Technical design report

Project name	27280 - Bicester Motion Innovation Quarter		
Design note title	Drainage Strategy Statement - SPY Development		
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Author	Jason Magee		
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1. Introduction

1.1 Scope of The Report

Hydrock have been appointed by Bicester Motion to provide a Drainage Strategy report for the approval of Oxfordshire County Council Lead Local Flood Authority.

The proposed technical report 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 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 damaged 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.
- Sewer Sector Guidance (where applicable).
- Local Authority Guidance.
- CIRIA C753 - SuDS Manual.
- National Planning Policy Framework (NPPF).
- DEFRA Non-Statutory Technical Standards for Sustainable Drainage.

2. Surface Water Strategy

2.1 Previous Consultants Strategy / Observations

As part of the initial planning submission Ridge had a proposal of infiltrating direct to ground to form the main method of disposal for the surface water drainage strategy.

However, infiltration tests were undertaken by Ridge (Report 5015203-RDG-XX-ST-DOC-C-00GCA01) during summer months in 6 locations. No infiltration was recorded in three of the locations with infiltration rates in the other three ranged from 1.6 x 10-5 to 7.75 x 10-5 m/s. Groundwater level monitoring during summer were recorded between 0.31m bgl and 2.54m bgl with an average GW level of 1.3m across the site historically and during recent investigation work undertaken by Hydrock (monitoring is still ongoing) between 0.30m – 1.21m bgl.

Whilst infiltration rates show that discharge into natural soils may work in some areas of the site in the summer months, the presence of a shallow groundwater table (which is close to surface in winter) show a thin unsaturated zone with the base of any proposed soakaways within the already saturated zone based on the monitoring results. As such based on the data, there is limited available storage capacity to consider drainage via infiltration viable.

In addition, it should be noted that shallow infiltration will only be viable where Made Ground is not present. As Made Ground is present across the site and locally deep where Made Ground – Landfill is present, this should only be considered where Made Ground is removed to prevent the risk of mobilising contaminants within the soils. Furthermore silt/clay from the weathered Cornbrash Formation is present which may limit infiltration at shallow depths.

As such, based on the potential contamination and the shallow groundwater levels, infiltration drainage is not considered suitable, therefore alternative measure will need to be explored

2.2 Pre-Development Surface Water Catchment Areas

Below is an indication of the pre-development catchment type area for the site.

Table 2.1: Pre-Development Catchment Areas

Pre-Development Catchment	Phase 1 (m2)	Phase 2 (m2)	Total (m2)
Impermeable			
Building / Roof	0	0	0
Roads / Hardstanding	2107	1410	3517
Permeable			
Soft Landscaping	29,124	7097	32,553
Total Area	**31,231**	**8507**	**39,738**

2.3 Pre-Development Surface Water Run-Off Rates - Greenfield

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.

In line with the Non-Statutory Technical Standard for Sustainable Drainage S2 (Peak Flow Control) it is a requirement that on new developments consideration be given to limit discharge as close as reasonably

practical to the equivalent 'Greenfield' rate for the corresponding storm event. Below considers what the maximum surface water discharge from the site would be if the site was 'Greenfield' i.e., not developed:

Table 2.2: Pre-Development Greenfield Run-Off Rates

Storm Event	Maximum discharge rate (l/s) Greenfield Phase 1	Maximum discharge rate (l/s) Greenfield Phase 2	Maximum discharge rate (l/s) Greenfield Total
1 in 1 Year	11.1	3.0	14.2
1 in 30 Year	29.7	8.1	37.8
1 in 100 Year	41.8	11.4	53.2
QBAR	**13.1**	**3.6**	**16.7**

2.4 Pre-Development Flood Exceedance

Topographical survey information indicates that, overland flows would follow the site topography and be directed south / southeast towards the existing watercourse.

2.5 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 2.3: Review of the Drainage Hierarchy

Method	Reasoning	Suitability
Interception / Reuse	No achievable due to the type of building (symphonic requirements)	X
Infiltration	Refer to section 3.1	X
Surface Water Body	Discharge to the adjacent watercourse feasible.	✓
Surface Water Sewer	Not applicable.	X
Combined Sewer	Not applicable.	X
Foul Water Sewer	Not applicable.	X

2.6 SuDS Assessment

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.

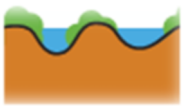
2.7 Suitability of SuDS Elements

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 2.4: 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.
	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.
	Permeable Surfaces 	Surfaces that allow water to penetrate into underlying layers to be stored, collected, or made to infiltrate to groundwater.	Yes.

	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.
Site and Regional Control	Filter Strip 	Grassed or planted areas that runoff is allowed to run across to promote infiltration and cleansing.	Yes.
	Soakaway 	A soakaway is designed to allow water to quickly soak into permeable layers of soil. Constructed 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.	No.
	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.	Yes.
	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.
	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.	Yes.
	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.
	Underground Storage 	Water can be stored in tanks, gravel, or plastic crates beneath the ground to provide attenuation.	No.

2.8 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.

Table 2.5: 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.	X
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.	✓
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.	✓
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.	✓
Bioretention / Rain Gardens	Areas of the site drainage to unlined bioretention components can be assume 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

3. Post-Development Surface Water Management Strategy

3.1 Proposed Surface Water Drainage Strategy

The below ground surface drainage system will now connect all new rainwater pipes, channels, and gullies at ground floor level and discharge firstly through preamble paving, into a conveyance pipe which runs along the car park edge into a series of offline / online basins. The run-off will then be discharged into the adjacent existing watercourse at the suitable Qbar rate. The site will be split in two areas, either the of the entrance, to account for levels and increased SuDS methods. The phases are as follows:

Phase 1 - Discharge south-central of the site into the adjacent watercourse.

Phase 2 - Discharge south-east of the site into the adjacent watercourse.

Permeable paving will be specified to all areas around the buildings as well as the car parks and bays. Open graded crushed rock will act as storage, while also conveying to the various basins, south of the site.

Pipework will be kept at a minimal with conveyance pipes used to discharge the run-off towards the basins.

Each phase will be restricted via a flow control at prior to discharging into the adjacent watercourse, with each location requiring a headwall and Land Drainage Consent (TBC) in order to approve discharge points.

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.

3.2 Post-Development Surface Water Catchment Areas

Below is an indication of the post-development catchment type area.

Table 3.1: Pre vs Post-Development Catchment Areas

Post-Development Catchment	Phase 1 (m2)	Phase 2 (m2)	Total (m2)
Impermeable			
Building / Roof	9800	1619	11,419
Roads / Hardstanding - Impermeable	7286	1536	8822
Roads / Hardstanding - Permeable	12,026	4298	16,324
Permeable			
Soft Landscaping	2541	616	3157
Total Area	**31,653**	**8069**	**39,722**

3.3 Post-Development Surface Water Run-Off Rates - Greenfield

In order to determine the post-development surface water flows an assessment has been carried out to ensure that the flows from the new development will not adversely affect flood risk either within the site boundary, offsite adjacent properties, or the downstream network.

Due to the nature of the existing development and its current arrangement, Greenfield will need to be considered for this site to reduce to run-off rates, therefore analysis has been outlined to confirm what rate is considered close as reasonably practical to the current constraints.

To meet the pre-development run-off QBAR will be used for all storm events for the site:

Storm Event	Phase 1	Phase 2	Total
QBAR	13.1	3.6	16.7

3.4 Allowance for Climate Change and Urban Creep

In accordance with EA guidance, an allowance for climate change has been incorporated into the design (40%) to ensure that the proposed surface water network has a suitable degree of resilience. These allowances vary with the expected lifetime of the development.

3.5 Post-Development Surface Water Volumes

In line with the Non-Statutory Technical Standard for Sustainable Drainage S4 & S5 (Volume Control), where reasonably practicable, for Greenfield 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 Greenfield Run-Off Volume for the same event.

Table 3.2: Pre- vs Post-Development Run-Off Volumes for the 1-in-100 year, 6-hour Rainfall Event

Pre-Development Run-Off Volume	Post-Development Run-Off Volume	-/+ (m^3)	Betterment (%)
958	1708	750	-75%

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. However due to the soil type onsite, minimal infiltration will occur therefore infiltration techniques are considered unsuitable for the site. It is therefore proposed to utilise further SuDS features to attenuate storm water on site prior to discharge into the existing downstream network.

In line with the Non-Statutory Technical Standard for Sustainable Drainage S6 (Flood Risk), where it has not been possible to reduce all the additional volume by infiltration or other SuDS techniques, the volume of run-off should be discharged in accordance with one of the following rates of run-off, whichever is the higher.

Table 3.3: Discharge Limits

Volume requirements	
The peak discharge rate has been reduced to pre-development 1-year peak flow rate	X
The peak discharge rate has been reduced to the site's estimated mean annual flood flow rate (Qbar). OR	✓
The peak discharge rate has been reduced to 2l/s/ha.	
The limiting discharge rate requires a flow rate of less than 5l/s at a discharge point, therefore up to 5l/s	X

3.6 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. Flows from the buildings, main car park and central link road will be directed south of the site towards the existing watercourse. The north link road with fall back to the building, but the low point will be created in the paving to direct exceedance away from the units. Bays to the north will fall north away from the site.

3.7 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, as shown below.

Table 3.4: Pollution Hazards

Land Use	Hazard Level	TSS	Metal	Hydro-carbons	
Other roofs (typically commercial / industrial roofs)	Low	0.3	0.2-0.8	0.05	✓
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	✓

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 3.5: 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
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.

Other Roofs	TSS	Metals	Hydrocarbons
Pollution Index	0.3	0.2	0.05
Mitigation Index (PP & Basin)	1.2	1.1	1.3
Net Pollution	-0.9	-0.9	-1.25
Comments	Permeable paving and basins will work as a management train downstream of the roof outlets.		

Residential Carpark	TSS	Metals	Hydrocarbons
Pollution Index	0.7	0.6	0.7
Mitigation Index (Permeable Paving)	1.7	1.7	1.9
Net Pollution	-1.0	-1.1	-1.2
Comments	Permeable paving, swales and basins effectively mitigates the pollution risk from the car park. Propriety systems (Aqua Swirls) will also be applied for further mitigation		

Based on the above tables the water quality criteria of document Ciria C753 - The SuDS Manual is satisfied.

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 watercourse.

3.8 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 multiple 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 greater than 50 spaces or 800m2 it is considered to be 'high risk' in terms of pollution to the surface water network and as such mitigations is deemed to be required. Permeable paving will be proposed to capture hydrocarbons, prior to release into the watercourse.

» 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.

3.9 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.

3.10 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 3.6: Proposed Schedule of Maintenance for Below Ground Drainage

Permeable Paving - Operation and maintenance requirements in accordance with CIRIA C753 - The SuDS Manual		
Maintenance Schedule	Required Action	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surfaces from adjacent impermeable areas as this area is most likely to

		collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements.
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required.
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging).
Monitoring	Initial inspection.	Monthly for three months after installation.
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 h after large storms in first six months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually.
	Monitor inspection chambers.	Annually.

Reference should be made to the manufacturer recommendations where applicable

Swale - Operation and maintenance requirements in accordance with CIRIA C753 - The SuDS Manual		
Maintenance Schedule	Required Action	Frequency
Regular maintenance	Remove litter and debris	Monthly, (or as required).
	Cut grass - to retain height within specified design range	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.

	Inspect infiltration surfaces for ponding, compaction, silt accumulation. Record areas where water is ponding for > 48 hours.	Monthly, or when required.
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half early.
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.
Occasional maintenance	Re-seed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Relevel uneven surfaces and reinstate design levels	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required.
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.

Filter Strip - Operation and maintenance requirements in accordance with CIRIA C753 - The SuDS Manual		
Maintenance Schedule	Required Action	Frequency
Regular maintenance	Remove litter and debris	Monthly, (or as required).
	Cut grass - to retain height within specified design range	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Inspect filter strip surface to identify evidence of erosion, poor vegetation growth, compaction, ponding, sedimentation and contamination (e.g. oils).	Monthly (at start, then half yearly).

	Check flow spreader and filter strip surface for evens gradients.	Monthly (at start, then half yearly).
	Inspect gravel flow spreader upstream of filter strip for clogging.	Monthly (at start, then half yearly).
	Inspect silt accumulation rate and establish appropriate removal frequencies.	Monthly (at start, then half yearly).
Occasional maintenance	Re-seed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over > 10% of the filter strip area.
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Relevel uneven surfaces and reinstate design levels	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required.
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.

Detention Basin - Operation and maintenance requirements in accordance with CIRIA C753 - The SuDS Manual		
Maintenance Schedule	Required Action	Frequency
Regular maintenance	Remove litter and debris	Monthly.
	Cut grass - for spillways and access routes	Monthly (during growing season), or as required.
	Cut grass - meadow grass in and around basin	Half yearly (spring - before nesting season, and autumn.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect banksides, structure, pipework etc for evidence of physical damage	Monthly.

	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required.
	Check any penstocks and other mechanical devices.	Annually.
	Tidy all dead growth before start of season.	Annually.
	Remove sediment from inlets, outlets and forebay.	Annually (or as required).
	Manage wetland plants in outlet pool - where provided.	Annually (as set out in chapter 23 of CIRIA C753).
Occasional maintenance	Reseed areas of poor vegetation growth.	As required.
	Prune and trim any trees and removed cuttings.	Every 2 years, or as required.
	Remove sediment from inlets, outlets, forbay and main basin when required.	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided).
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Realignment of rip-rap.	As required.
	Repair / rehabilitation of inlets, outlets and overflows.	As required.
	Relevel uneven surfaces and reinstate design levels.	As required.

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 3.7: 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.

4. Foul Water Strategy

4.1 Previous Consultants Strategy / Observations

As part of the initial planning submission Ridge had a proposal of discharging the foul downstream of the adjacent site, just off of Skimmingdish Lane via an onsite pump station and rising main.

4.2 Pre-Development Foul Water Drainage

Public: There are no foul water sewers within the vicinity of the site, including within Skimmingdish Lane.

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.

Private: There are no foul water drains within the site extents. The development to the northwest (Technical Site) collects existing infrastructure and discharges to an existing pump station, prior to ultimately discharging to a sewer asset further west of that site.

4.3 Post-Development Foul Water Drainage

The below-ground foul drainage system will now connect all new soil, waste and ventilating pipes, sanitary appliances and gullies at ground level and discharge to a pump station near the entrance of the site. The discharge will then be pumped via a rising main west of the site which ultimately connects to the existing private pump station within the Technical Site, via a “daisy chain” method, within the ownership boundary.

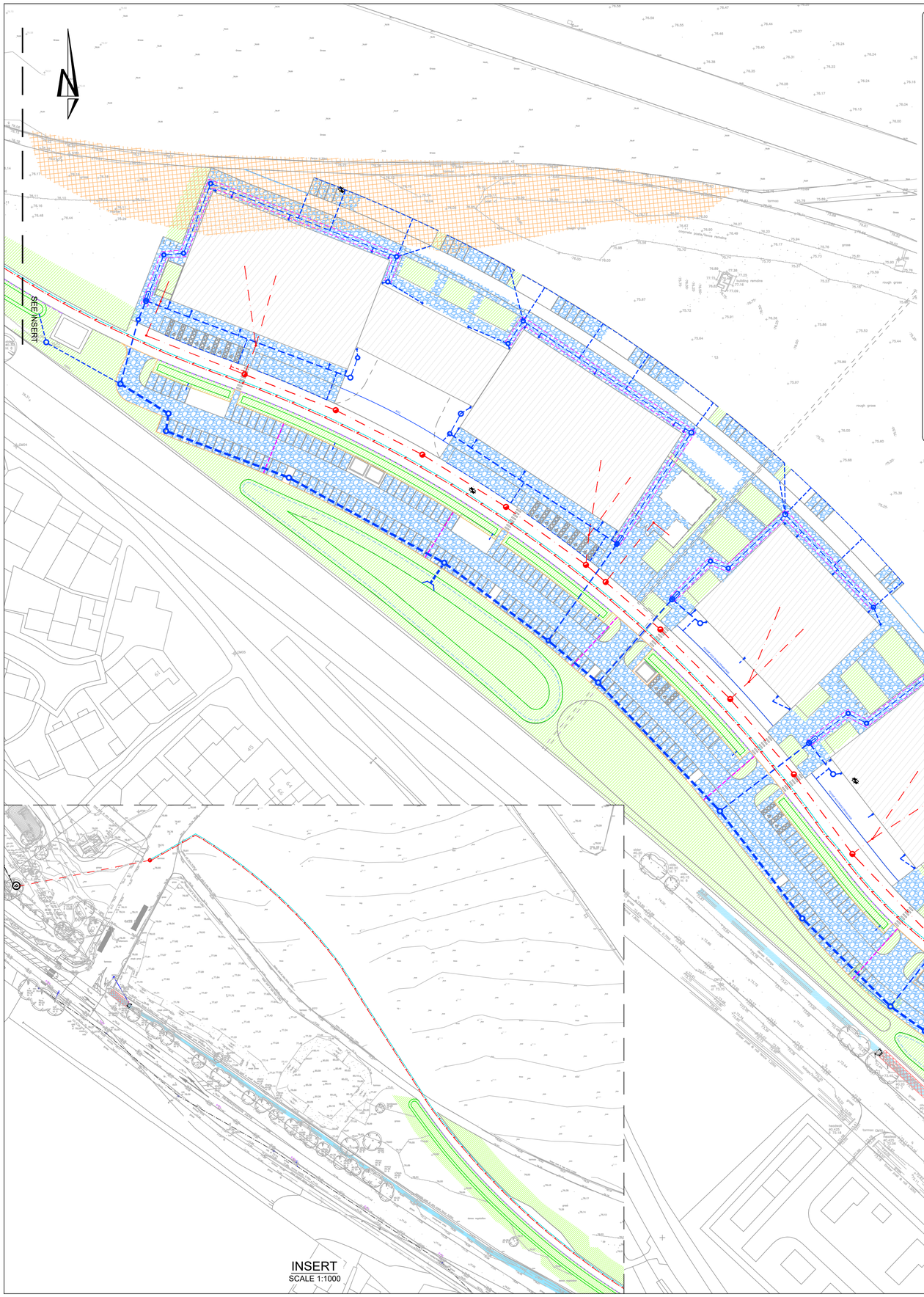
Comments from the supplier on the intended method:

"Proposal is to use a New PS to serve this new commercial development but pumping to gravity network which subsequently drains to the existing PS. Both systems then under the same private ownership by the same client. When pumping to another downstream PS then to save duplication of the emergency storage at the existing PS (daisy chain) it is common to use the downstream PS's HLA to inhibit the upstream New PS, this is best undertaken by hard wired cable running between the 2 PS's which runs in separate cable duct which can largely run in same trench as the RM as it is laid. The New PS Control Panel is then equipped with an inhibit override so that if the downstream PS hits HLA then the upstream New PS is prevented from pumping until this downstream HLA drops out and un-inhibits. The New PS then provides its own Emergency Storage at this facility, whilst the downstream existing PS stores at its own facility. The benefit in daisy chaining in this fashion is that the current pump rate to the Thames Sewer is maintained at the requested and restricted 3.8 lit/sec rate. Another benefit in daisy chaining in this fashion is that the septicity risk is reduced as more flows coming in to the same retained volume within the RM's and systems."

It is intended that only waste flows considered to be ‘Domestic’ shall be discharged into the foul drainage system. If the site wishes to discharge 'Trade Effluent' into the foul drainage system then will be required to make a formal application to the Sewerage Undertaker accordingly.

The design of all foul sewers and lateral drains must conform to BS EN 752, BS EN 16933, Building Regulations 2010 Part H, planning policy and best practice guidelines (such as SSG Appendix C – Design and Construction Guidance.) wherever applicable. Sanitary systems within building should be designed in accordance with BS EN 12056-2.

Appendix A – Drainage Designs



PROPOSED DRAINAGE - STORM

150Ø@1:100 — STORM WATER DRAIN - **PVCu**
(Structured walled pipe required at diameter >150mm)
Approx. gradient and diameter as noted, 100mm Ø UNO

SW-01 — STORM WATER MANHOLE
PC Ring 1.2m Ø UNO

SW-01 — STORM WATER INSPECTION CHAMBER
PVCu 450mm Ø. Max 1.2m depth - reduced access to 3.0m
Connections over 150mm - chamber to be **RANGE 600**
NOTE: Drawn to 900mm Ø for clarity

RE — STORM RODDING EYE
Ø as noted

SILT TRAP

CONCRETE ENCASEMENT TO PIPE
Refer to limits of cover table drawing 7101

01 & 01A — RAIN WATER OUTLET
Shown indicative, refer to architect for setting out.
Branch Ø to suit RWO diameter.
01 - Outlet connects into standard 90° rest bend.
01A - Indicates access required in above slab plumbing for rodding, refer to service engineers drawings for details.

AG — RAIN WATER OUTLET ACCESS GULLY
Branch Ø to be max 100mm .
AG - Outlet connects to gully.

RG — ROAD GULLY (to be trapped)

YG — YARD GULLY (to be trapped)

PG — PAVED AREA GULLY (to be trapped)

ACO — DRAINAGE CHANNEL
(Refer to layout for specification)

TH — THRESHOLD DRAINAGE CHANNEL
(Assumed not required. Architect to confirm.
Refer to architect for details / specification)

LEGEND

PROPOSED DRAINAGE - FOUL

100Ø@1:100 — FOUL WATER DRAIN - **PVCu**
Approx. gradient and diameter as noted, 100mm Ø UNO

FW-01 — FOUL WATER MANHOLE
PC Ring 1.2m Ø UNO

FW-01 — FOUL WATER INSPECTION CHAMBER
PVCu 450mm Ø. Max 1.2m depth - reduced access to 3.0m
Connections over 150mm - chamber to be **RANGE 600**
NOTE: Drawn to 900mm Ø for clarity

Note: All internal foul MH's and IC's to have recessed covers. double sealed and locking to prevent odours. Refer to layout for location.

SAC — FOUL WATER SHALLOW ACCESS CHAMBER
Max depth to invert 600mm from GL, 300mm Ø

RE — FOUL RODDING EYE
Ø as noted

YG — FOUL YARD GULLY (to be trapped)
Gully reference as noted on drawing.
Cover grade to suit loading.

FD — FLOOR DRAIN (to be trapped)
Internal use only, refer to architect for details / specification.
Roddable from above slab into standard (01) fitting.
Floor Drain / Gully to be kept charged to avoid odours.

01 & 01A — FOUL OUTLET / STACK POSITION
Shown indicative, refer to architect for setting out.
All branches 100mm Ø UNO.
01 - Outlet connects into standard 90° rest bend.
01A - Indicates access required in above slab plumbing for rodding, refer to service engineers drawings for details.
SVP - Indicates soil vent pipe by service engineer: with access.

PUBLIC AND PRIVATE EXISTING/PROPOSED DRAINAGE

150Ø@1:100 — EXISTING PUBLIC FOUL SEWER

150Ø@1:100 — EXISTING PUBLIC STORM SEWER

150Ø@1:100 — EXISTING PUBLIC COMBINED SEWER

150Ø@1:100 — EXISTING PRIVATE FOUL SEWER

150Ø@1:100 — EXISTING PRIVATE STORM SEWER

150Ø@1:100 — PROPOSED PUBLIC STORM SEWER (BY OTHERS)

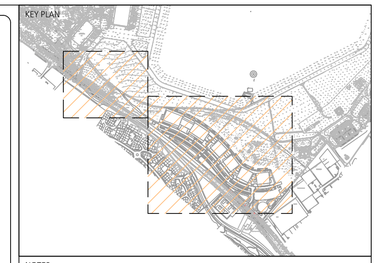
150Ø@1:100 — PROPOSED PUBLIC FOUL SEWER (BY OTHERS)

FOUNDATIONS

INDICATES PIPE THROUGH FOUNDATION

T.O.F. 0.000 — TOP OF FOUNDATION (TYPICAL)

KEY PLAN



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7. All drainage to be laid soffit to soffit unless otherwise shown.
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REV	DESCRIPTION	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P03	UPDATED TO SUIT SITE PLAN	B.MURPHY	18/04/24	J.MAGEE	18/04/24		
P02	UPDATED TO SUIT SITE PLAN	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3	J.MAGEE	03/11/23	J.MAGEE	03/11/23		

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SITE WIDE

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:1000

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7010	P03

GROUNDWATER AND CONTAMINATED LAND ISSUES HIGHLIGHTED WITHIN VARIOUS REPORTS. GEOTECHINCAL ENGINEER HAS REVIEWED CONDITIONS AND FULLY CONFIRMED INFILTRATION UNVIABLE. DISCHARGE TO WATER COURSE PROPOSED AS THE ALTERNATIVE DISPOSAL MEASURE.

DRAINAGE NOT SUBMITTED TO LLFA AS PART OF SECTION 73. CONDITIONS STILL STATE INFILTRATION AND AUTHORITY HAVE NOT RECIEVED OR COMMENTED ON CHANGE IN DRAINAGE STRATEGY. FURTHER CONDITIONS MAY BE REQUESTED. TBC.

