

**Job name:** College Lane, Hurstpierpoint

**Job No:** S12809

**Note No:** S12809-JNP-XX-XX-RP-C-1003-P01

**Date:** 17/02/2026

**Prepared by:** Sam Hinson

**Subject:** Discharge of Drainage Conditions

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## 1. Introduction

- 1.1 JNP Group were instructed by Earlswood Homes to collate the supporting information required to discharge Condition 4 relating to planning application DM/25/1379.
- 1.2 The development proposes the erection of seven dwellings, together with associated open space, hard and soft landscaping, car parking, and supporting infrastructure.
- 1.3 In response to the application to discharge Condition 4, the Mid Sussex District Council (MSDC) Flood Risk and Drainage Team advised that insufficient information had been provided to satisfy the drainage condition requirements. Reference was made to the MSDC *Detailed Drainage Design Information Guide for Discharge of Condition Stage* checklist (Appendix A).
- 1.4 This report collates the information required to address the points contained within this checklist. Each section of the design checklist is reproduced within this report, with each item accompanied by the relevant response. Supporting information is appended to this document and referenced where appropriate.
- 1.5 It should be noted that the detailed drainage design has followed the established and approved drainage strategy set out by others at planning stage. This information was submitted under the original application DM/24/1139 of which DM/25/1379 was a variation.
- 1.6 This included the Flood Risk Assessment & Drainage Strategy by Motion, dated 19<sup>th</sup> April 2024, reference 1eahur/2403069 and the Surface Water Pump Failure & Mitigation Strategies by Motion, dated 5<sup>th</sup> August 2024, reference 1eahur/2403069. These documents will be resubmitted in support of this discharge of condition application.

## 2. Flood Risk

- 2.1 Flood Risk Assessment & Drainage Strategy by Motion, dated 19<sup>th</sup> April 2024, reference 1eahur/2403069, concluded that *'the proposed development is at a very low residual risk of flooding from all sources.'* The principles of the proposed drainage strategy set out by Motion have been followed at detailed design stage.
- 2.2 It is therefore considered that no further evidence of flood risk mitigation is required.

### 3. Surface Water Drainage Checklist Response

3.1 *'Greenfield runoff rate (Qbar). FEH method or similar approved; based on pre-development catchment'*

Response: Qbar 3.89 l/s

This was stated in the approved Flood Risk Assessment & Drainage Strategy (Motion, 19<sup>th</sup> April 2024).

3.2 *'On-site infiltration testing. BRE365-compliant tests at SuDS location/depth; safety factor applied'*

Response: No infiltration testis was carried out on the basis that the site is underlain by Weald Clay, which would not be conducive to infiltration.

This is set out in paragraphs 2.11-2.14 of the approved Flood Risk Assessment & Drainage Strategy (Motion, 19<sup>th</sup> April 2024).

3.3 *'Groundwater monitoring (if relevant). Demonstrates seasonal high water table is >1m below base'*

Response: This is not required as infiltration is not proposed.

3.4 *'Catchment and drainage areas. Plans show areas drained and contributing catchments for each SuDS feature'*

Response: Refer to S12809-JNP-XX-XX-DR-C-2004-P03 Drainage Areas (Appendix B)

3.5 *'Climate change allowances. EA guidance applied to rainfall intensity'*

Response: A 30% allowance for climate changes has been applied to 30 year return period storms and a 45% allowance for climate change has been applied to 100 year return period storms. This is set out in S128089-JNP-92-XX-CA-C-1000 SW Network Calculations (Appendix C).

3.6 *'Urban creep allowance. 10% additional impermeable area unless justified'*

Response: A 10% allowance for urban creep has been applied to all roof areas. These areas are indicated on S12809-JNP-XX-XX-DR-C-2004-P03 Drainage Areas (Appendix B).

3.7 *'Design rainfall. Latest FEH data; FSR not accepted without justification'*

Response: FEH data has been used. This is set out in S128089-JNP-92-XX-CA-C-1000 SW Network Calculations (Appendix C).

3.8 *'Cv value. 1.0 applied to all impermeable surfaces'*

Response: Cv value of 1.0 has been used. This is set out in S128089-JNP-92-XX-CA-C-1000 SW Network Calculations (Appendix C).

