



# Waste Transfer Compound North Manchester General Hospital

## Drainage Management Strategy

For NHS Manchester University

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# Document control sheet

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| Issued by      | Hydrock Consultants Limited<br>St Baldred's Hall<br>239 Ashley Road<br>Hale<br>Cheshire WA15 9NE<br>United Kingdom | T +44 (0)161 2330746<br>E manchester@hydrock.com<br>hydrock.com |
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| Prepared by  | Sophie Jones, Engineer         |      |
| Checked by   | Chloe Fell, Principal Engineer |      |
| Approved by  | Neil Byrne, Technical Director |      |

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|              |             |            |                  |

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## **1. Introduction**

### **1.1 Development Context**

- 1.1.1 This report has been prepared by Hydrock Consultants Limited (Hydrock) on behalf of the NHS Manchester University to support the planning application to construct a new waste transfer compound with associated office/breakroom, covered waste storage and compactors, bins, van parking and associated infrastructure and access. (see Appendix A).
- 1.1.2 The site is currently used as a hospital staff car park and is therefore considered to be 'brownfield'.
- 1.1.3 As the site is less than 1 hectare, there is no Flood Risk Assessment required.

## 2. Development Description and Location

### 2.1 Site Location

2.1.1 This site is referenced in Table 1, and a location plan is provided in Figure 1.

| Site Referencing Information  |                                                                                                                                                                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Site Name                     | Waste Transfer Compound NMGH                                                                                                                                                                                                                                                                            |
| Site Address & Location       | Crescent Drive, Manchester, M8 5XL                                                                                                                                                                                                                                                                      |
| Council Area                  | Manchester City Council                                                                                                                                                                                                                                                                                 |
| Approximate Grid Reference    | 384993E, 402099N                                                                                                                                                                                                                                                                                        |
| Site Area                     | The total site area is 0.14ha.                                                                                                                                                                                                                                                                          |
| Boundaries & Surrounding Land | The site is bound by Crescent Drive to the west, Crumpsall Jewish Cemetery to the south and additional hospital staff car parking to the remaining areas.                                                                                                                                               |
| Existing Land Use and Access  | The site is currently used as a hospital staff carpark                                                                                                                                                                                                                                                  |
| Elevation and Topography      | A topographical survey has been undertaken and indicates that the site has a high point centrally of ~78.3m AOD and falls away from this point in all directions to a level of ~77.4m AOD to the North and West and ~76.5m AOD to the South and East. See Appendix B for the full topographical survey. |
| Development Proposals         | The proposed development is for the construction of a new waste transfer compound with associated office/breakroom, covered waste storage and compactors, bins, van parking and associated infrastructure and access.                                                                                   |
| Vehicular access              | The main vehicular access to the site will be from Crescent Drive to the west.                                                                                                                                                                                                                          |

Table 1: Site referencing information



Figure 1: Site location

### 3. Drainage Strategy

#### 3.1 Existing surface water runoff

- 3.1.1 The existing site is considered to be 'brownfield' therefore a calculation of the brownfield runoff rate is required.
- 3.1.2 The total site area is approximately 0.14 hectares, of which 0.11 hectares of impermeable area goes to surface water sewer, the remainder enters the existing foul network. Using the modified rational method and a standard rainfall intensity of 50 mm/hr, the impermeable site area would generate a run-off rate of 17.4/s.
- 3.1.3 A 50% betterment on the brownfield rate is required in accordance with Manchester City Council's Local Flood Risk Management Strategy and the Manchester Trafford and Salford Strategic Flood Risk Assessment.
- 3.1.4 Applying a 50% betterment to this provides a design run-off rate of 8.7/s. Run-off from the proposed development will not exceed this rate and therefore provide betterment and reduce the flood risk of the downstream catchment.
- 3.1.5 The allowable surface water discharge rate for the proposed developed area discharging into the nearest surface water sewer is 8.7l/s.

#### 3.2 Infiltration

- 3.2.1 The underlying ground conditions typically consist of made ground, up to 6 metres of very clayey fine to medium sand and fine to medium gravel underlain with up to 4m of silty clay. See Appendix C for historic borehole logs found on the British Geological Survey GeolIndex.
- 3.2.2 The Soilscape soils data shows the site to be a mixture of 'Slowly permeable seasonally wet acid loamy and clayey soils with impeded drainage'.
- 3.2.3 However, infiltration into ground is not considered feasible due to the nature of the works on site.

#### 3.3 Sustainable Drainage Systems (SuDS)

- 3.3.1 Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed to manage both the environmental risks resulting from the urban runoff and to contribute, wherever possible, to environmental enhancement. Therefore, SuDS objectives are to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).
- 3.3.2 SuDS help to mimic the natural flow of water ensuring that both the quantity and quality of the surface water is dealt with before feeding it into the drainage network. SuDS features usually come with added maintenance, however the benefits they reap are considered to outweigh this. The selection of the most appropriate SuDS features should consider constraints, requirements, and maintenance of the site. It should be remembered that Local Planning Authorities expect SuDS to be investigated on construction projects. The

implementation of SuDS features can assist in achieving the drainage requirements set out in the National Planning Policy Framework.

- 3.3.3 A strong design theme is essential if maximum aesthetic benefits are to be gained from the SuDS approach. At a more local scale SuDS should link with the individual plot structure, planting and amenity areas, gaining multiple benefits from a limited area of land.
- 3.3.4 The 'Management Train Approach' should be central to the surface water drainage strategy of a proposed site. The main objective is the treatment and control of runoff as near to source as possible, thus protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:
- » Prevention - The use of good site design and housekeeping measures to prevent runoff and pollution (e.g. rainwater re-use).
  - » Source Control - Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
  - » Site Control - Management of water in a local area (e.g. ground storage/attenuation, detention ponds/basins).
  - » Regional Control - Management of water from a site or various sites (e.g. wetlands, balancing ponds).
- 3.3.5 The SuDS philosophy for a development site is the promotion of Pollution Prevention and Site Control Techniques. The following design philosophy is proposed:
- » Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance.
  - » Surface water discharge into the nearest available surface water sewer.
  - » Site Control features (attenuation) to accommodate the additional surface water runoff generated by the development site before discharging into the watercourse.
  - » Prevention measures in the form of rainwater re-use systems (tbc).
  - » Provision of suitable oil separators in line with Pollution Prevention Guidance 3 criteria (where applicable).
  - » Aim to limit, where possible, the impermeable fraction of development.
- 3.3.6 It is proposed that the development site has two levels of treatment. Prevention is considered as the first level of treatment and the site control as the second.
- 3.3.7 A review of the possible SuDS solutions that are feasible include:
- » Rainwater harvesting tanks
  - » Ground storage/attenuation
  - » Oil separators

### 3.4 Prevention and Source Control - Principles and Objectives

- 3.4.1 The main objective of prevention and source control is the treatment and control of runoff as near to source as possible. Application of these techniques will require reduction of impermeable areas and techniques to restrict the runoff rates.
- 3.4.2 Prevention measures to be considered, where possible, as part of the overall approach to the management train at this site include rainwater harvesting. Typical examples are given in the SuDS Manual (Ciria C697) and are briefly described in Table 2 below. It must be noted that the effectiveness of each system is dependent on the final design as well as the actual site conditions.

| SuDS Group   | Technique               | Image                                                                               | Description                                                                                                                                                                                                                                          | Advantages                                                                                                                                                   | Disadvantages                                                                                  | Suitable for us on site?                                                   |
|--------------|-------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Retention    | Balancing Pond/Swale    |    | Provides both storm water attenuation and treatment. Run-off from each rain event is detained and treated in the pool. The retention time promotes pollutant removal through sedimentation.                                                          | Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.                | No reduction in run-off volume, land take may limit use in high density sites.                 | Unsuitable due to lack of available land.                                  |
|              | Sub-Surface Attenuation |    | Oversized pipes, tank systems and modular geo-cellular systems that can be used to create a below ground storage structure.                                                                                                                          | Modular and flexible, dual usage (infiltration/storage, high void ratios), can be installed beneath trafficked and soft landscaped areas.                    | No water quality treatment.                                                                    | Sub-surface storage can be used.                                           |
| Infiltration | Infiltration Trench     |  | Surface water run-off can be discharged directly to ground for infiltration by soakaways, basins, or trenches. A prerequisite is that both groundwater and ground conditions are appropriate to receive the quality and quantity of water generated. | Reduces the volume of run-off, effective at pollutant removal, contributes to groundwater recharge, simple and cost effective, easy performance observation. | Requires appropriate pre-treatment, basins require a large flat area, offset from foundations. | Infiltration is not considered to be feasible given the ground conditions. |
|              | Infiltration Basin      |                                                                                     |                                                                                                                                                                                                                                                      |                                                                                                                                                              |                                                                                                |                                                                            |
|              | Soakaway                |                                                                                     |                                                                                                                                                                                                                                                      |                                                                                                                                                              |                                                                                                |                                                                            |

|           |                    |                                                                                     |                                                                                                                                                                        |                                                                                                                                                                                                               |                                                                                                                        |                                           |
|-----------|--------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
|           | Porous Paving      |    | Block or porous paving allows run-off to infiltrate through to sub base layer. Water can then be infiltrated into ground or conveyed into storage or drainage systems. | Reduces the volume of run-off and if designed for infiltration contributes towards groundwater recharge. Easy to install and retrofit. Simple to manage. If lined can be used where groundwater is sensitive. | Not suitable for heavily trafficked areas or adoptable roads. Requires regular sweeping to prevent clogging with dirt. | Unsuitable due to nature of development.  |
|           | Permeable Paving   |                                                                                     |                                                                                                                                                                        |                                                                                                                                                                                                               |                                                                                                                        |                                           |
| Detention | Detention Basin    |    | Surface storage basins that provide flow control through attenuation. Normally dry and in certain situations the land may also function as a recreational facility.    | Cater for a wide range of rainfall events, can be used where groundwater is vulnerable, potential for dual land use, easy to maintain.                                                                        | Land take, little reduction in run-off volume, detention depths constrained by levels.                                 | Unsuitable due to lack of available land. |
|           | Enhanced Dry Swale |  | Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate.         | Incorporate into landscaping, good removal of pollutants, reduces run-off rates and volumes, low cost.                                                                                                        | Not suitable for steep areas, significant land take, not suitable in areas with roadside parking.                      | Unsuitable due to lack of available land. |
|           | Enhanced Wet Swale |                                                                                     |                                                                                                                                                                        |                                                                                                                                                                                                               |                                                                                                                        |                                           |