SA-06 - INFILTRATION RATE: FAILED
REFER TO RIDGE
5015203-RDG-XX-ST-DOC-C-00GCA01-A

LEVELS TO TIE INTO EXISTING

INDICATES KERBDRAIN

INDICATES SUMP TO CONVEY FLOWS FROM SUB-BASE

STACKS SHOWN INDICATIVE. M&E TO CONFIRM LOCATIONS

RWP'S SHOWN INDICATIVE. ARCHITECTS

KERBDRAIN TO DRAIN INTO SUB-BASE

ALLOW SPUR FOR FUTURE PHASE

INDICATES SUB BASE STORAGE ZONE

SA-05 - INFILTRATION RATE: 4.89x10-5
REFER TO RIDGE
5015203-RDG-XX-ST-DOC-C-00GCA01-A
DEPTH: 72.470

SMH_101
CL: 73.94
DP=1.232m
IL(150Ø): 72.71
IL(150Ø): 72.71

SMH_103
CL: 73.95
DP=1.335m
IL(150Ø): 72.61
IL(150Ø): 72.61

SMH_102
CL: 73.99
DP=1.360m
IL(150Ø): 72.63
IL(150Ø): 72.63

SMH_104
CL: 73.87
DP=1.328m
IL(150Ø): 72.57
IL(150Ø): 72.57
IL(300Ø): 72.54

SMH_105
CL: 73.30
DP=0.907m
IL(300Ø): 72.39
IL(300Ø): 72.39

SMH_110
CL: 73.99
DP=1.144m
IL(150Ø): 72.85

SMH_044
CL: 74.18
DP=1.074m
IL(150Ø): 73.11

SMH_112
CL: 74.11
DP=1.537m

SMH_114

FMH_034
CL: 73.90
DP=0.904m
IL(100Ø): 73.00

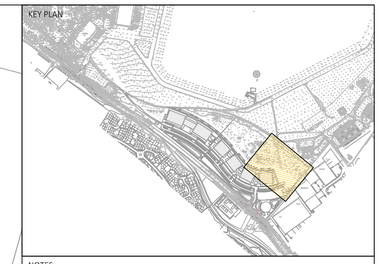
FMH_033

FMH_035

407
74.000

150Ø@1:301
150Ø@1:290
150Ø@1:411
150Ø@1:384
300Ø@1:302
100Ø@1:48
100Ø@1:53
150Ø@1:278
100Ø@1:38

KEY PLAN



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Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
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CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 1

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7011	P03

RWP'S SHOWN INDICATIVE. ARCHITECTS TO CONFIRM LOCATIONS

SMH_046
CL: 74.27
DP=1.349m
IL(150Ø): 72.92
IL(150Ø): 72.92

SMH_049
CL: 74.14
DP=1.143m
IL(300Ø): 73.00

FMH_030

FMH_032 406 74.250

SMH_112
CL: 74.11
DP=1.537m
IL(150Ø): 72.58
IL(150Ø): 72.58

SMH_111
CL: 74.22
DP=1.716m
IL(150Ø): 72.51

SMH_114
CL: 73.94
DP=1.186m
IL(150Ø): 72.75
IL(150Ø): 72.75

FMH_034
CL: 73.90
DP=0.904m
IL(100Ø): 73.00
IL(100Ø): 73.00
IL(100Ø): 73.00

PD100F ACO ROAD DRAIN D400

SMH_113
CL: 73.91
DP=1.227m
IL(150Ø): 72.69
IL(150Ø): 72.69

FMH_031
CL: 74.03
DP=1.030m
IL(100Ø): 73.00
IL(100Ø): 73.00
IL(100Ø): 73.00

FMH_012
CL: 73.63
DP=2.762m
IL(150Ø): 70.87
IL(150Ø): 71.61
IL(150Ø): 70.87

PD100F ACO ROAD DRAIN D400

PUMP STATION CONTROL PANEL TO HAVE INHIBIT OVERRIDE SO THAT IF THE DOWNSTREAM PUMP STATION HITS HLA THEN THE UPSTREAM STATION IS PREVENTED FROM PUMPING UNTIL THE DOWNSTREAM HLA DROPS OUT AND UN-INHIBITS. THE NEW PS PROVIDES ITS OWN EMERGENCY STORAGE AT THIS FACILITY, WHILST THE DOWNSTREAM EXISTING PUMP STATION STORES ITS OWN

SEE PACKAGE PUMP STATION - PPS-01 NOTE

FMH_010
CL: 73.78
P=2.324m
Ø): 71.45
Ø): 71.45

FMH_011
CL: 73.72
DP=2.640m
IL(150Ø): 71.08
IL(100Ø): 72.80
IL(150Ø): 71.08

INDICATES SUB BASE STORAGE ZONE

SMH_012
CL: 73.34
DP=1.217m
IL(600Ø): 72.13
IL(600Ø): 72.13

SMH_011
CL: 73.46
DP=1.217m
IL(600Ø): 72.24
IL(600Ø): 72.24

SMH_010
CL: 73.55
DP=1.217m
IL(600Ø): 72.33
IL(600Ø): 72.33

INDICATES FREEBOARD LEVEL: 73.100

INDICATES PROPOSED HEADWALL AS PART OF THE S278 WORKS

DRY BASIN - BA-01
MAX STORAGE VOLUME = TBCm³
MAX WATER LEVEL = TBC
MAX DEPTH = TBCmm
STORAGE PROVIDED IN ABOVE GROUND BASIN
105m² (BASE) x 1100mm DEEP (WITH 1:4 SIDE SLOPES)
TOP OF BASIN = 73.400
BASE OF BASIN = 72.100
FREEBOARD = 300mm

BASE OF WATERCOURSE AT HEADWALL

INDICATES PROPOSED CULVERT AS PART OF THE S278 WORKS

HEADWALL - HW-01 (5)
HEADWALL BY ALTHON
TYPE: HC3
IL: 72.060
PIPE Ø: 300mm
HEIGHT: 800mm
WIDTH: 1300mm
DEPTH: 900mm

(72.060)

FLOW CONTROL MANHOLE - FC-01
HYDRO-BRAKE FLOW CONTROL.
DISCHARGE LIMITED TO:
13.1l/s
CL: 73.500
IL: 72.100
HEAD: 1m

PACKAGE PUMP STATION - PPS-01
XL25,000 PPS (BY TT PUMPS)
TANK SIZE = 2.2mØ x 2.9m DEEP (INCL. SUMP)
SIZED IN ACCORDANCE WITH BREGS REQUIREMENTS
D400 CVR AIRTIGHT COVER LOCKABLE.
DISCHARGE LEVEL: 77.400
CL: 73.460
TWL: 71.360
IL(IN): 69.730
EMERGENCY STORAGE (12HR WORKING DAY): 20m3

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DEPTH INCREASED TO ALLOW FOR POTENTIAL FUTURE PHASES TO SPUR ONTO GRAVITY CONNECTION

FMH_014
CL: 73.76
DP=1.755m
IL(100Ø): 72.80
IL(150Ø): 72.00

HIT AND MISS KERBS TO ALLOW RUN-OFF TO SWALE

SUB BASE ALLOWANCE FOR EVENTS SPACE

SMH_106
CL: 73.23
DP=1.309m
IL(300Ø): 72.33
IL(600Ø): 71.93
IL(600Ø): 72.33

INDICATES FREEBOARD LEVEL: 73.100

SA-04 - INFILTRATION RATE: 7.75x10-5
REFER TO RIDGE
5015203-RDG-XX-ST-DOC-C-00GCA01-A
DEPTH: 70.910

SMH_107
CL: 73.46
DP=1.217m
IL(600Ø): 72.25
IL(600Ø): 72.25

SWALE TO DISCHARGE TO SUB BASE

SUB BASE ALLOWANCE FOR EVENTS SPACE

GRASSCRETE (SYSTEM C) - GC-01 (7)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 2916m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
2781m² x 400mm DEEP

FMH_108
CL: 73.35
DP=1.217m
IL(600Ø): 72.13
IL(600Ø): 72.13

DRY BASIN - BA-02
MAX STORAGE VOLUME = TBCm³
MAX WATER LEVEL = TBC
MAX DEPTH = TBCmm
STORAGE PROVIDED IN ABOVE GROUND BASIN
142m² (BASE) x 1100mm DEEP (WITH 1:4 SIDE SLOPES)
TOP OF BASIN = 73.400
BASE OF BASIN = 72.100
FREEBOARD = 300mm

DRY BASIN - BA-02
MAX STORAGE VOLUME = TBCm³
MAX WATER LEVEL = TBC
MAX DEPTH = TBCmm
STORAGE PROVIDED IN ABOVE GROUND BASIN
142m² (BASE) x 1100mm DEEP (WITH 1:4 SIDE SLOPES)
TOP OF BASIN = 73.400
BASE OF BASIN = 72.100
FREEBOARD = 300mm

INDICATES FREEBOARD LEVEL: 73.100

(73.000) (ROAD)

72.920

LOW POINT

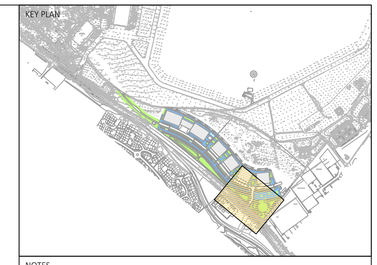
FLOW CONTROL MANHOLE - FC-01
HYDRO-BRAKE FLOW CONTROL.
DISCHARGE LIMITED TO:
3.6l/s
CL: 73.500
IL: 72.100
HEAD: 1m

RISK
POSSIBLE BREAK OUT OF PROPOSED / EXISTING CULVERT. COORDINATION REQUIRED WITH OFFSITE DRAINAGE TO CONFIRM VIABILITY

SKIMMINGDISH LANE

OFFSITE DRAINAGE TAKEN FROM BM-LE-HAD-XX-DR-CE-001-005 REV A

KEY PLAN



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	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 2

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7012	P03

DRAINAGE NOT SUBMITTED TO LLFA AS PART OF SECTION 73. CONDITIONS STILL STATE INFILTRATION AND AUTHORITY HAVE NOT RECEIVED OR COMMENTED ON CHANGE IN DRAINAGE STRATEGY. FURTHER CONDITIONS MAY BE REQUESTED. TBC.

GROUNDWATER AND CONTAMINATED LAND ISSUES HIGHLIGHTED WITHIN VARIOUS REPORTS. GEOTECHINCAL ENGINEER HAS REVIEWED CONDITIONS AND FULLY CONFIRMED INFILTRATION UNVIABLE. DISCHARGE TO WATER COURSE PROPOSED AS THE ALTERNATIVE DISPOSAL MEASURE.

LEVELS TO TIE INTO EXISTING

INDICATES KERBDRAIN

ROAD TO FALL TOWARDS KERBDRAIN

INDICATES KERBDRAIN

INDICATES SUMP TO CONVEY FLOWS FROM SUB-BASE

STACKS SHOWN INDICATIVE. M&E TO CONFIRM LOCATIONS

RWP'S SHOWN INDICATIVE. ARCHITECTS TO CONFIRM LOCATIONS

INDICATES SUMP TO CONVEY FLOWS FROM SUB-BASE

STACKS SHOWN INDICATIVE. M&E TO CONFIRM LOCATIONS

INDICATES PETROL INTERCEPTOR. AQUA SWIRL BY SDS.

INDICATES PETROL INTERCEPTOR. AQUA SWIRL BY SDS.

SWALE TO DISCHARGE TO SUB BASE

INDICATES BAFFLE IN SUB BASE

INDICATES SUB BASE STORAGE ZONE

INDICATES FREEBOARD LEVEL: 74.100

HIT AND MISS KERBS TO ALLOW RUN-OFF TO SWALE

INDICATES BAFFLE IN SUB BASE

INDICATES SUB BASE STORAGE ZONE

BASE OF EXISTING WATERCOURSE

INDICATES EXISTING WATERCOURSE

SKIMMINGDISH LANE

PD100F ACO ROAD DRAIN D400

PD100F ACO ROAD DRAIN D400

SA-03 - INFILTRATION RATE: FAILED REFER TO RIDGE 5015203-RDG-XX-ST-DOC-C-00GCA01-A

404 75.000

405 74.500

SMH_027 CL: 75.90 DP=1.902m IL(150Ø): 73.99 IL(150Ø): 73.99

SMH_033 CL: 74.99 DP=1.206m IL(150Ø): 73.78 IL(150Ø): 73.78

SMH_032 CL: 74.94 DP=0.925m IL(150Ø): 74.03

SMH_039 CL: 74.48 DP=1.223m IL(150Ø): 73.25 IL(150Ø): 73.25

SMH_038 CL: 74.45 DP=1.066m IL(150Ø): 73.38

SMH_045 CL: 74.26 DP=1.278m IL(150Ø): 72.98 IL(150Ø): 72.98

SMH_035 CL: 75.14 DP=1.559m IL(150Ø): 73.58 IL(150Ø): 73.58

SMH_034 CL: 75.03 DP=1.412m IL(150Ø): 73.62 IL(150Ø): 73.62

SMH_041 CL: 74.70 DP=1.559m IL(150Ø): 73.14 IL(150Ø): 73.14

SMH_040 CL: 74.55 DP=1.375m IL(150Ø): 73.17 IL(150Ø): 73.17

SMH_030 CL: 75.85 DP=2.269m IL(150Ø): 73.73 IL(300Ø): 73.58 IL(300Ø): 73.58

SMH_036 CL: 75.15 DP=1.820m IL(300Ø): 73.33 IL(150Ø): 73.48 IL(300Ø): 73.33

SMH_037 CL: 74.96 DP=1.410m IL(300Ø): 73.55

SMH_047 CL: 74.32 DP=1.435m IL(150Ø): 72.88 IL(150Ø): 72.88

SMH_043 CL: 74.47 DP=1.220m IL(300Ø): 73.25

SMH_042 CL: 74.63 DP=1.539m IL(300Ø): 73.12 IL(150Ø): 73.12 IL(300Ø): 73.10

FMH_022 CL: 75.76 DP=1.264m IL(100Ø): 74.50 IL(100Ø): 74.50 IL(100Ø): 74.50

FMH_006 CL: 74.91 DP=2.194m IL(150Ø): 72.72 IL(150Ø): 72.72

FMH_025 CL: 74.86 DP=0.859m IL(100Ø): 74.00 IL(100Ø): 74.00 IL(100Ø): 74.00

FMH_028 CL: 74.30 DP=0.798m IL(100Ø): 73.50 IL(100Ø): 73.50

SMH_048 CL: 74.12 DP=1.309m IL(300Ø): 72.85 IL(150Ø): 72.85 IL(300Ø): 72.85

FMH_010 CL: 73.78 DP=2.324m IL(150Ø): 71.45 IL(150Ø): 71.45

FMH_005 CL: 75.47 DP=2.464m IL(150Ø): 73.01 IL(100Ø): 74.30 IL(150Ø): 73.01

SMH_005A CL: 74.40 DP=1.425m IL(600Ø): 72.97 IL(300Ø): 73.27 IL(600Ø): 72.97

FMH_007 CL: 74.60 DP=2.180m IL(150Ø): 72.42 IL(100Ø): 73.80 IL(150Ø): 72.42

FMH_008 CL: 74.36 DP=2.229m IL(150Ø): 72.13 IL(150Ø): 72.13

FMH_009 CL: 74.09 DP=2.255m IL(150Ø): 71.84 IL(100Ø): 73.30 IL(150Ø): 71.84

SMH_006 CL: 74.47 DP=1.638m IL(600Ø): 72.91 IL(300Ø): 73.21 IL(600Ø): 72.91

SMH_007 CL: 73.90 DP=1.217m IL(600Ø): 72.69 IL(300Ø): 72.99 IL(600Ø): 72.69

SMH_008 CL: 73.74 DP=1.217m IL(600Ø): 72.53 IL(600Ø): 72.53

SMH_009 CL: 73.61 DP=1.207m IL(300Ø): 72.71 IL(600Ø): 72.41 IL(600Ø): 72.41

GRASSCRETE (SYSTEM C) - GC-01 (4)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1798m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
912m² x 400mm DEEP

GRASSCRETE (SYSTEM C) - GC-01 (5)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1846m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
1145m² x 400mm DEEP

GRASSCRETE (SYSTEM C) - GC-01 (6)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1838m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
1346m² x 400mm DEEP

KEY PLAN

NOTES

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4. Levels shown in metres above Ordnance Datum (mAOD).
5. 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.
6. All external drainage within trafficked areas with less than 1.2m cover to have type Z concrete bed and surround. All external drainage within landscaped areas with cover less than 0.6m to have type Z concrete bed and surround. All drainage with greater cover than the minimum required to have type S bed and surround.
7. All drainage to be laid soffit to soffit unless otherwise shown.
8. The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
9. All foul drainage to be minimum 100mm diameter, all surface water drainage to be minimum 150mm diameter unless otherwise shown.
10. Cover levels shown on this drawing refer to approximate surface levels. It is the contractors responsibility to ensure that access covers and frames are set at the final surface levels.
11. Where possible the contractor is to orientate manhole biscuits and covers to locate them parallel to kerbs and paving.
12. The Contractor should comply with hs(g) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
13. It is the contractors responsibility to determine the location and depth of all existing services, mains and cables prior to construction.
14. Contractor to provide temporary screens in each of the down stream manholes during the construction period of the development in accordance with SFA 2.9.10 and the local sewerage undertakers requirements.
15. All in-situ concrete and precast concrete components to be manufactured using Sulphate Resisting Portland Cement, (SRPC) to BS 4027, if required, subject to soil conditions. Manhole components to be to BS EN 1917:2002.
16. All ironwork to be kite marked by BSI or certified by equal inspection authority.
17. All redundant connections to be capped off and grouted from the down stream manhole.
18. All new drainage pipes to be jetted, CCTV surveyed with DVD recording and any defects highlighted to the supervising officer. Following the rectification of any defects, the drain is to be re-surveyed with CCTV and the recordings made available to the project manager/engineer.
19. Prior to commencing the works the contractor is to confirm details of the existing drainage system as noted on the drawing.
20. Prior to commencing the works the contractor is to undertake the drainage investigation work as noted on the drawing.

REV						
P03	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	18/04/24	J.MAGEE	18/04/24		
P02	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
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Wapping Road
Bristol
BS1 4RW
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CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 3

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7013	P03

GROUNDWATER AND CONTAMINATED LAND ISSUES HIGHLIGHTED WITHIN VARIOUS REPORTS. GEOTECHINCAL ENGINEER HAS REVIEWED CONDITIONS AND FULLY CONFIRMED INFILTRATION UNVIABLE. DISCHARGE TO WATER COURSE PROPOSED AS THE ALTERNATIVE DISPOSAL MEASURE.

DRAINAGE NOT SUBMITTED TO LLFA AS PART OF SECTION 73. CONDITIONS STILL STATE INFILTRATION AND AUTHORITY HAVE NOT RECEIVED OR COMMENTED ON CHANGE IN DRAINAGE STRATEGY. FURTHER CONDITIONS MAY BE REQUESTED. TBC.

POTENTIAL AREA OF CONTAMINATION "THE DUMP" FULL EXTENT TO BE CONFIRMED

ROAD TO FALL TOWARDS KERBDRAIN

SA-01 - INFILTRATION RATE: 2.08x10-5
REFER TO RIDGE
5015203-RDG-XX-ST-DOC-C-00GCA01-A
DEPTH: 75.090

INDICATES KERBDRAIN

SMH_026
CL: 75.94
DP=1.550m
IL(150Ø): 74.39
IL(150Ø): 74.39

SMH_026A
CL: 75.98
DP=1.537m
IL(150Ø): 74.45

SMH_014A
CL: 75.98
DP=1.129m
IL(150Ø): 75.00

SMH_014
CL: 75.95
DP=1.148m
IL(150Ø): 74.95
IL(150Ø): 74.95

RWP'S SHOWN INDICATIVE. ARCHITECTS TO CONFIRM LOCATIONS

403
76.000

402
76.000

SMH_028
CL: 75.95
DP=1.784m
IL(150Ø): 74.17

SMH_029
CL: 75.90
DP=1.924m
IL(150Ø): 74.13
IL(300Ø): 73.98

STACKS SHOWN INDICATIVE. M&E TO CONFIRM LOCATIONS

FMH_015

401
76.000

FMH_017

SMH_019A
CL: 75.97
DP=1.363m
IL(150Ø): 74.75

SMH_019
CL: 75.95
DP=1.408m
IL(150Ø): 74.70
IL(300Ø): 74.55

FMH_004
CL: 75.55
DP=2.246m
IL(150Ø): 73.30
IL(150Ø): 73.30

ACO

FMH_016
CL: 75.94
DP=0.443m
IL(100Ø): 75.50
IL(100Ø): 75.50
IL(100Ø): 75.50

SMH_017
CL: 75.90
DP=1.546m
IL(150Ø): 74.36
IL(150Ø): 74.36

SMH_016
CL: 75.98
DP=1.678m
IL(150Ø): 74.40
IL(150Ø): 74.40

FMH_002
CL: 75.71
DP=1.822m
IL(150Ø): 73.88
IL(150Ø): 73.88

ALLOW SPUR FOR FUTURE PHASE

SA-02 - INFILTRATION RATE: FAILED
REFER TO RIDGE:
5015203-RDG-XX-ST-DOC-C-00GCA01-A

RUNS AT 1:100 AS ASSUMED >5WC'S UPSTREAM AND ALLOWANCE FOR FUTURE PHASES

FMH_003
CL: 75.63
DP=2.035m
IL(150Ø): 73.60
IL(150Ø): 73.60

SMH_005
CL: 74.64
DP=1.848m
IL(600Ø): 73.13
IL(600Ø): 73.13

SMH_018
CL: 75.92
DP=1.801m
IL(300Ø): 74.12
IL(150Ø): 74.26
IL(300Ø): 74.12

SMH_004
CL: 74.99
DP=1.653m
IL(600Ø): 73.34
IL(600Ø): 73.34

HIT AND MISS KERBS TO ALLOW RUN-OFF TO SWALE

INDICATES BAFFLE IN SUB BASE

SMH_002
CL: 75.13
DP=1.606m
IL(600Ø): 73.53
IL(600Ø): 73.53

SMH_003
CL: 75.00
DP=1.495m
IL(600Ø): 73.50
IL(600Ø): 73.50

SMH_001
CL: 75.45
DP=1.864m
IL(300Ø): 73.59
IL(600Ø): 73.59

ALLOW FOR AN OVERFLOW INTO THE SYSTEM

INDICATES SUB BASE STORAGE ZONE

GRASSCRETE (SYSTEM C) - GC-01 (1)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1544m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
847m² x 400mm DEEP

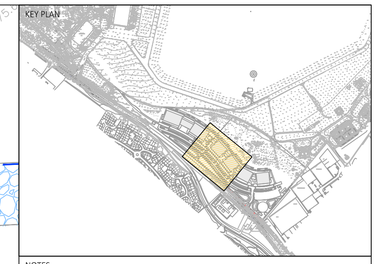
GRASSCRETE (SYSTEM C) - GC-01 (2)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1796m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
923m² x 400mm DEEP

GRASSCRETE (SYSTEM C) - GC-01 (3)
TO BE LOCATED BENEATH CAR PARK.
DRAINED AREA = 1898m²
SRP = 1 IN 100 YR + 40% CLIMATE CHANGE.
STORAGE PROVIDED IN OPEN GRADED CRUSHED ROCK (OGCR) TYPE 3 OR SIMILAR WITH MIN 30% VOIDS.
943m² x 400mm DEEP

SKIMMINGDISH LANE

RISK
NO TOPOGRAPHICAL SURVEY PRESENT ALONG CENTRAL PORTION OF SKIMMINGDISH LANE. SURVEY REQUIRED TO DETERMINE FEASIBILITY OF OUTFALL LEVEL

KEY PLAN



NOTES

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7. All drainage to be laid soffit to soffit unless otherwise shown.
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20. Prior to commencing the works the contractor is to undertake the drainage investigation work as noted on the drawing.

REV						
P03	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	18/04/24	J.MAGEE	18/04/24		
P02	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 4

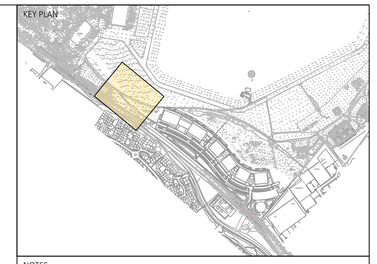
HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7014	P03

DRAINAGE NOT SUBMITTED TO LLFA AS PART OF SECTION 73. CONDITIONS STILL STATE INFILTRATION AND AUTHORITY HAVE NOT RECEIVED OR COMMENTED ON CHANGE IN DRAINAGE STRATEGY. FURTHER CONDITIONS MAY BE REQUESTED. TBC.

GROUNDWATER AND CONTAMINATED LAND ISSUES HIGHLIGHTED WITHIN VARIOUS REPORTS. GEOTECHINCAL ENGINEER HAS REVIEWED CONDITIONS AND FULLY CONFIRMED INFILTRATION UNVIABLE. DISCHARGE TO WATER COURSE PROPOSED AS THE ALTERNATIVE DISPOSAL MEASURE.



INDICATES FOUL RISING MAIN WITH HARD WIRED CABLE (INHIBITOR) TO COMMUNICATE BETWEEN PROPOSED AND EXISTING PUMP STATION

HIT AND MISS KERBS TO ALLOW RUN-OFF TO SWALE. TO INFILTRATE LOCALLY (SUBJECT TO INFILTRATION RESULTS)

INDICATES EXISTING WATERCOURSE

SKIMMINGDISH LANE

OFFSITE DRAINAGE TAKEN FROM BM-LE-HAD-XX-DR-CE-001-005 REV A

ALLOW FOR

NOTES

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7. All drainage to be laid soffit to soffit unless otherwise shown.
8. The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
9. All foul drainage to be minimum 100mm diameter, all surface water drainage to be minimum 150mm diameter unless otherwise shown.
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12. The Contractor should comply with hs(g) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
13. It is the contractors responsibility to determine the location and depth of all existing services, mains and cables prior to construction.
14. Contractor to provide temporary screens in each of the down stream manholes during the construction period of the development in accordance with SFA 2.9.10 and the local sewerage undertakers requirements.
15. All in-situ concrete and precast concrete components to be manufactured using Sulphate Resisting Portland Cement, (SRPC) to BS 4027, if required, subject to soil conditions. Manhole components to be to BS EN 1917:2002.
16. All ironwork to be kite marked by BSI or certified by equal inspection authority.
17. All redundant connections to be capped off and grouted from the down stream manhole.
18. All new drainage pipes to be jetted, CCTV surveyed with DVD recording and any defects highlighted to the supervising officer. Following the rectification of any defects, the drain is to be re-surveyed with CCTV and the recordings made available to the project manager/engineer.
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20. Prior to commencing the works the contractor is to undertake the drainage investigation work as noted on the drawing.

REV						
P03	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	18/04//24	J.MAGEE	18/04/24		
P02	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 5

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7015

REVISION
P03

GROUNDWATER AND CONTAMINATED LAND ISSUES HIGHLIGHTED WITHIN VARIOUS REPORTS. GEOTECHINCAL ENGINEER HAS REVIEWED CONDITIONS AND FULLY CONFIRMED INFILTRATION UNVIABLE. DISCHARGE TO WATER COURSE PROPOSED AS THE ALTERNATIVE DISPOSAL MEASURE.

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INDICATES FOUL RISING MAIN WITH HARD WIRED CABLE (INHIBITOR) TO COMMUNICATE BETWEEN PROPOSED AND EXISTING PUMP STATION

PUMP STATION DAISY CHAIN PROPOSED TO KEEP ONSITE FLOWS AT 3.8 L/S.

FMH_101
CL: 78.10
DP=0.900m
IL(100Ø): 77.40

100Ø@1.1%

CONNECTION TO THE EXISTING ONSITE PUMP STATION. RISING MAIN TO "DAISY CHAIN" INTO EXISTING SYSTEM.

