



Gaywood Green, Kirkby

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT



24th September 2024

Gaywood Green, Kirkby

Flood Risk Assessment & Drainage Strategy Report

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Gaywood Green, Kirkby

Flood Risk Assessment & Drainage Strategy Report

Liiv Housing Group - Gaywood Green, Kirkby



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Contents

1.0 INTRODUCTION	4
2.0 SITE DESCRIPTION	5
2.1 Geology	5
2.2 Hydrogeology	5
2.3 Hydrology	6
3.0 PROPOSED DEVELOPMENT	6
4.0 PLANNING POLICY	6
4.1 Sequential and Exception Test	7
4.2 Exception Test	7
5.0 FORMS OF FLOODING.....	7
5.1 Flooding from Rivers	7
5.2 Flooding from Sea	7
5.3 Flooding from Land	7
5.4 Flooding from Groundwater	8
5.5 Flooding from Sewers.....	8
5.6 Flooding from Reservoirs, Canals and Other Artificial Sources	8
6.0 PROPOSED DEVELOPMENT	9
6.1 Effect of Proposed Development	9
6.2 Existing Drainage Systems.....	9
6.3 Proposed Drainage Strategy.....	10
6.3.1 Surface Water Drainage	10
6.3.2 SuDS Summary	14
6.3.3 Water Quality Assessment	15
6.3.4 Foul Water Drainage.....	16
7.0 FUTURE MANAGEMENT & MAINTENANCE	17
7.1 General Maintenance & Inspection Requirements.....	17

7.2 Inspection Chambers, Manholes and Catchpits 18

7.3 Pipes 18

7.4 Drainage Channels and Gullies..... 19

7.5 Vortex Flow Control Device 20

7.6 Permeable Paving 21

7.7 Bioretention Systems 22

7.8 Swales..... 23

8.0 CONCLUSIONS 24

9.0 RECOMMENDATIONS..... 26

Appendix A - Site Location Plan 28

Appendix B - Aerial Photograph 29

Appendix C - Topographic Survey 30

Appendix D - Proposed Site Plan..... 31

Appendix E - Flood Maps 32

Appendix F - Existing Drainage Information..... 33

Appendix G - Pre & Post Development Impermeable Areas Drawing **Error! Bookmark not defined.**

Appendix H - Existing Brownfield Runoff Calculations 34

Appendix I - Preliminary Storage Estimate 35

Appendix J - Preliminary Drainage Strategy Drawing 36

Appendix K - Knowsley Council SuDS Pro-Forma 37



Alan Johnston Partnership Ltd.

Company No. 13204766

Gaywood Green, Kirkby

Flood Risk Assessment & Drainage Strategy Report

1.0 INTRODUCTION

This Flood Risk Assessment (FRA) and Drainage Strategy Report has been prepared on behalf of Livv Housing Group in connection with the construction of a new residential development. The site is situated to the north of Gaywood Avenue, Kirkby, Liverpool. Even though the entire site is located in Flood Zone 1, as the total area of the proposed development is greater than 1.0ha, an FRA is required.

This FRA has been prepared in accordance with the general requirements of the National Planning Policy Framework and the associated Planning Practice Guidance, both published by the Department for Communities and Local Government. This involves the identification of flood risk to new development(s) on the site, the possible effect of this development on flood risk elsewhere and the investigation of the impact on the development as a result of increased sea levels, fluvial flows and larger pluvial events due to increased impermeable areas and climate change.

The purpose of this report is to present a site-specific assessment of flood risk based on available information, to identify relevant flood levels affecting the site with respect to a particular probability of flooding. The flood levels identified are dependent on the correctness of the current conditions, as stated in this report and the prediction of future climatic conditions implicit in the National Planning Policy Framework.

For any size of storm event, the procedure will always yield a probability that the event will occur in any year, albeit the probability is smaller for larger events. The predicted storm event has a probability of occurrence in any year and the derived flood level has an associated probability of exceedance. This means that there is always a risk that property flooding could occur one or more times in any year.

Therefore, this report should not be interpreted or relied upon as providing a guarantee against flooding. There is always a residual risk that flooding will occur and it is not possible to predict a zero risk of flooding.

In accordance with National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance, flood risk must be assessed for all sources including tidal (from the sea), fluvial (from rivers), pluvial (from land), groundwater, sewer and artificial water bodies (e.g., reservoirs, canals, major water supply infrastructure etc.).

More specifically, the development of any site must be carried out in such a way as to mitigate any potential flood risk, both on and off site from all sources of flooding.

The other purpose of this report is to present the surface water and foul water outline drainage strategies for the site which have been developed by the Alan Johnston Partnership. To demonstrate how the specific drainage requirements are to be met, the report should be read in conjunction with the relevant drawings and supporting information, included within the appendices.

The drainage strategies outlined within this report, have been prepared in accordance with BS EN 752:2017 (Drain and sewer systems outside buildings), Design and Construction Guidance for foul and surface water sewers offered for adoption (DCG), Building Regulations Approved Document H (Drainage and waste disposal), the National Planning Policy Framework document (Department for Communities and Local Government, July 2021) and associated Planning Practice Guidance.

2.0 SITE DESCRIPTION

The site is situated on the existing Central Park development site, which is located to north of Gaywood Avenue, Kirkby, Liverpool, at National Grid reference SJ 41805 97647. The site location is illustrated in Appendix A and the extent of the area to which the application relates is shown on the enclosed aerial photo, attached in Appendix B.

The existing site covers a total area of 1.436ha and currently comprises of a number of existing residential tower blocks, garage blocks and associated access roads and car parking areas. The site is bounded by a residential development to the east, Gaywood Avenue to the south and Broad Lane to the west and north.

The site generally falls from north-east to south-west, with levels falling from approximately 30.60mAOD in the north-east to approximately 26.00mAOD in the south-west. An aerial photo is included in Appendix B to illustrate the site at the present day and a topographic survey is attached in Appendix C.

2.1 Geology

An intrusive site investigation was completed by CCG in August 2024 and the results of that investigation is contained within the CCG report CCG-C-24-14643 - Phase II Ground Investigation Report. This report indicates that the strata underlying the site consists of made ground underlain by sandstone bedrock, comprising of sands/weathered sandstone.

This corresponds with the information taken from the British Geological Survey (BGS) 1:50,000 Bedrock maps, which shows that the site has no record of superficial deposits, with bedrock reported to be of the Chester Formation comprising of sandstone.

2.2 Hydrogeology

The Environment Agency groundwater maps show the bedrock is classified as a Principal Aquifer, defined as aquifers that comprise of layers of rock or drift deposits that have high intergranular and/or fracture permeability, meaning they usually provide a high level of

water storage and transmission. They may also support water supply and/or river base flow on a strategic scale.

The Environment Agency groundwater maps also indicate that the development site is situated within a groundwater Source Protection Zone (SPZ) III. Therefore, should infiltration be suitable across the site, discussions with the Environment Agency should be undertaken to determine the level of treatment to the surface water prior to infiltrating into the ground.

2.3 Hydrology

The nearest watercourse is Knowsley Brook which is located approximately 850m south-west of the proposed development. As such, the site is located within Flood Zone 1 which is categorized by the Environment Agency as land assessed as having less than a 1 in 1,000 annual probability of river flooding (1% - 0.1%). Therefore, the site is an area identified by the Environment Agency as at low risk of flooding from rivers and streams.

3.0 PROPOSED DEVELOPMENT

The entire site covers a total area of 1.436ha. The proposed development is to demolish the existing residential tower blocks and associated buildings across the site and replace them with a new residential development comprising of 74no. dwellings, associated access roads, car parking and landscaping areas.

To enable a viable scheme, the proposed site levels are constrained by the existing developments and highways surrounding the site, therefore the site levels may be amended but are likely to remain similar to the existing in order to tie into the surrounding developments and highways. A proposed site plan is attached in Appendix D.

4.0 PLANNING POLICY

The National Planning Policy Framework (NPPF) sets out the Government's policy on meeting the challenges of climate change, flooding and coastal change. The NPPF states that:

"Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impact of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development. Local planning authorities should adopt proactive strategies to mitigate and adapt to climate change taking full account of flood risk, coastal change and water supply and demand consideration."

This Flood Risk Assessment proposes recommendations to facilitate the proposed development so that it takes into account flood risk at all stages of the development.

4.1 Sequential and Exception Test

Based on the sites location within Flood Zone 1, the development is deemed appropriate according to NPPF therefore the development is appropriately situated and the Sequential Test is not required.

4.2 Exception Test

NPPF classifies the development (dwelling houses) as a 'More Vulnerable' development and as the site is located within Flood Zone 1, the development is deemed appropriate according to NPPF and therefore the Exception Test is not required.



5.0 FORMS OF FLOODING

The National Planning Policy Framework requires all forms of flooding to be considered.

5.1 Flooding from Rivers

The Flood Risk map is included as Appendix E. As can be seen from the Flood Risk map, the entire site is located within Flood Zone 1 and therefore, the site is located in Flood Zone 1 with a chance of flooding of less than 0.1% (or 1 in 1000).

The nearest watercourse is Knowsley Brook which is located approximately 850m south-west of the site. As such, the risk of flooding to the new development from rivers is considered to be low.

5.2 Flooding from Sea

The site is not at risk of flooding from the sea. The lowest level of the site is approximately 45.50mAOD, i.e., well above tidal flood levels.

5.3 Flooding from Land

Intense rainfall, often of short duration, that is unable to soak into the ground or enter drainage systems can run quickly off land and result in local flooding. The Surface Water Flooding map is included in Appendix E. It can be seen from the map that most of the site is classified as having a low or very low risk of surface water flooding.

A very small area of land to the west of the site is classified as having a medium to high flood risk. Assessing the topo survey attached in Appendix C, it can be seen that this area is an existing car park area and is actually a low point when compared to the surrounding site levels.

However, these areas are to be reworked during the construction of the new development and therefore the levels within these areas will likely be amended to suit the proposed development. These areas will also have sufficient new positive drainage to collect any surface water runoff.

Therefore, due to the likely amended levels and sufficiently designed drainage systems, these areas can be considered to be at low risk from flooding. Therefore, the risk of flooding from overland flows due to surface water flooding is considered to be low and as such the overall site is considered to be at low risk of flooding from surface water/surrounding land.

5.4 Flooding from Groundwater

From the groundwater vulnerability maps we can see that the site is located within an area with a medium to low risk of groundwater flooding. This coupled with the fact that the Long Term Flood Risk Service indicates that groundwater flooding is unlikely in this area, leads to the conclusion that the site has a low risk of flooding from groundwater.

However, this should be confirmed via the intrusive site investigation, which should indicate the level of any groundwater found.

5.5 Flooding from Sewers

A historical record of public sewers surrounding and serving the development site is included in Appendix F. As can be seen from the historic public sewer map, there are no public sewers located within the site boundary, with the only nearby public sewers being located within the highways surrounding the site.

The site also contains a series of private surface and foul water sewers which seem to discharge into the aforementioned public sewers. These are indicated within the CCTV survey, extracts of which are also attached within Appendix F. The entire CCTV survey report can be issued, should it be required.

Therefore, as there are no public sewers located within the site and the fact that the proposed drainage for the site will be suitably designed, leads to the conclusion that the site itself is considered to have a low risk of flooding from sewers.

5.6 Flooding from Reservoirs, Canals and Other Artificial Sources

The Reservoir Flood Risk map is included in Appendix E. The nearest artificial waterbody is the White Man's Dam which is located approximately 2.20km south-east of the site. As such, it can be seen from the map that the site is not at risk of flooding from reservoirs, canals or other artificial sources.



6.0 PROPOSED DEVELOPMENT

6.1 Effect of Proposed Development

As previously outlined in Section 3.0, the existing site covers a total area of 1.436ha. The pre and post development impermeable areas for the 1.436ha development area have been assessed and are indicated on the attached drawing in Appendix G. The comparison between the pre and post development impermeable areas is also summarised below;

Total Development Site Area (ha)	Existing Impermeable Area (ha)	Proposed Impermeable Area (ha)
1.436	0.775	0.757

Therefore, the changes to the existing site will decrease the volume of impermeable areas and as such, the proposed development will lead to a decrease in the;

- ◆ Volume of surface water ponding on the site.
- ◆ Volume of surface water runoff leaving the site or discharging into surrounding areas.
- ◆ Peak discharge rate from the site.

Despite this, drainage systems are needed to drain the foul and surface water flows arising from the proposed development. Where possible, any existing drainage networks should be utilised. Appropriate design and construction of these systems as set out in Section 6.3 should ensure that there is no increase in offsite flood risk that would otherwise impact downstream areas.

6.2 Existing Drainage Systems

As can be seen from the United Utilities sewer maps attached in Appendix F, there are no public sewers located within the site boundary. But there are public foul water sewers and public surface water sewers located within the highways surrounding the site.

The CCTV survey extracts, also attached in Appendix F, indicate that there are existing private foul and surface water drainage networks which seem to discharge into the surrounding public sewers.

As can be seen from the CCTV survey extracts, attached in Appendix F, there are 2no. existing private surface water drainage networks which collect the runoff from the existing site. The first private surface water drainage network collects the runoff from the existing development and conveys the flow to the south of the site, where it seems to discharge into the 450mm diameter public surface water sewer, located within Gaywood Avenue to the south of the site.

The other private surface water network collects the runoff from the western area of the site and conveys the flow further west prior to discharging into the 1000mm diameter public surface water sewer, located within Broad Lane to the west of the site.

The CCTV survey extracts, attached in Appendix F, also indicate that there are 4no. separate foul water networks across the site with all of them looking as though they discharge into the surrounding public foul water sewers.

The first private foul water drainage network collects the foul water flows from the existing development and conveys the flow to the south of the site, where it seems to discharge into the 225mm diameter public foul water sewer, located within Gaywood Avenue to the south of the site.

The second and third private foul water drainage networks collect the foul water flows from the existing development and convey the flows to the west of the site, where they both seem to discharge into the 300mm diameter public foul water sewer, located within Broad Lane to the west of the site.

The final private foul water network collects the runoff from the northern area of the site and conveys the flow further north prior to also discharging into the 300mm diameter public foul water sewer, located within Broad Lane to the north of the site.

Whilst CCTV surveys of the existing private drainage have been completed, further surveys should be undertaken to confirm that the assumed connections to the surrounding public sewers are intact and if any of the existing connections could be suitable for re-use.

As there are no public sewers running through the site, it is envisaged that no sewer easements, sewer diversions or build over agreements will be required. However, a pre development enquiry and further discussions with United Utilities should be undertaken to confirm this and also to confirm acceptance of any proposed connections to the surrounding public sewers.

6.3 Proposed Drainage Strategy

As outlined above in section 6.1, site-wide drainage systems are required to drain the foul and surface water flows arising from the proposed development. The proposed drainage systems must ensure that there is no increase in offsite flood risk that would otherwise impact downstream areas.

6.3.1 Surface Water Drainage

The Planning Policy Guidance and the CIRIA SuDS Manual C753 detail that surface water runoff from a development should be disposed of as high up the following hierarchy as reasonable practicable:

- ◆ into the ground (infiltration);
- ◆ to a surface water body;
- ◆ to a surface water sewer, highway drain, or another drainage system;
- ◆ to a combined sewer.

Considering the hierarchy above, the surface water network for the proposed area of the site should infiltrate where possible. As indicated in Section 2.1, an intrusive site investigation was completed by CCG in August 2024 and the results of that investigation

is contained within the CCG report CCG-C-24-14643 - Phase II Ground Investigation Report.

Falling head tests were undertaken as part of the site investigation and these indicated that the soil infiltration rates are very slow. This is highlighted within the site investigation through the discovery of perched water.

Due to the low permeability of the underlying strata and the fact that the perched water has acquired contamination by leaching, the use of infiltration drainage has been deemed as unsuitable. This is due to the use of soakaways likely aggravating the distribution of the contaminated accumulations of perched water.

Section 18.5 of the CCG Phase II Ground Investigation Report, CCG-C-24-14643 states that soakaway drainage is not viable for the proposed site.

As infiltration has been ruled out by the site investigation, the intent for the development would be to discharge to a watercourse. As indicated in Section 5.1, the nearest watercourse is Knowsley Brook which is located approximately 850m south-west of the site. Therefore, it is envisaged that due to the distance across already developed third-party land, discharging the surface water runoff to watercourse is not feasible.

As such, it is anticipated that the surface water runoff from the site will discharge into the existing public surface water sewers which are located within the existing highways surrounding the proposed development.

While every effort to use the existing systems should be made, the drainage systems should be designed to suit the proposed site layout and topography which aims to provide an efficient design.

In line with Design and Construction Guidance for foul and surface water sewers (DCG), the requirements for the design of a new surface water drainage systems are as follows:

- ◆ Below ground piped drainage to be sized to accommodate the 1 in 2 year (50% AEP) design storm without surcharge.
- ◆ System to be designed not to flood any part of the site in a 1 in 30 year (3% AEP) design storm.
- ◆ For events in exceedance of the 1 in 30 year design storm and up to and including the 1 in 100 year event, site drainage and topography should be designed where practicable to route surface water run-off away from buildings to safe above-ground storage areas on site, thereby preventing this run-off from leaving the site and increasing flood risk elsewhere.

For each design case described above, the design storm is the critical storm duration for the site conditions. In the case of the 1 in 100 year design storm, a 45% increase in the peak rainfall intensity is applied to allow for the estimated worst case impacts of climate change. This is in accordance with new advice, issued by Defra, which updates previous climate change allowances outlined in the National Planning Policy Framework.

Suitable systems of below ground drainage will be required to contain as a minimum requirement, the 1 in 30 year event + 40% climate change. Additionally, any surface water run-off from events that exceed the design capacity of the new drainage system, up to and including the 1 in 100 year (+45%) event, will be retained on-site in safe storage areas.

In line with common practice, it is proposed the surface water discharge from the proposed development should mimic that from the existing site.

As the existing site is a brownfield site, Table 6.1 of the Knowsley MBC's Strategic Flood Risk Assessment (SFRA) Level 2 advises that proposed surface water runoff is to be restricted to provide at least a 50% betterment on the existing brownfield runoff rates. This is further highlighted within Section 4.2 of the Knowsley Council Sustainable Drainage & Surface Water Management Technical Guidance For Developers.

