100 year plus 45% allowance for climate change.

In restricting the flows from the development site, there will be a requirement to provide attenuation to accommodate flows up to the 1 in 100-year event with a climate change allowance of 45%. The purpose of the attenuation is to maintain operation on the system during the 1 in 1-year, 1 in 30-year and the 1 in 100-year (plus climate change) storm events.

The required volume of attenuation has been calculated to be approximately 116m^3 using the quick storage estimate function in Infodrainage software.

7.3. Drainage Hierarchy Points of Discharge

The NPPF Planning Practice Guidance Paragraph 080 states that:

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

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

Infiltration Potential of Sustainable Drainage Systems (SuDS)

As described in section 2.3 of this report, the majority of the site is underlain by Bollin Mudstone Member – Mudstone and has superficial deposits of Till, Devensian - Diamicton. The SI undertaken states the Glacial till underlaying the site constitutes of clay which is unfavourable to infiltration. Furthermore groundwater has been identified in the Bolin Mudstone Member there is records of the SI finding groundwater. Therefore, it is considered that soakaway drainage will not be a suitable means of disposing surface water runoff from the developed site.

Water Body

The nearest significant surface water feature is a lake in Painswick Park located approximately 1.13km to the southwest. This lake is fed by the Baguley Brook, which flows within a culverted channel and runs North-South around 750m West of the development site. In addition, unnamed streams and a small pond approximately 450m Northeast of the plot within Park Wood, and a further stream located about 650m Southeast of the site within Hatchetts Wood. Disposal of surface water via discharge to a water body is not deemed feasible due to the distance to the water body and the constraints imposed by crossing third-party land ownerships.

Surface Water Sewer

The nearest surface water sewer is c.160m west of the site, mh ref 4106, however to discharge to this location multiple third-party landownerships must be crossed including the metrolink. Therefore it is not deemed feasible to

discharge to this sewer.

Combined Sewer

There are several combined water sewers surrounding the development and it is likely this will be the only feasible discharge option for the development based on the results of UU sewer records and additional surveys.

The current strategy is designed on the basis that discharge to the 375mm diameter combined sewer between mh ref 5104 and 6104 t the south of Etrop Way.

7.4. Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) will be utilised in line with The SuDS Manual (C753) guidance and aim to minimise the impact the development has on runoff quantity and quality and maximise amenity and biodiversity opportunities.

The management train approach is a fundamental principle of SuDS, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that **at least two** of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using; green roofs, permeable pavements and soakaways.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geo-cellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, i.e. balancing ponds and wetlands.

The drainage strategy for this development will incorporate Source Control; permeable paving and Site Control; flow control.

Details of how the SuDS hierarchy have been reviewed are shown in the table below.

Table 4: Detailed SuDS Hierarchy review:

Order of Priority	Sustainable Drainage Measures	Suitability (Y/N)	Comments
1	Store rainwater for later use	N	Discounted – not adequate area required for irrigation to make proposal commercially viable. Alternative methods proposed to irrigate landscaped areas (raingardens)
2	Use infiltration techniques, such as porous surfaces in non-clay areas	N	Discounted – the underlying soil characteristics inhibit using infiltration as a method of disposal i.e. soakaways. Borehole records show low permeability substrate underlain by the water table being present in the underlying member.
3	Attenuate rainwater in ponds or open water features for gradual release	N	Discounted – spatial constraints and alternative filtration and attenuation provided elsewhere.
4	Implement green roofs or raingardens for water retention	N	Discounted – spatial constraints and alternative filtration and attenuation provided elsewhere.
5	Attenuate rainwater beneath permeable surfaces such as car parks	Y	Attenuation has been provided in the form of permeable paving
6	Attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Attenuation tanks have been proposed to retain additional flows greater than 4.2l/s to provide additional attenuation, secondary to the permeable paving.
7	Discharge rainwater direct to a watercourse	N	Discounted – all flows are controlled at source and proximity to watercourse makes this unfeasible.
8	Discharge rainwater to a surface water sewer/drain	N	Discounted – Proximity to surface water network makes this unfeasible.
9	Discharge rainwater to the combined sewer	Y	There is a local combined sewer which the site will discharge to.

7.5. Surface Water Drainage Design

In order to restrict surface water run-off from the development site to 4.2l/s run-off rate, on-site storage will be required to accommodate excess run-off.

This is achieved utilising **Source Control** and **Site Control**.

Within the current design, it is anticipated that storage will be provided by permeable paving and a geo-cellular buried attenuation tank.

The site drainage proposals are shown on the Drainage Strategy drawing in Appendix D.

7.6. Foul Water Drainage Strategy

The proposed foul water drainage network is to be a separate piped gravity network that conveys foul water flows from the proposed building within the development to the public combined sewer, and shall be designed in accordance with:

- BS EN 752:2008 (Drain and sewer systems outside buildings)
- Sewers for Adoption (7th Edition)
- Technical Guidance to the National Planning Policy Framework document (Department for Communities and Local Government, March 2012)
- BS EN 12056-2:2000 (Drainage systems inside buildings)
- Building Regulations Approved Document H, Drainage and waste disposal. (Office of the Deputy Prime Minister, December 2010)

No drainage pipes will be less than 100mm in diameter, and the design will ensure all velocities are over 0.75 m/s. Adequate access will be provided to ensure that maintenance activity can be carried out. Foul water drainage will be conveyed via a new below-ground pipe network and discharged from the site to the existing combined sewer located beyond the northwest corner of the site.

It is anticipated that the foul water from the development will discharge to the UU combined sewer in Etrop Way. There may be an option to utilise the existing manhole, alternatively a saddle connection will be required.

A Pre-Development enquiry has been issued to UU to confirm the discharge rate and the foul flows have been approved to discharge freely into the local combined sewer.

Any connection to the public sewer is subject to formal agreement with United Utilities under Section 106 of the Water Industry Act 1991.

The site drainage proposals are shown on the Drainage Strategy drawing in Appendix D.

7.7. Maintenance

Reference should be made to the Drainage Inspection and Maintenance Schedule in Appendix E, which includes required actions and typical frequencies for all drainage infrastructure serving the development. The drainage will be managed and maintained by an appointed Management Company.

8. Conclusion

This report has assessed the current and future flood risk to C2 The Birtles within Wythenshawe Civic redevelopment. The proposed development for this plot comprises the erection of 81 no. residential apartments (Use Class C3a) with retail uses at ground floor (Use Class E), associated landscaping, servicing, car and cycle parking and other associated works following demolition of the existing buildings.

The assessment has been undertaken in accordance with the National Planning Policy Framework (NPPF) and associated guidance on flood risk and coastal change contained within the Planning Practice Guidance. Manchester City Council. Salford City Council and Trafford Councils Strategic Flood Risk Assessment (SFRA), the Manchester Core Strategy 2012 and Addendum to Manchester Core Strategy 2024 which have served as a further source of information and guidance where relevant.

The assessment indicates that the site is located within flood zone 1, at very low risk from fluvial and tidal flooding, surface water flooding is the main source of potential risk, with EA mapping highlighting localised medium to high-risk areas. Although EA's Risk of Flooding from Surface Water map indicates that some minor areas of the site are at low, medium and high risk of surface water flooding, a detailed drainage strategy, supported by hydraulic calculations, has been prepared to demonstrate clearly that the proposed layout, design and mitigation measures would ensure there would be minimal risk of surface water flooding to occupiers and users throughout the lifetime of the development - without increasing flood risk elsewhere. Therefore, a sequential test need not be applied.

Climate change may increase rainfall intensities by up to 45% during the lifetime of the development, which could express these surface water risks. However, planned adjustments to site levels in line with the proposed layout, mitigate this flooding for the 1in30 and no impact to wider developments for the 1in100 + climate change event.

The drainage strategy for the Site includes Source Control and Site Prevention as SuDS measures. Infiltration has been deemed unfeasible due to the underlying soil characteristics. The borehole records show low permeability substrate not allowing significant infiltration.