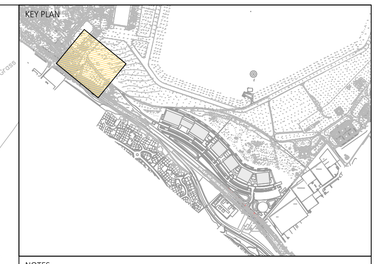
EXISTING PUMP STATION - EXPS
PARADIGM PUMP SYSTEM
TANK SIZE = 2.5mØ x 4.2m DEEP
SIZED IN ACCORDANCE WITH BREGS REQUIREMENTS
CL: 78.232
IL(IN): 76.601
FLOW RATE: 3.8 L/S
RISING MAIN OUTLET: 90mm OD SDR17

INDICATES EXISTING WATERCOURSE

OFFSITE DRAINAGE TAKEN FROM BM-LE-HAD-XX-DR-CE-001-005 REV A

SKIMMINGDISH LANE

KEY PLAN



NOTES

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4. Levels shown in metres above Ordnance Datum (mAOD).
5. 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.
6. All external drainage within trafficked areas with less than 1.2m cover to have type Z concrete bed and surround. All external drainage within landscaped areas with cover less than 0.6m to have type Z concrete bed and surround. All drainage with greater cover than the minimum required to have type S bed and surround.
7. All drainage to be laid soffit to soffit unless otherwise shown.
8. The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
9. All foul drainage to be minimum 100mm diameter, all surface water drainage to be minimum 150mm diameter unless otherwise shown.
10. Cover levels shown on this drawing refer to approximate surface levels. It is the contractors responsibility to ensure that access covers and frames are set at the final surface levels.
11. Where possible the contractor is to orientate manhole biscuits and covers to locate them parallel to kerbs and paving.
12. The Contractor should comply with hs(g) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
13. It is the contractors responsibility to determine the location and depth of all existing services, mains and cables prior to construction.
14. Contractor to provide temporary screens in each of the down stream manholes during the construction period of the development in accordance with SFA 2.9.10 and the local sewerage undertakers requirements.
15. All in-situ concrete and precast concrete components to be manufactured using Sulphate Resisting Portland Cement, (SRPC) to BS 4027, if required, subject to soil conditions. Manhole components to be to BS EN 1917:2002.
16. All ironwork to be kite marked by BSI or certified by equal inspection authority.
17. All redundant connections to be capped off and grouted from the down stream manhole.
18. All new drainage pipes to be jetted, CCTV surveyed with DVD recording and any defects highlighted to the supervising officer. Following the rectification of any defects, the drain is to be re-surveyed with CCTV and the recordings made available to the project manager/engineer.
19. Prior to commencing the works the contractor is to confirm details of the existing drainage system as noted on the drawing.
20. Prior to commencing the works the contractor is to undertake the drainage investigation work as noted on the drawing.

REV						
P03	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	18/04//24	J.MAGEE	18/04//24		
P02	UPDATED TO SUIT SITE PLAN					
	B.MURPHY	19/01/24	J.MAGEE	19/01/24		
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE LAYOUT
SHEET 6

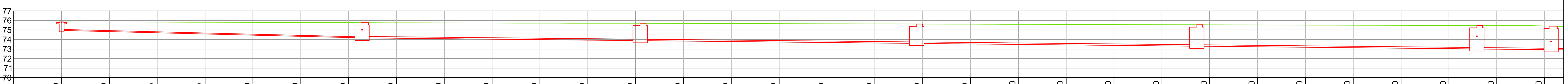
HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:250

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7016

REVISION
P03

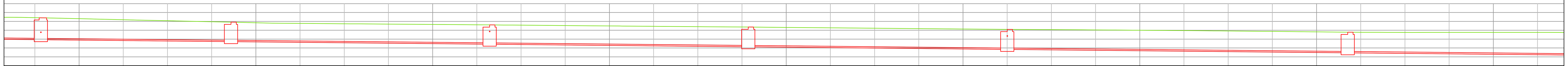
Alignment - (Foul Network) - (20)



CHAINAGE (M)	EXISTING LEVELS REF: DS_PGL
00.000	
05.000	75.838
10.000	75.828
15.000	75.816
20.000	75.802
25.000	75.786
30.000	75.770
35.000	75.755
40.000	75.742
45.000	75.731
50.000	75.721
55.000	75.713
60.000	75.707
65.000	75.691
70.000	75.675
75.000	75.661
80.000	75.649
85.000	75.639
90.000	75.628
95.000	75.611
	75.60
100.000	75.594
105.000	75.580
110.000	75.567
115.000	75.556
120.000	75.544
125.000	75.528
130.000	75.513
135.000	75.500
140.000	75.489
145.000	75.479
150.000	75.467
155.000	75.419

COVER LEVEL REF: Foul Network	INVERT LEVEL REF: Foul Network
75.845	74.960
75.765	74.130
75.706	73.884
75.631	73.595
75.549	73.303
75.474	73.010
75.403	72.932

PIPE DATA REF: Foul Network	PIPE DETAILS REF: Foul Network
100Ø @ 1:40	swp_1001 PVC Pipe SI 31.41M
150Ø @ 1:100	swp_1002 PVC Pipe SI 29.07M
150Ø @ 1:100	swp_1003 PVC Pipe SI 28.91M
150Ø @ 1:100	swp_1004 PVC Pipe SI 29.27M
150Ø @ 1:100	swp_1005 PVC Pipe SI 29.27M
150Ø @ 1:100	swp_1006 PVC Pipe SI 7.75M

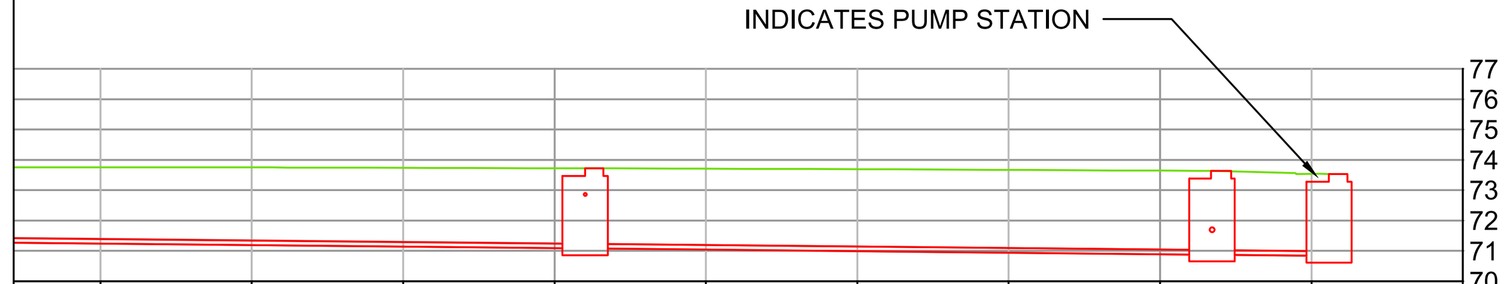


CHAINAGE (M)	EXISTING LEVELS
155.000	75.419
160.000	75.302
165.000	75.186
170.000	75.072
175.000	74.960
180.000	74.844
185.000	74.773
190.000	74.731
195.000	74.690
	74.67
200.000	74.652
205.000	74.615
210.000	74.572
215.000	74.527
220.000	74.485
225.000	74.443
230.000	74.404
235.000	74.366
240.000	74.322
245.000	74.277
250.000	74.231
255.000	74.186
260.000	74.140
265.000	74.094
270.000	74.065
275.000	74.035
280.000	74.002
285.000	73.961
290.000	73.917
295.000	73.869
	73.83
300.000	73.817
305.000	73.773
310.000	73.753
315.000	73.757
320.000	73.759
325.000	73.756

COVER LEVEL	INVERT LEVEL
75.403	72.932
74.911	72.717
74.604	72.425
74.361	72.132
74.094	71.839
73.778	71.454

PIPE DATA	PIPE DETAILS
@ 1:100	_1006 Pipe SI 75M
150Ø @ 1:100	swp_1007 PVC Pipe SI 21.51M
150Ø @ 1:100	swp_1008 PVC Pipe SI 29.27M
150Ø @ 1:100	swp_1009 PVC Pipe SI 29.26M
150Ø @ 1:100	swp_1010 PVC Pipe SI 29.30M
150Ø @ 1:100	swp_1035 PVC Pipe SI 38.52M
150Ø @ 1:100	swp_1012 PVC Pipe SI 37.48M

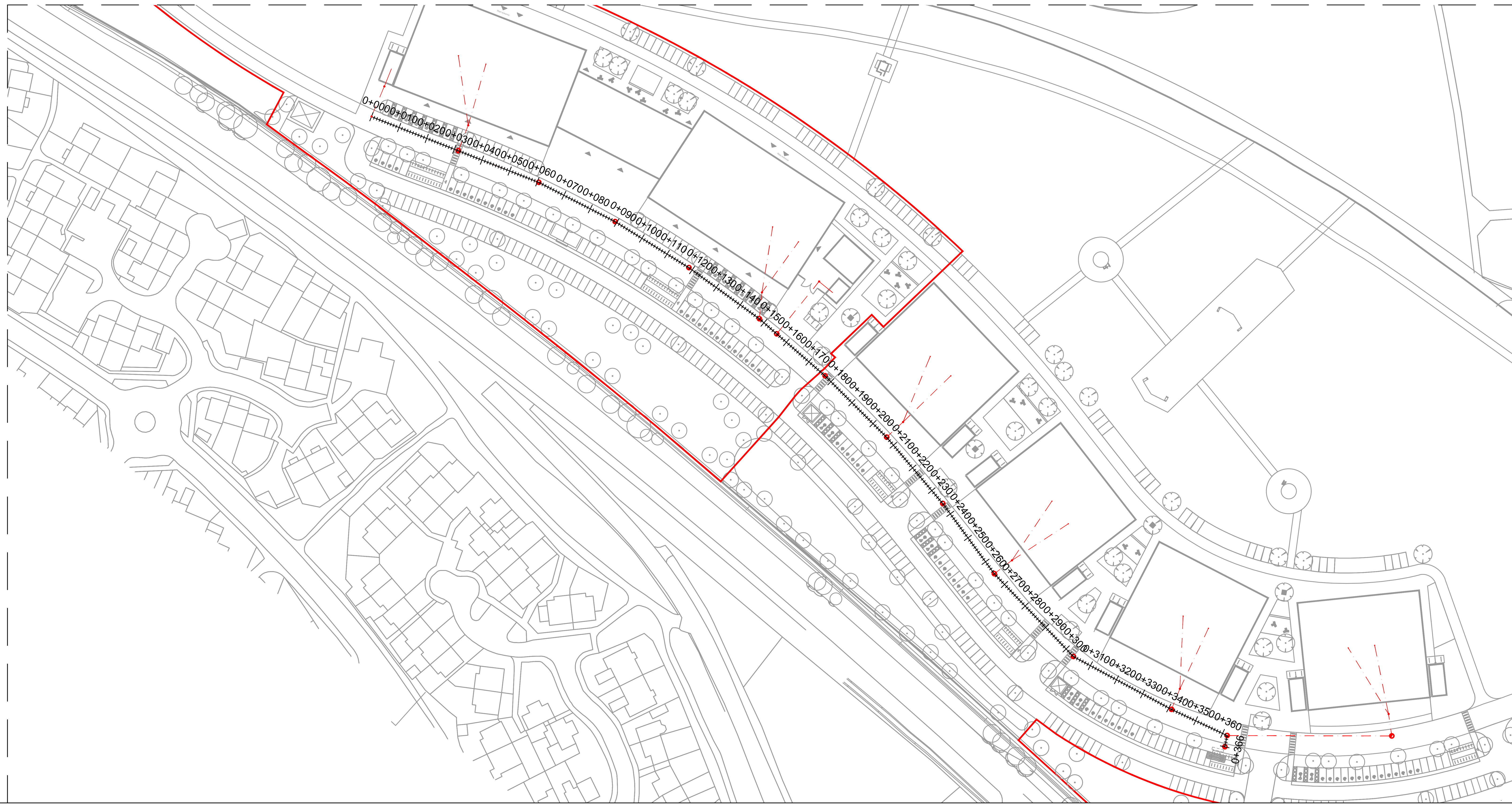
INDICATES PUMP STATION



CHAINAGE (M)	EXISTING LEVELS
325.000	73.756
330.000	73.749
335.000	73.738
340.000	73.723
345.000	73.708
350.000	73.691
355.000	73.669
360.000	73.643
365.000	73.536

COVER LEVEL	INVERT LEVEL
73.719	71.079
73.634	70.872
73.530	70.833

PIPE DATA	PIPE DETAILS
@ 1:100	_1012 Pipe SI 48M
150Ø @ 1:100	swp_1013 PVC Pipe SI 20.71M
150Ø @ 1:100	swp_1014 PVC Pipe SI 3.86M



KEY PLAN

NOTES

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REV	REVISION NOTES/COMMENTS					
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE SECTIONS - FOUL

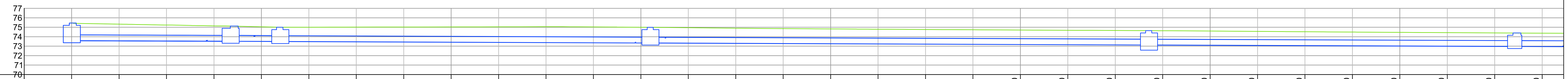
HYDROCK PROJECT NO.	SCALE @ A1
C-27280	NTS

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7063	P02

KEY PLAN

Alignment - (Surface Network) 1



CHAINAGE (M)	EXISTING LEVELS REF: DS_PGL
00.000	
05.000	75.329
10.000	75.231
15.000	75.143
20.000	75.046
25.000	75.002
30.000	75.013
35.000	75.022
40.000	75.031
45.000	75.040
50.000	75.049
55.000	75.033
60.000	74.999
65.000	74.950
70.000	74.899
75.000	74.857
80.000	74.822
85.000	74.790
90.000	74.760
95.000	74.731
	74.73
100.000	74.705
105.000	74.681
110.000	74.659
115.000	74.634
120.000	74.598
125.000	74.561
130.000	74.524
135.000	74.490
140.000	74.457
145.000	74.428
150.000	74.400
155.000	74.372

COVER LEVEL REF: Surface Network	75.450	75.133	74.996	74.992	74.645	74.399
INVERT LEVEL REF: Surface Network	73.586	73.527	73.501	73.338	72.797	72.974

PIPE DATA REF: Surface Network	600Ø @ 1:283	600Ø @ 1:201	600Ø @ 1:240	600Ø @ 1:250	600Ø @ 1:250
PIPE DETAILS REF: Surface Network	SWP_1024 PVC Pipe SI 16.75M	SWP_1066 PVC Pipe SI 5.23M	SWP_1026 PVC Pipe SI 39.02M	SWP_1019 PVC Pipe SI 52.55M	SWP_1004 PVC Pipe SI 38.55M

NOTES

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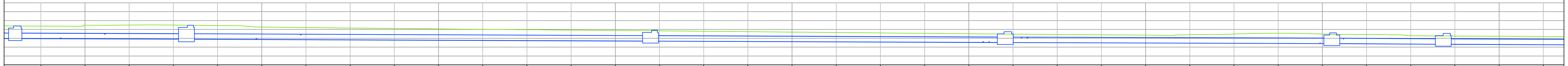
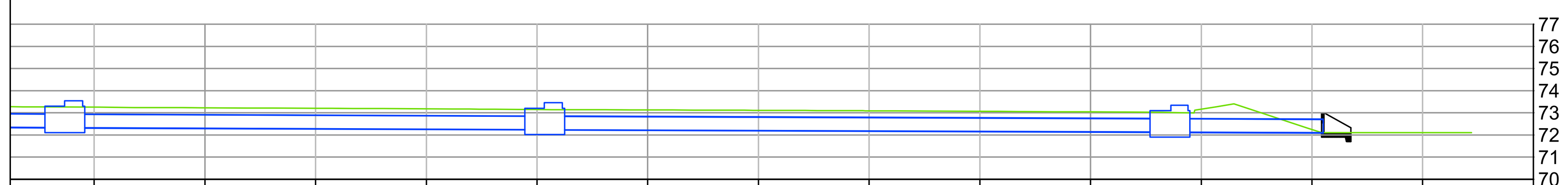


CHAINAGE (M)	EXISTING LEVELS
155.000	74.372
160.000	74.474
165.000	74.490
170.000	74.493
175.000	74.432
180.000	74.264
185.000	74.212
190.000	74.156
195.000	74.107
	74.09
200.000	74.059
205.000	74.012
210.000	73.967
215.000	73.925
220.000	73.882
225.000	73.843
230.000	73.791
235.000	73.743
240.000	73.697
245.000	73.652
250.000	73.605
255.000	73.559
260.000	73.513
265.000	73.468
270.000	73.432
275.000	73.393
280.000	73.353
285.000	73.401
290.000	73.478
295.000	73.564
300.000	73.481
	73.46
305.000	73.433
310.000	73.293
315.000	73.256
320.000	73.228
325.000	73.205

COVER LEVEL	74.399	74.473	73.904	73.743	73.613	73.548
INVERT LEVEL	72.974	72.835	72.687	72.526	72.406	72.331

PIPE DATA	600Ø @ 1:289	600Ø @ 1:238	600Ø @ 1:250	600Ø @ 1:308	600Ø @ 1:167	600Ø @ 1:238
PIPE DETAILS	SWP_1004A PVC Pipe SI 19.35M	SWP_1005 PVC Pipe SI 52.54M	SWP_1006 PVC Pipe SI 40.14M	SWP_1037 PVC Pipe SI 36.94M	SWP_1033 PVC Pipe SI 12.55M	SWP_1038 PVC Pipe SI 21.67M

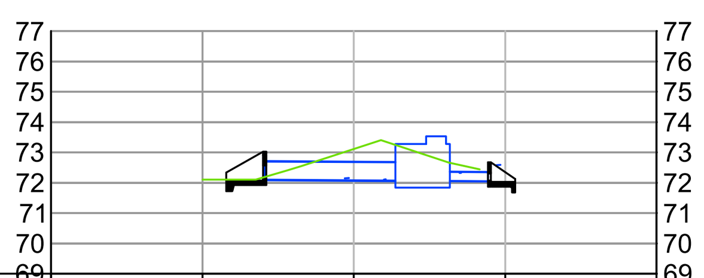


CHAINAGE (M)	EXISTING LEVELS
315.000	73.256
320.000	73.228
325.000	73.205
330.000	73.179
335.000	73.149
340.000	73.131
345.000	73.113
350.000	73.092
355.000	73.067
360.000	73.040
365.000	73.162
370.000	72.241
375.000	72.100

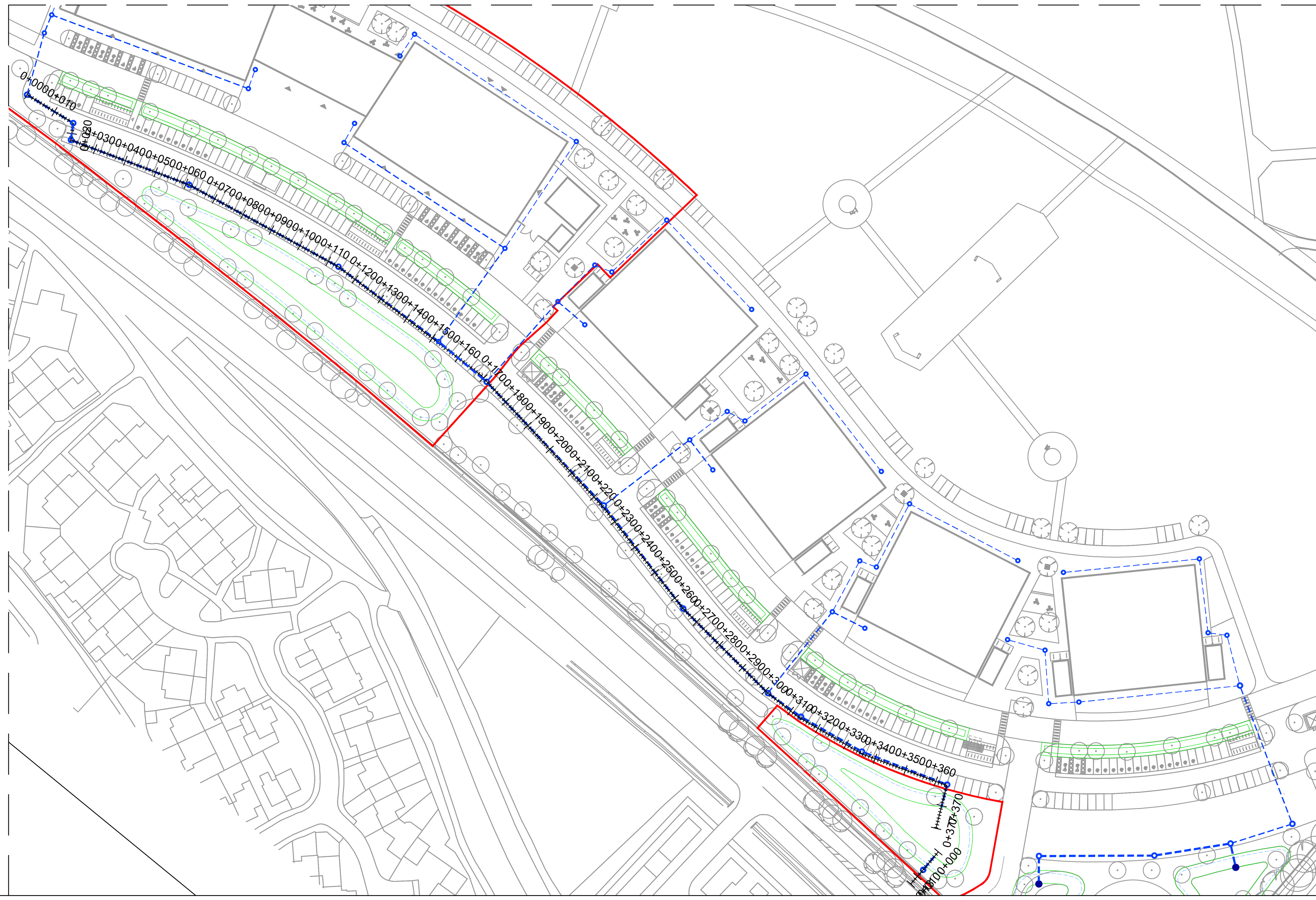
COVER LEVEL	73.548	73.456	73.345	72.749
INVERT LEVEL	72.331	72.239	72.128	???

PIPE DATA	600Ø @ 1:238	600Ø @ 1:252	600Ø @ 1:260
PIPE DETAILS	SWP_1038 PVC Pipe SI 21.67M	SWP_1045 PVC Pipe SI 28.20M	SWP_1039 PVC Pipe SI 7.20M

Alignment - (Surface Network) 2



CHAINAGE (M)	00.000	05.000	10.000	
EXISTING LEVELS REF: DS_PGL		73.108		13.076
COVER LEVEL REF: Surface Network		73.532		
INVERT LEVEL REF: Surface Network		72.065		
PIPE DATA REF: Surface Network		600Ø @ 1:000Ø @ 1:144		
PIPE DETAILS REF: Surface Network		SWP_1035 PVC Pipe SI 5.21M	SWP_1036 PVC Pipe SI 2.16M	



REV	REVISION NOTES/COMMENTS					
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

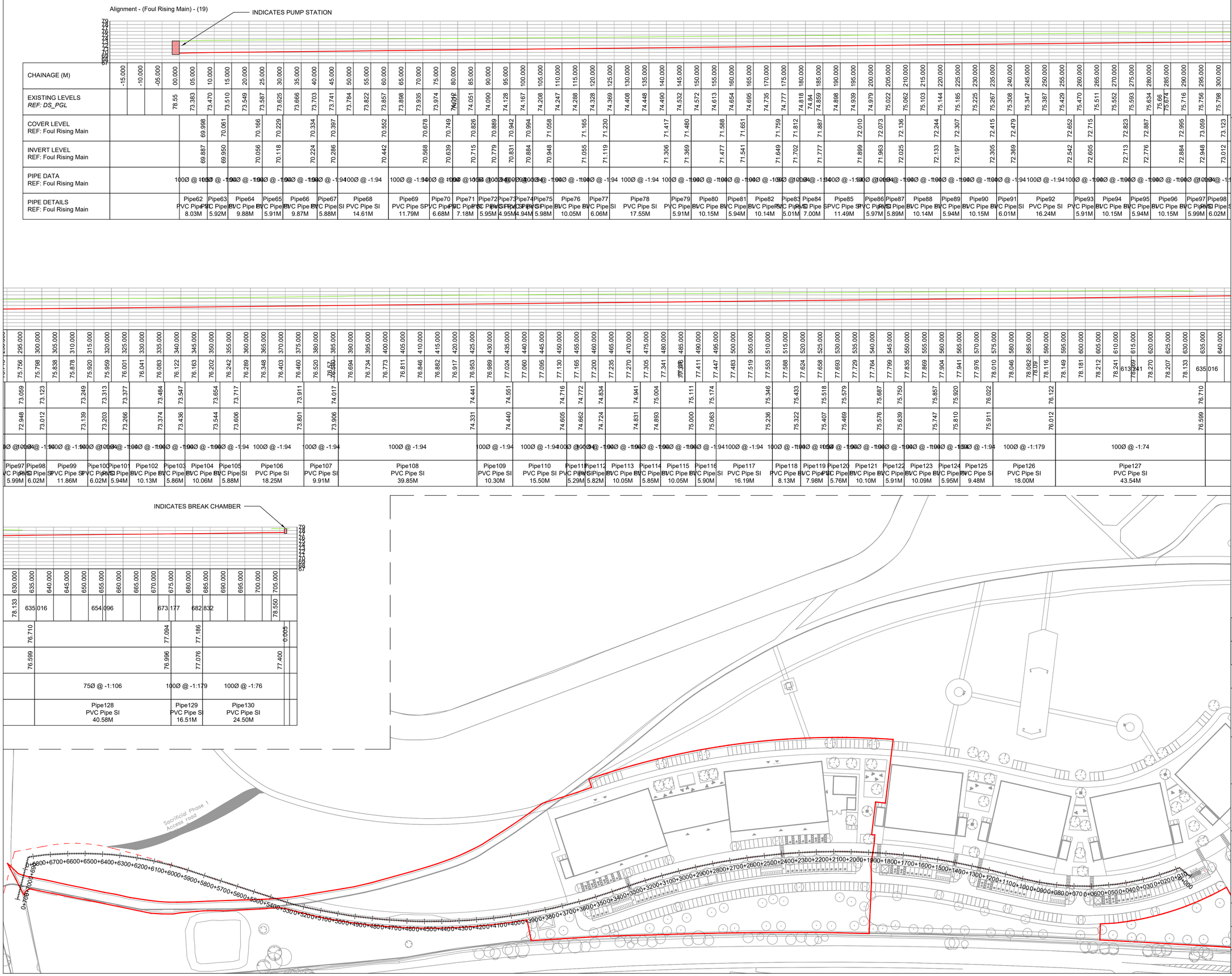
Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE SECTIONS - SURFACE

HYDROCK PROJECT NO. C-27280
SCALE @ A1 NTS
STATUS DESCRIPTION SUITABLE FOR STAGE 3
STATUS S4
DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) 27280-HYD-00-ZZ-DR-C-7064
REVISION P02



KEY PLAN

NOTES

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4. All levels are shown in metres above Ordnance Datum (m AOD).