A pre development enquiry and discussions with United Utilities are required to confirm their acceptance of the 50% betterment on the existing brownfield runoff rate.

Using the total pre-development impermeable area of 0.775ha, an assessment of the existing surface water run-off from the brownfield site has been completed using a three pipe network within Micro Drainage. The existing brownfield runoff assessment is attached in Appendix H and the results are summarised within the table below.

Rainfall Return Period (years)	Existing Brownfield Runoff Rate (L/s)	Proposed Runoff Rate with 50% Betterment (L/s)
1 Year	89.0	44.5
Qbar (2 Year)	112.6	56.3
30 year	216.1	108.1
100 year	239.8	119.9

The proposed surface water discharge rates incorporating the 50% betterment are also indicated within the above table. As such, applying a 50% reduction to comply with Knowsley Council requirements, the maximum surface water discharged rate for the entire site is 44.5 L/s.

Using the total post development impermeable area of 0.757ha at the restricted discharge rate of 44.5 L/s, for the 1 in 100 year + 45% return period design storm, a storage volume of 379.4m³ is required. The preliminary attenuation storage assessment is attached in Appendix I.

As per the requirements, outlined within the Knowsley Council Sustainable Drainage & Surface Water Management Technical Guidance For Developers, the preliminary attenuation assessment, attached in Appendix I, includes for the following;

- ◆ A 45% climate change allowance.
- ◆ An additional 10% for urban creep.
- ◆ Volumetric runoff coefficient set to 1.0.

- ◆ MAAD factor set to 0.
- ◆ Maximum rainfall increased to software maximum of 550mm/hr to avoid limiting the rainfall intensity.

The detailed design of the proposed surface water drainage network should also ensure that the above requirements are met, throughout the design of the network.

As seen in from the Preliminary Drainage Strategy Drawing attached in Appendix J, the proposed surface water drainage is to be split into two separate networks with two separate connections to the surrounding public surface water sewers.

As such, the overall surface water discharge rate of 44.5 L/s is to be split between the two networks, with the network to the north having a discharge rate of 22.7 L/s and the network to the south a discharge rate of 21.8 L/s. Vortex flow control devices will be used to restrict the surface water discharge rates to the required rates of 22.7 L/s and 21.8 L/s.

As seen in from the Preliminary Drainage Strategy Drawing attached in Appendix J, it is anticipated that the Cellular attenuation tanks will be provided to supply additional storage along with 900dia pipes to achieve the attenuation storage volume of 379.4m³ for the development.

The Preliminary Drainage Strategy Drawing attached in Appendix J, indicates that the surface water drainage collects the runoff from the site via permeable paving, raingardens, tree pits, swales and gullies for water quality purposes & larger pipes & cellular attenuation tanks for storage this then conveys the surface water runoff to the existing public surface water sewers, located within the highways surrounding the proposed site.

The surface water runoff discharges into the public surface water sewers via vortex flow control devices which restrict the runoff to the public surface water sewers to the required discharge rates of 22.7 L/s and 21.8 L/s, for all rainfall events up to and including the 1 in 100 year +45% climate change event.

The surface water drainage strategy and discharge rate should be confirmed via more detailed discussions with Knowsley Council and United Utilities prior to the commencement of any works.

6.3.2 SuDS Summary

As outlined within the summary table below, all SuDS techniques have been considered for this development;

SuDS Technique	Suitable for This Development?	Reasoning
Green Roof	✗	Not suitable due to minimal available roof areas and residential nature of the development.
Rainwater Harvesting	✗	Impractical due to lack of demand for greywater.
Basins & Ponds	✗	Not suitable due to the lack of available space.
Filter Strips & Swales	✓	Suitable and incorporated where possible.
Bio-retention Areas	✓	Suitable and incorporated where possible.
Infiltration Techniques	✗	Unsuitable due to impermeable strata but to be confirmed via intrusive site investigation.
Permeable Surfaces	✓	Only non-infiltration permeable surfaces suitable as infiltration unsuitable due to impermeable strata.
Tanked/Piped Systems	✓	Suitable but not required.

Green roofs have been considered but due to the minimal roof areas and the residential nature of the development, the use of green roofs has been discounted.

Rainwater harvesting was also considered but due to a lack of greywater demand and the cost associated with tanks and pumping of the separate system, it has been deemed as impractical to include a rainwater harvesting system.

Due to the limited space available across the site, the use of basins and ponds have been deemed unsuitable. Filter strips have not been incorporated due to the impermeable underlying strata but the use of conveyance swales have incorporated where possible across the site.

Bio-retention areas have been incorporated across the site where possible. These include the use of raingardens, tree pits and also SuDSPods to provide on plot attenuation.

As previously discussed in Section 6.3.1 infiltration is assumed to be unfeasible across the site and therefore the use of infiltration SuDS techniques is not possible. However, the use of non-infiltration permeable surfaces such as permeable paving have been deemed as acceptable and have therefore been incorporated within the car park and 'shared surface' areas.

Finally, the use of oversized pipes and below ground cellular attenuation tanks are suitable but due to the use of the granular drainage blanket below the areas of permeable paving as the attenuation storage, these SuDS solutions are not required.

The use of specific SuDS techniques across the site will be determined during the detailed design process but where possible, the SuDS summary should be adhered to as close as reasonably possible.

6.3.3 Water Quality Assessment

Managing the water quality of the surface water runoff from the proposed development is important to ensure that the receiving surface waters or groundwater are well protected. Generally, this can be achieved through the use of well-designed SuDS systems which provide treatment and pollution removal to the surface water runoff.

Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018) details the water quality management and addresses the drainage design requirements to minimise the potential pollution risk.

As the proposed development consists of residential roof areas, low traffic roads and residential car parks, in accordance within Table G3.1 of the Statutory National Standards for Sustainable Drainage Systems (2018) the pollution hazard level is low and as such the simple index approach can be used to assess the treatment requirements for the low risk of pollution.

The simple index approach is outlined within Chapter 26 of CIRIA Report C753 - The SuDS Manual. Therefore, using Table 26.2 and applying the proposed site description above, results in the pollution hazard indices being; TSS - 0.5, Metals - 0.4 and Hydrocarbons - 0.4.

Assessing this against Table 26.3 of CIRIA Report C753 - The SuDS Manual using the proposed permeable paving areas, raingardens, tree pits and swales, results in the mitigation indices outweighing the pollution hazard indices identified above. The use of permeable paving itself results in mitigation indices of; TSS - 0.7, Metals - 0.6 and Hydrocarbons - 0.7, which is sufficient.

Therefore, as the mitigation indices are equal to or greater than each of the pollution hazard indices the use of a permeable paving with raingardens, tree pits and swales is deemed acceptable from a pollution mitigation perspective and as such complies with the water quality requirements of Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018).

Given the results of the simple index approach above, it is concluded that the proposed SuDS solutions provide sufficient treatment to comply with Standard S3 of the Statutory National Standards for Sustainable Drainage Systems (2018) but discussions with the LLFA should be undertaken to confirm their agreement.

6.3.4 Foul Water Drainage

Foul water drainage disposal is set out in Part H of the Building Regulations in order of priority the preferred methods are;

1. Public sewer
2. Septic tank
3. Cesspool

The foul water system shall be designed in accordance with;

- ◆ BS EN 752:2017 (Drain and sewer systems outside buildings)
- ◆ Design and Construction Guidance for foul and surface water sewers (DCG)
- ◆ Planning Practice Guidance and the National Planning Policy Framework document (Department for Communities and Local Government, July 2021).
- ◆ 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 2015).

As can be seen from the Preliminary Drainage Strategy Drawing attached in Appendix J, the foul water drainage is similar to the proposed surface water drainage, in that, the proposed foul water drainage is to be split into two separate networks with two separate connections to the surrounding public foul water sewers.

The proposed foul water drainage network collects the runoff from the proposed buildings and discharges it into the surrounding public foul water sewers, located within the highways surrounding the proposed site. It is anticipated that the foul water runoff will discharge at an unrestricted discharge rate into the existing public foul water sewers.

The foul water drainage strategy and unrestricted discharge rates should be confirmed via more detailed discussions with Knowsley Council and United Utilities prior to the commencement of any works.



7.0 FUTURE MANAGEMENT & MAINTENANCE

The proposed drainage solution uses SUDS techniques in accordance with the CIRIA SUDS Manual C753. The surface water run-off from the proposed development is to be restricted using a vortex flow control device and the attenuated run-off is to be stored using permeable paving and a cellular attenuation tank.

It is envisaged that the following components will be included within the drainage strategy for the proposed development:

- ◆ Inspection chambers, manholes and catchpits.
- ◆ Pipes.
- ◆ Drainage channels and gullies.
- ◆ Vortex flow control devices.
- ◆ Permeable paving.
- ◆ Bioretention systems (raingardens, tree pits and SuDSPods).
- ◆ Swales.

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.

It is assumed that the majority of the proposed drainage will remain private and therefore maintenance of the proposed drainage systems will be the responsibility of Livv Housing Group or an on-site facilities management team. Therefore, a copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.

The maintenance of the specified SuDS should also be included within the developments Operation and Maintenance Manual and should be detailed in accordance with the CIRIA SuDS Manual C753, as per the operation and maintenance guidance outlined below.

7.1 General Maintenance & Inspection Requirements

- ◆ No work shall be carried out on the drainage system without permission from a nominated person, who has access to information/a working knowledge of the system.
- ◆ Maintenance/inspection work shall be carried out in a safe/planned manner.
- ◆ All work is to be carried out by competent persons suitably trained and equipped in accordance with current statutory safe working policies.
- ◆ Entry into confined spaces shall be kept to a minimum and be restricted to suitably qualified persons working in accordance with current safe working policies.
- ◆ Drainage systems shall be inspected on a regular basis or if any problems be suspected. Debris/defects discovered shall be recorded and a programme of cleaning/repair initiated. Urgent repairs/cleaning to be actioned as soon as practicable.
- ◆ 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.

- ◆ Clearing of the drainage system can be achieved by a number of methods depending on the nature of the work;
 - Rodding - Manual/Mechanical with flexible rods.
 - Jetting - High pressure water jetting.
 - Plunging.

7.2 Inspection Chambers, Manholes and Catchpits

The appropriate health and safety equipment must be used when accessing manholes/catchpits. 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. The following operations should be carried out annually.

- ◆ Covers of inspection chambers and manholes shall be removed and the sides, benchings and channels cleared.
- ◆ Accumulated deposits of silt in inspection chambers, catchpits and manholes shall be removed. Any traps shall then be plunged and thoroughly flushed out with clean water. This should be completed in Autumn, after leaf fall.
- ◆ Main and branch drains shall be cleared as required and afterwards be flushed with clean water. Any obstructions found shall be removed and not flushed down the system.
- ◆ Covers of inspection chambers, manholes and catchpits shall be replaced, bedded in suitable grease or other sealing material as required and bolted/locked down as appropriate. Missing bolts and broken items shall be replaced in accordance with the manufacturer's details.

7.3 Pipes

Regular inspection and maintenance are important to identify areas which may have become obstructed/clogged and may not be draining correctly, as failure to do so would expose the development to a greater level of flood risk.

Pipes are proprietary products and therefore the materials used can vary across the site. As such, where used the manufacturer's recommendations should be followed. Access for maintenance of the pipes is provided through inspection chambers and manholes. The below table sets out the maintenance schedule for the pipe components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for evidence of poor operation via water levels. If required take remedial action.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.
	Check and remove large debris and/or vegetation growth near pipe runs.	Monthly or as required.
Remedial Actions	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.	As required, if above actions do not improve performance.
Monitoring	Initial Inspection should be provided as post construction CCTV survey.	N/A
	Inspect/check all inlets, outlets and overflows to ensure they are in good condition and operating as designed.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.

7.4 Drainage Channels and Gullies

Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel units can be cleaned through the use of a 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 are allowed to move within their frame, this may cause damage to the frame or seating. The below table sets out the maintenance schedule for the drainage channel and gullies components of the proposed drainage systems.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Litter and debris removal.	Monthly or as required.
	Check and remove large debris and/or vegetation growth near pipe 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.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue.	As required, if above actions do not improve performance.
Monitoring	Initial Inspection including channel outlet boxes and gully sumps.	Monthly for 3 months, then six-monthly intervals. Also, 48 hours after large storms.

7.5 Vortex Flow Control Device

Regular inspection and maintenance is important to identify if the vortex flow control device has become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

Vortex flow control devices are proprietary products and therefore can vary from manufacturer to manufacturer. As such, where used the manufacturer's recommendations should be followed.

- ◆ Normally, little maintenance is required as there are generally a vortex flow control device has no moving parts.
- ◆ If blockages occur, they tend to do so at the intake of the vortex flow control device.
- ◆ Vortex flow control devices are generally fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.
- ◆ The smaller type conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard.
- ◆ Following installation of the vortex flow control device it is vitally important that any extraneous material i.e., Building materials are removed from the unit and the chamber.
- ◆ After the system is made live, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. Units should also be inspected within 48 hours after large storms.

7.6 Permeable Paving

Regular inspection and maintenance is important to identify if the inlets/outlets have become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

The maintenance requirements for permeable paving are outlined within Table 20.15 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the potential permeable paving component of the proposed drainage system.

TABLE 20.15 Operation and maintenance requirements for pervious pavements		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

7.7 Bioretention Systems

Regular inspection and maintenance is important to identify if the inlets/outlets have become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

The maintenance requirements for bioretention systems are outlined within Table 18.3 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the bioretention systems components of the proposed drainage systems.

TABLE 18.3 Operation and maintenance requirements for bioretention systems		
Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

7.8 Swales

Regular inspection and maintenance is important to identify if the inlets/outlets have become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

The maintenance requirements for swales are outlined within Table 17.1 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the swales components of the proposed drainage systems.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

It should be noted that the Main Contractor should provide a Verification Report, including photographic evidence, to demonstrate that the drainage has been constructed as per the design drawings. As-built drawings should as be supplied by the Main Contractor, where the construction of the drainage varies from the design construction status drawings.

7.9 Cellular Attenuation Tank

Regular inspection and maintenance are important to identify if the inlets/outlets have become obstructed/clogged and may not be functioning correctly, as failure to do so would expose the development to a greater level of flood risk.

The maintenance requirements for cellular attenuation tanks are outlined within Table 21.3 of the CIRIA SUDS Manual C753. An extract of that table is given below to set out the maintenance schedule for the cellular attenuation tank component of the proposed drainage systems.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks		
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 from 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 blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, 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

8.0 CONCLUSIONS

- ◆ The site is located within Flood Zone 1 and has a low risk of flooding from rivers & sea, surface water, reservoirs and all other sources. Therefore, due to the low risk of flooding from all sources, no flood risk mitigation measures are required for the proposed development.
- ◆ The historic public sewer map indicates that there are no public sewers located within the site boundary but there are a number of existing surface water and foul water public sewers located within the highways surrounding the proposed site.
- ◆ CCTV surveys have confirmed that the site has a number of existing private surface water and foul water drainage networks which serve the current site. The existing private drainage networks seem to discharge into the surrounding public sewers located within the highways surrounding the proposed site.
- ◆ An intrusive site investigation has been completed by CCG and it indicates that the underlying strata consists of made ground underlain by sandstone bedrock, comprising of sands/weathered sandstone.
- ◆ Section 18.5 of the CCG Phase II Ground Investigation Report, CCG-C-24-14643 states that soakaway drainage is not viable for the proposed site due to the potential for contamination leaching and also the low permeability of the underlying strata.
- ◆ Table 6.1 of the Knowsley MBC's Strategic Flood Risk Assessment (SFRA) Level 2, indicates that as the existing site is brownfield, the proposed surface water discharge rates should be restricted to a 50% betterment on the existing brownfield runoff rates. This is further highlighted within Section 4.2 of the Knowsley Council Sustainable Drainage & Surface Water Management Technical Guidance For Developers.
- ◆ Therefore, the proposed surface water discharge rate should be restricted to a 50% betterment on the existing 1 year brownfield runoff rate, which is 44.5 L/s. This should be applied for all rainfall events up to and including the 1 in 100 year +45% climate change event.
- ◆ It is anticipated that the surface water drainage will be split into two separate networks with two separate connections to the surrounding public surface water sewers.
- ◆ As such, the overall surface water discharge rate of 44.5 L/s is to be split between the two networks, with the network to the north having a discharge rate of 22.7 L/s and the network to the south a discharge rate of 21.8 L/s. Vortex flow control devices will be used to restrict the surface water discharge rates to the required rates of 22.7 L/s and 21.8 L/s.

- ◆ As the surface water runoff from the site is to be restricted, attenuation storage will be required to store the surcharged runoff. A preliminary storage estimate has been completed and indicates that the required attenuation storage volume will be 379.4m³ this has been concluded following the detailed drainage design being completed and finalised.
- ◆ Cellular Attenuation Tanks & the proposed surface water network itself will be utilised to provide sufficient storage volume to prevent any flooding for all rainfall events up to and including the 1 in 100 year +45% climate change event.
- ◆ The foul water drainage will also be split into two separate networks, with two separate connections to the surrounding public foul water sewers.
- ◆ The foul water drainage networks will collect the runoff from the proposed buildings and discharge the foul water, at an unrestricted discharge rates, into the existing public foul water sewers.

