Project Title

Flood Risk Assessment
& Outline Drainage Strategy

At

Agnes Court

Wilmslow Road

Manchester

M14 6AJ

For

Feltham Group Properties

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Executive Summary

Item	Brief Description
Development Proposed	construction of six apartments over two levels with undercroft parking at the location of a number of garages at Agnes Court, Wilmslow Road, Manchester, M14 6AJ.
Flood Risk Review	**Tidal:** Low Risk Flood Zone 1 **Fluvial:** Low Risk Flood Zone 1 **Surface Water:** Very Low Risk. **Sewer & Drainage**: Low Risk **Groundwater**: Low Risk **Reservoir:** Low Risk
Geology	A review of the BGS online mapping has indicated the Superficial Deposits to encompass Till/Diamicton – silts and clays, with the underlying bedrock comprising the Chester Formation – Sandstone. These findings are supported by a local BGS borehole indicating made ground underlain by 2.5m of stiff silty clay.
Infiltration Rate	Based on the assessment of the BGS data set and the presence of underlying cohesive ground, infiltration as a means of draining the site has been discounted.
Local Hydrology	The closest identified watercourse is the culverted Cringle Brook, flowing west beyond the northern boundary.
Nearest Adopted Sewers and onsite private drainage	A review of the United Utilities (UU) sewer records has indicated a 300mm diameter combined water sewer within Victoria Road to the south of the site, flowing south easterly towards Wilmslow Road. No surface water sewers have been identified in close proximity. A CCTV survey of the drainage serving the full Agnes Court development has been undertaken and confirms a private combined water network that ultimately flows south and outfalls to the combined sewer In Victoria Road. The current garages discharge into this network unrestricted.
Existing Discharge Rate	For the purpose of this assessment the site is classed as Brownfield with discharge rates defined below based on the modified rational method and an impermeable area of 200m^2: 1yr (30mm/hr) – 1.7l/s 30yr (65mm/hr) – 3.6/s 100yr (95mm/hr) – 5.3l/s
Proposed Discharge Rate and Outfall Location	Connection made to the combined water sewer at a peak discharge rate of 2l/s, plus also considered the minimum flow control size to prevent blockage and in line with Manchester Council local policy.

Item	Brief Description
Allowance for Climate Change	45% - based on a >100-year design life to 'the 2100's'.
SuDS features	Water butts, geocellular attenuation tank & flow control.
Maintenance Responsibility	Management Company
Foul Drainage Strategy	New foul drainage generated by the development to outfall unrestricted to the UU adopted combined water sewer via the exiting combined water connection.

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1.0 Introduction

1.1 PG Consulting (PGC) has been appointed by Feltham Group Properties to prepare this Flood Risk Assessment and outline drainage strategy report to support a planning application for the construction of six apartments over two levels with undercroft parking, at the location of a number of garages at Agnes Court, Wilmslow Road, Manchester, M14 6AJ. The Site Masterplan as indicated in Appendix A provides details of the proposed development intent.

1.2 The assessment has been undertaken in line with Section 14 of the 'National Planning Policy Framework' (NPPF) plus the accompanying Technical Guidance on Flood Risk. The current outline Architectural.

1.3 This Flood Risk Assessment (FRA) has been commissioned by Feltham Group Properties and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A.

1.4 The report has been commissioned to identify any flood related issues associated with the proposed developments and any likely constraints that could be imposed plus to consider the outline drainage strategy for it. The following issues have been suggested by the Environment Agency (EA), United Utilities & Manchester City Council (MCC) and subsequently addressed within this report.

- Identify available data relating to flood risk at the site.
- Determine whether the site is at risk from flooding, including from breach or overtopping of any existing flood defences, surface water flooding and/or ground water flooding.
- If at risk from any source, devise appropriate measures to prevent flood risk whilst not compromising the flood risk elsewhere.
- Consider the flood risk from all other sources.
- Identify available data relating to drainage at the existing site, including historical discharges.
- Devise an appropriate outline foul and surface water drainage strategy to deal with any increase in surface water runoff and include for climate change. This will also include hydraulics calculations where appropriate.
- Consider the recommendations of the Manchester City Council (MCC) Strategic Flood Risk Assessment (SFRA).
- Prepare the Flood Risk Assessment and Outline Surface Water Drainage Strategy report.
- Assess mitigation measures & off-site impacts and define any residual risks.

2.0 Development Description and Location

2.1 Site Location

The site is referenced in Table 1, and a site location map is provided in Appendix A.

Table 1: Site Referencing Information

Item	Brief Description
Site name	Agnes Court, Wilmslow Road.
Site address and location	Agnes Court, Wilmslow Road, Manchester, M14 6AJ.
Council Area	Manchester City Council (MCC)
Approximate Grid Reference	OS: 385247, 393476
General Locality	The development is located approximately 4km to the south east of Manchester City Centre, within he suburb of Fallowfield.

2.2 Existing site Description

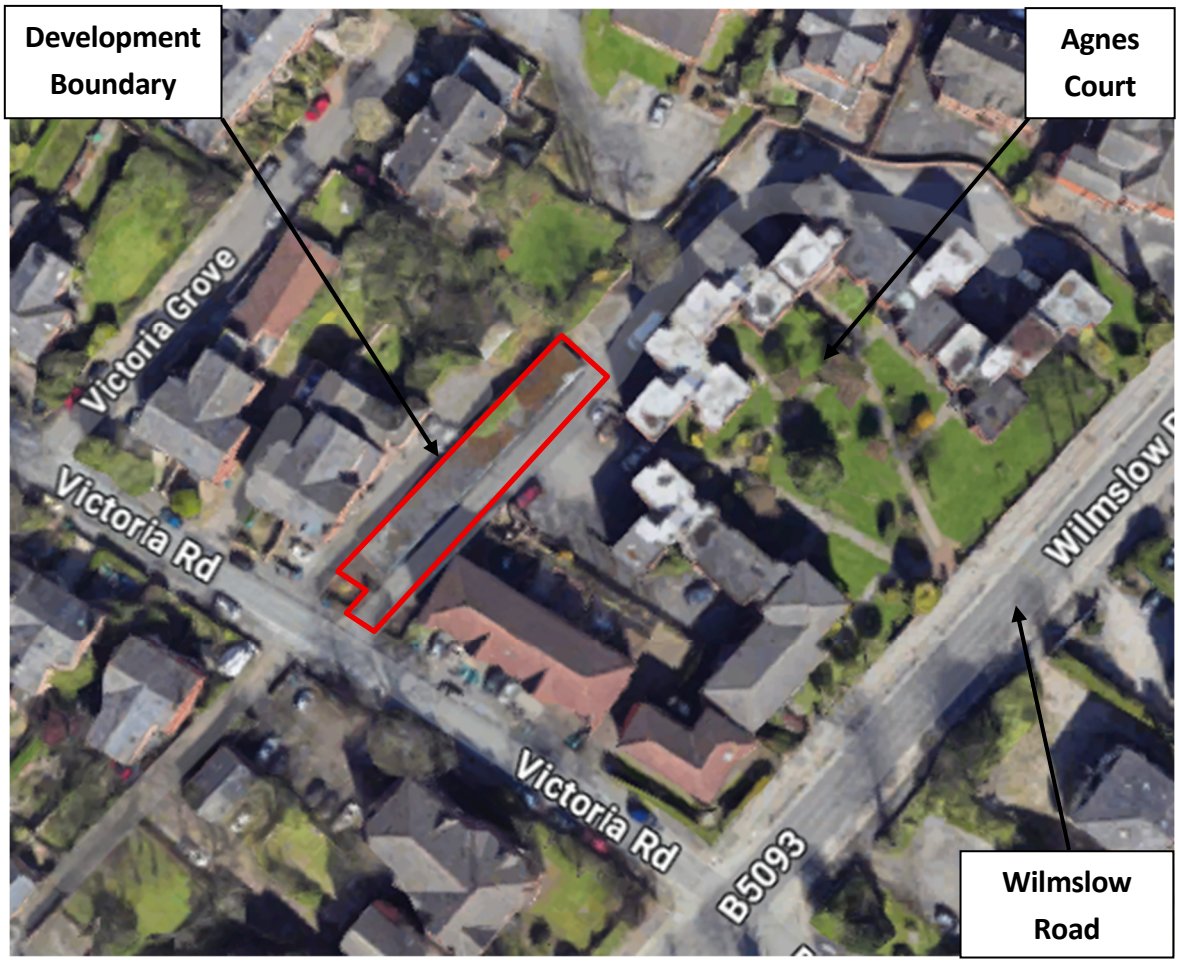
2.2.1 The Red Line Boundary is rectangular in plan footprint and encompasses sixteen garages, located within the southwest corner of the wider Agnes Court residential development.