3.9 *'Hydraulic calculations. 1 in 1, 1 in 30, 1 in 30 + CC, and 1 in 100 + CC critical storm durations; no flooding'*

Response: No flooding is reported in these return period storms. This is set out in S128089-JNP-92-XX-CA-C-1000 SW Network Calculations (Appendix C).

3.10 *'Flow control structures. Head-discharge curve, outlet sizing, orifice protection from blockage'*

Response: No flow control structures are proposed as the pumping station will act at the flow control. Details of the proposed pumping station are provided in Appendix D.

To control silt, catchpit chambers will be provided at all key points upstream as indicated on S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout (Appendix B)

3.11 *'SuDS layout plan. Full drainage layout with invert levels, cover levels, flow directions, and labels'*

Response: Refer to S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout (Appendix B).

3.12 *'Longitudinal and cross sections. For basins, pipes, flow controls, below-ground structures'*

Response: Refer to the following drawings in Appendix B:

- S12809-JNP-XX-XX-DR-C-2005-P03 Longitudinal Section and Manhole Schedules
- S12809-JNP-XX-XX-DR-C-2007-P03 Tank Layout & Sections
- S12809-JNP-XX-XX-DR-C-3001-P01 - Drainage Construction Details (Sheet 1 of 2)
- S12809-JNP-XX-XX-DR-C-3002-P02 - Drainage Construction Details (Sheet 2 of 2)
- S12809-JNP-XX-XX-DR-C-3003-P04 - External Works Details
- S12809-JNP-XX-XX-DR-C-3004-P02 S106 Manhole Construction Details

3.13 *'Exceedance flow routing. Plans show how exceedance flows are managed/safely routed'*

Response: Refer to S12809-JNP-XX-XX-DR-C-2009-P01 Flood Routing Layout (Appendix B).

3.14 *'Finished floor levels. FFLs at least 150mm above surrounding ground/exceedance routes'*

Response: Refer to S12809-JNP-XX-XX-DR-C-2002-P05 External Levels (Appendix E)

3.15 *'Water quality treatment. Simple Index Approach; mitigation index  $\geq$  hazard index'*

Response: This is set out in section 6 of the approved Flood Risk Assessment & Drainage Strategy (Motion, 19<sup>th</sup> April 2024).

3.16 *'Proprietary systems (if used). Certification, design basis, and O&M provided'*

Response: The pumping station details are provided in Appendix D.

Tank details are provided on S12809-JNP-XX-XX-DR-C-2007-P03 Tank Layout & Sections (Appendix B)

Supporting calculations for the tank are provided in Appendix F.

The management plan for these features is provided in a separate document which has been submitted in discharge of this condition. S12809-JNP-XX-XX-RP-C-1002- SuDS Management and Maintenance Plan.

3.17 *'SuDS details. Type, size, function, inlet/outlet, invert and cover levels, safety features'*

Response: Refer to the following drawings in Appendix B:

- S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout
- S12809-JNP-XX-XX-DR-C-2007-P03 Tank Layout & Sections
- S12809-JNP-XX-XX-DR-C-3003-P04 - External Works Details

3.18 *'Maintenance plan. Asset register and inspection/maintenance schedule; CIRIA Table 32.1'*

Response: S12809-JNP-XX-XX-RP-C-1002- SuDS Management and Maintenance Plan (provided separately).

3.19 *'Maintenance party and mechanism. Legal body named; landowner, management company or adoption route clear'*

Response: S12809-JNP-XX-XX-RP-C-1002- SuDS Management and Maintenance Plan (provided separately).

3.20 *'Discharge to sewer. Qbar max unless sewerage undertaker agrees higher rate'*

Response: 2 l/s as agreed with Southern Water. Southern Water correspondence confirming no objection to the discharge of condition 4 is provided in Appendix G.

3.21 *'Sewer connection approval. Undertaker correspondence confirming acceptability of rate and location'*

Response: Southern Water correspondence confirming no objection to the discharge of condition 4 is provided in Appendix G along with a copy of the S106 connection approval.

3.22 *'Attenuation sizing. Demonstrates storage for 1 in 100 +CC event without flooding'*

Response: This is set out in S128089-JNP-92-XX-CA-C-1000 SW Network Calculations (Appendix C).