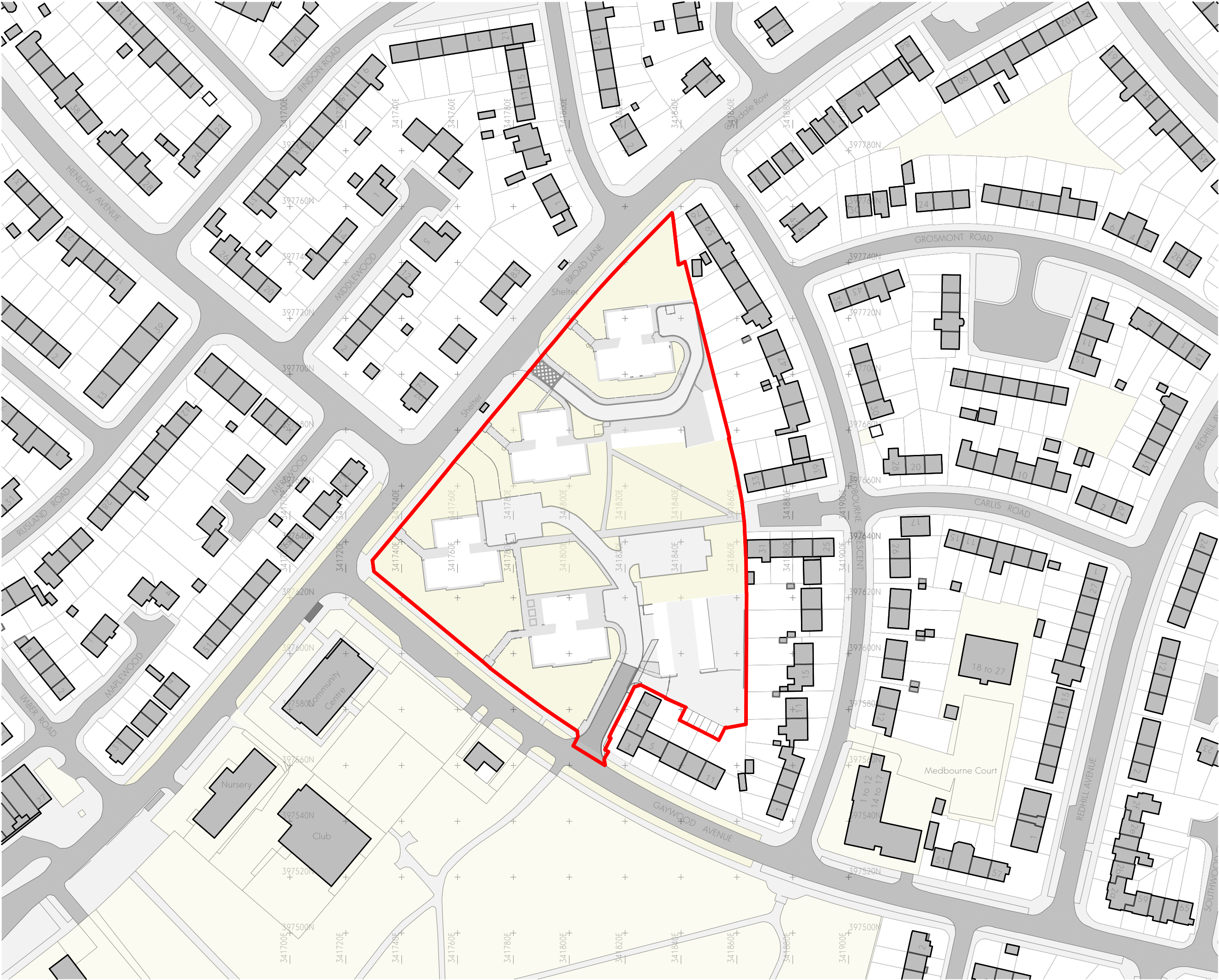
9.0 RECOMMENDATIONS

- ◆ Whilst CCTV surveys of the existing private drainage have been completed, further surveys should be undertaken to confirm that the assumed connections to the surrounding public sewers are intact and if any of the existing connections could be suitable for re-use.
- ◆ A pre development enquiry and discussions with United Utilities should be undertaken to confirm that no sewer easements, sewer diversions or build over agreements will be required and also to confirm acceptance of the proposed surface and foul water drainage strategies and their proposed connections to the surrounding public sewers.
- ◆ All surface and foul water connections to the surrounding public sewers should be confirmed via Section 104 & Section 106 agreements with United Utilities. This is to confirm that the proposed adoptable drainage, connections and discharge rates from the site are acceptable to United Utilities.
- ◆ The use of specific SuDS techniques across the site will be determined during the detailed design process but where possible, the SuDS summary should be adhered to as close as reasonably possible, with SuDS techniques incorporated, where possible, across the site.
- ◆ The surface water drainage strategy and discharge rate should be confirmed via more detailed discussions with Knowsley Council and United Utilities prior to the commencement of any works.

- ◆ The foul water drainage strategy and unrestricted discharge rate should be confirmed via more detailed discussions with Knowsley Council and United Utilities prior to the commencement of any works.
- ◆ The external ground levels around proposed buildings shall fall away from the proposed buildings with any new levels being designed to ensure any overland flood routes, for events in excess of the 100 Year + 45% CC, exit towards the surrounding access roads, landscaping areas and highways, for use in exceptional circumstances.



Appendix A – Site Location Plan



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All drawings and specifications should be read in conjunction with the project health and safety plan, any possible conflicts should be presented to the Planning Coordinator.

All work to be carried out in accordance with current Building Regulations.

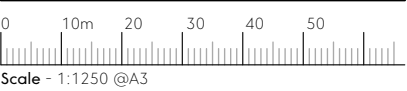
Contractors must verify all dimensions at the job before commencing any work or making shop drawings.

Written dimensions should be taken.

Do not scale off drawing.

Do not take digital dimensions from this drawing.

Any discrepancies to be reported to the Architect.



Key

Site Boundary

P01	12.01.24	First Issue	CT	DT
Rev	Date	Comment	Dr	Ch



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GWPA Ref (529)2316

Job Title
Livv Housing Gaywood Green

Client

Livv Housing Group

Site Location Plan

Name	(529)2316-GWP-01-01-D-A-(PA)-000
Scale	1:1250@A3
Revision	P01
Drawn/Checked	JH/CT
First Issue	12.01.24
Drawing Status	S2 - Planning

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Appendix B – Aerial Photograph



Appendix C – Topographic Survey



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All work to be carried out in accordance with current Building Regulations.

Contractors must verify all dimensions of the job before commencing any work or making this drawing.

Written dimensions should be taken.

Do not scale off drawing.

Do not take digital dimensions from this drawing.

Any discrepancies to be reported to the Architect.

0 10m 20m
Scale 1:400 (A1)

IN

Key

- Site Boundary
- Existing Trees, Category C
- Existing Trees, Category B

Topographic Abbreviations

AV	Air Valve	PB	Pedestrian Beacon
BS	Borehole	PBR	Post Box
BO(ILL)	Ballard (Illuminated)	PGR	Pedestrian Guard Rail
BS	Bus Stop	PH	Parking Meter
CB	Cabinet	PO	Post
COL	Cover Level	RE	Rodding Eye
COL	Column	R2(ILL)	Road Sign (Illuminated)
Conc	Concrete	RWP	Rain Water Pipe
DC	Drainage Channel	SPL(ILL)	Sign Post (Illuminated)
DBin	Dog Fouling Bin	SPCam	Speed Camera
DP	Down Pipe	ST	Stop Tap
EP	Electricity Pole	SV	Sludge Valve
ER	Earth Rod	SVP	Soil Vent Pipe
FFL	Finished Floor Level	Tbox	Telephone Box
FL	Fire Hydrant	TL	Traffic Light
FP	Flag Pole	TCF	Top of Fence Level
GP	Gate Post	TOW	Top of Wall Level
GV	Gas Valve	TP	Telecoms Pole
GV	Gully	VP	Vent Pipe
IC	Inspection Cover	WB	Waste Bin
KO	Kerb Outlet	WB	Window Bottom Level
LP	Lamp Post	WM	Water Meter
MH	Manhole	WO	Wash Out
Mkr	Marker	WT	Window Top Level
MP	Marker Post	WV	Water Valve
	NW	Monitoring Well	

P01 12.01.24 First Issue
Rev Date Comment CT DT
Dr Ch

GWP

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GWP Ref: (529)2316

Job: Livv Housing Gaywood Green

Client: Livv Housing Group

Site Topographical Survey

Name: (529)2316-GWP-01-01-D-A-(PA)-0002
Scale: 1:400@A1 Revision: P01
Drawn/Checked: JH / CT First Issue: 12.01.24
Drawing Status: S2 - Planning

Bitcloud: DESKTOP-H5C2CHA - Bitcloud Base for Archcad 27 / Livv Gaywood Green - (529)2316-GWP-01-0002-A-002

Appendix D – Proposed Site Plan



 Hard surfacing – Tarmac
 Shared Surface (Contrasted)
 Bin Stores

Best Practice Distances (9/13/21m)

Existing site access retained.
Location of existing bus stop subject
to assessment of visibility splays

Bin collection point

Existing cat b trees retained

Existing cat b trees retained

— Bin collection point

- Existing garages to be demolished, replaced with like for like function to be

- Adoptable road

- Existing cat b trees retained

— Public open space

- Bin collection point
- Adoptable road (shared surface)

- Adoptable road

- Dual aspect corner plot (SPD distances)

P15	03.09.25	Update to reflect latest transport drawings	CT	DT
P14	27.08.25	General Update	YT	DT
P13	20.08.25	General Update	MK	DT
P12	11.04.25	Masterplan updated follow client feedback	DT	RT
P11	25.03.25	Masterplan updated follow pre-app feedback	DT	RT
P10	10.09.24	General Update	JB	DT
Rev	Date	Comment	Dr	Ch



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GWPA Ref (529)2316

Job Title Livv Housing Gaywood Green

Client

Livv Housing Group

Proposed Site Plan

Name (529)2316-GWP-01-01-D-A-(PA)-0010

Scale 1: 500@A1	Revision P15
Drawn/CheckedVT / DT	First Issue 12.01.24
Drawing StatusS2 – Planning	

BIMcloud: NewBIMServer - BIMcloud Basic for Archicad 28/Liv
Gaywood Green - (529)2316-GWP-01-XX-M3-A-P12

2b/3p House	= 15 no. (70m ² / NDSS)
3b/4p House	= 12 no. (84m ² / NDSS)
4b/6p House (2.5 storey)	= 3 no. (112m ² / NDSS)
<u>Sub-Total</u> = 30 no	
Inspired Living (1b/2p)	= 6 no. (50m ² / NDSS)
Inspired Living (2b/3p)	= 6 no. (61m ² / NDSS)
<u>Sub-Total</u> = 12 no	
Apartments (Block A - 1b2p)	= 28 no. (50m ² / NDSS)
Apartments (Block A - 2b3p)	= 9 no. (61m ² / NDSS)
<u>Sub-Total</u> = 37 no	
<u>Total Dwellings</u> = 79 no	

Appendix E – Flood Maps

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
341796/397661

Created
25 Jul 2024 16:57

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following**:

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>

Flood map for planning

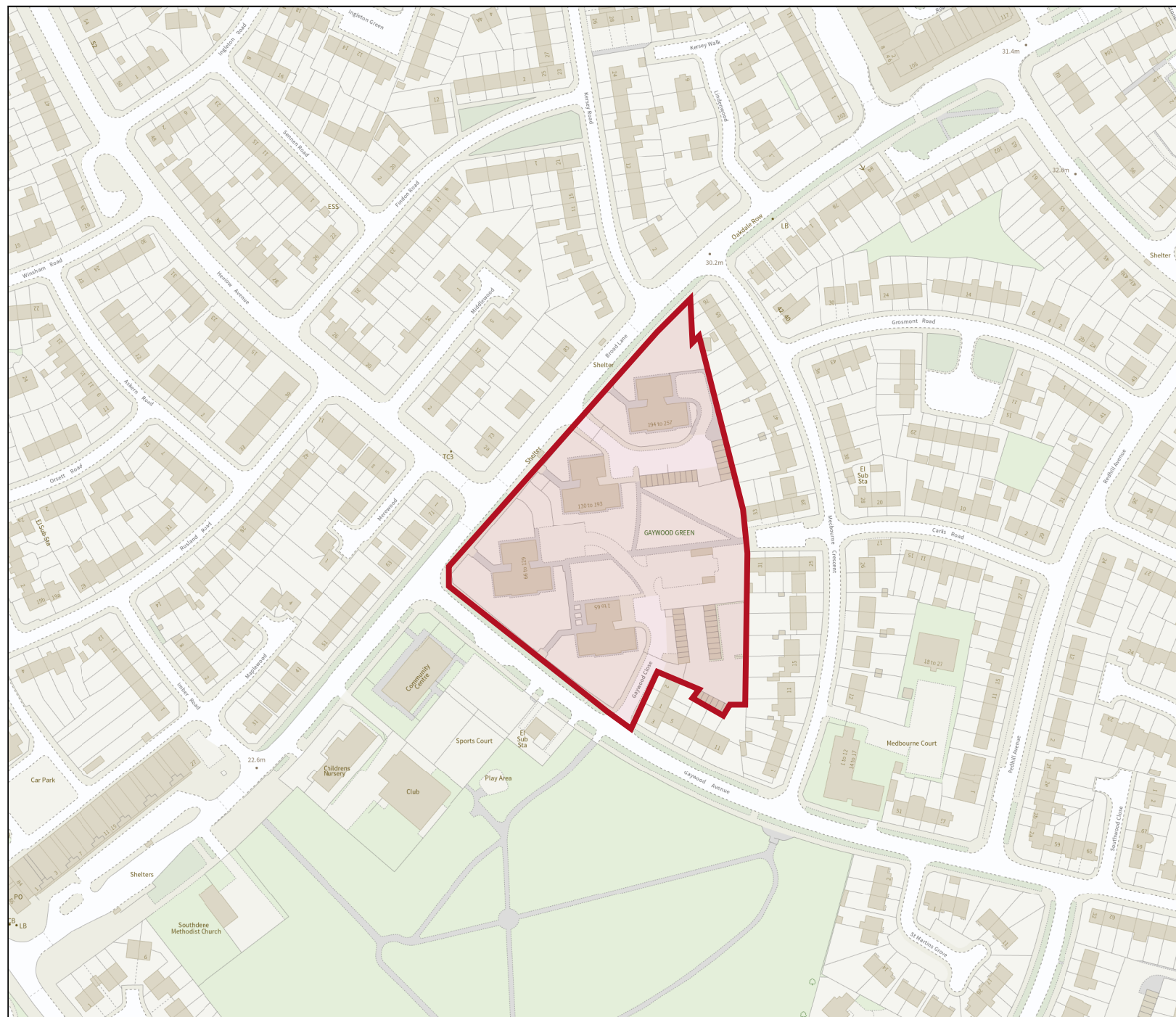
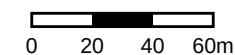
Your reference
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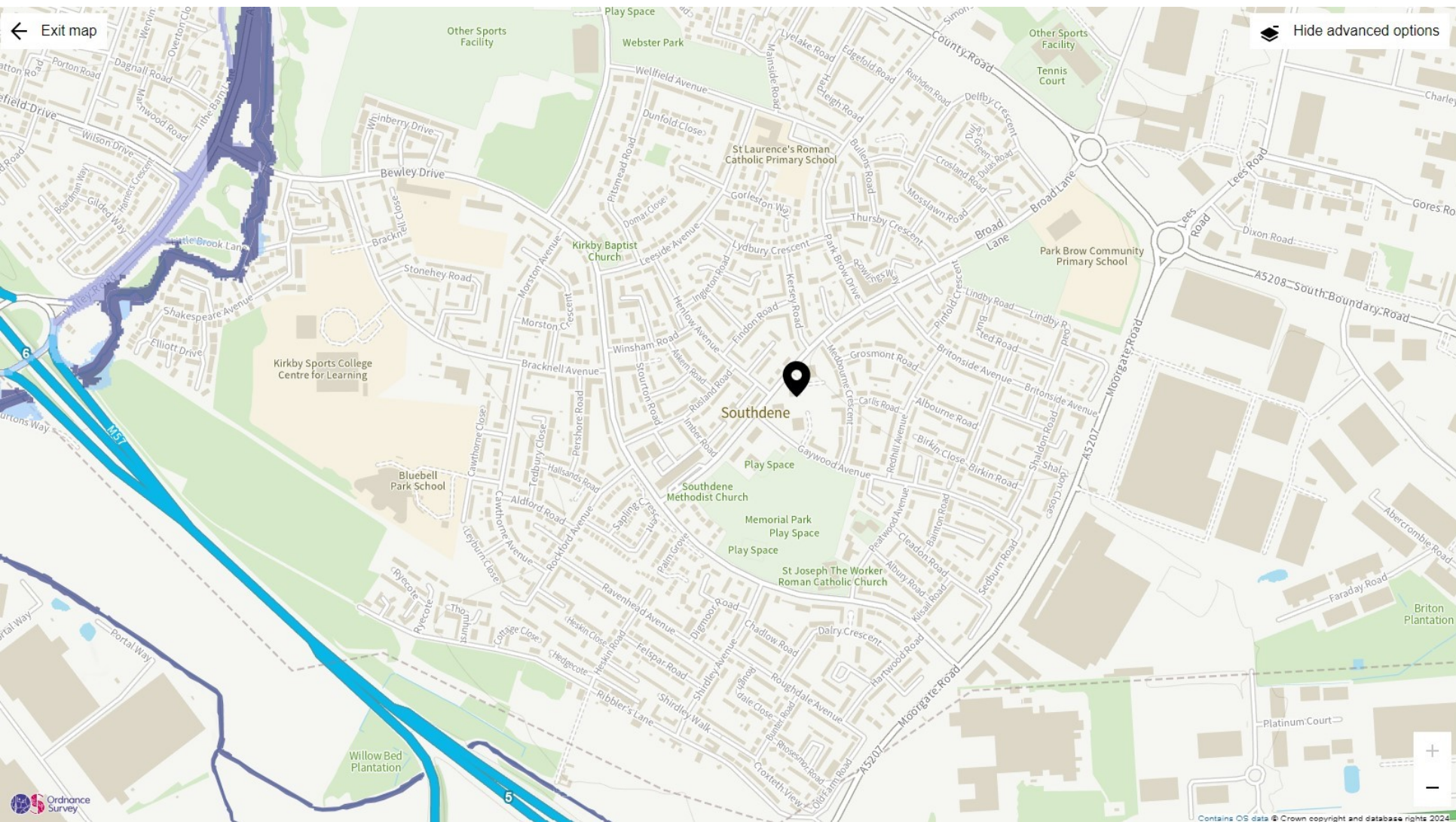
Location (easting/northing)
341796/397661