Attenuation has been provided in the form of permeable paving and geo-cellular attenuation tank.

The proposed surface water outfall is the public combined sewer, as other discharge options are not deemed feasible due to the site's location and underlying ground conditions. The outfall to the public combined sewer will be subject to agreement with the Lead Local Flood Authority (LLFA) and United Utilities, the statutory undertaker for the sewer. It is proposed to limit surface water discharge to 4.2l/s.

There is an additional catchment considered beyond the northern extent of the site in the market area. The drainage channel that is serving this area clashes with the proposals and is required to be diverted. A proposed route has been suggested that avoids existing services but will need coordination with UU as it encroaches on the combined sewer easement.

Foul water flows will be conveyed using a traditional piped gravity system, discharging to the public combined sewer. This connection is additionally subject to approval from United Utilities under S106 of the Water Industry Act 1991.

Appendix A - Proposed Development – Site Layout

Seating
Mix of benches and cube blocks provided. PPC finished metal framework with timber seated tops. Bench to include back and arm rests. Colour TBC.

Bin
External bin provided to external resident space designed to match furniture. Final spec TBC

Door Guard
Proprietry door guard to resident accessible doors. Specification TBC.

Secure Railing
To perimeter of soft landscape to deter unauthorised access.
1.2m high mild steel PPC railing consisting of flat bar profiles. To incorporate electronic fob access to all gates.
Colour and detailed design tbc

Boulders
Natural stone boulders distributed through soft landscape

Lighting Bollard
Low level lighting bollard to resident amenity and ecologically sensitive areas.
Lighting layout indicative subject to specialist design input.
Propietary product, spec TBC.

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NOTES:
1. Do not scale from this drawing.
2. Always work to noted dimensions.
3. All dimensions are in millimetres unless otherwise stated.
4. All setting out, levels and dimensions to be agreed on site.
5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

KEY

Red Line Boundary

Paving Type 1
Acent Banding to Main entrance / Birtles pedestrian areas - to match LUF works

Paving Type 2
Hardstanding to pedestrian areas
Resin bound gravel or similar - Vehicle loading spec in front of substation and generator, pedestrian elsewhere. Colour TBC to compliment brickwork
Metal edging to all edges - Kinley Bison edging or similar approved

Paving Type 3
Accent Banding to Commercial unit entrances / Birtles pedestrian areas - to match LUF works

Paving Type 4
Tarmac with coloured chippings to parking bays - to include line painting to demark accessible bays.
Conservation kerb to all edges. Along rain garden edge, breaks in the kerb to allow for water drainge into planting

Paving Type 5
Temporary hardstanding to cover footprint of demolished building

Paving Type 6
Reinforced grass (geogrid) surfacing to facilitate substation access

Paving Type 7
Maintence strip to building preimeter. Clean round decorative gravel with timber edging - to retain 150mm of soft landscaping beyond

Tactile Paving
Tactile paving to crossing points

Ornamental Planting
Mixed shrub, herbaceous perennial & ornamental grass mix
Notes: 300mm topsoil over 400mm subsoil
Gravel garden and rain garden suitable mix planted within fine loose decorative gravel and large natural stone boulders - Refer to planting plans and drainage strategy drawings (Civic)

Rain Garden Planting
To be 20% planted 80% Decorative loose gravel with natural stone boulders.
Gravel garden and rain garden suitable mix - Refer to planting plans and drainage strategy drawings (Civic).
Notes: 300mm topsoil over 400mm subsoil (rain garden specific soil)

Native Hedge
Hedgerow to visually screen service area.
1.6m high instant hedge. Double staggered.
Notes: 300mm topsoil over 600mm subsoil

Climbers
Tensile wire system with climbing plants to soften and screen existing and new substation enclosures
Twining climber species - Final extent to be coordinated with substation ventilation requirements

Proposed Feature Tree
Semi-mature tree planted in soft landscape with underground guying system
30-35cm girth - Refer to planting schedules
Notes: 300mm topsoil over 600mm subsoil

Proposed Acent Trees
Semi-mature tree planted in soft landscape with underground guying system
20-25cm girth - Refer to planting schedules
Notes: 300mm topsoil over 600mm subsoil

+185.1m **Existing Surface Level**

+184.9m **Proposed Surface Level**

Revision	Date	Description	Drawn	Apprvd.
P08	10/11/25	For Information	MB	SC
P07	31/10/25	Planning	CB	SC
P06	20/10/25	Draft Planning - For Coordination	BM	SC
P05	15/10/25	For Information	CB	SC
P04	09/10/25	For Information	CB	SC

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Client Muse

Project Wythenshawe Civic Plot C2

Drg Title General Arrangement

Created on	Created by	Approved by
13-08-25	MB	SPL

Scale	Size	Workstage
1:200	A2	RIBA 2

Drg No. 3475a-PLA-XX-XX-DR-L-0001
Suitability S3 **Revision** P08

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Appendix B - Topographical Survey

NOTES

KEY

Grid & Datum - Local Plane Grid related to OS National Grid & Datum
By GNSS RTK Observations

STANDARD ABBREVIATIONS

STREET FURNITURE

A/C - AIR CONDITIONING
AE - AERIAL
AL - ALARM
AV - AIR VALVE
BA - BUOYANCY AID
BB - BELISHA BEACON
BD - BUILDING DIVIDE
BH - BOREHOLE
BI - BOLLARD ILLUMINATED
BL - BASEMENT LIGHT
BO - BOLLARD
BP - BOUNDARY POST
BR - BOULDER
BS - BUS STOP
BU - BUSH
CA - CABLE
CB - CONTROL BOX
CC - CLOSE CIRCUIT TV
CIB - CIGARETTE BIN
Col - COLUMN
CT - CLOSE CIRCUIT TV POLE
DP - DOWN PIPE
DR - DRAIN
Dr.Ch - DRAINAGE CHANNEL
DU - DUCT
EL - ELECTRIC
EP - ELECTRICITY POLE
ER - EARTH ROD
FA - FENDOR ANCHOR
F/B - FLOWER BED
FH - FIRE HYDRANT
FL - FLOODLIGHT
FS - FLAG STAFF
GA - GAS
GM - GAS METER
G - GIRTH
GP - GATE POST
GU - GULLY
GV - GAS VALVE
Hyd - HYDRANT
IC - INSPECTION COVER
IT - TRAFFIC COVER
JB - JUNCTION BOX
KO - KERB OFFLET
LA - LADDER
LB - LITTER BIN
LC - LIGHTING COLUMN
LI - LIGHT
LP - LAMP POST
MBO - MOORING BOLLARD
MA - MAST
MH - MANHOLE
MO - MONUMENT
MP - MILE POST
MR - MOORING RING
MW - MONITORING WELL
NP - NAME PLATE
O/H - OVERHEAD
OSBM ORDNANCE SURVEY BENCH MARK
PA - PLAY APPARATUS
PB - PILLAR BOX
PH - PUBLIC HOUSE
PI - PIPE
PL - PLANT
PM - PARKING METER
PN - PLANTER
PO - POST
PP - PETROL PUMP
RH - RIDGE HEIGHT
RS - ROAD SIGN
RI - ROAD SIGN ILLUMINATED
RTW - RETAINING WALL
RWP - RAINWATER PIPE
SA - STANCHION
SC - SPEED CAMERA
SD - SATELITTE DISH
S/F - SAFETY FENCE
SG - SIGNAL
SI - SIGN
SI - SIGN ILLUMINATED
SMP - SERVICE MARKER POST
SS - SECURITY SENSOR
ST - STOP TAP
SU - STUMP
SV - STOP VALVE
SW - SWITCHGEAR
SY - STAY
TA - TAP
TBM - TEMPORARY BENCH MARK
TCB - TELEPHONE CALL BOX
TE - TELEPHONE
TM - TICKET MACHINE
TS - TRAFFIC SIGNAL
TP - TELEGRAPH POLE
UTL - UNABLE TO LIFT
VDP - VEHICLE DETECTOR PAD
VP - VENT PIPE
WB - WHISTLE BLOW
WM - WATER METER
WO - WASH OUT
WP - WASTE PIPE