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	06/11/23	J.MAGEE	06/11/23		

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

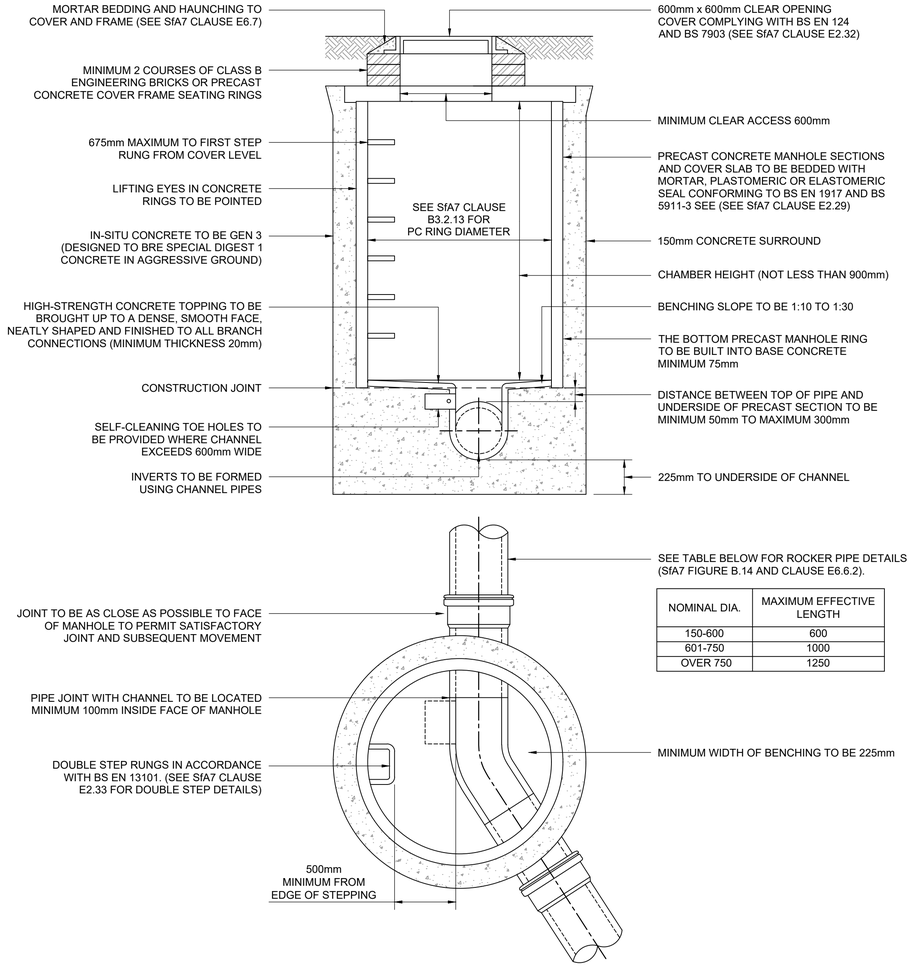
TITLE

DRAINAGE SECTIONS - FOUL RISING MAIN

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	NTS

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S4

DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7065	P02

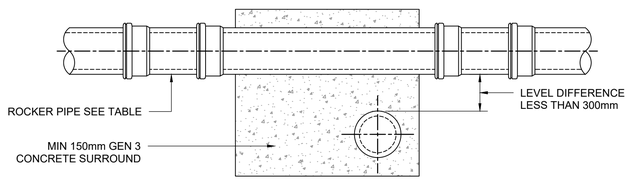


NOMINAL DIA.	MAXIMUM EFFECTIVE LENGTH
150-600	600
601-750	1000
OVER 750	1250

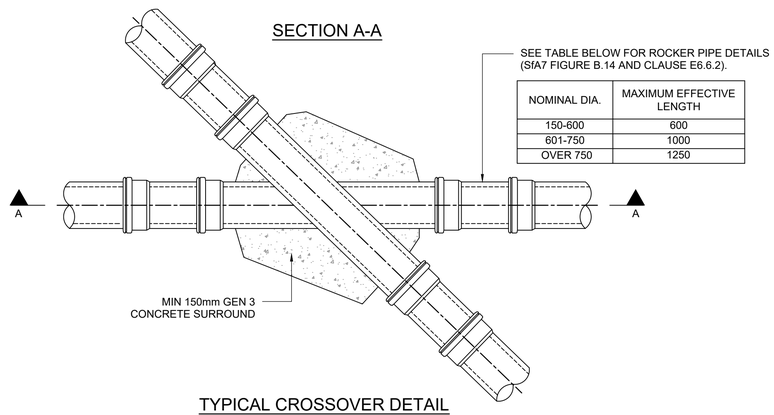
TYPICAL MANHOLE DETAIL - TYPE 2

SCALE 1:20

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m



SECTION A-A



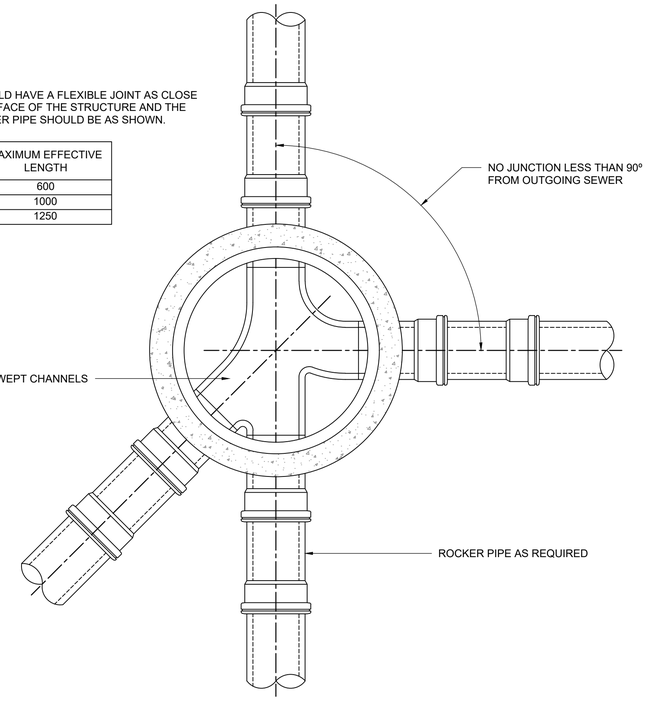
NOMINAL DIA.	MAXIMUM EFFECTIVE LENGTH
150-600	600
601-750	1000
OVER 750	1250

TYPICAL CROSSOVER DETAIL

SCALE 1:25

PIPES BUILT INTO MANHOLE SHOULD HAVE A FLEXIBLE JOINT AS CLOSE AS FEASIBLE TO THE EXTERNAL FACE OF THE STRUCTURE AND THE LENGTH OF THE NEXT ROCKER PIPE SHOULD BE AS SHOWN.

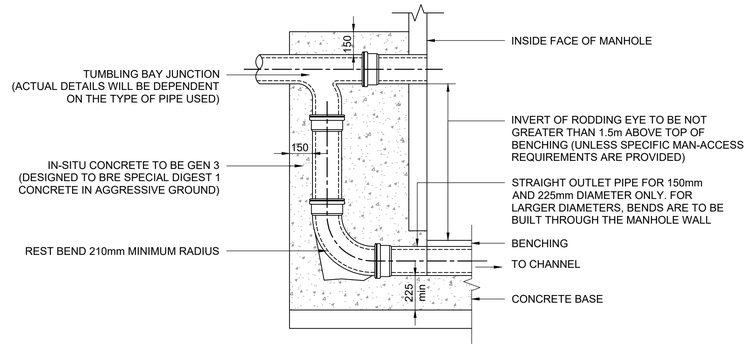
NOMINAL DIA.	MAXIMUM EFFECTIVE LENGTH
150-600	600
601-750	1000
OVER 750	1250



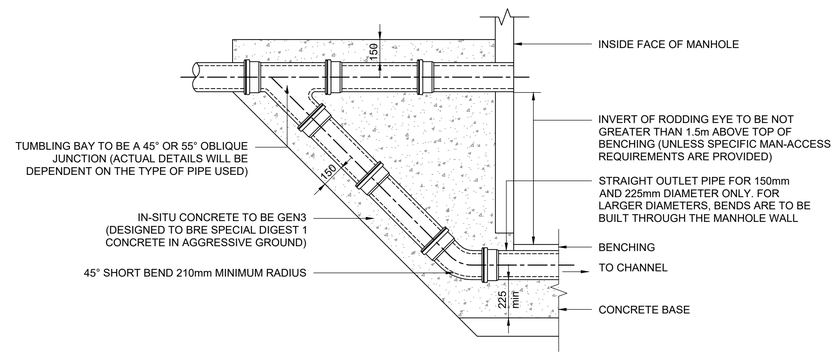
ALL PIPES ENTERING THE BOTTOM OF THE MANHOLE TO HAVE SOFFITS LEVEL.

TYPICAL ARRANGEMENT OF PIPE JUNCTIONS WITHIN MANHOLES

SCALE 1:20



EXTERNAL VERTICAL BACKDROP



EXTERNAL RAMPED BACKDROP

NOTE: STEEPER GRADIENTS ARE PREFERRED TO THE USE OF BACKDROPS. TYPE OF BACKDROP TO BE USED TO BE AGREED WITH UNDERTAKER.

TYPICAL VERTICAL AND RAMPED BACKDROP DETAIL

SCALE 1:20

KEY PLAN

NOTES

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REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
	SUITABLE FOR STAGE 3					
P02	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
	REVISED STAGE 3 - YASA SUBMISSION					

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

TITLE

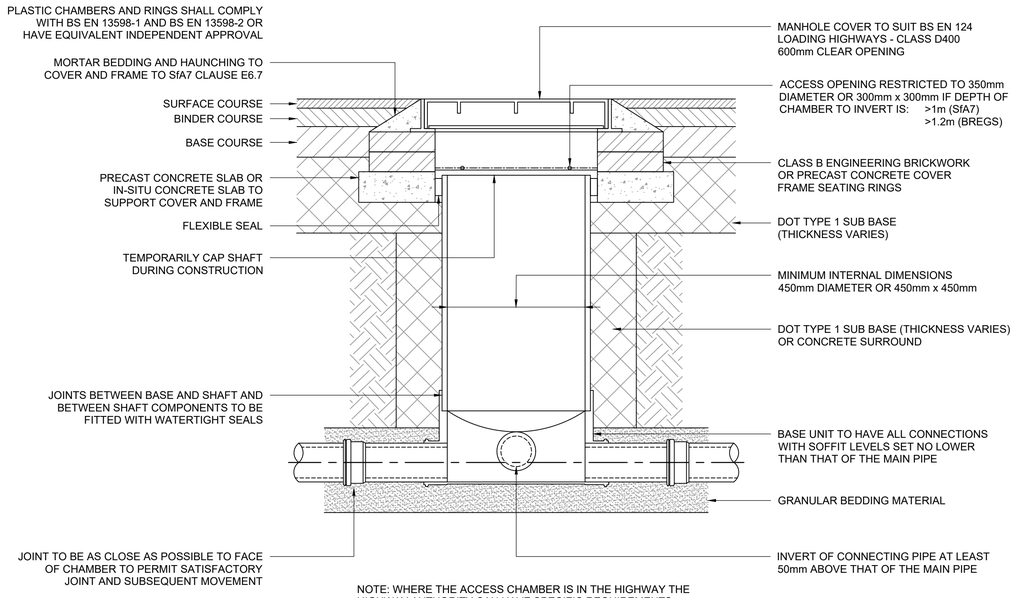
DRAINAGE DETAILS
SHEET 1

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	AS SHOWN

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7100

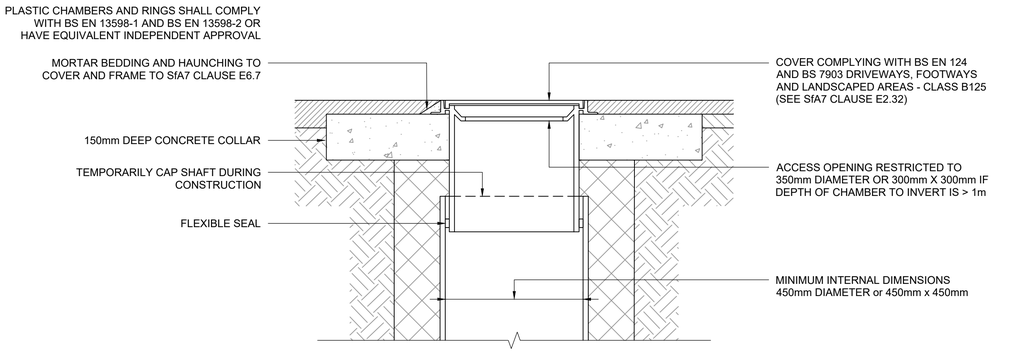
REVISION
P02



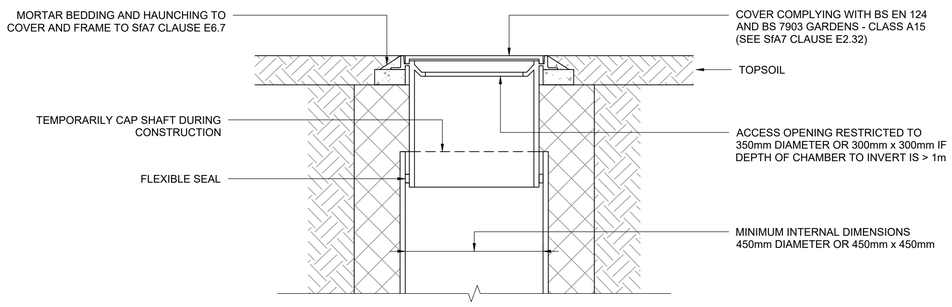
NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY THE HIGHWAY AUTHORITY CAN HAVE SPECIFIC REQUIREMENTS

TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3 (Flexible material detail)

SCALE 1:10
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
IN AREAS SUBJECT TO VEHICLE LOADING 3m, NON-ENTRY



SITED IN DOMESTIC DRIVEWAYS OR FOOTWAYS



SITED IN DOMESTIC GARDENS

NOTE: WHERE THE ACCESS CHAMBER IS IN THE HIGHWAY THE HIGHWAY AUTHORITY CAN HAVE SPECIFIC REQUIREMENTS

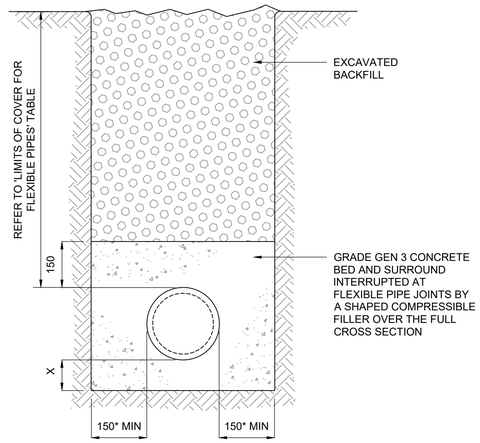
ALTERNATIVE TOP DETAILS FOR LIGHT VEHICLE LOADING AND LANDSCAPED AREAS - TYPE 3

SCALE 1:10

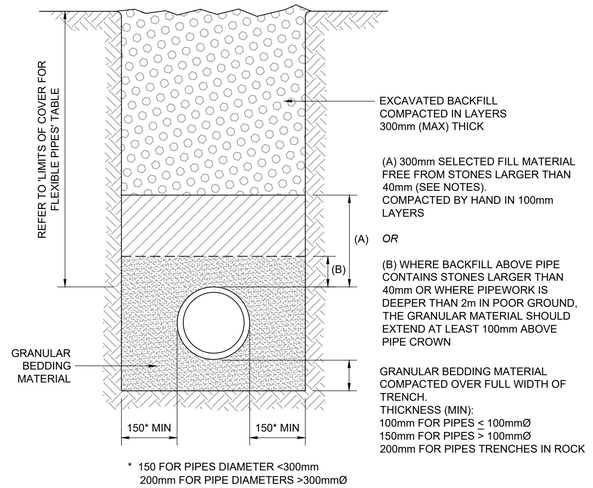
USE OF GRANULAR BEDDING MATERIAL:

NOMINAL BORE OF PIPE (min)	AGGREGATE SIZE (mm) SINGLE SIZED	GRADED
100	10	-
150	10 OR 14	14 TO 5
225-300	10,14 OR 20	14 TO 5 OR 20 TO 5
375-525	14 OR 20	14 TO 5 OR 20 TO 5
EXCEEDING 525	14,20 OR 40	14 TO 5 OR 20 TO 5 40 TO 5

DIM X ≥ 100mm FOR PIPES ≤ 100mmØ
DIM X ≥ 150mm FOR PIPES > 100mmØ
DIM X ≥ 200mm FOR PIPES TRENCHES IN ROCK



CLASS Z BEDDING
CONCRETE SURROUND



* 150 FOR PIPES DIAMETER <300mm
200mm FOR PIPE DIAMETERS >300mmØ

CLASS P BEDDING

TYPICAL PIPE BEDDING FOR PIPES UP TO 800mm DIA

SCALE 1:10

NOTES:

1. * = 150 FOR PIPES DIAMETER UP TO 300mm,
   * = 200mm FOR PIPE DIAMETERS OVER 300mmØ

BASED ON NARROW TRENCH THEORY: DESIGNER TO CONFIRM FOR SPECIFIC PIPELINE.

2. BACKFILL MATERIAL TO BE SELECTED EXCAVATED MATERIAL WHERE THIS MATERIAL COMPLIES WITH CESWI. ADDITIONAL MATERIAL TO MAKE UP ANY DEFICIENCY TO BE GRANULAR SUB-BASE TYPE 1 UNLESS STATED OTHERWISE.

3. IN WET, SOFT, OR SILTY SOILS, WHERE LATERAL SUPPORT IS NOT OBTAINED OR WHERE FINES MAY MIGRATE, THE GRANULAR BEDDING MATERIAL SHALL BE SURROUNDED BY GEOTEXTILE FABRIC WITH MIN 200 OVERLAP.

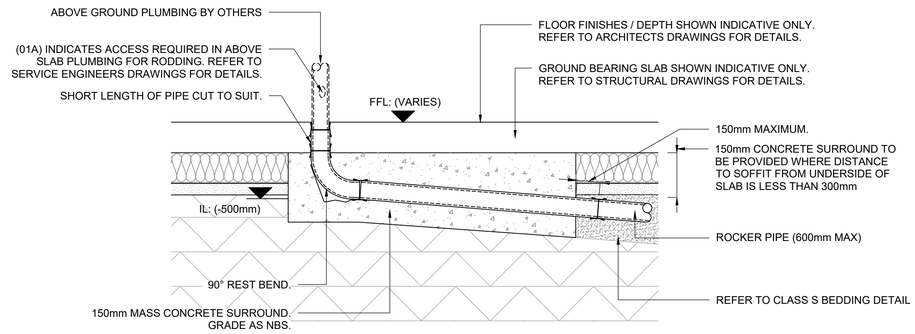
4. TRENCH BACKFILL TO MEET HIGHWAY SPECIFICATION WHEN LAID IN ROAD OR FOOTPATH.

FOR AREAS ADOPTED HIGHWAYS	FOR AREAS SUBJECT TO LIGHT VEHICULAR ACCESS	FOR AREAS NOT UNDER ROADS OR BUILDINGS
USE CLASS P BEDDING WHERE COVER IS: 1.2m Min & 8.0m Max - FOR 100mm DIA PIPES 1.2m MIn & 4.0m Max - FOR 150mm DIA PIPES OR GREATER FOR DEFINITION OF AREAS OF ADOPTED HIGHWAY SEE LAYOUT DRG	USE CLASS P BEDDING WHERE COVER IS: 0.9m Min & 8.0m Max - FOR 100mm DIA PIPES 0.9m MIn & 5.0m Max - FOR 150mm DIA PIPES OR GREATER FOR DEFINITION OF AREAS OF VEHICLE ACCESS SEE LAYOUT DRG	USE CLASS P BEDDING WHERE COVER IS: 0.6m Min & 8.0m Max - FOR 100mm DIA PIPES 0.6m Min & 5.0m Max - FOR 150mm DIA PIPES OR GREATER
WHERE COVER IS LESS THAN THE ABOVE: FOR UPVC PIPE USE OPTION 1 CLASS Z + REINFORCEMENT AS RECOMMENDED IN BS5955-6:1980 OR OPTION 2 CLASS Q BEDDING + RC SLAB PROTECTION. REFER TO NBS FOR DETAILS.		WHERE COVER IS LESS THAN THE ABOVE: FOR UPVC PIPE USE CLASS Z

NOTE:
REFERENCE SHOULD BE MADE TO PIPE MANUFACTURER/SUPPLIER TO CONFIRM THE LIMITS OF COVER NOTED ABOVE ARE ACCEPTABLE

LIMITS OF COVER TO FLEXIBLE (PVCu) PIPES

BS EN 752 & BUILDING REGS PART H



TYPICAL INTERNAL OUTLET: 01 & 01A FOR GROUND BEARING SLAB

SCALE 1:20
(REFER TO DRAINAGE LAYOUT FOR LOCATION)

KEY PLAN

NOTES

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REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
P02	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24

P01 SUITABLE FOR STAGE 3
P02 REVISED STAGE 3 - YASA SUBMISSION

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE DETAILS
SHEET 2

HYDROCK PROJECT NO.
C-27280

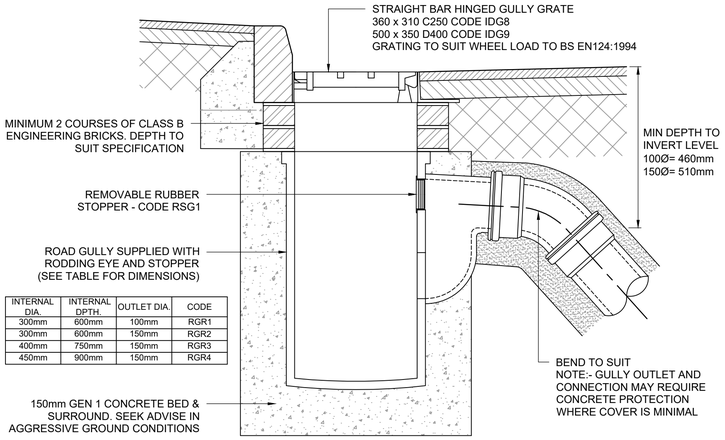
SCALE @ A1
AS SHOWN

STATUS DESCRIPTION
SUITABLE FOR STAGE 3

STATUS
S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7101

REVISION
P02



INTERNAL DIA.	INTERNAL DPTH.	OUTLET DIA.	CODE
300mm	600mm	100mm	RGR1
300mm	600mm	150mm	RGR2
400mm	750mm	150mm	RGR3
450mm	900mm	150mm	RGR4

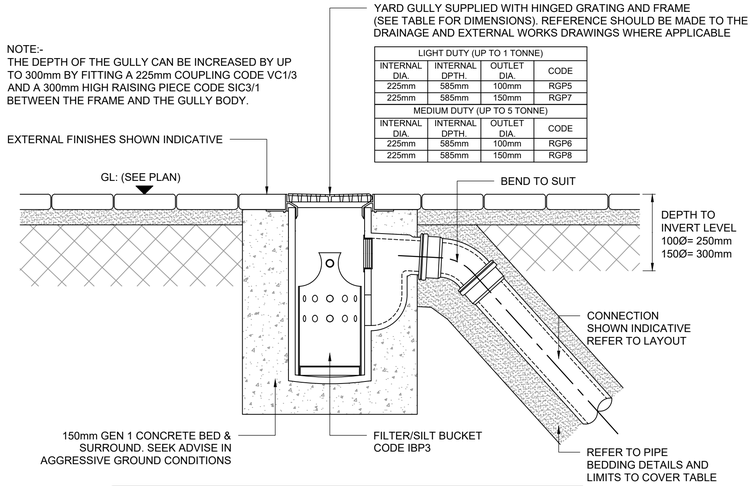
GULLY DETAIL BASED ON HEPWORTH SUPERSLEVE CLAY DRAINAGE ROAD GULLY DETAIL. FOR FURTHER DETAILS REFER TO MANUFACTURERS RECOMMENDATIONS.

SHOULD AN ALTERNATIVE GULLY WISH TO BE SPECIFIED THEN IT IS THE RESPONSIBILITY OF THE SPECIFIER TO ENSURE THAT THE ALTERNATIVE IS COMPARABLE IN TERMS OF DETAIL AND PERFORMANCE REQUIREMENTS. PROPOSALS SHOULD BE SUBMITTED WHERE APPLICABLE TO THE DESIGNER FOR APPROVAL.

DETAIL RG: ROAD GULLY

SCALE 1:10

NOTE:-
THE DEPTH OF THE GULLY CAN BE INCREASED BY UP TO 300mm BY FITTING A 225mm COUPLING CODE VC1/3 AND A 300mm HIGH RAISING PIECE CODE SIC3/1 BETWEEN THE FRAME AND THE GULLY BODY.



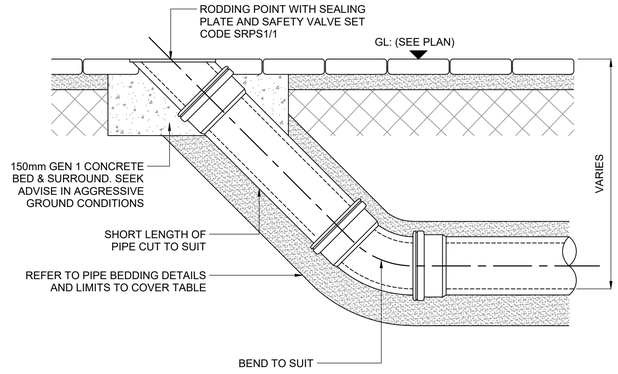
LIGHT DUTY (UP TO 1 TONNE)			
INTERNAL DIA.	INTERNAL DPTH.	OUTLET DIA.	CODE
225mm	585mm	100mm	RGP5
225mm	585mm	150mm	RGP7
MEDIUM DUTY (UP TO 5 TONNE)			
INTERNAL DIA.	INTERNAL DPTH.	OUTLET DIA.	CODE
225mm	585mm	100mm	RGP6
225mm	585mm	150mm	RGP8

GULLY DETAIL BASED ON HEPWORTH SUPERSLEVE CLAY DRAINAGE YARD GULLY DETAIL. FOR FURTHER DETAILS REFER TO MANUFACTURERS RECOMMENDATIONS.

SHOULD AN ALTERNATIVE GULLY WISH TO BE SPECIFIED THEN IT IS THE RESPONSIBILITY OF THE SPECIFIER TO ENSURE THAT THE ALTERNATIVE IS COMPARABLE IN TERMS OF DETAIL AND PERFORMANCE REQUIREMENTS. PROPOSALS SHOULD BE SUBMITTED WHERE APPLICABLE TO THE DESIGNER FOR APPROVAL.