|                |                      |                                                                                    |                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                  |                                                                                                                                                                                          |                                                                           |
|----------------|----------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Source Control | Green/Brown Roof     |   | Multi-layered system that covers the roof of a building with vegetation cover/landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of run-off and attenuating peak flows.                                                                                                                  | Mimics greenfield state of building footprint for high density developments, good removal of pollutants, ecological benefits, insulates buildings, sound absorption.                                                             | Additional weight, not appropriate for steep roofs, maintenance of roof vegetation.                                                                                                      | Green/Brown roof can be used subject to Architect building specification. |
|                | Rainwater Harvesting |  | Similar to the use of water butts this prevention method stores rainwater runoff from roofs and external areas in below ground tanks. The water can then be used for irrigation purposes to the soft landscaping areas or alternatively pumped to an internal storage tank where the 'Grey' water can be used for WC's and washing machines. | Harvested grey water will collect and automatically be used for various systems, such as toilet flushing, outside taps etc. The result will be less water usage and cheaper bills and a greener building or commercial premises. | Rainfall is hard to predict and sometimes little or no rainfall can limit the supply of rainwater. It also should have a "mains water" top up to ensure that you don't run out of water. | Rainwater Harvesting can be used.                                         |

|            |                            |                                                                                    |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                               |                                                                                                                                                                               |                                                                              |
|------------|----------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Filtration | Surface Sand Filter        |   | Structures designed to treat surface water run-off through filtration using a sand bed filter medium. The filters can be designed with or without infiltration. Temporary storage of run-off is achieved through ponding above the filter layer. They are used where particularly high pollutant removal is required. | Flexibility of design, efficient in removing pollutants, suitable for retrofits and in tightly constrained urban locations.                                                                   | Not for high sediment content, detention times can support algae growth, minimum hydraulic head of 1.2m required, possible odour problems, high capital and maintenance cost. | There is no requirement for high pollution reduction at this site.           |
|            | Sub-surface Sand Filter    |                                                                                    |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                               |                                                                                                                                                                               |                                                                              |
|            | Perimeter Sand Filter      |                                                                                    |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                               |                                                                                                                                                                               |                                                                              |
|            | Bioretention/ filter swale |  | Vegetated strips of land designed to accept run-off as overland sheet flow between a hard-surfaced area and a receiving system.                                                                                                                                                                                       | Landscaping features, effective in removing pollutants, flexible layout to fit into landscape, suited for highly impervious areas, good retrofit, capability, effective pre-treatment option. | Requires landscaping and management, large land required, not suitable for steep sites; no significant attenuation or reduction of flows.                                     | No requirement for high pollution reduction; large land areas not available. |

|            |                     |                                                                                    |                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                               |                                                                                                                                       |
|------------|---------------------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
|            | Filter trench/drain |   | Shallow excavations filled with rubble or stone that create temporary subsurface storage for filtration of storm water run-off. Receive lateral inflow from an adjacent impermeable surface. | Hydraulic benefits achieved with filter trenches, trenches can be incorporated into site landscaping and fit well beside roads and car parks.   | High clogging potential without effective pre-treatment, limited to small catchments, high cost of replacing filter material. | Filter drains can't be used.                                                                                                          |
| Conveyance | Conveyance Swales   |  | Formal linear drainage features in which surface water can be stored or conveyed. They can be incorporated with water features such as ponds or waterfalls where appropriate.                | Negate the need for underground pipework. Can provide some attenuation. Possible reduction in run-off volume via plant uptake and infiltration. | Potential trip/wheel hazard, disabled access issues.                                                                          | Could be used where conveyance is required but the lack of formal outside spaces at the site makes the aesthetic aspects unnecessary. |
|            | Rills               |                                                                                    |                                                                                                                                                                                              |                                                                                                                                                 |                                                                                                                               |                                                                                                                                       |

|                |                            |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |
|----------------|----------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>Wetland</b> | Shallow Wetland            |  | <p>Wetlands provide storm water attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation.</p> <p>Wetlands detain flows for an extended period to allow sediments to settle and to remove contaminants. They can provide significant ecological benefits.</p> | <p>Good pollutant removal and if lined can be used where groundwater is vulnerable. Good community acceptability, ecological and amenity benefits.</p> | <p>Land take is high, requires base flow, little reduction in run-off volume, not suitable for steep sites.</p> | <p>Unsuitable due to lack of available land.</p> |
|                | Extended Detention Wetland |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |
|                | Pond Wetland               |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |
|                | Pocket Wetland             |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |
|                | Submerged Gravel Wetland   |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |
|                | Wetland Channel            |                                                                                   |                                                                                                                                                                                                                                                                                                            |                                                                                                                                                        |                                                                                                                 |                                                  |

Table 2: SuDS considerations

### 3.5 Surface Water Drainage Strategy

- 3.5.1 Surface Water Drainage Strategies must follow the hierarchy of surface water disposal as set out in Building Regulations - Approved Document H, as listed below;
- » **Option 1** - Into the ground (infiltration)
  - » **Option 2** - To a watercourse
  - » **Option 3** - To a public/private sewer
- 3.5.2 Option 1 infiltration into the ground is not considered feasible, this is due to the nature of activities on the proposed site and the lack of available space to the south of the site where the soakaway would be located.
- 3.5.3 Option 2, to a watercourse is not considered feasible due to there being no available watercourses within the vicinity of the site.
- 3.5.4 Therefore, Option 3 is the preferred method, whereby surface water will discharge into the nearest private surface water sewer within Crescent Drive.
- 3.5.5 Surface water runoff from roofs and external areas will be directed to the below ground gravity network, where it will join the wider private drainage network of carrier drains at a restricted rate of 8.7L/s (see Appendix D Hydrock proposed surface water drainage layout).
- 3.5.6 A hydraulic model has been created using drainage software as part of the preliminary drainage design, which defines pipe sizes and attenuation volumes. Hydraulic calculations have been provided in Appendix E. It is noted that these rates and volumes are preliminary and may change at detailed design stage when more specific information is available.
- 3.5.7 A climate change allowance of 45% has been applied.
- 3.5.8 The proposed drainage layout is designed in accordance with Design and Construction Guidance. No above ground flooding for the 1 in 30-year storm event should occur. An assessment of extreme storm event, the 100-year event plus 45% climate change has been carried out. The storm-water volumes generated by this event are classed as exceedance flooding and will be safely contained on site and directed away from the buildings, where they will sit in the low points of the site and drain into the surface water infrastructure via filter drains as water levels recede.
- 3.5.9 As part of the drainage strategy, we are proposing the following:
- » The proposed drainage system will be a managed gravity system with a flow control set at a permissible maximum discharge rate of 8.7L/s into the nearest surface water sewer within Crescent Drive.
  - » The catchment areas will be drained via drainage channels and then discharge into the new private surface water network. Surface runoff from the roof will also discharge to the new private surface water network.
  - » Pollution treatment measures will be provided in the form of silt traps on drainage elements which will filter and trap silts and debris and mitigate against the risk of pollution entering the sewer network. All separators will be alarmed and remotely monitored at all times to ensure reliability.

### 3.6 Water Quality

- 3.6.1 The site mainly comprises of commercial waste, access road, and parking, which have pollution hazard levels of medium in accordance with CIRIA C753 table 26.2 as below.
- 3.6.2 As the vehicle running area is less than 800m<sup>2</sup> in area there is no requirement for an oil separator however, all gullies/kerb drain outlets will be trapped.

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

- 3.6.3 Appropriate SuDS mitigation indices in the will be provided for each area of the development in accordance with CIRIA C753 table 26.3, as below.

| Type of SuDS component                       | Mitigation indices <sup>1</sup>                                                                                                                                                                                                                    |        |              |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|
|                                              | TSS                                                                                                                                                                                                                                                | Metals | Hydrocarbons |
| Filter strip                                 | 0.4                                                                                                                                                                                                                                                | 0.4    | 0.5          |
| Filter drain                                 | 0.4 <sup>2</sup>                                                                                                                                                                                                                                   | 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 <sup>4</sup>                            | 0.7 <sup>3</sup>                                                                                                                                                                                                                                   | 0.7    | 0.5          |
| Wetland                                      | 0.8 <sup>3</sup>                                                                                                                                                                                                                                   | 0.8    | 0.8          |
| Proprietary treatment systems <sup>5,6</sup> | These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area. |        |              |

### 3.7 Foul Drainage Strategy

- 3.7.1 Due to the nature of the development, surface water runoff from the waste facilities will be drained via drainage channels and enter the private foul network.
- 3.7.2 Foul flows will outfall via gravity into a package pumping station and then flow along a rising main into the nearest private foul sewer within Crescent Drive approximately 50m north of the site. (see Appendix D).
- 3.7.3 A map showing the location of the existing United Utilities public sewer is included in Appendix F, due to the location of the sewer it is deemed unviable to connect due to Crescent Drive being an ambulance/bus route.

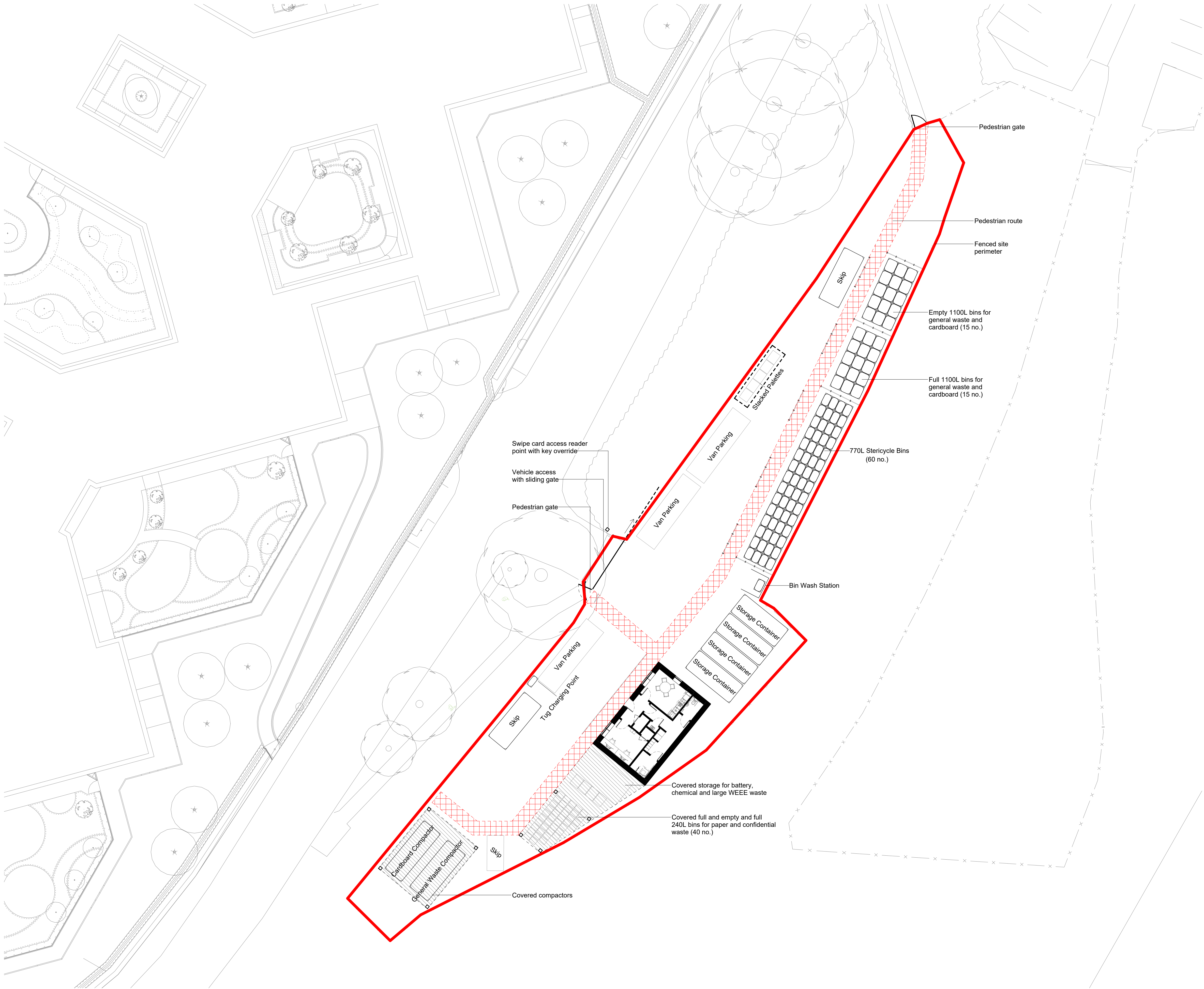
### 3.8 Management, Maintenance and Residual Risk