FENCE TYPES

B/W - BARBED WIRE
C/B - CLOSE BOARDED
C/I - CORRUGATED IRON
C/P - CONCRETE PANEL
H/R - HANDRAIL
I/R - IRON RAILING
PAL - PALISADE
P/C - POST & CHAIN
P/P - POST & PANEL
P/R - POST & RAIL
PSB - PEDESTRIAN SAFETY BARRIER
P/W - POST & WIRE
W/M - WIRE MESH

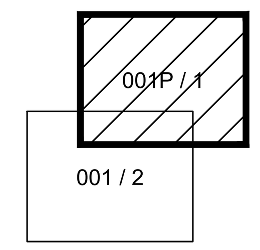
LEVELS

BL43.45 - BED LEVEL
EV43.45 - EAVE LEVEL
IL43.45 - INVERT LEVEL
43.45 - SPOT LEVEL
RF43.45 - ROOF LEVEL
RL43.45 - RIDGE LEVEL
SB43.45 - SOFT BED LEVEL
SL43.45 - SOFFIT LEVEL
TH43.45 - THRESHOLD LEVEL
WL43.45 - WATER LEVEL

SYMBOLS

HEDGE
GATE
BUILDING
TREE CANOPY
CONTROL STATION
EMBANKMENT
TREE
BUSH

SHEET LAYOUT



Rev	Date	Drawn	Description	Chk'd	App'd

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Title

AREA - C.2
WYTHENSHAWE CIVIC CENTRE
M22 5RQ

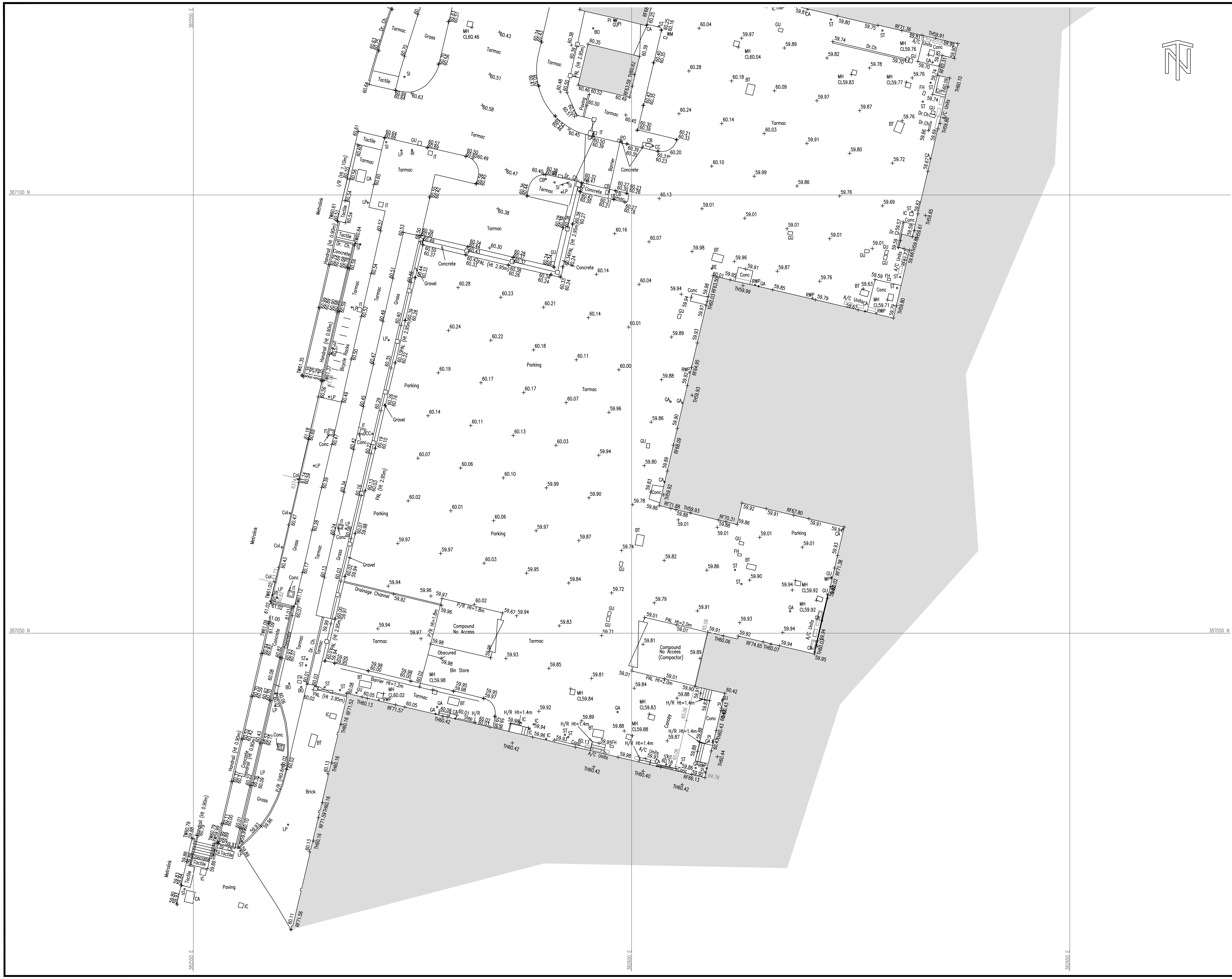
TOPOGRAPHICAL SURVEY

SHEET 1 OF 2

Surveyed	PG/HS/OB	Drawn	HS/PK	Drawn Date: 17/04/2025
Checked	AM	Approved	NDO	

Scale	Project	Status
1:200 @ A1	13162	PROV
	CAD File P:\\13162\DRAWINGS\13162_001P.DWG	

Drawing No	Rev
13162 / 001P / 1	0



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F/B - FLOWER BED
FH - FIRE HYDRANT
FL - FLOODLIGHT
FS - FLAG STAFF
GA - GAS
GM - GAS METER
G - GIRTH
GP - GATE POST
GU - GULLY
GV - GAS VALVE
Hyd - HYDRANT
IC - INSPECTION COVER
IT - TRAFFIC COVER
JB - JUNCTION BOX
KO - KERB OFFLET
LA - LADDER
LB - LITTER BIN
LC - LIGHTING COLUMN
LI - LIGHT
LP - LAMP POST
MBO - MOORING BOLLARD
MA - MAST
MH - MANHOLE
MO - MONUMENT
MP - MILE POST
MR - MOORING RING
MW - MONITORING WELL
NP - NAME PLATE
O/H - OVERHEAD
OSBM ORDNANCE SURVEY BENCH MARK
PA - PLAY APPARATUS
PB - PILLAR BOX
PH - PUBLIC HOUSE
PI - PIPE
PL - PLANT
PM - PARKING METER
PN - PLANTER
PO - POST
PP - PETROL PUMP
RH - RIDGE HEIGHT
RS - ROAD SIGN
RI - ROAD SIGN ILLUMINATED
RTW - RETAINING WALL
RWP - RAINWATER PIPE
SA - STANCHION
SC - SPEED CAMERA
SD - SATELITTE DISH
S/F - SAFETY FENCE
SG - SIGNAL
SI - SIGN
SI - SIGN ILLUMINATED
SMP - SERVICE MARKER POST
SS - SECURITY SENSOR
ST - STOP TAP
SU - STUMP
SV - STOP VALVE
SW - SWITCHGEAR
SY - STAY
TA - TAP
TBM - TEMPORARY BENCH MARK
TCB - TELEPHONE CALL BOX
TE - TELEPHONE
TM - TICKET MACHINE
TS - TRAFFIC SIGNAL
TP - TELEGRAPH POLE
UTL - UNABLE TO LIFT
VDP - VEHICLE DETECTOR PAD
VP - VENT PIPE
WB - WHISTLE BLOW
WM - WATER METER
WO - WASH OUT
WP - WASTE PIPE