2.2.2 The general area is predominantly residential.

2.2.3 There is a substantial travel network in the area, particularly on Wilmslow Road to the east. The nearest train station is located 1km to the southeast.

2.2.4 Figure 1 below identifies the overall site location details. Further details of the existing layout can be seen on the Red Line Plans in Appendix A.

Figure 1: Site Location



2.3 Local Topography

2.3.1 A topographical survey has been completed and indicates the existing garages to hold a level of 35.90m AOD. There is a nominal fall away in all directions. Refer to Appendix B for full details.

3.0 Planning Policy and Consultation

3.1 Planning Policy Framework

3.1.1 According to the Environment Agency (EA) Indicative flood maps for planning, the development area holds a Flood Zone 1 classification, i.e. land assessed as having less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding in any year.

3.1.2 As a requirement of the new NPPF (2025), Section 14, the proposed development must satisfy the requirements of the Sequential Test and where applicable the Exception Test.

3.1.3 Sequential Test:

Under the NPPF (2025) and the accompanying Planning Policy Guidance (PPG), Flood Zone 1, is defined as low Probability flood risk. The proposal is for a residential development, which in line with Table 1 is classified as 'More Vulnerable'.

Placing both these criteria into Table 2 (Flood Risk Vulnerability and Flood Zone 'Incompatibility'), More Vulnerable development in Flood Zone 1 determines that the sequential test is passed and there is no requirement for the exception test.

3.2 Strategic Flood Risk Assessment (SFRA)

3.2.1 SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or local planning authorities should prepare SFRA's in consultation with the EA.

3.2.2 Manchester City Council, in consultation with the Greater Manchester Combined Authority, produced the Greater Manchester Level 2 Strategic Flood Risk Assessment (2020) to demonstrate and define its understanding and role in managing flood risk. A fundamental aim of the strategy is that the Council embraces and supports its role as Lead Local Flood Authority, and this means taking the lead in helping with infrastructure development and re-development and working with other bodies in dealing with flood risk. The Council wants to encourage and wherever possible enforce current thinking and guidance and be able to provide improvements through working better together. The Strategy is aimed at providing an overview and assessment of local flood risk, setting out objectives and measures for how the Council will manage and reduce local flood risk. This Strategy builds on existing and developing approaches to flood risk management and promotes the use of a wide range of measures to manage flood risk. Risk should be managed in a co-ordinated way within catchments and balance the needs of communities, the economy and the environment.

3.2.3 A summary of the main elements from the SFRA associated with the district is detailed below. The full report can be obtained from the Manchester City Council website.

- The most significant sources of flood risk are fluvial and surface water.
- To better understand local flood risk and make best use of available information in order to better manage flood risk to people, businesses, property, infrastructure and the natural environment.
- To reduce the potential impact and costs of flooding in the Borough.
- To ensure resilience of local water bodies and drainage assets.
- To ensure appropriate development in areas of flood risk.
- To develop a collaborative partnership approach to flood risk management and cooperate with other Risk Management Authorities (RMAs) and key stakeholders working across catchments.
- To assist communities in understanding information on flood risk and support themselves.
- To encourage, support and provide flood risk management which seeks to enhance and protect the environment.
- For all sites, development proposals should look at opportunities to incorporate SuDS to reduce the risk of surface water flooding.
- All proposed developments must ensure that foul and surface water are kept separate.

3.3 Manchester City Council (MCC) Sustainable Drainage Guidance

3.3.1 Manchester City Council (MCC) and Partners have prepared the Greater Manchester Sustainable Drainage Design Guide that provides details for the Management of Surface Water, defining how SuDS can be integrated into the fabric of development starting at the planning stage and leading through the concept, outline and detailed design stages.

3.3.2 The main principles of the integration of SuDS for Major developments are summarised below and as taken from the CIRIA SuDS Manual:

- Sustainable surface water management is a material consideration for all planning applications. This means all development proposals must include a site-specific surface water drainage strategy following sustainable urban drainage guidelines (SuDS).
- On greenfield sites, surface water run off must be managed to achieve at least no increase in run off rates. Where possible, there should be a reduction in rates.
- On previously developed sites**,** run off proposals should demonstrate a reduction in rates in line with the non-Statutory Technical Standards for Sustainable Drainage Systems (2015) (or any later replacement standards).

- In line with Part H of the building regulations and the National Standards for SuDS (2025), surface water drainage options must be considered in the following order. An option higher in the hierarchy can only be agreed if it can be demonstrated that earlier options are not feasible.
    i. Into the ground (infiltration)
    ii. To a surface water body
    iii. To a surface water sewer
    iv. To a combined sewer
- Development in a critical drainage area should not result in the loss of open watercourses. Culverts should be opened where possible. We will only permit the culverting of existing watercourses if there is an overriding need. proposals must show how watercourses and riverside habitats will be conserved and enhanced.
- The Council as Lead Local Flood Authority are a statutory consultee for surface water drainage on all major planning applications. To approve an application, we need to be satisfied that:
    i. The proposals are appropriate in relation to flood risk and pollution control.
    ii. There are clear arrangements in place for ongoing maintenance.

4.0 Definition of Flood Hazard

4.1 Sources of Information

4.1.1 The NPPF (2025) requires the developer to consider the impact of runoff generated by the proposed development onto the downstream catchment, and to assess the risk of runoff from the surrounding district impacting on the development's footprint. Further, the report is to consider flood risk from all other sources. The following section defines the flood risk receptors and anticipated flood risk. Section 5 then discusses in further the probability of flooding and the likely impacts.

Table 2: Sources of information used in the identification of flood risk

Source of Information	Details
Environment Agency	Various Flood Maps from EA website
MCC Strategic Flood Risk Assessment	Fluvial & Surface Water Flood Maps

4.2 Flooding from Sea (Tidal)

4.2.1 The site holding a level at 35m AOD is not affected by Tidal flooding.

4.3 Flooding from Rivers (Fluvial Flood Risk)

4.3.1 The closest watercourse to the development, located beyond the northern boundary is known as Cringle Brook, flowing in a westerly direction.

4.3.2 The National Planning Policy Framework (NPPF) categorises fluvial and tidal flood risk as follows:

- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%).
- Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
- Zone 3a (high probability) - Land assessed as having a 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 The Functional Floodplain - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the EA. (Not separately distinguished from Zone 3a on the Flood Map).