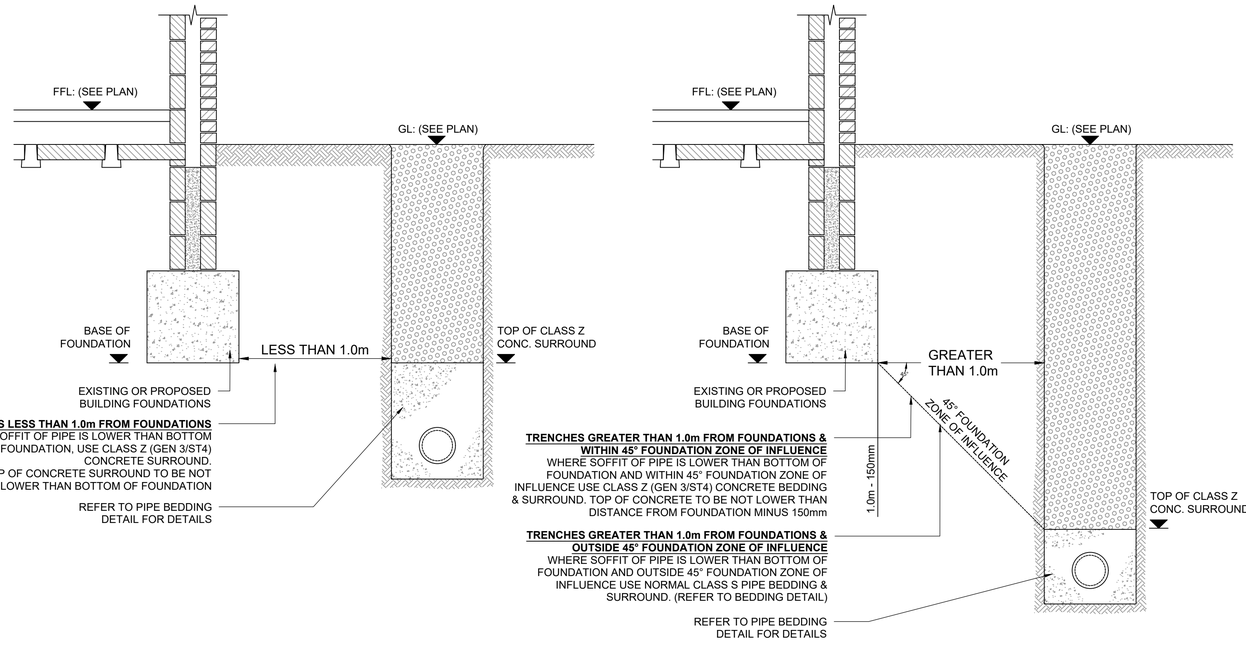
DETAIL YG: YARD GULLY

SCALE 1:10



TYPICAL RODDING EYE DETAIL

SCALE 1:10

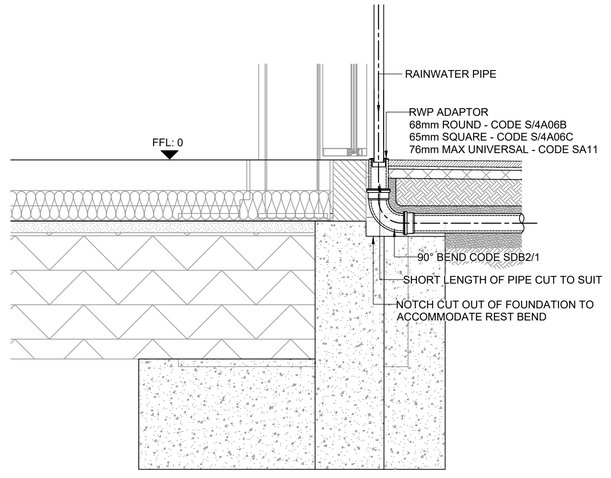


DRAINAGE TRENCH LESS THAN 1.0m FROM EXISTING/PROPOSED FOUNDATIONS

DRAINAGE TRENCH GREATER THAN 1.0m FROM EXISTING/PROPOSED FOUNDATIONS

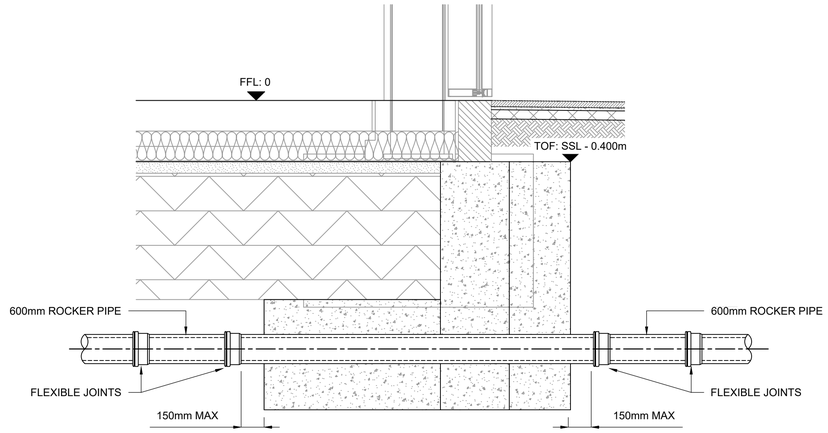
PIPE PROTECTION ADJACENT TO EXISTING/PROPOSED FOUNDATIONS

SCALE 1:20



TYPICAL RAINWATER WATER PIPE 01 & 01A DETAIL

SCALE 1:20



TYPICAL DRAIN THROUGH FOUNDATION DETAIL

SCALE 1:20

KEY PLAN

NOTES

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REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

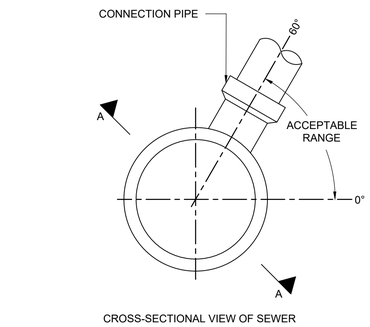
PROJECT
BICESTER MOTION

TITLE
DRAINAGE DETAILS
SHEET 3

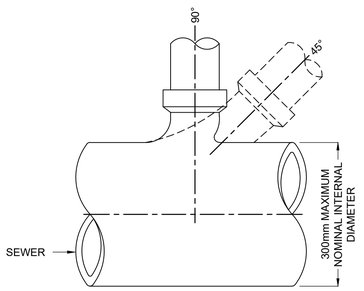
HYDROCK PROJECT NO.	SCALE @ A1
C-27280	AS SHOWN

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7102	P02



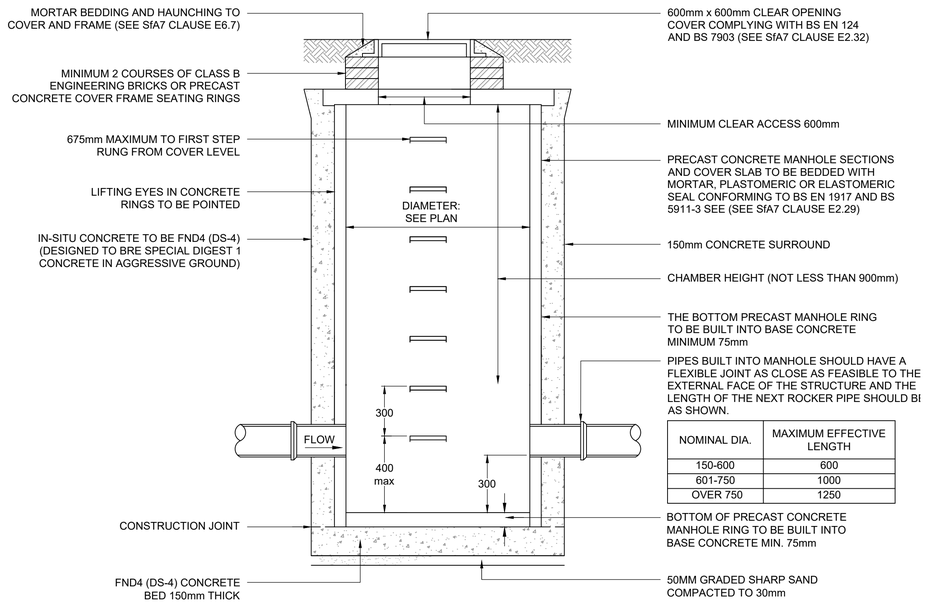
CROSS-SECTIONAL VIEW OF SEWER



PLAN VIEWED IN
DIRECTION OF ARROW - A

CONNECTIONS TO SEWER

SCALE 1:20

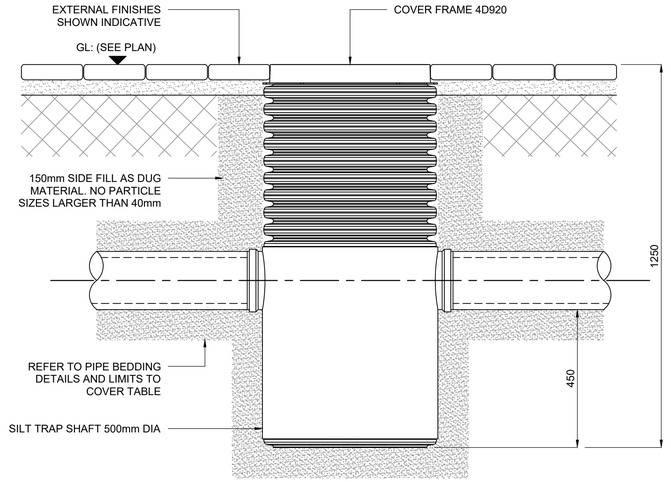


NOMINAL DIA.	MAXIMUM EFFECTIVE LENGTH
150-600	600
601-750	1000
OVER 750	1250

TYPICAL CATCHPIT DETAIL

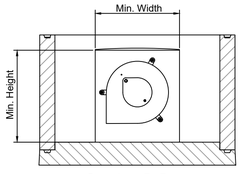
SCALE 1:20

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m



TYPICAL SILT TRAP DETAIL

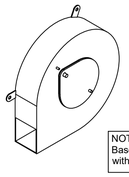
SCALE 1:10



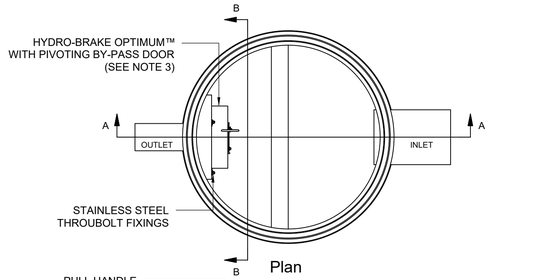
Section B-B
(View on mounting block)

Technical Specification Criteria		
BBA Approved	Head (m)	Flow (L/s)
Design Point		
Flush Flow		
Kick Flow		
Optimisation		

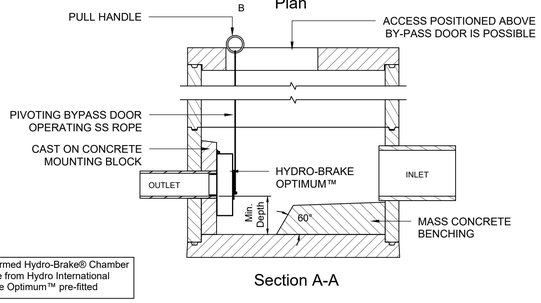
Physical Specification	
Min. Block Width	
Min. Block Height	
Min. Sump Depth	
Min. Outlet Diameter	



NOTE - A pre-formed Hydro-Brake® Chamber Base is available from Hydro International with Hydro-Brake Optimum™ pre-fitted



Plan



Section A-A

TYPICAL HYDRO-BRAKE

SCALE 1:20

KEY PLAN

NOTES

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REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
DRAINAGE DETAILS
SHEET 4

HYDROCK PROJECT NO.
C-27280-C

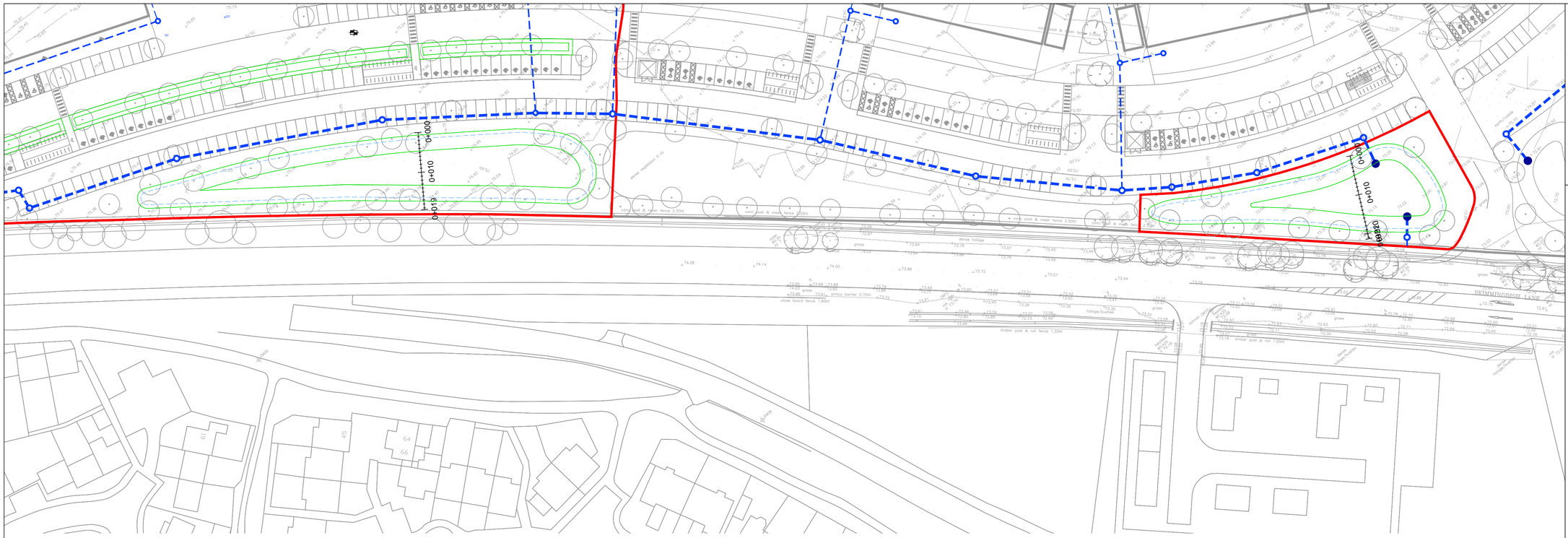
SCALE @ A1
AS SHOWN

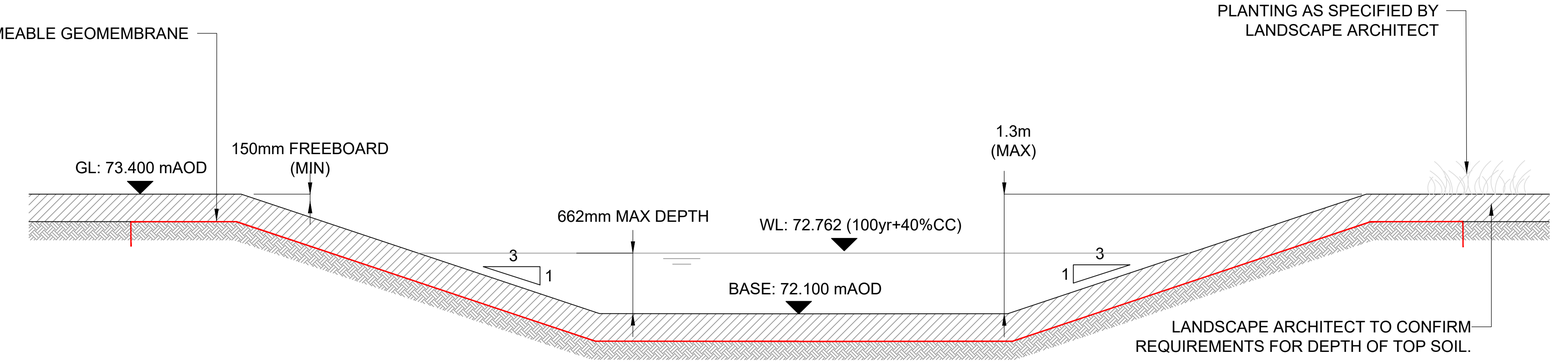
STATUS DESCRIPTION
SUITABLE FOR STAGE 3

STATUS
S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7103

REVISION
P02





DRY BASIN - BA-01

SCALE 1:50

Alignment - (7)

CHAINAGE (M)	05.000	10.000	15.000	20.000
EXISTING LEVELS *REF: DS_PGL*	73.100	73.100	73.660	
PROPOSED LEVELS *REF: DS_PGL*				
HORIZONTAL GEOMETRY REF: Alignment - (7)	L =19.416			
VERTICAL GEOMETRY REF: Alignment - (7)	G =-32.496% L =3.678	G =-0.000% L =0.881	G =0.000% L =7.728	G =32.362% L =2.160 =32.362% L =1.857 =10.657% L =2.130

Alignment - (7) (1)

CHAINAGE (M)	05.000	10.000	15.000	20.000
EXISTING LEVELS *REF: DS_PGL (1)*	72.108	72.100	72.136	
PROPOSED LEVELS *REF: DS_PGL (1)*				
HORIZONTAL GEOMETRY REF: Alignment - (7) (1)	L =21.352			
VERTICAL GEOMETRY REF: Alignment - (7) (1)	G =11.617% L =0.846 =40.358% L =1.843 =-31.679% L =2.337	G =-0.000% L =1.802	G =0.000% L =8.046	G =28.459% L =3.732 =-29.787% L =1.800 =10.536% L =0.988

KEY PLAN

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4. All levels are shown in metres above Ordnance Datum (m AOD).

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	J.MAGEE	06/10/23	J.MAGEE	06/10/23		
P02	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24

REVISED STAGE 3 - YASA SUBMISSION

SUITABLE FOR STAGE 3

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

TITLE

SUDS DETAIL

HYDROCK PROJECT NO.

C-27280

SCALE @ A1

NTS

STATUS DESCRIPTION

SUITABLE FOR STAGE 3

STATUS

S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)

27280-HYD-00-ZZ-DR-C-7311

REVISION

P02

KEY PLAN

NOTES

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4. All levels are shown in metres above Ordnance Datum (m AOD).

KEY

	AREA 1 GRASS (excluding green areas)	= 29124m^2
	A1 HARD LANDSCAPING	= 2107m^2
	TOTAL	= 31231m^2

KEY

	AREA 2 GRASS	= 7097m^2
	A2 HARD LANDSCAPING	= 1410m^2
	TOTAL	= 8507m^2

TOTAL	= 39738m^2

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	PRELIMINARY ISSUE					
	C.HOPKINSON	30.11.23	J.MCGEE	NYI	J.MCGEE	NYI

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

TITLE

PRE-DEVELOPMENT CATCHMENT PLAN

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:1000

STATUS DESCRIPTION	STATUS
FOR INFORMATION	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7710

REVISION
P01

KEY PLAN

NOTES

1. 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.
2. 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.
3. 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.
4. All levels are shown in metres above Ordnance Datum (m AOD).

PHASE 1 KEY

	BUILDING / ROOF	= 9800m^2
	PERMEABLE PAVING	= 12026m^2
	HARDSTANDING	= 7286m^2
	SOFT LANDSCAPING	= 2541m^2
	TOTAL	= 31653m^2

PHASE 2 KEY

	BUILDING / ROOF	= 1619m^2
	PERMEABLE PAVING	= 4298m^2
	HARDSTANDING	= 1536m^2
	SOFT LANDSCAPING	= 616m^2
	TOTAL	= 8069m^2

TOTAL = 39722m^2

P02	REVISED TO SUIT LAYOUT					
	C.HOPKINSON	27/03/24	J.MAGEE	27/03/24	J.MAGEE	NYI
P01	PRELIMINARY ISSUE					
	C.HOPKINSON	01/02/24	J.MAGEE	02/02/24	J.MAGEE	02/02/24
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LTD

PROJECT
BICESTER MOTION

TITLE
POST-DEVELOPMENT CATCHMENT PLAN

HYDROCK PROJECT NO. C-27280-C	SCALE @ A1 NTS
STATUS DESCRIPTION PLANNING	STATUS S2
DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) 27280-HYD-00-ZZ-SK-C-7720	REVISION P02

Appendix B – Surface Water Calculations

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

- Indicates pipe length does not match coordinates

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	26.762	0.310	86.3	0.253	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	19.792	0.070	282.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.002	4.622	0.020	231.1	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.003	40.616	0.160	253.8	0.153	0.00	0.0	0.600	o	600	Pipe/Conduit	
S2.000	33.172	0.260	127.6	0.309	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	52.528	0.210	250.1	0.154	0.00	0.0	0.600	o	600	Pipe/Conduit	
S3.000	34.380	0.170	202.2	0.308	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	55.234	0.220	251.1	0.155	0.00	0.0	0.600	o	600	Pipe/Conduit	
S4.000	33.686	0.120	280.7	0.309	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	55.145	0.220	250.7	0.155	0.00	0.0	0.600	o	600	Pipe/Conduit	
S5.000	33.700	0.130	259.2	0.302	5.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.26	73.900	0.253	0.0	0.0	0.0	1.69	119.7	34.3
S1.001	50.00	5.49	73.590	0.253	0.0	0.0	0.0	1.44	408.1	34.3
S1.002	50.00	5.54	73.520	0.253	0.0	0.0	0.0	1.60	451.7	34.3
S1.003	50.00	5.98	73.500	0.406	0.0	0.0	0.0	1.52	430.8	55.0
S2.000	50.00	5.40	73.900	0.309	0.0	0.0	0.0	1.39	98.3	41.8
S1.004	50.00	6.55	73.340	0.869	0.0	0.0	0.0	1.54	434.1	117.7
S3.000	50.00	5.52	73.600	0.308	0.0	0.0	0.0	1.10	77.9	41.7
S1.005	50.00	7.16	73.130	1.332	0.0	0.0	0.0	1.53	433.3	180.4
S4.000	50.00	5.60	73.330	0.309	0.0	0.0	0.0	0.93	66.0	41.8
S1.006	50.00	7.75	72.910	1.796	0.0	0.0	0.0	1.53	433.6	243.2
S5.000	50.00	5.58	73.120	0.302	0.0	0.0	0.0	0.97	68.7	40.8

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.007	40.147	0.160	250.9	0.185	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.008	36.941	0.120	307.8	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S6.000	32.044	0.110	291.3	0.301	5.00	0.0	0.600	o	300	Pipe/Conduit	
S1.009	11.831	0.080	147.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.010	22.764	0.090	252.9	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.011	27.931	0.110	253.9	0.218	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.012	1.000#	0.030	33.3	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.013	2.249	0.040	56.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.000	45.566	0.150	303.8	0.348	5.00	0.0	0.600	o	300	Pipe/Conduit	
S7.001	20.001	0.060	333.4	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.002	23.728	0.080	296.6	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.003	35.714	0.120	297.6	0.391	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.004	1.000#	0.030	33.3	0.043	0.00	0.0	0.600	o	600	Pipe/Conduit	
S7.005	3.681	0.097	38.0	0.023	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.007	50.00	8.19	72.690	2.283	0.0	0.0	0.0	1.53	433.4	309.1
S1.008	50.00	8.64	72.530	2.283	0.0	0.0	0.0	1.38	390.9	309.1
S6.000	50.00	5.58	72.820	0.301	0.0	0.0	0.0	0.92	64.8	40.8
S1.009	50.00	8.74	72.410	2.584	0.0	0.0	0.0	2.00	565.6	349.9
S1.010	50.00	8.98	72.330	2.584	0.0	0.0	0.0	1.53	431.6	349.9
S1.011	50.00	9.29	72.240	2.803	0.0	0.0	0.0	1.52	430.8	379.5
S1.012	50.00	9.29	72.130	2.803	0.0	0.0	0.0	4.23	1195.4	379.5
S1.013	50.00	9.30	72.100	2.803	0.0	0.0	0.0	3.25	919.5	379.5
S7.000	50.00	5.85	72.540	0.348	0.0	0.0	0.0	0.90	63.4	47.1
S7.001	50.00	6.10	72.390	0.348	0.0	0.0	0.0	1.33	375.5	47.1
S7.002	50.00	6.38	72.330	0.348	0.0	0.0	0.0	1.41	398.3	47.1
S7.003	50.00	6.80	72.250	0.739	0.0	0.0	0.0	1.41	397.6	100.0
S7.004	50.00	6.81	72.130	0.781	0.0	0.0	0.0	4.23	1195.4	105.8
S7.005	50.00	6.82	72.100	0.804	0.0	0.0	0.0	3.96	1119.3	108.9

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Date 18/04/2024 22:13 | Designed by jasonmagee
File Drawnet.MDX | Checked by
Innovyze | Network 2020.1.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	76.370	2.470	Open Manhole	1200	S1.000	73.900	300				
S2	75.710	2.120	Open Manhole	1500	S1.001	73.590	600	S1.000	73.590	300	
S3	75.560	2.040	Open Manhole	1500	S1.002	73.520	600	S1.001	73.520	600	
S4	75.560	2.060	Open Manhole	1500	S1.003	73.500	600	S1.002	73.500	600	
S5	76.120	2.220	Open Manhole	1200	S2.000	73.900	300				
S5	75.050	1.710	Open Manhole	1500	S1.004	73.340	600	S1.003	73.340	600	
								S2.000	73.640	300	
S7	75.690	2.090	Open Manhole	1200	S3.000	73.600	300				
S6	74.760	1.630	Open Manhole	1500	S1.005	73.130	600	S1.004	73.130	600	
								S3.000	73.430	300	
S9	75.170	1.840	Open Manhole	1200	S4.000	73.330	300				
S7	74.500	1.590	Open Manhole	1500	S1.006	72.910	600	S1.005	72.910	600	
								S4.000	73.210	300	
S11	74.660	1.540	Open Manhole	1200	S5.000	73.120	300				
S8	73.900	1.210	Open Manhole	1500	S1.007	72.690	600	S1.006	72.690	600	
								S5.000	72.990	300	
S9	73.740	1.210	Open Manhole	1500	S1.008	72.530	600	S1.007	72.530	600	
S14	74.120	1.300	Open Manhole	1200	S6.000	72.820	300				
S10	73.610	1.200	Open Manhole	1500	S1.009	72.410	600	S1.008	72.410	600	
								S6.000	72.710	300	
S11	73.550	1.220	Open Manhole	1500	S1.010	72.330	600	S1.009	72.330	600	
S12	73.460	1.220	Open Manhole	1500	S1.011	72.240	600	S1.010	72.240	600	
S13	73.340	1.210	Open Manhole	1500	S1.012	72.130	600	S1.011	72.130	600	
S14	73.500	1.400	Open Manhole	1500	S1.013	72.100	600	S1.012	72.100	600	
S	73.500	1.440	Open Manhole	0		OUTFALL		S1.013	72.060	600	
S20	73.870	1.330	Open Manhole	1200	S7.000	72.540	300				
S21	73.300	0.910	Open Manhole	1500	S7.001	72.390	600	S7.000	72.390	300	
S22	73.230	0.900	Open Manhole	1500	S7.002	72.330	600	S7.001	72.330	600	
S23	73.460	1.210	Open Manhole	1500	S7.003	72.250	600	S7.002	72.250	600	
S24	73.350	1.220	Open Manhole	1500	S7.004	72.130	600	S7.003	72.130	600	
S25	73.500	1.400	Open Manhole	1500	S7.005	72.100	600	S7.004	72.100	600	
S	73.500	1.497	Open Manhole	0		OUTFALL		S7.005	72.003	600	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	459497.506	224028.487	459497.506	224028.487	Required	
S2	459486.027	224004.311	459486.027	224004.311	Required	
S3	459504.019	223996.065	459504.019	223996.065	Required	
S4	459502.449	223991.717	459502.449	223991.717	Required	
S5	459554.175	224007.630	459554.175	224007.630	Required	
S5	459540.466	223977.422	459540.466	223977.422	Required	
S7	459605.518	223980.251	459605.518	223980.251	Required	
S6	459586.293	223951.750	459586.293	223951.750	Required	
S9	459653.582	223943.213	459653.582	223943.213	Required	
S7	459630.518	223918.661	459630.518	223918.661	Required	
S11	459694.167	223899.469	459694.167	223899.469	Required	
S8	459668.010	223878.221	459668.010	223878.221	Required	
S9	459692.857	223846.686	459692.857	223846.686	Required	
S14	459738.918	223845.701	459738.918	223845.701	Required	
S10	459719.006	223820.593	459719.006	223820.593	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S11	459728.289	223813.258	459728.289	223813.258	Required	
S12	459748.001	223801.873	459748.001	223801.873	Required	
S13	459774.163	223792.093	459774.163	223792.093	Required	
S14	459766.867	223766.074	459766.867	223766.074	Required	
S	459765.356	223764.408			No Entry	
S20	459864.638	223822.851	459864.638	223822.851	Required	
S21	459880.782	223780.241	459880.782	223780.241	Required	
S22	459861.714	223774.205	459861.714	223774.205	Required	
S23	459838.331	223770.176	459838.331	223770.176	Required	
S24	459802.617	223770.324	459802.617	223770.324	Required	
S25	459800.721	223736.442	459800.721	223736.442	Required	
S	459798.300	223733.669			No Entry	

