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Derry Hill

Drainage Strategy Report

For *New Key Developments*

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1. Introduction

1.1 Scope of The Report

Hydrock have been appointed by New Key Developments to provide a Drainage Strategy report for the approval of Wiltshire Council Lead Local Flood Authority.

The proposed drainage strategy will be in accordance with national guidelines and will incorporate a 'best practise' approach in reducing the impact of the flooding caused by the new development.

The report is based upon sewer asset information provided by the sewerage undertakers Wessex Water in relation to assets within the vicinity of the development site.

The report highlights the key stakeholders in terms of ownership and maintenance to ensure the drainage system is kept well maintained and reduce the risk of failure. Should the network fail at any point, clearly defined ownership liabilities will ensure that problems can quickly be rectified, thereby reducing the impact of potential damage caused by flooding.

1.2 Limitations of The Report

This report has been prepared in connection with the scope as described above and considers the instructions and requirements of the client's needs. It is not intended for and should not be relied upon by any third party.

The information received is summarised within this report. In the event that the information is relied upon and is subsequently found to be incorrect, Hydrock Consultants accepts no responsibility for any direct and/or consequential loss that may occur as a result.

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1.3 References / Design Codes

- » BS EN 752 - Drain and Sewer Systems Outside Buildings.
- » Building Regulations Approved Document Part H - Drainage and waste disposals.
- » Sewers for Adoption (where applicable).
- » Local Authority Guidance.
- » CIRIA C753 - SuDS Manual.
- » National Planning Policy Framework (NPPF).
- » DEFRA Non-Statutory Technical Standards for Sustainable Drainage.

2. Site Information

2.1 Site Location

The Site is located in Deery Hill, west of Calne, within Wilshire County. The development sits on the corner of Church Road directly to the east of Derry Hill Church.

Table 2.1: Site Referencing Information

Site Address	
Address	Church Rd, Derry Hill, Calne
Postcode	SN11 9NR (nearest)
National Grid Reference	396349, 170926

Figure 1: Site Location with Approximate Red Line Boundary



2.2 Site Topography

The existing building is currently at 120.180, with the surrounding hardstanding generally falling northwest to southeast, from a high point of 120.150 towards the access at a low point of 119.470.

See **Appendix A**Error! Reference source not found. for Topographical Survey

2.3 Geology

The BGS (British Geology Survey) website indicates the site is situated on Hazelbury Bryan Formation - Sandstone. Sedimentary bedrock formed between 163.5 and 157.3 million years ago during the Jurassic period.

The LandIS website indicates the soil to be freely draining with a sandy texture.

2.4 Hydrology & Hydrogeology

The MagicMap indicates that the area is not located above any principal aquifers. The area is however labelled as high within a Groundwater Vulnerability Zone.

There are no known watercourses within the vicinity of the site.

Groundwater is unknown at the time of writing.

2.5 Fluvial Flood Risk

Fluvial flood risk is the risk of flooding from the overbank flow of rivers and watercourses.

Within England, the risk of fluvial flooding is defined by Flood Zones (FZs) which indicate the potential extent of flooding for a given Annual Exceedance Probability (i.e., the potential for an occurrence within any one year (AEP)) without considering the benefits from flood defences, other manmade structures, or channel improvement works.

The EA Flood Map for Planning indicates that the site is located within Flood Zone 1 and is therefore considered to be at low risk (1:1000 AEP) of fluvial flooding (see

Figure 2). In addition, the site does (not) benefit from flood defences.

Figure 2: EA Flood Map for Fluvial Flooding

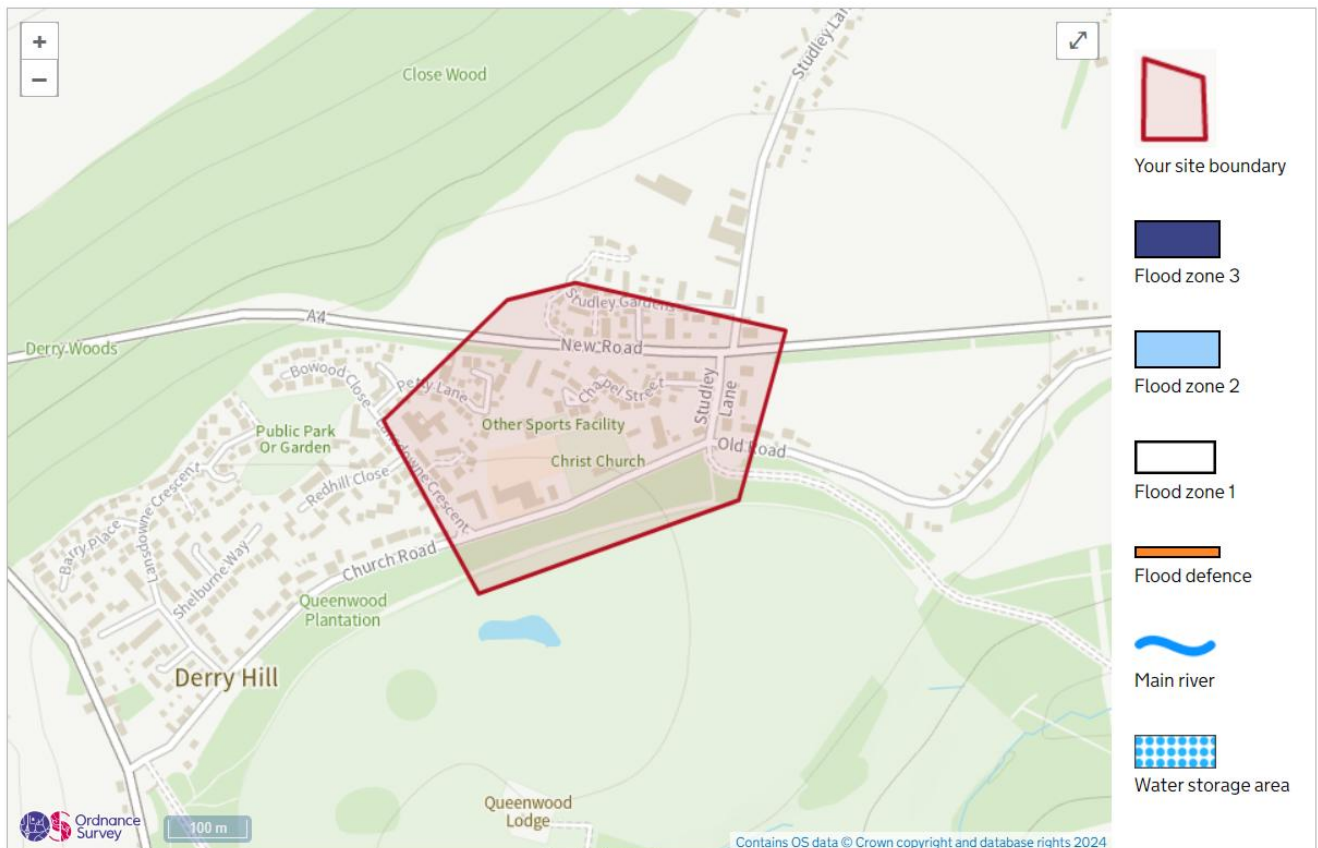


Table 2.2: Flood Zones Probability of Flooding

NPPF - Flood Zones		
Flood Zone 1	Low Probability	Less than 1 in 1000 (< 0.1%) chance of flooding occurring each year
Flood Zone 2	Medium Probability	Between 1 in 100 and 1 in 1000 (1% - 0.1%) chance of flooding occurring each year
Flood Zone 3a	High Probability	Greater than 1 in 100 (> 1%) chance of flooding occurring each year
Flood Zone 3b	Functional Floodplain	Land where water <i>has</i> to be stored in times of flood

2.6 Proposed Development

Conversion of former care home into nine individual residential apartments.