4.3.3 Figure 2 below locates the site on the Environment Agency's indicative floodplain map. This indicates the red line boundary to hold a Flood Zone 1 classification, i.e. land assessed as having less than a 1 in 1000 (<0.1%) annual probability of fluvial flooding in any year. The risk from fluvial flood water is diminished to acceptable levels, removing the requirement for further investigation and assessment of the fluvial flood regime.

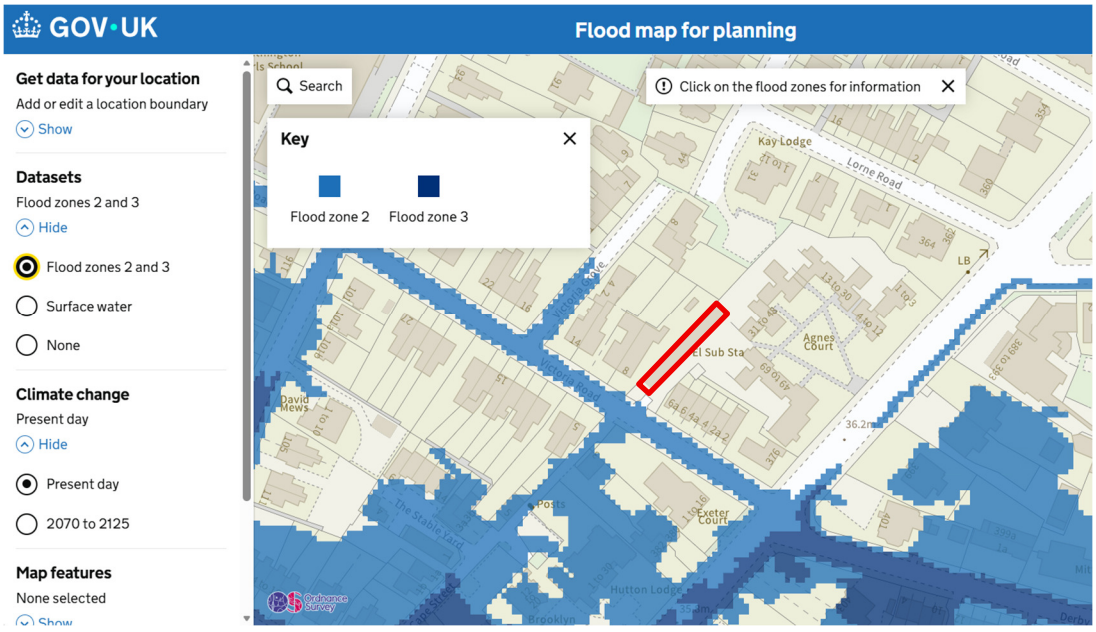


Figure 2 – The EA's Flood Map for Planning

4.4 Flooding from Sewers (and Drains)

4.4.1 A review of the United Utilities (UU) sewer records has indicated a 300mm diameter combined water sewer within Victoria Road to the south of the site, flowing south easterly towards Wilmslow Road. No surface water sewers have been identified in close proximity.

4.4.2 A CCTV survey of the drainage serving the full Agnes Court development has been undertaken and confirms a private combined water network that ultimately flows south and outfalls to the combined sewer In Victoria Road. The current garages discharge into this network unrestricted..

4.4.3 The extensive drainage networks serving the surrounding urban district ensures that the development footprint is protected from the impact of both upstream and downstream runoff. It is speculated that complete protection may well exist beyond a storm event equivalent to the 30-year statistical event. Beyond this projection, there may be a small degree of peripheral 'Exceedance' flooding within the areas above the drains. However, this is expected to be localised and restricted to the location of specific manhole covers located outside the development footprint.

4.4.4 Thus, flood risk to the site from sewers is diminished to acceptable levels and considered to be low.

4.5 Flooding from Surface Water

4.5.1 The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- High risk means that each year this area has a chance of flooding of greater than 3.3%.
- Medium risk means that each year this area has a chance of flooding between 1% and 3.3%.
- Low risk means that each year this area has a chance of flooding between 0.1% and 1%.
- Very Low risk means that each year this area has a chance of flooding of less than 0.1%.

4.5.2 Low susceptibility surface water flooding from the SFRA Maps plus the indicative 1 in 30 and 1 in 100-year surface water maps from the EA website (see Figures 3 & 4 below) have been reviewed. These have indicated that the existing garages to be at no risk for both the 1 in 30 and 1 in 100-year events.

4.5.3 Based on these findings the new dwellings have a very low risk of surface water flooding.

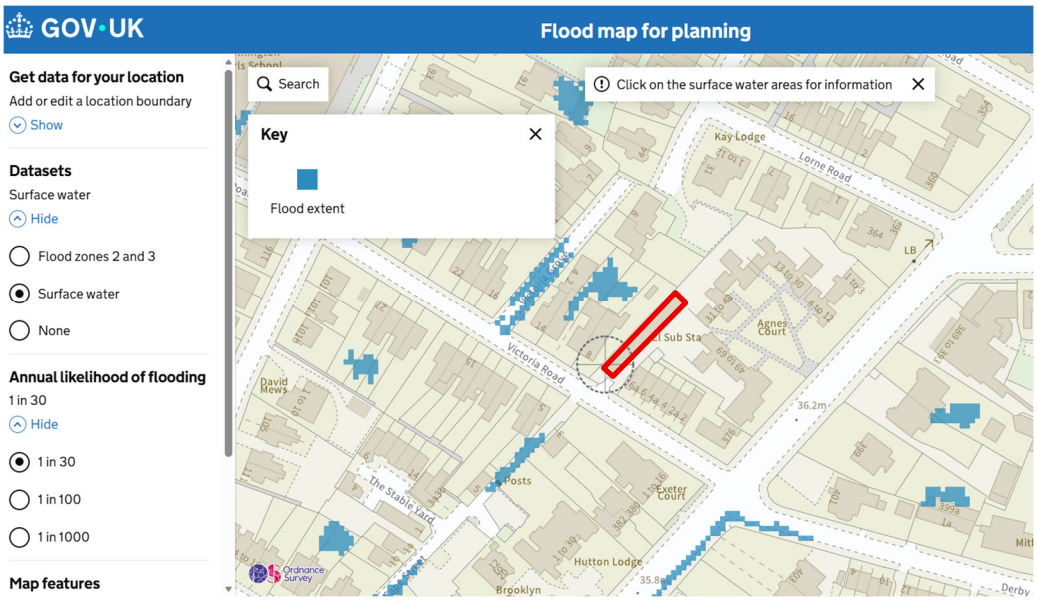


Figure 3 – EA Surface Water Flood Map (1 in 30 year)

