



Drainage Strategy

Former Syntor Fine Chemicals,

Acornfield Road, Liverpool, L33 7UW

February 2025

Document Control Sheet

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1.0 Background

1.1 Brief

BDN Ltd. has been commissioned by Applied Nutrition to assess the drainage requirements of a brownfield site for a portal frame industrial storage unit and office premises with associated infrastructure. As a new development, Sustainable Drainage Systems (SuDS), surface and foul water drainage must be considered. This report gives an overview of the methodology used, summarises the options investigated and the drainage proposals for the development.

The Drainage Strategy will be used to support a detailed planning application. The site is centred around Ordnance Survey Grid Ref: SJ 43476 99416 with the nearest post code of L33 7UW.



Figure 1.1 Ordnance Survey Map – Site Location

1.2 Objectives

The Objectives of this strategy are as follows:

- To establish the existing drainage characteristics of the site.
- To assess the post development runoff from the site.
- To determine the suitability of SuDS to manage post development surface runoff.
- To assess the post development foul flows from the site.
- To determine a suitable discharge location for foul flows.

1.3 Background Information

The site location plan presented within Figure 1.1 in red, indicates the total extent of the site has an area of 1.456 hectares, which is to be redeveloped for the construction of a portal frame structure with associated hard landscaping. Access to the site is achieved from Acornfield Road, which is adjacent to the eastern boundary extents of the site.

2.0 Surface Water Drainage

2.1 Suds Methodology

The following methodology was used to produce a SuDS strategy for the site:

- Calculate pre-development/Brownfield runoff, using the method outlined in the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS).
- Calculate the required post development attenuation/storage required for the critical storm with a return period of 30 years in line with the National Planning Policy Framework (NPPF).
- Test the sensitivity of the site by investigating the volume of runoff produced during storms with a return period of 100 year plus 40% allowance for climate change in line with the NPPF.

Surface water attenuation is to be provided to ensure that surface water flows for up to a 30-year return period storm are attenuated below ground or within designated at surface features with no road/property/overland flooding. The proposed development must also test the sensitivity of the site for a 100-year return period storm with a 40% allowance for climate change to ensure that no flooding of properties or third part land occurs.

The potential methods of discharge in order of preference are:

- Discharge via infiltration.
- Discharge to watercourse.
- Discharge to surface water sewer.
- Discharge to combined sewer.

A site investigation has been completed for the site by Spire Geotechnical; the report can be summarised as follows:

Made ground was recorded in each position to depths of between 0.20m and 1.20m below ground level. Made ground generally includes concrete or gravel surfacing. In the west, the made ground included roadstone/aggregate locally overlying a thin clay fill. In the site centre, a placed stone backfill is present (part of previous remedial work in 2017).

The made ground overlies firm and stiff cohesive glacial till deposits. The till was initially soft in nature. The clay overlies solid geological deposits of sandstone at an approximate depth of 10m from surface. Localised areas of shallow trapped/perched groundwater were observed generally at the made ground and natural clay interface.

Based on the hierarchy of discharge of surface water, the preferred method of surface water disposal is by infiltration. However, based on the geological information above, discharge via infiltration is not considered viable due to the cohesive nature of the soil.

The Ordnance Survey and EA maps show that the site is situated within the catchment of an unnamed watercourse, approximately 250m to the northeast. Due to the significant expanse of third-party land between the site and the watercourses, they are not considered to be viable locations for discharge.

The existing building on-site is understood to use separate sewer systems, the proposals are therefore that the foul and surface water be connected to the existing sewers located within Acornfield Road.

Surface water flows will be restricted to a flow rate agreed with the Lead Local Flood Authority (LLFA) to ensure that there will be no additional flooding to the surrounding area due to the development. To ensure the water quality entering the water network does not have a detrimental impact to the environment, the design will look to incorporate source control features in compliance with the SuDS guidelines to delay the time of entry of flows to the network and provide a suitable level of treatment.

The level of treatment is required to be proportional to the level of risk. For the proposed site it is generally considered that the rooftop will require one level of treatment with the hardstanding areas requiring two levels of treatment.

2.2 Proposed Drainage

It is proposed to provide a surface water drainage system serving the roof and hard-standing areas for the development. The area of the proposed new development is 1.456ha, with an impermeable area of 1.282ha proposed to be positively drained.

The greenfield runoff rate for the area has been calculated using the IH124 Input Method (calculations carried out using MicroDrainage).

Region	QBAR (l/s)	Q (100 yrs) (l/s)	Q (1 yrs) (l/s)	Q (2 yrs) (l/s)	Q (5 yrs) (l/s)	Q (10 yrs) (l/s)	Q (20 yrs) (l/s)	Q (25 yrs) (l/s)	Q (30 yrs) (l/s)
ICP SUDS	115.5	279.4	90.1	102.0	142.0	172.0	202.0	212.0	220.1
Region 9	115.5	251.7	101.6	107.2	139.7	164.0	188.3	196.8	203.6
ADAS 345	115.5	240.2	100.5	107.5	137.4	159.3	181.5	189.4	195.8
FEH	115.5	212.5	98.1	110.8	138.6	155.9	173.4	179.0	183.5
ReFH2	115.5	219.4	98.1	110.8	139.7	159.3	177.7	183.6	188.2
Greenfield Volume	115.5	212.5	98.1	110.8	137.4	155.9	173.4	179.0	183.5
Greenfield Volume (ReFH2)	115.5	205.5	98.1	110.8	136.2	153.6	169.3	174.4	178.3
Ireland Greater Dublin	115.5	301.4	98.1	106.2	158.2	192.8	226.1	236.7	245.2

Figure 3.2 FSR Method Greenfield Runoff Calculations in MicroDrainage

Based on the total site area of 1.456ha the following greenfield runoff rates for the following return period events have been calculated:

QBar	3.363 l/s
1 in 1 year	2.297 l/s
1 in 30-year	5.702 l/s
1 in 100-year	6.995 l/s

For a new development, the surface water discharge for a previously undeveloped site would normally be expected to be restricted to the QBar, greenfield runoff rate. To achieve a restricted flow rate and maintain minimum orifice plate sizing in accordance with LLFA and best practice guidance, it is proposed to limit surface water discharge to 5l/s.

MicroDrainage has been used to estimate the surface water attenuation requirements for a 1 in 100-year return period event

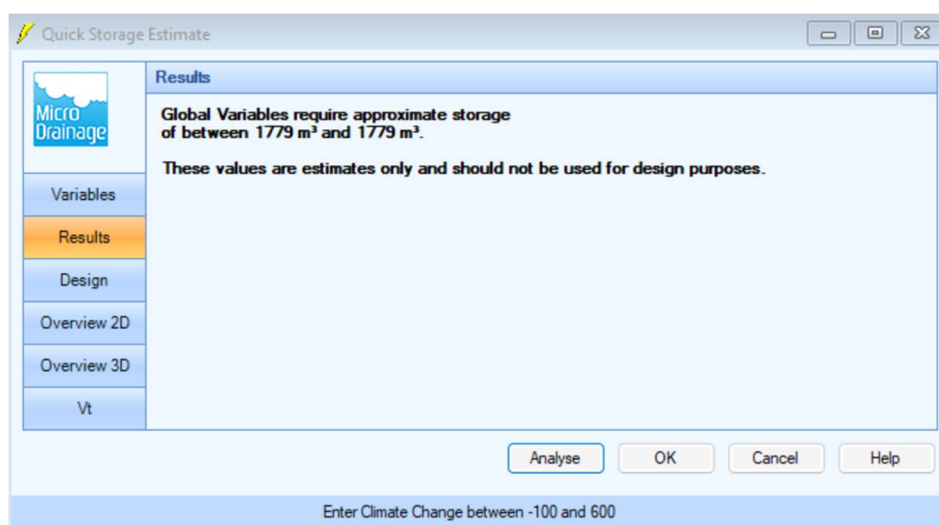


Figure 3.2.1 MicroDrainage attenuation estimate

MicroDrainage has been used to model the proposed surface water drainage and carry out a simulation for various return periods that for a 1 in 30-year return period event there is no exceedance of the network and for a 1 in 100 plus 40% for climate change (CC) surface water flows are directed away from buildings and retained on site. See Appendix A for proposed drainage layout and Appendix B for MicroDrainage calculations.

It is proposed to drain hardstanding areas of the site via linear drainage, filter drains and permeable paving. The levels and falls across the site will be designed to direct surface water away from buildings towards SuDS collection features.

It is important to note the need to remove silt from runoff prior to discharge into SuDS features. SuDS such as filter drains, and pervious pavements are sustainable alternatives to proprietary treatment systems otherwise required to manage silt.

During extreme storm events in excess of a 1 in 30-year return period event, exceedance flows will be retained within the detention basins. Once the peak of a storm subsides the flows will drain from the network and discharge at the restricted flow rate. This will ensure all buildings are protected from flooding and that any exceedance flows are managed within the site boundary.