See **Appendix B** for Architect's Proposed Site Layout.

3. Pre-Development Surface Water Management Strategy

3.1 Existing Surface Water Drainage Network

3.1.1 Existing Public Drainage

Review of Wessex Waters's sewer asset maps confirm that there are no surface water public sewers within the vicinity of the site.

For the purpose of this report the drainage has been taken from the sewer asset map information only. It is recommended a full drainage CCTV survey is undertaken to determine accurate routes of the existing drainage so the proposed network can be suitably coordinated.

See **Appendix C** for the Sewer Asset Map.

3.1.2 Existing Private Drainage

At the time of writing no CCTV or GPR survey has been undertaken. A topographical survey has been provided which show the cover and inverts with assumed directions. There is no surface water chambers labelled.

3.2 Pre-Development Surface Water Catchment Areas

Below is an indication of the pre-development catchment type area. Please note as the building is not changing, only the car park has been considered.

Table 3.1: Pre-Development Catchment Areas

Catchment	Area (m ²)
<u>Impermeable</u>	
Roads / Hardstanding	368
<u>Permeable</u>	
Soft Landscaping	6
Total Area	374

3.3 Site Infiltration Rates

In order to determine the post-development surface water flows, an assessment has been carried out on the pre-development to ensure that the run-off from the new development will not adversely affect flood risk either within the site boundary, offsite adjacent properties, or the downstream network. This run-off will be limited by the site infiltration rates. On site testing has been carried out an infiltration rate of 8.9×10^{-5} m/s has been determined and indicates that the site is suitable for an infiltration solution.

3.4 Pre-Development Flood Exceedance

Topographical survey information indicates that, should the existing drainage network fail or otherwise have its capacity exceeded, overland flows would follow the site topography and be directed towards Church Road, via the site access.

4. Surface Water Management and SuDS Assessment

4.1 Run-off Destinations

An appraisal should be undertaken to confirm the most suitable and sustainable method for managing surface water runoff from the development in accordance with the following hierarchy as highlighted in Part H of Building Regulations and the National Planning Policy Framework (NPPF):

1. Infiltration to the ground using a sustainable drainage system.
2. If this is not feasible, discharge to a watercourse or river; generally, at a controlled rate unless it does not affect flood risk e.g., if to the sea or an estuary.
3. Discharge at a controlled rate to a surface water sewer or drain.
4. Discharge at a controlled rate to a combined sewer system, with the approval from the Water Authority.
5. Only if the above have all been investigated and it has been proved that none of these options are suitable will discharge at a controlled rate to a foul sewer system, with the approval from the Water Authority.

The discharge of surface water run-off has been considered in accordance with the hierarchical approach:

Table 4.1: Review of the Drainage Hierarchy

Method	Reasoning	Suitability
Interception / Reuse	As proposal is only a car park, this has not been considered	X
Infiltration	Preliminary data suggest infiltration is viable.	✓
Surface Water Body	As infiltration looks viable, this has not been considered	X
Surface Water Sewer	As infiltration looks viable, this has not been considered	X
Combined Sewer	As infiltration looks viable, this has not been considered	X
Foul Water Sewer	As infiltration looks viable, this has not been considered	X

4.2 SuDS Assessment

4.2.1 Overview of SuDS

The design of the surface water drainage system should seek to implement and maximise the use of Sustainable Drainage Systems (SuDS) where possible.

The primary purpose of a SuDS system is to manage surface water run-off within a development via mimicking natural methods, attenuating additional water volume generated by the introduction of impermeable areas whilst providing a degree of water treatment to run-off alongside amenity and biodiversity benefits to the local community.

The suitability and benefits of the various potential SuDS systems for the proposed development should be considered, which will aim to maximise the 4 pillars of SuDS:

- » Water Quantity (Controlling runoff);
- » Water Quality (Managing quality of runoff);
- » Amenity (Create and sustain better places for people);
- » Biodiversity (Create and sustain better places for nature).

The implementation of SuDS can be divided into the management of sources and of the wider site and even region, with preference given to source control.

4.2.2 Suitability of SuDS Elements

The drainage design should adopt the principles of SuDS where appropriate taking into consideration the site context and location. The principals of SuDS are that they should be designed to maximise the opportunities and benefits that can be secured surface water run-off management in terms of quality, quantity, flood risk, and amenity. The implementation and selection of SuDS techniques is largely dependent on the site layout and context. Some SuDS techniques may be more appropriate than others.

The suitability of SuDS components has been assessed as follows:

Table 4.2: Suitability of SuDS Components

Hierarchy	System	Description	Suitability
Source Control	Green Roofs 	A planted soil layer on the roof of a building: stores water in the soil layer to be absorbed by vegetation. Reduces runoff and treats pollutants.	No. Only a car park.
	Rainwater Harvesting 	Rainwater is collected from the roof of a building or from other paved surfaces and stored in an over ground or underground tank for treatment and reuse locally.	No. Only a car park.
	Permeable Surfaces 	Surfaces that allow water to penetrate into underlying layers to be stored, collected or made to infiltrate to groundwater.	No. not considered suitable for the application.
	Bioretention Area 	A vegetated area with gravel and sand layers below designated to channel, filter and cleanse water vertically, to then be stored, collected or made to infiltrate to groundwater.	No. not considered suitable for the application.
Hierarchy	System	Description	Suitability
Site and Regional Control	Filter Strip 	Grassed or planted areas that runoff is allowed to run across to promote infiltration and cleansing.	No. not considered suitable for the application.
	Soakaway 	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed	Yes.

	like a dry well, an underground pit is dug filled with gravel or rubble. Water can be piped to a soakaway where it will be stored and allowed to gradually seep into the ground.	An open graded crushed rock layer has been implemented above a cellular soakaway system.
Swale 	Shallow depressions to convey and filter water. May be 'wet' with above ground attenuation or 'dry' with a gravel layer. Can be made to infiltrate to groundwater.	No. not considered suitable for the application.
Hardscape Storage 	Hardscape water features can be used to store run-off above ground within a constructed container. Storage features can be integrated into public realm areas with a more urban character.	No. not considered suitable for the application.
Pond / Basin 	Store and treat water. Ponds have a level of standing water whereas basins are generally dry. Can be made to infiltrate to groundwater.	No. not considered suitable for the application.
Wetland 	Wetlands are shallow vegetated water bodies with a varying water level. Specially selected plant species are used to filter water. Water flows horizontally and is gradually treated before being discharged. Wetlands can be integrated with a natural or hardscape environment.	No. not considered suitable for the application.
Underground Storage 	Water can be stored in tanks, gravel or plastic crates beneath the ground to provide attenuation.	No. not considered suitable for the application.