FENCE TYPES

B/W - BARBED WIRE
C/B - CLOSE BOARDED
C/I - CORRUGATED IRON
C/P - CONCRETE PANEL
H/R - HANDRAIL
I/R - IRON RAILING
PAL - PALISADE
P/C - POST & CHAIN
P/P - POST & PANEL
P/R - POST & RAIL
PSB - PEDESTRIAN SAFETY BARRIER
P/W - POST & WIRE
W/M - WIRE MESH

LEVELS

BL43.45 - BED LEVEL
EV43.45 - EAVE LEVEL
IL43.45 - INVERT LEVEL
43.45 - SPOT LEVEL
RF43.45 - ROOF LEVEL
RL43.45 - RIDGE LEVEL
SB43.45 - SOFT BED LEVEL
SL43.45 - SOFFIT LEVEL
TH43.45 - THRESHOLD LEVEL
WL43.45 - WATER LEVEL

SYMBOLS

HEDGE
GATE
BUILDING
TREE CANOPY
CONTROL STATION
EMBANKMENT
TREE
BUSH

SHEET LAYOUT

001P / 1
001 / 2

Rev	Date	Drawn	Description	Chk'd	App'd

ND OLIVER & CO
CHARTERED GEOMATIC SURVEYORS

Jupiter House, 21 Roebuck Lane, Sale, Manchester, M33 7SY
T: 0161 973 3495 F: 0161 962 6819
E: mail@ndoliver.com www.ndoliver.com

Client

WALKER SIME LTD
THE CORNERHOUSE
FOURTH AVENUE
TRAFFORD PARK
MANCHESTER, M14 7DB

Title

AREA - C.2
WYTHENSHAWE CIVIC CENTRE
M22 5RQ

TOPOGRAPHICAL SURVEY
SHEET 1 OF 2

Surveyed	PG/HS/OB	Drawn	HS/PK	Drawn Date: 17/04/2025
Checked	AM	Approved	NDO	
Scale 1:200 @ A1		Project 13162		Status PROV
		CAD File P:\\13162\DRAWINGS\13162_001P.DWG		
Drawing No 13162 / 001P / 2				Rev 0

Appendix C - Existing Sewer Records

TACE

Part of the Contollo Group

Statutory Utilities Report
Wythenshawe Plot C2

Client
MCC/MUSE

Consulting Engineers
TACE
Portland House
Oak Green
Earl Road
Cheadle Hulme
Cheshire
SK8 6QL
www.tace.co.uk

Ref: 1802
Revision: B -C2
Date: September 2025

CONTROLLED DOCUMENT			
TACE Project No:	PA1802- C2		
	Name	*Signature*	*Date*
Prepared by:	James Rouen Stout		03/09/2025
Checked:	Nigel Griffiths		03/09/2025
TACE Approved:	James Massey		03/09/2025

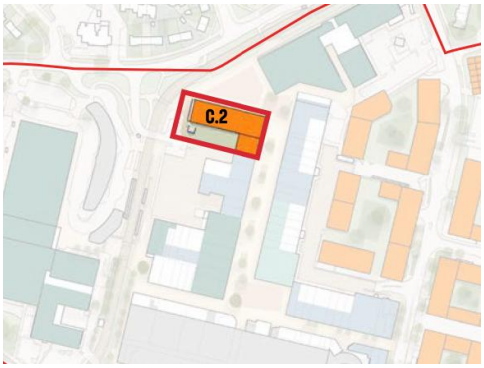
Revision Record					
Rev.	*Date*	*By*	*Summary of Changes*	*Chkd*	*Aprd*
A	03/09/2025	JRS	Preliminary Issue	NG	JM
B	28.10.25	JRS	Updated to include Part R connectivity	JM	NG

Contents

1.0 Executive Summary....4
2.0 Introduction....4
3.0 Existing Services....4
4.0 Proposed Services Strategy....5

1.0 Executive Summary

TACE have been engaged to assess the below development in order to determine the feasibility of acquiring suitably sized new incoming services for a residential housing project:



TACE have also made assessments of the likely utilities work needed to prepare the site with any diversions and disconnections, together with easements to infrastructure around the site's perimeter.

The new services applications are based on the load assessments for electrically heated dwellings.

Initial meetings and overview of existing services indicates that the local area network has sufficient capacity to supply utilities to the site.

This will be an increase in the water supply and a potential additional sub-station.

Initial indication is that no major disruption is envisaged.

2.0 Introduction

This document is intended to provide an indication of the utility services required for the Wythenshawe residential scheme plots C2.

The scheme comprises of Ground floor retail and or residential with upper floor apartments in varying configurations.

The project is the first phase of a wider Development Framework for the regeneration of Wythenshawe Civic Centre. The Development Framework, through targeting realistic and deliverable interventions in the short term, seeks to promote the Civic Centre as a vibrant and diverse centre which acts as a focal point for retail, leisure and wider services where people want to spend time. This in turn will assist the regeneration and rejuvenation of the local area

3.0 Existing Services

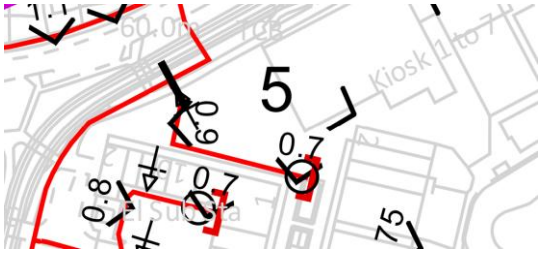
The TOPO issued by the design team indicates that the water and electrical services on the site supply the existing building.

We would suggest at some point in time that the client has slit trenches instructed to ensure services are outside the red line boundary. It would equally be important for services to the car park where drop-down paving is shown to ensure that statutory depths are maintained and lowering of services could be required.

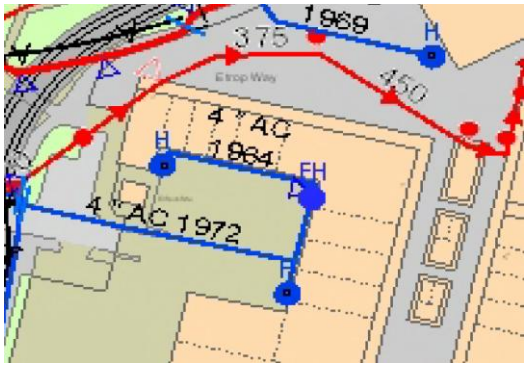
It should be noted that there may be legal easements associated with the existing sub-station within the red line boundary.

Diversions/Disconnections

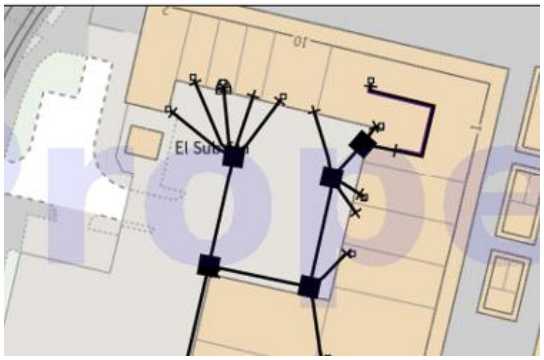
Disconnect existing electrical services.



Disconnect existing gas services



Disconnect existing water supply-
Note civils to review Drainage



Disconnect Openreach services

4.0 Proposed Services Strategy

TACE has made several assumptions to initiate the new services applications, as follows:

Electricity

The site will present a significant load and whilst a substation is available locally on Etrop Way, we envisage this will be extended to add a new sub-station. This addition is indicated on the site plans.

This will be subject to the final utility loads being assessed.

Our initial load assessment is tabled below and has been issued to ENWL.

		Individual Load kW	Quantity	Load Sub Total kW	Power Factor	Sub Total kVA	Diversity	Sub Total kVA Diversifed	Notes
1.00	Apartments	3.40	75	255.00	0.95	268.42	1.00	268.42	
	Landlords	50.00	1	50.00	0.95	52.63	1.00	52.63	
	Retail 1	100.00	1	100.00	0.95	105.26	0.75	78.95	
						Total		400.00	

ENWL have indicated that 7.9Mw of spare capacity is available in the local network.