## 4. Foul Water Drainage Checklist Response

4.1 *'Foul drainage layout Inverts, pipe sizes, gradients, connection points'*

Response: Refer to the S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout in Appendix B

4.2 *'System type. Gravity or pumped; pump design and calculations if applicable'*

Response: Pumping station details provided in Appendix D.

4.3 *'Peak flow rate Based on occupancy and discharge volume'*

Response: Pump rate 3.8 l/s. Refer to the S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout in Appendix B

4.4 *'Public sewer connection. Location confirmed; manhole ID and route to sewer'*

Response: Refer to the S12809-JNP-XX-XX-DR-C-2001-P07 Drainage Layout in Appendix

4.5 *'Undertaker correspondence. Email or letter showing awareness of proposal and preliminary approval'*

4.6 Response: Southern Water correspondence confirming no objection to the discharge of condition 4 is provided in Appendix G along with a copy of the S106 connection approval

## List of Appendices

|            |                                                                                         |
|------------|-----------------------------------------------------------------------------------------|
| Appendix A | <i>MSDC Detailed Drainage Design Information Guide for Discharge of Condition Stage</i> |
| Appendix B | <i>Drainage Drawings</i>                                                                |
| Appendix C | <i>Network Calculations</i>                                                             |
| Appendix D | <i>Pumping Station Information</i>                                                      |
| Appendix E | <i>External Levels Layout</i>                                                           |
| Appendix F | <i>Tank Calculations</i>                                                                |
| Appendix G | <i>Southern Water Correspondence</i>                                                    |

## Document Issue Record

| Technical Note No          | Rev | Date       | Prepared | Reviewed | Approved |
|----------------------------|-----|------------|----------|----------|----------|
| S12809-JNP-XX-XX-RP-C-1003 | P01 | 17/02/2026 | SH       | -        | -        |
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|                            |     |            |          |          |          |
|                            |     |            |          |          |          |

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# **Appendix A**

## **MSDC Detailed Drainage Design Information Guide for Discharge of Condition Stage**

# DETAILED DRAINAGE DESIGN CHECKLIST – CONDITION DISCHARGE STAGE

*Checklist for Applicants and Agents (Aligned with Defra June 2025 National standards for sustainable drainage systems (SuDS) and CIRIA SuDS Manual C753)*

*v2.0 issued 071125*

## PURPOSE OF THIS CHECKLIST

This checklist supports applicants, agents, and drainage engineers in preparing condition discharge submissions to Mid Sussex District Council (MSDC) for surface water and foul drainage schemes. It is intended to ensure all submissions are:

- Technically complete and policy compliant
- Aligned with the National standards for sustainable drainage systems (SuDS) (Defra, June 2025)
- Aligned with the CIRIA SuDS Manual (C753)
- Consistent with West Sussex LLFA Policy and EA Climate Change Guidance

All drainage strategies and condition discharge submissions must follow the MSDC Detailed Drainage Design Technical Summary. This technical summary sets out the specific local implementation of national policy and SuDS standards, and defines MSDC's minimum expectations for buildability, hydraulic performance, water quality treatment, biodiversity, and long-term maintenance.

This checklist should accompany all formal submissions to discharge drainage conditions. It is designed to reflect the minimum technical content expected by MSDC. Where requirements are not met or are only partially addressed, this must be clearly justified within the submission.

Applicants are strongly advised to read this Checklist and accompanying Detailed Drainage Design Technical Summary guidance in full before preparing condition discharge submissions. Early compliance with these requirements will reduce risk of re-submission or refusal.

## GENERAL GUIDANCE FOR APPLICANTS

This checklist is intended to support the discharge of post-permission drainage conditions. It does not replace validation guidance at application stage but should be used where conditions state:

- *"No development shall commence until a detailed surface water drainage scheme..."*
- *"The development hereby permitted shall not be commenced until details of the disposal of foul and surface water..."*
- Or similar wording requiring drainage design to be agreed prior to construction.

All submissions must demonstrate compliance with relevant drainage standards and be tailored to the specifics of the site, its constraints, and the proposed development.