4.2.3 Interception Storage

Interception can be defined as the capture and retention on site of the first 5mm of the majority of all rainfall events. Interception mechanisms have been assessed to show the site is compliant for zero run-off from the first 5mm for 80% of events during the summer and 50% in winter. (Ciria)

Table 4.3: Interception Storage Systems

System	Reasoning	
Green Roofs	All surfaces that have green / blue roofs	X
Rainwater Harvesting	All surfaces drained to RWH systems designed whether for surface water management or just water supply, provided the RWH system design is based on regular daily demand for non-potable water	X
Soakaways / Infiltration	Areas of the site drained to systems that are designed to infiltrate run-off for events greater than a 1 month return period.	✓
Permeable Pavements	All permeable pavements, whether lined or not, can be assumed to comply, provided there is no extra area drained to the permeable pavement.	X
Filter Strips / Swales	Roads drained by filters strips / swales, where the longitudinal gradient of the vegetated area is less than 1:100, are suitable for interception delivery for impermeable areas up to 5 times the base of the vegetated surface area receiving the runoff.	X
Infiltration Trenches	Roads drained by infiltration trenches can be considered to provide interception	X
Detention Basins	Areas of the site drainage to detention basin with a flat base can be assumed to comply. The area of the basin that is assumed to contribute to interception of run-off should be below the outlet of the basin.	X
Bioretention / Rain Gardens	Areas of the site drainage to unlined bioretention components can be assumed to comply where the impermeable area is less than 5 times the vegetated surface area receiving run-off/ They can be designed to deliver interception for larger areas, where suitable infiltration capacity is available.	X
Ponds	Areas drained by ponds (with a permanent water pool that is effectively maintained by the outlet structure) are not assumed to deliver interception	X

5. Post-Development Surface Water Management Strategy

5.1 Proposed Surface Water Drainage Strategy

The below ground surface drainage system will connect all channels and gullies at ground floor level and be directed into the below ground attenuating cellular soakaway and sub-base, prior to infiltrating to ground.

SuDS will be by way of a cellular soakaway and attenuating sub-base.

Attenuation will be by way of cellular soakaway with min 95% voids and attenuating sub-base with 30% voids.

Discharge will be direct to ground.

It will be a gravity system without the need for pumping.

Where applicable, the surface water management strategy has incorporated the recommendations of the 'Non-Technical Standards for Sustainable Drainage' and general 'good practice' in terms of providing a Sustainable Drainage System (SuDS) that does not adversely impact flood risk either within the site or beyond the development boundary.

5.2 Post-Development Surface Water Catchment Areas

Below is an indication of the pre-development catchment type area. Please note as the building is not changing, only the car park has been considered.

Table 5.1: Pre vs Post-Development Catchment Areas

Catchment	Area (m ²)
<u>Impermeable</u>	
Roads / Hardstanding	334
<u>Permeable</u>	
Soft Landscaping	40
Total Area	374

5.3 Post-Development Surface Water Run-Off Rates

In order to determine the post-development surface water flows, an assessment has been carried out on the post-development to ensure that the run-off from the new development will not adversely affect flood risk either within the site boundary, offsite adjacent properties, or the downstream network. This run-off will be limited by the site infiltration rate of 8.9×10^{-5} based off on site testing.

5.3.1 Allowance for Climate Change and Urban Creep

In accordance with EA guidance, an allowance for climate change has been incorporated into the design to ensure that the proposed surface water network has a suitable degree of resilience. These allowances vary with the expected lifetime of the development.

Urban Creep Factor (UCF) is defined as any increase in the impervious area that is drained to an existing drainage system without planning permission being required, such as the construction of patios, small extensions, etc.

As the footprint of the car park will remain majority impervious, this factor is not applied.

5.4 Post-Development Surface Water Volumes

In line with the **Non-Statutory Technical Standard for Sustainable Drainage S4 & S5 (Volume Control)**, where reasonably practicable, for Brownfield developments the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6-hour rainfall event should never exceed the Brownfield Run-Off Volume for the same event.

Where there is an increase in the volume of run-off as a result of the development, infiltration or other SuDS techniques should be considered to mitigate volume run-off. Due to the soil type onsite, infiltration will occur therefore infiltration techniques are considered suitable for the site.

It is noted that the proposed development has more areas of green open space compared to the pre-development situation, therefore the volume of runoff from the post-development will be less than the current Brownfield site. The proposed SuDS treatment train for the site includes a soakaway which further assists in reducing the peak volume of runoff discharging from the site. Decrease in impermeable area as indicated below:

Pre-Development Catchment Area (ha)	Post-Development Catchment Area (ha)	-/+ (m ³)	Betterment (%)
368	334	-12	10%

5.4.1 Post-Development Surface Water Storage

In line with the **Non-Statutory Technical Standard for Sustainable Drainage S7 & S8 (Flood Risk)**, all storm events up to and including the 1 in 30 AEP storm event will be retained within the proposed surface water drainage network and exceedance volumes from all other storm events up to and including the 1 in 100 AEP plus 40% allowance for climate change will be retained within the site and managed to minimise the risk to people and property.

Expected attenuation requirements are shown below:

Table 5.2: Attenuation Requirements

Type of Storage Structure	Dimensions (m)	Void Ratio	Total Attenuation Volume (m ³)
Cellular Soakaway	8m x 2m x 750mm deep	95%	11.45
Attenuating Sub-base	8m x 2m x 370mm deep	30%	1.78

5.5 Post-Development Flood Exceedance

In line with the **Non-Statutory Technical Standard for Sustainable Drainage S9 (Flood Risk)**, in the event that there is a failure of the surface water drainage network beyond the design storm or through other circumstances, exceedance flows will be directed away from buildings and critical infrastructure.

5.6 Summary of Post-Development Flows

It has been determined that the post-development surface water will infiltrate to ground in accordance with national guidelines and non-statutory technical standards so as to not adversely impact downstream flooding of the site as a result of the new development.

See **Appendix E** for the Drainage Strategy Layout.

5.7 Water Quality

Consideration must be given both during construction and post-development to ensure that water quality is not negatively impacted.

Table 26.2 of [The SuDS Manual](#) identifies the overall pollution hazard indices from the site to be low, as shown below.

Table 5.3: Pollution Hazards

Land Use	Hazard Level	TSS	Metal	Hydro-carbons	
Residential roofs	Very Low	0.2	0.2	0.05	X
Other roofs (typically commercial / industrial roofs)	Low	0.3	0.2-0.8	0.05	X
Individual property driveways, residential car parks, low traffic roads (e.g., cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., <300 traffic movements/day	Low	0.5	0.4	0.4	✓
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads / motorways	Medium	0.7	0.6	0.7	X
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9	X

Table 26.3 of [The SuDS Manual](#) provides various mitigation indices for discharge to surface waters. The mitigation indices for SuDS elements that are included within the proposed development are shown below.

Table 5.4: Pollution Mitigation

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

Refer to below tables for a summary comparing the mitigation and pollution indices for each identified land usage classification.

Residential Carpark	TSS	Metals	Hydrocarbons
Pollution Index	0.5	0.4	0.4
Mitigation Index	0	0	0
Net Pollution	0.5	0.4	0.4
Comments	Small car parks without HGV use are low risk for pollution.		

Based on the above tables the water quality criteria of document [Ciria C753 - The SuDS Manual](#) is satisfied.

Although potential SuDS options have been stated, alternative options may be considered provided that the management train meets or exceeds the water quality requirements.

Provided that the mitigation indices of the various treatment trains meet or exceed the requirements of each pollutant, it is expected that there will be no reduction in the quality of water being discharged into the public sewer network.

5.7.1 *Quality of Surface Water Run-off: Post-Development*

In line with the SuDS suitability, the design should seek to provide an appropriate level of water treatment to effectively mitigate the pollution risk associated with the site and not affect the quality of water downstream.