Water

An existing water routes Ainley Road to Etrop Way to enter the existing site. The Loading units used in the design have resulted in the below which have been issued to Unted Utilities.

Area	Load from schedule (l/s)	Pipe size (mm)	Meter
Apartments	3.7	108	internal

In addition to the above advice has been sought on the location of the fire hydrants which may result in an additional hydrant on site to meet the required distances to the main entrance.

Landlords' services have been requested as part of the applications.

Gas

In line with decarbonisation, it is not proposed to provide gas to the site as part of this proposal.

Part R

Description
The development will meet the following key requirements:

- **RA1: Gigabit-ready physical infrastructure**
  - All dwellings will be equipped with internal physical infrastructure (e.g. ducts, conduits, termination points) capable of supporting gigabit broadband speeds.
  - Infrastructure will be installed in a manner that allows future upgrades without structural alterations.

- **RA2: Connection to a gigabit-capable network**
  - Each dwelling will be connected to a public electronic communications network capable of delivering gigabit speeds.
  - Where connection is not feasible, appropriate justification will be provided in line with the exemptions outlined in the Approved Document.

This development is designed to meet the digital connectivity standards required under Part R, ensuring future-proofed homes that support high-speed broadband access. The proposal aligns with national objectives for improved digital infrastructure and supports sustainable, connected communities.

Appendix D - Drainage Strategy

N

EXISTING 375mm COMBINED SEWER
EASEMENT EITHER SIDE OF SEWER TO BE CONFIRMED BY UNITED UTILTIES

SADDLE CONNECTION TO EXISTING 375mm COMBINED SEWER
SUBJECT TO S106 APPROVAL FROM UNITED UTILITIES

SURFACE WATER DISCHARGE RATE OF 5l/s TO BE AGREED WITH UNITED UTILITIES AND LLFA

APPROXIMATE CONNECTION IL: 56.864m
FURTHER CCTV INFORMATION REQUIRED TO CONFIRM ACCURATE DEPTH

SW15
CL: 60.200m
IL: 56.893m
Dp: 3.307m
∅: 1200mm

150Ø @ 1:99

150Ø @ 1:100

SW10
CL: 60.200m
IL: 56.940m
Dp: 3.260m
∅: 1200mm

PROPOSED GEO-CELLULAR ATTENUATION TANK

PLAN AREA (m^2): 31.68
DEPTH (m): 2.00
INVERT LEVEL (m): 57.350

61m^3 ATTENUATION VOLUME

SW8
CL: 60.200m
IL: 57.992m
Dp: 2.208m
∅: 600mm

150Ø @ 1:100

FW5
CL: 59.550m
IL: 57.992m
Dp: 1.558m
∅: 450mm

FW4
CL: 59.500m
IL: 58.102m
Dp: 1.398m
∅: 450mm

FW3
CL: 59.500m
IL: 58.140m
Dp: 1.360m
∅: 450mm

SW6
CL: 59.500m
IL: 58.097m
Dp: 1.403m
∅: 450mm

150Ø @ 1:101

SW11
CL: 59.500m
IL: 58.177m
Dp: 1.323m
∅: 450mm

150Ø @ 1:100

225Ø @ 1:172

225Ø @ 1:166

150Ø @ 1:100

225Ø @ 1:170

FW2
CL: 59.500m
IL: 58.384m
Dp: 1.116m
∅: 450mm

225Ø @ 1:21

SW5
CL: 59.500m
IL: 58.572m
Dp: 0.928m
∅: 450mm

150Ø @ 1:95

225Ø @ 1:169

SW4
CL: 59.500m
IL: 58.601m
Dp: 0.899m
∅: 450mm

150Ø @ 1:100

150Ø @ 1:100

150Ø @ 1:100

SW7
CL: 59.550m
IL: 58.072m
Dp: 1.478m
∅: 450mm

SW1
CL: 59.900m
IL: 58.550m
Dp: 1.350m
∅: 1200mm

FW1
CL: 59.500m
IL: 58.500m
Dp: 1.000m
∅: 450mm

SW2
CL: 59.700m
IL: 58.359m
Dp: 1.341m
∅: 600mm

SW3
CL: 59.500m
IL: 58.750m
Dp: 0.750m
∅: 150mm

Sub (Existing)

GENERATOR
13 Sq.m

RESI ENTRANCE
32 Sq.m

SPRINKLER
34 Sq.m

SWITCH
2 Sq.m

CYCLE
42 Sq.m

LOBBY
4 Sq.m

REFUSE
37 Sq.m

POST / PARCELS
17 Sq.m

RETAIL
A
92 Sq.m

RETAIL
B
88 Sq.m

WORKPLACE / RETAIL
C
88 Sq.m

0 1.5 3 4.5 6 7.5 9 12 15 m
SCALE 1:150 @ A1
SCALE 1:300 @ A3

FLOW CONTROL SUMMARY

MH NUMBER	FLOW CONTROL	DESIGN FLOW (l/s)	PRODUCT REFERENCE
SW10	HYDROBRAKE (OR SIMILAR APPROVED)	4.2	CHE-0075-4200-2500-4200

STANDARD NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND THE SPECIFICATIONS.
2. THIS DRAWING SHOULD NOT BE SCALED.
3. ALL DIMENSIONS ARE TO BE VERIFIED BY THE CONTRACTOR ON SITE.
4. ALL DISCREPANCIES SHOULD BE REPORTED TO C.A./E.A. PRIOR TO THE COMMENCEMENT OF WORKS.

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NOTES

1. OS BASE PROVIDED BY FCB, RECEIVED 12.02.25.
2. PROPOSED LAYOUT PROVIDED BY PLANIT, RECEIVED 14.11.25.
3. TOPOGRAPHICAL SURVEY IS TAKEN FROM N D OLIVER & CO DRAWING NUMBER 13162/001/C/1 REV C DATED 09.06.25

KEY

- SITE BOUNDARY (TAKEN FROM PLANIT DRAWING NUMBER 3475a-PLA-XX-XX-DR-L-0001 RECEIVED 21.10.25)
- PROPOSED SW / FW / CW MANHOLE
- PROPOSED SW / FW INSPECTION CHAMBER
- PROPOSED SW FLOW CONTROL MANHOLE
- PROPOSED SW RODDING EYE
- PROPOSED SW SOLID WALL DRAIN
- PROPOSED SW PERFORATED DRAIN
- PROPOSED FW DRAIN
- PROPOSED COMBINED SEWER
- EXISTING COMBINED SEWER
- PROPOSED PERMEABLE PAVING 500mm SUB-BASE 50m^3 ATTENUATION VOLUME
- PROPOSED ATTENUATION TANK
- INDICATIVE RAINWATER DOWNPIPE POSITION

DRAWING NOTES

1. FOUL WATER DRAINAGE STRATEGY INDICATIVE ONLY TO PROVE CONNECTION TO EXISTING COMBINED SEWER IS FEASIBLE VIA A GRAVITY NETWORK. DEPTH AND NUMBER OF INSPECTION CHAMBERS TO BE CONFIRMED ONCE FOUNDATION STRATEGY AND NUMBER/POSITION OF POP UPS ARE CONFIRMED.
2. SURFACE WATER DRAINAGE DISCHARGE RATE AND METHOD OF DISCHARGE TO BE AGREED WITH UNITED UTILITIES AND LLFA.
3. RAINWATER DOWNPIPE POSITIONS SHOWN INDICATIVELY ONLY, TO BE CONFIRMED BY ARCHITECT
4. PROPOSED SURFACE WATER NETWORK SIZED TO ENSURE THAT THERE IS NO FLOODING FOR ALL STORMS UP TO THE 1 IN 100 YEAR EVENT + 45% CLIMATE CHANGE ALLOWANCE AS THERE IS MINIMAL SPACE TO STORE FLOODED SURFACE WATER ON SITE.