2.3 SuDS Suitability Assessment

The NPPF states that SuDS should be incorporated in all new developments unless evidence of unsuitability is provided. Therefore, the following SuDS components have been considered for the site:

SuDS Component	Description	Site Suitability	Comments
Rainwater Harvesting	Systems that collect runoff from the roof of a building or other paved surface for use.	✓	Rainwater harvesting could be used to irrigate areas of soft landscaping

Green Roof	Planted soil layers on the roof of buildings that slow and store runoff.	✗	Roof layout unsuitable
Soakaway	Systems that collect and store runoff, allowing it to infiltrate into the ground.	✗	Ground conditions are considered to be unsuitable.
Permeable Pavement	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/ or allowed to infiltrate into the ground below.	✓	Permeable paving used in car parking areas.
Filter Drain	Trench lined with a geotextile and filled with gravel into which runoff water is led, either directly from the drained surface or via a filter strip	✓	Filter drains have been proposed to the length of the access road.
Infiltration Trench	Systems that collect and store runoff, allowing it to infiltrate to the ground.	✗	Ground conditions are considered to be unsuitable.
Swale	Vegetated channels (sometimes planted) used to convey and treat runoff.	✗	Site layout is unsuitable for the use of a Swale.
Bio-retention Area	Shallow landscaped depressions that allow runoff to pond temporarily on the surface. Before filtering through vegetation and underlying soils.	✗	The proposed site layout is unsuitable for the use of a bio-retention area.
Infiltration Basin	Vegetated depressions that store and treat runoff, allowing it to infiltrate into the ground.	✗	Ground conditions are unsuitable for the use of an infiltration basin.
Detention Basin	Vegetated depressions that store and treat runoff.	✗	Site layout is considered unsuitable for the use of a detention basin.
Pond	Permanent pools of water used to facilitate treatment of can also be stored in attenuation zone above pool.	✗	Site layout is considered unsuitable.
Stormwater Wetlands	Permanent pools of water used to facilitate treatment of runoff can also be stored in attenuation zone above pool.	✗	Size of development unsuitable for stormwater wetlands to be used.
Proprietary Device	Subsurface structures designed to provide treatment of runoff.	✓	Full retention separator proposed.

SuD features considered acceptable will be implemented where possible on the project to accommodate run-off. In addition to the SuDs features, all positively drained surface water from the development will pass through a retention separator before being attenuated within the rainwater harvesting tank to be used later during the concrete making process.

2.4 Water Quality Management

The LLFA and LASOO stipulate that water quality should be considered as part of a major application. Where water contaminants are being washed into the drainage network offsite the total pollutant load to the receiving surface water body is potentially high. By applying the simple index approach stated in Ciria C753 the potential hazard indices for the proposed development are shown below:

Site Hazard Indices						Proposed Mitigation Measure
Land Use	Area (ha)	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons	
Commercial Roof	0.729	Very Low	0.3	0.2	0.05	Proprietary Device
Car Parking	0.179	Low	0.5	0.4	0.4	Permeable Paving
Access Road	0.199	Medium	0.7	0.6	0.7	Filter Drain
Service Yard	0.175	Medium	0.7	0.6	0.7	Retention Separation

To achieve adequate treatment of the surface water before it is attenuated it will be necessary to use two proprietary treatment devices as one alone cannot remove the required levels of metals.

Type of SUDS Feature	Mitigation Indices		
	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
Filter Drain	0.4	0.4	0.4
Retention Separator	0.8	0.6	0.9

By comparing the combined SUDS mitigation indices for the proposed SUDS components to the potential hazard indices for this development it is shown that water quality has been considered and mitigated for in accordance with CIRIA C753.

2.5 Source Control

A requirement of the LLFA is to retain the first 5mm of rainfall on site of all rainfall events. This level of source control can be met through a number of measures such as rainwater harvesting, permeable paving etc. or evapotranspiration.

It is required that 2 SUDS components would be needed prior to infiltration as this development is of medium risk regarding ground water pollution. It is assessed full infiltration is not possible requiring the drainage system to be wrapped.

Interception Mechanism	Base area of surface receiving run off (m ²)	% against total imp. site area (12,820m ²)
Filter Drain	90	0.71
Permeable Paving	836	6.52

The interception provided in the proposed SuDs features accounts for approx. 7% of the overall amount of interception required.

$$1.282\text{ha} \times 5\text{mm (rainfall)} = 64.1\text{m}^3 \text{ storage volume required}$$

A minimum of 250mm of aggregate will be provided below the permeable paving and filter drain outlet pipework to provide the source control storage required to retain the first 5mm of rainfall.

$$926\text{m}^2 \times 0.250\text{m} = 231.5\text{m}^3 \text{ Storage (not incl. void ratio)}$$

$$231.5\text{m}^3 \times 0.3 \text{ (assuming 30\% void ration)} = 69.45\text{m}^3 \text{ Storage Provided}$$

2.6 Exceedance Events

Overland flows resulting from exceedance events are expected to be retained within the developed site, without posing any increased flood risk on site or elsewhere.

2.7 Maintenance Issues

The sewer network within the development site is to be private and is not proposed to be offered for adoption to UU. The sewer network for the site should be designed to operate at a level required by current best practice as defined within Sewers for Adoption 7th Edition.

The surface water pipes are designed with a minimum velocity of 1m/s at pipe full flow and with a roughness of 0.6mm. The pipe should provide enough capacity to convey all the surface runoff flows to attenuation and treatment facilities.

A private inspection and maintenance agreement will be required for the onsite drainage, to be conducted in accordance with the maintenance schedules identified in Appendix C.

Regular SUDS scheme inspections will:

Help determine future maintenance activities.

Confirm hydraulic, water quality, amenity, and ecological performance.

Allow identification of potential system failures, e.g. blockage, poor infiltration, poor water quality etc.

During the first year of operation, inspections should ideally be conducted after every significant storm event to ensure proper functioning.

2.8 Safety Issues

Surface water pipework and manholes will be designed in accordance with Sewers for Adoption 7th Edition along with the appropriate building regulations so as to ensure suitable access for maintenance and operation as required.

2.9 Drainage During Construction

Drainage is typically an early activity in the construction of a development, taking form during the earthworks phase. However, the connection of piped drainage system to SuDS components should not take place until the end of construction works, unless a robust strategy for silt removal prior to occupation of the site is implemented.

Silt-laden runoff from construction sites represents a common form of waterborne pollution and cannot enter SuDS components not specifically designed to manage this, as it can overwhelm the system and pollute receiving water features. Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to SuDS components.

The three principal aspects of drainage during construction are conveying runoff, controlling runoff and trapping sediments:

- Conveyance of runoff can be achieved through small ditches / swales, channels and drains. Runoff control measures should be implemented to ensure that runoff does not overwhelm the temporary drainage system causing flooding on site or elsewhere.
- Control of runoff can be achieved through perimeter ditches or appropriate grading to ensure that any runoff from the construction site stays on site. Runoff rates leaving the site should be managed so they do not exceed pre-development conditions.
- Construction runoff should be directed to dedicated infiltration basins with adequate upstream sediment and pollution control such as sediment basins, silt fences and straw bales prior to infiltration or off-site discharge.

The image below shows overland flows based on the existing topographical surface. Flood Flows leave site at the locations highlighted below up to a maximum depth of 240mm. To mitigate this risk during construction, 275mm high bunds will be constructed within the west yard area along the southern boundary of the site perimeter to prevent flood water leaving the site with a standby pump available including a sediment sock.

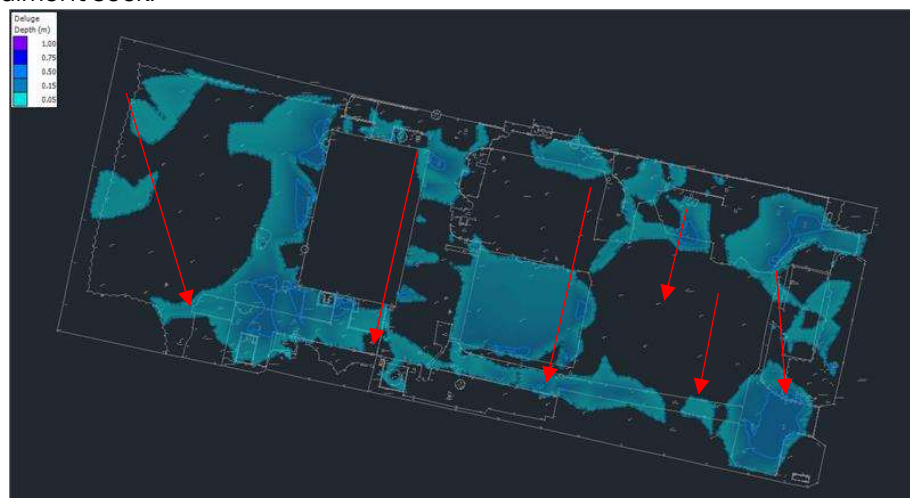


Figure 2.8 MicroDrainage Overland Flow Plan

Additional conveyance, control and treatment measures should be installed as needed during grading. Slope stability needs to be considered when using open water features to convey, control and treat runoff across the site. Any necessary surface stabilisation measures should be applied immediately on all disturbed areas where construction work is either delayed or incomplete.