The proposed layout has primary drivers of pollutant risks to the discharge point. The sources, pollutants and mitigations are as follows:

Carpark

In accordance with Environment Agency Document PPG3 (now withdrawn but considered best practice guidance) the proposed as the car park is less than 50 spaces or 800m² it is considered to be 'low risk' in terms of pollution to the surface water network and as such an oil interceptor is deemed not to be required.

Gullies

Gullies and drainage channels will be specified with silt traps and catch pits will be incorporated in the drainage system to reduce the risk of silts / salts getting into the surface water network.

5.7.2 *Quality of Surface Water Run-off: During Construction*

It is anticipated that the during construction adequate provisions will be put in place to ensure the existing drainage is protected to prevent material which could have a negative impact on water quality entering the system.

Some pollution mitigation techniques that are to be considered include:

- » Monitoring and managing disposal of site waste. Make sure all waste is correctly dealt with to stop it from spreading.
- » Keeping materials such as sand and cement secure. Materials should be located where there isn't risk of them being washed into the drainage system.
- » Covering up all drains to prevent waste from ending up in the system.
- » Keep the road and paths to the site clean at all times. This will prevent silt and other pollutants from running off into any bodies of water.
- » Properly collect and treat any wastewater that is produced.
- » Temporary installation of screens within manholes to capture any debris.

5.8 Design Standards for Surface Water Drainage

The surface water drainage strategy for the new development should aim to deliver a safe, functional, cost effective and, as far as possible, sustainable drainage system (SuDS) which considers the following design principles to ensure:

- » That natural drainage features are protected;
- » That public health and safety risks are taken into account and managed;
- » The constructability of the surface water system;
- » The maintainability of the surface water system;
- » The long-term economic viability of the system;
- » That sustainability issues are taken into account;
- » That the information requirements of stakeholders are adequately addressed;
- » That the potential value of the surface water system, in enhancing the rural and urban environment is recognized and optimized.

The surface water below ground gravity drainage system is to provide connections from all new rainwater pipes, channels, gullies and road gullies at ground floor level. The locations of the drainage components are to be fully coordinated with all relevant architectural, landscaping and services drawings. All materials and products relating to the below ground drainage system shall be specified in accordance with their intended use and meet all relevant British Standards and BBA accreditations.

In accordance with best practice storm drainage will be designed to the following performance criteria:

1 in 2-year storm return period:	Pipes running under full conditions with no surcharge.
1 in 30-year storm return period:	No flooding.
1 in 100-year storm:	Extreme flooding to be retained on site.

6. Foul Water Management Strategy

6.1 Pre-Development Foul Water Drainage

6.1.1 *Existing Public Drainage:*

Review of Wessex Water's sewer asset maps confirm that there is a 150mm foul sewer located to the south of the site in Church Road.

For the purpose of this report the drainage has been taken from the sewer asset map information only. It is recommended a full drainage CCTV survey is undertaken to determine accurate routes of the existing drainage so the proposed network can be suitably coordinated.

See **Appendix C** for the Sewer Asset Map.

6.1.2 *Existing Private Drainage:*

Existing survey information of the site shows existing foul drainage on site which is assumed to have been draining the building. The existing drainage can be seen located south of the building and assumed to drain south and discharge into the foul sewer located within Church Road.

6.2 Post-Development Foul Water Drainage

There is no proposed foul water drainage on this site, additionally there are no proposed amendments to the existing foul network.

7. Ownership and Maintenance

The key elements of the foul and surface water drainage system will require periodic maintenance to prevent failure of the system and/or a reduction in capacity of the networks as a whole and the following matrix therefore sets out the various drainage items to be maintained, identifies who is responsible and the frequency of maintenance.

The proposed SuDS features will require maintenance including litter and debris removal, sediment removal, vegetation maintenance and remediation to any damaged structures.

The maintenance requirements will be the responsibility of a private maintenance company. All inspection and maintenance works should take into consideration the implications of 'lone working'. An assessment should be carried out and the risks mitigated accordingly.

Table 7.1: Proposed Schedule of Maintenance for Below Ground Drainage

Soakaways - Operation and maintenance requirements in accordance with CIRIA C753 - The SuDS Manual		
<u>Maintenance Schedule</u>	<u>Required Action</u>	<u>Frequency</u>
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually.
	Cleaning of gutters and any filters on downpipes.	Annually (or as required based on inspections).
	Trimming any roots that may be causing blockages.	Annually (or as required).
Occasional maintenance	Remove sediment and debris	As required, based on inspections.
Remedial actions	Reconstruct soakaway and / or replace or clean void fill, if performance deteriorates or failure occurs.	As required.
	Replacements of clogged geotextile (will require reconstruction of soakaway).	As required.
	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually.
	Check soakaway to ensure emptying is occurring.	Annually.

The following information should be passed to the development operator to ensure that future maintenance is carried out in a safe and proper manner.

A formal review of the risks should be undertaken on an annual basis:

Table 7.2: Proposed Operational Schedule for Below Ground Drainage

Operation	Risks	Mitigating Measures
Access to manholes for Inspection and Maintenance.	1. Confined spaces	1. Entry to confined space to be minimised and, where unavoidable, to be carried out by appropriately trained personnel
Removal of silt from outfall	1. Risk to members of the public 2. Open Water	1. Access to hazardous areas by members of the public to be prohibited. 2. To be carried out by appropriately trained personnel
Removal of silt from drainage channel	1. Risk to members of the public	1. Access to hazardous areas by members of the public to be prohibited

Provided that the surface and foul water strategies as set out in this report, are implemented, it is expected that the primary residual failure would be as a result of some form of failure of the site drainage system during the life of the development. Therefore, regular, ongoing maintenance as set out in the [Operations and Maintenance Manual](#), will be required to ensure that the capacity of the system is maintained as designed.