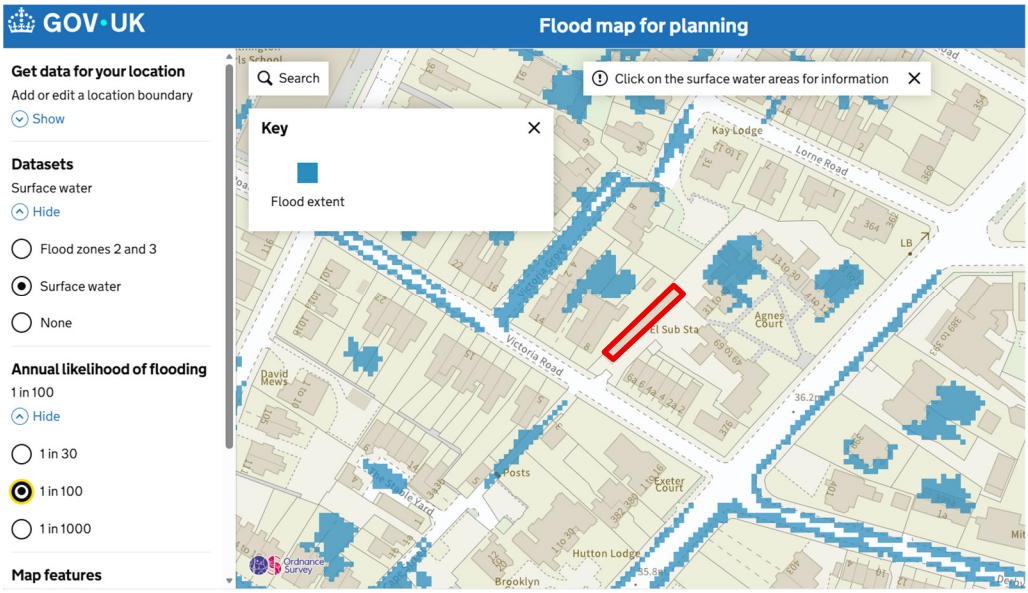


Figure 4 – EA Surface Water Flood Map (1 in 100 year)

4.6 Groundwater Flooding

4.6.1 Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or maybe localised sands or river gravels in valley bottoms underlain by less permeable rocks.

4.6.2 No site investigation has been carried out at the site. British Geological Survey mapping confirmed that the bedrock strata is designated as a Principal Aquifer. The Superficial Drift part of the site is designated as a Secondary A Aquifer.

4.6.3 The Strategic Flood Risk Assessment (SFRA) maps for the area indicate that the site is not at risk of groundwater flooding.

4.6.4 The proposed development does not include any below ground basement areas and floor levels will be raised above the external levels. Based on this and the anticipated deeper groundwater levels, the risk of groundwater flooding to the site is considered low.

4.7 Reservoir Flooding

4.7.1 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

4.7.2 The Long-Term Flood Risk Assessment (Flood Risk from Reservoirs) map shows that the site is at low risk of reservoir flooding.

4.7.3 As long at the reservoirs are continually maintained the risk of flooding remains very low.

4.8 Historical Flooding

4.8.1 The Environment Agency and SFRA records do not indicated any historical flooding in the vicinity of the site.

4.9 Flood Risk Summary

4.9.1 The earlier sections have defined the anticipated flood risks from all sources. Table 3 below considers each of the sources and defines in tabular format the probability of flood risk associated to each and the likely impacts.

Table 3 – Flood Risk Summary

Source	Flood Risk	Impacts	Remarks / Mitigation Measures
Tidal	Low	Low	Development site is located in Tidal Flood Zone 1.
Fluvial	Low	Low	The development is located in low flood risk zone 1.
Sewers & Private Drainage	Low	Low	No adopted sewers within development boundary. Retained private drainage will serve the new building, designed to current guidance with any exceedance flooding located away from the dwellings.
Surface (Overland Flows)	Low	Low	Property located in a very low-risk area for surface water flooding.
Groundwater	Low	Low	SFRA maps would not indicate ground water flooding a risk. No basements proposed.
Artificial Sources	Low	Low	No Artificial sources in close proximity.

5.0 Outline Drainage Strategy

5.1 Existing Drainage

5.1.1 A review of the United Utilities (UU) sewer records has indicated a 300mm diameter combined water sewer within Victoria Road to the south of the site, flowing south easterly towards Wilmslow Road.

5.1.2 No surface water sewers have been identified in close proximity.

5.1.3 A CCTV survey of the drainage serving the full Agnes Court development has been undertaken and confirms a private combined water network that ultimately flows south and outfalls to the combined sewer In Victoria Road. The current garages discharge into this network unrestricted. Refer to Appendix E for details of the existing private network.

5.2 Existing Drainage Runoff

5.2.1 The current site can be classed as Brownfield with the roof and hard paved areas draining unrestricted to the adjacent combined sewer. Figure 5 below defines the existing Brownfield runoff rates based on the modified rational method and respective rainfall intensities, with an impermeable area from the roof and driveway of 0.02ha.

Impermeable Areas (ha)	1 yr (30mm/hr)	30yr (65mm/hr)	100yr (95mm/hr)
0.020	1.7 l/s	3.6 l/s	5.3 l/s

Figure 5: Existing Brownfield Runoff Rates

5.3 Hydrological Assessment

5.3.1 The closest identified watercourse is the culverted Cringle Brook, flowing west beyond the northern boundary in 3rd party land.

5.4 Geology

5.4.1 Due to access requirements, no formal site investigation has been undertaken at this time. According to the British Geological Survey (BGS), the superficial deposits encompass Till/Diamicton – silts and clays, with the underlying bedrock comprising the Chester Formation – Sandstone.

5.4.2 These findings are supported by a local BGS borehole indicating made ground underlain by 2.5m of stiff silty clay.

5.4.3 Based on these findings, infiltration as a means of draining the site has been discounted.

5.5 Sustainable Drainage Systems (SuDS) Assessment

5.5.1 SuDS Objectives

5.5.1.1 Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

5.5.2 SuDS Design Themes

5.5.2.1 The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

i. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.

ii. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).

iii. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.

iv. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

5.5.3 SuDS Site Constraints

5.5.3.1 SuDS techniques are suitable for all sites; therefore an assessment of the existing site is required so that SuDS limitations can be determined.

- *Land Use Characteristics:* The size and type of development has the potential for a range of source control and site control SuDS devices to be considered.
- *Site Characteristics:* Desk top investigations have determined that infiltration-based options would not be possible.
- *Catchment Characteristics:* The site is currently classed for drainage purposes as 'Greenfield'.
- *Environmental and Amenity Performance:* The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. All types of SuDS will be considered and blended into the project where feasible. Maintenance plans will be prepared for all SuDS devices that are included.

5.5.4 SuDS Methods

5.5.4.1 Figures 6 and 7 on the following pages provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates & volumes, and whether they can be suitably incorporated at this development site.

The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the residential development.

Method	Comment	Suitability for Development
Green Roofs	• Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater. Promotes evaporation and local biodiversity.	*Not suitable*: • Architectural proposals for the development and maintenance issues deem this unsuitable.
Water Butts	• Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas for reuse by the property owners.	*Suitable*: • To be incorporated to the base of the rear rainwater pipes.
Rainwater Harvesting	• Rainwater harvesting reduces the total runoff volume from the developed site by reusing as 'Grey' water. Also reduces treated water consumption.	*Not suitable*: • Very limited end use.
Infiltration Options	• Reduces total run off volume from the development by allowing water to infiltrate to suitable sub strata.	*Not Suitable*: • Presence of the underlying cohesive ground would preclude infiltration options.
Permeable Surfacing (Infiltration)	• Reduces total run off volume from the development by allowing water to infiltrate to suitable sub strata. • Can be used to enhance water quality.	*Not Suitable*: • No external areas proposed.
Permeable Surfacing (Standard)	• Can be used to enhance quality of runoff water. • Sub-base provides 'source' storage and reduces the volume of storage downstream with selection of stone fill or use of plastic box stems. • Impermeable membrane at base of construction to prevent impact on pavement stability.	*Not Suitable*: • No external areas proposed.
Bio-Retention	• Collect and retain run-off within tree pits or above ground planers to help improve water quality, prior to discharge in piped system or infiltration.	*Not Suitable*: • The size and type of the development restrict the use of above ground surface runoff storage.
Swales, basins and ponds	• Provide areas for above ground surface runoff storage. • Swales also improve water quality through filtration.	*Not Suitable*: • No external areas proposed to locate any swales.