- 3.8.1 The proposed drainage layout will be designed in accordance with building regulations. SuDS guidance will be taken from Ciria C753.
- 3.8.2 Run-off from roofs is considered to be generally clean with limited contamination, and will be discharged directly to the proposed drainage infrastructure and new SuDS Facilities. Silt is to be prevented from entering the drainage system by the use of trapped gullies.
- 3.8.3 A private management company will maintain the drainage infrastructure as part of a hospital site-wide management and maintenance schedule as shown in Table 3.
- 3.8.4 Access and egress arrangements to and from the new development, should exceedance flooding occur, will be via the access on to Crescent Drive.
- 3.8.5 Flood risk to people and property can be managed but it can never be completely removed. Residual risk remains after flood management or mitigation measures have been put in place. This relates to a rainfall event beyond what can be fully quantified.

| Item                                  | Maintenance                                                                                                                                                                                                                                                                                                                                                                                               | Frequency per year |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Gullies                               | Removal of silt accumulation from mud bucket.<br>Gratings checked for operation/damage – replaced if required.                                                                                                                                                                                                                                                                                            | 2                  |
| Foul Water Manholes                   | Manholes covers checked for operation/damage – seating's re-greased or replaced as required.<br>Check for blockages and or damage to invert channel/inlets – jetting pipe runs if blocked, any damage to be repaired.<br>All access ladders & other associated ironworks to be checked for corrosion & fixings to be checked for deterioration. To be repaired or replaced dependant of extent of damage. | 1                  |
| Surface Water Manholes, Flow Controls | As Above<br>All catch pits/Vortex Separators to have silt/solid accumulation removed & base jetted clean.                                                                                                                                                                                                                                                                                                 | 1                  |
| Drainage Channels                     | All catch/access pits to have silt/solid accumulation removed.<br>Channel run to be jetted through between access points.<br>Any channel grates to be inspected for damage & replaced as necessary.                                                                                                                                                                                                       | 2                  |

Table 3: Drainage maintenance

## *Appendix A*

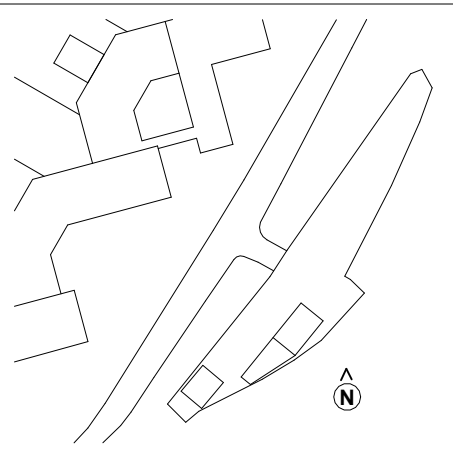


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The copyright in this drawing is vested in Sheppard Robson and no license or assignment of any kind has been, or is, granted to any third party whether by provision of copies or originals or otherwise unless agreed in writing.  
DO NOT SCALE FROM THIS DRAWING  
The contractor shall check and verify all dimensions on site and report any discrepancies in writing to Sheppard Robson before proceeding work  
FOR ELECTRONIC DATA ISSUE  
Electronic Data / drawings are issued as "read only" and should not be interrogated for measurement. All dimensions and levels should read, only from those values stated in text on the drawing.

NOTES

| REVISIONS |            |                         |
|-----------|------------|-------------------------|
| REV.      | DATE       | AMENDMENT               |
| P01       | 30/11/2023 | Issued to Design Team   |
| P02       | 15/12/2023 | Issued to Design Team   |
| P03       | 18/01/2024 | Issued to Arup          |
| P04       | 08/02/2024 | Layout updated          |
| P05       | 20/02/2024 | Building Layout Updated |

KEYPLAN



CLIENT



SHEPPARD ROBSON

27th Floor City Tower Piccadilly Plaza Manchester M1 4BT  
T: +44 (0)161 233 8900 E: enquiries@sheppardrobson.co.uk

PROJECT  
North Manchester General Hospital

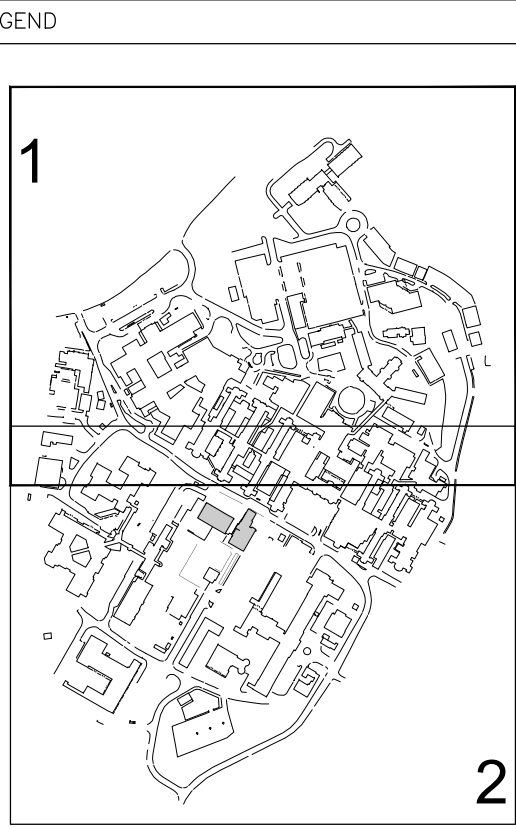
| SCALE@A1 | DATE       | ORIGINATOR | CHECKED | AUTHORISED |
|----------|------------|------------|---------|------------|
| 1 : 200  | 20/02/2024 | LH         | DB      | AS         |

DESCRIPTION  
WP1 Waste Transfer Compound  
Sketch Layout

STAGE

| STATUS                        | PURPOSE FOR ISSUE | SR NO. |
|-------------------------------|-------------------|--------|
| S2                            | FOR INFORMATION   | 6512   |
| DRAWING NO.                   |                   | REV.   |
| 23130-SRA-NM171-00-DR-A-SK004 |                   | P05    |

## *Appendix B*



| LEGEND |                      |
|--------|----------------------|
|        | Buildings            |
|        | Kerb line            |
|        | Line marking         |
|        | Drive/Path           |
|        | Centre line          |
|        | Break line           |
|        | Station and Name     |
|        | Tree / Bush / Shrub  |
|        | Area of Undergrowth  |
|        | Hedge                |
|        | Ridge Level          |
|        | Eaves Level          |
|        | Flat Roof Level      |
|        | Gable                |
|        | Iron Railings        |
|        | Whin Mass            |
|        | Post & Rail          |
|        | Post & Wire          |
|        | Chain Line           |
|        | Wooden Panels        |
|        | Concrete Panels      |
|        | Steel Palisade       |
|        | Inspection chamber   |
|        | Ballast              |
|        | Blanked road         |
|        | Gully                |
|        | Down pipe            |
|        | Vent pipe            |
|        | Pipe above ground    |
|        | Latrine              |
|        | Water level          |
|        | Flood light          |
|        | Lamp post            |
|        | Telegraph post       |
|        | Electricity post     |
|        | Bus stop             |
|        | Stop valve           |
|        | Stop valve           |
|        | Earth rod            |
|        | Water meter          |
|        | Air valve            |
|        | Wash out             |
|        | Ridding eye          |
|        | Bedding box          |
|        | Cable to             |
|        | Marker post          |
|        | Gas meter post       |
|        | Silt                 |
|        | Internal floor level |
|        | Threshold level      |
|        | Sign post            |
|        | Travels              |
|        | Boundary             |
|        | ELEC                 |
|        | ELEC                 |
|        | British Telecom      |
|        | Concrete             |
|        | Inspection chamber   |
|        | Rigid Retaining wall |
|        | Unstable soil        |
|        | Tree-removal line    |
|        | Gully                |
|        | Matt Box             |
|        | Tree Stump           |
|        | Cover level          |
|        | Level level          |

**NOTES**

This plan should only be used for its original purpose. Axis Surveys accepts no responsibility for this plan if supplied to any party other than the original client. Do not scale, all dimensions should be checked on site prior to design and construction.

Drainage information (where applicable) has been visually inspected from the surface and therefore no allowance has been made for any sub-surface entry into manholes, chambers or voids. Therefore any details relating to depths, sizes, ETC will be approximate only.

The contractor is to check and verify all building and all dimensions, levels and sewer level levels of connection points before work starts.

Should there be any conflict between the details indicated on this drawing and those indicated on other drawings, the engineer should be informed prior to construction on site.

It is important to note that the same accuracies implied by the plotting scale are equally applicable to digital data supplied for CAD.

Every effort is made to identify all visible above ground features, however it should be borne in mind that there may be features obscured at the time of survey.

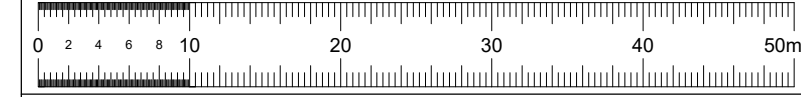
Values features in the vicinity of site boundaries, as shown on this survey may not represent the extent of legally conveyed ownership.