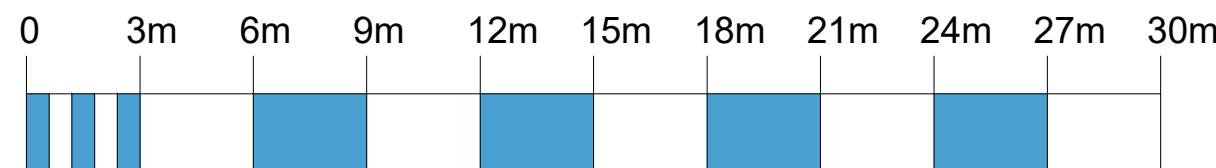
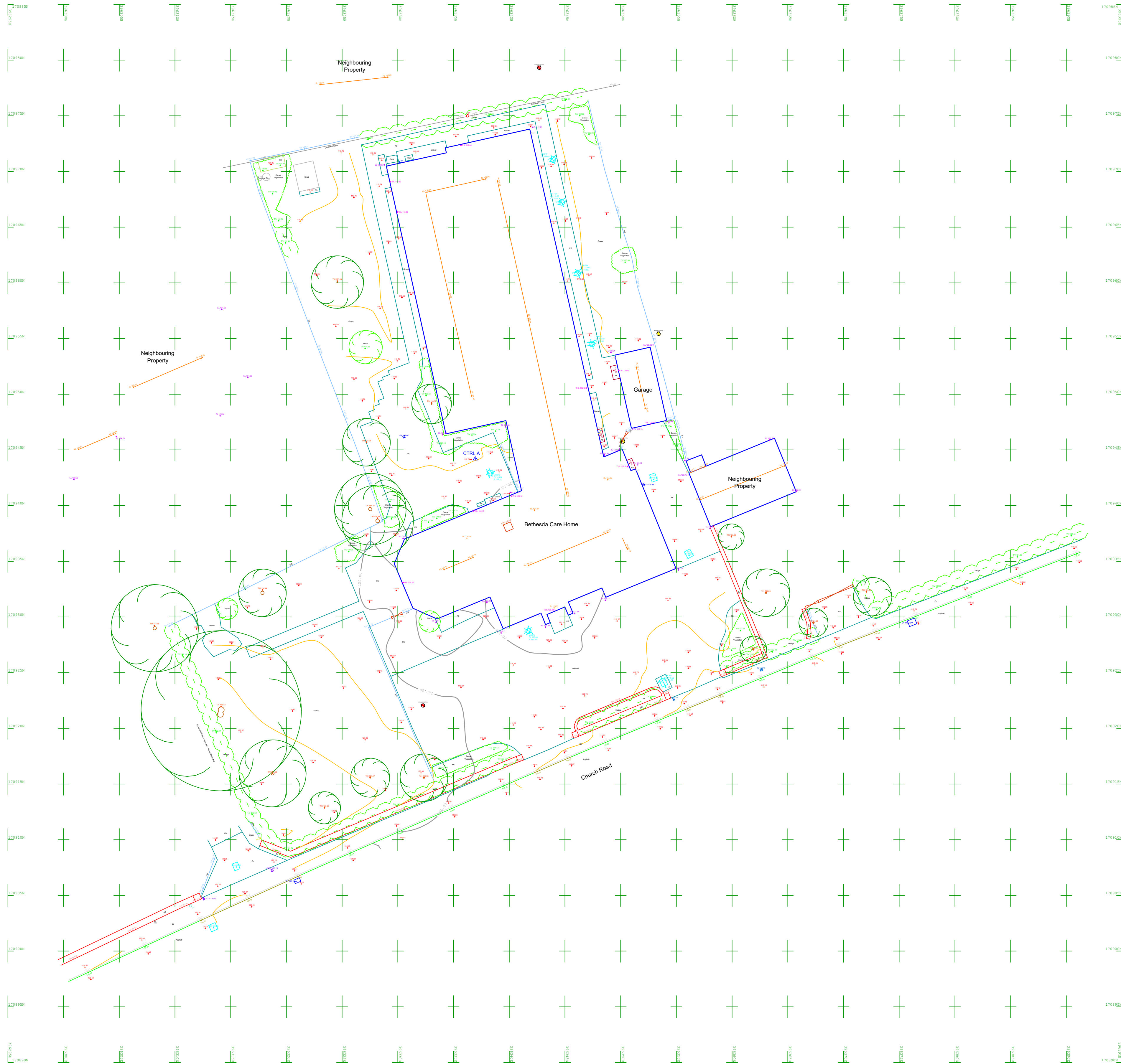
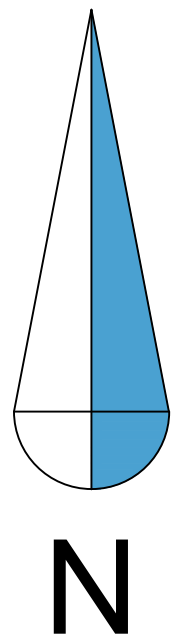
8. Conclusions

This report concludes that the foul and surface water drainage strategy for the development will be designed in accordance with both national and local standards and best practice. The following key items have been summarised below:

- » The surface water drainage system for the new development will be designed to accommodate the required flows for the lifetime of the development.
- » It has been determined that the post-dev surface water flow infiltrates to ground in accordance with national guidelines and non-statutory technical standards, so as to not adversely impact downstream flooding of the site as a result of the new development.
- » All surface water run-off from storm events up to and including the 100-year plus 40% climate change will be retained within the overall site.
- » Attenuation provided 'at source' by way of a cellular soakaway and attenuating sub-base prior to infiltrating to the ground at a suitable rate to meet the required flow rates for the whole site.
- » In the event that flows from rainfall exceed the 1 in 100-year rainfall event or system failure through lack of maintenance, surface water run-off will be directed via exceedance routes away buildings and/or critical infrastructure.
- » Ownership and maintenance liabilities for the surface water drainage system will be clearly defined so that in the event of failure the drainage system appropriate action can be taken to ensure that the drainage system continues to work efficiently.

Appendix A Topographical Survey

SurveyBase - SB10805



Notes: Coordinate System

The survey has been orientated to the O.S. National Grid (OSGB36) via GPS and the O.S. Active Network. True OSGB36 coordinates have been established at:

Station: CTRL A E: 170944.191 N: 396336.953 EL: 119.749

and a further OSGB36 point established to create a true O.S. bearing for angle orientation.

Stations * and * are marked with a MAG Nail, Hilti Nail or Wooden Stake.

ON DETAIL SURVEY					
A/C	Air Conditioning Unit	GV	Gas Valve	S/A	Skateaway
AV	Air Valve	GY	Gully	Stay	Stay
Bel	Bell Level	IC	Inspection Cover	SC	Stop Cock
BS	Bellish Beacon	IL	Invert Level	SV	Stop Valve
BOL	Bollard	JB	Junction Box	S	Stump
BO	Borehole	KO	Kerb Outlet	SW	Surface Water
BR	Brick	LP	Lamp Post	STW	Survey Control Station
BKP	Brick paving	LI	Light	Tac	Tactile Paving
BT	Initial Telecom	MH	Manhole Cover	TP	Telegraph Pole
CAB	Cabinet	Mtr	Master Post	T/CB	Telephone Call Box
CP	Catch Pit	MB	Multiple Bole	ThL	Threshold Level
Co	Concrete	NVP	No Visible Pipes	T/F	Top Of Fence
CL	Cover Level	ONG	Overground	T/P	Top Of Parapet Level
CUL	Culvert	O/H	Overhead	T/V	Top Of Vegetation
dl	Dilapidated	PM	Parking Meter	T/W	Top Of Wall
DCH	Drainage Channel	PS	Paving Sub	TL	Traffic Lights
ER	Earth Road	PO	Post	UTL	Unable to Lift
EP	Electricity Pole	PB	Post Box	VP	Vent Pipe
FR	Fire Hydrant	R	Road	WL	Water Level
FB	Flower Bed	RE	Rodding Eye	WM	Water Meter
FW	Foul	RS	Road Sign	WO	Water Wash Out
		SP	Sign Post		
ON FENCES/WALLS/DIVISIONS					
A/B	Armco Crash Barrier	P/L	Palisade Fence	BWBrick Wall	
B/W	Barbed Wire Fence	P/F	Picket Fence	CW	Concrete Wall
CL	Chain Link Fence	P/R	Post and Rail Fence	RW	Retaining Wall
C/B	Close Boarded Fence	P/W	Post and Wire Fence	SW	Stone Wall
E/F	Electric Fence	S/F	Safety Fence	TW	Timber Wall
H/F	Hera Fence	T/F	Trellis Fence		
H/R	Hand Rail	WM	Wire Mesh Fence		
I/R	Iron Rail Fence				
ON BUILDINGS					
CHM	Chimney	FRL	Flat Roof Level	RL	Ridge Level
DH	Door Head	FL	Floor Level	SH	Sill Height
DN	Down Pipe	HH	Head Height	SNP	Soil Pipe
EL	Eave Level	PL	Parapet Level	ThL	Threshold Level