Figure 6: Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc.	*Suitable:* • Subject to detailed design and drainage layout has the potential to be used to attenuate the peak flows.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally, it would be suitable for adoption by the statutory water company (e.g., United Utilities).	*Not Suitable:* • The use of oversized pipes is more suited to large residential schemes.

Figure 7: Sub-Surface SuDS Methods

5.5.5 SuDS Hierarchal Approach

5.5.5.1 Based on the SuDS assessment in Tables 6 & 7, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Desk top based investigations have determined that the underlying cohesive ground would not be suitable for infiltration-based options.
Connection to Watercourse	No	No accessible watercourse in close proximity.
Connection to Surface Water Sewer	No	No surface water sewer in close proximity.
Connection to a Combined Sewer	Yes	Reuse existing connection to the combined water sewer at restricted rates.

Figure 8: SuDS Hierarchal Approach

5.5.6 SuDS Design Philosophy

5.5.6.1 SuDS assessment and hierarchal approach discussed in Figure 6, 7 and 8 above has defined the overall SuDS strategy. Thus, the SuDS philosophy for the development site is the promotion of prevention and site control techniques with discharge to the adjacent watercourse at a restricted rate.

The following design philosophy is proposed:

- Aim to reduce the impermeable fraction of development.

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the existing drainage infrastructure.
- Prevention measures in the form of water butts.
- Site control in the form of a controlled outflow and attenuation measures.

5.6 The Non-Statutory Technical Standards for SuDS

5.6.1 It is best practice to develop drainage strategies to the DEFRA document 'The Non-Statutory Technical Standards for SuDS'. The Manchester City Council (MCC) SuDS document also follows the principles of this document.

5.6.2 The DEFRA document advises the following with respect to 'Peak Flow Control' (S2) and 'Volume Control' (S4) for Greenfield sites such as this:

- ***S3*** *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*
- ***S5*** *Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*
- ***S6*** *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with* ***S5*** *above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*

5.6.3 As noted above, and in line with policy, it is intended that surface water discharge rates will be restricted close to the respective greenfield runoff rates for all rainfall events in accordance with standard **S2** and to comply with the peak volume requirements as per **S4** and **S6**. A Maximum rate of 2.0l/s will therefore be applied to the flow control.

5.7 Climate Change

5.7.1 In May 2022, the Environment Agency released updated climate change allowances for peak rainfall intensities which should be applied to new developments. Rather than nation wide allowances, each area will have its own peak rainfall allowances. In the case of the Manchester area, this is the Upper Mersey Management Catchment peak rainfall allowances.

5.7.2 Based on the nature of the residential development, a lifespan of circa 70 years could be anticipated. Therefore, the potential climate change allowance for the 2070's Upper end Allowance for is 45%, which will be included in the hydraulic calculations.

5.8 Outline Surface Water Drainage Strategy

5.8.1 The general principle of the surface water drainage strategy is to collect the runoff from the roof area of the new residential property and direct it into an underground drainage network that then outfalls to the existing private combined drain at a peak runoff rate of 2.0l/s via a new connection. Due to this restricted rate attenuation will take the form of a shallow geocellular attenuation tank. Water butts will also be incorporated to the rear rainwater pipes.

5.8.2 The proposed drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance, i.e. up to the 30-year storm return period criterion and tested for the 1 in 100-year return period including a 45% increase to account for climate change to confirm that there is no flood risk to the units.

5.8.3 A fully detailed hydraulic surface water network has been simulated in the Causeway 'Flow' Design Software. Taking account of the flow control of 2.0l/s no flooding will occur up to the extreme 100 year + 45% CC storm event.

5.8.4 Drawing PGC1501-DR-C-001 in Appendix C indicates the Drainage Strategy based on the Architects masterplan intent, with the outline hydraulic calculations in Appendix D.

5.9 Volume Control

5.9.1 The impermeable area of the application site will mimic the current areas as a result of the development and therefore the volume of run-off in the 100-year 6-hour storm event will be not change from the pre-development level.

5.10 Pollution Control

5.10.1 Runoff from roofs is generally considered to be clean and will be discharged directly into the new drainage network. Surface water run-off from hard paved areas at risk of contamination should receive water quality treatment. Access roads are considered as a medium hazard in terms of contamination. Figure 9 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 9: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

5.10.2 Figure 10 then illustrates the SuDS Component mitigation indices from the CIRIA SuDS Manual C753 (2015).

5.10.3 The selection of treatment should ensure that the SuDS mitigation component index (Figure 10) exceeds the pollution hazard index (Figure 9).

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.

4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.

5 See Chapter 14 for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: **http://tinyurl.com/qf7yuj7**

6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Figure 10: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

5.10.4 The roof areas have a have low pollution hazard level and thus no further treatment is required.

5.11 Maintenance

5.11.1 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 proprietary 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.

5.11.2 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – '*basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections*.'
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example.'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict*.'

5.11.3 Piped Networks, Inspection, Manhole and Catchpit Chambers

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 where required.

Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.

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 discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

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 be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required, take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Figure 11: Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

5.11.4 Flow Control Units

The flow control units are intended for flood control and flow restriction.

The flow control is specified as Hydro-brake and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre- treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

Figure 12: Operation and Maintenance Requirements for Flow Controls

5.11.5 Geocellular tanks

Geocellular tanks are modular storage systems made with plastic units. These units can be assembled to achieved re required volume and usually on multiple layers. Generally, the units have 95% of voids content and are used to create an efficient below ground structure to store surface water.

The geocellular units and geotextile are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.

Access for maintenance should be provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.

Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris form the catchment surface (where it may cause risks to performance).	Monthly.
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Figure 13: Operation & maintenance requirements for attenuation storage tanks - Based on CIRIA SuDS Manual 2015

5.12 Foul Water Drainage

5.12.1 New foul drainage to connect to the combined drain passing through the site via a new connection.

5.12.2 The proposed foul drainage for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance.

5.12.3 Drawing PGC 1501-C-DR-001 in Appendix C indicates the outline foul water drainage strategy.

6.0 Management Measures, Off Site Impacts and Residual Risk

6.1 Flood Risk Management Measures

6.1.1 The assessment has determined that the proposed finished floor level will be located above the 1 in 100 year and 1 in 1000-year flood events.

6.1.2 All other flood risks have been considered and found not to be a flood risk generator to the development.

6.1.3 SuDS in the form of prevention and site control measures from the site will help to minimise the flood risk impact to the surrounding watercourse.

6.2 Off Site Impacts

6.2.1 The report has justified that the risk of flooding to the new development layout is low. Thus the development site has a very low risk of flooding from fluvial or by all other sources of flood risk.

6.2.2 By including SuDS into the drainage system, this will reduce surface water flooding impact onto the downstream catchments.