Maintenance inspections should be performed weekly, and maintenance repairs should be made immediately after periods of rainfall.

All drainage infrastructure (namely underground features) must be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers and storing construction materials away from the drainage infrastructure.

2.10 Overland Flows

Overland flow from the site has been identified in the Flood Risk Assessment. To mitigate the impact of this surface flow, measures will be taken to direct the water away from the existing buildings.

Site grading and proposed drainage will ensure that the proposed building and landscaping will not be affected by any overland surface flow. The measures are designed to re-direct the existing flow of the water into proposed permeable paving and filter drains.

2.11 Drainage Impact Assessment Summary

Based on the investigation carried out to date, the drainage impact assessment can be summarised For the following:

- Flows from the hard-standing areas conveyed via gravity.
- All flows will be conveyed by the drainage network and will not infiltrate into the ground.
- A flow control device will restrict overall flows to 5l/s to the existing surface water sewer within Acornfield Road.
- Peak flows in excess of discharge rates during storms up to 1 in 100 years, plus 40% for climate change, will be attenuated on site to ensure there is no flooding of buildings or flooding off site.
- Exceedance flows will be attenuated within areas of hard landscaping.

3.0 Foul Water Drainage

3.1 Proposed Drainage

It is proposed to provide a foul water drainage system serving foul water from appliances within the proposed officed. Foul flows will be discharged to a new foul system located within the development which will in turn discharge to the existing United Utilities foul water sewer within Acornfield Road.

It is not anticipated that there will be any trade effluent requirements from the site.

3.2 Maintenance Issues

The sewer network within the development plots is to be private and is not proposed to be offered for adoption to UU. The sewer network for the site should be designed to operate at a level required by current best practice as defined within Sewers for Adoption 7th Edition.

The foul pipes should be designed to provide a self-cleansing regime with a minimum flow velocity of 0.75m/s at one-third design flow. Gradients should be restricted to no steeper than 1:10 to comply with safety standards.

3.3 Safety Issues

Foul water pipework and manholes will be designed in accordance with Sewers for Adoption 7th Edition along with the appropriate building regulations to ensure suitable access for maintenance and operation as required.

3.0 Conclusion

The drainage strategy has been produced for the proposed development at Acornfield Road, Liverpool. This report has been produced to present the drainage proposals for the development and document the underlying analysis, as required by the local authority planning process. The drainage strategy has been produced in accordance with the applicable regulatory framework and relevant best practice guidance, as set out within the report.

Ground conditions at the site are not considered to be permeable, making infiltration drainage unfeasible at the development. The nearest watercourses to the site are not considered to be feasible for the discharge of surface water run-off due to site constraints and the distance across third party land. The proposals for the drainage will therefore be to redirect all surface water to the existing United Utilities drainage off site.

In accordance with Knowsley Councils requirements the greenfield runoff rate of the site must be used. It is therefore proposed that surface water discharge will be restricted using a flow control to 5l/s in accordance with best practice guidelines. Surface water flows in exceedance of the discharge rate will be attenuated on site through the use of underground storage.

Foul drainage from the proposed development is to be discharged to the existing UU foul sewers surrounding the site.

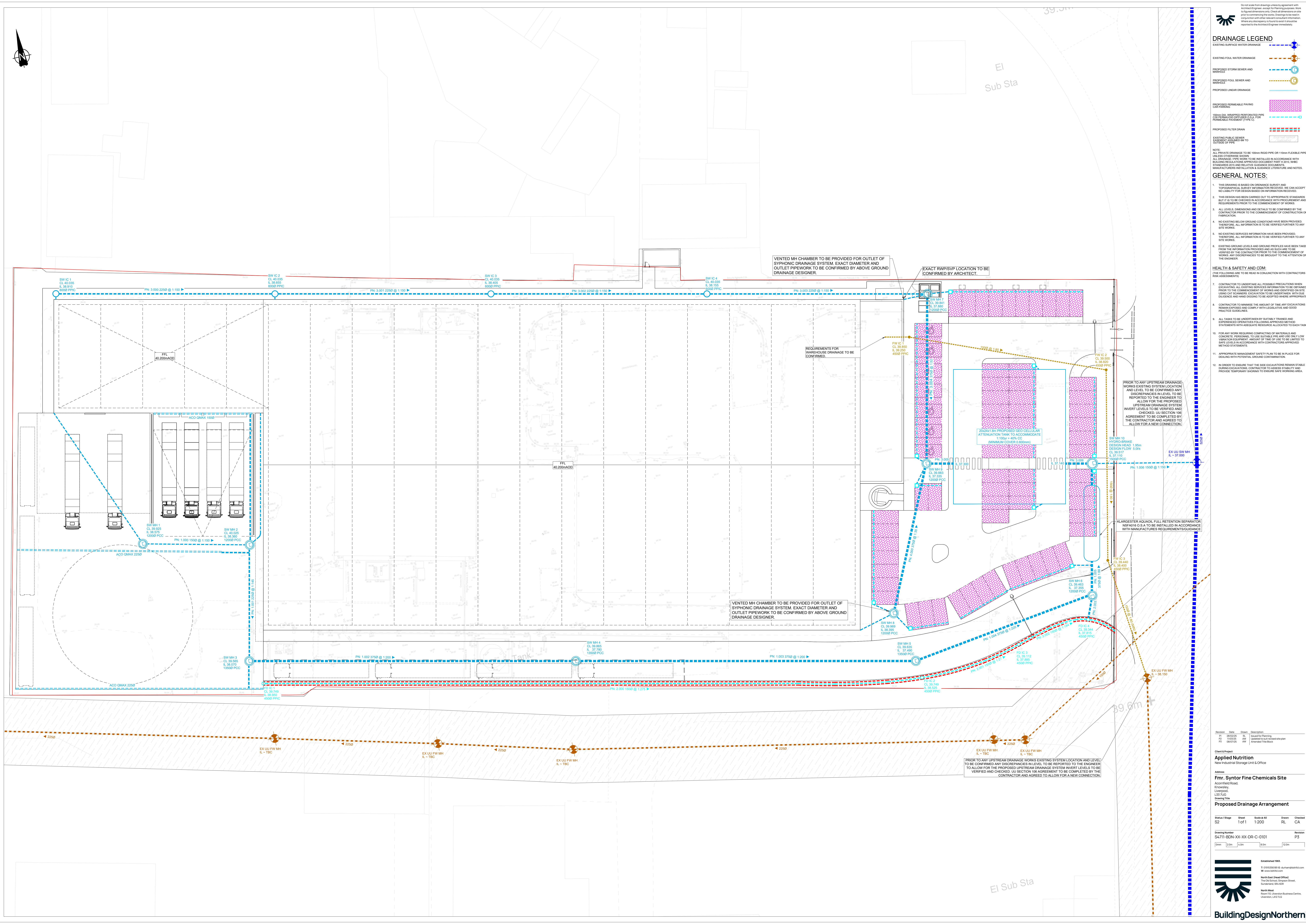
A pre-development enquiry has been submitted to UU which has approved the proposals.

4.0 Design Standards

The following methodology was used to produce a SUDS strategy:

- BS EN 725:2008 – Drain and sewer systems outside buildings.
- SuDs Manual (CIRIA C753) 2015
- Building Regulations Approved Document Part H 2010 (With 2015 Amendments) Drainage and waste disposal.
- National Building Specification
- GPP 3 – Use and design of oil separators in surface water drainage systems.
- Civil Engineering Specification for the Water Industry (8th Edition)
- Design and Construction Guidance for foul and surface water sewers (2021)
- BRE Digest 365

Appendix A – Proposed Drainage Arrangement



1. THIS GRAPHICAL BASED ON ORDNANCE SURVEY AND TOPOGRAPHICAL SURVEY INFORMATION RECEIVED. WE CAN ACCEPT NO LIABILITY FOR DESIGN BASED ON INFORMATION RECEIVED.
2. THIS DESIGN HAS BEEN CARRIED OUT TO APPROPRIATE STANDARDS BUT IT HAS BEEN RECEIVED IN ACCORDANCE WITH PROCEEDURE AND REQUIREMENTS PRIOR TO THE COMMENCEMENT OF WORKS.
3. ALL LEVELS, DIMENSIONS AND DETAILS TO BE CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF FABRICATION.
4. NO EXISTING BELOW GROUND CONDITIONS HAVE BEEN PROVIDED. THEREFORE, ALL INFORMATION IS TO BE VERIFIED FURTHER BY ANY SITE WORKS.
5. NO EXISTING SERVICES INFORMATION HAVE BEEN PROVIDED. THEREFORE, ALL INFORMATION IS TO BE VERIFIED FURTHER BY ANY SITE WORK.
6. EXISTING GROUND LEVELS AND GROUND PROFILES HAVE BEEN TAKEN FROM THE INFORMATION PROVIDED AND AS SUCH ARE TO BE CONSIDERED AS CORRECT. ANY DISCREPANCIES TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER.