## **Surface Water**

Surface water drainage strategies must show how runoff will be managed in a safe, sustainable, and policy-compliant manner. In line with the MSDC Detailed Drainage Design Technical Summary, designs should:

- Demonstrate compliance with the drainage hierarchy, with priority given to infiltration-based solutions
- Include hydraulic calculations based on the critical storm duration for the 1 in 30 and 1 in 100-year events, with appropriate climate change uplift applied to rainfall intensity in accordance with the latest Environment Agency guidance
- Apply flow and volume control measures using FEH rainfall data, avoiding use of outdated methods such as FSR
- Use the Simple Index Approach to assess and provide appropriate water quality treatment
- Maximise amenity and biodiversity through the use of above-ground, vegetated SuDS features where feasible
- Provide a detailed layout showing catchments, flow paths, SuDS components, levels, and exceedance routing
- Include a clear maintenance and management plan, including named responsible party and legal mechanism
- Avoid siting SuDS components (e.g. basins, permeable paving) within flood zones or mapped surface water risk areas unless resilience under flood conditions can be clearly demonstrated

Submissions must be realistic and buildable. MSDC will not accept assumptions or data that do not reflect current best practice.

## **Foul Water**

Applicants must provide a fully detailed foul drainage strategy that ensures effective and lawful discharge of wastewater from the site. The strategy must:

- Prioritise connection to the public sewer wherever viable
- Include evidence from the sewerage undertaker confirming availability or constraints to connection
- Where non-mains systems are proposed, provide justification for infeasibility of a mains connection and demonstrate full compliance with the General Binding Rules or applicable EA permit requirements
- Where an existing non-mains foul system (e.g. septic tank) is to be retained, include documented evidence that the system complies with the current General Binding Rules and any required discharge consents
- If the existing system is non-compliant, submit design proposals for an upgrade or replacement as part of the condition discharge submission

Foul water designs must also be supported by detailed layout plans, flow calculations, and where applicable, pumping station specifications.

## **Application Stage Best Practice**

Applicants who wish to avoid pre-commencement drainage conditions altogether are strongly encouraged to follow this checklist and the MSDC Detailed Drainage Design Technical Summary at planning application stage.

Providing full drainage details with the initial submission increases the likelihood that conditions can be avoided, and allows drainage issues to be resolved earlier in the design process. This proactive approach promotes confidence in the deliverability of the drainage strategy and minimises delays later in the planning process.



## PART 1 – SURFACE WATER DRAINAGE DESIGN CHECKLIST

| Requirement                                          | Summary of Expectation                                                                            | Summary | Reference (Drawing / Report Section) |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------|--------------------------------------|
| <b>For all strategies</b>                            |                                                                                                   |         |                                      |
| <b>Greenfield runoff rate (Q<sub>bar</sub>)</b>      | <i>FEH method or similar approved; based on pre-development catchment</i>                         |         |                                      |
| <b>On-site infiltration testing</b>                  | <i>BRE365-compliant tests at SuDS location/depth; safety factor applied</i>                       |         |                                      |
| <b>Groundwater monitoring (if relevant)</b>          | <i>Demonstrates seasonal high water table is &gt;1m below base</i>                                |         |                                      |
| <b>Catchment and drainage areas</b>                  | <i>Plans show areas drained and contributing catchments for each SuDS feature</i>                 |         |                                      |
| <b>Climate change allowances</b>                     | <i>EA guidance applied to rainfall intensity</i>                                                  |         |                                      |
| <b>Urban creep allowance</b>                         | <i>10% additional impermeable area unless justified</i>                                           |         |                                      |
| <b>Design rainfall</b>                               | <i>Latest FEH data; FSR not accepted without justification</i>                                    |         |                                      |
| <b>Cv value</b>                                      | <i>1.0 applied to all impermeable surfaces</i>                                                    |         |                                      |
| <b>Hydraulic calculations</b>                        | <i>1 in 1, 1 in 30, 1 in 30 + CC, and 1 in 100 + CC critical storm durations; no flooding</i>     |         |                                      |
| <b>Flow control structures</b>                       | <i>Head-discharge curve, outlet sizing, orifice protection from blockage</i>                      |         |                                      |
| <b>SuDS layout plan</b>                              | <i>Full drainage layout with invert levels, cover levels, flow directions, and labels</i>         |         |                                      |
| <b>Longitudinal and cross sections</b>               | <i>For basins, pipes, flow controls, below-ground structures</i>                                  |         |                                      |
| <b>Exceedance flow routing</b>                       | <i>Plans show how exceedance flows are managed/safely routed</i>                                  |         |                                      |
| <b>Finished floor levels</b>                         | <i>FFLs at least 150mm above surrounding ground/exceedance routes</i>                             |         |                                      |
| <b>Water quality treatment</b>                       | <i>Simple Index Approach; mitigation index ≥ hazard index</i>                                     |         |                                      |
| <b>Proprietary systems (if used)</b>                 | <i>Certification, design basis, and O&amp;M provided</i>                                          |         |                                      |
| <b>SuDS details</b>                                  | <i>Type, size, function, inlet/outlet, invert and cover levels, safety features</i>               |         |                                      |
| <b>Maintenance plan</b>                              | <i>Asset register and inspection/maintenance schedule; CIRIA Table 32.1 referenced</i>            |         |                                      |
| <b>Maintenance party and mechanism</b>               | <i>Legal body named; landowner, management company or adoption route clear</i>                    |         |                                      |
| <b>For infiltration based strategies</b>             |                                                                                                   |         |                                      |
| <b>Soakaway or infiltration design</b>               | <i>Sizing for 6-hour 1 in 100 +CC storm; half-drain time &lt;24h</i>                              |         |                                      |
| <b>For strategies which discharge to watercourse</b> |                                                                                                   |         |                                      |
| <b>Discharge to watercourse</b>                      | <i>Restricted to Q<sub>bar</sub>; outfall location and construction details provided</i>          |         |                                      |
| <b>Attenuation sizing</b>                            | <i>Demonstrates storage for 1 in 100 +CC event without flooding</i>                               |         |                                      |
| <b>For strategies which discharge to sewer</b>       |                                                                                                   |         |                                      |
| <b>Discharge to sewer</b>                            | <i>Q<sub>bar</sub> max unless sewerage undertaker agrees higher rate</i>                          |         |                                      |
| <b>Sewer connection approval</b>                     | <i>Undertaker correspondence confirming acceptability of rate and location; S106 not required</i> |         |                                      |