6.3 Residual Risks

6.3.1 With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

Appendix A – Development Plans



REV	DATE	AMENDMENT	BY	CHKD

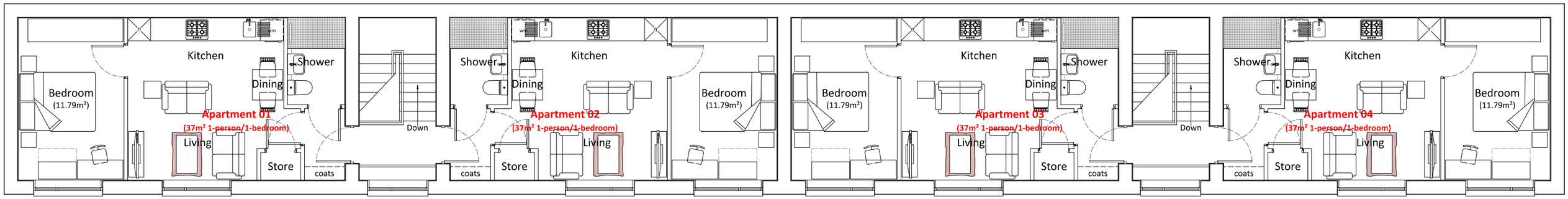
PROJECT:	Agnes Court, Wilmslow Road, Fallowfield				
CLIENT:	Feltham Group Properties				
DRAWING:	Site Location Plan				
DRAWN BY:	DB	CHECKED BY:	MB	CREATED: 19/03/2026	SCALE: 1:1250 @ A4
STATUS:	Developed Design			DRAWING No: 1497/SLP	REVISION:

HNA architects
Architecture | Planning | Design

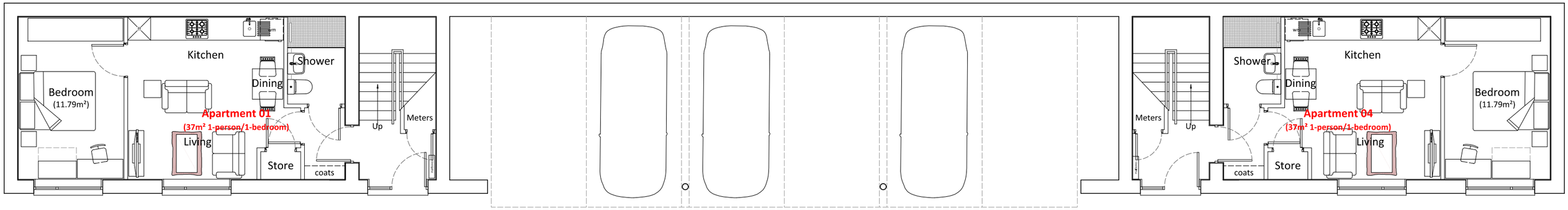
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E-MAIL: info@hna-architects.co.uk

RIBA Chartered Practice



Proposed Garages Conversion - First Floor Plan



Proposed Garages Conversion - Ground Floor Plan

REV	DATE	AMENDMENT	BY	CHKD

HNA architects
Architecture | Planning | Design

PROJECT:	Agnes Court, Wilmslow Rd/Victoria Rd, Manchester				
CLIENT:	-				
DRAWING:	Garages Conversion - Proposed Floor Plans				
DRAWN BY:	EK	CHECKED BY:	MB	CREATED: 04/03/2026	SCALE: 1:100 @ A3
STATUS:	Planning			DRAWING No: 1497-P-101	REVISION:

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Appendix B – Topographical Survey

STANDARD REFERENCE & ABBREVIATIONS

(AR)........Assumed Route	IL.........Invert Level
AB.........Air Brick	IP.........Inlet Pipe
AV.........Air Valve	KO.........Kerb Outlet
B/W........Barbed Wire	LB.........Letter Box
BAR........Barrier	LP.........Lamp Post
BB.........Belisha Beacon	MG.........Multi-Girth
BH.........Borehole	MH.........Manhole
BL.........Bed Level	MKR........Marker
BOL........Bollard	MP.........Mooring Point
BS.........Bus Stop	NP.........Street Name Plate
BT Box.....British Telecom Box	O/H........Overhead
BT.........British Telecom IC	O/P........Open Paling
BRTW.......Brick Retaining Wall	OE.........Overhead Electric Wire
BW.........Brick Wall	OP.........Outfall Pipe
C/B........Close Boarded	OSBM.......Ordnance Survey Bench Mark
C/I........Corrugated Iron	OT.........Overhead Telecom Wire
C/P........Chestnut Paling	P/C........Post & Chain
CB.........Control Box	P/R........Post & Rail
CBW........Concrete Block Wall	P/W........Post & Wire
CCTV.......Closed Circuit TV	PAV........Paving
CD.........Cable Duct	PB.........Pillar Box
CEL........Cellar Light	PC.........Pedestrian Crossing
CH/L.......Chain Link	PP.........Petrol Pump
CHY........Chimney	PT.........Post or Pillar
CL.........Cover Level	RE.........Rodding Eye
CM.........Cable Marker	RS.........Road Sign
COL........Column	RTW........Retaining Wall
CONC.......Concrete	RWP........Rain Water Pipe
CP.........Catch Pit	SAP........Sapling
CRTW.......Concrete Retaining Wall	SL.........Sump Level
CTV........Cable Television	SoL........Soffit Level
CUL........Culvert	SP.........Sign Post
CW.........Concrete Block Wall	SPL........Springing Level
DC.........Drainage Channel	SRTW.......Stone Retaining Wall
DPC........Damp Proof Course	SV.........Stop Valve (unspecified)
DR.........Drain	SVP........Soil Vent Pipe
DSW........Dry Stone Wall	SW.........Stone Wall
ECP........Electricity Cable Pit	TAC........Tactile Paving
EIC........Electricity Inspection Cover	TB.........Traffic Bollard
EJ.........Expansion Joint	TBM........Temporary Bench Mark
EJB........Electricity Junction Box	TCB........Telephone Call Box
EL SUB STN..Electricity Sub Station	TFR........Taken From Records
EL.........Eaves Level	TIE........Anchor Point (Masts/Poles)
ELB........Electricity Box	TL.........Traffic Light
EP.........Electricity Pole	TLB........Traffic Light Control Box
ER.........Earth Rod	TM.........Ticket Machine
ETL........Electricity Transmission Line	TMC........Tarmac
FB.........Flower Bed	TP.........Telecommunications Pole
FH.........Fire Hydrant	TPIT.......Trial Pit
FL.........Floor Level	TS.........Trash Screen
FP.........Flagpole	U/C........Under Construction
G*.*.......Girth (of tree)	U/G........Underground
G..........Gulley	UTL........Unable to Lift (MH,IC etc)
GAB........Gabion	UTS........Unable to Survey
GIP........Gas Inlet Pipe	VDP........Vehicle Detector Pad
GMKR.......Gas Marker	VP.........Vent Pipe
GST........Gas Stop Tap (Domestic)	W/M........Wire Mesh
GSV........Gas Stop Valve (Mains)	WL.........Water Level
HSE........Housing	WM.........Water Meter
Ht.........Height	WO.........Wash Out
HV.........High Voltage	WP.........Waste Pipe
I/R........Iron Railing	WST........Water Stop Tap (domestic)
IC.........Inspection Cover	WSV........Water Stop Valve (mains)



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Note:

The survey is plotted on a plane local Grid. Orientation to National Grid.
All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

Levels in parenthesis indicate top of walls.

Revision - Date - Description

A - 8/7/24 - Additional information Added, text and levels ammended.