Scale
1:2500

Created
25 Jul 2024 16:57

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area





Key

Surface water

☐

 Extent

☐

 Depth

☐

 Velocity

Rivers and the sea

☒

 Extent High risk
More than 3.3% chance each year Medium risk
Between 1% and 3.3% chance each year Low risk
Between 0.1% and 1% chance each year Very low risk
Less than 0.1% chance each year**Reservoirs**

☐

 Extent**Map details**

☒

 Show flooding

☒

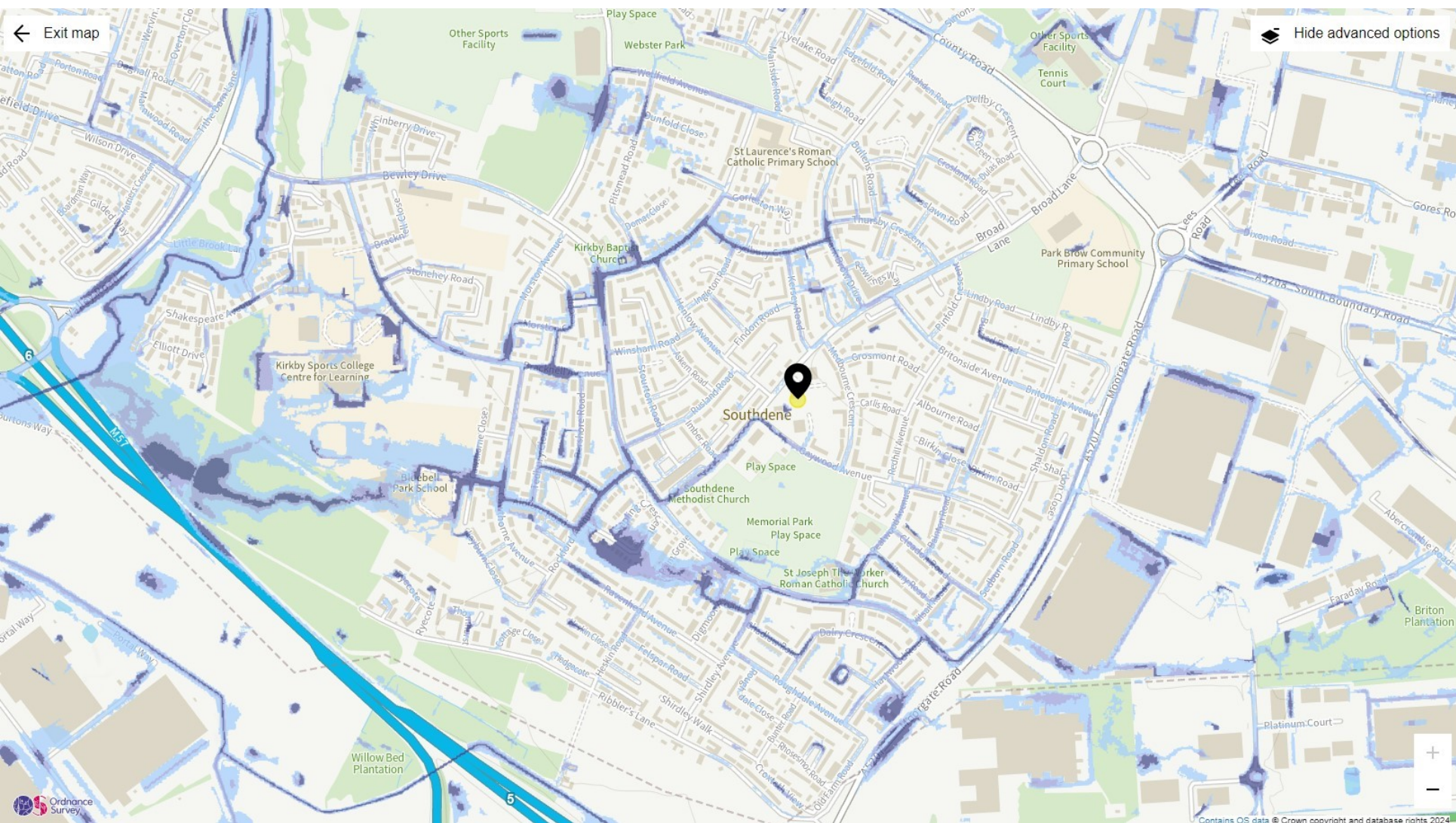
 Selected address

Pause to updates of flood risk data

+

-

Contains OS data © Crown copyright and database rights 2024



Key

Surface water



Extent



High risk

More than 3.3% chance each year



Medium risk

Between 1% and 3.3% chance each year



Low risk

Between 0.1% and 1% chance each year



Depth



Velocity

Rivers and the sea



Extent

Reservoirs



Extent

Map details



Show flooding



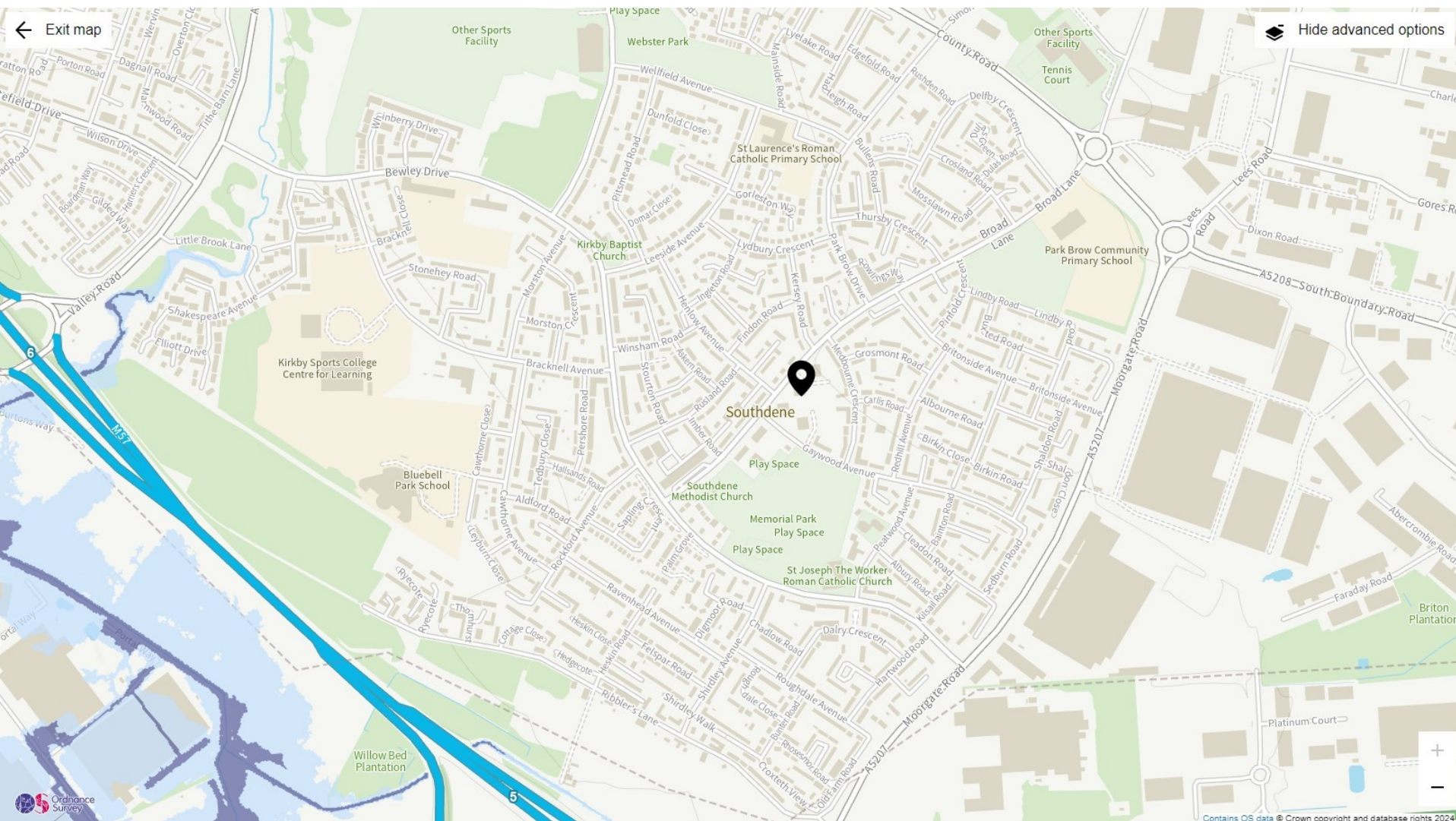
Selected address



15m boundary

Pause to updates of flood risk data

We have [paused updates to information about flood risk](#) from rivers and the sea and surface water while we get ready for new data.



Key

Surface water

- ☐ Extent
- ☐ Depth
- ☐ Velocity

Rivers and the sea

- ☐ Extent

Reservoirs

- ☒ Extent

 When river levels are normal

 When there is also flooding from rivers

Map details

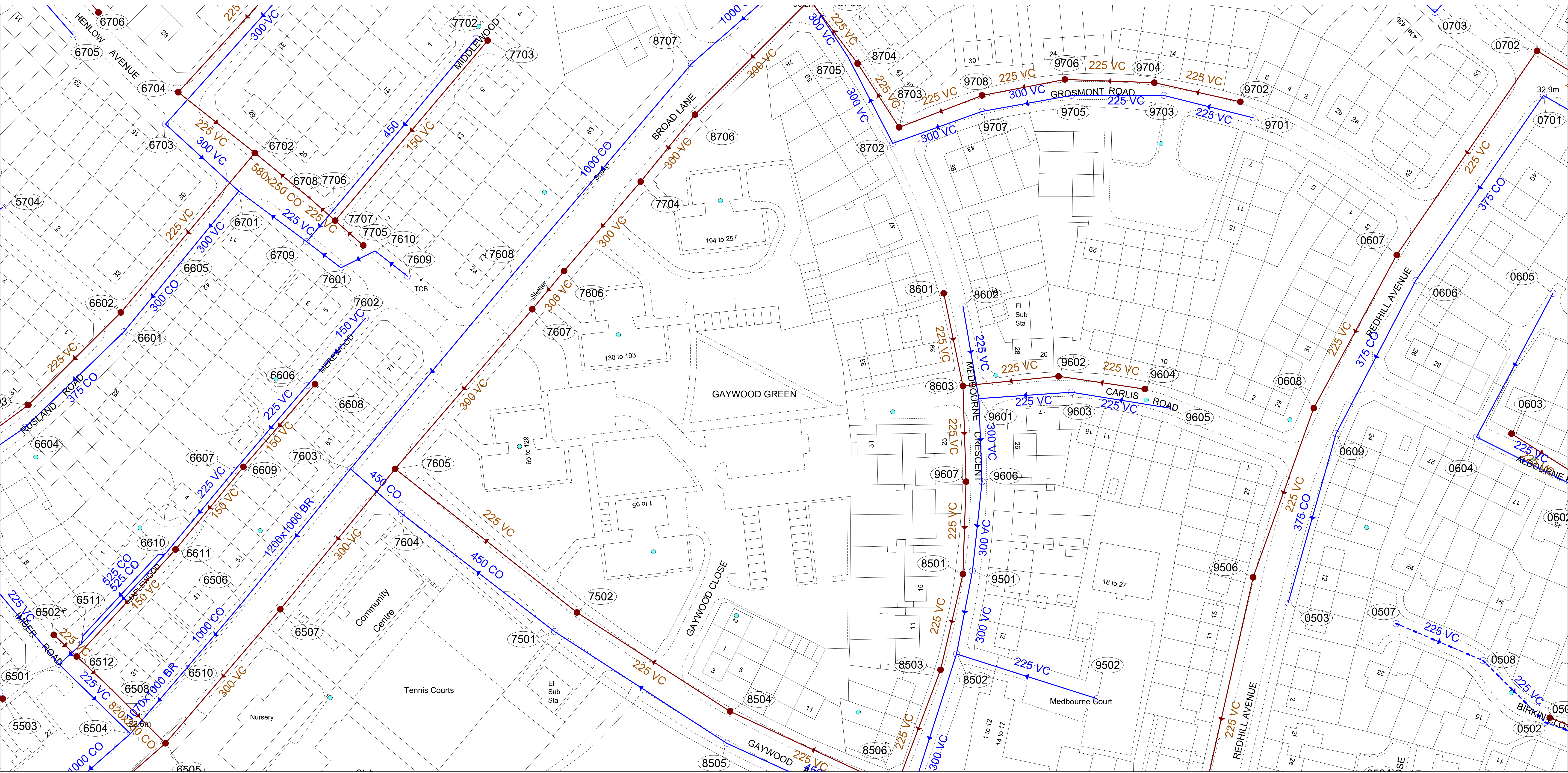
☒ Show flooding

☒  Selected address

Pause to updates of flood risk data

We have [paused updates to information about flood risk](#) from rivers and the sea and surface water while we get ready for new data.

Appendix F – Existing Drainage Information





**GAYWOOD GREEN
KIRKBY
L32 6QT**

13/02/2023

Job Number: ASST/1032

Buxton Water

1a Maple Court, Maple View,
White Moss Business Park, Skelmersdale WN8 9TW
Tel: 01942 290130
<http://www.buxtons-water.co.uk>

Job Number
ASST/1032

Surveyed by (Operator)
DAV McLAUGHLIN

Base Unit
BGBF9QDTDU

Date
13/02/2023

Client Details:

LIVV HOUSING
KINGS BUSINESS PARK
PRESCOT
L34 1PJ

Client Contact Name: Lee Cargin

Site Details:

GAYWOOD GREEN
KIRKBY
L32 6QT

Contractor Details:

Buxton Water Limited
1a Maple Court
Maple View
White Moss Business Park
Skelmersdale
WN8 9TW

Office Contact Number: 01942 290130

Purpose of Survey:

CCTV Drainage Survey

Undertake a full camera survey of ALL accessible external underground drainage inclusive of surface water and foul drainage.

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
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Report Contents

Page 1	Cover Page
Page 2	Job Overview
Page 3	Contents Page
Page 8	Customer Letter
Page 31	Site Drawings
Page 32	Site Photos
Page 33	Job Summary
Page 46	Survey Run Sheet(Survey 1 - SWMH01 to SWMH02)
Page 49	Survey Run Sheet(Survey 2 - SWMH01 to RESTBEND)
Page 51	Survey Run Sheet(Survey 3 - FWMH01 to FWMH02)
Page 53	Survey Run Sheet(Survey 4 - FWMH01 to RESTBEND)
Page 55	Survey Run Sheet(Survey 5 - FWMH01 LEG1 to UNKNOWN)
Page 57	Survey Run Sheet(Survey 6 - SWMH02 to UNKNOWN)
Page 60	Survey Run Sheet(Survey 7 - SWMH02 LEG1 to UNKNOWN)
Page 62	Survey Run Sheet(Survey 8 - FWMH02 to FWMH03)
Page 64	Survey Run Sheet(Survey 9 - FWMH02 LEG1 to RESTBEND)
Page 66	Survey Run Sheet(Survey 10 - FWMH02 LEG2 to RESTBEND)
Page 68	Survey Run Sheet(Survey 11 - FWMH04 to FWMH05)
Page 70	Survey Run Sheet(Survey 12 - FWMH04 to RESTBEND)

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
--------------------------------	---	--------------------------------	---------------------------

Report Contents

Page 72	Survey Run Sheet(Survey 13 - SWMH04 to SWMH05)
Page 75	Survey Run Sheet(Survey 14 - SWMH04 to UNKNOWN)
Page 78	Survey Run Sheet(Survey 15 - FWMH05 to FWMH06)
Page 80	Survey Run Sheet(Survey 16 - FWMH05 LEG1 to RESTBEND)
Page 82	Survey Run Sheet(Survey 17 - FWMH05 LEG2 to RESTBEND)
Page 84	Survey Run Sheet(Survey 18 - FWMH05 LEG3 to RESTBEND)
Page 86	Survey Run Sheet(Survey 19 - FWMH05 LEG4 to UNKNOWN)
Page 88	Survey Run Sheet(Survey 20 - FWMH06 to UNKNOWN)
Page 90	Survey Run Sheet(Survey 21 - SWMH05 to SWMH06)
Page 92	Survey Run Sheet(Survey 22 - FWMH08 to FWMH09)
Page 94	Survey Run Sheet(Survey 23 - FWMH08 to RESTBEND)
Page 96	Survey Run Sheet(Survey 24 - SWMH07 to SWMH08)
Page 100	Survey Run Sheet(Survey 25 - SWMH07 to RESTBEND)
Page 102	Survey Run Sheet(Survey 26 - FWMH09 to FWMH10)
Page 104	Survey Run Sheet(Survey 27 - FWMH09 LEG1 to RESTBEND)
Page 106	Survey Run Sheet(Survey 28 - FWMH09 LEG2 to RESTBEND)
Page 108	Survey Run Sheet(Survey 29 - FWMH09 LEG4 to GULLY)
Page 110	Survey Run Sheet(Survey 30 - FWMH09 LEG3 to RESTBEND)
Page 112	Survey Run Sheet(Survey 31 - FWMH10 to FWMH11 (OFF SITE MAIN))

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
--------------------------------	---	--------------------------------	---------------------------