(THE FOLLOWING ARE TO BE READ IN CONJUNCTION WITH CONTRACTOR'S RISK ASSESSMENTS)

- CONTRACTOR TO UNDERTAKE ALL POSSIBLE PRECAUTIONS WHEN EXCAVATING. ALL EXISTING SERVICES INFORMATION TO BE OBTAINED FROM THE LOCAL AUTHORITY AND TO BE SHOWN ON THE EXCAVATION SCHEDULE. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY.
8. CONTRACTOR TO MINIMIZE THE AMOUNT OF TIME ANY EXCAVATION IS OPEN TO THE PUBLIC AND TO COMPLY WITH LEGISLATIVE AND GOOD PRACTICE GUIDELINES.
9. ALL TASKS TO BE UNDERTAKEN BY SUITABLY TRAINED AND EXPERIENCED OPERATIVES FOLLOWING APPROVED METHOD STATEMENTS WITH ADEQUATE RESOURCES ALLOCATED TO EACH TASK.
10. FOR ANY WORK REQUIRING RESCUE OF MATERIALS AND/OR EQUIPMENT, CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY.
11. APPROPRIATE MANAGEMENT SAFETY PLAN TO BE IN PLACE FOR DEALING WITH POTENTIAL DANGER CONTAMINATION.
12. IN ORDER TO ENSURE THAT THE SITE EXCAVATIONS REMAIN STABLE DURING EXCAVATIONS, CONTRACTOR TO ASSESS STABILITY AND TO UNDERTAKE NECESSARY PRECAUTIONS TO MAINTAIN STABILITY OF EXCAVATIONS. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY. CONTRACTOR TO BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND FOR OBTAINING ANY OF THE NECESSARY INFORMATION FROM THE LOCAL AUTHORITY.

Fmr. Syntor Fine Chemicals Site

Status / Stage	Sheet	Scale @ A0	Drawn	Checked
S2	1 of 1	1:200	RL	CA

Drawing Number	Revision
S4711-BDN-XX-XX-DR-C-0101	P3

0m 2.0m 4.0m 6.0m 8.0m



Appendix B – Proposed Drainage Calculations

BDN Ltd		Page 2
The Old School Simpson Street Sunderland SR4 6DR	Applied Nutritition Acornfield Road Knowsley	
Date 28/02/2025 08:26 File S4711-BDN-XX-XX-CA-C-0001...	Designed by C Agar Checked by A Webb	
Innovyze	Network 2020.1.3	

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)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
3.000	39.113	0.195	200.5	0.035	5.00	0.0	0.600		o	225	Pipe/Conduit	
3.001	39.006	0.195	200.0	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
3.002	38.925	0.195	199.6	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
3.003	39.015	0.195	200.1	0.000	0.00	0.0	0.600		o	225	Pipe/Conduit	
3.004	30.416	0.640	47.5	0.340	0.00	0.0	0.600		o	375	Pipe/Conduit	
4.000	30.371	1.060	28.7	0.314	5.00	0.0	0.600		o	375	Pipe/Conduit	
3.005	14.305	0.075	190.7	0.146	0.00	0.0	0.600		o	375	Pipe/Conduit	
3.006	14.305	0.075	190.7	0.000	0.00	0.0	0.600		o	375	Pipe/Conduit	
1.006	16.319	0.110	148.4	0.059	0.00	0.0	0.600		o	150	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)
3.000	50.00	5.71	38.910	0.035	0.0	0.0	0.0	0.92	36.6	4.8
3.001	50.00	6.41	38.715	0.035	0.0	0.0	0.0	0.92	36.6	4.8
3.002	50.00	7.12	38.520	0.035	0.0	0.0	0.0	0.92	36.7	4.8
3.003	50.00	7.82	38.325	0.035	0.0	0.0	0.0	0.92	36.6	4.8
3.004	50.00	8.02	37.975	0.375	0.0	0.0	0.0	2.63	290.9	50.8
4.000	50.00	5.15	38.395	0.314	0.0	0.0	0.0	3.40	375.1	42.5
3.005	50.00	8.20	37.335	0.835	0.0	0.0	0.0	1.31	144.5	113.1
3.006	50.00	8.38	37.260	0.835	0.0	0.0	0.0	1.31	144.5	113.1
1.006	50.00	21.86	37.110	1.282	0.0	0.0	0.0	0.82	14.5«	173.6

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: MH 10, DS/PN: 1.006, Volume (m³): 8.1

Unit Reference	MD-SHE-0092-5000-1950-5000
Design Head (m)	1.950
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	92
Invert Level (m)	37.110
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.950	5.0	Kick-Flo®	0.821	3.4
Flush-Flo™	0.403	4.2	Mean Flow over Head Range	-	4.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.9	1.200	4.0	3.000	6.1	7.000	9.1
0.200	3.9	1.400	4.3	3.500	6.6	7.500	9.4
0.300	4.1	1.600	4.6	4.000	7.0	8.000	9.7
0.400	4.2	1.800	4.8	4.500	7.4	8.500	10.0
0.500	4.1	2.000	5.1	5.000	7.8	9.000	10.3
0.600	4.0	2.200	5.3	5.500	8.1	9.500	10.6
0.800	3.5	2.400	5.5	6.000	8.5		
1.000	3.7	2.600	5.7	6.500	8.8		

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Storage Structures for Storm

Filter Drain Pipe: 2.000

Manning's N	0.075	Trench Length (m)	106.0
Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	249.5
Invert Level (m)	38.950	Cap Volume Depth (m)	0.000
Trench Width (m)	0.6	Cap Infiltration Depth (m)	0.000

Filter Drain Pipe: 2.001

Manning's N	0.075	Trench Length (m)	25.5
Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	39.8
Invert Level (m)	38.525	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000

Filter Drain Pipe: 2.002

Manning's N	0.075	Trench Length (m)	17.2
Infiltration Coefficient Base (m/hr)	0.00000	Pipe Diameter (m)	0.225
Infiltration Coefficient Side (m/hr)	0.00000	Pipe Depth above Invert (m)	0.000
Safety Factor	2.0	Number of Pipes	1
Porosity	0.30	Slope (1:X)	245.1
Invert Level (m)	37.885	Cap Volume Depth (m)	0.000
Trench Width (m)	1.0	Cap Infiltration Depth (m)	0.000

Porous Car Park Manhole: MH 7, DS/PN: 3.004

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	53.0
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	70.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	39.410	Membrane Depth (mm)	130

Porous Car Park Manhole: MH 8, DS/PN: 4.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	24.0
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	32.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	39.540	Membrane Depth (mm)	130

Cellular Storage Manhole: ATT, DS/PN: 3.006

Invert Level (m)	37.260	Infiltration Coefficient Side (m/hr)	0.00000
Infiltration Coefficient Base (m/hr)	0.00000	Safety Factor	2.0

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Cellular Storage Manhole: ATT, DS/PN: 3.006

Porosity 0.95

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	480.0	0.0	1.300	480.0	0.0
0.100	480.0	0.0	1.400	480.0	0.0
0.200	480.0	0.0	1.500	480.0	0.0
0.300	480.0	0.0	1.600	480.0	0.0
0.400	480.0	0.0	1.700	480.0	0.0
0.500	480.0	0.0	1.800	480.0	0.0
0.600	480.0	0.0	1.900	0.0	0.0
0.700	480.0	0.0	2.000	0.0	0.0
0.800	480.0	0.0	2.100	0.0	0.0
0.900	480.0	0.0	2.200	0.0	0.0
1.000	480.0	0.0	2.300	0.0	0.0
1.100	480.0	0.0	2.400	0.0	0.0
1.200	480.0	0.0	2.500	0.0	0.0

Porous Car Park Manhole: MH 10, DS/PN: 1.006

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	49.2
Membrane Percolation (mm/hr)	1000	Length (m)	9.6
Max Percolation (l/s)	131.2	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	39.085	Membrane Depth (mm)	130