SURVEY STATIONS

Name	Easting	Northing	Height
SO1	385255.50	393459.29	36.01
SO2	385285.25	393444.66	36.43
SO3	385314.29	393482.06	36.59
SO4	385262.41	393507.60	36.13
SO5	385243.89	393482.82	35.74
SO1A	385227.92	393465.76	35.94

Survey Operations

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Client
HNA Architects

Drawing Title
Topographical Survey of Land at:
Agnes Court
Wilmslow Road
Fallowfield

Scale(s)	1:200	Surveyor	CA
Date	Jun 24	Drawn	OKS/JE
Job Number	24D278	Checked	SI/MG/SO

Sheet Size & Drg Number & Revision
A1 24D278/001 A

Appendix C – PGC Drawings

SURFACE WATER DRAINAGE

CONSIDERATION HAS BEEN GIVEN TO THE HIERARCHY OF DRAINAGE OPTIONS FOR THE SITE AS FOLLOWS:

- DISCHARGE INTO GROUND - NO PHASE 2 SITE INVESTIGATION COMPLETED. BGS INDICATES GROUND TO BE COHESIVE.
- DISCHARGE TO SURFACE WATER BODY - NO VIABLE WATERCOURSE IN CLOSE PROXIMITY.
- DISCHARGE TO SURFACE WATER SEWER, HIGHWAY DRAIN OR OTHER DRAINAGE SYSTEM - NO SURFACE WATER SEWER IN CLOSE PROXIMITY.
- DISCHARGE TO COMBINED WATER SEWER - REUSE EXISTING CONNECTION TO THE COMBINED PUBLIC SEWER VIA EXISTING CONNECTION AT RESTRICTED RATES.

SUDS TO ENCOMPASS:

- RAINWATER PLANTERS
- GEOCELLULAR ATTENUATION CRATES
- FLOW CONTROL CHAMBER.

SUMMARY

IMPERMEABLE AREA:	200m² (TOTAL)
OUTFALL LOCATION:	COMBINED WATER SEWER
PEAK DISCHARGE RATE:	2L/S
ATTENUATION VOLUME:	4.8m³ (100YR + 45% CC)

FOUL WATER DRAINAGE

FOUL WATER GENERATED BY THE NEW DEVELOPMENT WILL DISCHARGE TO THE SAME COMBINED SEWER IN VICTORIA ROAD VIA AN EXISTING CONNECTION.

EX MH
CL: 35.35
IL: 33.35

EXACT ROUTE OF EXISTING 225/300Ø DRAIN TO BE CONFIRMED AND POTENTIALLY DIVERTED IF BENEATH NEW BUILDING

RWP & BIG

NEW MH01
CL: 35.90
IL: 34.90

BURIED MANHOLE (EXACT LOCATION TBC)

NEW DRAINAGE CHANNEL
150Ø @ 1.84

EX MH
CL: 35.64
IL: 34.04

GEOCELLULAR STORAGE TANK, TO PROVIDE 4.8m3 ATTENUATION (3x2x0.8m HIGH). TANK TO BE VENTED AND DESIGNED TO SUIT BOTH THE TEMPORARY AND PERMANENT SCENARIO.
CL: 35.90
IL: 34.50
HEIGHT OF UNIT: 0.8m
MIN 0.60m COVER

NEW CONNECTION TO EXISTING COMBINED DRAIN

EX 225/300Ø

NEW MH02
CL: 35.90
IL: 34.90

30mmØ ORIFICE PLATE FLOW RESTRICTING DEVICE PLACED WITHIN CHAMBER TO RESTRICT OUTFLOWS TO 2L/S FOR ALL EVENTS

NEW CONNECTION TO EXISTING COMBINED DRAIN

300Ø COMBINED WATER PUBLIC SEWER

UU MH 1402
CL: 35.72
IL: 32.97

NOTE THIS DRAWING IS ISSUED TO SUPPORT THE OUTLINE PLANNING APPLICATION ONLY. FINAL DRAINAGE LAYOUT AND SUDS CONFIGURATION SUBJECT TO FINAL SITE LAYOUT AND DETAILED DESIGN

GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUT FALLS IN RELATION TO EXISTING SEWERS PRIOR TO ANY CONSTRUCTION TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED.
4. DO NOT SCALE FROM THIS DRAWN, WORK TO DIMENSIONS OR COORDINATES PROVIDED. ALL LEVELS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.

KEY

- EXISTING COMBINED WATER SEWER
- EXISTING COMBINED WATER DRAINAGE
- PROPOSED FOUL WATER DRAINAGE
- PROPOSED SURFACE WATER DRAINAGE
- SITE BOUNDARY

NOTE ALL RWP AND SVP LOCATIONS TO BE CONFIRMED BY OTHERS

ALL PIPEWORK TO BE 100Ø UNLESS NOTED OTHERWISE

REV	DATE	DRAWN	REV'D ENG.	NOTES
P3	26.03.26	PG	PG	SITE BOUNDARY UPDATED
P2	11.03.26	PG	PG	SITE PLAN UPDATED
P1	03.03.26	PG	PG	PRELIMINARY ISSUE

CLIENT
FELTHAM GROUP PROPERTIES

PROJECT
AGNES COURT,
WILMSLOW ROAD, MANCHESTER

DRAWING TITLE
DRAINAGE STRATEGY PLAN

DRAWING STATUS
INFORMATION

SCALE	DRAWN BY	ENGINEER	SHEET
1:100	PG	PG	A1

DRAWING No: PGC1501-DR-C-001
REVISION: P3

PG Consulting
Civil & Infrastructure Engineers
108 Ack Lane West,
Cheadle Hulme,
Cheshire,
SK8 7ES
Tel: 07710 758971
Email: paul@pgcl.co.uk

Appendix D – Hydraulic Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	10	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	✓
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Depth (m)	Invert Level (m)
MHSW01	0.016	4.00	35.900	450	1.000	34.900
TANK		4.00	35.900	100	1.400	34.500
MHSW02	0.004	4.00	35.900	450	1.500	34.400
EX SEWER			35.900	100	2.500	33.400

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	MHSW01	MHSW02	42.000	0.600	34.900	34.400	0.500	84.0	150	4.64	107.3
2.000	TANK	MHSW02	2.000	0.600	34.500	34.400	0.100	20.0	150	4.01	113.4
1.001	MHSW02	EX SEWER	3.000	0.600	34.400	33.400	1.000	3.0	150	4.65	107.3

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.097	19.4	6.2	0.850	1.350	0.016	0.0	58	0.978
2.000	2.262	40.0	0.0	1.250	1.350	0.000	0.0	0	0.000
1.001	5.861	103.6	7.8	1.350	2.350	0.020	0.0	28	3.472

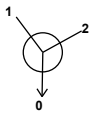
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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	42.000	84.0	150	Circular	35.900	34.900	0.850	35.900	34.400	1.350
2.000	2.000	20.0	150	Circular	35.900	34.500	1.250	35.900	34.400	1.350
1.001	3.000	3.0	150	Circular	35.900	34.400	1.350	35.900	33.400	2.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	MHSW01	450	Manhole	Adoptable	MHSW02	450	Manhole	Adoptable
2.000	TANK	100	Manhole	Adoptable	MHSW02	450	Manhole	Adoptable
1.001	MHSW02	450	Manhole	Adoptable	EX SEWER	100	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
MHSW01	83.333	75.239	35.900	1.000	450	 0	1.000	34.900	150
TANK	20.321	54.671	35.900	1.400	100	 0	2.000	34.500	150
MHSW02	27.860	44.633	35.900	1.500	450	 1 2 0	2.000 1.000 1.001	34.400 34.400 34.400	150 150 150
EX SEWER	27.648	32.094	35.900	2.500	100	 1	1.001	33.400	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.400	Starting Level (m)	
Summer CV	1.000	Check Discharge Rate(s)	x
Winter CV	1.000	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	40	0	0
100	45	0	0

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Node MHSW02 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.250	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	2.0		
Invert Level (m)	34.400	Diameter (m)	0.030		