THIS SURVEY HAS BEEN ORIENTATED TO THE ORDNANCE SURVEY (OS) NATIONAL GRID (OSNGR) VIA A GLOBAL POSITION SYSTEM (GPS) AND THE U.S. ACTIVE NETWORK (OS NET).

A TRUE ORDNANCE COORDINATE HAS BEEN ESTABLISHED NEAR TO THE SITE CENTRE VIA A TRANSFORMATION USING THE OSTNED & OSNGR TRANSFORMATION MODELS. THE SURVEY HAS BEEN CORRELATED TO THE OSTNED & OSNGR DATUMS OF 1936 & 1939.

ESTABLISHED TO CREATE A TRUE U.S. BEARING FOR ANGLE

| Eastings | Northings  | Level      |
|----------|------------|------------|
| AX1      | 38483311   | 402242.528 |
| AX2      | 38483700   | 402213.863 |
| AX3      | 38484000   | 402213.863 |
| AX4      | 38484085   | 402199.784 |
| AX5      | 38484085   | 402199.784 |
| AX6      | 384776.706 | 402171.443 |
| AX7      | 384833.058 | 402199.182 |
| AX8      | 384811.822 | 402003.673 |
| AX9      | 384842.340 | 401986.419 |
| AX10     | 384821.865 | 402003.798 |
| AX11     | 384859.573 | 402063.632 |
| AX12     | 384859.573 | 402063.632 |
| AX13     | 384843.111 | 402096.026 |
| AX14     | 384843.111 | 402096.026 |
| AX15     | 384843.111 | 402096.026 |
| AX16     | 384843.111 | 402096.026 |
| AX17     | 384843.111 | 402096.026 |
| AX18     | 384843.111 | 402096.026 |
| AX19     | 384843.111 | 402096.026 |
| AX20     | 384843.111 | 402096.026 |
| AX21     | 384843.111 | 402096.026 |
| AX22     | 384843.111 | 402096.026 |
| AX23     | 384843.111 | 402096.026 |
| AX24     | 384843.111 | 402096.026 |
| AX25     | 384843.111 | 402096.026 |
| AX26     | 384843.111 | 402096.026 |
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| AX98     | 384843.111 | 402096.026 |
| AX99     | 384843.111 | 402096.026 |
| AX00     | 384843.111 | 402096.026 |



Bretby Business Park Burton on Trent  
Staffordshire DE15 0YZ  
T: 01283 550969  
E: info@axis-surveys.com  
www.axis-surveys.com

|         |                                              |
|---------|----------------------------------------------|
| CLIENT  | GRM Development Solutions                    |
| PROJECT | North Manchester General Hospital Manchester |
| TITLE   | Topographical Survey 3D                      |
| SCALE   | 1:500                                        |
| DATE    | June 2021                                    |
| DRAWN   | JL                                           |
| CHECKED | LB                                           |
| REF NO. | 36540                                        |
| STATUS  | FINAL                                        |
| SHEET   | 1 of 2                                       |

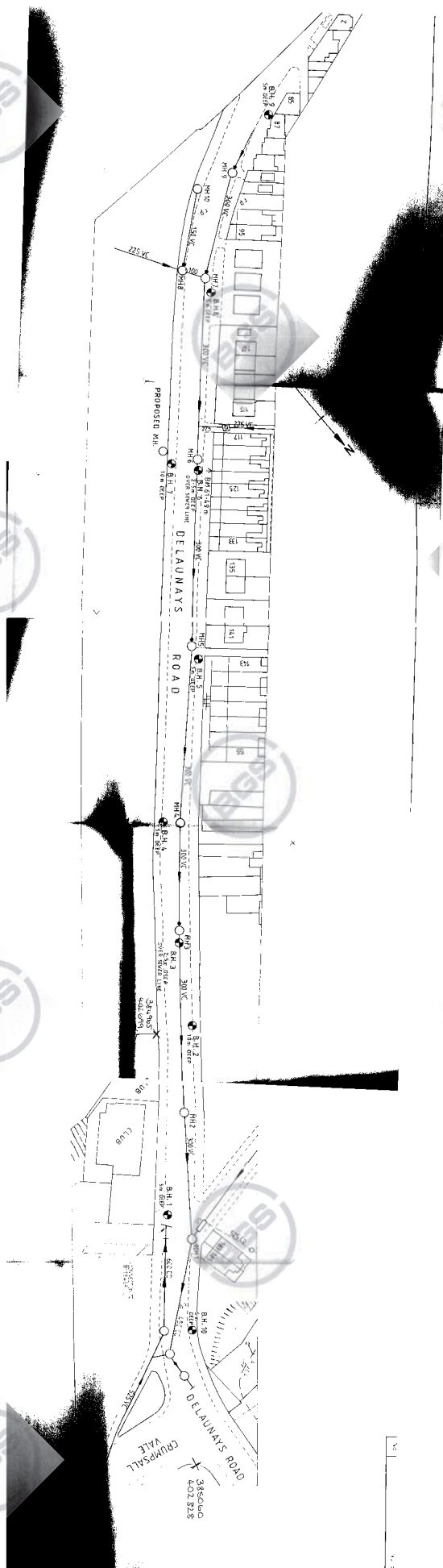


## *Appendix C*

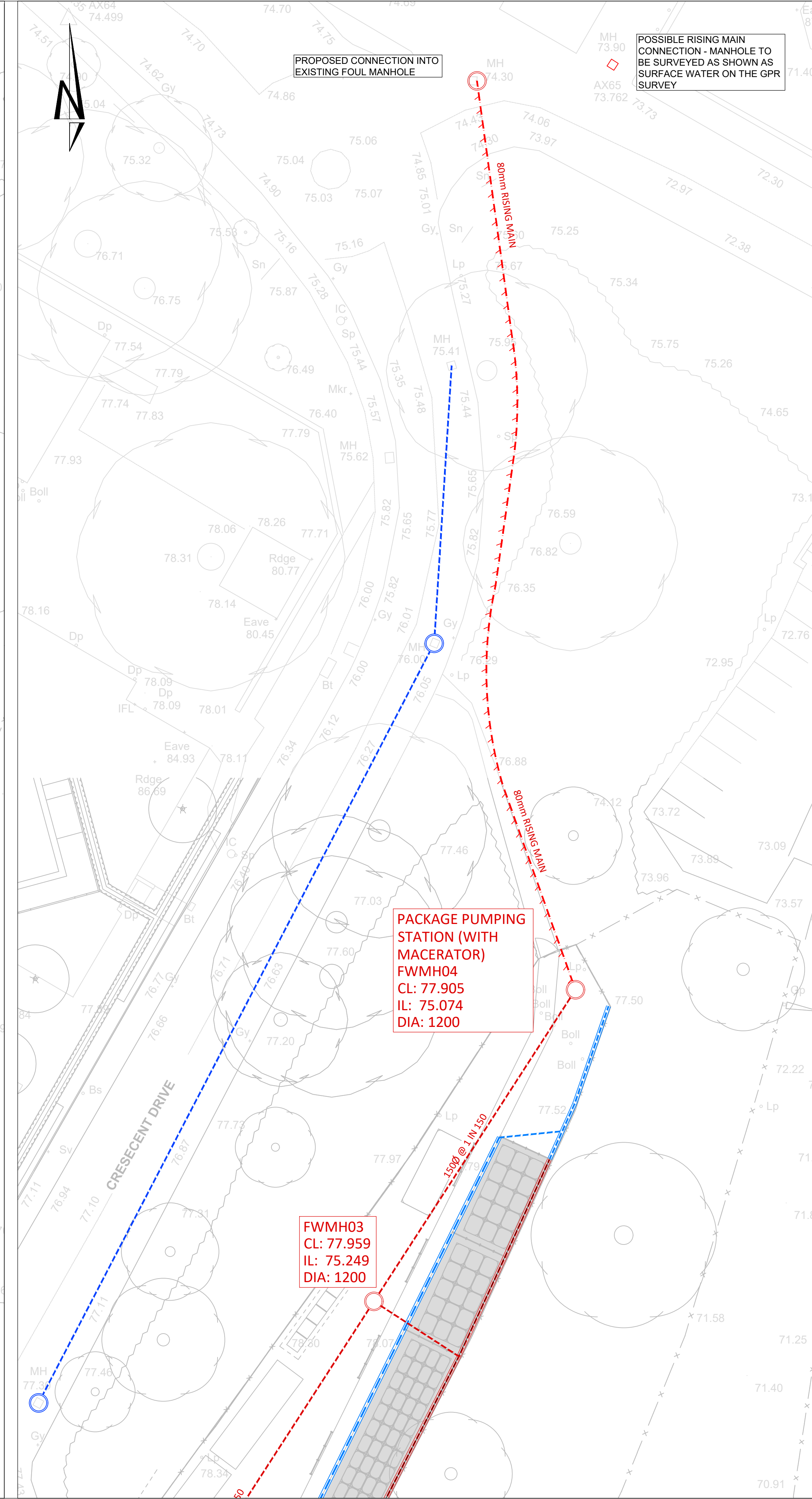
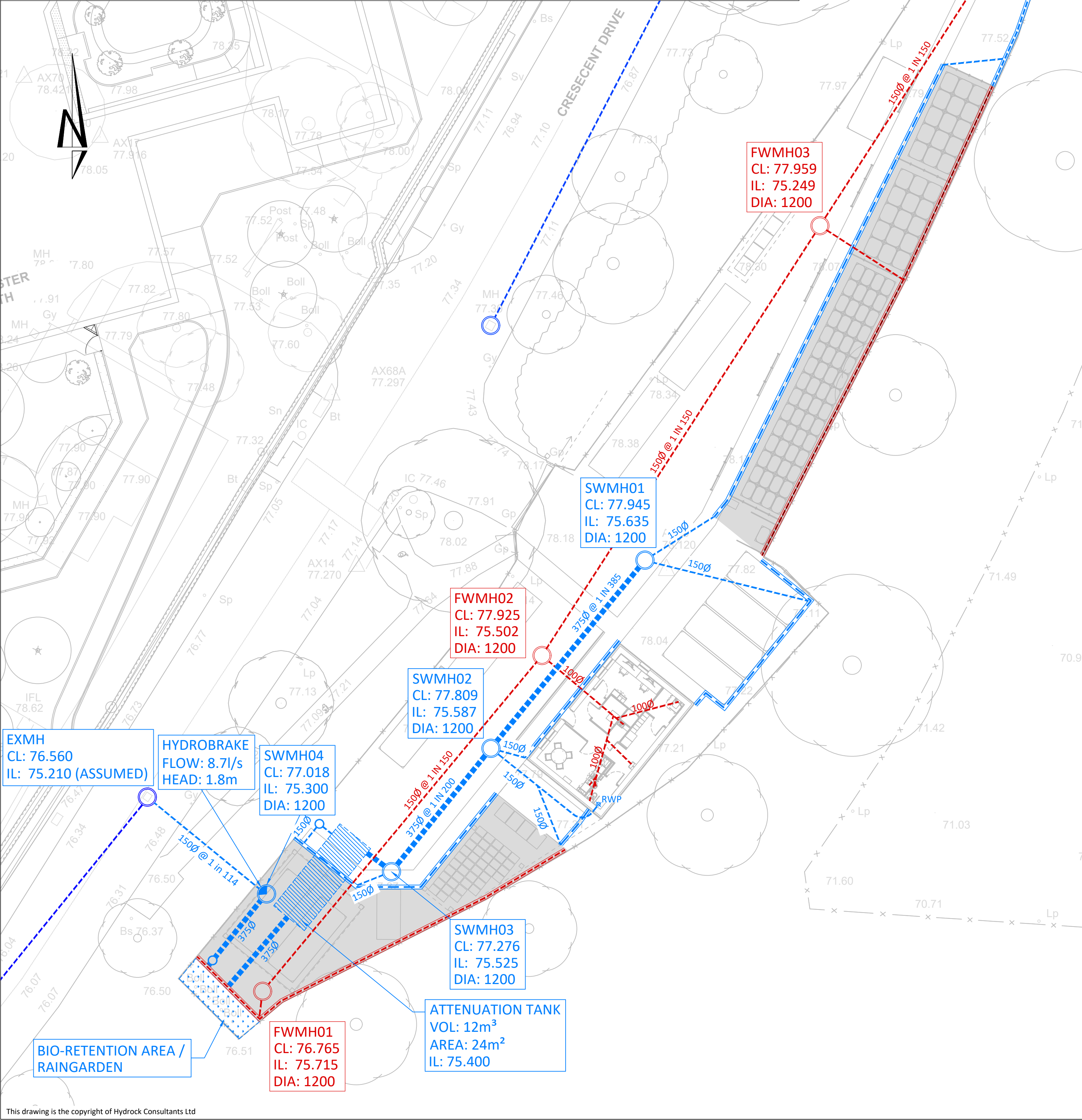
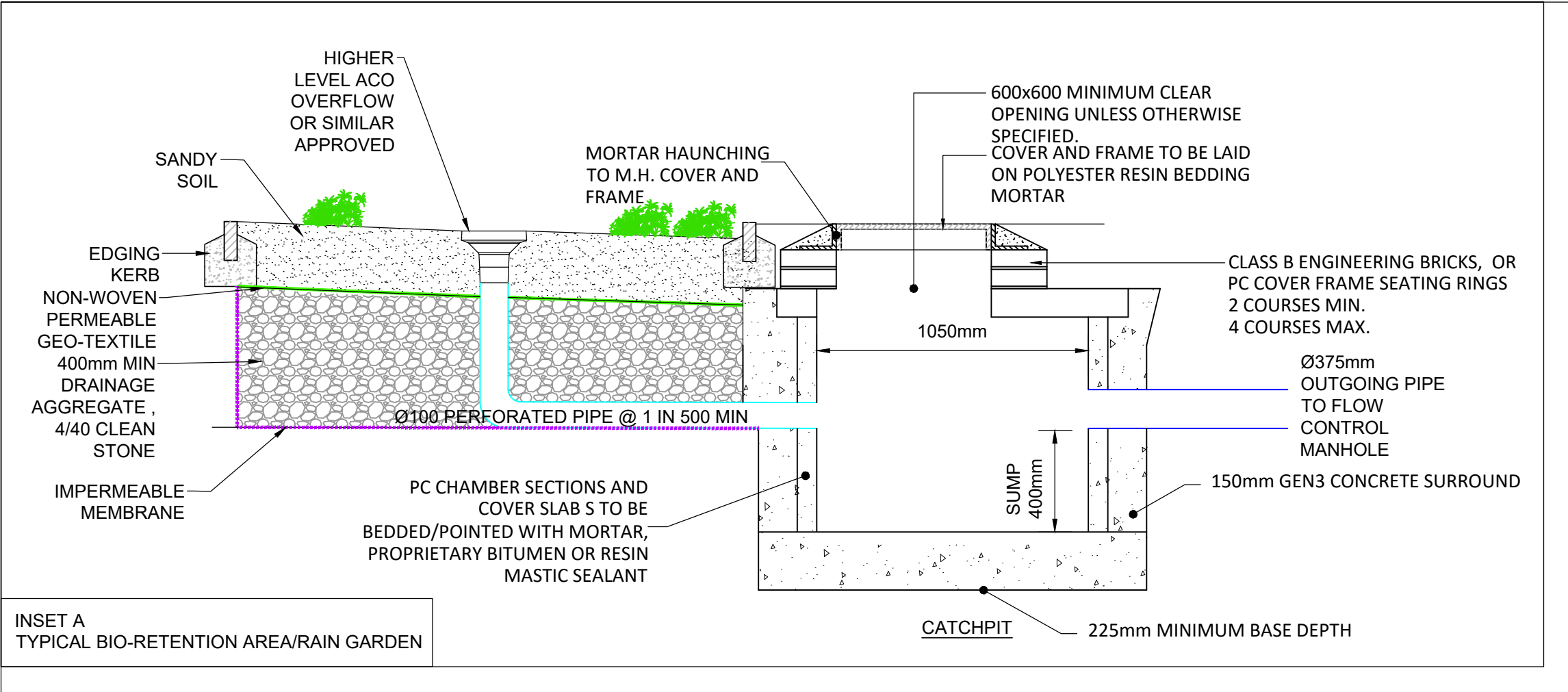