DATE	REV	DESCRIPTION	DRAWN	CHKD
24.11.25	P03	UPDATED FOR PLANNING	TPR	JDL
14.11.25	P02	SITE PLAN UPDATED, PLANNING ISSUE	TPR	JDL
31.10.25	P01	DRAFT ISSUE	TPR	JDL

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PROJECT
C2 THE BIRTLES

TITLE
PROPOSED DRAINAGE STRATEGY
GENERAL ARRANGEMENT

DRAWING STATUS	STATUS CODE
INFORMATION	-

CE PROJECT No.	SCALE @ A1	DATE CREATED	DRAWN	CHECKED
18702	1:150	OCT' 25	TPR	JDL

DRAWING No.
18702-CIV-XX-XX-D-C-30001

REV
P03

FILE LOCATION PATH: P:\PROJECTS HOT\3323-02 MUSE - WYTHENSHAWE - PLOTS C2 AND 3.3\004 BIM\CIVIL\SDRAWINGS\C2\18702-CIV-XX-XX-D-C-30001_PROPOSED DRAINAGE.DWG

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		

Catchment Area Type : Catchment Area

Area (ha)	0.003

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (1) Type : Catchment Area

Area (ha)	0.03

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (2) Type : Catchment Area

Area (ha)	0.027

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (3) Type : Catchment Area

Area (ha)	0.031

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (4)

Type : Catchment Area

Area (ha)	0.021

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (5)

Type : Catchment Area

Area (ha)	0.018

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (6)

Type : Catchment Area

Area (ha)	0.017

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (7)

Type : Catchment Area

Area (ha)	0.016

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (8) Type : Catchment Area

Area (ha)	0.002

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (9) Type : Catchment Area

Area (ha)	0.012

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (10) Type : Catchment Area

Area (ha)	0.008

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (11) Type : Catchment Area

Area (ha)	0.005

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	Company Address:		

Catchment Area (12)

Type : Catchment Area

Area (ha)	0.006

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Catchment Area (13)

Type : Catchment Area

Area (ha)	0.006

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.850
Depth (m)	0.590
Base Level (m)	59.260
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	6.197
Long. Slope (1:X)	2000.00
Width (m)	20.165
Total Volume (m³)	18.744

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (9)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (6)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (7)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP10
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.550
Depth (m)	0.590
Base Level (m)	58.960
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	14.474
Long. Slope (1:X)	2000.00
Width (m)	2.306
Total Volume (m^3)	5.007

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (13)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (10)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP14
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.550
Depth (m)	0.640
Base Level (m)	58.910
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	16.605
Long. Slope (1:X)	2000.00
Width (m)	3.861
Total Volume (m^3)	10.580

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (12)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP13
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0

Porous Paving (3)

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.650
Depth (m)	0.590
Base Level (m)	59.060
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	7.847
Long. Slope (1:X)	2000.00
Width (m)	2.474
Total Volume (m³)	2.912

Inlets

Inlet (1)

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (8)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP21
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Porous Paving (4)

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.550
Depth (m)	0.640
Base Level (m)	58.910
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	14.068
Long. Slope (1:X)	2000.00
Width (m)	3.794
Total Volume (m^3)	8.806

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area (11)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP12
Outlet Type	Free Discharge

Advanced

Conductivity (m/hr)	250.0

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Porous Paving (5)

Type : Porous Paving

Dimensions

Exceedance Level (m)	59.500
Depth (m)	0.590
Base Level (m)	58.910
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	2.5
Porosity (%)	30
Length (m)	10.259
Long. Slope (1:X)	2000.00
Width (m)	2.875
Total Volume (m^3)	4.424

Inlets

Inlet

Inlet Type	Lateral Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	SWP11
Outlet Type	Orifice
Diameter (m)	0.015
Coefficient of Discharge	0.600
Invert Level (m)	58.910

Advanced

Conductivity (m/hr)	250.0

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		

Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	59.550
Depth (m)	2.000
Base Level (m)	56.950
Number of Crates Long	22
Number of Crates Wide	9
Number of Crates High	5
Porosity (%)	95
Crate Length (m)	0.4
Crate Width (m)	0.4
Crate Height (m)	0.4
Total Volume (m³)	60.792

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (1)
Outlet Type	Free Discharge

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW1	59.900 58.550	Diameter / Length: 1.200					Manhole
E:382605.698 N:387106.926	1.350		{a} SWP1	Pipe	58.550	Diam/Width:150	Not Applicable
SW2	59.700 58.359	Diameter / Length: 1.200	{1} SWP1 {2} SWP10	Pipe Pipe	58.359 58.359	Diam/Width:150 Diam/Width:150	Manhole
E:382624.359 N:387102.921	1.341		{a} SWP5	Pipe	58.359	Diam/Width:150	Not Applicable
SW3	59.500 58.750	Diameter / Length: 0.150					Manhole
E:382632.082 N:387099.103	0.750		{a} SWP2	Pipe	58.750	Diam/Width:150	Not Applicable
SW4	59.500 58.601	Diameter / Length: 0.450	{1} SWP11 {2} SWP2	Pipe Pipe	58.601 58.676	Diam/Width:100 Diam/Width:150	Manhole
E:382633.785 N:387106.277	0.899		{a} SWP22	Pipe	58.601	Diam/Width:225	Not Applicable
SW5	59.500 58.572	Diameter / Length: 0.450	{1} SWP22	Pipe	58.572	Diam/Width:225	Manhole
E:382634.826 N:387111.072	0.928		{a} SWP3	Pipe	58.572	Diam/Width:225	Not Applicable

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW6	59.500 58.097	Diameter / Length: 0.450	{1} SWP4 {2} SWP13	Pipe Pipe	58.097 58.097	Diam/Width:225 Diam/Width:100	Manhole
E:382613.298 N:387115.749	1.403		{a} SWP6	Pipe	58.097	Diam/Width:225	Not Applicable
SW7	59.550 58.073	Diameter / Length: 0.450	{1} SWP6	Pipe	58.072	Diam/Width:225	Manhole
E:382609.153 N:387115.659	1.477		{a} SWP7	Pipe	58.073	Diam/Width:225	Not Applicable
SW8	60.200 57.881	Diameter / Length: 0.450	{1} SWP7 {2} SWP14	Pipe Pipe	57.992 57.881	Diam/Width:225 Diam/Width:100	Manhole
E:382595.685 N:387118.480	2.319		{a} Pipe	Pipe	57.992	Diam/Width:225	Not Applicable
SW10	60.200 56.940	Diameter / Length: 1.200	{1} Pipe (1)	Pipe	56.940	Diam/Width:225	Manhole
E:382594.870 N:387129.160	3.260		{a} SWP18	Pipe	56.940	Diam/Width:150	Not Applicable

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: Phase	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SW11	59.500 58.177	Diameter / Length: 0.450	{1} SWP3 {2} SWP5 {3} SWP12 {4} SWP21	Pipe Pipe Pipe Pipe	58.177 58.252 58.177 58.177	Diam/Width:225 Diam/Width:150 Diam/Width:100 Diam/Width:100	Manhole
E:382626.618 N:387112.855	1.323		{a} SWP4	Pipe	58.177	Diam/Width:225	Not Applicable
SW14	60.200 56.864	Diameter / Length: 1.200	{1} SWP19	Pipe	56.864	Diam/Width:150	Manhole
E:382597.635 N:387136.166	3.336						Not Applicable
SW15	60.200 56.893	Diameter / Length: 1.200	{1} SWP18	Pipe	56.893	Diam/Width:150	Manhole
E:382596.249 N:387133.664	3.307		{a} SWP19	Pipe	56.893	Diam/Width:150	Not Applicable

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Outfall Details Storm Phase: Phase	Company Address:		