SITE

Rev	Comments	By	Chkd	Date
-		-	-	-
-		-	-	-
-		-	-	-
-		-	-	-
-		-	-	-



SURVEYBASE

PRECISION DIGITAL SURVEYORS

www.surveybase.co.uk

Bath: 01225 314370 - London: 02039 066892

Project Name

Bethesda Care Home, Derry Hill, Calne SN11 9NN

CAD Drawing Name

SB10805 - TOPO

Drawing Title

Topographical Survey of (SITE)

Client	Date
Aaron Evans Architects	04/06/2024
	Scale
	A1 @ 1:200

Drawn By	Checked By	SB Code	Revision
SB - JM	SB - CW	SB10805	-

Grid Orientation	Site Level Datum
NORTH GPS	OS GPS

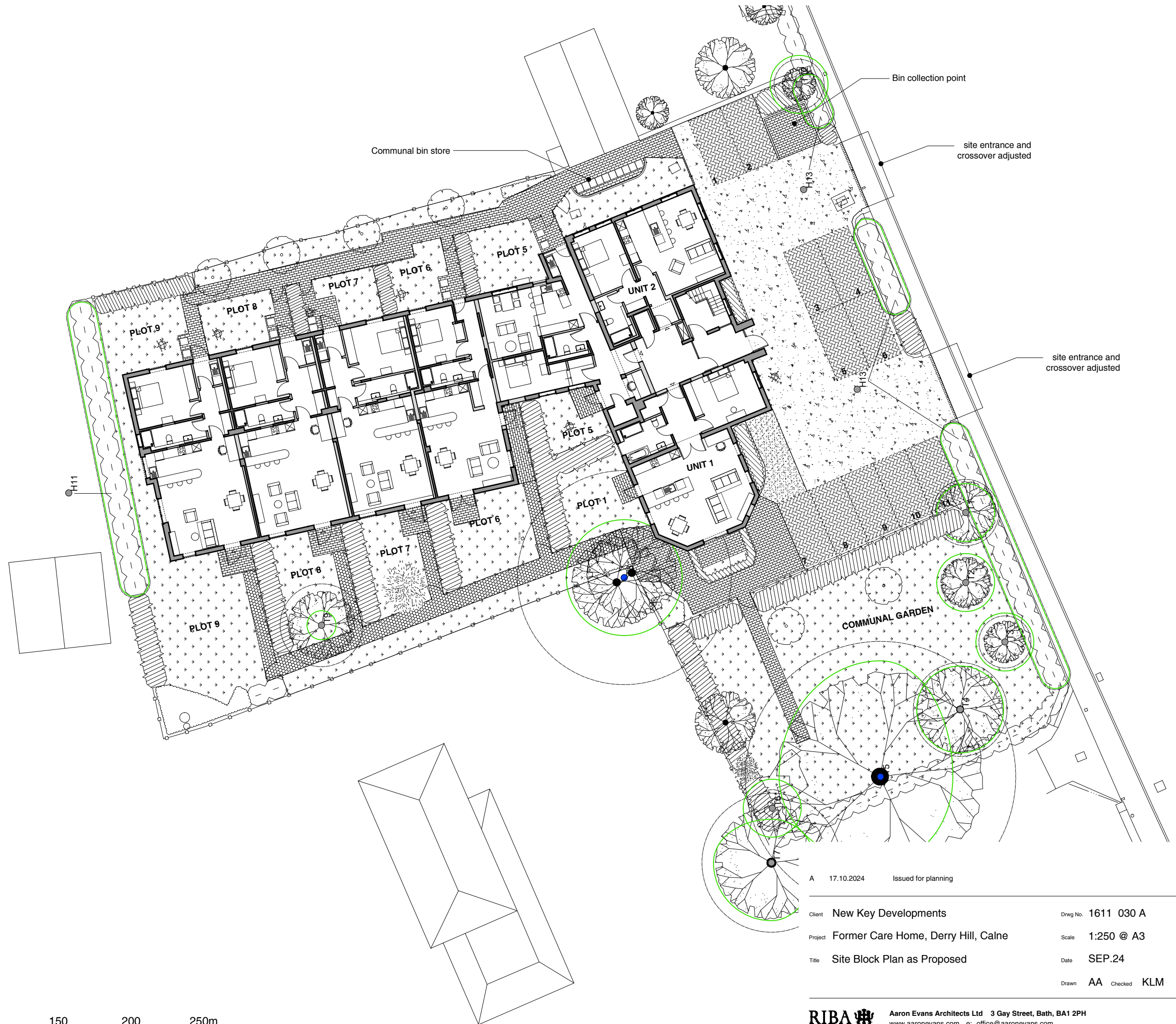
All dimensions are to be checked on site where applicable. This drawing must not be scaled, and only written dimensions should be respected.

Tree species and sizes on this drawing are not guaranteed, and if critical should be verified by an arboriculturist. Tree spreads are average about the bole, and heights are approximate at the time of the survey.



Appendix B Architect's Proposed Site Layout

Aaron Evans - 1611 030A



A 17.10.2024 Issued for planning

Client New Key Developments
Project Former Care Home, Derry Hill, Calne
Title Site Block Plan as Proposed

Drwg No. 1611 030 A
Scale 1:250 @ A3
Date SEP.24
Drawn AA Checked KLM

**AARON
EVANS**
ARCHITECTS

RIBA
Chartered Practice

Aaron Evans Architects Ltd 3 Gay Street, Bath, BA1 2PH
www.aaronevans.com e: office@aaronevans.com