384708  
402471

| Sampling                                                 |      | Properties |      |       | Strata                                                                                                                        |               |        |         |                            |       |       |
|----------------------------------------------------------|------|------------|------|-------|-------------------------------------------------------------------------------------------------------------------------------|---------------|--------|---------|----------------------------|-------|-------|
| Depth                                                    | Type | Cu kPa     | w%   | SPT N | Description                                                                                                                   | Depth         | Level  | Legend  |                            |       |       |
|                                                          |      |            |      |       | MADE GROUND: Tarmacadam over stone sets over concrete.                                                                        | GL            |        |         |                            |       |       |
| 1.00-1.45                                                | CB   |            |      | 26    | MADE GROUND: Comprising soft grey brown silty sandy clay with some fine gravel.                                               | 0.70          |        |         |                            |       |       |
| 1.00-1.50                                                | B    |            |      |       |                                                                                                                               | 0.90          |        |         |                            |       |       |
| 2.00-2.45                                                | CB   |            |      | 39    | MADE GROUND: Comprising brown and black very clayey coarse SAND with much angular fine to medium gravel of predominantly ash. |               |        |         |                            |       |       |
| 2.00-2.50                                                | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| 3.00-3.45                                                | SD   |            |      | 7     |                                                                                                                               | 2.90          |        |         |                            |       |       |
| 3.00-3.50                                                | B    |            |      |       | Loose brown and grey very silty very clayey fine to medium SAND with traces of sub-rounded fine to medium gravel above 3.50m. |               |        |         |                            |       |       |
| 4.00-4.50                                                | SD   |            |      | 9     |                                                                                                                               |               |        |         |                            |       |       |
| 4.00-4.50                                                | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| 5.00-5.45                                                | SD   |            |      | 6     |                                                                                                                               |               |        |         |                            |       |       |
| 5.00-5.50                                                | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| 5.80-6.25                                                | SD   |            |      | 8     |                                                                                                                               | 5.80          |        |         |                            |       |       |
| 5.80-6.30                                                | B    |            |      |       | Loose light brown silty clayey fine medium to coarse SAND with occasional thin bands of grey silt.                            |               |        |         |                            |       |       |
| 6.80-7.25                                                | SD   |            |      | 7     |                                                                                                                               |               |        |         |                            |       |       |
| 6.80-7.30                                                | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| 7.80-8.25                                                | SD   |            |      | 9     |                                                                                                                               |               |        |         |                            |       |       |
| 7.80-8.30                                                | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| 8.50-8.95                                                | CB   |            |      | 26    |                                                                                                                               | 8.50          |        |         |                            |       |       |
| 8.50-9.00                                                | B    |            |      |       | Soft grey silty sandy CLAY with some sub-rounded fine medium to coarse gravel.                                                |               |        |         |                            |       |       |
| 9.50-9.95                                                | CB   |            |      | 44    |                                                                                                                               |               |        |         |                            |       |       |
| 9.50-10.00                                               | B    |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
|                                                          |      |            |      |       | End of Borehole                                                                                                               | 10.00         |        |         |                            |       |       |
| <b>Drilling</b>                                          |      |            |      |       | <b>Groundwater</b>                                                                                                            |               |        |         |                            |       |       |
| Type                                                     | From | To         | Size | Fluid | Struck                                                                                                                        | Behaviour     | Sealed | Date    | Hole                       | Cased | Water |
| Shell and Auger                                          | GL   | 10.00      | 0.15 | -     | 2.10                                                                                                                          | Rose to 2.80m | -      | 21.3.88 | 10.00                      | 8.50  | 2.80  |
| <b>Remarks</b> Service Location Plan excavated to 1.00m. |      |            |      |       |                                                                                                                               |               |        |         |                            |       |       |
| <b>Borehole Record</b>                                   |      |            |      |       | <b>Project</b> Manchester City Council<br>Delanays Road<br>Sewer Renewal Road                                                 |               |        |         | <b>Contract</b> E6531/16   |       |       |
| <b>exploration associates</b>                            |      |            |      |       |                                                                                                                               |               |        |         | <b>Borehole</b> 9 (1 of 1) |       |       |



## *Appendix D*



**Notes:**

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
- This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.
- All RWP and pop-up locations are assumed, pending detailed design.
- Outfall invert levels to be confirmed by survey prior to construction. Final outfall location may be changed for construction.
- Drainage layout may be subject to change once the detailed design is carried

**SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION**

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

**CONSTRUCTION**

**MAINTENANCE / CLEANING**

**DECOMMISSIONING / DEMOLITION**

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

**Key:**

- SURFACE WATER DRAINAGE
- FOUL WATER DRAINAGE
- FOUL WATER MANHOLE
- PROPOSED RISING MAIN
- SURFACE WATER MANHOLE
- HYDROBRAKE MANHOLE
- SURFACE WATER CHANNEL DRAIN SEE DRAWING 32425-HYD-XX-XX-DR-D-1103
- RAINWATER PIPE
- FOUL WATER CHANNEL DRAIN - ACO MULTIDRAIN OR SIMILAR APPROVED
- BIN STORE CATCHMENT DRAINING TO FOUL NETWORK
- ATTENUATION TANK
- BIO-RETENTION AREA / RAINGARDEN
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER DRAINAGE

|     |          |                                          |    |     |
|-----|----------|------------------------------------------|----|-----|
| T4  | 04.12.24 | FOUL DRAINAGE AMENDED TO PUMPED SOLUTION | TF | CF  |
| T3  | 10.10.24 | FOUL DRAINAGE IN ROAD AMENDED            | TF | CF  |
| T2  | 25.06.24 | FIRST ISSUE                              | TF | CF  |
| T1  | 15.03.24 | FIRST ISSUE                              | TF | CF  |
| Rev | Date     | Description                              | By | Ckd |