Report Contents

Page 114	Survey Run Sheet(Survey 32 - SWMH08 to CATCHPIT)
Page 117	Survey Run Sheet(Survey 33 - FWMH12 to FWMH13)
Page 119	Survey Run Sheet(Survey 34 - FWMH12 to RESTBEND)
Page 122	Survey Run Sheet(Survey 35 - SWMH09 to SWMH10)
Page 125	Survey Run Sheet(Survey 36 - SWMH09 to RESTBEND)
Page 127	Survey Run Sheet(Survey 37 - FWMH13 to FWMH14)
Page 129	Survey Run Sheet(Survey 38 - FWMH13 LEG1 to RESTBEND)
Page 131	Survey Run Sheet(Survey 39 - FWMH13 LEG3 to RESTBEND)
Page 133	Survey Run Sheet(Survey 40 - FWMH13 LEG2 to RESTBEND)
Page 136	Survey Run Sheet(Survey 41 - FWMH13 LEG4 to GULLY)
Page 138	Survey Run Sheet(Survey 42 - FWMH14 to FWMH15 (OFF SITE MAIN))
Page 141	Survey Run Sheet(Survey 43 - SWMH10 to SWMH11)
Page 144	Survey Run Sheet(Survey 44 - SWMH11 to SWMH12)
Page 146	Survey Run Sheet(Survey 45 - SWMH14 to SWMH13)
Page 148	Survey Run Sheet(Survey 46 - SWMH14 LEG1 to ROAD GULLY)
Page 150	Survey Run Sheet(Survey 47 - SWMH14 LEG2 to ROAD GULLY)
Page 152	Survey Run Sheet(Survey 48 - SWMH13 to SWMH12)
Page 154	Survey Run Sheet(Survey 49 - SWMH13 LEG1 to SWMH15)
Page 157	Survey Run Sheet(Survey 50 - SWMH15 to UNKNOWN)

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
--------------------------------	---	--------------------------------	---------------------------

Report Contents

Page 160	Survey Run Sheet(Survey 51 - SWMH12 LEG1 TO SWMH13 OVERLAP to SWMH13)
Page 162	Survey Run Sheet(Survey 52 - SWMH12 to SWMH17)
Page 165	Survey Run Sheet(Survey 53 - SWMH12 LEG2 to SWMH16 (BURIED))
Page 167	Survey Run Sheet(Survey 54 - SWMH17 OVERLAP TO SWMH12 to SWMH12)
Page 169	Survey Run Sheet(Survey 55 - SWMH17 to SWMH18)
Page 171	Survey Run Sheet(Survey 56 - SWMH17 LEG1 to UNKNOWN)
Page 173	Survey Run Sheet(Survey 57 - SWMH17 LEG2 to UNKNOWN)
Page 175	Survey Run Sheet(Survey 58 - FWMH16 to FWMH17)
Page 177	Survey Run Sheet(Survey 59 - SWMH18 OVERLAP TO SWMH17 to SWMH17)
Page 179	Survey Run Sheet(Survey 60 - SWMH18 to SWMH19 (OFF SITE))
Page 181	Survey Run Sheet(Survey 61 - SWMH18 LEG1 to UNKNOWN)
Page 183	Survey Run Sheet(Survey 62 - SWMH18 LEG2 to ROAD GULLY)
Page 186	Survey Run Sheet(Survey 63 - SWMH18 LEG3 to UNKNOWN)
Page 188	Survey Run Sheet(Survey 64 - FWMH17 OVERLAP TO FWMH16 to FWMH16)
Page 190	Survey Run Sheet(Survey 65 - FWMH17 to FWMH03)
Page 192	Survey Run Sheet(Survey 66 - FWMH17 LEG1 to UNKNOWN)
Page 194	Survey Run Sheet(Survey 67 - FWMH03 to FWMH18 (OFF SITE))
Page 196	Survey Run Sheet(Survey 68 - SWMH20 to SWMH21)
Page 198	Survey Run Sheet(Survey 69 - SWMH20 to UNKNOWN)

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
--------------------------------	---	--------------------------------	---------------------------

Report Contents

Page 200	Survey Run Sheet(Survey 70 - SWMH20 LEG1 to ROAD GULLY)
Page 203	Survey Run Sheet(Survey 71 - SWMH21 to SWMH06 (SEIZED))
Page 205	Survey Run Sheet(Survey 72 - SWMH21 LEG1 to ROAD GULLY)
Page 207	Survey Run Sheet(Survey 73 - SWMH21 LEG2 to ROAD GULLY)
Page 209	Defect Summary
Page 215	Grade Defect Descriptions

LIVV HOUSING
KINGS BUSINESS PARK
PRESCOT
L34 1PJ
ASST/1032

13 February 2023

Buxton Water attended site on 13th February 2023 to carry out investigation works, the following is a report on the findings of said investigation works:

Run 1

Start of Survey: SWMH01

Invert Level: 0.5m

End of Survey: SWMH02

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris throughout the line as well as a circumferential crack at 2.57m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install a 150mm CIP patch at 2.57m

Run 2

Start of Survey: SWMH01

Invert Level: 0.5m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified a foreign object in the line causing the survey to be abandoned at 3.38m

Recommended Repair:

1. Sonar drain trace to pinpoint location of object
2. CAT scan area
3. Remove ground surface
4. Excavate to a depth of no more than 0.5m, remove defective section of pipe and replace with at least 1m of new 100mm PVC pipework
5. Bed, surround and backfill
6. Reinststate ground surface
7. Resurvey line to assess condition of full length of pipe

Run 3

Start of Survey: FWMH01

Invert Level: 1m

End of Survey: FWMH02

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified 3x medium displaced joints at 12.21m, 13.31m and 13.64m

Recommended Repair:

1. Install 2x 150mm CIP patches at 12.21m and 13.31m

Run 4

Start of Survey: FWMH01

Invert Level: 1m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified a large open joint at 1.31m causing the survey to be abandoned

Recommended Repair:

1. Install a 100mm CIP patch at 1.31m

Run 5

Start of Survey: FWMH01 Leg 1

Invert Level: 1m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: PVC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 6

Start of Survey: SWMH02

Invert Level: 0.62m

End of Survey: Unknown

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris throughout the line as well as 4x medium displaced joints at 0.21m, 7.17m, 10.26m and 10.88m. The survey also identified a broken section of pipework at 0.62m and a large displaced joint at 11.17m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install 3x 150mm CIP patches at 0.21m, 7.17m and 10.26m
3. Install a 150mm flexi-patch at 11.17m

Run 7

Start of Survey: SWMH02 Leg 1

Invert Level: 0.62m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris at the start of the line causing the survey to be abandoned

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey line to assess condition of full length of pipe

Run 8

Start of Survey: FWMH02

Invert Level: 1.18m

End of Survey: FWMH03

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified a medium displaced joint at 4.48m

Recommended Repair:

1. Install a 150mm CIP patch at 4.48m

Run 9

Start of Survey: FWMH02 Leg 1

Invert Level: 1.18m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified debris in the line at 1.9m, 2.67m and 5.38m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 10

Start of Survey: FWMH02 Leg 2

Invert Level: 1.18m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified debris at 2.36m causing the survey to be abandoned

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey line to assess condition of full length of pipe

Run 11

Start of Survey: FWMH04

Invert Level: 0.9m

End of Survey: FWMH05

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified a medium displaced joint at 1.48m as well as debris in the line at 3.33m and 6.12m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install a 150mm CIP patch at 1.48

Run 12

Start of Survey: FWMH04

Invert Level: 0.9m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC/Cast Iron

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 13

Start of Survey: SWMH04

Invert Level: 0.53m

End of Survey: SWMH05

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified 2x medium displaced joints at the start of the line and 19.83m as well as debris in the line at 3.74m and 11.05m. The survey also identified a large displaced joint at 5.83m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install 3x 150mm CIP patches at the start of the line, 5.83m and 19.83m

Run 14

Start of Survey: SWMH04

Invert Level: 0.53m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified medium displaced joints throughout the line as well as a large displaced joint at 3m. The survey also identified a large open joint at 3.81m

Recommended Repair:

1. Install a 4.5m flexible liner to cover all defects

Run 15

Start of Survey: FWMH05

Invert Level: 1.17m

End of Survey: FWMH06

Invert Level: 1.76m

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 16

Start of Survey: FWMH05 Leg 1
Invert Level: 1.17m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 17
Start of Survey: FWMH05 Leg 2
Invert Level: 1.17m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified encrustation at 1.14m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove encrustation from line

Run 18
Start of Survey: FWMH05 Leg 3
Invert Level: 1.17m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 19
Start of Survey: FWMH04
Invert Level: 1.17m
End of Survey: Unknown
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: PVC

Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line, this line is capped

Recommended Repair:
None

Run 20
Start of Survey: FWMH06
Invert Level: 1.76m
End of Survey: Unknown
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified mass roots at 8.93m, 12.24m and 13.02m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit and root cutter to attempt to remove roots from line
2. Install 3x 150mm CIP patches at 8.93m, 12.24m and 13.02m

Run 21
Start of Survey: SWMH05
Invert Level: 0.82m
End of Survey: SWMH06
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified 2x medium displaced joints at 0.83m and 1.81m

Recommended Repair:
1. Install 2x 150mm CIP patches at 0.83m and 1.81m

Run 22
Start of Survey: FWMH08
Invert Level: 0.82m
End of Survey: FWMH09
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified debris in the line at 9.07m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from the line

Run 23

Start of Survey: FWMH08

Invert Level: 0.82

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified encrustation in the line at 1.36m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove encrustation from line

Run 24

Start of Survey: SWMH07

Invert Level: 0.5m

End of Survey: SWMH08

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris from the start of the line to 3.45m and from 10.43m to 14.02m as well as a circumferential crack at 2.45m. The survey also identified 2x medium displaced joints at 6.33m and 16.9m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install 3x 150mm CIP patches at 2.45m, 6.33m and 16.9m

Run 25

Start of Survey: SWMH07

Invert Level: 0.5m

End of Survey: Restbend

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 100mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified silt in the line from 1.79m to 2.29m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove silt from line

Run 26

Start of Survey: FWMH09

Invert Level: 1.23m
End of Survey: FWMH10
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a medium displaced joint at 4.05m

Recommended Repair:
1. Install a 150mm CIP patch at 4.05m

Run 27
Start of Survey: FWMH09 Leg 1
Invert Level: 1.23m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC/Cast Iron
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 28
Start of Survey: FWMH09 Leg 2
Invert Level: 1.23m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC/Cast Iron
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified encrustation at 1.76m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove encrustation from line

Run 29
Start of Survey: FWMH09 Leg 4
Invert Level: 1.23m
End of Survey: Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: PVC
Drain Trace: No

Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 30
Start of Survey: FWMH09 Leg 3
Invert Level: 1.23m
End of Survey: Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC/Cast Iron
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 31
Start of Survey: FWMH10
Invert Level: 3m
End of Survey: FWMH11 (Off Site Main)
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a circumferential crack at 0.48m as well as a medium displaced joint at 5.1m

Recommended Repair:
1. Install 2x 150mm CIP patches at 0.48m and 5.1m

Run 32
Start of Survey: SWMH08
Invert Level: 0.64m
End of Survey: Catchpit
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified debris throughout the line

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 33
Start of Survey: FWMH12
Invert Level: 0.9m
End of Survey: FWMH13
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 34
Start of Survey: FWMH12
Invert Level: 0.9m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC/Cast Iron
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a longitudinal crack at the start of the line as well as encrustation at 1.36m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove encrustation from line
2. Install a 100mm CIP patch at the start of the line

Run 35
Start of Survey: SWMH09
Invert Level: 0.48m
End of Survey: SWMH10
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 100mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified 2x medium displaced joints at 0.43m and 0.79m as well as debris at 5.62m and from 10.55m to 11.1m. The survey also identified a circumferential fracture at 21m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install 2x 100mm CIP patches at 0.43m and 21m

Run 36
Start of Survey: SWMH09
Invert Level: 0.48m

End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified debris at 0.55m causing the survey to be abandoned

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey line to assess condition of full length of pipe

Run 37

Start of Survey: FWMH13
Invert Level: 1m
End of Survey: FWMH14
Invert Level: 2.36m
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a circumferential crack at the start of the line

Recommended Repair:

1. Install a 150m CIP patch at the start of the line

Run 38

Start of Survey: FWMH13 Leg 1
Invert Level: 1m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified debris in the line at 2.45m causing the survey to be abandoned

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey line to assess condition of full length of pipe

Run 39

Start of Survey: FWMH13 Leg 3
Invert Level: 1m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC/Cast Iron

Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 40
Start of Survey: FWMH13 Leg 2
Invert Level: 1m
End of Survey: Restbend
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a medium displaced joint at 0.57m as well as encrustation at 1.36m

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove encrustation from line
2. Install a 100mm CIP patch at 0.57m

Run 41
Start of Survey: FWMH13 Leg 4
Invert Level: 1m
End of Survey: Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 100mm
Pipe Material: PVC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 42
Start of Survey: FWMH14
Invert Level: 2.36m
End of Survey: FWMH15 (Off Site Main)
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified a medium displaced joint at the start of the line as well as a longitudinal fracture at 5.83m

Recommended Repair:

1. Install a 150mm CIP patch at the start of the line
2. Install a 150mm flexi-patch at 5.83m

Run 43

Start of Survey: SWMH10

Invert Level: 0.58m

End of Survey: SWMH11

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris in the line from 9.76m to 12.4m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 44

Start of Survey: SWMH11

Invert Level: 1.92m

End of Survey: SWMH12

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified a medium displaced joint at 3.52m

Recommended Repair:

1. Install a 150mm CIP patch at 3.52m

Run 45

Start of Survey: SWMH14

Invert Level: 2.1m

End of Survey: SWMH13

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris throughout the line as well as a longitudinal crack at 17.55m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install a 225mm CIP patch at 17.55m

Run 46

Start of Survey: SWMH14 Leg 1

Invert Level: 2.1m
End of Survey: Road Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 47
Start of Survey: SWMH14 Leg 2
Invert Level: 2.1m
End of Survey: Road Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 48
Start of Survey: SWMH13
Invert Level: 2.15m
End of Survey: SWMH12
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 225mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified debris throughout the line

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey to assess condition of full length of pipe

Run 49
Start of Survey: SWMH13 Leg 1
Invert Level: 2.15m
End of Survey: SWMH15
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified 2x medium displaced joints at 2.38m and 4.95m as well as debris from 3.36m to 6.33m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Install 2x 150mm CIP patches at 2.38m and 4.95m

Run 50

Start of Survey: SWMH15

Invert Level: 1.82m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris in the line from 0.55m to 3.6m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 51

Start of Survey: SWMH12 Leg 1 to SWMH13 Overlap

Invert Level: 1.62m

End of Survey: SWMH13

Invert Level: 2.15m

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified no defects on this line, this is an overlap survey

Recommended Repair:

None

Run 52

Start of Survey: SWMH12

Invert Level: 1.62m

End of Survey: SWMH17

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 53

Start of Survey: SWMH12 Leg 2

Invert Level: 1.62m

End of Survey: SWMH16 (Buried)

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris from the start of the line to 13.83m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 54

Start of Survey: SWMH17 Overlap to SWMH12

Invert Level: 3.28m

End of Survey: SWMH12

Invert Level: 1.62m

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified no defects on this line, this is an overlap survey

Recommended Repair:

None

Run 55

Start of Survey: SWMH17

Invert Level: 3.28m

End of Survey: SWMH18

Invert Level: 2.5m

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris from 11m through to 17.64m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from the line
2. Resurvey line to assess condition of full length of pipe

Run 56

Start of Survey: SWMH17 Leg 1

Invert Level: 3.28m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris at the start of the line causing the survey to be abandoned

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line
2. Resurvey line to assess condition of full length of pipe

Run 57

Start of Survey: SWMH17 Leg 2

Invert Level: 3.28m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris at the start of the line

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 58

Start of Survey: FWMH16

Invert Level: 2.85m

End of Survey: FWMH17

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 59

Start of Survey: SWMH18 Overlap to SWMH17

Invert Level: 2.5m

End of Survey: SWMH17

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris throughout the line, this is an overlap survey

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 60

Start of Survey: SWMH18

Invert Level: 2.5m

End of Survey: SWMH19

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris in the line from 16.17m to 25.79m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 61

Start of Survey: SWMH18 Leg 1

Invert Level: 2.5m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified no defects on this line, this line is capped

Recommended Repair:

None

Run 62

Start of Survey: SWMH18 Leg 2

Invert Level: 2.5m

End of Survey: Road Gully

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm

Pipe Material: PVC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 63

Start of Survey: SWMH18 Leg 3

Invert Level: 2.5m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Surface Water

CCTV Survey Result:

The survey identified debris from the start of the line to 2.79m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 64

Start of Survey: FWMH17 Overlap to FWMH16

Invert Level: 2m

End of Survey: FWMH16

Invert Level: 2.85m

Direction of Flow: Upstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified debris in the line from 2.4m to 5.05m

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from the line

Run 65

Start of Survey: FWMH17

Invert Level: 2.5m

End of Survey: FWMH03

Invert Level:

Direction of Flow: Downstream

Pipe Diameter: 225mm

Pipe Material: VC

Drain Trace: No

Duty: Foul

CCTV Survey Result:

The survey identified no defects on this line

Recommended Repair:

None

Run 66

Start of Survey: FWMH17 Leg 1

Invert Level: 2.5m

End of Survey: Unknown

Invert Level:

Direction of Flow: Upstream

Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line, this line is capped

Recommended Repair:
None

Run 67
Start of Survey: FWMH03
Invert Level: 2.08m
End of Survey: FWMH18 (Off Site)
Invert Level: 2.5m
Direction of Flow: Downstream
Pipe Diameter: 225mm
Pipe Material: VC
Drain Trace: No
Duty: Foul
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 68
Start of Survey: SWMH20
Invert Level: 1.6m
End of Survey: SWMH21
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 225mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified debris throughout the line

Recommended Repair:
1. Attend site with a high volume tanker jetting unit to remove debris from line

Run 69
Start of Survey: SWMH20
Invert Level: 1.6m
End of Survey: Unknown
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified no defects on this line, this line is capped

Recommended Repair:
None

Run 70

Start of Survey: SWMH20 Leg 1
Invert Level: 1.6m
End of Survey: Road Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: PVC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 71

Start of Survey: SWMH21
Invert Level: 1.43m
End of Survey: SWMH06
Invert Level:
Direction of Flow: Downstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified mass roots at 10.29m causing the survey to be abandoned

Recommended Repair:
1. Attend site with a high volume tanker jetting unit and root cutter to remove roots from line
2. Resurvey line to assess condition of full length of pipe

Run 72

Start of Survey: SWMH21 Leg 1
Invert Level: 1.43m
End of Survey: Road Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified no defects on this line

Recommended Repair:
None

Run 73

Start of Survey: SWMH21 Leg 2

Invert Level: 1.43m
End of Survey: Road Gully
Invert Level:
Direction of Flow: Upstream
Pipe Diameter: 150mm
Pipe Material: VC
Drain Trace: No
Duty: Surface Water
CCTV Survey Result:
The survey identified debris throughout the line

Recommended Repair:

1. Attend site with a high volume tanker jetting unit to remove debris from line

Buxton Water Limited would be happy to assist with any of the highlighted drainage remedial works highlighted within this report. If you would like to discuss the contents of the report or would like to request a quotation for the drainage repair items, then please contact our Drainage Team on 01942 290130.