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
SW14	Free Discharge			

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH

Type: FEH

Site Location	GB 382517 387053 SJ 82517 87053
Rainfall Version	2022
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45.000
2.0	0.000
30.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Resident Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW1	FEH: 100 years: +45 %: 60 mins: Summer	59.900	58.550	59.700	1.150	1.6	1.301	0.000	0.2	0.356	Flood Risk
SW2	FEH: 100 years: +45 %: 120 mins: Summer	59.700	58.359	59.700	1.341	6.2	1.759	0.242	2.5	24.148	Flood
SW3	FEH: 100 years: +45 %: 360 mins: Winter	59.500	58.750	59.433	0.683	0.4	0.012	0.000	0.1	0.797	Flood Risk
SW4	FEH: 100 years: +45 %: 360 mins: Winter	59.500	58.601	59.433	0.832	3.1	0.132	0.000	3.1	30.704	Flood Risk
SW5	FEH: 100 years: +45 %: 360 mins: Winter	59.500	58.572	59.433	0.861	5.9	0.137	0.000	5.9	51.745	Flood Risk
SW6	FEH: 100 years: +45 %: 360 mins: Winter	59.500	58.097	59.432	1.335	15.1	0.212	0.000	14.7	165.180	Flood Risk
SW7	FEH: 100 years: +45 %: 360 mins: Winter	59.550	58.073	59.432	1.359	14.7	0.216	0.000	14.7	160.313	Flood Risk
SW8	FEH: 100 years: +45 %: 360 mins: Winter	60.200	57.881	59.431	1.550	15.4	0.246	0.000	14.7	171.007	Surcharged
SW10	FEH: 100 years: +45 %: 360 mins: Winter	60.200	56.940	59.430	2.490	4.2	2.817	0.000	4.1	137.584	Surcharged
SW11	FEH: 100 years: +45 %: 360 mins: Winter	59.500	58.177	59.433	1.256	11.7	0.200	0.000	11.0	128.726	Flood Risk
SW14	FEH: 100 years: +45 %: 15 mins: Summer	60.200	56.864	56.907	0.043	3.2	0.000	0.000	3.2	4.053	OK
SW15	FEH: 100 years: +45 %: 360 mins: Winter	60.200	56.893	56.947	0.054	4.1	0.061	0.000	4.1	137.469	OK

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW1	FEH: 2 years: +0 %: 30 mins: Summer	59.900	58.550	58.791	0.241	1.1	0.272	0.000	0.4	0.392	Surcharged
SW2	FEH: 2 years: +0 %: 30 mins: Summer	59.700	58.359	58.790	0.431	3.1	0.487	0.000	1.6	3.648	Surcharged
SW3	FEH: 2 years: +0 %: 15 mins: Summer	59.500	58.750	58.750	0.000	0.0	0.000	0.000	0.0	0.000	OK
SW4	FEH: 2 years: +0 %: 15 mins: Summer	59.500	58.601	58.662	0.061	6.0	0.010	0.000	5.9	2.627	OK
SW5	FEH: 2 years: +0 %: 15 mins: Summer	59.500	58.572	58.620	0.048	11.3	0.008	0.000	11.2	4.988	OK
SW6	FEH: 2 years: +0 %: 15 mins: Summer	59.500	58.097	58.252	0.156	26.1	0.025	0.000	25.4	13.084	OK
SW7	FEH: 2 years: +0 %: 15 mins: Summer	59.550	58.073	58.212	0.139	25.4	0.022	0.000	24.4	13.036	OK
SW8	FEH: 2 years: +0 %: 15 mins: Summer	60.200	57.881	58.031	0.150	25.3	0.024	0.000	25.2	13.310	OK
SW10	FEH: 2 years: +0 %: 240 mins: Summer	60.200	56.940	57.629	0.689	2.5	0.780	0.000	2.4	42.447	Surcharged
SW11	FEH: 2 years: +0 %: 15 mins: Summer	59.500	58.177	58.297	0.120	19.0	0.019	0.000	18.1	9.617	OK
SW14	FEH: 2 years: +0 %: 15 mins: Summer	60.200	56.864	56.895	0.030	1.6	0.000	0.000	1.6	2.095	OK
SW15	FEH: 2 years: +0 %: 720 mins: Winter	60.200	56.893	56.934	0.041	2.5	0.046	0.000	2.5	61.422	OK

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SW1	FEH: 30 years: +0 %: 60 mins: Summer	59.900	58.550	59.368	0.818	2.0	0.925	0.000	0.7	1.084	Surcharged
SW2	FEH: 30 years: +0 %: 60 mins: Summer	59.700	58.359	59.368	1.009	5.8	1.141	0.000	2.5	13.276	Surcharged
SW3	FEH: 30 years: +0 %: 15 mins: Summer	59.500	58.750	58.750	0.000	0.0	0.000	0.000	0.0	0.000	OK
SW4	FEH: 30 years: +0 %: 15 mins: Summer	59.500	58.601	58.692	0.091	13.2	0.015	0.000	13.0	5.787	OK
SW5	FEH: 30 years: +0 %: 15 mins: Summer	59.500	58.572	58.642	0.070	25.1	0.011	0.000	24.9	10.998	OK
SW6	FEH: 30 years: +0 %: 180 mins: Winter	59.500	58.097	58.460	0.363	14.6	0.058	0.000	14.6	73.625	Surcharged
SW7	FEH: 30 years: +0 %: 180 mins: Winter	59.550	58.073	58.459	0.387	14.6	0.061	0.000	14.6	73.522	Surcharged
SW8	FEH: 30 years: +0 %: 180 mins: Winter	60.200	57.881	58.459	0.578	15.2	0.092	0.000	15.2	77.851	Surcharged
SW10	FEH: 30 years: +0 %: 180 mins: Winter	60.200	56.940	58.459	1.519	3.3	1.717	0.000	3.2	53.618	Surcharged
SW11	FEH: 30 years: +0 %: 15 mins: Summer	59.500	58.177	58.541	0.364	39.8	0.058	0.000	35.9	20.631	Surcharged
SW14	FEH: 30 years: +0 %: 15 mins: Summer	60.200	56.864	56.901	0.037	2.4	0.000	0.000	2.4	3.061	OK
SW15	FEH: 30 years: +0 %: 180 mins: Winter	60.200	56.893	56.940	0.047	3.2	0.054	0.000	3.2	53.514	OK

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FEH: 100 years: +45 %: 60 mins: Summer	59.741	59.701	0.478	0.441	21.3	17.231	0.000	0.000	4.9	15.216	8.073	OK
Porous Paving (1)	FEH: 100 years: +45 %: 240 mins: Winter	59.572	59.431	0.605	0.471	1.8	5.159	0.262	0.000	1.2	9.521	-3.036	Flood
Porous Paving (2)	FEH: 100 years: +45 %: 240 mins: Winter	59.348	59.432	0.430	0.522	3.5	8.695	0.000	0.000	0.6	7.699	17.811	OK
Porous Paving (3)	FEH: 100 years: +45 %: 240 mins: Winter	59.420	59.433	0.356	0.373	1.1	2.071	0.000	0.000	0.3	2.644	28.878	OK
Porous Paving (4)	FEH: 100 years: +45 %: 240 mins: Winter	59.377	59.432	0.460	0.522	2.8	7.559	0.000	0.000	0.6	7.090	14.159	OK
Porous Paving (5)	FEH: 100 years: +45 %: 360 mins: Winter	59.313	59.324	0.397	0.414	0.4	3.565	0.000	0.000	0.2	3.577	19.423	OK
Cellular Storage	FEH: 100 years: +45 %: 360 mins: Winter	59.431	59.431	2.481	2.481	14.7	60.660	0.000	0.000	4.2	138.864	0.217	OK