Architect:

**SR**

Hydrock Consultants Ltd  
239 Ashley Road  
Walsley, Cheshire  
WAL5 5NE  
T +44 (0)161 233 0746  
www.hydrock.com

**Hydrock**

Client:

**NHS**  
**Manchester University**  
NHS Foundation Trust

Project Title:

**NORTH MANCHESTER GENERAL HOSPITAL**

Drawing Title:

**DRAINAGE LAYOUT**

Drawing Status:

**TENDER**

Hydrock Job No:

**C32425**

|       |         |            |            |            |
|-------|---------|------------|------------|------------|
| Drawn | Checked | Scale @ A1 | Date       | Issue Date |
| TF    | CF      | 1:250      | 15.03.2024 | 15.03.2024 |

Drawing Number:

**32425-HYD-XX-XX-DR-D-0500**

Revision:

**T4**

## *Appendix E*



|  |   |
|--|---|
|  | • |
|  | • |
|  | • |

|                  |
|------------------|
| NMGH             |
| Waste Relocation |



|                         |
|-------------------------|
| Date 06/11/2024         |
| File SW Model Rev 2.MDX |

|                |
|----------------|
| Designed by CF |
| Checked by NB  |

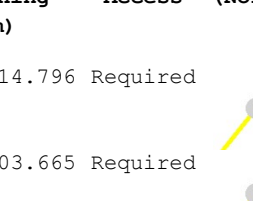
|          |
|----------|
| Innovyze |
|----------|

---

Network 2020.1.3

## Manhole Schedules for SW 1.SWS

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | PN    | Pipe Out Invert Level (m) | Diameter (mm) | PN    | Pipes In Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|---------|-----------|--------------|---------------|--------------------|-------|---------------------------|---------------|-------|---------------------------|---------------|---------------|
| SWMH1   | 77.940    | 2.305        | Open Manhole  | 1200               | 1.000 | 75.635                    | 600           |       |                           |               |               |
| SWMH2   | 77.840    | 2.253        | Open Manhole  | 1200               | 1.001 | 75.587                    | 600           | 1.000 | 75.587                    | 600           |               |
| SWMH3   | 77.140    | 1.615        | Open Manhole  | 1200               | 1.002 | 75.525                    | 600           | 1.001 | 75.525                    | 600           |               |
| TANK    | 76.900    | 1.500        | Open Manhole  | 1200               | 1.003 | 75.400                    | 600           | 1.002 | 75.400                    | 600           |               |
| SWMH4   | 77.020    | 1.720        | Open Manhole  | 1200               | 1.004 | 75.300                    | 150           | 1.003 | 75.300                    | 600           |               |
|         | 76.560    | 1.350        | Open Manhole  | 0                  |       | OUTFALL                   |               | 1.004 | 75.210                    | 150           |               |

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North)                                                                      |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|-------------------------------------------------------------------------------------|
| SWMH1   | 385021.644          | 402114.796           | 385021.644               | 402114.796                | Required       |  |
| SWMH2   | 385012.767          | 402103.665           | 385012.767               | 402103.665                | Required       |                                                                                     |
| SWMH3   | 385000.992          | 402089.223           | 385000.992               | 402089.223                | Required       |                                                                                     |
| TANK    | 384995.035          | 402087.340           | 384995.035               | 402087.340                | Required       |                                                                                     |
| SWMH4   | 384992.348          | 402089.941           | 384992.348               | 402089.941                | Required       |                                                                                     |
|         | 384983.313          | 402097.282           |                          |                           | No Entry       |                                                                                     |

|                         |                  |                                                                                     |
|-------------------------|------------------|-------------------------------------------------------------------------------------|
| Hydrock Consultants Ltd |                  | Page 3                                                                              |
| .                       | NMGH             |  |
| .                       | Waste Relocation |                                                                                     |
| .                       |                  |                                                                                     |
| Date 06/11/2024         | Designed by CF   |                                                                                     |
| File SW Model Rev 2.MDX | Checked by NB    |                                                                                     |
| Innovyze                | Network 2020.1.3 |                                                                                     |

PIPELINE SCHEDULES for SW 1.SWS

Upstream Manhole

| PN    | Hyd  | Diam | MH    | C.Level | I.Level | D.Depth | MH           | MH DIAM., L*W |
|-------|------|------|-------|---------|---------|---------|--------------|---------------|
|       | Sect | (mm) | Name  | (m)     | (m)     | (m)     | Connection   | (mm)          |
| 1.000 | o    | 600  | SWMH1 | 77.940  | 75.635  | 1.705   | Open Manhole | 1200          |
| 1.001 | o    | 600  | SWMH2 | 77.840  | 75.587  | 1.653   | Open Manhole | 1200          |
| 1.002 | o    | 600  | SWMH3 | 77.140  | 75.525  | 1.015   | Open Manhole | 1200          |
| 1.003 | o    | 600  | TANK  | 76.900  | 75.400  | 0.900   | Open Manhole | 1200          |
| 1.004 | o    | 150  | SWMH4 | 77.020  | 75.300  | 1.570   | Open Manhole | 1200          |

Downstream Manhole

| PN    | Length | Slope | MH    | C.Level | I.Level | D.Depth | MH           | MH DIAM., L*W |
|-------|--------|-------|-------|---------|---------|---------|--------------|---------------|
|       | (m)    | (1:X) | Name  | (m)     | (m)     | (m)     | Connection   | (mm)          |
| 1.000 | 14.237 | 296.6 | SWMH2 | 77.840  | 75.587  | 1.653   | Open Manhole | 1200          |
| 1.001 | 18.634 | 300.5 | SWMH3 | 77.140  | 75.525  | 1.015   | Open Manhole | 1200          |
| 1.002 | 6.247  | 50.0  | TANK  | 76.900  | 75.400  | 0.900   | Open Manhole | 1200          |
| 1.003 | 3.740  | 37.4  | SWMH4 | 77.020  | 75.300  | 1.120   | Open Manhole | 1200          |
| 1.004 | 11.641 | 129.3 |       | 76.560  | 75.210  | 1.200   | Open Manhole | 0             |

| Hydrock Consultants Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                                     |              | Page 4                                                                              |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------|--------------|-------------------------------------------------------------------------------------|----------------|-----------------|-----------|-----------|----------|-----------------|----------------|-----------------|-------|------|---|-----|-------|-------|-------|-------|------|---|-----|-------|-------|-------|-------|---|---|-----|-------|-------|-------|-------|------|---|-----|-------|-------|-------|-------|---|---|-----|-------|-------|-------|--|--|--|--|-------|-------|-------|--|--|--|--|-------|-------|-------|---------------------|--------------|--------------|--------------|------------------|----------|--------|-------|--|--------|--------|-------|---|---|-------------------------|-------|-----------------------------------|-------|------------------------|-------|-------------------------------|-------|------------------|---|--------------------|-------|----------------------|---|-------------------------------------|-------|---------------------------------|-------|-----------------|----|-------------------------------|-------|------------------------|---|----------------|-----|--------------|--------|-----------------------|---|-------------|-------|--------|-------------------|-------------|-------|------------|--------|-----------------------|----|---------|-------|--|--|
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   | NMGH                                |              |  |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   | Waste Relocation                    |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                   |                                     |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Date 06/11/2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   | Designed by CF                      |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| File SW Model Rev 2.MDX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   | Checked by NB                       |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   | Network 2020.1.3                    |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| <div>Area Summary for SW 1.SWS</div> <table><thead><tr><th>Pipe Number</th><th>PIMP Type</th><th>PIMP Name</th><th>PIMP (%)</th><th>Gross Area (ha)</th><th>Imp. Area (ha)</th><th>Pipe Total (ha)</th></tr></thead><tbody><tr><td>1.000</td><td>User</td><td>-</td><td>100</td><td>0.056</td><td>0.056</td><td>0.056</td></tr><tr><td>1.001</td><td>User</td><td>-</td><td>100</td><td>0.040</td><td>0.040</td><td>0.040</td></tr><tr><td>1.002</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>1.003</td><td>User</td><td>-</td><td>100</td><td>0.011</td><td>0.011</td><td>0.011</td></tr><tr><td>1.004</td><td>-</td><td>-</td><td>100</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td colspan="4"></td><td>Total</td><td>Total</td><td>Total</td></tr><tr><td colspan="4"></td><td>0.108</td><td>0.108</td><td>0.108</td></tr></tbody></table> <div>Free Flowing Outfall Details for SW 1.SWS</div> <table><thead><tr><th>Outfall Pipe Number</th><th>Outfall Name</th><th>C. Level (m)</th><th>I. Level (m)</th><th>Min I. Level (m)</th><th>D,L (mm)</th><th>W (mm)</th></tr></thead><tbody><tr><td>1.004</td><td></td><td>76.560</td><td>75.210</td><td>0.000</td><td>0</td><td>0</td></tr></tbody></table> <div>Simulation Criteria for SW 1.SWS</div> <table><tbody><tr><td>Volumetric Runoff Coeff</td><td>0.750</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Areal Reduction Factor</td><td>1.000</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>Inlet Coeffiecient</td><td>0.800</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Run Time (mins)</td><td>60</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td>Output Interval (mins)</td><td>1</td></tr></tbody></table> <div>Number of Input Hydrographs 0</div> <div>Number of Storage Structures 1</div> <div>Number of Online Controls 1</div> <div>Number of Time/Area Diagrams 0</div> <div>Number of Offline Controls 0</div> <div>Number of Real Time Controls 0</div> <div>Synthetic Rainfall Details</div> <table><tbody><tr><td>Rainfall Model</td><td>FSR</td><td>Profile Type</td><td>Summer</td></tr><tr><td>Return Period (years)</td><td>1</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>18.000</td><td>Storm Duration (mins)</td><td>30</td></tr><tr><td>Ratio R</td><td>0.357</td><td></td><td></td></tr></tbody></table> |                   |                                     |              |                                                                                     |                | Pipe Number     | PIMP Type | PIMP Name | PIMP (%) | Gross Area (ha) | Imp. Area (ha) | Pipe Total (ha) | 1.000 | User | - | 100 | 0.056 | 0.056 | 0.056 | 1.001 | User | - | 100 | 0.040 | 0.040 | 0.040 | 1.002 | - | - | 100 | 0.000 | 0.000 | 0.000 | 1.003 | User | - | 100 | 0.011 | 0.011 | 0.011 | 1.004 | - | - | 100 | 0.000 | 0.000 | 0.000 |  |  |  |  | Total | Total | Total |  |  |  |  | 0.108 | 0.108 | 0.108 | Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) | 1.004 |  | 76.560 | 75.210 | 0.000 | 0 | 0 | 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 | Rainfall Model | FSR | Profile Type | Summer | Return Period (years) | 1 | Cv (Summer) | 0.750 | Region | England and Wales | Cv (Winter) | 0.840 | M5-60 (mm) | 18.000 | Storm Duration (mins) | 30 | Ratio R | 0.357 |  |  |
| Pipe Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | PIMP Type         | PIMP Name                           | PIMP (%)     | Gross Area (ha)                                                                     | Imp. Area (ha) | Pipe Total (ha) |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | User              | -                                   | 100          | 0.056                                                                               | 0.056          | 0.056           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | User              | -                                   | 100          | 0.040                                                                               | 0.040          | 0.040           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                 | -                                   | 100          | 0.000                                                                               | 0.000          | 0.000           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | User              | -                                   | 100          | 0.011                                                                               | 0.011          | 0.011           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                 | -                                   | 100          | 0.000                                                                               | 0.000          | 0.000           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                                     |              | 0.108                                                                               | 0.108          | 0.108           |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Outfall Pipe Number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Outfall Name      | C. Level (m)                        | I. Level (m) | Min I. Level (m)                                                                    | D,L (mm)       | W (mm)          |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 1.004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                   | 76.560                              | 75.210       | 0.000                                                                               | 0              | 0               |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| 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            |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Rainfall Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | FSR               | Profile Type                        | Summer       |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Return Period (years)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1                 | Cv (Summer)                         | 0.750        |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Region                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | England and Wales | Cv (Winter)                         | 0.840        |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| M5-60 (mm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 18.000            | Storm Duration (mins)               | 30           |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| Ratio R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.357             |                                     |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |
| ©1982-2020 Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                                     |              |                                                                                     |                |                 |           |           |          |                 |                |                 |       |      |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |       |      |   |     |       |       |       |       |   |   |     |       |       |       |  |  |  |  |       |       |       |  |  |  |  |       |       |       |                     |              |              |              |                  |          |        |       |  |        |        |       |   |   |                         |       |                                   |       |                        |       |                               |       |                  |   |                    |       |                      |   |                                     |       |                                 |       |                 |    |                               |       |                        |   |                |     |              |        |                       |   |             |       |        |                   |             |       |            |        |                       |    |         |       |  |  |