PIPELINE SCHEDULES for Storm

Upstream Manhole

- Indicates pipe length does not match coordinates

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	76.370	73.900	2.170	Open Manhole	1200
S1.001	o	600	S2	75.710	73.590	1.520	Open Manhole	1500
S1.002	o	600	S3	75.560	73.520	1.440	Open Manhole	1500
S1.003	o	600	S4	75.560	73.500	1.460	Open Manhole	1500
S2.000	o	300	S5	76.120	73.900	1.920	Open Manhole	1200
S1.004	o	600	S5	75.050	73.340	1.110	Open Manhole	1500
S3.000	o	300	S7	75.690	73.600	1.790	Open Manhole	1200
S1.005	o	600	S6	74.760	73.130	1.030	Open Manhole	1500
S4.000	o	300	S9	75.170	73.330	1.540	Open Manhole	1200
S1.006	o	600	S7	74.500	72.910	0.990	Open Manhole	1500
S5.000	o	300	S11	74.660	73.120	1.240	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	26.762	86.3	S2	75.710	73.590	1.820	Open Manhole	1500
S1.001	19.792	282.7	S3	75.560	73.520	1.440	Open Manhole	1500
S1.002	4.622	231.1	S4	75.560	73.500	1.460	Open Manhole	1500
S1.003	40.616	253.8	S5	75.050	73.340	1.110	Open Manhole	1500
S2.000	33.172	127.6	S5	75.050	73.640	1.110	Open Manhole	1500
S1.004	52.528	250.1	S6	74.760	73.130	1.030	Open Manhole	1500
S3.000	34.380	202.2	S6	74.760	73.430	1.030	Open Manhole	1500
S1.005	55.234	251.1	S7	74.500	72.910	0.990	Open Manhole	1500
S4.000	33.686	280.7	S7	74.500	73.210	0.990	Open Manhole	1500
S1.006	55.145	250.7	S8	73.900	72.690	0.610	Open Manhole	1500
S5.000	33.700	259.2	S8	73.900	72.990	0.610	Open Manhole	1500

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.007	o	600	S8	73.900	72.690	0.610	Open Manhole	1500
S1.008	o	600	S9	73.740	72.530	0.610	Open Manhole	1500
S6.000	o	300	S14	74.120	72.820	1.000	Open Manhole	1200
S1.009	o	600	S10	73.610	72.410	0.600	Open Manhole	1500
S1.010	o	600	S11	73.550	72.330	0.620	Open Manhole	1500
S1.011	o	600	S12	73.460	72.240	0.620	Open Manhole	1500
S1.012	o	600	S13	73.340	72.130	0.610	Open Manhole	1500
S1.013	o	600	S14	73.500	72.100	0.800	Open Manhole	1500
S7.000	o	300	S20	73.870	72.540	1.030	Open Manhole	1200
S7.001	o	600	S21	73.300	72.390	0.310	Open Manhole	1500
S7.002	o	600	S22	73.230	72.330	0.300	Open Manhole	1500
S7.003	o	600	S23	73.460	72.250	0.610	Open Manhole	1500
S7.004	o	600	S24	73.350	72.130	0.620	Open Manhole	1500
S7.005	o	600	S25	73.500	72.100	0.800	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.007	40.147	250.9	S9	73.740	72.530	0.610	Open Manhole	1500
S1.008	36.941	307.8	S10	73.610	72.410	0.600	Open Manhole	1500
S6.000	32.044	291.3	S10	73.610	72.710	0.600	Open Manhole	1500
S1.009	11.831	147.9	S11	73.550	72.330	0.620	Open Manhole	1500
S1.010	22.764	252.9	S12	73.460	72.240	0.620	Open Manhole	1500
S1.011	27.931	253.9	S13	73.340	72.130	0.610	Open Manhole	1500
S1.012	1.000#	33.3	S14	73.500	72.100	0.800	Open Manhole	1500
S1.013	2.249	56.2	S	73.500	72.060	0.840	Open Manhole	0
S7.000	45.566	303.8	S21	73.300	72.390	0.610	Open Manhole	1500
S7.001	20.001	333.4	S22	73.230	72.330	0.300	Open Manhole	1500
S7.002	23.728	296.6	S23	73.460	72.250	0.610	Open Manhole	1500
S7.003	35.714	297.6	S24	73.350	72.130	0.620	Open Manhole	1500
S7.004	1.000#	33.3	S25	73.500	72.100	0.800	Open Manhole	1500
S7.005	3.681	38.0	S	73.500	72.003	0.897	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.253	0.253	0.253
1.001	-	-	100	0.000	0.000	0.000
1.002	-	-	100	0.000	0.000	0.000
1.003	User	-	100	0.153	0.153	0.153
2.000	User	-	100	0.309	0.309	0.309
1.004	User	-	100	0.154	0.154	0.154
3.000	User	-	100	0.308	0.308	0.308
1.005	User	-	100	0.155	0.155	0.155
4.000	User	-	100	0.309	0.309	0.309
1.006	User	-	100	0.155	0.155	0.155
5.000	User	-	100	0.302	0.302	0.302
1.007	User	-	100	0.185	0.185	0.185
1.008	-	-	100	0.000	0.000	0.000
6.000	User	-	100	0.301	0.301	0.301
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
1.011	User	-	100	0.218	0.218	0.218
1.012	-	-	100	0.000	0.000	0.000
1.013	-	-	100	0.000	0.000	0.000
7.000	User	-	100	0.330	0.330	0.330
	User	-	100	0.017	0.017	0.348
7.001	-	-	100	0.000	0.000	0.000
7.002	-	-	100	0.000	0.000	0.000
7.003	User	-	100	0.391	0.391	0.391
7.004	User	-	100	0.043	0.043	0.043
7.005	User	-	100	0.023	0.023	0.023
				Total	Total	Total
				3.606	3.606	3.606

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.013	S	73.500	72.060	72.060	0	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S7.005	S	73.500	72.003	72.000	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Storage Structures	10
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.409		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.005, Volume (m³): 19.6

Unit Reference	MD-SHE-0124-7000-0970-7000
Design Head (m)	0.970
Design Flow (l/s)	7.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	124
Invert Level (m)	73.130
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.970	7.0
Flush-Flo™	0.293	7.0
Kick-Flo®	0.643	5.8
Mean Flow over Head Range	-	6.0

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	4.4	1.200	7.7	3.000	11.9	7.000	17.8
0.200	6.8	1.400	8.3	3.500	12.8	7.500	18.4
0.300	7.0	1.600	8.8	4.000	13.6	8.000	19.0
0.400	6.9	1.800	9.3	4.500	14.4	8.500	19.6
0.500	6.7	2.000	9.8	5.000	15.2	9.000	20.1
0.600	6.2	2.200	10.3	5.500	15.9	9.500	20.6
0.800	6.4	2.400	10.7	6.000	16.5		
1.000	7.1	2.600	11.1	6.500	17.2		

Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.013, Volume (m³): 2.3

Unit Reference	MD-SHE-0165-1310-1000-1310
Design Head (m)	1.000
Design Flow (l/s)	13.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	165
Invert Level (m)	72.100
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Hydro-Brake® Optimum Manhole: S14, DS/PN: S1.013, Volume (m³): 2.3

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	13.1
Flush-Flo™	0.315	13.1
Kick-Flo®	0.694	11.0
Mean Flow over Head Range	-	11.2

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	5.9	1.200	14.3	3.000	22.1	7.000	33.2
0.200	12.7	1.400	15.4	3.500	23.8	7.500	34.3
0.300	13.1	1.600	16.4	4.000	25.4	8.000	35.4
0.400	13.0	1.800	17.3	4.500	26.8	8.500	36.5
0.500	12.7	2.000	18.2	5.000	28.2	9.000	37.5
0.600	12.2	2.200	19.0	5.500	29.6	9.500	38.5
0.800	11.8	2.400	19.9	6.000	30.8		
1.000	13.1	2.600	20.6	6.500	32.0		

Hydro-Brake® Optimum Manhole: S25, DS/PN: S7.005, Volume (m³): 2.3

Unit Reference	MD-SHE-0090-3600-1000-3600
Design Head (m)	1.000
Design Flow (l/s)	3.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	90
Invert Level (m)	72.100
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.6
Flush-Flo™	0.300	3.6
Kick-Flo®	0.631	2.9
Mean Flow over Head Range	-	3.1

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	2.8	0.300	3.6	0.500	3.4	0.800	3.2
0.200	3.5	0.400	3.5	0.600	3.1	1.000	3.6

Hydro-Brake® Optimum Manhole: S25, DS/PN: S7.005, Volume (m³): 2.3

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
1.200	3.9	2.400	5.4	5.000	7.6	8.000	9.5
1.400	4.2	2.600	5.6	5.500	8.0	8.500	9.8
1.600	4.5	3.000	6.0	6.000	8.3	9.000	10.1
1.800	4.7	3.500	6.5	6.500	8.6	9.500	10.4
2.000	5.0	4.000	6.9	7.000	9.0		
2.200	5.2	4.500	7.3	7.500	9.3		

Storage Structures for Storm

Cellular Storage Manhole: S1, DS/PN: S1.000

Invert Level (m) 75.870 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Cellular Storage Manhole: S5, DS/PN: S2.000

Invert Level (m) 75.620 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Cellular Storage Manhole: S7, DS/PN: S3.000

Invert Level (m) 75.190 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Complex Manhole: S6, DS/PN: S1.005

Tank or Pond

Invert Level (m) 73.460

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	659.0	1.300	1217.2

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 2.0
Membrane Percolation (mm/hr) 1000 Porosity 0.30
Max Percolation (l/s) 1000.0 Invert Level (m) 74.285

Porous Car Park

Width (m) 180.0 Depression Storage (mm) 5
Length (m) 20.0 Evaporation (mm/day) 3
Slope (1:X) 40.0 Membrane Depth (mm) 0

Cellular Storage Manhole: S9, DS/PN: S4.000

Invert Level (m) 74.670 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Cellular Storage Manhole: S11, DS/PN: S5.000

Invert Level (m) 74.160 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Cellular Storage Manhole: S14, DS/PN: S6.000

Invert Level (m) 73.620 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Complex Manhole: S14, DS/PN: S1.013

Tank or Pond

Invert Level (m) 72.100

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	928.0	1.300	1396.9

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	20.0
Membrane Percolation (mm/hr)	1000	Length (m)	260.0
Max Percolation (l/s)	1444.4	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.925	Membrane Depth (mm)	0

Cellular Storage Manhole: S20, DS/PN: S7.000

Invert Level (m)	73.370	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.30
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	850.0	0.0	0.301	0.0	0.0
0.300	850.0	0.0			

Complex Manhole: S25, DS/PN: S7.005

Tank or Pond

Invert Level (m) 72.100

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	440.0	1.300	777.8

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	32.0
Membrane Percolation (mm/hr)	1000	Length (m)	85.0
Max Percolation (l/s)	755.6	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	72.925	Membrane Depth (mm)	0

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	10
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	2	+0%	100/15 Summer			
S1.001	S2	15 Summer	2	+0%	100/15 Summer			
S1.002	S3	15 Summer	2	+0%	100/15 Summer			
S1.003	S4	15 Summer	2	+0%	100/15 Summer			
S2.000	S5	15 Summer	2	+0%	30/15 Summer			
S1.004	S5	240 Winter	2	+0%	30/120 Summer			
S3.000	S7	15 Summer	2	+0%	30/15 Summer			
S1.005	S6	240 Winter	2	+0%	30/30 Summer			
S4.000	S9	15 Summer	2	+0%	2/15 Summer			
S1.006	S7	15 Summer	2	+0%	100/15 Summer			
S5.000	S11	15 Summer	2	+0%	30/15 Summer			
S1.007	S8	15 Summer	2	+0%	30/15 Summer	100/15 Summer		
S1.008	S9	15 Summer	2	+0%	30/15 Summer	100/15 Summer		
S6.000	S14	15 Summer	2	+0%	2/15 Summer			
S1.009	S10	15 Summer	2	+0%	30/15 Summer	100/15 Summer		
S1.010	S11	15 Summer	2	+0%	30/15 Summer			
S1.011	S12	15 Summer	2	+0%	30/15 Summer			
S1.012	S13	15 Summer	2	+0%	30/15 Summer			
S1.013	S14	960 Summer	2	+0%	30/600 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	74.053	-0.147	0.000	0.51		5	54.6	OK
S1.001	S2	73.774	-0.416	0.000	0.18			54.4	OK
S1.002	S3	73.727	-0.393	0.000	0.25			53.9	OK
S1.003	S4	73.713	-0.387	0.000	0.21			78.7	OK
S2.000	S5	74.095	-0.105	0.000	0.74		5	66.4	OK
S1.004	S5	73.703	-0.237	0.000	0.09			33.0	OK
S3.000	S7	73.830	-0.070	0.000	0.92		5	65.9	OK
S1.005	S6	73.702	-0.028	0.000	0.02			7.0	OK
S4.000	S9	73.643	0.013	0.000	1.10		4	66.3	SURCHARGED
S1.006	S7	73.120	-0.390	0.000	0.25			97.0	OK
S5.000	S11	73.393	-0.027	0.000	1.00		4	63.0	OK
S1.007	S8	72.994	-0.296	0.000	0.50			186.1	OK
S1.008	S9	72.872	-0.258	0.000	0.55			181.4	OK
S6.000	S14	73.127	0.007	0.000	1.06		5	62.8	SURCHARGED
S1.009	S10	72.772	-0.238	0.000	0.68			235.2	OK
S1.010	S11	72.710	-0.220	0.000	0.69			230.7	OK
S1.011	S12	72.640	-0.200	0.000	0.74			255.6	OK
S1.012	S13	72.560	-0.170	0.000	0.85			252.7	OK
S1.013	S14	72.447	-0.253	0.000	0.04		656	13.1	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S2.000	S5	
S1.004	S5	
S3.000	S7	
S1.005	S6	
S4.000	S9	
S1.006	S7	
S5.000	S11	
S1.007	S8	5
S1.008	S9	5
S6.000	S14	
S1.009	S10	2
S1.010	S11	
S1.011	S12	
S1.012	S13	
S1.013	S14	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S7.000	S20	15 Summer	2	+0%	2/15 Summer				72.907
S7.001	S21	15 Summer	2	+0%	100/15 Summer				72.606
S7.002	S22	15 Summer	2	+0%	100/15 Summer				72.556
S7.003	S23	15 Summer	2	+0%	100/15 Summer				72.513
S7.004	S24	15 Summer	2	+0%	100/15 Summer				72.407
S7.005	S25	480 Summer	2	+0%	100/60 Summer				72.400

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S7.000	S20	0.067	0.000	1.19		4	70.4	SURCHARGED	
S7.001	S21	-0.384	0.000	0.25			69.5	OK	
S7.002	S22	-0.374	0.000	0.22			69.2	OK	
S7.003	S23	-0.337	0.000	0.37			123.4	OK	
S7.004	S24	-0.323	0.000	0.44			129.6	OK	
S7.005	S25	-0.300	0.000	0.01		456	3.6	OK	

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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 Storage Structures	10
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	30	+0%	100/15 Summer			
S1.001	S2	360 Winter	30	+0%	100/15 Summer			
S1.002	S3	360 Winter	30	+0%	100/15 Summer			
S1.003	S4	360 Winter	30	+0%	100/15 Summer			
S2.000	S5	15 Summer	30	+0%	30/15 Summer			
S1.004	S5	360 Winter	30	+0%	30/120 Summer			
S3.000	S7	15 Summer	30	+0%	30/15 Summer			
S1.005	S6	360 Winter	30	+0%	30/30 Summer			
S4.000	S9	15 Summer	30	+0%	2/15 Summer			
S1.006	S7	15 Summer	30	+0%	100/15 Summer			
S5.000	S11	15 Summer	30	+0%	30/15 Summer			
S1.007	S8	15 Summer	30	+0%	30/15 Summer	100/15 Summer		
S1.008	S9	15 Summer	30	+0%	30/15 Summer	100/15 Summer		
S6.000	S14	15 Summer	30	+0%	2/15 Summer			
S1.009	S10	15 Summer	30	+0%	30/15 Summer	100/15 Summer		
S1.010	S11	15 Summer	30	+0%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	74.173	-0.027	0.000	0.95		5	102.5	OK
S1.001	S2	73.998	-0.192	0.000	0.04			13.2	OK
S1.002	S3	73.998	-0.122	0.000	0.06			12.3	OK
S1.003	S4	73.998	-0.102	0.000	0.05			20.1	OK
S2.000	S5	74.441	0.241	0.000	1.39		4	125.1	SURCHARGED
S1.004	S5	73.998	0.058	0.000	0.11			42.5	SURCHARGED
S3.000	S7	74.242	0.342	0.000	1.72		4	123.3	SURCHARGED
S1.005	S6	73.997	0.267	0.000	0.02			7.0	SURCHARGED
S4.000	S9	74.014	0.384	0.000	2.05		4	124.3	SURCHARGED
S1.006	S7	73.353	-0.157	0.000	0.45			174.5	OK
S5.000	S11	73.765	0.345	0.000	1.90		4	119.5	SURCHARGED
S1.007	S8	73.316	0.026	0.000	0.88			323.6	SURCHARGED
S1.008	S9	73.225	0.095	0.000	0.82			269.9	SURCHARGED
S6.000	S14	73.461	0.341	0.000	2.00		4	118.6	SURCHARGED
S1.009	S10	73.155	0.145	0.000	1.00			347.9	SURCHARGED
S1.010	S11	73.089	0.159	0.000	1.04			347.2	SURCHARGED

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S2.000	S5	
S1.004	S5	
S3.000	S7	
S1.005	S6	
S4.000	S9	
S1.006	S7	
S5.000	S11	
S1.007	S8	5
S1.008	S9	5
S6.000	S14	
S1.009	S10	2
S1.010	S11	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.011	S12	15 Summer	30	+0%	30/15 Summer				72.969
S1.012	S13	15 Summer	30	+0%	30/15 Summer				72.815
S1.013	S14	720 Summer	30	+0%	30/600 Summer				72.705
S7.000	S20	15 Summer	30	+0%	2/15 Summer				73.376
S7.001	S21	15 Summer	30	+0%	100/15 Summer				72.727
S7.002	S22	15 Summer	30	+0%	100/15 Summer				72.694
S7.003	S23	15 Summer	30	+0%	100/15 Summer				72.670
S7.004	S24	600 Winter	30	+0%	100/15 Summer				72.661
S7.005	S25	600 Winter	30	+0%	100/60 Summer				72.661

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	S12	0.129	0.000	1.10			380.5	SURCHARGED	
S1.012	S13	0.085	0.000	1.28			379.8	SURCHARGED	
S1.013	S14	0.005	0.000	0.04			13.1	SURCHARGED	
S7.000	S20	0.536	0.000	2.07		3	122.7	SURCHARGED	
S7.001	S21	-0.263	0.000	0.44			125.4	OK	
S7.002	S22	-0.236	0.000	0.42			130.0	OK	
S7.003	S23	-0.180	0.000	0.73			244.8	OK	
S7.004	S24	-0.069	0.000	0.09			26.1	OK	
S7.005	S25	-0.039	0.000	0.01			3.6	OK	

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 Coeffiecient	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 Storage Structures	10
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.400
Region	England and Wales	Cv (Summer)	0.950
M5-60 (mm)	20.000	Cv (Winter)	0.950

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
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) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Summer	100	+40%	100/15 Summer			
S1.001	S2	600 Winter	100	+40%	100/15 Summer			
S1.002	S3	600 Winter	100	+40%	100/15 Summer			
S1.003	S4	600 Winter	100	+40%	100/15 Summer			
S2.000	S5	15 Summer	100	+40%	30/15 Summer			
S1.004	S5	600 Winter	100	+40%	30/120 Summer			
S3.000	S7	15 Summer	100	+40%	30/15 Summer			
S1.005	S6	600 Winter	100	+40%	30/30 Summer			
S4.000	S9	15 Summer	100	+40%	2/15 Summer			
S1.006	S7	15 Summer	100	+40%	100/15 Summer			
S5.000	S11	15 Summer	100	+40%	30/15 Summer			
S1.007	S8	15 Summer	100	+40%	30/15 Summer	100/15 Summer		
S1.008	S9	15 Summer	100	+40%	30/15 Summer	100/15 Summer		
S6.000	S14	30 Summer	100	+40%	2/15 Summer			
S1.009	S10	15 Summer	100	+40%	30/15 Summer	100/15 Summer		
S1.010	S11	15 Summer	100	+40%	30/15 Summer			

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	75.216	1.016	0.000	1.66		3	178.3	SURCHARGED
S1.001	S2	74.469	0.279	0.000	0.05			15.6	SURCHARGED
S1.002	S3	74.469	0.349	0.000	0.07			15.0	SURCHARGED
S1.003	S4	74.468	0.368	0.000	0.07			24.5	SURCHARGED
S2.000	S5	75.623	1.423	0.000	2.34		3	210.8	SURCHARGED
S1.004	S5	74.468	0.528	0.000	0.14			52.6	SURCHARGED
S3.000	S7	75.196	1.296	0.000	2.93		3	209.9	SURCHARGED
S1.005	S6	74.466	0.736	0.000	0.02			8.0	FLOOD RISK
S4.000	S9	74.714	1.084	0.000	2.89		3	175.2	SURCHARGED
S1.006	S7	74.030	0.520	0.000	0.61			233.4	SURCHARGED
S5.000	S11	74.244	0.824	0.000	2.34		5	147.7	SURCHARGED
S1.007	S8	73.908	0.618	8.431	1.02			376.6	FLOOD
S1.008	S9	73.742	0.612	1.924	1.17			383.9	FLOOD
S6.000	S14	73.748	0.628	0.000	2.18		7	129.2	SURCHARGED
S1.009	S10	73.610	0.600	0.082	1.32			458.3	FLOOD
S1.010	S11	73.450	0.520	0.000	1.37			458.5	FLOOD RISK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3	
S1.003	S4	
S2.000	S5	
S1.004	S5	
S3.000	S7	
S1.005	S6	
S4.000	S9	
S1.006	S7	
S5.000	S11	
S1.007	S8	5
S1.008	S9	5
S6.000	S14	
S1.009	S10	2
S1.010	S11	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.011	S12	15 Summer	100	+40%	30/15 Summer				73.290
S1.012	S13	960 Winter	100	+40%	30/15 Summer				73.184
S1.013	S14	960 Winter	100	+40%	30/600 Summer				73.184
S7.000	S20	15 Summer	100	+40%	2/15 Summer				73.508
S7.001	S21	960 Winter	100	+40%	100/15 Summer				73.133
S7.002	S22	960 Winter	100	+40%	100/15 Summer				73.134
S7.003	S23	960 Winter	100	+40%	100/15 Summer				73.134
S7.004	S24	960 Winter	100	+40%	100/15 Summer				73.133
S7.005	S25	960 Winter	100	+40%	100/60 Summer				73.133

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.011	S12	0.450	0.000	1.56			542.4	FLOOD RISK	
S1.012	S13	0.454	0.000	0.23			68.3	FLOOD RISK	
S1.013	S14	0.484	0.000	0.04			13.5	SURCHARGED	
S7.000	S20	0.668	0.000	2.24		5	133.3	SURCHARGED	
S7.001	S21	0.143	0.000	0.05			14.7	FLOOD RISK	
S7.002	S22	0.204	0.000	0.05			14.0	FLOOD RISK	
S7.003	S23	0.284	0.000	0.09			30.3	SURCHARGED	
S7.004	S24	0.403	0.000	0.11			31.4	FLOOD RISK	
S7.005	S25	0.433	0.000	0.01			3.7	SURCHARGED	

KEY PLAN

NOTES

1. 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.
2. 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.
3. 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.
4. Levels shown in metres above Ordnance Datum (mAOD).

REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	J.MAGEE	24/11/23	J.MAGEE	24/11/23		

REVISION NOTES/COMMENTS: FOR INFORMATION

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

TITLE

DRAINAGE LAYOUT
SITE WIDE

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	1:1000

STATUS DESCRIPTION	STATUS
SUITABLE FOR INFORMATION	S2

DRAWING NO. (PROJECT-CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-SK-C-7790	P01

Appendix C – External Designs

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)

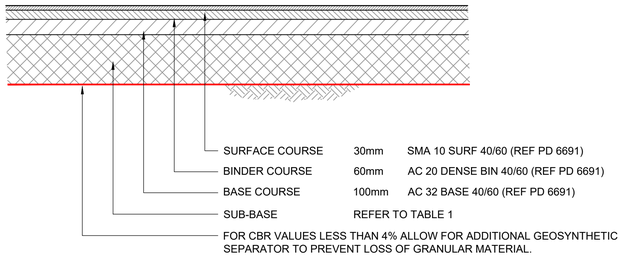


Table 1 : Minimum Sub-base Thickness

California Bearing Ratio (CBR) Values	MINIMUM THICKNESS (mm) OF SUB-BASE (Consolidated in accordance with MCHW Volume 1 clause 801, table 8/1)
LESS THAN 2.5%	N/A [1]
2.5%	350
3%	300
4%	250
5%	225
10%	175
15%	150
GREATER THAN 15%	150 [2]

[1] For all pavements on subgrades with CBR values below 2.5%, 150mm of sub-base on a varying thickness of capping must be used. Refer to engineer for advise.
[2] The minimum depth of Type 1 material is 150mm.