Best regards

Carl Pendleton
Operations Director

This sketch is not to scale and does not represent the exact routing of the drainage system



Job Number
ASST/1032

Surveyed by (Operator)
DAV McLAUGHLIN

Base Unit
BGBF9QDTDU

Date
13/02/2023



Property: Front Elevation - *Front of Site*

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
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Job Information

Total Distance Surveyed: **740.15 metres**
Engineer: **DAV McLAUGHLIN**
Number of Surveys: **73**
Number of Surveys grade 4 or above: **1**

Job Comments

Please refer to the attached drawing and report for further reference

Section 1 Overview (13/02/2023)

Manholes: **SWMH01 to SWMH02**
Pipe Length: **21 metres**
Structural Grade: **2**
Service Grade: **3**
Material: **Vitrified clay**
Pipe Size: **150mm**
Use: **Surface water**

Section 2 Overview (13/02/2023)

Manholes: **SWMH01 to RESTBEND**
Pipe Length: **3.38 metres**
Structural Grade: **0**
Service Grade: **5**
Material: **Vitrified clay**
Pipe Size: **100mm**
Use: **Surface water**

Section 3 Overview (13/02/2023)

Manholes: **FWMH01 to FWMH02**
Pipe Length: **14.69 metres**
Structural Grade: **1**
Service Grade: **0**
Material: **Vitrified clay**
Pipe Size: **150mm**
Use: **Foul**

Section 4 Overview (13/02/2023)

Manholes: **FWMH01 to RESTBEND**
Pipe Length: **2.43 metres**
Structural Grade: **1**
Service Grade: **0**
Material: **Vitrified clay**
Pipe Size: **100mm**
Use: **Foul**

Section 5 Overview (13/02/2023)

Manholes: **FWMH01 LEG1 to UNKNOWN**
Pipe Length: **2.69 metres**
Structural Grade: **0**
Service Grade: **0**
Material: **Polyvinyl chloride**
Pipe Size: **100mm**
Use: **Foul**

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 6 Overview (13/02/2023) Manholes: SWMH02 to UNKNOWN Pipe Length: 12.26 metres Structural Grade: 4 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 7 Overview (13/02/2023) Manholes: SWMH02 LEG1 to UNKNOWN Pipe Length: 0 metres Structural Grade: 0 Service Grade: 5 Material: Vitrified clay Pipe Size: 100mm Use: Surface water			
Section 8 Overview (13/02/2023) Manholes: FWMH02 to FWMH03 Pipe Length: 12.48 metres Structural Grade: 1 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 9 Overview (13/02/2023) Manholes: FWMH02 LEG1 to RESTBEND Pipe Length: 8.86 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 10 Overview (13/02/2023) Manholes: FWMH02 LEG2 to RESTBEND Pipe Length: 2.36 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 11 Overview (14/02/2023) Manholes: FWMH04 to FWMH05 Pipe Length: 13.57 metres Structural Grade: 1 Service Grade: 4 Material: Vitrified clay Pipe Size: 150mm Use: Foul			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 12 Overview (14/02/2023) Manholes: FWMH04 to RESTBEND Pipe Length: 2.79 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 13 Overview (14/02/2023) Manholes: SWMH04 to SWMH05 Pipe Length: 22.02 metres Structural Grade: 1 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 14 Overview (14/02/2023) Manholes: SWMH04 to UNKNOWN Pipe Length: 4.64 metres Structural Grade: 1 Service Grade: 0 Material: Vitrified clay Pipe Size: 100mm Use: Surface water			
Section 15 Overview (14/02/2023) Manholes: FWMH05 to FWMH06 Pipe Length: 4.55 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 16 Overview (14/02/2023) Manholes: FWMH05 LEG1 to RESTBEND Pipe Length: 9.45 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 17 Overview (14/02/2023) Manholes: FWMH05 LEG2 to RESTBEND Pipe Length: 1.14 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Foul			

Job Number ASST71032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 18 Overview (14/02/2023) Manholes: FWMH05 LEG3 to RESTBEND Pipe Length: 9.52 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 19 Overview (14/02/2023) Manholes: FWMH05 LEG4 to UNKNOWN Pipe Length: 0.74 metres Structural Grade: 0 Service Grade: 0 Material: Polyvinyl chloride Pipe Size: 100mm Use: Foul			
Section 20 Overview (14/02/2023) Manholes: FWMH06 to UNKNOWN Pipe Length: 14.74 metres Structural Grade: 0 Service Grade: 5 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 21 Overview (14/02/2023) Manholes: SWMH05 to SWMH06 Pipe Length: 5.12 metres Structural Grade: 1 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 22 Overview (14/02/2023) Manholes: FWMH08 to FWMH09 Pipe Length: 14.38 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 23 Overview (14/02/2023) Manholes: FWMH08 to RESTBEND Pipe Length: 1.36 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Foul			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 24 Overview (14/02/2023) Manholes: SWMH07 to SWMH08 Pipe Length: 21.83 metres Structural Grade: 2 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 25 Overview (14/02/2023) Manholes: SWMH07 to RESTBEND Pipe Length: 2.29 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Surface water			
Section 26 Overview (14/02/2023) Manholes: FWMH09 to FWMH10 Pipe Length: 6.17 metres Structural Grade: 1 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 27 Overview (14/02/2023) Manholes: FWMH09 LEG1 to RESTBEND Pipe Length: 10.1 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 28 Overview (14/02/2023) Manholes: FWMH09 LEG2 to RESTBEND Pipe Length: 1.76 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Foul			
Section 29 Overview (14/02/2023) Manholes: FWMH09 LEG4 to GULLY Pipe Length: 2.29 metres Structural Grade: 0 Service Grade: 0 Material: Polyvinyl chloride Pipe Size: 100mm Use: Foul			

Job Number ASST71032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 30 Overview (14/02/2023) Manholes: FWMH09 LEG3 to RESTBEND Pipe Length: 9 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 31 Overview (14/02/2023) Manholes: FWMH10 to FWMH11 (OFF SITE MAIN) Pipe Length: 12.31 metres Structural Grade: 2 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 32 Overview (14/02/2023) Manholes: SWMH08 to CATCHPIT Pipe Length: 16.31 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 33 Overview (14/02/2023) Manholes: FWMH12 to FWMH13 Pipe Length: 14.95 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 34 Overview (14/02/2023) Manholes: FWMH12 to RESTBEND Pipe Length: 1.36 metres Structural Grade: 2 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Foul			
Section 35 Overview (14/02/2023) Manholes: SWMH09 to SWMH10 Pipe Length: 22.48 metres Structural Grade: 3 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Surface water			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 36 Overview (14/02/2023) Manholes: SWMH09 to RESTBEND Pipe Length: 0.55 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Surface water			
Section 37 Overview (14/02/2023) Manholes: FWMH13 to FWMH14 Pipe Length: 4.07 metres Structural Grade: 2 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 38 Overview (14/02/2023) Manholes: FWMH13 LEG1 to RESTBEND Pipe Length: 2.45 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 39 Overview (14/02/2023) Manholes: FWMH13 LEG3 to RESTBEND Pipe Length: 9.88 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 40 Overview (14/02/2023) Manholes: FWMH13 LEG2 to RESTBEND Pipe Length: 1.36 metres Structural Grade: 1 Service Grade: 4 Material: Vitrified clay Pipe Size: 100mm Use: Foul			
Section 41 Overview (14/02/2023) Manholes: FWMH13 LEG4 to GULLY Pipe Length: 2.98 metres Structural Grade: 0 Service Grade: 0 Material: Polyvinyl chloride Pipe Size: 100mm Use: Foul			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 42 Overview (14/02/2023) Manholes: FWMH14 to FWMH15 (OFF SITE MAIN) Pipe Length: 13.24 metres Structural Grade: 3 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 43 Overview (14/02/2023) Manholes: SWMH10 to SWMH11 Pipe Length: 12.4 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 44 Overview (14/02/2023) Manholes: SWMH11 to SWMH12 Pipe Length: 9.86 metres Structural Grade: 1 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 45 Overview (14/02/2023) Manholes: SWMH14 to SWMH13 Pipe Length: 24.38 metres Structural Grade: 2 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 46 Overview (14/02/2023) Manholes: SWMH14 LEG1 to ROAD GULLY Pipe Length: 4.1 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 47 Overview (14/02/2023) Manholes: SWMH14 LEG2 to ROAD GULLY Pipe Length: 3.98 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 48 Overview (14/02/2023) Manholes: SWMH13 to SWMH12 Pipe Length: 21.1 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 49 Overview (14/02/2023) Manholes: SWMH13 LEG1 to SWMH15 Pipe Length: 6.33 metres Structural Grade: 1 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 50 Overview (14/02/2023) Manholes: SWMH15 to UNKNOWN Pipe Length: 20.5 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 51 Overview (15/02/2023) Manholes: SWMH12 LEG1 TO SWMH13 OVERLAP to SWMH13 Pipe Length: 9 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 52 Overview (15/02/2023) Manholes: SWMH12 to SWMH17 Pipe Length: 25.71 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 53 Overview (15/02/2023) Manholes: SWMH12 LEG2 to SWMH16 (BURIED) Pipe Length: 18.5 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			

Job Number ASST71032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 54 Overview (15/02/2023) Manholes: SWMH17 OVERLAP TO SWMH12 to SWMH12 Pipe Length: 21.07 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 55 Overview (15/02/2023) Manholes: SWMH17 to SWMH18 Pipe Length: 17.64 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 56 Overview (15/02/2023) Manholes: SWMH17 LEG1 to UNKNOWN Pipe Length: 0.2 metres Structural Grade: 0 Service Grade: 4 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 57 Overview (15/02/2023) Manholes: SWMH17 LEG2 to UNKNOWN Pipe Length: 0.31 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 58 Overview (15/02/2023) Manholes: FWMH16 to FWMH17 Pipe Length: 18.29 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Foul			
Section 59 Overview (15/02/2023) Manholes: SWMH18 OVERLAP TO SWMH17 to SWMH17 Pipe Length: 8.26 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 60 Overview (15/02/2023) Manholes: SWMH18 to SWMH19 (OFF SITE) Pipe Length: 25.79 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 61 Overview (15/02/2023) Manholes: SWMH18 LEG1 to UNKNOWN Pipe Length: 3 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 62 Overview (15/02/2023) Manholes: SWMH18 LEG2 to ROAD GULLY Pipe Length: 31.33 metres Structural Grade: 0 Service Grade: 0 Material: Polyvinyl chloride Pipe Size: 150mm Use: Surface water			
Section 63 Overview (15/02/2023) Manholes: SWMH18 LEG3 to UNKNOWN Pipe Length: 11.62 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 64 Overview (15/02/2023) Manholes: FWMH17 OVERLAP TO FWMH16 to FWMH16 Pipe Length: 12.62 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Foul			
Section 65 Overview (15/02/2023) Manholes: FWMH17 to FWMH03 Pipe Length: 7.5 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Foul			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
Section 66 Overview (15/02/2023) Manholes: FWMH17 LEG1 to UNKNOWN Pipe Length: 3.07 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Foul			
Section 67 Overview (15/02/2023) Manholes: FWMH03 to FWMH18 (OFF SITE) Pipe Length: 11.24 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 225mm Use: Foul			
Section 68 Overview (15/02/2023) Manholes: SWMH20 to SWMH21 Pipe Length: 8.81 metres Structural Grade: 0 Service Grade: 3 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			
Section 69 Overview (15/02/2023) Manholes: SWMH20 to UNKNOWN Pipe Length: 1.52 metres Structural Grade: 0 Service Grade: 0 Material: Vitrified clay Pipe Size: 150mm Use: Surface water			
Section 70 Overview (15/02/2023) Manholes: SWMH20 LEG1 to ROAD GULLY Pipe Length: 26.33 metres Structural Grade: 0 Service Grade: 0 Material: Polyvinyl chloride Pipe Size: 150mm Use: Surface water			
Section 71 Overview (15/02/2023) Manholes: SWMH21 to SWMH06 (SEIZED) Pipe Length: 10.31 metres Structural Grade: 0 Service Grade: 5 Material: Vitrified clay Pipe Size: 225mm Use: Surface water			

Job Number ASST/1032	Surveyed by (Operator) DAV McLAUGHLIN	Base Unit BGBF9QDTDU	Date 13/02/2023
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Section 72 Overview (15/02/2023)

Manholes: **SWMH21 LEG1 to ROAD GULLY**
Pipe Length: **13.38 metres**
Structural Grade: **0**
Service Grade: **0**
Material: **Vitrified clay**
Pipe Size: **150mm**
Use: **Surface water**

Section 73 Overview (15/02/2023)

Manholes: **SWMH21 LEG2 to ROAD GULLY**
Pipe Length: **12.45 metres**
Structural Grade: **0**
Service Grade: **3**
Material: **Vitrified clay**
Pipe Size: **150mm**
Use: **Surface water**

Appendix G – Existing Brownfield Runoff Calculations

Alan Wood & Partners		Page 1
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
File EX BROWNFIELD RUNOFF - 0.775HA.MDX	Checked by KOB	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales			
Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	19.800	Add Flow / Climate Change (%)	0
Ratio R	0.385	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.685	4-8	0.090

Total Area Contributing (ha) = 0.775

Total Pipe Volume (m³) = 1.811

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	10.000	0.100	100.0	0.259	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	10.000	0.100	100.0	0.258	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	10.000	0.100	100.0	0.258	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.13	26.875	0.259	0.0	0.0	0.0	1.31	52.0	35.1
S1.001	50.00	5.23	26.700	0.517	0.0	0.0	0.0	1.57	111.1	70.0
S1.002	50.00	5.34	26.600	0.775	0.0	0.0	0.0	1.57	111.1	104.9

Alan Wood & Partners		Page 2
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
File EX BROWNFIELD RUNOFF - 0.775HA.MDX	Checked by KOB	
Innovyze	Network 2020.1.3	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.259	0.259	0.259
1.001	-	-	100	0.258	0.258	0.258
1.002	-	-	100	0.258	0.258	0.258
				Total	Total	Total
				0.775	0.775	0.775

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.002	S	28.000	26.500	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.800	Storm Duration (mins)	30
Ratio R	0.385		

Alan Wood & Partners		Page 3
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
File EX BROWNFIELD RUNOFF - 0.775HA.MDX	Checked by KOB	
Innovyze	Network 2020.1.3	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.385 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

									Water	Surcharged	Flooded
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
S1.000	SSW01	15 Winter	1	+0%	2/15 Summer	30/15 Summer			27.033	-0.067	0.000
S1.001	SSW02	15 Winter	1	+0%	2/15 Summer	100/15 Summer			26.975	-0.025	0.000
S1.002	SSW03	15 Winter	1	+0%	1/15 Summer				26.916	0.016	0.000

			Half Drain		Pipe				
PN	US/MH Name	Cap.	Flow / (l/s)	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded	
S1.000	SSW01	0.80				34.6	OK	6	
S1.001	SSW02	0.77				61.2	OK	2	
S1.002	SSW03	1.12				89.0	SURCHARGED		

Alan Wood & Partners		Page 4
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
File EX BROWNFIELD RUNOFF - 0.775HA.MDX	Checked by KOB	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.385 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	
S1.000	SSW01	15 Winter	2	+0%	2/15 Summer	30/15 Summer			27.180	0.080	0.000	
S1.001	SSW02	15 Winter	2	+0%	2/15 Summer	100/15 Summer			27.088	0.088	0.000	
S1.002	SSW03	15 Winter	2	+0%	1/15 Summer				26.992	0.092	0.000	

PN	US/MH Name	Cap.	Flow / (l/s)	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded			
S1.000	SSW01	0.94				40.6	SURCHARGED	6			
S1.001	SSW02	0.97				76.8	SURCHARGED	2			
S1.002	SSW03	1.42				112.6	SURCHARGED				

Alan Wood & Partners		Page 5
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
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Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.385 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

							Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) SurchARGE	First (Y) Flood			
S1.000	SSW01	15 Winter	30	+0%	2/15 Summer	30/15 Summer	28.002	0.902	2.168
S1.001	SSW02	15 Winter	30	+0%	2/15 Summer	100/15 Summer	27.838	0.838	0.000
S1.002	SSW03	15 Winter	30	+0%	1/15 Summer		27.538	0.638	0.000

			Half Drain		Pipe			Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Exceeded	
S1.000	SSW01	1.90			82.2	FLOOD		6
S1.001	SSW02	1.72			136.6	FLOOD RISK		2
S1.002	SSW03	2.73			216.1	SURCHARGED		

Alan Wood & Partners		Page 6
1 Dale Street Liverpool L2 2ET	223-068 Gaywood Green, Kirkby Ex. Brownfield Runoff Rates	
Date 06/08/2024 15:47	Designed by JRS	
File EX BROWNFIELD RUNOFF - 0.775HA.MDX	Checked by KOB	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.800 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.385 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 0

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	
S1.000	SSW01	15 Winter	100	+0%	2/15 Summer	30/15 Summer			28.016	0.916	16.315	
S1.001	SSW02	15 Winter	100	+0%	2/15 Summer	100/15 Summer			28.000	1.000	0.042	
S1.002	SSW03	15 Summer	100	+0%	1/15 Summer				27.755	0.855	0.000	

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
S1.000	SSW01	2.52			109.0	FLOOD	6
S1.001	SSW02	1.72			136.5	FLOOD	2
S1.002	SSW03	3.03			239.8	FLOOD RISK	