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-----------|------------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|-----|-------|------|-------|------|-------|-----|-------|------|-------|------|--|--|-------|-----|-------|------|-------|------|--|--|---------------------|--|--|
| Hydrock Consultants Ltd                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  | Page 5                                                                              |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NMGH             |  |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Waste Relocation |                                                                                     |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
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| Date 06/11/2024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Designed by CF   |                                                                                     |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| File SW Model Rev 2.MDX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Checked by NB    |                                                                                     |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Network 2020.1.3 |                                                                                     |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| <div>Online Controls for SW 1.SWS</div> <div>Hydro-Brake® Optimum Manhole: SWMH4, DS/PN: 1.004, Volume (m³): 2.7</div> <div><div>Unit Reference MD-SHE-0125-8700-1800-8700</div><div>Design Head (m)1.800</div><div>Design Flow (l/s)8.7</div><div>Flush-Flo™Calculated</div><div>ObjectiveMinimise upstream storage</div><div>ApplicationSurface</div><div>Sump AvailableYes</div><div>Diameter (mm)125</div><div>Invert Level (m)75.300</div><div>Minimum Outlet Pipe Diameter (mm)150</div><div>Suggested Manhole Diameter (mm)1200</div></div> <div><div>Control Points</div><div>Head (m)Flow (l/s)</div><div>Design Point (Calculated)1.8008.7</div><div>Flush-Flo™0.5348.7</div><div>Kick-Flo®1.0956.9</div><div>Mean Flow over Head Range-7.6</div></div> <div>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</div> <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>4.5</td><td>1.200</td><td>7.2</td><td>3.000</td><td>11.1</td><td>7.000</td><td>16.6</td></tr><tr><td>0.200</td><td>7.4</td><td>1.400</td><td>7.7</td><td>3.500</td><td>11.9</td><td>7.500</td><td>17.1</td></tr><tr><td>0.300</td><td>8.2</td><td>1.600</td><td>8.2</td><td>4.000</td><td>12.7</td><td>8.000</td><td>17.7</td></tr><tr><td>0.400</td><td>8.6</td><td>1.800</td><td>8.7</td><td>4.500</td><td>13.4</td><td>8.500</td><td>18.2</td></tr><tr><td>0.500</td><td>8.7</td><td>2.000</td><td>9.1</td><td>5.000</td><td>14.1</td><td>9.000</td><td>18.7</td></tr><tr><td>0.600</td><td>8.7</td><td>2.200</td><td>9.6</td><td>5.500</td><td>14.8</td><td>9.500</td><td>19.2</td></tr><tr><td>0.800</td><td>8.4</td><td>2.400</td><td>10.0</td><td>6.000</td><td>15.4</td><td></td><td></td></tr><tr><td>1.000</td><td>7.6</td><td>2.600</td><td>10.3</td><td>6.500</td><td>16.0</td><td></td><td></td></tr></table> <tr><td colspan="3">©1982-2020 Innovyze</td></tr> |                  |                                                                                     | Depth (m)  | Flow (l/s) | Depth (m)  | Flow (l/s) | Depth (m)  | Flow (l/s) | Depth (m) | Flow (l/s) | 0.100 | 4.5 | 1.200 | 7.2 | 3.000 | 11.1 | 7.000 | 16.6 | 0.200 | 7.4 | 1.400 | 7.7 | 3.500 | 11.9 | 7.500 | 17.1 | 0.300 | 8.2 | 1.600 | 8.2 | 4.000 | 12.7 | 8.000 | 17.7 | 0.400 | 8.6 | 1.800 | 8.7 | 4.500 | 13.4 | 8.500 | 18.2 | 0.500 | 8.7 | 2.000 | 9.1 | 5.000 | 14.1 | 9.000 | 18.7 | 0.600 | 8.7 | 2.200 | 9.6 | 5.500 | 14.8 | 9.500 | 19.2 | 0.800 | 8.4 | 2.400 | 10.0 | 6.000 | 15.4 |  |  | 1.000 | 7.6 | 2.600 | 10.3 | 6.500 | 16.0 |  |  | ©1982-2020 Innovyze |  |  |
| Depth (m)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Flow (l/s)       | Depth (m)                                                                           | Flow (l/s) | Depth (m)  | Flow (l/s) | Depth (m)  | Flow (l/s) |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4.5              | 1.200                                                                               | 7.2        | 3.000      | 11.1       | 7.000      | 16.6       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7.4              | 1.400                                                                               | 7.7        | 3.500      | 11.9       | 7.500      | 17.1       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.300                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8.2              | 1.600                                                                               | 8.2        | 4.000      | 12.7       | 8.000      | 17.7       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8.6              | 1.800                                                                               | 8.7        | 4.500      | 13.4       | 8.500      | 18.2       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8.7              | 2.000                                                                               | 9.1        | 5.000      | 14.1       | 9.000      | 18.7       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8.7              | 2.200                                                                               | 9.6        | 5.500      | 14.8       | 9.500      | 19.2       |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 0.800                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 8.4              | 2.400                                                                               | 10.0       | 6.000      | 15.4       |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| 1.000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7.6              | 2.600                                                                               | 10.3       | 6.500      | 16.0       |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |
| ©1982-2020 Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                                                                     |            |            |            |            |            |            |           |            |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |     |       |      |       |      |       |     |       |      |       |      |  |  |       |     |       |      |       |      |  |  |                     |  |  |

| Hydrock Consultants Ltd                                                                                                                                                                                                                                                                                                                                                                       |                  | Page 6                                                                              |           |           |           |           |           |           |       |      |       |      |       |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-------|------|-------|------|-------|-----|
| .                                                                                                                                                                                                                                                                                                                                                                                             | NMGH             |  |           |           |           |           |           |           |       |      |       |      |       |     |
| .                                                                                                                                                                                                                                                                                                                                                                                             | Waste Relocation |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |
| .                                                                                                                                                                                                                                                                                                                                                                                             |                  |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |
| Date 06/11/2024                                                                                                                                                                                                                                                                                                                                                                               | Designed by CF   |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |
| File SW Model Rev 2.MDX                                                                                                                                                                                                                                                                                                                                                                       | Checked by NB    |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |
| Innovyze                                                                                                                                                                                                                                                                                                                                                                                      | Network 2020.1.3 |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |
| <div>Storage Structures for SW 1.SWS</div> <div>Tank or Pond Manhole: TANK, DS/PN: 1.003</div> <div>Invert Level (m) 75.400</div> <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>24.0</td><td>0.500</td><td>24.0</td><td>0.501</td><td>0.0</td></tr></tbody></table> |                  |                                                                                     | Depth (m) | Area (m²) | Depth (m) | Area (m²) | Depth (m) | Area (m²) | 0.000 | 24.0 | 0.500 | 24.0 | 0.501 | 0.0 |
| Depth (m)                                                                                                                                                                                                                                                                                                                                                                                     | Area (m²)        | Depth (m)                                                                           | Area (m²) | Depth (m) | Area (m²) |           |           |           |       |      |       |      |       |     |
| 0.000                                                                                                                                                                                                                                                                                                                                                                                         | 24.0             | 0.500                                                                               | 24.0      | 0.501     | 0.0       |           |           |           |       |      |       |      |       |     |
| ©1982-2020 Innovyze                                                                                                                                                                                                                                                                                                                                                                           |                  |                                                                                     |           |           |           |           |           |           |       |      |       |      |       |     |

|                                                                                                                                                                                                                                                                                                                                                                                      |  |                                 |        |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------|--------|--|--|
| Hydrock Consultants Ltd                                                                                                                                                                                                                                                                                                                                                              |  |                                 | Page 7 |  |  |
| <div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; background-color: #ccc; margin-right: 5px;"></div> <div> <div style="background-color: #ccc; width: 100%; height: 100%;"></div> <div style="background-color: #ccc; width: 100%; height: 100%;"></div> <div style="background-color: #ccc; width: 100%; height: 100%;"></div> </div> </div> |  | NMGH<br>Waste Relocation        |        |  |  |
| Date 06/11/2024<br>File SW Model Rev 2.MDX                                                                                                                                                                                                                                                                                                                                           |  | Designed by CF<br>Checked by NB |        |  |  |
| Innovyze                                                                                                                                                                                                                                                                                                                                                                             |  | Network 2020.1.3                |        |  |  |