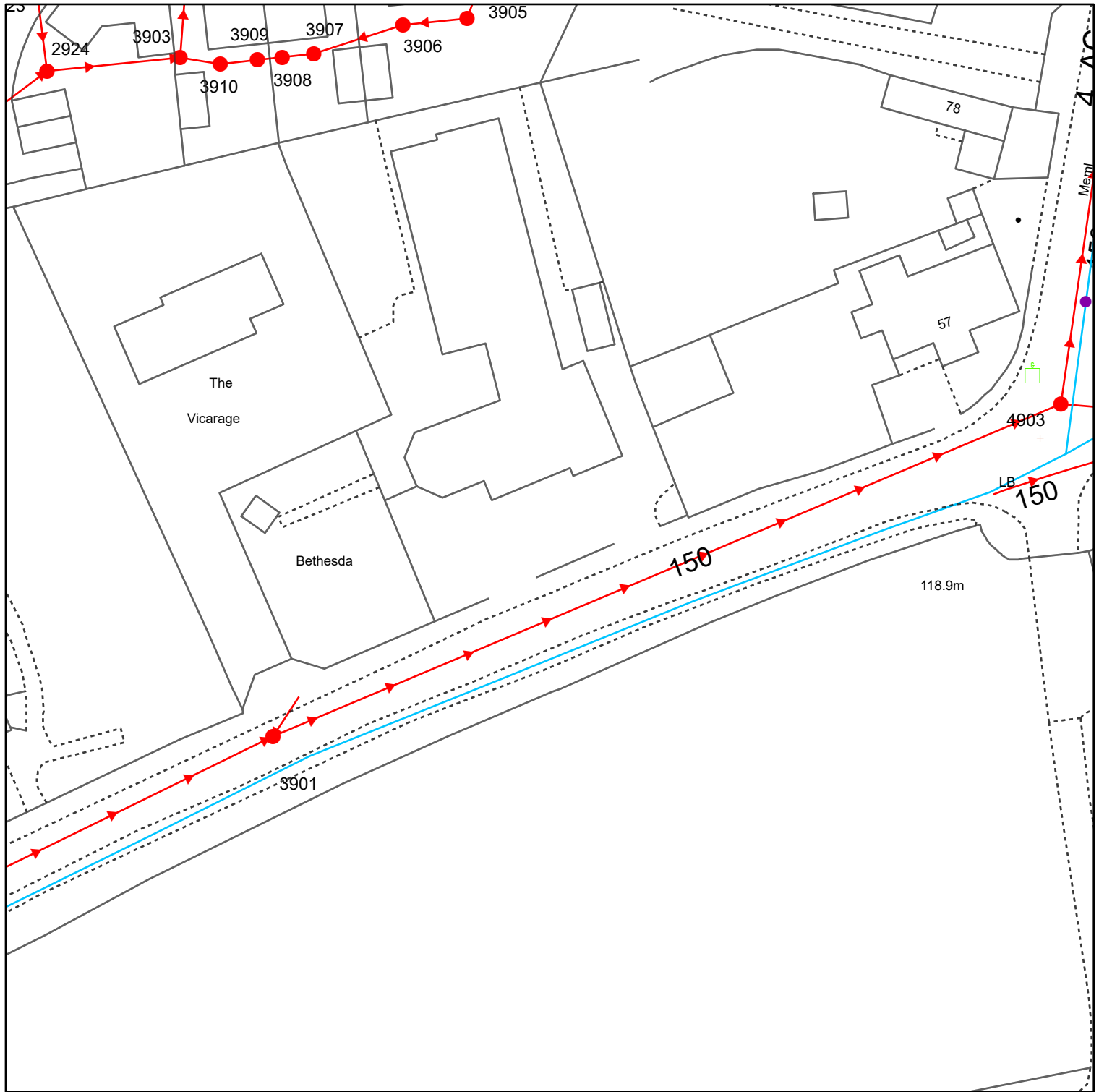
01225 466234

This drawing is copyright. Only figured dimensions to be used. Contractors not to scale from this drawing and must check all dimensions before proceeding.

Appendix C Sewer Asset Map

WWMap

Wessex Water Network Map

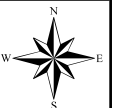


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WATER MAINS		SEWERS		STRATEGIC PUBLIC		PRIVATE		SECTION 104		OTHER WESSEX PIPES		NON-WESSEX / UNKNOWN	
	Distribution		Foul								Rising Mains		Private Rising Mains
	Washout		Surface								Standby Rising Mains		Culverted Watercourse
	Raw Water		Combined								Effluent Disposal		Highway Drain
	Abandoned		Abandoned								Overflow		Use Unknown
	Private										Syphon		Status Unknown
Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).													
Some styles of line and symbol are shown on the key in sample/typical colours.													
FITTINGS		STRUCTURES										OTHER STRUCTURES	
	Hydrant		Manhole - Foul		Pumping Station - Surface						Attenuation Tank		Chamber
	Other		Manhole - Surface		Pumping Stn - Foul/Combined						Storage Tank		Tunnel
			Manhole - Combined		Gully								Interceptor
			Inlet		Vent Column								
			Outfall		Rodding Eye								
			Lamphole		Catchpit								
			Bifurcation - Foul		Flushing Chamber								
			Bifurcation - Surface		Soakaway								
			Bifurcation - Combined		Non Return Valve								
			Combined Sewage Overflow		Air Valve								
					Hatch Box								
					Washout								

Information in this map is provided for identification purposes only. No warranty as to accuracy is given or implied. The precise route of pipe work may not exactly match that shown. Wessex Water does not accept liability for inaccuracies. Sewers and lateral drains adopted by Wessex Water under the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011 are to be plotted over time and may not yet be shown. In carrying out any works, you accept liability for the cost of any repairs to Wessex Water apparatus damaged as a result of your works. You are advised to commence excavations using hand tools only. Mechanical digging equipment should not be used until pipe work has been precisely located. If you are considering any form of building works and pipe work is shown within the boundary of your property or a property to be purchased (or very close by) a surveyor should plot its exact position prior to commencing works or purchase. If you are proposing to build over or near Wessex Water's apparatus you should contact the Developer Services Team, tel: 01225 526333 or e-mail: developer.enquiries@wessexwater.co.uk to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

Date: 08/07/2024
Centre: 396347E, 170924N
Scale: 1:625
(when printed at A4 size)



Appendix D Calculations

Project:	Date: 14/04/2026			
	Designed by: jneallong	Checked by:	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	Company Address:			



Catchment Area

Type : Catchment Area

Area (ha)	0.033
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.950
Winter Volumetric Runoff	0.950
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project:	Date: 14/04/2026			
	Designed by: jneallong	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Stormwater Controls Storm Phase: Phase				



Cellular Storage

Type : Cellular Storage

Dimensions

Exceedance Level (m)	119.760
Depth (m)	0.750
Base Level (m)	118.960
Number of Crates Long	1
Number of Crates Wide	1
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	8
Crate Width (m)	2
Crate Height (m)	0.75
Total Volume (m³)	11.450

Inlets

Inlet

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

Advanced

Base Infiltration Rate (m/hr)	0.32
Side Infiltration Rate (m/hr)	0.32
Safety Factor	2.0

Project:	Date: 14/04/2026		
	Designed by: jneallong	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		





FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 1 years: +0 %: 15 mins: Summer	0.03	5.7	2.590

Project:	Date: 14/04/2026		
	Designed by: jneallong	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		





FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 30 years: +0 %: 15 mins: Summer	0.03	14.1	6.350

Project:	Date: 14/04/2026		
	Designed by: jneallong	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		





FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Summer	0.03	25.7	11.562

Project:	Date: 14/04/2026		
	Designed by: jneallong	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		





FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 1 years: +0 %: 60 mins: Summer	119.095	119.095	0.135	0.135	3.4	2.046	0.000	4.296	0.0	0.000	82.131	OK

Project:	Date: 14/04/2026			
	Designed by: jneallong	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:			



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 30 years: +0 %: 60 mins: Winter	119.422	119.422	0.462	0.462	6.6	7.014	0.000	6.819	0.0	0.000	38.739	OK

Project:	Date: 14/04/2026			
	Designed by: jneallong	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:			