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

PN	US/MH Name	Surcharged Flooded		Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	MH 1	-0.100	0.000	0.24		3.3	OK	
1.001	MH 2	-0.163	0.000	0.17		6.5	OK	
1.002	MH 3	-0.236	0.000	0.29		37.6	OK	
1.003	MH 4	-0.239	0.000	0.28		36.5	OK	
1.004	MH 5	-0.122	0.000	0.26		28.9	OK	
2.000	FD IC1	-0.640	0.000	0.15	8	3.4	OK	
2.001	FD IC 2	-1.129	0.000	0.05	12	8.3	OK	
2.002	FD IC 3	-0.675	0.000	0.09		6.2	OK	
2.003	FD IC 3	-0.224	0.000	0.15		7.1	OK	
1.005	MH 6	-0.015	0.000	0.23		26.9	OK	
3.000	IC 1	-0.161	0.000	0.17		6.0	OK	
3.001	IC 2	-0.163	0.000	0.17		5.9	OK	
3.002	IC 3	-0.163	0.000	0.16		5.7	OK	
3.003	IC 4	-0.164	0.000	0.16		5.7	OK	
3.004	MH 7	-0.259	0.000	0.21	8	53.6	OK	
4.000	MH 8	-0.273	0.000	0.16	6	54.6	OK	
3.005	MH 9	0.030	0.000	1.23		132.1	SURCHARGED	
3.006	ATT	0.047	0.000	0.04	441	4.0	SURCHARGED	
1.006	MH 10	0.421	0.000	0.31	473	4.2	SURCHARGED	

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)						
1.000	MH 1	-0.078	0.000	0.46			6.3	OK	
1.001	MH 2	-0.132	0.000	0.35			13.5	OK	
1.002	MH 3	-0.146	0.000	0.65			85.8	OK	
1.003	MH 4	0.029	0.000	0.05			7.2	SURCHARGED	
1.004	MH 5	0.319	0.000	0.06			7.2	SURCHARGED	
2.000	FD IC1	-0.510	0.000	0.27		8	6.1	OK	
2.001	FD IC 2	-1.059	0.000	0.10		12	16.6	OK	
2.002	FD IC 3	-0.605	0.000	0.26			17.7	OK	
2.003	FD IC 3	-0.164	0.000	0.42			20.5	OK	
1.005	MH 6	0.454	0.000	0.09			10.7	SURCHARGED	
3.000	IC 1	-0.134	0.000	0.33			11.4	OK	
3.001	IC 2	-0.136	0.000	0.32			11.1	OK	
3.002	IC 3	-0.138	0.000	0.31			10.8	OK	
3.003	IC 4	-0.139	0.000	0.31			10.8	OK	
3.004	MH 7	-0.087	0.000	0.46		3	119.5	OK	
4.000	MH 8	-0.231	0.000	0.31		6	103.8	OK	
3.005	MH 9	0.475	0.000	0.21			23.0	SURCHARGED	
3.006	ATT	0.549	0.000	0.03			3.6	SURCHARGED	
1.006	MH 10	0.923	0.000	0.31			4.2	SURCHARGED	

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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 1 Number of Storage Structures 7 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.382
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.700	Cv (Winter)	0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 2, 30, 100
 Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	MH 1	960 Winter	100	+40%	100/15 Winter				39.101
1.001	MH 2	960 Winter	100	+40%	100/15 Summer				39.101
1.002	MH 3	960 Winter	100	+40%	100/15 Summer				39.100
1.003	MH 4	960 Winter	100	+40%	30/480 Winter				39.099
1.004	MH 5	960 Winter	100	+40%	30/15 Summer				39.099
2.000	FD IC1	15 Winter	100	+40%					39.542
2.001	FD IC 2	960 Winter	100	+40%					39.099
2.002	FD IC 3	960 Winter	100	+40%					39.099
2.003	FD IC 3	960 Winter	100	+40%	100/180 Winter				39.098
1.005	MH 6	960 Winter	100	+40%	30/15 Summer				39.098
3.000	IC 1	15 Winter	100	+40%	100/15 Summer				39.445
3.001	IC 2	15 Winter	100	+40%	100/15 Summer				39.386
3.002	IC 3	15 Winter	100	+40%	100/15 Summer				39.330
3.003	IC 4	15 Winter	100	+40%	100/15 Summer				39.296
3.004	MH 7	15 Winter	100	+40%	100/15 Summer				39.314
4.000	MH 8	15 Winter	100	+40%	100/15 Summer				39.256
3.005	MH 9	960 Winter	100	+40%	2/15 Summer				39.101
3.006	ATT	960 Winter	100	+40%	2/180 Winter				39.099
1.006	MH 10	960 Winter	100	+40%	2/15 Summer				39.097

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

PN	US/MH Name	Surcharged		Flooded		Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow	Volume						
1.000	MH 1	0.376	0.000	0.06					0.8	SURCHARGED	
1.001	MH 2	0.516	0.000	0.04					1.6	SURCHARGED	
1.002	MH 3	0.655	0.000	0.08					10.1	SURCHARGED	
1.003	MH 4	0.944	0.000	0.07					9.4	SURCHARGED	
1.004	MH 5	1.234	0.000	0.08					9.2	SURCHARGED	
2.000	FD IC1	-0.207	0.000	0.44				9	9.8	FLOOD RISK	
2.001	FD IC 2	-0.650	0.000	0.02				361	3.7	OK	
2.002	FD IC 3	-0.013	0.000	0.07				911	4.6	FLOOD RISK	
2.003	FD IC 3	0.443	0.000	0.11					5.2	FLOOD RISK	
1.005	MH 6	1.368	0.000	0.12					13.9	SURCHARGED	
3.000	IC 1	0.310	0.000	0.57					19.9	SURCHARGED	
3.001	IC 2	0.446	0.000	0.72					25.2	SURCHARGED	
3.002	IC 3	0.585	0.000	0.87					30.2	SURCHARGED	
3.003	IC 4	0.746	0.000	1.03					35.8	SURCHARGED	
3.004	MH 7	0.964	0.000	0.74				6	189.3	SURCHARGED	
4.000	MH 8	0.486	0.000	0.54				3	178.2	SURCHARGED	
3.005	MH 9	1.391	0.000	0.31					33.1	SURCHARGED	
3.006	ATT	1.464	0.000	0.05					4.9	SURCHARGED	
1.006	MH 10	1.837	0.000	0.37					5.0	SURCHARGED	

Appendix C – Typical Maintenance Schedule

Drainage Maintenance Schedule

Maintenance of all drainage features not adopted by the local water authority will be the responsibility of the landowner or site operator and will need to be carried out by a competent contractor.

As required by CDM 2015 designs have been produced to ensure that all maintenance risks have been identified, eliminated, reduced and/ or controlled where appropriate.

Any manufacturer specific maintenance requirements are to be included as part of the site health and safety file.

Sewerage Maintenance Schedule

Drainage maintenance schedule covers collection gully's, pipework, and chambers.

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Removal of blockages to surface collection features and removal of silt from catch pits.	Annually, after autumn leaf fall or based on as required based on site specific observations.
Monitoring	Initial inspection.	Monthly for three months after installation.
	Inspect attenuation crates and flow control device – if required take remedial action.	Six-monthly.
	Inspect all drainage features.	Annually.
Remedial Actions	Cleansing of drainage features via rodding of jetting.	As required.

Full Retention Separator Maintenance Schedule

A log should be maintained detailing the depth of oil, depth of sediment, inspection dates, replacement parts, repairs and any cleaning undertaken. This log should be made available to the authorities upon request. As this is a proprietary system, the maintenance guidance will be provided within the manufacturers' documentation.

Once a separator has reached its maximum level of oil and or sediment a waste management contractor should empty it. All chambers should be emptied evenly to balance the pressure on internal baffles.

Disposal of the collected contaminants must be in accordance with Environmental Agency and Local authority guidelines. After emptying, the Separator must be immediately refilled with clean water – failure to do so can affect the unit's performance and may cause structural damage.

Separators should be subject to a full structural survey every five years to inspect the structural condition, water tightness of system, internal coatings, and state of all inbuilt parts.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Initial inspection	Monthly for 3 months after installation
	Inspect for evidence building rubble has not entered the unit	At 3 and 6 months after installation
	Inspect silt accumulation rates and establish appropriate emptying program	Every 6 Months

- Waste Removal Procedure – Oil & Silt
- Remove the access cover and lower the desludging hose into the separation chamber.
- Lower the desludging hose to the base of the tank and withdraw any grit or sludge that may be present.
- Do not remove more water than is necessary. Ensure that you access and clean both compartments.

Operation and Maintenance Requirements for Attenuation Tanks

Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	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
	Check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
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 sediments build-up and remove if necessary	Every 5 years, or as required
Monitoring	Initial inspection	Monthly for 3 months after installation
	Inspect for evidence building rubble has not entered the unit	At 3 and 6 months after installation
	Inspect silt accumulation rates and establish appropriate emptying program	Every 6 Months

Operation and Maintenance Requirements for Filter Drains:

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly (or as required).
	Inspect filter drain surface, inlet/outlet pipework and control systems for	Monthly.

	blockages, clogging, standing water and structural design.	
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulators, and establish appropriate silt removal frequencies.	Six monthly.
	Remove sediment from pre-treatment devices.	Six monthly, or as required.
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g. NJUG, 2007 or BS 3998:2010).	As Required.
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace the overlying filter medium.	Five yearly, or as required.
	Clear perforated pipework for blockages.	As required.