|                           |                                                                     |  |  |
|---------------------------|---------------------------------------------------------------------|--|--|
| <b>Attenuation sizing</b> | <i>Demonstrates storage for 1 in 100 +CC event without flooding</i> |  |  |
|---------------------------|---------------------------------------------------------------------|--|--|

## PART 2 – FOUL WATER DRAINAGE DESIGN CHECKLIST

| <b>Requirement</b>                                                     | <b>Summary of Expectation</b>                                                 | <b>Summary</b> | <b>Reference (Drawing / Report Section)</b> |
|------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------|---------------------------------------------|
| <b><i>For all strategies</i></b>                                       |                                                                               |                |                                             |
| <b>Foul drainage layout</b>                                            | <i>Inverts, pipe sizes, gradients, connection points</i>                      |                |                                             |
| <b>System type</b>                                                     | <i>Gravity or pumped; pump design and calculations if applicable</i>          |                |                                             |
| <b>Peak flow rate</b>                                                  | <i>Based on occupancy and discharge volume</i>                                |                |                                             |
| <b><i>For strategies which discharge to sewer</i></b>                  |                                                                               |                |                                             |
| <b>Public sewer connection</b>                                         | <i>Location confirmed; manhole ID and route to sewer</i>                      |                |                                             |
| <b>Undertaker correspondence</b>                                       | <i>Email or letter showing awareness of proposal and preliminary approval</i> |                |                                             |
| <b><i>For strategies which discharge via non-mains foul system</i></b> |                                                                               |                |                                             |
| <b>Non-mains foul system</b>                                           | <i>Justification for use; compliance with General Binding Rules</i>           |                |                                             |
| <b>Drainage field infiltration</b>                                     | <i>BS6297-compliant infiltration test results provided</i>                    |                |                                             |
| <b>EA Permit</b>                                                       | <i>Submitted or confirmed not required (e.g. for discharge to water)</i>      |                |                                             |

# **Appendix B**

## **Drainage Drawings**

Private Drainage Notes

1.

This drawing is to be read in conjunction with and checked against all other drawings, engineering details, specification and any structural, geotechnical or other specialist documents provided.
2.

All pipes to be vitrified clay or UPVC and shall be 100mmØ laid to a fall of 1:80 unless noted otherwise or indicated by size and invert levels. All connections when laid shall be plugged, protected as necessary and marked with a stake for future use.
3.