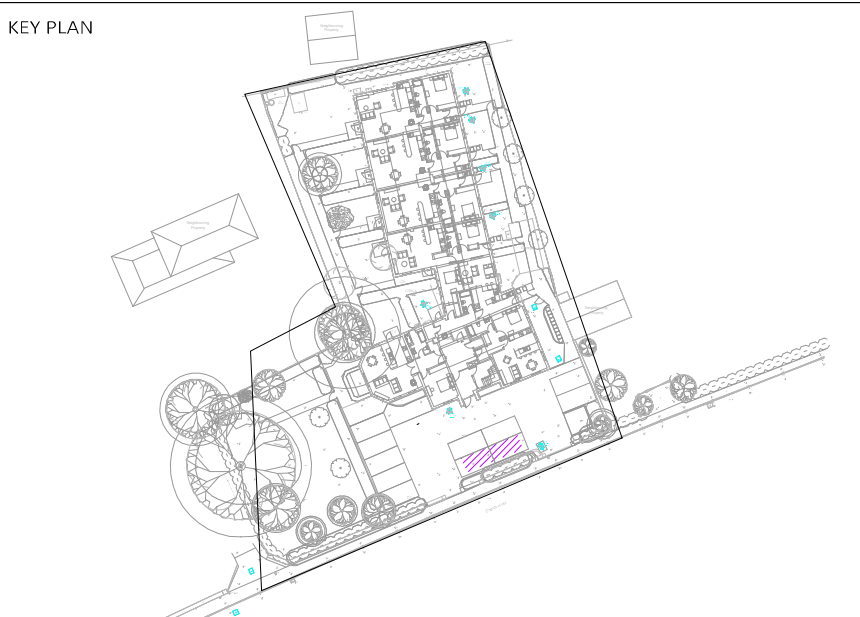


**FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By:
Max. Avg. Depth**

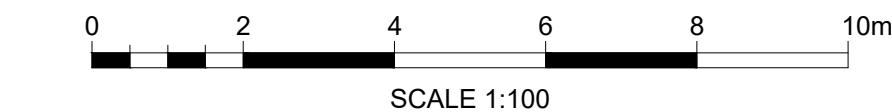
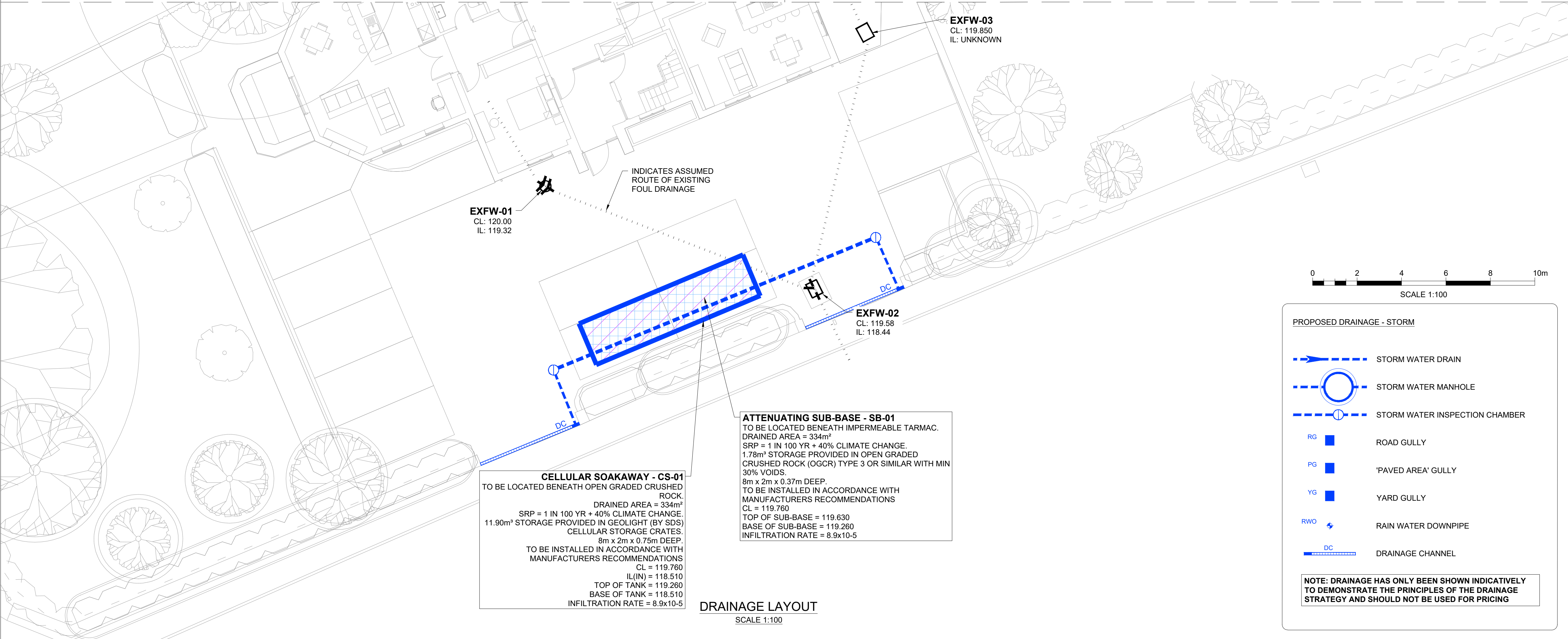
Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Cellular Storage	FSR: 100 years: +40 %: 120 mins: Winter	119.999	119.999	1.039	1.039	7.8	15.075	3.622	17.016	0.0	0.000	-31.660	Flood

Appendix E Proposed Drainage Strategy Layout

DHC-HYD-00-ZZ-DR-C-7000



- NOTES
- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
 - The DWG file is issued for the purposes of coordination only and do not represent formal drawing issue and are not to be reprinted in any form. Formal issue of drawings is via DWF, Adobe PDF files and/or hard copies and their associated information issue sheets.
 - Note that all care has been taken with the export of DWG files and their content, but we recommend that you make due dimensional checks before using any DWG file information. Any errors found are to be reported to Hydrock immediately.
 - All levels are shown in metres above Ordnance Datum (m AOD).
 - All private drainage to comply with current Building Regulations, BS EN-752 Drain and Sewer systems outside Buildings and other relevant British Standards and Codes of Practices.
 - Drainage pipework routes under building footprint will require Co-ordination with foundations.
 - Final foul pipe connection routes and manholes are subject to confirmation of above ground drainage design discharge points at ground level by others to allow final pipe sizes, configuration and connections.
 - Door threshold drainage channel requirements to be advised by others.
 - Surface water drainage RWP locations to be confirmed by Architect.
 - External levels shown on this drawing relating to the civils, drainage works etc are to be confirmed on receipt of final external levels drawing (by others).
 - Foul drainage shown indicative subject to detailed design.



PROPOSED DRAINAGE - STORM

STORM WATER DRAIN

STORM WATER MANHOLE

STORM WATER INSPECTION CHAMBER

RG ROAD GULLY

PG 'PAVED AREA' GULLY

YG YARD GULLY

RWO RAIN WATER DOWNPIPE

DC DRAINAGE CHANNEL

NOTE: DRAINAGE HAS ONLY BEEN SHOWN INDICATIVELY TO DEMONSTRATE THE PRINCIPLES OF THE DRAINAGE STRATEGY AND SHOULD NOT BE USED FOR PRICING

SCALE BAR ADDED					
P04	J.NEAL-LONG	08.05.26	J.MAGEE	08.05.26	
UPDATED STRATEGY TO SUIT COMMENTS					
P03	J.NEAL-LONG	23.04.26	J.MAGEE	23.04.26	
PERMEABLE PAVING EXTENTS ADDED. LATEST SITE PLAN ADDED.					
P02	B.MURPHY	17.10.24	J.MAGEE	17.10.24	
PRELIMINARY ISSUE					
P01	J.MAGEE	03.10.24	J.MAGEE	03.10.24	
REV					

Hydrock

CLIENT

NEW KEY DEVELOPMENTS

PROJECT

DERRY HILL

TITLE

DRAINAGE STRATEGY

HYDROCK PROJECT NO.	SCALE @ A1
C-XXXX-C	1:100
STATUS DESCRIPTION	STATUS
PLANNING	S2
DRAWING NO.	REVISION
DHC-HYD-00-ZZ-SK-C-7700	P04