Operation and Maintenance Requirements for Permeable Paving:

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 manufacturers recommendations – pay particular attention to areas where water runs onto pervious pavement 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 50mm 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 10-15 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, 48h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

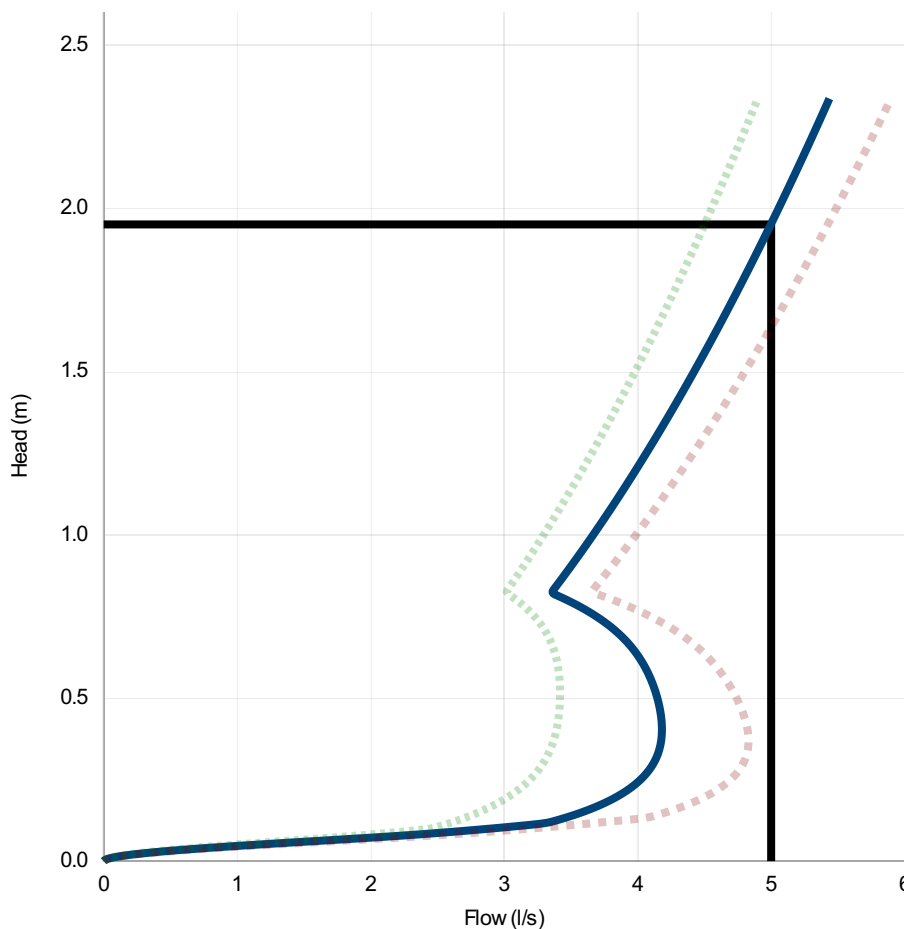
Appendix D – Hydro-Brake Technical Specification

Technical Specification

	Original Setting		Minimum Setting		Maximum Setting	
Control Point	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)	Head (m)	Flow (l/s)
Primary Design	1.950	5.000	1.950	4.502	1.950	5.424
Flush-Flo™	0.403	4.182	0.512	3.419	0.369	4.830
Kick-Flo®	0.821	3.350	0.821	3.010	0.823	3.650
Mean Flow		3.974		3.463		4.400



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Head (m)	Flow (l/s)
0.000	0.000
0.067	1.817
0.134	3.472
0.202	3.863
0.269	4.066
0.336	4.158
0.403	4.182
0.471	4.164
0.538	4.117
0.605	4.040
0.672	3.918
0.740	3.726
0.807	3.433
0.874	3.448
0.941	3.568
1.009	3.683
1.076	3.794
1.143	3.901
1.210	4.006
1.278	4.107
1.345	4.205
1.412	4.302
1.479	4.395
1.547	4.487
1.614	4.576
1.681	4.664
1.748	4.750
1.816	4.834
1.883	4.916
1.950	4.997

DESIGN ADVICE



The head/flow characteristics of this SHE-0092-5000-1950-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 28/02/2025 08:35

Site Applied Nutrition

DESIGNER Andrew Webb

Ref MH10

SHE-0092-5000-1950-5000

Hydro-Brake® Optimum

Technical Specification

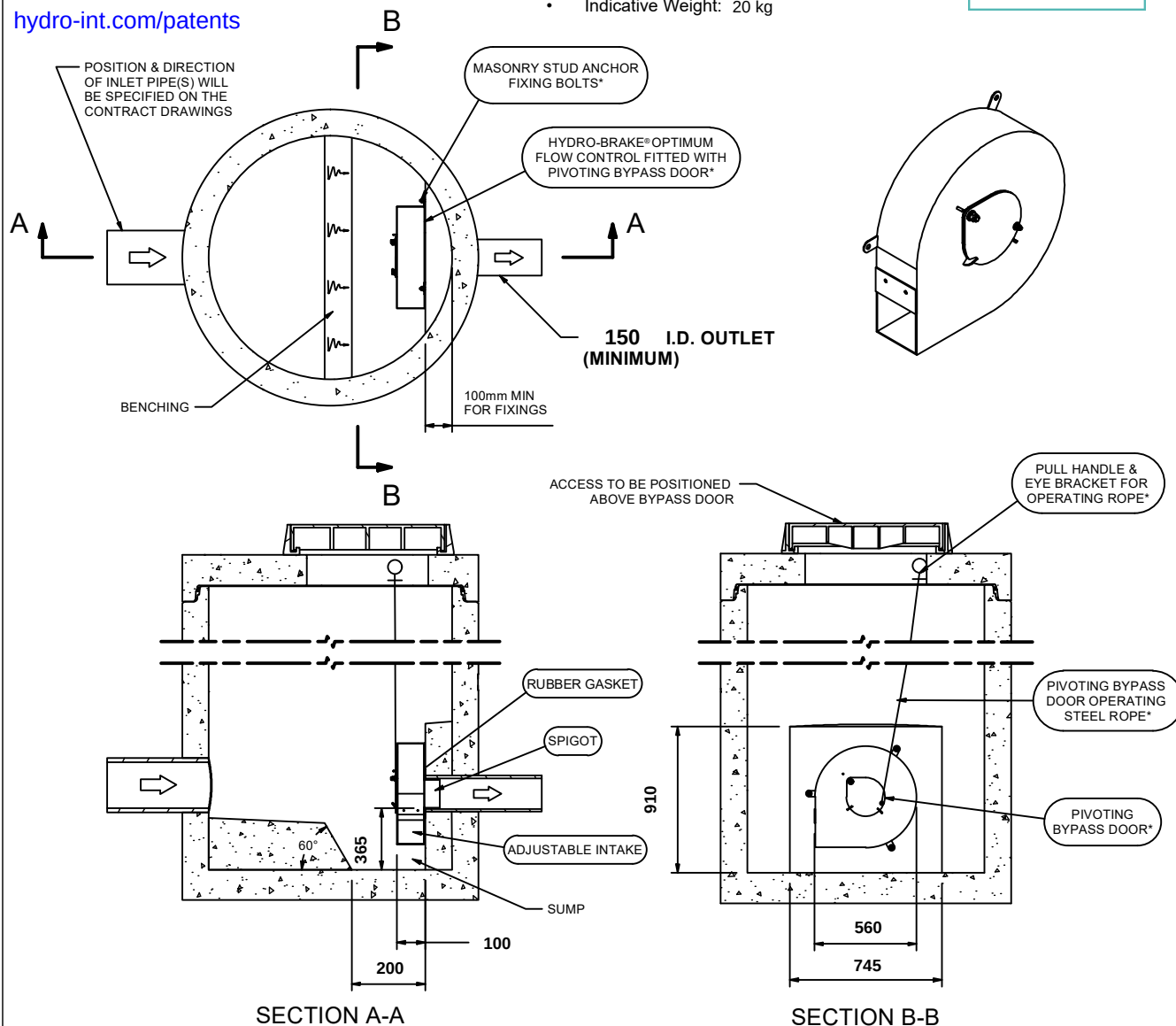
Control Point	Head (m)	Flow (l/s)
Primary Design	1.950	5.000
Flush-Flo™	0.403	4.182
Kick-Flo®	0.821	3.350
Mean Flow		3.974