Appendix H – Drainage Calculation Networks 1 & 2

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.300	Minimum Backdrop Height (m)	0.200
Ratio-R	0.389	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.056	5.00	30.029	2700	341831.713	397667.738	4.768
2	0.081	5.00	29.778	2700	341814.348	397681.425	4.572
7	0.100	5.00	29.955	2700	341814.651	397697.455	4.741
3	0.022	5.00	29.486	2700	341806.688	397687.426	4.304
4	0.088	5.00	29.082	2700	341794.213	397697.214	3.940
5	0.000		29.116	2700	341787.893	397702.122	3.994
6	0.000		29.567	2700	341775.557	397711.637	4.537

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	1	2	22.111	0.600	25.261	25.206	0.055	400.0	900	5.24	50.0
1.001	2	3	9.731	0.600	25.206	25.182	0.024	400.0	900	5.34	50.0
2.000	7	3	12.806	0.600	25.214	25.182	0.032	400.0	900	5.14	50.0
1.002	3	4	15.857	0.600	25.182	25.142	0.040	400.0	900	5.51	49.9
1.003	4	5	8.002	0.600	25.142	25.122	0.020	400.0	900	5.60	49.6
1.004	5	6	15.579	0.600	25.122	25.030	0.092	170.0	300	5.81	0.0

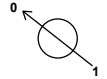
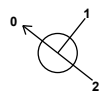
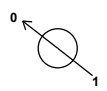
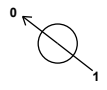
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.560	992.5	10.1	3.868	3.672	0.056	0.0	63	0.522
1.001	1.560	992.5	24.8	3.672	3.404	0.137	0.0	96	0.682
2.000	1.560	992.5	18.1	3.841	3.404	0.100	0.0	82	0.619
1.002	1.560	992.5	46.7	3.404	3.040	0.259	0.0	131	0.819
1.003	1.560	992.5	62.2	3.040	3.094	0.347	0.0	150	0.889
1.004	1.203	85.0	0.0	3.694	4.237	0.347	0.0	0	0.000

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	22.111	400.0	900	Circular_Default Sewer Type	30.029	25.261	3.868	29.778	25.206	3.672
1.001	9.731	400.0	900	Circular_Default Sewer Type	29.778	25.206	3.672	29.486	25.182	3.404
2.000	12.806	400.0	900	Circular_Default Sewer Type	29.955	25.214	3.841	29.486	25.182	3.404
1.002	15.857	400.0	900	Circular_Default Sewer Type	29.486	25.182	3.404	29.082	25.142	3.040
1.003	8.002	400.0	900	Circular_Default Sewer Type	29.082	25.142	3.040	29.116	25.122	3.094
1.004	15.579	170.0	300	Circular_Default Sewer Type	29.116	25.122	3.694	29.567	25.030	4.237

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	2700	Manhole	Adoptable	2	2700	Manhole	Adoptable
1.001	2	2700	Manhole	Adoptable	3	2700	Manhole	Adoptable
2.000	7	2700	Manhole	Adoptable	3	2700	Manhole	Adoptable
1.002	3	2700	Manhole	Adoptable	4	2700	Manhole	Adoptable
1.003	4	2700	Manhole	Adoptable	5	2700	Manhole	Adoptable
1.004	5	2700	Manhole	Adoptable	6	2700	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	341831.713	397667.738	30.029	4.768	2700				
						0	1.000	25.261	900
2	341814.348	397681.425	29.778	4.572	2700		1	1.000	25.206
						0	1.001	25.206	900
7	341814.651	397697.455	29.955	4.741	2700				
						0	2.000	25.214	900
3	341806.688	397687.426	29.486	4.304	2700		1	2.000	25.182
						2	1.001	25.182	900
						0	1.002	25.182	900
4	341794.213	397697.214	29.082	3.940	2700		1	1.002	25.142
						0	1.003	25.142	900
5	341787.893	397702.122	29.116	3.994	2700		1	1.003	25.122
						0	1.004	25.122	900
6	341775.557	397711.637	29.567	4.537	2700		1	1.004	25.030
									300

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.300	Starting Level (m)	
Ratio-R	0.389	Check Discharge Rate(s)	✓
Summer CV	1.000	Check Discharge Volume	✓
Winter CV	1.000	100 year 360 minute (m³)	
Analysis Speed	Normal		

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	10	0
2	0	10	0
30	0	10	0
100	45	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 5 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	25.122	Product Number	CTL-SHE-0188-2270-2500-2270
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	22.7	Min Node Diameter (mm)	2100

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1	23	25.471	0.210	9.4	1.2596	0.0000	OK
30 minute summer	2	23	25.470	0.264	17.8	1.6119	0.0000	OK
30 minute summer	7	23	25.469	0.255	16.8	1.5761	0.0000	OK
30 minute summer	3	23	25.469	0.287	23.8	1.6747	0.0000	OK
30 minute summer	4	22	25.470	0.328	28.2	2.0383	0.0000	OK
30 minute summer	5	22	25.470	0.348	21.4	1.9922	0.0000	SURCHARGED
30 minute summer	6	22	25.125	0.095	18.9	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)
30 minute summer	1	1.000	2	4.2	0.220	0.004	2.9524	
30 minute summer	2	1.001	3	9.2	0.307	0.009	1.5971	
30 minute summer	7	2.000	3	11.5	0.335	0.012	2.0550	
30 minute summer	3	1.002	4	14.7	0.361	0.015	3.0305	
30 minute summer	4	1.003	5	21.4	0.468	0.022	1.7396	
30 minute summer	5	1.004	6	18.9	0.946	0.222	0.3106	36.8

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	1	23	25.550	0.289	12.1	1.7296	0.0000	OK
30 minute summer	2	23	25.548	0.342	22.2	2.0917	0.0000	OK
30 minute summer	7	24	25.548	0.334	21.7	2.0653	0.0000	OK
30 minute summer	3	24	25.548	0.366	31.1	2.1342	0.0000	OK
30 minute summer	4	24	25.548	0.406	35.9	2.5249	0.0000	OK
30 minute summer	5	24	25.548	0.426	24.8	2.4395	0.0000	SURCHARGED
30 minute summer	6	24	25.129	0.099	20.3	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)
30 minute summer	1	1.000	2	6.2	0.225	0.006	4.3843	
30 minute summer	2	1.001	3	12.2	0.314	0.012	2.2483	
30 minute summer	7	2.000	3	14.9	0.375	0.015	2.9152	
30 minute summer	3	1.002	4	18.2	0.391	0.018	4.1168	
30 minute summer	4	1.003	5	24.8	0.471	0.025	2.2928	
30 minute summer	5	1.004	6	20.3	0.964	0.239	0.3277	47.4

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	1	44	25.935	0.674	17.3	4.0319	0.0000	OK
60 minute summer	2	44	25.935	0.729	28.7	4.4556	0.0000	OK
60 minute summer	7	44	25.935	0.721	30.8	4.4600	0.0000	OK
60 minute summer	3	44	25.935	0.753	38.1	4.3934	0.0000	OK
60 minute summer	4	44	25.934	0.792	44.8	4.9267	0.0000	OK
60 minute summer	5	44	25.934	0.812	30.0	4.6518	0.0000	SURCHARGED
60 minute summer	6	45	25.134	0.104	22.6	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	1	1.000	2	3.8	0.220	0.004	11.7097	
60 minute summer	2	1.001	3	10.8	0.317	0.011	5.4315	
60 minute summer	7	2.000	3	20.5	0.364	0.021	7.1107	
60 minute summer	3	1.002	4	17.7	0.396	0.018	9.1785	
60 minute summer	4	1.003	5	30.0	0.499	0.030	4.7761	
60 minute summer	5	1.004	6	22.6	0.993	0.266	0.3554	113.3

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.36%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	1	57	28.176	2.915	24.1	17.4424	0.0000	SURCHARGED
60 minute winter	2	57	28.175	2.969	40.6	18.1564	0.0000	SURCHARGED
60 minute winter	7	57	28.175	2.961	42.4	18.3299	0.0000	SURCHARGED
60 minute winter	3	57	28.175	2.993	46.0	17.4751	0.0000	SURCHARGED
60 minute winter	4	57	28.174	3.032	64.1	18.8529	0.0000	SURCHARGED
60 minute winter	5	57	28.176	3.054	45.8	17.4850	0.0000	SURCHARGED
60 minute winter	6	57	25.139	0.109	24.5	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 winter	1	1.000	2	8.3	0.257	0.008	14.0134	
60 minute winter	2	1.001	3	18.6	0.351	0.019	6.1673	
60 minute winter	7	2.000	3	25.6	0.410	0.026	8.1161	
60 minute winter	3	1.002	4	26.7	0.423	0.027	10.0498	
60 minute winter	4	1.003	5	45.8	0.531	0.046	5.0715	
60 minute winter	5	1.004	6	24.5	1.014	0.289	0.3771	216.0

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.300	Minimum Backdrop Height (m)	0.200
Ratio-R	0.389	Preferred Cover Depth (m)	1.200
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
8	0.150	5.00	27.309	2700	341791.472	397626.544	2.211
9	0.041	5.00	28.098	2700	341796.228	397635.982	3.026
10	0.051	5.00	28.237	2700	341807.210	397630.448	3.196
11	0.121	5.00	27.972	2700	341831.782	397618.063	3.000
12	0.015	5.00	27.404	2700	341825.403	397605.169	2.468
13	0.080	5.00	26.925	2700	341819.388	397593.010	2.023
14	0.000		26.211	1800	341807.278	397568.531	1.446
15	0.000		26.231	1800	341798.000	397561.500	1.524

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	8	9	10.569	0.600	25.098	25.072	0.026	400.0	900	5.11	50.0
1.001	9	10	12.298	0.600	25.072	25.041	0.031	400.0	900	5.24	50.0
1.002	10	11	27.517	0.600	25.041	24.972	0.069	400.0	900	5.54	49.8
1.003	11	12	14.386	0.600	24.972	24.936	0.036	400.0	900	5.69	49.2
1.004	12	13	13.565	0.600	24.936	24.902	0.034	400.0	900	5.84	0.0
1.005	13	14	27.311	0.600	24.902	24.765	0.137	200.0	225	6.33	0.0
1.006	14	15	11.641	0.600	24.765	24.707	0.058	200.0	255	6.53	0.0

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	1.560	992.5	27.1	1.311	2.126	0.150	0.0	101	0.701
1.001	1.560	992.5	34.5	2.126	2.296	0.191	0.0	113	0.752
1.002	1.560	992.5	43.6	2.296	2.100	0.242	0.0	126	0.803
1.003	1.560	992.5	64.5	2.100	1.568	0.363	0.0	153	0.901
1.004	1.560	992.5	0.0	1.568	1.123	0.378	0.0	0	0.000
1.005	0.921	36.6	0.0	1.798	1.221	0.458	0.0	0	0.000
1.006	0.998	51.0	0.0	1.191	1.269	0.458	0.0	0	0.000

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	10.569	400.0	900	Circular_Default Sewer Type	27.309	25.098	1.311	28.098	25.072	2.126
1.001	12.298	400.0	900	Circular_Default Sewer Type	28.098	25.072	2.126	28.237	25.041	2.296
1.002	27.517	400.0	900	Circular_Default Sewer Type	28.237	25.041	2.296	27.972	24.972	2.100
1.003	14.386	400.0	900	Circular_Default Sewer Type	27.972	24.972	2.100	27.404	24.936	1.568
1.004	13.565	400.0	900	Circular_Default Sewer Type	27.404	24.936	1.568	26.925	24.902	1.123
1.005	27.311	200.0	225	Circular_Default Sewer Type	26.925	24.902	1.798	26.211	24.765	1.221
1.006	11.641	200.0	255	Circular_Default Sewer Type	26.211	24.765	1.191	26.231	24.707	1.269

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	8	2700	Manhole	Adoptable	9	2700	Manhole	Adoptable
1.001	9	2700	Manhole	Adoptable	10	2700	Manhole	Adoptable
1.002	10	2700	Manhole	Adoptable	11	2700	Manhole	Adoptable
1.003	11	2700	Manhole	Adoptable	12	2700	Manhole	Adoptable
1.004	12	2700	Manhole	Adoptable	13	2700	Manhole	Adoptable
1.005	13	2700	Manhole	Adoptable	14	1800	Manhole	Adoptable
1.006	14	1800	Manhole	Adoptable	15	1800	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
8	341791.472	397626.544	27.309	2.211	2700				
						0	1.000	25.098	900
9	341796.228	397635.982	28.098	3.026	2700		1	1.000	25.072
						0	1.001	25.072	900
10	341807.210	397630.448	28.237	3.196	2700		1	1.001	25.041
						0	1.002	25.041	900
11	341831.782	397618.063	27.972	3.000	2700		1	1.002	24.972
						0	1.003	24.972	900
12	341825.403	397605.169	27.404	2.468	2700		1	1.003	24.936
						0	1.004	24.936	900
13	341819.388	397593.010	26.925	2.023	2700		1	1.004	24.902
						0	1.005	24.902	225
14	341807.278	397568.531	26.211	1.446	1800		1	1.005	24.765
						0	1.006	24.765	255

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
15	341798.000	397561.500	26.231	1.524	1800		1	1.006	24.707 255

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
Rainfall Events	Singular	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.300	Starting Level (m)	
Ratio-R	0.389	Check Discharge Rate(s)	✓
Summer CV	1.000	Check Discharge Volume	✓
Winter CV	1.000	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0
2	0	10	0
30	0	10	0
100	45	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m³)	

Node 13 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	24.856	Product Number	CTL-SHE-0184-2180-2500-2180
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	21.8	Min Node Diameter (mm)	2100

Node 12 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.98	Time to half empty (mins)	38

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	30.0	30.0	0.400	30.0	37.8	0.401	0.0	37.8

Node 13 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.98	Time to half empty (mins)	38

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	22.0	22.0	0.400	22.0	28.7	0.401	0.0	28.7

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	26.136
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	58

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	110.0	110.0	0.800	110.0	139.7	0.801	0.0	139.7

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	8	24	25.345	0.247	25.3	1.7821	0.0000	OK
30 minute summer	9	24	25.344	0.272	27.1	1.6405	0.0000	OK
60 minute summer	10	41	25.344	0.303	20.9	1.8418	0.0000	OK
60 minute summer	11	41	25.344	0.372	28.1	2.4619	0.0000	OK
60 minute summer	12	41	25.344	0.408	20.3	2.3919	0.0000	OK
60 minute summer	13	41	25.344	0.442	23.0	2.9199	0.0000	SURCHARGED
60 minute summer	14	42	24.882	0.117	19.5	0.2973	0.0000	OK
60 minute summer	15	42	24.815	0.108	19.5	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)
30 minute summer	8	1.000	9	20.8	0.507	0.021	1.5994	
30 minute summer	9	1.001	10	20.6	0.515	0.021	2.1454	
60 minute summer	10	1.002	11	12.7	0.331	0.013	5.9845	
60 minute summer	11	1.003	12	18.4	0.398	0.019	3.7911	
60 minute summer	12	1.004	13	16.6	0.203	0.017	3.9976	
60 minute summer	13	1.005	14	19.5	0.916	0.532	0.5811	
60 minute summer	14	1.006	15	19.5	0.900	0.382	0.2523	61.8

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	8	42	25.445	0.347	24.3	2.5068	0.0000	OK
60 minute summer	9	42	25.445	0.373	25.1	2.2488	0.0000	OK
60 minute summer	10	42	25.445	0.404	25.5	2.4565	0.0000	OK
60 minute summer	11	42	25.445	0.473	33.2	3.1276	0.0000	OK
60 minute summer	12	42	25.445	0.509	22.6	2.9816	0.0000	OK
60 minute summer	13	42	25.445	0.543	25.9	3.5838	0.0000	SURCHARGED
60 minute summer	14	43	24.886	0.121	20.6	0.3076	0.0000	OK
60 minute summer	15	43	24.819	0.112	20.6	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	8	1.000	9	18.5	0.427	0.019	2.5048	
60 minute summer	9	1.001	10	17.2	0.410	0.017	3.2243	
60 minute summer	10	1.002	11	13.8	0.352	0.014	8.4403	
60 minute summer	11	1.003	12	20.2	0.416	0.020	5.0865	
60 minute summer	12	1.004	13	17.5	0.215	0.018	5.2175	
60 minute summer	13	1.005	14	20.6	0.928	0.564	0.6074	
60 minute summer	14	1.006	15	20.6	0.912	0.405	0.2634	78.5

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute summer	8	48	26.148	1.050	46.2	7.5768	0.0000	SURCHARGED
60 minute summer	9	48	26.148	1.076	45.6	7.8220	0.0000	SURCHARGED
60 minute summer	10	48	26.147	1.106	42.9	6.7241	0.0000	SURCHARGED
60 minute summer	11	50	26.147	1.175	53.4	7.7722	0.0000	SURCHARGED
60 minute summer	12	47	26.147	1.211	30.1	7.4420	0.0000	SURCHARGED
60 minute summer	13	47	26.147	1.245	34.9	8.4734	0.0000	SURCHARGED
15 minute summer	14	21	24.890	0.125	21.8	0.3177	0.0000	OK
15 minute summer	15	21	24.822	0.115	21.8	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)
60 minute summer	8	1.000	9	33.0	0.398	0.033	6.6984	
60 minute summer	9	1.001	10	27.3	0.431	0.027	7.7942	
60 minute summer	10	1.002	11	16.3	0.414	0.016	17.4396	
60 minute summer	11	1.003	12	25.5	0.466	0.026	9.1175	
60 minute summer	12	1.004	13	21.9	0.228	0.022	8.5971	
60 minute summer	13	1.005	14	21.8	0.940	0.595	0.6329	
15 minute summer	14	1.006	15	21.8	0.924	0.427	0.2743	91.1

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.20%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	8	114	26.915	1.817	39.3	13.1181	0.0000	SURCHARGED
120 minute winter	9	114	26.915	1.843	64.2	96.8972	0.0000	SURCHARGED
120 minute winter	10	116	26.916	1.875	30.2	11.3917	0.0000	SURCHARGED
120 minute winter	11	114	26.915	1.943	39.1	12.8493	0.0000	SURCHARGED
120 minute winter	12	116	26.916	1.980	34.3	23.3915	0.0000	SURCHARGED
120 minute winter	13	116	26.915	2.013	45.2	21.9268	0.0000	FLOOD RISK
960 minute summer	14	600	24.890	0.125	21.8	0.3177	0.0000	OK
960 minute summer	15	600	24.822	0.115	21.8	0.0000	0.0000	OK