TYPE A3: ASPHALT PAVING CONSTRUCTION
(Cars, Light Vehicles & Occasional Heavy Goods Vehicles)

SCALE 1:20

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)

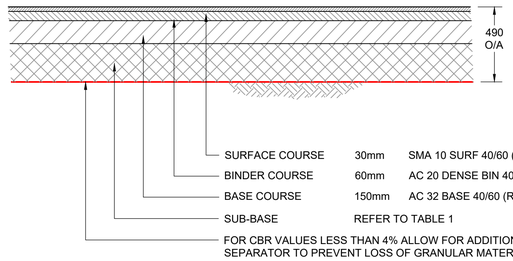


Table 1 : Minimum Sub-base Thickness

California Bearing Ratio (CBR) Values	MINIMUM THICKNESS (mm) OF SUB-BASE (Consolidated in accordance with MCHW Volume 1 clause 801, table 8/1)
LESS THAN 2.5%	N/A [1]
2.5%	350
3%	300
4%	250
5%	225
10%	175
15%	150
GREATER THAN 15%	150 [2]

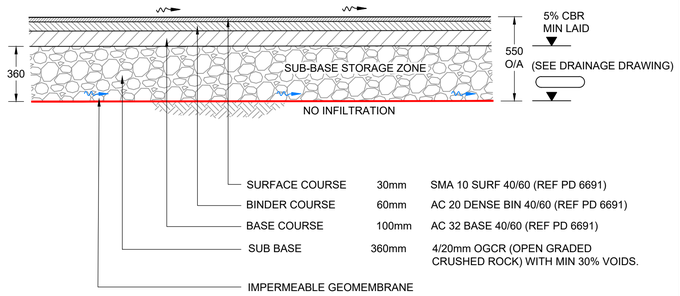
[1] For all pavements on subgrades with CBR values below 2.5%, 150mm of sub-base on a varying thickness of capping must be used. Refer to engineer for advise.
[2] The minimum depth of Type 1 material is 150mm.

TYPE A4: ASPHALT PAVING CONSTRUCTION
(Frequent Heavy Goods Vehicles)

SCALE 1:20

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)



TYPE A3 (AT): ASPHALT WITH ATTENUATING SUB-BASE PAVING CONSTRUCTION
(Cars, Light Vehicles & Occasional Heavy Goods Vehicles)

SCALE 1:20

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

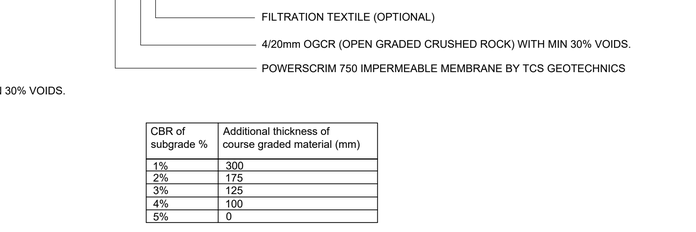
(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)

TYPE HLO2: HYDRO LINEO GRASS BUILD UP
(Cars & Light Vehicles & Occasional Heavy Goods Vehicles)

SCALE 1:20

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)



CBR of subgrade %	Additional thickness of course graded material (mm)
1%	300
2%	175
3%	125
4%	100
5%	0

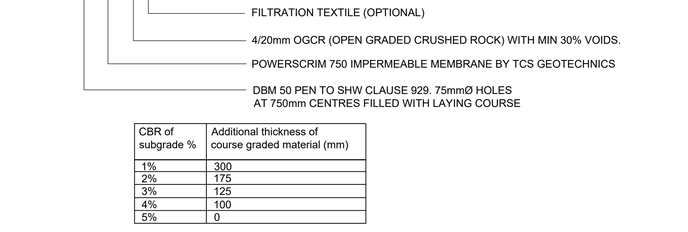
NOTE:
- DETAIL ABOVE MAKES NO ALLOWANCE FOR ADDITIONAL REQUIREMENTS SHOULD THE PERMEABLE CONSTRUCTION BE USED FOR SITE TRAFFIC. REFER TO PARAGRAPH 5.6.4 OF BS7533-13:2009 FOR MORE INFORMATION.
- MATERIALS TO HARDSCAPE SPECIFICATION

TYPE P-B1 (P): BLOCK PAVING CONSTRUCTION (PERMEABLE)
(Pedestrian Loading only)
SYSTEM TYPE C

SCALE 1:20

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)

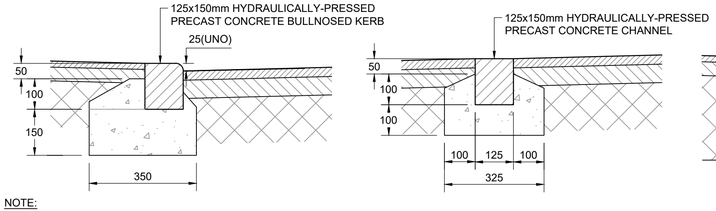


CBR of subgrade %	Additional thickness of course graded material (mm)
1%	300
2%	175
3%	125
4%	100
5%	0

NOTE:
- DETAIL ABOVE MAKES NO ALLOWANCE FOR ADDITIONAL REQUIREMENTS SHOULD THE PERMEABLE CONSTRUCTION BE USED FOR SITE TRAFFIC. REFER TO PARAGRAPH 5.6.4 OF BS7533-13:2009 FOR MORE INFORMATION.
- MATERIALS TO HARDSCAPE SPECIFICATION

TYPE P-B3 (P): BLOCK PAVING CONSTRUCTION (PERMEABLE)
(Cars, Light Vehicles & Occasional Heavy Goods Vehicles)
SYSTEM TYPE C

SCALE 1:20



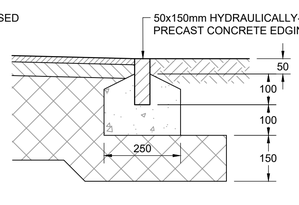
NOTE:
1. VEHICULAR CROSSING UPSTAND TO BE 25mm
   PEDESTRIAN CROSSING UPSTAND TO BE 0-6mm

BULL NOSE KERB DETAIL
(BN 25mm AND BN FLUSH)

SCALE 1:10

CHANNEL BLOCK KERB DETAIL
(CS2)

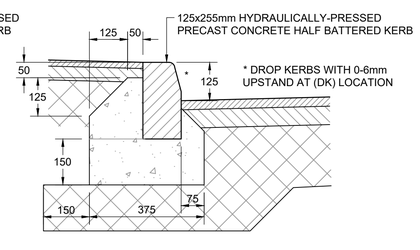
SCALE 1:10



FOOTWAY EDGING DETAIL
(EF)

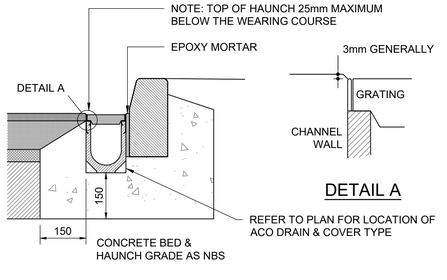
SCALE 1:10

NOTES:
1. ALL KERBS TO BE TO BS EN1340
2. ALL KERBS TO BE BEDDED ON CONCRETE GRADE ST4
3. ALL KERBS TO BE BACKED WITH CONCRETE GRADE ST1



HALF BATTERED KERB DETAIL
(HB2)

SCALE 1:10



DETAIL A

ACO LINEAR DRAINAGE CHANNEL DETAIL

SCALE 1:10

SURFACE PROTECTION:
IN ASPHALT PAVEMENTS AVOID CONTACT BETWEEN COMPACTION EQUIPMENT AND CHANNEL/GRATING. THIS MAY BE ACHIEVED BY ENSURING THAT THE FINISHED SURFACE LEVEL LIES ABOVE THE GRATING LEVEL (BY AT LEAST 3mm). STONES SHOULD BE REMOVED FROM GRATING PRIOR TO LAYING/ROLLING WEARING COURSE.

GENERAL INSTALLATION NOTES:
ACO DRAIN TO BE CONSTRUCTED IN ACCORDANCE WITH MANUFACTUERS RECOMENDATIONS

KEY PLAN

NOTES

1. 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.
2. 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.
3. 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.
4. CBR values in accordance with SI report. contractor to inform engineer of any soft spots during construction.
5. In the event of any contradiction between this drawing and the specification, then the contractor shall seek clarification from the engineer before proceeding.
6. All in-situ concrete and precast concrete components to be manufactured using sulphate resisting portland cement (srpc) to BS 4027, If required, subject to soil conditions.
7. Refer to landscape architects drawings for extent of external surfaces and kerbing.
8. Drainage trenches within traffic areas and footways or in areas to be adopted shall be backfilled using granular type 1 material up to the road formation level.
9. Old drainage or service trenches to be excavated are to remove soft or degraded material and backfilled with specified granular sub-base material.
10. Subgrade variation: if material appears to vary from anticipated conditions, or if there are extensive soft spots, test subgrade CBR to BS 1377-4 OR BS 1377-9.
11. Soft or damaged areas to be excavated and replaced with sub-base material, compacted in layers 300 mm (maximum) thick.
12. Final excavation to formation / subformation level to be carried before compaction of subgrade.
13. Excavation or compaction not to be carried out in wet conditions when the subgrade may be damaged or destabilized.
14. Compact thoroughly by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed roads / pavings.
15. Particular care to be taken when compacting fully at intrusions, perimeters and where local excavation or backfilling has taken place.
16. Subgrade improvement layer (capping) to Highways Agency 'Specification For Highway Works', Table 6/1, Placed and compacted to Highways Agency 'Specification For Highway Works', Table 6/1, Clauses 612 and 613.3, 613.8, 613.9, 613.10 and 613.13.
17. Depth of frost susceptible material below final surface of paving to be (minimum) 450mm.
18. Do not place fill on frozen surfaces. remove material affected by frost. Replace and re-compact if not damaged after thawing.
19. Subgrades and sub-base should be protected to prevent degradation by construction traffic, construction operations and inclement weather.
20. Type 1 unbound mixture for sub-base to Highways Agency 'Specification For Highway Works', Clause 801 and 803.
21. Type 1 to be spread and levelled in 150 mm maximum layers, each layer thoroughly compacted.
22. At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place particular care should be taken to ensure material is fully compacted.

A PRELIMINARY CBR VALUE OF 4% (MINIMUM). TAKEN FROM 5015203-RDG-XX-ST-DOC-C-00GCA01-A-Ground Condition Assessment.

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT
BICESTER MOTION LIMITED

PROJECT
BICESTER MOTION

TITLE
EXTERNAL DETAILS

HYDROCK PROJECT NO.
C-27280

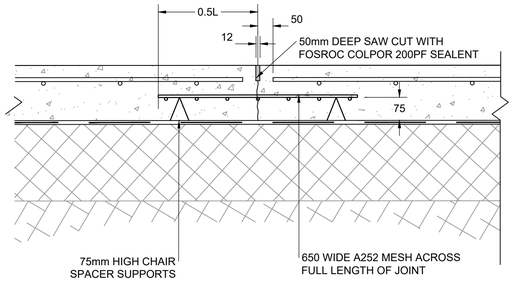
SCALE @ A1
AS SHOWN

STATUS DESCRIPTION
SUITABLE FOR STAGE 3

STATUS
S4

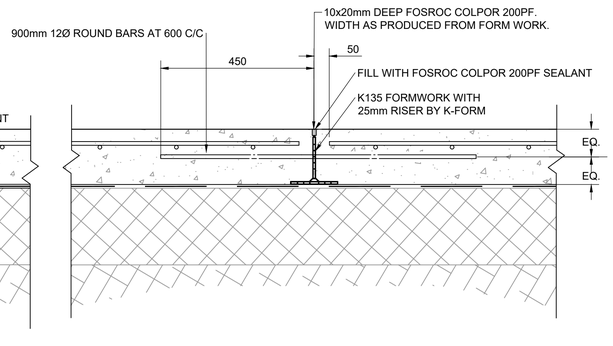
DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)
27280-HYD-00-ZZ-DR-C-7300

REVISION
P02



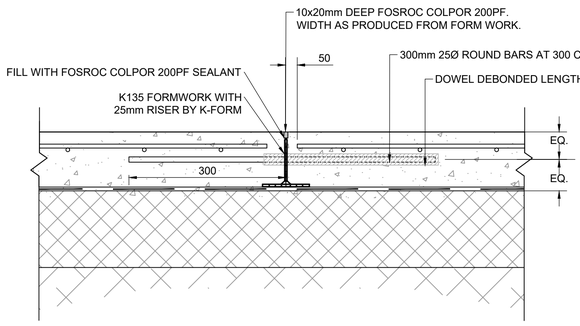
SAWN RESTRAINED-MOVEMENT JOINT

SCALE 1:10



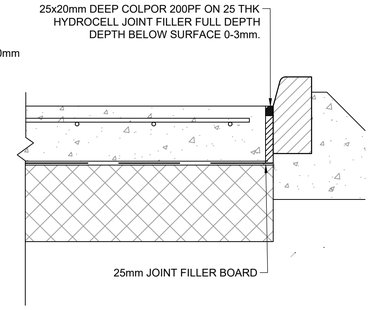
LONGITUDINAL JOINTS

SCALE 1:10



FORMED FREE-MOVEMENT - CONTRACTION JOINTS

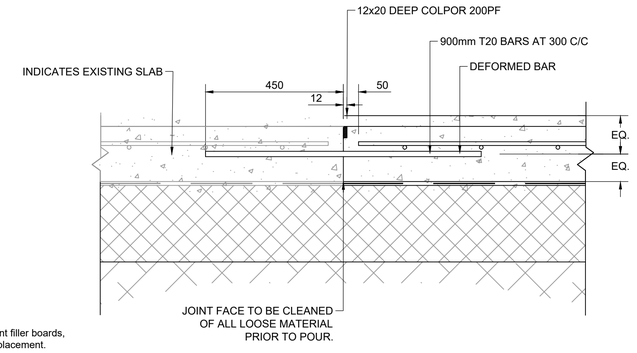
SCALE 1:10



NOTES:
1. ISOLATION JOINTS TO BE PROVIDED AT ALL GULLIES, MANHOLES AND CHANNELS WHERE THE PAVEMENT ABUTS WALLS.

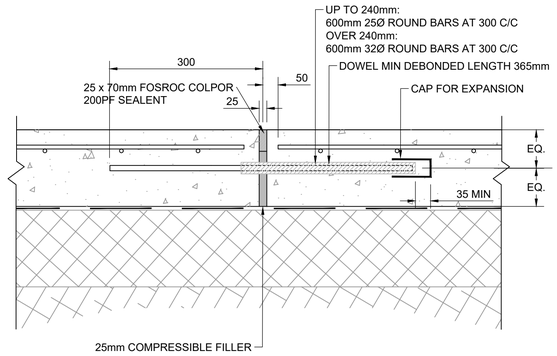
ISOLATION JOINTS

SCALE 1:10



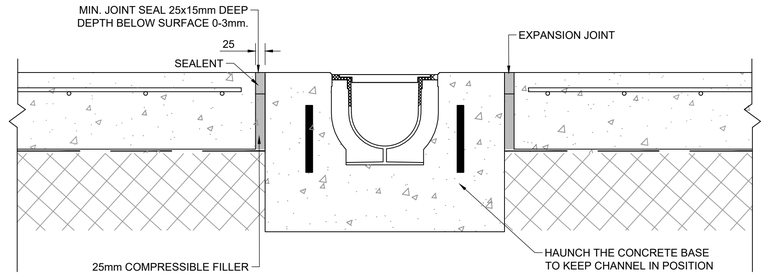
TIED JOINT INTO EXISTING SLAB

SCALE 1:10



FREE MOVEMENT - EXPANSION JOINT

SCALE 1:10

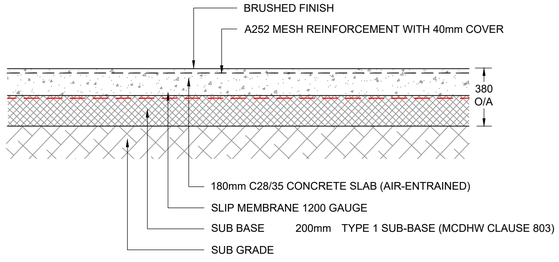


HAURATON RECYFIX STANDARD CHANNEL

SCALE 1:10

PAVEMENT BUILD-UPS ARE SUBJECT TO IN-SITU CBR TESTS AT SUB-GRADE LEVEL

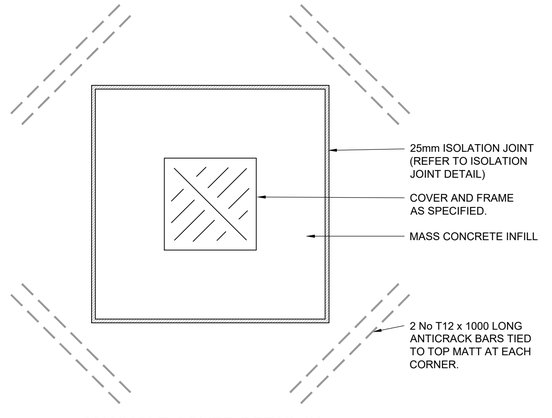
(REFER TO SITE INVESTIGATION FOR GROUND CONDITIONS)



NOTE: CONTRACTOR TO CONFIRM SUITABILITY OF EXISTING SUB-GRADE FOR RE-USE IN THE NEW WORKS ANY MADE GROUND TO BE REMOVED AND SOFT SPOTS IN-FILLED WITH WELL COMPACTED HARDCORE OR TYPE 1 AS REQUIRED. SUB-GRADE SHOULD ACHIEVE A MIN 3%.

TYPE C4:
CONCRETE APRON CONSTRUCTION
(Frequent Heavy Goods Vehicles)

SCALE 1:20



MANHOLE COVER DETAIL IN SERVICE YARD & ACCESS RD.

SCALE NTS

Notes:

GENERAL PREPARATION

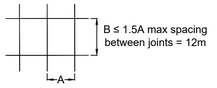
1. READY MIXED CONCRETE
   - Production plant: currently certified by a body accredited by UKAS to BS EN ISO/IEC 170605 for product conformity certification
   - Source of ready-mixed concrete: obtain from one source if possible. Otherwise, submit proposals.
     - Name and address of depot: submit before any concrete is delivered.
     - Delivery notes: Retain for inspection.
   - Declarations of nonconformity from concrete producer: Notify Immediately.
2. SUB BASE PREPARATION
   - Surface: Sound, free of debris, mud and soft spots, and suitably close textured.
   - Levels and falls: Within specified tolerances:
     - Vehicular areas: +20 mm.
     - Pedestrian areas: +12mm.
     - Drainage outlets: +0 to -10 mm of required finished level.
   - Kerbs and edgings: Complete, adequately bedded and haunched, and to required levels.
3. LAYING FABRIC REINFORCEMENT
   - Flatness: Lay in flat sheets, straight and out of winding.
   - Main reinforcement: Parallel to long axis of slab.
   - Temporary support: Securely fix and support fabric during construction of slab.
4. STEEL FRAMEWORK
   - Side forms: Steel, drilled for dowel bars, free from warping and kinks.
   - Fixing:
     - To required line, +10mm.
     - To required level, +3mm
   - Locking plates: Use where necessary to ensure rigidity and prevent movement during laying and compaction of concrete.
   - Removal of forms: Six hours (minimum) after completing compaction. Treat exposed edges with waterproof compound.

LAYING CONCRETE

5. TRANSPORTING CONCRETE
   - General: Avoid contamination, segregation, loss of ingredients, excessive evaporation and loss of workability. Protect from heavy rain.
   - Entrained air: Anticipate effects of transport and placing methods in order to achieve specified air content.
   - Placing: Use suitable walkways and barrow runs for traffic over reinforcement and freshly placed concrete.
6. LAYING CONCRETE GENERALLY
   - Timing: Place as soon as practicable after mixing and while sufficiently plastic for full compaction. After discharge from the mixer do not add water or retemper.
   - Temperature of concrete at point of delivery:
     - In hot weather (maximum): 30°C.
     - In cold weather (minimum): 5°C.
   - Cold weather:
     - Do not use frozen materials.
     - Do not place concrete against frozen or frost covered surfaces.
     - Do not place concrete when air temperature is below 3°C on a falling thermometer. Do not resume placing until rising air temperature has reached 3°C.
   - Surfaces on which concrete is to be placed: Free from debris and standing water.
   - Placing in final position: Place in one continuous operation up to construction joints.
     - Do not place concrete simultaneously on both sides of movement joints.
   - Spreading: Spread and strike off with surcharge sufficient to obtain required compacted thickness.
   - Adjacent work: Form neat junctions and prevent damage. Keep clean all channels, kerbs, inspection covers, etc.
7. COMPACTING
   - General: Fully compact concrete to full depth (until air bubbles cease to appear on the surface) especially around reinforcement, cast-in accessories, into corners and at joints.
   - Poker vibrators: Do not use to make concrete flow into position. Do not allow to come into contact with fabric reinforcement.
   - Wet formed joint grooves: Rectify any irregularities by means of a vibrating float.
   - Finish: A dense, even textured surface free from laitance or excessive water.
     - Excess concrete: Remove from top of groove formers.
8. MANHOLE COVER AND GULLY GRATING FRAMES
   - General: Set frames in independent concrete slabs placed over, but slightly larger than, exterior of manhole shaft or gully pot and any concrete surround.
   - Positioning of joints in main slab: Set out so that manhole/ gully slabs are adjacent to a main transverse joint, wherever possible.
   - Joints: Separate the independent slabs from main slabs with 25 mm thick joint filler board. Set board 20 mm below top of slab to form a sealing groove.
9. LEVELS
   - Lines and levels of finished surface: Smooth and even, with regular falls to prevent ponding.
   - Finished surfaces: Within ±6 mm of required levels (+6 or -0 mm adjacent to gullies and manholes).
10. SURFACE REGULARITY
    - General: Where appropriate in relation to the geometry of the surface, the variation in gap under a 3 m straightedge (with feet) placed anywhere on the surface to be not more than 5 mm.
    - Sudden irregularities: Not permitted.

JOINTS

11. JOINTS GENERALLY
    - Layout: All joints to be accurately located, straight and well aligned.
    - Construction joints made at end of working day: Form as contraction joints.
    - Modifications to joint design or location: Submit proposals.
    - Temporary support: Prior to concreting, set formwork, dowel bars, tie bars, joint filler boards, sealing groove fillets and the like rigidly in position and support to prevent displacement. Maintain support until concrete has set.
    - Keep clean:
      - Do not allow concrete to enter any gaps or voids in formwork or to render movement joints ineffective.
      - Do not allow concrete to impregnate or penetrate materials used as compressible joint fillers.



12. LONGITUDINAL CONSTRUCTION JOINTS
    - Definition: Longitudinal joints are those parallel to the main axis of the paving.
    - Standard: To Concrete Society Technical Report 28.
    - Formed groove:
      - Size (minimum width x depth): 15 x 13 mm.
      - Preparation: Repair damaged edges of initially cast slab prior to forming groove.
      - Method: Fix preformed fillet against top edge of the initially cast slab before placing the adjacent slab. Remove when concrete is fully cured.
    - Completion: Round upper edges of slabs at joints to 5 mm radius. Do not overwork concrete.
13. CONTRACTION JOINTS WITH SAWN GROOVE
    - Standard: To Concrete Society Technical Report 28.
    - Temperature: Do not start sawing if temperature is falling.
    - Sawn groove:
      - Timing: Cut as early as possible after the slab has been placed but without causing edges of groove to spall.
      - Width (minimum): 3 mm.
      - Depth: 3 mm per 10 mm depth of slab or 50 mm, whichever is the greater.
    - Upper portion of joint: Enlarge by sawing a groove:
      - Width (minimum): 13 mm.
      - Depth: 25mm
14. EXPANSION JOINTS
    - Joint filler board:
      - Type: Bitumen impregnated fibre board
      - Standard: To Highways Agency 'Specification for Highway Works', clause 1015.
      - Thickness: 25 mm.
      - Depth: Joint filler board must extend from underside of sealing groove fillet to full depth of slab to provide complete separation of adjacent slabs.
      - Holes for dowel bars: Accurately bored or punched holes to form a sliding fit for dowel bars.
    - Completion: Round upper edges of slabs at joints to 5 mm radius. Do not overwork concrete.
15. BRUSHED FINISH
    - Direction:At right angles to longitudinal direction of the slab.
    - Texture depth: Approximately 1 mm with finished surface having an overall even texture.

CURING/PROTECTION/FINISHING

16. CURING
    - General: Immediately after completion of surface treatment prevent evaporation from surface and exposed edges of slabs for a minimum period of seven days.
    - Early curing:
      - Cover with waterproof sheeting held clear of surface. Seal against draughts at edges and junctions.
      - Do not apply sprayed compounds or sheets in direct contact until surface is in a suitable state and will not be marked.
    - Coverings for curing: Contractor's choice of:
      - Impervious sheet material.
      - Resin based aluminized curing compound containing a fugitive dye and with an efficiency index of 90% when tested to BS 7542.
      - Sprayed plastics film.
17. PROTECTION
    - Prevent damage to concrete:
      - From rain, indentation, physical damage, dirt, staining, rust marks and other disfiguration.
      - From thermal shock.
      - In cold weather, from freezing expansion of water trapped in pockets, etc.
      - By use as a building platform or for storing, mixing or preparing materials.
18. OPENING TO TRAFFIC
    - Light vehicles: 7 days after placing concrete.
    - Heavy vehicles: 28 days after placing concrete.