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FEH: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FEH: 2 years: +0 %: 180 mins: Summer	59.404	59.273	0.141	0.013	3.2	2.866	0.000	0.000	2.0	8.805	84.708	OK
Porous Paving (1)	FEH: 2 years: +0 %: 480 mins: Summer	59.197	58.966	0.230	0.006	0.5	1.422	0.000	0.000	0.2	3.313	71.595	OK
Porous Paving (2)	FEH: 2 years: +0 %: 1440 mins: Summer	58.999	58.912	0.080	0.002	0.1	0.969	0.000	0.000	0.1	2.140	90.845	OK
Porous Paving (3)	FEH: 2 years: +0 %: 480 mins: Summer	59.123	59.063	0.059	0.003	0.1	0.179	0.000	0.000	0.0	0.525	93.865	OK
Porous Paving (4)	FEH: 2 years: +0 %: 720 mins: Summer	58.992	58.913	0.075	0.003	0.2	0.749	0.000	0.000	0.1	1.364	91.493	OK
Porous Paving (5)	FEH: 2 years: +0 %: 720 mins: Summer	58.985	58.925	0.070	0.015	0.1	0.420	0.000	0.000	0.0	0.877	90.500	OK
Cellular Storage	FEH: 2 years: +0 %: 240 mins: Summer	57.629	57.629	0.679	0.679	9.4	20.448	0.000	0.000	2.5	42.495	66.364	OK

Project:	Date: 29/10/2025		
	Designed by: TomRi	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		

FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FEH: 30 years: +0 %: 60 mins: Summer	59.512	59.369	0.249	0.109	11.4	6.648	0.000	0.000	5.8	12.394	64.531	OK
Porous Paving (1)	FEH: 30 years: +0 %: 180 mins: Summer	59.346	58.970	0.379	0.010	1.8	2.347	0.000	0.000	0.8	4.468	53.113	OK
Porous Paving (2)	FEH: 30 years: +0 %: 720 mins: Summer	59.048	58.914	0.130	0.004	0.3	1.562	0.000	0.000	0.1	3.107	85.239	OK
Porous Paving (3)	FEH: 30 years: +0 %: 360 mins: Summer	59.159	59.064	0.095	0.004	0.2	0.286	0.000	0.000	0.1	0.865	90.176	OK
Porous Paving (4)	FEH: 30 years: +0 %: 480 mins: Summer	59.039	58.914	0.122	0.004	0.4	1.217	0.000	0.000	0.2	2.275	86.177	OK
Porous Paving (5)	FEH: 30 years: +0 %: 240 mins: Summer	59.030	58.958	0.115	0.048	0.4	0.767	0.000	0.000	0.1	1.053	82.654	OK
Cellular Storage	FEH: 30 years: +0 %: 180 mins: Winter	58.459	58.459	1.509	1.509	15.2	45.407	0.000	0.000	3.3	54.559	25.308	OK

Appendix E - Drainage Inspection & Maintenance Schedule

Wythenshawe Civic, Manchester – Plot C2 The Birtles

Drainage Inspection & Maintenance Schedule

November 2025

PREPARED FOR

Muse Places & Manchester City Council

Drainage Inspection & Maintenance Schedule

Prepared By	Jack Lee, MEng, CEng
Reviewed By	Jack Lee, MEng, CEng
Report Reference	18702-CIV-XX-XX-T-C-00002
Issued	19.11.25

Revisions			
Date	**Rev**	**Reason**	**Name**
19/11/2025	01	Initial Issue	Jack Lee, MEng, CEng

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1. Maintenance

The following document outlines the maintenance requirements for the project site. The responsibility of the required maintenance falls to multiple authorities, the below schedules set out which organisations are responsible for the various maintenance regimes.

1.1. General

This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where propriety products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

The existing surface water network has been retained with additional SuDS features added to provide attenuation. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking, or other space. As the flows are being attenuated on site there will be a period after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48 hours appropriate action should be taken as noted in this section.

1.2. Components

The following components have been included within the drainage design for the proposed development:

- Inspection and manhole chambers
- Catchpits
- Pipes
- Drainage channels and gullies
- Vortex Flow Control
- Cellular Attenuation Tank

The proposed locations of the components are indicated on Civic Engineers drawings:

- 18702-CIV-XX-XX-D-C-30001

Table 1 below shows the maintenance responsibilities of the various components.

Table 1 - Maintenance Responsibility

Component	Maintenance responsibility
Private inspection chambers and manholes (internal)	Maintenance company
Private inspection chambers and manholes (external)	Maintenance company
Pipes (internal)	Maintenance company
Pipes (external)	Maintenance company
Drainage channels and plot gullies	Maintenance company
Vortex Flow Control	Maintenance company
Cellular Attenuation Tank	Maintenance company

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

A copy of the final construction drainage layout should be provided in the final operations and maintenance manual.

It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.

Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects, and should be disposed of appropriately.

Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system. Sand and silt must not be disposed of into the drainage network.

During the winter months, drainage features such as channels should be cleared of ice, snow, debris, or litter.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the upstream/downstream catchpits.

1.3. Inspection and Manhole Chambers

Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with building Regulations Part H.

The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the maintenance manager prior to any access. Double locked and sealed manholes must be sealed and locked correctly post maintenance operation.

1.4. Pipes

Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes will be fully compliant with Civic Engineers drainage specification.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the drainage rate. They are intended to be dry except for during rainfall events. Pipes which are proposed simply to convey water around the site have been designed such that they are considered to be self-cleansing. Where the primary function of the pipe/tank is to provide attenuation and the pipes are therefore oversized the velocity of water in

the pipe may drop below 0.75m/s, which is considered to be self-cleansing. For larger diameter pipes the risk is reduced due to the overall pipe size, however these pipes should be inspected for sediment build up.

Access for maintenance is provided through access chambers and manholes.

Regular inspection and maintenance are important to identify areas which may have been obstructed/clogged and may not drain correctly thus exposing the development to a greater level of flood risk.

Table 2 below shows the maintenance schedule for pipes, the actions required and the frequency of which these actions need to be undertaken.

Table 2 - Maintenance Schedule for Pipes

Maintenance schedule	Required action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial inspection should be provided as post construction CCTV survey.	N/A
Regular maintenance/inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required.
Remedial action	Rod through poorly performing runs as initial remediation.	As required
	If continued poor performance jet and CCTV survey poorly performing runs.	As required
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required if above does not improve performance.

1.5. Drainage Channels and Gullies

Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned using high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers can move within their frame, this may cause damage to the frame or seating.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park channels.

Below, Table 3 shows the maintenance schedule for drainage channels and gullies, the actions required and the frequency of which these actions need to be undertaken.

Table 3 - Maintenance Schedule for Drainage Channels and Gullies

Maintenance schedule	Required action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance/inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required.
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving	3-monthly, 48 hours after large storms.
Remedial action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

1.6. Vortex Flow Control

The proposed proprietary Vortex Flow Control should be inspected and cleaned in accordance with the manufacturer's recommendations.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers can move within their frame, this may cause damage to the frame or seating.

Sediment/material removal should be undertaken in accordance with the manufacturers recommended protocols.

Below, Table 4 shows the maintenance schedule for drainage Hydrodynamic Vortex Separator, the actions required and the frequency of which these actions need to be undertaken.

Table 4 - Maintenance Schedule for Vortex Flow Control

Maintenance schedule	Required action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial inspection of chamber.	Half yearly and after large storms.
Regular maintenance/inspection	Litter and debris removal	Monthly or as required.
Remedial action	Inspect chamber and rod through outlets as initial remediation. Manufacturers advice to be sought if blockage issues persist	As required.

1.7. Cellular Attenuation Tank

The proposed proprietary Cellular Attenuation Tank should be inspected and cleaned in accordance with the manufacturer's recommendations.

Maintenance requirements include Regular inspection of silt traps, and air vents and connected chambers with removal of sediment and debris as required.

Below, Table 5 shows the maintenance schedule for drainage Hydrodynamic Vortex Separator, the actions required and the frequency of which these actions need to be undertaken.

Table 5 - Maintenance Schedule for Cellular Attenuation Tank

Maintenance schedule	Required action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial inspection of chambers connected to tank.	Half yearly and after large storms.
Regular maintenance/inspection	Litter and debris removal	Monthly or as required.
Remedial action	Inspect chamber and rod through as initial remediation. Manufacturers advice to be sought if blockage issues persist	As required.

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