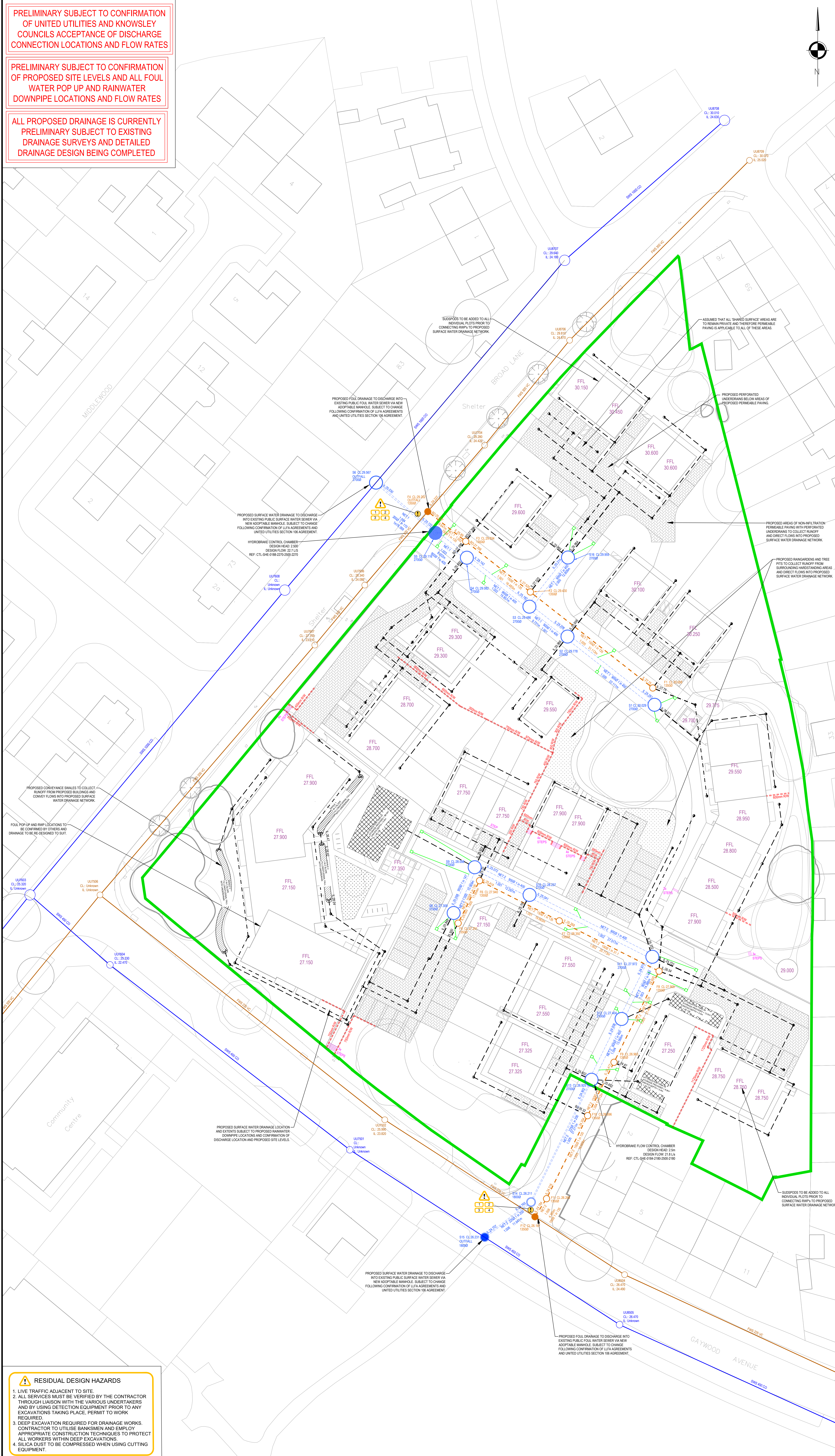
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	8	1.000	9	35.6	0.404	0.036	6.6984	
120 minute winter	9	1.001	10	-25.8	0.446	-0.026	7.7942	
120 minute winter	10	1.002	11	-20.7	0.409	-0.021	17.4396	
120 minute winter	11	1.003	12	30.5	0.451	0.031	9.1175	
120 minute winter	12	1.004	13	24.7	0.217	0.025	8.5971	
120 minute winter	13	1.005	14	21.8	0.940	0.595	0.6329	
960 minute summer	14	1.006	15	21.8	0.924	0.427	0.2743	551.3

Appendix I – Detailed Drainage Strategy Drawing

PRELIMINARY SUBJECT TO CONFIRMATION OF UNITED UTILITIES AND KNOWSLEY COUNCILS ACCEPTANCE OF DISCHARGE CONNECTION LOCATIONS AND FLOW RATES

PRELIMINARY SUBJECT TO CONFIRMATION OF PROPOSED SITE LEVELS AND ALL FOUL WATER POP UP AND RAINWATER DOWNPIPE LOCATIONS AND FLOW RATES

ALL PROPOSED DRAINAGE IS CURRENTLY PRELIMINARY SUBJECT TO EXISTING DRAINAGE SURVEYS AND DETAILED DRAINAGE DESIGN BEING COMPLETED



GENERAL NOTES

- SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
- ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
- THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADAPTABLE HIGHWAYS SHALL BE 150mm.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE RATES SHALL INCLUDE FOR HANDING AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE CEM REGULATIONS AT ALL TIMES.
- THE OUTSIDER OF ALL SEWERS SHALL BE A MINIMUM OF 1.0m FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5m FROM KERB LINES.
- EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES.
- ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES.
- ALL MATERIALS TO BEAR THE RELEVANT B & W ITEM AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS.
- ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A., N.B.C. OR THE NETWORK OPERATOR AS APPLICABLE.
- WHERE "ULTRA RIB" UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADAPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAD IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
- A CLASS 8 BED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL AS DIRECTED BY THE HIGHWAY AUTHORITY BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4.
- SUB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE.
- DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H. 110mm UP V.C. PIPES LAD TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

FOUL	S.W.
1 IN 40	1 IN 60
1 IN 80	1 IN 100
ELSEWHERE	
- ALL GULLY CONNECTIONS TO BE 150mm VITRIFIED CLAY UNLESS OTHERWISE SPECIFIED.
- MINIMUM COVER TO DRAINAGE SPOFF LEVEL.

LANDSCAPING	TRAFFICKED AREAS	HIGHWAYS
0.60m	0.90m	1.20m

• CLASS 9 BEDDING AND SURROUND TO BE USED WHERE MINIMUM COVER IS ACHIEVED.
• WHERE MINIMUM COVER IS NOT ACHIEVED CLASS 2 BEDDING AND SURROUND (CONCRETE ENCASEMENT) IS TO BE USED.

REFER TO UNITED UTILITIES STANDARD DRAWINGS FOR CONSTRUCTION DETAILS

- STND/19/001 - TYPE 1 MANHOLE
- STND/19/002 - TYPE 2 MANHOLE & INVERT ACCESS DETAIL
- STND/19/003 - SHALLOW MANHOLE DETAIL FOR SMALL DIAMETER PIPES
- STND/19/004 - SHALLOW SW MANHOLE DETAIL
- STND/19/007 - EXTERNAL AND INTERNAL BACKDROPS
- STND/19/008 - PIPE EMBEDMENT DETAILS
- STND/19/010 - VARIABLE MANHOLE GUIDANCE NOTES

LEGEND

	PROPOSED SURFACE WATER DRAINAGE
	PROPOSED FOUL WATER DRAINAGE
	PROPOSED ADOPTABLE SURFACE WATER MANHOLE
	PROPOSED ADOPTABLE FOUL WATER MANHOLE
	PROPOSED VORTEX FLOW CONTROL CHAMBER
	PROPOSED HIGHWAY GULLY
	PROPOSED AREAS OF PERMEABLE PAVING
	PROPOSED AREAS OF RAIN GARDENS AND TREE PITS
	PROPOSED OFF-LINE ATTENUATION BASIN
	PROPOSED CONVEYANCE SWALES
	EXISTING PUBLIC SURFACE WATER DRAINAGE
	EXISTING PUBLIC FOUL WATER DRAINAGE
	SITE BOUNDARY

PS4	03.10.2020	PRELIMINARY ISSUE - UPDATED TO SUIT REVISED SITE PLAN	J.A.J.	KOB	KOB
PS3	06.09.2024	PRELIMINARY ISSUE - UPDATED TO SUIT REVISED SITE PLAN	J.A.J.	JSB	KOB
PS2	20.07.2024	PRELIMINARY ISSUE - UPDATED TO SUIT LATEST SITE PLAN	J.A.P.	JSB	KOB
PS1	10.02.2024	PRELIMINARY ISSUE	LS	JSB	KOB
REV	DATE	DESCRIPTION	BY	CHK	APP

DRAWING STATUS:

PRELIMINARY

CLIENT:

LIV HOUSING GROUP

ARCHITECT:

GWP ARCHITECTS

PROJECT:

GAYWOOD GREEN
KIRKBY
LIVERPOOL

TITLE:

PRELIMINARY DRAINAGE STRATEGY

STATUS:	PROJECT NO:	PROJECT	ORIGINATOR	COLLUSION	LEVEL	TYPE	ROLE	DRAWING NO.	REV
S2	223-068	GWG - AJP - XX - 00 - DR - C - 0900						P04	

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	LS	LS	KOB	KOB	FEB 2023

0151 227 1462 68info@ajpengineers.co.uk 61 Dale Street, Liverpool, L2 2ET

RESIDUAL DESIGN HAZARDS

- LIVE TRAFFIC ADJACENT TO SITE.
- ALL SERVICES MUST BE VERIFIED BY THE CONTRACTOR THROUGH LIAISON WITH THE VARIOUS UNDERTAKERS AND BY USING DETECTION EQUIPMENT PRIOR TO ANY EXCAVATIONS TAKING PLACE. PERMIT TO WORK REQUIRED.
- DEEP EXCAVATION REQUIRED FOR DRAINAGE WORKS. CONTRACTOR TO UTILISE BANKSMEN AND EMPLOY APPROPRIATE CONSTRUCTION TECHNIQUES TO PROTECT ALL WORKERS WITHIN DEEP EXCAVATIONS.
- SILICA DUST TO BE COMPRESSED WHEN USING CUTTING EQUIPMENT.

Appendix J – Knowsley Council SuDS Pro-Forma

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

This pro-forma is a requirement of the Planning Validation Checklist. You **must complete all white boxes in full** and submit this pro-forma along with your supporting evidence to the Local Planning Authority for any application which seeks planning permission for major development (as defined in section 2 of [Statutory Instrument 2015 No. 595](#)).

This pro-forma supports developers and regulators in **summarising and confirming** how surface water from a development will be managed sustainably under current and future conditions. It should be completed in conjunction with the Council's 'Completing your Pro Forma' document and your sustainable drainage system should be designed in accordance with [CIRIA The SuDS Manual C753](#).

The pro-forma follows Policy CS24 of [Knowsley MBC's Local Plan](#), [National Planning Policy Framework](#), [House of Commons Written Statement \(HWSW 161\) on SuDS](#), [Planning Practice Guidance](#) and [Defra's Non-Statutory Technical Standards for Sustainable Drainage Systems](#). It is supported by the [Defra/EA Guidance on Rainfall Runoff Management](#) and can be completed using freely available tools such as [Tools for Sustainable Drainage Systems](#) or approved Industry Standard surface water management design software. The Council's [Sustainable Drainage & Surface Water Management Technical Guidance document](#) also provides further information.

Section 1: Development Details				
Development Name		Gaywood Green		
Development Address (including postcode)		100 Gaywood Avenue, Liverpool, L32 7PQ	Planning Application Reference (if available)	N/A
Development Grid Reference	Northings	397642	Expected lifetime of development (years)	100
	Eastings	341792	Have you submitted a Flood Risk Assessment?	Yes ☒ No ☐
Total Development Site Area (Ha)		1.436	Type of Planning Application (✓)	Outline ☐
Site area served by proposed drainage system (excluding open space) (Ha)*		0.757		Full ☒
Is your surface water drainage system designed to a (tick all that apply):				Hybrid ☐
Greenfield Standard - Site is undeveloped and a new drainage system will be installed; OR - Site is already developed and a new surface water drainage system will be installed to serve the new development.		☐		Reserved Matters ☐
Previously Developed Standard Site is already developed and the <u>entirety</u> of the existing surface water drainage system will be used to serve the new development.		☒		

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 2: Impermeable Area and Existing Drainage For outline or reserved matters applications, go to Section 3

	Existing (E)	Proposed (P)	Difference (P – E)	Evidence Checklist	
Impermeable Area (Ha)	0.775	0.757	0.018	☐	Plans showing development layout of site with existing and proposed impermeable areas.
State Drainage Method	To public sewer	To public sewer	N/A	☐	Plans showing current and proposed locations of sustainable drainage system.
Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?			Yes ☒ No ☐	☐	Plans showing existing layout to include: • Watercourses, open or culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes • Soakaways, filter drains

Section 3: Surface Water Discharge Hierarchy – Planning Practice Guidance

Surface Water Discharge Method	Proposed?	If YES - Evidence Checklist		If NO - Evidence Checklist	
1. Infiltration to ground	Yes ☐ No ☒	☐	Completed Infiltration Checklist from CIRIA The SuDS Manual C753 Appendix B <i>An editable version of this form is available on SusDrain website.</i>	☐	Geotechnical Survey, including Soil Permeability Testing stating Percolation Coefficient, in accordance with BRE 365 AND Statement providing justification in your Sustainable Drainage Strategy
2. Discharge to watercourse or surface water body (Main River or Ordinary)	Yes ☐ No ☒	☐	Watercourse and/or Water Body Survey Report	☐	Plan showing nearby watercourses and water bodies AND Statement providing justification in your Sustainable Drainage Strategy
3. Discharge to surface water sewer	Yes ☒ No ☐	☐	Water and Sewerage Company written agreement for the Right to Connect.	☐	Plan showing nearby sewers AND Statement providing justification in your Sustainable Drainage Strategy
4. Discharge to combined sewer	Yes ☐ No ☒				

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 4: Calculate Peak Discharge Rates – Technical Standards S2 and S3 (unless S1 applies)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) <i>Brownfield sites must reduce discharge rates by 50%</i>	Evidence Checklist	
Qbar	112.6	-	56.3	☐	MicroDrainage (or equivalent) calculations
1:1 Year Event	89.0	-	44.5		
1:30 Year Event	216.1	-	108.1		
1:100 Year Event	239.8	-	119.9		

Section 5: Calculate Discharge Volume – Technical Standards S4 and S6 (unless S1 applies)

Rainfall Event	Existing Volume (m ³)	Greenfield Volume (m ³)	Proposed Volume (m ³)	Evidence Checklist	
1:100 Year 6 Hour Event	5179.7	-	2589.8	☐	MicroDrainage (or equivalent) calculations

Section 6: Infiltration

Site Information	✓	Evidence Checklist	
Do your sustainable drainage proposals include any infiltration?	Yes ☐ No ☒ <i>If NO, please move on to Section 7</i>	☐	Proposed sustainable drainage plans
You should submit an alternative 'Plan B' sustainable drainage design utilising an alternative discharge method if site specific ground conditions are unknown at this stage. This will become the default design in the event infiltration proposals are not feasible upon site specific ground investigation. Have you submitted an alternative 'Plan B' sustainable drainage design?	Yes ☐ No ☐	☐	'Plan B' conceptual sustainable drainage plans and statement of approach

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 7: Storage – Technical Standards S7, S8 and S9

Storage Details	Details	Evidence Checklist	
State climate change allowance used (%)	45	☐	State / use in MicroDrainage
State storage volume provided (m ³) (excluding non-void spaces) <i>Must include an allowance for climate change and urban creep.</i>	379.4	☐	Drainage plans showing location of attenuation and all flow control devices and any supporting calculations
Summarise how storage will be provided for 1:30 year event on site. <i>Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas and no flooding occurs offsite in a 1 in 100 year (+ climate change allowance) event.</i>	- Surface water drainage network itself. - Granular drainage blanket below areas of permeable paving. - Raingardens. - Tree pits. - SuDsPods.	☐	Plans showing size and location of storage and supporting calculations
Summarise how storage will be provided for 1:100 year (+ climate change) 6 hour event on site. <i>Where storage above the 1:30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by MicroDrainage (or equivalent) calculations.</i>	- Surface water drainage network itself. - Granular drainage blanket below areas of permeable paving. - Raingardens. - Tree pits. - SuDsPods.	☐	Plans showing size and location of storage and supporting calculations

Section 8: Operation and Maintenance – Technical Standard S12 and HCWS161

Consideration	Select <u>ALL</u> that apply (✓)		Evidence Checklist	
State how <u>ALL</u> components of the sustainable drainage system will be maintained for the design life of the development.	Sustainable drainage features are at property level	☐	☐	Statement provided within your Sustainable Drainage Strategy
	Sustainable drainage system to be adopted by Water and Sewerage Company through a Section 104 agreement (Water Industry Act 1991)	☒		
	Applicant to secure maintenance of sustainable drainage features by entering into a Section 106 agreement (Town and Country Planning Act 1990)	☒		

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Declaration and Submission

This pro-forma has been completed using evidence from information which has been submitted with my planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details

Form <u>completed</u> by	Jonathan Jones	Email Address	jonathanjones@ajpltd.co.uk
		Daytime Telephone	0151 227 1462
Form <u>signed off</u> by	Kenny O'Brien	Accreditation(s) and/or Qualification(s) of Signatory	HNC Civil Engineering
Date (dd/mm/yyyy)	17/10/2025	Company	AJP

Client Details

Name	Mark Hooper	Company	Livv Housing Group
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