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	34.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	38

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	6.0	6.0	0.800	6.0	12.9	0.801	0.0	12.9

Approval Settings

Node Size	✓	Maximum Full Bore Velocity (m/s)	3.000
Node Losses	✓	Proportional Velocity	✓
Link Size	✓	Return Period (years)	
Minimum Diameter (mm)	150	Minimum Proportional Velocity (m/s)	0.750
Link Length	✓	Maximum Proportional Velocity (m/s)	3.000
Maximum Length (m)	100.000	Surcharged Depth	✓
Coordinates	✓	Return Period (years)	
Accuracy (m)	1.000	Maximum Surcharged Depth (m)	0.100
Crossings	✓	Flooding	✓
Cover Depth	✓	Return Period (years)	30
Minimum Cover Depth (m)		Time to Half Empty	x
Maximum Cover Depth (m)	3.000	Discharge Rates	✓
Backdrops	✓	Discharge Volume	✓
Minimum Backdrop Height (m)		100 year 360 minute (m³)	
Maximum Backdrop Height (m)	1.500	First Flush	✓
Full Bore Velocity	✓	Return Period (years)	30
Minimum Full Bore Velocity (m/s)		First Flush Depth (mm)	5

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	109.521	30.991	1 year 600 minute winter	6.274	2.511
1 year 15 minute winter	76.857	30.991	1 year 720 minute summer	8.203	2.199
1 year 30 minute summer	71.439	20.215	1 year 720 minute winter	5.513	2.199
1 year 30 minute winter	50.133	20.215	1 year 960 minute summer	6.768	1.782
1 year 60 minute summer	48.435	12.800	1 year 960 minute winter	4.483	1.782
1 year 60 minute winter	32.179	12.800	1 year 1440 minute summer	4.949	1.326
1 year 120 minute summer	30.053	7.942	1 year 1440 minute winter	3.326	1.326
1 year 120 minute winter	19.966	7.942	30 year +40% CC 15 minute summer	376.189	106.449
1 year 180 minute summer	23.233	5.979	30 year +40% CC 15 minute winter	263.992	106.449
1 year 180 minute winter	15.102	5.979	30 year +40% CC 30 minute summer	244.900	69.298
1 year 240 minute summer	18.475	4.882	30 year +40% CC 30 minute winter	171.860	69.298
1 year 240 minute winter	12.274	4.882	30 year +40% CC 60 minute summer	163.225	43.136
1 year 360 minute summer	14.169	3.646	30 year +40% CC 60 minute winter	108.443	43.136
1 year 360 minute winter	9.210	3.646	30 year +40% CC 120 minute summer	98.613	26.061
1 year 480 minute summer	11.185	2.956	30 year +40% CC 120 minute winter	65.516	26.061
1 year 480 minute winter	7.431	2.956	30 year +40% CC 180 minute summer	74.617	19.202
1 year 600 minute summer	9.182	2.511	30 year +40% CC 180 minute winter	48.503	19.202

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +40% CC 240 minute summer	58.245	15.393
30 year +40% CC 240 minute winter	38.697	15.393
30 year +40% CC 360 minute summer	43.710	11.248
30 year +40% CC 360 minute winter	28.413	11.248
30 year +40% CC 480 minute summer	34.053	8.999
30 year +40% CC 480 minute winter	22.624	8.999
30 year +40% CC 600 minute summer	27.658	7.565
30 year +40% CC 600 minute winter	18.898	7.565
30 year +40% CC 720 minute summer	24.485	6.562
30 year +40% CC 720 minute winter	16.456	6.562
30 year +40% CC 960 minute summer	19.901	5.240
30 year +40% CC 960 minute winter	13.183	5.240
30 year +40% CC 1440 minute summer	14.225	3.812
30 year +40% CC 1440 minute winter	9.560	3.812
100 year +45% CC 15 minute summer	505.670	143.087
100 year +45% CC 15 minute winter	354.856	143.087
100 year +45% CC 30 minute summer	332.000	93.944
100 year +45% CC 30 minute winter	232.982	93.944
100 year +45% CC 60 minute summer	222.268	58.739
100 year +45% CC 60 minute winter	147.669	58.739
100 year +45% CC 120 minute summer	134.215	35.469
100 year +45% CC 120 minute winter	89.169	35.469
100 year +45% CC 180 minute summer	101.219	26.047
100 year +45% CC 180 minute winter	65.795	26.047
100 year +45% CC 240 minute summer	78.690	20.795
100 year +45% CC 240 minute winter	52.280	20.795
100 year +45% CC 360 minute summer	58.701	15.106
100 year +45% CC 360 minute winter	38.157	15.106
100 year +45% CC 480 minute summer	45.550	12.038
100 year +45% CC 480 minute winter	30.262	12.038
100 year +45% CC 600 minute summer	36.875	10.086
100 year +45% CC 600 minute winter	25.195	10.086
100 year +45% CC 720 minute summer	32.556	8.725
100 year +45% CC 720 minute winter	21.879	8.725
100 year +45% CC 960 minute summer	26.340	6.936
100 year +45% CC 960 minute winter	17.448	6.936
100 year +45% CC 1440 minute summer	18.700	5.012
100 year +45% CC 1440 minute winter	12.567	5.012

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	MHSW01	10	34.941	0.041	3.2	0.0197	0.0000	OK
30 minute summer	TANK	23	34.604	0.104	2.2	0.5937	0.0000	OK
30 minute summer	MHSW02	23	34.604	0.204	3.4	0.0432	0.0000	SURCHARGED
30 minute summer	EX SEWER	24	33.410	0.010	0.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	MHSW01	1.000	MHSW02	3.2	0.373	0.164	0.4505	
30 minute summer	TANK	2.000	MHSW02	-2.2	-0.224	-0.054	0.0306	
30 minute summer	MHSW02	1.001	EX SEWER	0.8	1.726	0.008	0.0014	2.0

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Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.71%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	MHSW01	44	35.126	0.226	6.8	0.1083	0.0000	SURCHARGED
60 minute summer	TANK	44	35.124	0.624	5.6	3.5603	0.0000	SURCHARGED
60 minute summer	MHSW02	44	35.124	0.724	8.4	0.1534	0.0000	SURCHARGED
60 minute summer	EX SEWER	44	33.413	0.013	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	MHSW01	1.000	MHSW02	6.7	0.474	0.347	0.7394	
60 minute summer	TANK	2.000	MHSW02	-5.6	-0.319	-0.141	0.0352	
60 minute summer	MHSW02	1.001	EX SEWER	1.6	2.106	0.015	0.0023	8.7

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.02%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	MHSW01	45	35.602	0.701	9.2	0.3360	0.0000	FLOOD RISK
60 minute summer	TANK	45	35.598	1.098	7.2	4.5716	0.0000	SURCHARGED
60 minute summer	MHSW02	45	35.598	1.198	10.0	0.2540	0.0000	SURCHARGED
60 minute summer	EX SEWER	45	33.415	0.015	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute summer	MHSW01	1.000	MHSW02	7.8	0.523	0.404	0.7394	
60 minute summer	TANK	2.000	MHSW02	-7.2	-0.411	-0.181	0.0352	
60 minute summer	MHSW02	1.001	EX SEWER	2.0	2.259	0.020	0.0027	11.8

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Appendix E – CCTV Survey Plan

Clearway Drainage Systems
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Project Information

Project Name	Project Number	Project Date
Agnes Court M14 6AJ		23/04/2025

Project Drawing, Page '57665 Agnes Court 24.04.25'