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Variable flow rate post installation via adjustable inlet
- Indicative Weight: 20 kg



hydro-int.com/patents



IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
 ALL CIVIL AND INSTALLATION WORK BY OTHERS
 * WHERE SUPPLIED
 HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
 CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0092-5000-1950-5000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**
 A CRH COMPANY

DATE 28/02/2025 08:35

SITE Applied Nutrition

DESIGNER Andrew Webb

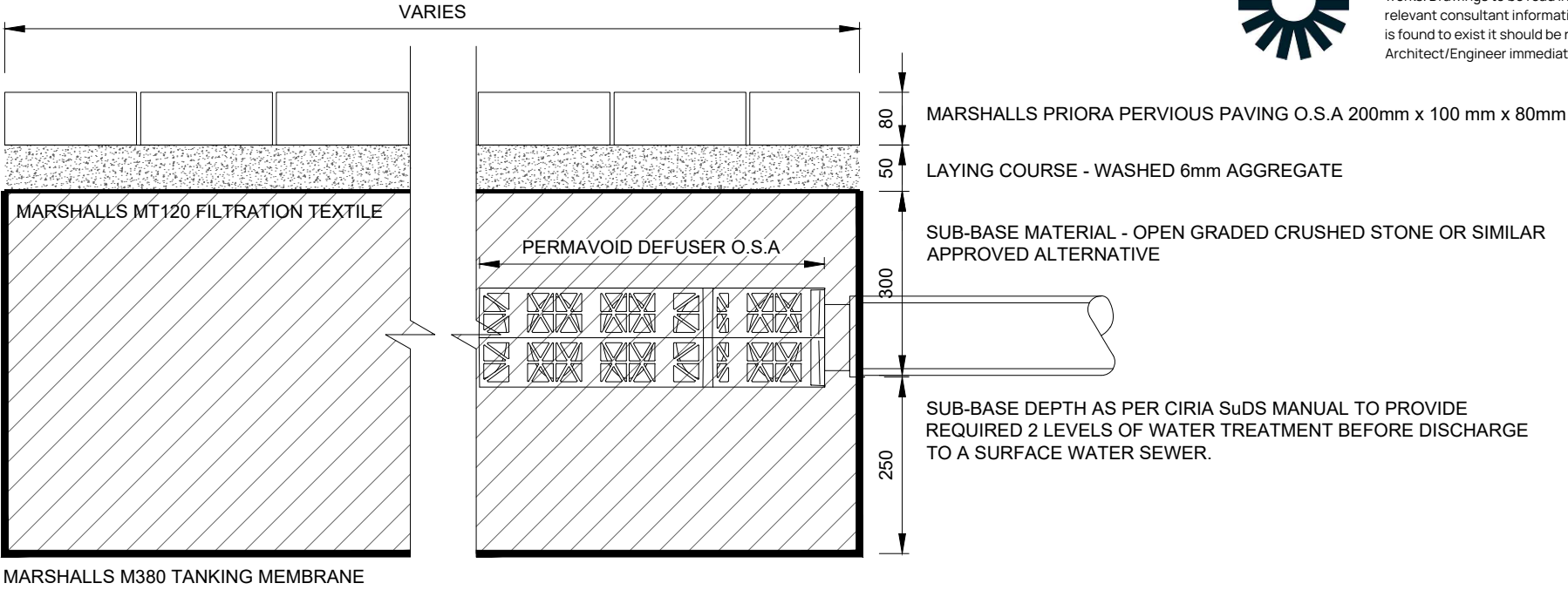
REF MH10

SHE-0092-5000-1950-5000

Hydro-Brake® Optimum

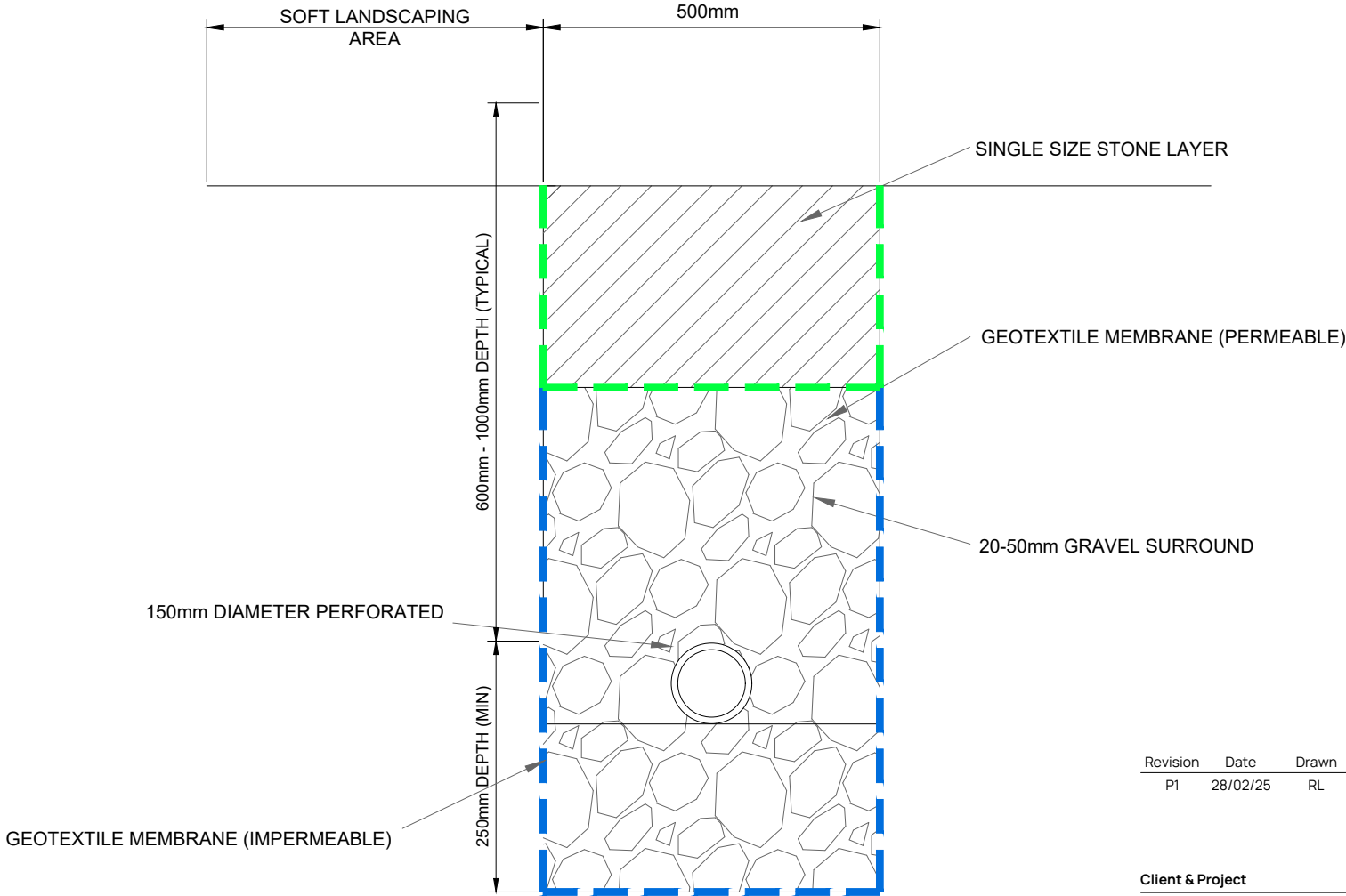
Appendix E – SuDs Construction Details

Do not scale from drawings unless by agreement with Architect/Engineer. Work to figured dimensions only. Check all dimensions on site prior to commencing the works. Drawings to be read in conjunction with other relevant consultant information. Where any discrepancy is found to exist it should be reported to the Architect/Engineer immediately.



'TYPE C' PERMEABLE PAVING CAR PARKING BAYS

Scale 1:10



TYPICAL FILTER DRAIN DETAIL

SCALE 1:10

Revision	Date	Drawn	Description
P1	28/02/25	RL	Issued for Planning.

Client & Project

Applied Nutrition
New Industrial Storage Unit & Office

Address

Fmr. Syntor Fine Chemicals Site

Acornfield Road,
Knowsley,
Liverpool,
L33 7UG

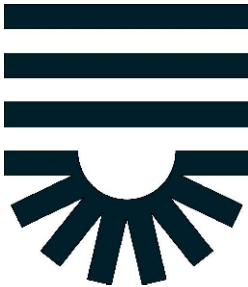
Drawing Title

Proposed SuDS Details

Status / Stage	Sheet	Scale @ A3	Drawn	Checked
S2	1 of 1	As Indicated	RL	CA

Drawing Number	Revision
S4711-BDN-XX-XX-DR-C-0200	P1

0mm	100mm	200mm	400mm	600mm
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Established 1983.