KEY PLAN

NOTES

1. 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.
2. 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.
3. 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.
4. CBR values in accordance with SI report. contractor to inform engineer of any soft spots during construction.
5. In the event of any contradiction between this drawing and the specification, then the contractor shall seek clarification from the engineer before proceeding.
6. All in-situ concrete and precast concrete components to be manufactured using sulphate resisting portland cement (srpc) to BS 4027, if required, subject to soil conditions.
7. Refer to landscape architects drawings for extent of external surfaces and kerbing.
8. Drainage trenches within traffic areas and footways or in areas to be adopted shall be backfilled using granular type 1 material up to the road formation level.
9. Old drainage or service trenches to be excavated are to remove soft or degraded material and backfilled with specified granular sub-base material.
10. Subgrade variation: if material appears to vary from anticipated conditions, or if there are extensive soft spots, test subgrade CBR to BS 1377-4 OR BS 1377-9.
11. Soft or damaged areas to be excavated and replaced with sub-base material, compacted in layers 300 mm (maximum) thick.
12. Final excavation to formation / subformation level to be carried before compaction of subgrade.
13. Excavation or compaction not to be carried out in wet conditions when the subgrade may be damaged or destabilized.
14. Compact thoroughly by roller or other suitable means, adequate to resist subsidence or deformation of the subgrade during construction and of the completed roads / pavings.
15. Particular care to be taken when compacting fully at intrusions, perimeters and where local excavation or backfilling has taken place.
16. Subgrade improvement layer (capping) to Highways Agency 'Specification For Highway Works', Table 6/1, Placed and compacted to Highways Agency 'Specification For Highway Works', Table 6/1, Clauses 612 and 613.3, 613.8, 613.9, 613.10 and 613.13.
17. Depth of frost susceptible material below final surface of paving to be (minimum) 450mm.
18. Do not place fill on frozen surfaces. remove material affected by frost. Replace and re-compact if not damaged after thawing.
19. Subgrades and sub-base should be protected to prevent degradation by construction traffic, construction operations and inclement weather.
20. Type 1 unbound mixture for sub-base to Highways Agency 'Specification For Highway Works', Clause 801 and 803.
21. Type 1 to be spread and levelled in 150 mm maximum layers, each layer thoroughly compacted.
22. At drainage fittings, inspection covers, perimeters and where local excavation and backfilling has taken place particular care should be taken to ensure material is fully compacted.

P02	REVISED STAGE 3 - YASA SUBMISSION					
	B.MURPHY	28/03/24	J.MAGEE	28/03/24	J.MAGEE	28/03/24
P01	SUITABLE FOR STAGE 3					
	J.MAGEE	03/11/23	J.MAGEE	03/11/23		
REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LIMITED

PROJECT

BICESTER MOTION

TITLE

EXTERNAL DETAILS

HYDROCK PROJECT NO.	SCALE @ A1
C-27280	AS SHOWN

STATUS DESCRIPTION	STATUS
SUITABLE FOR STAGE 3	S4

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-DR-C-7301	P02

Appendix D – Overland Flow Routes

KEY PLAN

NOTES

1. 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.
2. 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.
3. 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.
4. All levels are shown in metres above Ordnance Datum (m AOD).

LEGEND

OVERLAND FLOW ROUTE

REV	REVISION NOTES/COMMENTS					
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	PREMINARY ISSUE					
	C.HOPKINSON	31.01.24	B.MURPHY	31.01.24	J.MAGEE	31.01.24
P02	REVISED TO SUIT LAYOUT					
	C.HOPKINSON	17.04.24	B.MURPHY	17.04.24	J.MAGEE	17.04.24

Hydrock
Merchants' House North
Wapping Road
Bristol
BS1 4RW
t: +44 (0)117 945 9225
e: bristolcentral@hydrock.com

CLIENT

BICESTER MOTION LTD

PROJECT

BICESTER MOTION

TITLE

OVERLAND FLOW ROUTES

HYDROCK PROJECT NO.	SCALE @ A1
C-27280-C	1:125

STATUS DESCRIPTION	STATUS
PLANNING	S2

DRAWING NO. (PROJECT CODE-ORGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)	REVISION
27280-HYD-00-ZZ-SK-C-7730	P02

Appendix E – Foul Pump Station Designs

Reference QK29803 RevA
Date 18/04/2024

Hydrock
3rd Floor, Merchants House North
Wapping Road
Bristol
Somerset
BS1 4RW

Tel No : 07436 021498 / 0117 945 9225
E-Mail : JasonMagee@hydrock.com

Attention of : Jason Magee

Dear Jason ,

Re : Bicester Motion Innovation Quarter, OX26 5HA

We thank you for your valued enquiry, and now have the pleasure of submitting our best offer for the most suitable equipment for the above scheme on a supply-only basis as detailed in the following.

1 No	XL25000	Package Pumping Station	Supply-Only Basis,

Packaged Pumping Station, incorporating 80 mm pipework and valves all assembled and housed in a strong GRP chamber, with a FACTA D (Up to 44 tonne GLVW) access cover.
A fully automatic control panel, activated by level switches complete with pump trip / high-level alarm with audio/visual warning are incorporated as standard.

Full details of our offer are included on pages 2 and 3 of our quotation, which is further supported by our Package Pumping Station literature.

The Package Pumping Station is supplied fully assembled and ready for installation on site. A detailed Installation Manual is supplied, allowing for easy installation by a competent builder or ground worker. The pumping station can be fully operable within a couple of days from delivery.

For the future we strongly recommend that you take advantage of our Service Agreement Scheme, to ensure that the pumping station has a long, trouble-free life. We are pleased to offer this at a fixed rate for the first 2 years, if the Service Agreement is taken out when the pumping station is ordered. For details see the separate Service quote, if you have not received this this can be requested separately.

We trust that our offer and enclosed information meet with your approval, and hope your interest will progress into a future order with T-T PUMPS , in the meantime if you have any queries or require any additional information, please contact the undersigned.

Yours faithfully,
T-T Pumps Limited

Wayne Openshaw
Tendering Engineer
Tel - 01630 647200

Reference QK29803 RevA
Date 18/04/2024

Quotation

T-T PUMPS PACKAGE PUMPING STATION

Serving : Foul water, 3.8 l/s & 20m³ storage (between HLA - TWL) requested

Pump Duty:
Flow 4.33 l/s
Total Duty Head 19.79 metres

Pump:
Qty 2
Model DGG 1000/2/80 A0FT5 Motor Submersible
80mm Solids Handling
kW Rating 7.50 kW FLC Amps: 13.7 Voltage: 400 Phase: 3

Cable Length 10 m
Operation Mode Auto (duty/standby)

Controls: IP54 Steel enclosure c/w run/trip indicators, pump trip / high-level warning alarm & volt free contacts
Pump station control panel to have inhibit override so that if the downstream pump station hits HLA then this station will be prevented from pumping until the downstream HLA drops out and un-inhibits.
Interconnecting cable to be supplied and installed others, confirmation is needed to ensure that the downstream panel is suitable to receive this connection before manufacturing begins.
Not suitable for outdoor use unless installed within a kiosk please see optional extras
Where the control panel and associated equipment offered is on a supply-only basis, it is the requirement of the purchaser to ensure the completed electrical installation meets the requirements of BS7671 latest edition
Level Control 3 No Float Switches Cable Length: 10 m

Chamber : Model **XL25000** Product Reference :- PP/ **XL25000**

Internal Diameter	2.200 metres	
Internal Chamber Depth	2.600 metres	(Including pump sump)
Total Depth	5.000 metres	(including extension turrets included in with price)
Internal Length	7.050 metres	
Inlet Size	150 mm I/D	160 mm Outside Diameter

Chamber Pipework: 80 mm

Valves:
Gate Valve 80 mm
Reflux Valve 80 mm

Access Cover:
Size mm 1 No. 1550 x 1000 (main access) & 1 No. 600 x 600 (maintenance access)
Loading FACTA D (Up to 44 tonne GLVW) Double Seal
Suitable for: Public areas where all types of road vehicle access required. Heavy duty plant and delivery areas where HGV's can reach speeds of 20mph max.

Outlet Pipework (not included, for provision by others)

Recommended Rising Main : 79 mm Inside Diameter Black HPPE (PE100) SDR 17
Size of HPPE adaptor : 90 mm Outside Diameter

Pumping Station Pipework Termination Point : 90 mm HPPE Adapter (included)

Unit Price for Supply Only :	**£26,980.42**	Net + VAT at prevailing rates where applicable.
Delivery Period	**8 to 10**	Weeks from order acceptance (subject to credit/payment terms)
Carriage:	**Included**	All deliveries are to be offloaded by the client.
Extra for M & E Commissioning:	**£850.00**	Net + VAT (Based upon a Single Specific Visit)

Extras:

Weatherproof Control Kiosk 1250 H x 750 W x 400 D for a Single Door Mild Steel Kiosk. (Green)	£725.00	Net + VAT at prevailing rates where applicable.
160 mm Inlet Assembly	£220.00	Net + VAT at prevailing rates where applicable.
NICEIC Certification to BS7671 (please refer to the exclusions section, page 3 of this quotation).	£450.00	Net + VAT at prevailing rates where applicable.

Maintenance and Monitoring: -

Service and Maintenance Agreement = £340.00
(This price is per service based upon one annual service for domestic clients, or two visits for larger schemes)

Seer Junior Telemetry Rental = ***£75.00 Net Per Month*** *(Billed annually, unless quarterly invoicing requested - minimum 2-year contract applies).*

Seer is TT's market-leading telemetry system to compliment your Service and Maintenance agreement. (service agreement must be in place)

- *Cloud-based monitoring.*
- *Remote system access and fault diagnosis.*
- *Remote system reset, correct faults quickly and avoid unnecessary call-out charges.*
- *Real time data log, often highlighting issues before they happen.*
- *Circa 75% of faults reset remotely, avoiding unnecessary labour and tankering costs.*
- **For more information, please see our YouTube video:** https://youtu.be/vno9aTFxjio

(The rental price includes a cloud subscription, a sim card and monitoring of the pumping station in a single monthly price.

A 2-year minimum contract applies. Purchase options are available on request. Remote reset functionality needs to be via a compatible control system).

Quotation

T-T PUMPS PACKAGE PUMPING STATION

Exclusions :

a) Civil works relating to the installation of the package pumping station.
b) Excavation / Backfilling .
c) Pipework connection outside of package pumping station.
d) Installation / Commissioning.
e) Our offer is based on the supply only basis of equipment, with installation by others.
Part of the installation process will require a suitably sized and protected electrical power source which conforms to the latest edition of BS7671, for which TT Pumps takes no reponsibility.
For DNO metered supplies we can (as an optional upgrade) undertake testing as per BS7671 as part of our commissioning process.
For installations on domestic residences (which fall under Part P regulations), or installations where the system is fed from a submain Distribution board, the services of an Electrically skilled person will be required to undertake final testing in conjunction with our commissioning process, before energisation of the system, and to produce certification as per the requirements of BS7671.

Notes :

1) Conditions of Contract must be specifically agreed upon with T-T PUMPS, and confirmed in writing.

2) The cable lengths offered for the pumps and level control will allow the control panel to be sited a maximum distance of 1.5 metres from the pump chamber, with the control panel positioned not more than 1.5 metres above the cover level, having the cable ducting running in the most direct route.
If you have doubts about the cabling requirements please contact us and we will be happy to assist.

3) The pump offered are designed to transfer bodily waste, toilet paper and household wash waters only. Sanitary towels, condoms, cotton wool and other such such items should not enter the pumping station.

Validity:

Our offer is open for acceptance for an initial period of 30 days from the date of quotation. However, we reserve the right to review our quotation price post order considering both time elapsed between order placement, scheduled works / call-off period and also taking into account any key material market price changes.

Terms:

Terms and Conditions of Sale are available on our Website (www.ttpumps.com) or by request For any onsite works a notice of cancellation must be provided at least 48 hours in advance; otherwise, all expenses and fees will remain applicable.

Storage and Retention:

We can confirm that our offer complies with the storage requirements of current building regs assuming that the cover level is the first point of overflow.

If you have a specific retention requirement other than that which we have confirmed as above, please confirm the details of your requirements and we shall revise our offer where possible to suit.

Design Statement:

Please note that as part of this quotation, we endeavour to include all design features as per your request. If however we have failed to include a specific requirement within our quotation that you do require, please confirm so by return so that the quotation can be quickly revised. Any items not included for within this quotation will be fully chargeable should they be required at a later date.

Discharge Consent:

Prior to order, please ensure that you have raised the appropriate sewer connection application with your local water authority to confirm that the flow rate proposed from this pumping station design is acceptable should the system be discharging into an existing sewer network.

We endeavour to offer the correct pumping station design for the application, however, your local water authority may apply flow rate restrictions which in turn will affect the pumping station design.

TT will not accept or reimburse any costs should you choose to install a pumping station at your own risk, without the necessary consent in place.

Septicity:

Steps have been taken within this design to keep the risk of septicity occurring to a minimum. Our calculations are based upon the information provided at enquiry stage, additional septicity control methods are available should this be of interest to you.

Warranty

All T-T package pumping stations come complete with a manufacturers comprehensive 12 month warranty which will run from the date that the system is delivered to site, or from the date of commissioning should T-T complete this element of the installation.

Insurance and Collateral Warranty

TT holds insurance to cover Employers Liability (£10m), Public and Products Liability (£10m), Contract Works (subject to the claim) and Professional Indemnity (£5m). A copy of our insurance certificate is available on request.

Please note our insurance levels are fixed and valid for the certificate duration, yet any further requirements over and above our insurance, including collateral warranties, associated documentation / wording of that required must be submitted and agreed / approved with TT prior to order placement.

T-T Pumps Ltd, Onneley Works, Newcastle Road, Woore, Cheshire, CW3 9RU, United Kingdom
Tel: +44 (0) 1630 647200 Fax: +44 (0) 1630 642199 www.ttpumps.com Email: response@ttpumps.com

Reference QK29803 RevA
Date 18/04/2024

Key Features

A Single Sourced Engineered Product.

T-T PUMPS offers a single source for your pumping system needs, with expertise in pumping system design, which is further supported by T-T Controls, our controls division and Aquaflow our valve and pipework division.

Our in-house capability ensures that we can respond quickly and high-quality levels are maintained.

Chamber

Each chamber is made from strong GRP. The smooth internal walls aid the hygienic disposal of effluent, to avoid smells and septicity.

Pumps

High-reliability pumps are selected from our extensive range and chosen on the basis that the pumps are the best selection for each specific application with an emphasis on efficiency and reliability.

Controls

All control panels are specifically designed and manufactured in-house incorporating the latest technology.
Standard features such as door interlocked mains isolator, suitable for incoming 25mm meter tails, running, tripped and high-level indication, automatic duty cycle rotation (on dual stations only) and volt-free status contacts for use with remote monitoring are all standard incorporated features.

Technical Support

Product Selection

Our trained and experienced engineers aim to select most effective and efficient products for your application and will assist you throughout the installation of your pumping station.

Installation

Special Consideration has been given to ease of installation and making good positive connections for the gravity drainage pipework.
Every pumping station is provided with 2 comprehensive installation manuals which give a straightforward guide, allowing the builder rapid installation.

Commissioning

You may require to use the services of commissioning engineers who will check the installation and put the pumping station into operation.

After Sales

Full After Sales Service is available, including our planned maintenance Service Agreement Scheme.

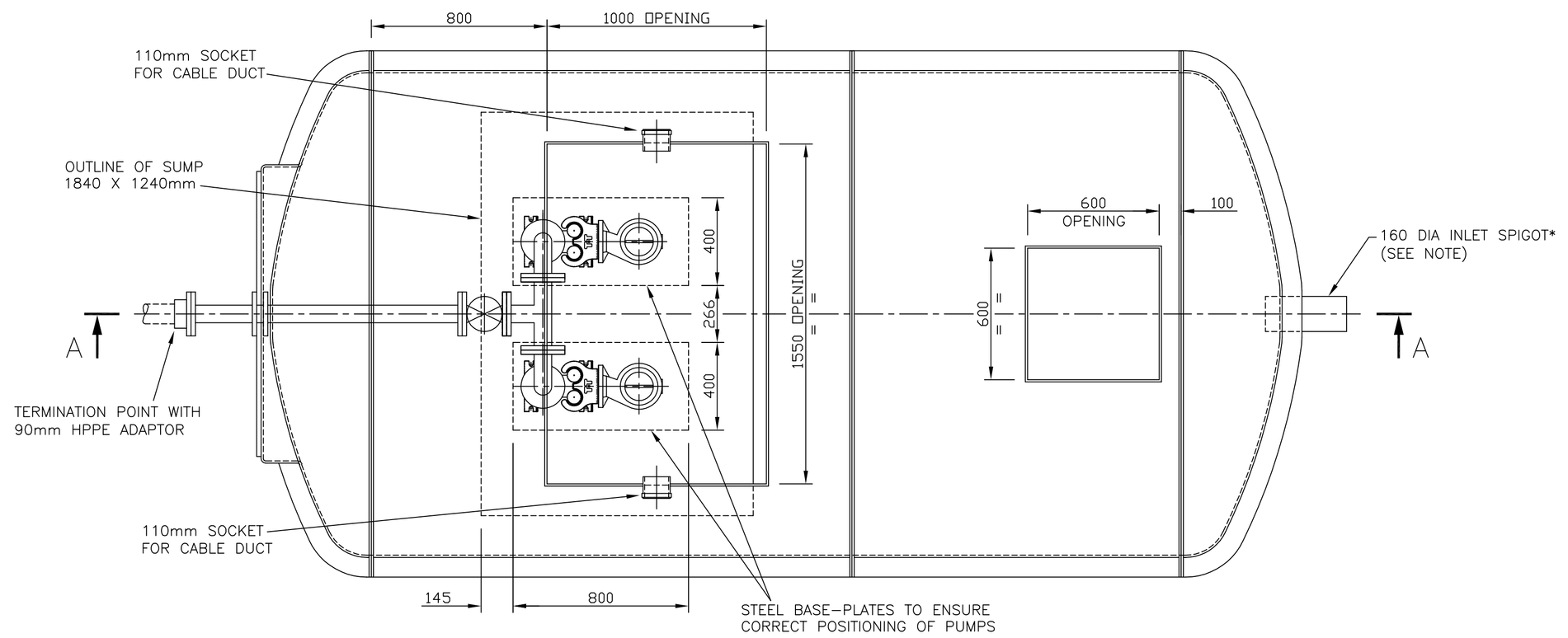
Insurance and Collateral Warranty

TT holds insurance to cover Employer's Liability (£10m), Public and Products Liability (£10m), Contract Works (subject to the claim) and Professional Indemnity (£5m).
A copy of our insurance certificate is available on request.

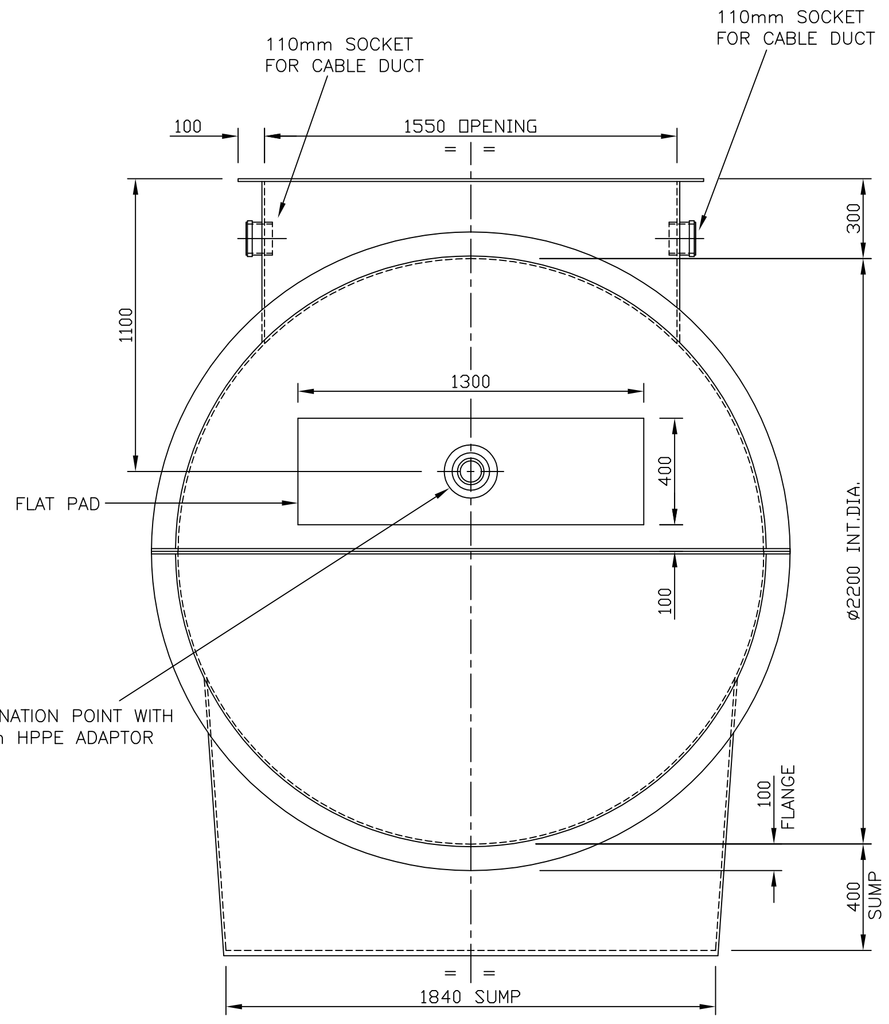
Please note our insurance levels are fixed and valid for the certificate duration, yet any further requirements over and above our insurance, including collateral warranties, associated documentation/wording of that required must be submitted and agreed/approved with TT prior to order placement.

T-T Pumps Ltd, Onneley Works, Newcastle Road, Woore, Cheshire, CW3 9RU, United Kingdom
Tel: +44 (0) 1630 647200 **Fax:** +44 (0) 1630 642100 **www.ttpumps.com** **Email:** response@ttpumps.com

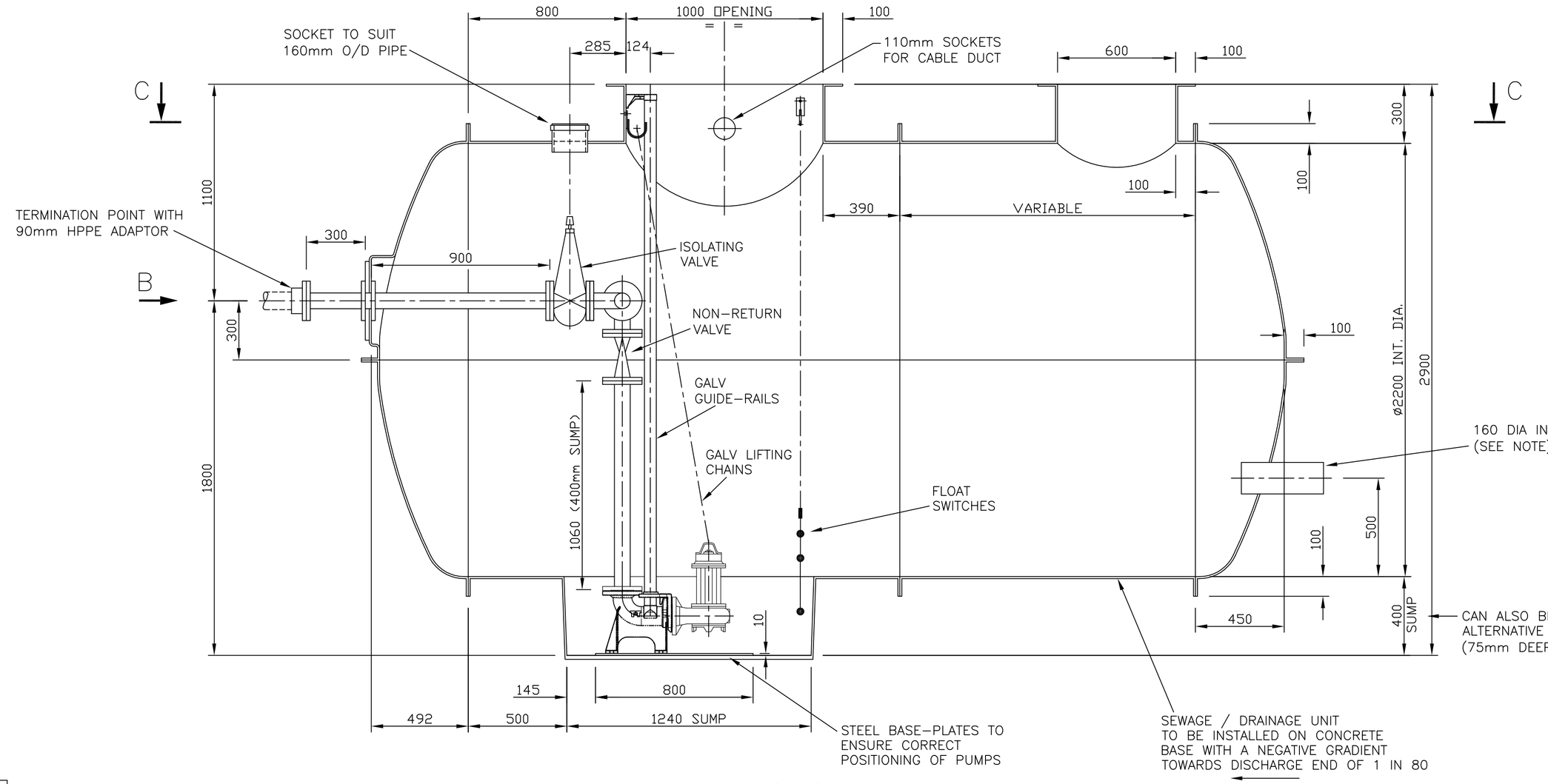
* INLET CONNECTIONS CAN BE POSITIONED AT 500mm FROM THE BASE ANYWHERE AROUND THE CHAMBER, AS SPECIFIED BY CLIENT



SECTIONAL PLAN ON 'C-C'



END ELEVATION ON ARROW 'B'



SECTIONAL ELEVATION ON 'A-A'

ISSUE	AMENDMENTS	DRAWN	APPROV.	DATE
F	CHANGED TO NEW T-T PEDESTAL	DCC	JPW	13.10.22
E	AMENDED TO SUIT THE NEW STYLE DUCKFOOT	HJW	JPW	25.06.20
D	GRP TANK AMENDED TO MANUFACTURER'S DETAILS	DCC	DJP	24.08.11
C	FROM EDGE OF CYLINDRICAL TANK TO INTERNAL	MWB	TRP	07.10.08
—	SIDE OF BULL NOSE IS '495mm'	—	—	—
B	DEPTH OF PUMP SUMP REDUCED & CABLE DUCT	MWB	TRP	06.10.08
—	SKT ADDED, BASEPLATE HOLES REDUCED TO M12	—	—	—
—	300mm LG PIPE ADDED TO DISCHARGE	—	—	—
A	DWG NUMBER AMENDED & SUMP DETAIL ADDED	MWB	TRP	03.03.08

TITLE

XL PLANET RANGE SEWAGE & STORMWATER PUMPING STATIONS
ø2.2 CHAMBER T-T SEWAGE / DRAINAGE STORAGE STATION
1No. 80NB DISCHARGE PIPE

DRAWN BY	M.W.B
APPROVED BY	B.N
DATE	01/11/07
ORIGINAL SCALE	1:33.3

ENSURE THAT THIS IS LATEST ISSUE | DIMENSIONS IN mm UNLESS STATED OTHERWISE
DO NOT SCALE | IF IN DOUBT ASK | TOLERANCE EXCEPT WHERE OTHERWISE STATED ± 0.5mm

T-T Pumping Stations
Onneley Works, Newcastle Road,
Woore, Cheshire, CW3 9RU
ttpumps.com
+44 (0) 1630 647200

PROJECT No	DRAWING No	ISSUE	SHEET 1
STD	PP/9310/F		OF 1

TT062 08.21