### 1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 1.SWS

#### Simulation Criteria

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

|                             |   |                              |   |
|-----------------------------|---|------------------------------|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 1 |
| Number of Online Controls   | 1 | 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     | 0.358 |
| Region         | England and Wales | Cv (Summer) | 0.750 |
| M5-60 (mm)     | 18.000            | Cv (Winter) | 0.840 |

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

#### Profile(s)

|                          |                                           |
|--------------------------|-------------------------------------------|
|                          | Summer and Winter                         |
| Duration(s) (mins)       | 15, 30, 60, 120, 240, 360, 480, 960, 1440 |
| Return Period(s) (years) | 1, 30, 100                                |
| Climate Change (%)       | 0, 0, 45                                  |

| PN    | US/MH Name | Storm     | Return Period | Climate Change | First (X) Surge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water Level (m) |
|-------|------------|-----------|---------------|----------------|-----------------|-----------------|--------------------|---------------|-----------------|
| 1.000 | SWMH1      | 15 Winter | 1             | +0%            |                 |                 |                    |               | 75.700          |
| 1.001 | SWMH2      | 15 Winter | 1             | +0%            |                 |                 |                    |               | 75.662          |
| 1.002 | SWMH3      | 15 Winter | 1             | +0%            |                 |                 |                    |               | 75.594          |
| 1.003 | TANK       | 15 Winter | 1             | +0%            | 100/30 Winter   |                 |                    |               | 75.481          |
| 1.004 | SWMH4      | 15 Winter | 1             | +0%            | 1/15 Summer     |                 |                    |               | 75.478          |

| PN    | US/MH Name | Depth (m) | Volume (m³) | Flow / Cap. (l/s) | Half Drain Time (mins) | Pipe Flow (l/s) | Status     | Level Exceeded |
|-------|------------|-----------|-------------|-------------------|------------------------|-----------------|------------|----------------|
| 1.000 | SWMH1      | -0.535    | 0.000       | 0.02              |                        | 6.7             | OK         |                |
| 1.001 | SWMH2      | -0.525    | 0.000       | 0.04              |                        | 10.8            | OK         |                |
| 1.002 | SWMH3      | -0.531    | 0.000       | 0.03              |                        | 10.9            | OK         |                |
| 1.003 | TANK       | -0.519    | 0.000       | 0.02              |                        | 7.7             | OK         |                |
| 1.004 | SWMH4      | 0.028     | 0.000       | 0.51              |                        | 7.2             | SURCHARGED |                |

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Date 06/11/2024

File SW Model Rev 2.MDX

NMGH  
Waste Relocation

Designed by CF  
Checked by NB

Innovyze

Network 2020.1.3

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

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor \* 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 1

Number of Online Controls 1

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 0.358

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status ON

Inertia Status OFF

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 45

Water Level

PNUS/MH NameStormReturn PeriodClimate ChangeFirst (X) SurgeFirst (Y) FloodFirst (Z) OverflowOverflow Act.

1.000SWMH160 Winter100+45%76.072

1.001SWMH260 Winter100+45%76.071

1.002SWMH360 Winter100+45%76.067

1.003TANK60 Winter100+45%100/30 Winter76.065

1.004SWMH460 Winter100+45%1/15 Summer76.064

Surcharged Flooded

PNUS/MH NameDepth (m)Volume (m³)Flow / Cap.Overflow (l/s)Half Drain Time (mins)Pipe Flow (l/s)StatusLevel Exceeded

1.000SWMH1-0.1630.0000.0616.3OK

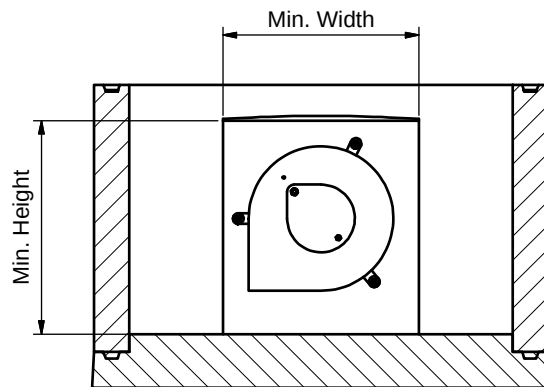
1.001SWMH2-0.1160.0000.0925.9OK

1.002SWMH3-0.0580.0000.0621.2OK

1.003TANK0.0650.0000.0310.4SURCHARGED

1.004SWMH40.6140.0000.628.7SURCHARGED

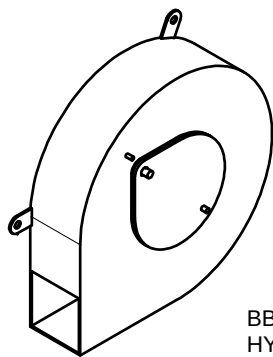
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Section B-B  
( View on mounting block)

| 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   |  |



BBA APPROVED S \_\_\_\_\_  
HYDRO-BRAKE OPTIMUM™

HYDRO-BRAKE OPTIMUM™  
WITH PIVOTING BY-PASS DOOR  
(SEE NOTE 3)

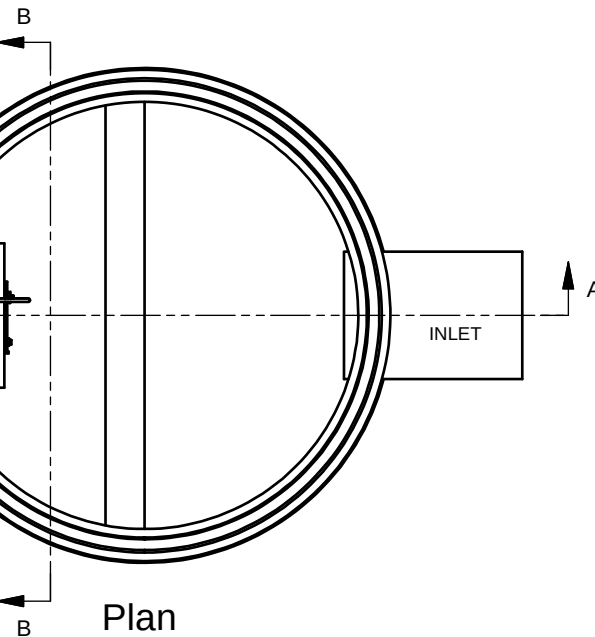
STAINLESS STEEL  
THROUBOLT FIXINGS

PULL HANDLE

PIVOTING BYPASS DOOR  
OPERATING SS ROPE

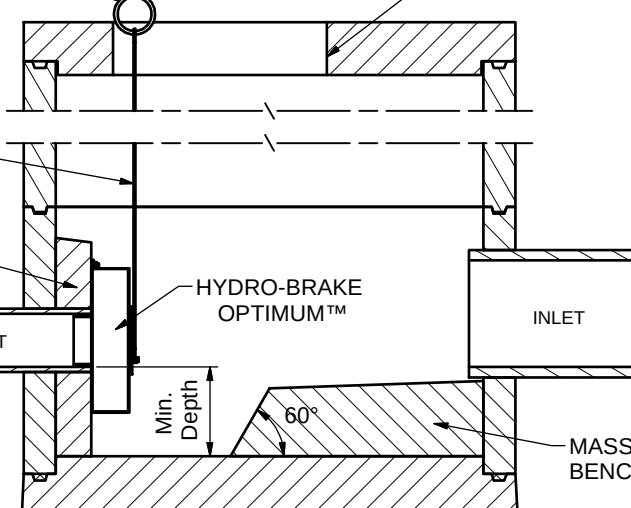
CAST ON CONCRETE  
MOUNTING BLOCK

MIN OUTLET DIA \_\_\_\_\_



Plan

ACCESS POSITIONED ABOVE  
BY-PASS DOOR IS POSSIBLE



Section A-A

MASS CONCRETE  
BENCHING



1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT GENERAL ARRANGEMENT & DETAIL DRAWINGS.
2. ALL COMPONENTS SHALL BE MANUFACTURED IN ACCORDANCE WITH THE PRODUCTION SPECIFICATION HRD-FM09/15.
3. HYDRO-BRAKE OPTIMUM™ IS ALSO AVAILABLE WITH ALTERNATIVE FIXING MOUNTS (E.G. CURVED BACK PLATE, PUSH FIT)

| REV              | BY         | DATE       | DESCRIPTION |
|------------------|------------|------------|-------------|
| REVISION HISTORY |            |            |             |
| Date             | 15/03/2012 | Scale      | 1:15        |
| Drawn By         | swaters    | Checked By | Approved By |

HYDRO-BRAKE  
OPTIMUM™  
FOR SURFACE WATER

GENERAL  
ARRANGEMENT

**Hydro**  
International  
stormwater

Shearwater House  
Clevedon Hall Estate  
Victoria Road, Clevedon,  
North Somerset, BS21 7RD  
Tel: 01275 878371  
Fax: 01275 874979

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

ANY WARRANTY GIVEN BY HYDRO INTERNATIONAL WILL APPLY ONLY TO THOSE ITEMS SUPPLIED BY IT. ACCORDINGLY HYDRO INTERNATIONAL CANNOT ACCEPT ANY RESPONSIBILITY FOR ANY STRUCTURE, PLANT, OR EQUIPMENT, (OR THE PERFORMANCE THERE OF) DESIGNED, BUILT, MANUFACTURED, OR SUPPLIED BY ANY THIRD PARTY. HYDRO INTERNATIONAL HAVE A POLICY OF CONTINUOUS DEVELOPMENT AND RESERVE THE RIGHT TO AMEND THE SPECIFICATION. HYDRO INTERNATIONAL CANNOT ACCEPT LIABILITY FOR PERFORMANCE OF ITS EQUIPMENT, (OR ANY PART THEREOF). IF THE EQUIPMENT IS SUBJECT TO CONDITIONS OUTSIDE ANY DESIGN SPECIFICATION. HYDRO INTERNATIONAL OWNS THE COPYRIGHT OF THIS DRAWING, WHICH IS SUPPLIED IN CONFIDENCE. IT MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED, IN WHOLE OR IN PART, WITHOUT PRIOR PERMISSION IN WRITING FROM HYDRO INTERNATIONAL.  
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DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETRES.

TOLERANCING INFORMATION IS FOUND IN PRODUCTION SPECIFICATION HRD-FM09/15

|                     |         |
|---------------------|---------|
| Approximate Weight: | N/A     |
| Finish:             |         |
| Treatment:          |         |
| Sheet Size:         | A3      |
| Sheet:              | 1 OF 1  |
| Next Assembly:      |         |
| PROJECT (Wipe No.)  |         |
| Drawing No.         | HBO-SS1 |
| Rev                 | A       |

enquiries@hydro-international.co.uk

## *Appendix F*

## Existing United Utilities Sewer Map -