Building drainage shall comply with BS 8301 1985, BS EN 752 and Building Regulations Part H. Inspection chambers located within garages to have double seal bolt down covers.
4.

Gully top and manhole cover specification to be in accordance with BS EN 124 and located in accordance with the intended use and loading classification as described within groups 1-6:
5.

This drawing is schematic for clarity only, positions of pipe runs and manholes may vary on site due to site conditions.
6.

Connections to pre-formed inspection chamber bases should ensure the main channel is used in all cases. High velocity discharges (e.g. from SVPs) must use the main channel.
7.

Cover and invert levels are indicative and may vary on site. In any case the following minimum cover to depth of cover to the crown of pipes without protection shall be as follows:
- a.

Domestic gardens and pathways without any possibility of vehicular access - 0.35m
- b.

Domestic driveways, parking areas and yards with height restrictions to prevent entry by vehicles with a gross weight in excess of 7.5 tonnes - 0.5m
- c.

Domestic driveways, parking areas and narrow streets without footways (e.g Mews developments) with limited access for vehicles with a gross weight in excess of 7.5 tonnes - 0.9m
- d.

Agricultural land and public open space - 0.9m
- e.

Other highways and parking areas with unrestricted access to vehicles with a gross weight in excess of 7.5 tonnes - 1.2m

Note: any protection required where drainage does not comply with a-e above shall be as follows:-

- a)

Vitrified clay pipes - provide a 100 mm min. thick concrete bed and surround (instead of class 'S' bedding) and a 13 mm thick compressible filler at each joint.
- b)

UPVC pipes - provide a concrete bridging (in addition to class 'S' bedding) in accordance with appendix A15, Building Regulations part 'H'.

Note: in-situ concrete used in connection with a) and b) above shall be standard mix GEN3 in accordance with BS 5328.

8.

Drainage runs should be laid at a minimum of 5m from the rear of properties where practicable to allow for future extensions.
9.

Where pipes pass under buildings, unless beam & block floors are used, they are to be surrounded in concrete.
10.

All branch drains, or connections, are to discharge to the collectors obliquely, and in the direction of the main flow.
11.

Finished floor levels (FFL's), assumed to be typically a minimum of 150mm above finished ground level outside. refer to architects drawing for details.
12.

All new private shallow 225mm diameter surface water and foul inspection chambers and rodding eyes shown without cover levels (CL) shall be assumed to be at external ground level, and invert levels (IL) are to be typically between 450 and 600mm below CL, subject to the length of the internal house connections.
13.

Prior to topsoiling of rear gardens, the gardens should be reworked, rotovated or decompacted to a depth of 600mm. Once this is carried out, no plant is to access these areas, any further consolidation of subsoil to be reworked as necessary. Before reworking or rotovating the Contractor is to mark all drain runs in the area.
14.

Pipe bedding to be Class 'S' bedding (100mm granular bed and surround).
15.

Excavations for manholes, pipe runs etc located within a 45 degree load distribution splay from any adjoining existing foundations, are to be adequately supported for the duration of the works and building drainage protected.
16.

Foundations adjacent to pipe runs or manholes are to have their formation level set above the invert level no higher than the equivalent of the horizontal distance between the pipe/excavation trench and the foundation, minus 500 mm
17.

Where excavations for pipe runs are parallel and in close proximity to each other and/or other service trenches, the contractor shall ensure that adequate safety measures, including temporary shoring, are provided in line with current health & safety Legislation and good practice. Particular attention is to be paid to adjacent trenches of differing invert levels.
18.

All existing drainage found on site during the works shall be investigated, its operational status confirmed, and the following applied:-

a)

Inoperative drainage shall be cut back and pipe runs filled with concrete grout.

b)

'Live' drainage shall be temporarily re-routed to allow the new drainage to be constructed.
19.

Where existing drainage is to be re-used including road, building and external drainage systems, the contractor shall ensure that all chambers and drainage runs are cleaned, de-silted and made good.
20.

Covers to existing chambers to be re-used shall be replaced where necessary to suit proposed development loading class, see note 5. Chamber covers shall also be adjusted to suit final ground levels as necessary.
21.

Where necessary, existing chambers shall be re-benched to suit new pipework arrangement.
22.