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North East (Head Office)
The Old School, Simpson Street,
Sunderland, SR4 6DR

North West
Room 110, Ulverston Business Centre,
Ulverston, LA12 7LQ

BuildingDesignNorthern

Appendix F – United Utilities Correspondance

United Utilities Grasmere House, 2nd Floor
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

17th February 2025

Dear Andrew

Pre-Development Enquiry for Former Syntor chemicals, Acornfield Road, Liverpool L33 7UW

UU Reference Number: 06989975

We have assessed your application based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your strategy will need review by other authorities as part of the planning process. We advise conducting necessary site investigations to confirm viability of your proposals.

Asset Protection

According to our public sewer records, there are public sewers located within your site boundary. This requires an easement of 6m. If you cannot achieve the required clearance, you may wish to consider diverting the public sewer.

Please see **comment 3** of the attached guidance sheet and **[Working Near Our Pipelines Guidance document](#)**

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the east of your proposed development at an unrestricted rate.

Manhole reference SJ43998302, **Grid reference** 343810, 399301

[Please see the images on page 3 for clarification](#)

Surface Water

Follow the National Planning Policy Guidance drainage hierarchy and Provide evidence for discounting higher options before considering public sewer discharge. Consult the Lead Local Flood Authority regarding surface water concerns.

[Please see comment 4 within the guidance sheet](#)

Infiltration

[Please see comment 4 within the guidance sheet](#)

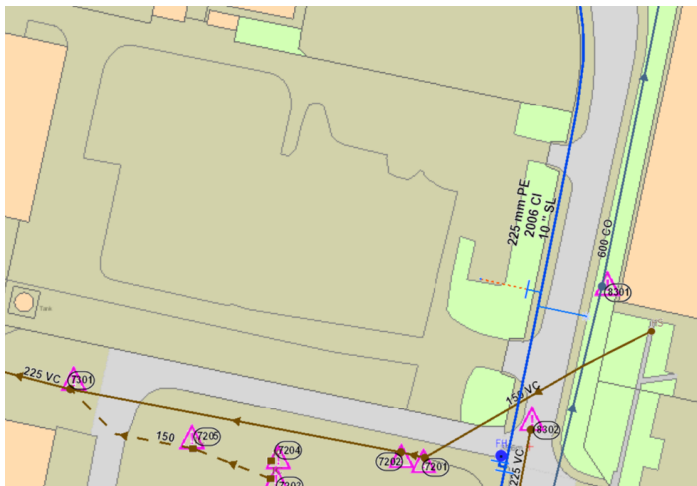
Public Sewer

United Utilities will consider a connection to the 600mm diameter public surface water sewer within Acornfield road located east of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities requests that any agreed rate does not exceed 5l/s.

Manhole reference SJ43998201, Grid reference 343813, 399279

[Please see images on page 3 for clarification](#)

Site Images



Appendix G – Knowsley Council Sustainable Drainage Pro-Forma

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

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 your application to discharge condition(s) related to your sustainable drainage system and surface water management in relation to your 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	Applied Nutrition		Planning Permission Reference	TBC	
			Approved Sustainable Drainage Strategy Reference	TBC	
Development Address (including postcode)	Former Syntor Chemicals, Acornfield Road, Knowsley, L33 7UW		Development Grid Reference	Northings	343724
				Eastings	399359
Has your proposed SuDS design changed since your Sustainable Drainage Strategy was approved?	Yes ☐ No ☒	If YES, summarise key changes here:			

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

Section 2: SuDS Design

Consideration	Provide Details	Evidence Checklist	
Provide the drawing reference(s) of your detailed SuDS design drawing(s)	S4711-BDN-XX-XX-DR-C-0101_P1 Proposed Drainage Arrangement	☒	Detailed SuDS design drawing showing, as a minimum: • Number of discharge points • Location of discharge points • Location and volumes of attenuation • Location and types of flow control devices Pipes and manholes including dimensions and direction of flow • Topography • Finished floor levels
Have you considered the possibility of runoff from existing neighbouring sites?	Yes ☒ No ☐	☒	Topographic plan showing pre-development surface water flow paths and a 5 metre buffer around the curtilage of the site.
State the number of discharge points	1	☒	Discharge points shown on detailed SuDS design drawing

Section 3: 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>	☒	Shown on detailed SuDS design drawing
Is infiltration feasible?	Yes ☐ No ☒	☒	If YES, proposals must be supported by a completed Infiltration Checklist from CIRIA The SuDS Manual C753 Appendix B <i>An editable version of this form is available on SusDrain website.</i>
If NO, following site specific ground investigation are you implementing your 'Plan B' sustainable drainage design?	Yes ☒ No ☐	☒	'Plan B' detailed SuDS design drawing

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

Section 4: Exceedance Planning – Technical Standards S7, S8 and S9

Consideration	Details	Evidence Checklist	
Does flooding occur to any part of the site during 1:30 year rainfall event?	Yes ☐ No ☒	☒	MicroDrainage (or equivalent) calculations
Does flooding occur to any building or plant during the 1:100 year rainfall event?	Yes ☐ No ☒	☒	MicroDrainage (or equivalent) calculations
If YES to above, is this area designated to hold water?	Yes ☐ No ☐	☐	Shown on detailed SuDS design drawing, surface water depths for areas designated to hold flood water over 1:30 year rainfall event should be indicated on plans
Summarise how you have designed for exceedance. <i>You should demonstrate routing of water away from property and infrastructure, safe access and egress routes, safe designated temporary storage areas and finished floor levels (metres).</i>	Falls have been designed to direct surface water run-off to areas of soft landscaping and SuDs collection features.	☒ ☒	Topographic plan showing exceedance flow routes for rainfall events in excess of 1:100 year (+ climate change) event and relative to finished floor levels Statement provided within your Sustainable Drainage Strategy explaining how it will be temporarily stored in safe designated storage areas.

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

Section 5: Structural Integrity and Construction – Technical Standards S10, S11, S13 and S14

Consideration	Summarise	Evidence Checklist	
In accordance with S10 and S11, have all components of the sustainable drainage system been designed to ensure structural integrity of the drainage system to withstand the anticipated loads over the design life of the development? <i>Reasonable levels of maintenance can be taken into account, but materials must be fit for purpose and the suitability of components which will foreseeably require replacement during the design life of the development should be considered unsuitable. For example, geocellular storage may be appropriate for commercial developments, but not residential.</i> Please summarise how you have met this requirement.	SuD features designed in accordance with Ciria C753	☒	Statement provided within your Sustainable Drainage Strategy
Where you are connecting to an existing sewerage or drainage system, how have you ensured that the structural integrity and functionality of the existing sewerage or drainage system will be preserved during construction? NOTE: Any damage caused to the drainage system during construction must be rectified before the drainage system is considered to be completed. Please summarise how you have met this requirement.	Connection to be made to existing United Utilities MH, contractor to confirm condition prior	☒	Statement provided within your Sustainable Drainage Strategy
Other Considerations			
Have you considered how surface water drainage will be provided for the site during construction? <i>e.g. temporary drainage, pollution prevention for watercourses, drains etc and protection of existing/part built drainage systems.</i>	Yes ☒ No ☐	☒	Construction phasing plan, construction environmental management plan (CEMP) or other statements

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

Section 6: Operation and Maintenance – Technical Standard S12 and HCWS161

Consideration	Details	Evidence Checklist	
Have you attached your completed Operation and Maintenance Plan for approval? <i>NOTE: Does not apply where an adopting body agrees to adopt all communal components of the system e.g. WaSC, Highway Authority</i>	Yes ☒ No ☐ Not required ☐	☒	Completed Operation and Maintenance Plan
Is pumping used for surface water drainage on any part of the site?	Yes ☐ No ☒ If YES, summarise your reasons for pumping below.	☐ ☒	Statement provided within your Sustainable Drainage Strategy Shown on detailed SuDS design drawing
House of Commons Written Statement on Sustainable Drainage Systems (HCWS161) states that the SuDS should be designed to ensure that the maintenance and operation requirements are economically proportionate. State how you have addressed this requirement. <i>Economic proportionality may need careful consideration where SuDS requiring replacement during the design life of the development (e.g. geocellular storage) are utilised and the occupier will also be paying the Water and Sewerage Company surface water drainage charges.</i>	Site wide drainage is to remain under private ownership, an appropriate maintenance budget will be allocated each year for the continues upkeep of the SuDs features.	☒	Statement provided within your Sustainable Drainage Strategy

Please note: You will need to provide an Operation and Maintenance Plan with your Discharge of Conditions application.

PRO-FORMA 2: Sustainable Drainage System: Discharge of Conditions

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	C Agar	Email Address	calvin.agar@bdnltd.com
		Daytime Telephone	0191 535 6189
Form <u>signed off</u> by	A Webb	Accreditation(s) and/or Qualification(s) of Signatory	BSc (Hons) MIHE
Date (dd/mm/yyyy)	28/02/25	Company	Building Design Northern Ltd

Client Details

Name	Thomas Ryder	Company	Applied Nutrition
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