The Contractor shall consider and take adequate measures to ensure surface water runoff during construction is managed to prevent pollution of surface water receptors and increased flood risk.

Important Drainage Notes:

Prior to progressing groundworks the contractor shall:

1.

Confirm line and level of all outfall manholes. Where the depths of these manholes are insufficiently deep for any new connection from the site, the engineer shall be informed immediately.
2.

Ensure all relevant consents for sewer connections are in place :

-

Southern Water S106 sewer connections
3.

Building drainage shall comply with BS 8301 1985, BS EN 752 and Building Regulations Part H. Inspection chambers located within garages to have double seal bolt down covers.

Private Packaged Pump Station

Packaged pump station to be BBA certified or NHBC approved.

Chamber / housing parameters:

- Packaged treatment plant to withstand loadings D400 class and to be fully odour proof
- To be installed as manufacturer requirements
- Foul Water Pump Station to have minimum 1500mmØ chamber

Warning systems:

- Audible / visual pump failure warning system to be installed. Location of control kiosk for the pump system to be confirmed by client

Notes

1.

The above should be deemed as minimum requirements. Pump station to be secured by contractor and designed by specialist.
2.

The pump system to be supplied by TT Pumps or similar approved with BBA certification or NHBC approved and shall be designed to the latest design parameters in full compliance with Part H of the Building Regulations 2010 and BS EN 752: Part 6 Pumping Installations and any subsequent addendums/revisions.
3.

The contractor shall check buoyancy of pump chamber for both the temporary and permanent condition and take necessary measures to counteract buoyancy effects. In any instance chamber shall be encased in concrete minimum 150mm thick or manufacturer's recommendations. See manufacturers installation specification.
4.

Supply of rising main to be undertaken by contractor.

Cellular Tank Notes

1.

This drawing shall be read in conjunction with the Drg.No.3001-3002 Drainage Construction Details.
2.

The design of the tank shall be undertaken by the specialist manufacturer in accordance with CIRIA 737 to include but not limited to lateral and vertical loadings and flotation. Full consideration shall be given to the site specific ground conditions and groundwater levels.
3.

Minimum cellular tank void ratio to be 95%.
4.

Tank dimensions shown are the minimum required, refer to manufacturers details for actual dimensions.
5.

Tank to be laid at 1:300 falls to outlet.
6.

Ventilation to be provided as required by manufacturer.
7.

No trees shall be planted within 5m of attenuation tank.
8.

The contractor shall undertake flotation calculations for construction stage works and provide all necessary mitigation to counter flotation of tank

THE DETAILS ON THIS DRAWING ARE INDICATIVE ONLY. INSTALLATION TO BE IN STRICT ACCORDANCE WITH MANUFACTURERS DESIGN AND DETAILS. REFER TO MANUFACTURERS DESIGN PACK AND INSTALLATION DETAILS

General Notes

1.

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| HAZARD IDENTIFICATION BOX                                                                                            |                                                                                                 |                    |                                    |
|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------|------------------------------------|
| This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015 |                                                                                                 |                    |                                    |
| Hazard Ref                                                                                                           | Hazard Type<br><small>(Construction Method/ Material/ Clearing/ Demolition/ Adaptation)</small> | Hazard Description | Mitigation Measures/ Residual Risk |
|                                                                                                                      |                                                                                                 |                    |                                    |

|                               |            |             |                            |
|-------------------------------|------------|-------------|----------------------------|
|                               |            |             |                            |
|                               |            |             |                            |
|                               |            |             |                            |
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|                               |            |             |                            |
|                               |            |             |                            |
|                               |            |             |                            |
|                               |            |             |                            |
| P01                           | 11/09/2025 | First Issue | SH/LC                      |
| Rev.                          | Date       | Description | Drawn / Checked / Approved |
| Suitability                   |            |             |                            |
| S2 - Suitable for Information |            |             |                            |



|                                                                                                                           |                                            |                                  |                                             |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------|---------------------------------------------|
| Client                                                                                                                    |                                            | Earlswood Homes                  |                                             |
| Job:                                                                                                                      |                                            | College Lane, Hurstpierpoint     |                                             |
| Title:                                                                                                                    |                                            | Drainage Notes                   |                                             |
| Classification:<br>FL 60_20<br>Scale @ A1:<br>NTS                                                                         | <br>certification<br>Accredited Contractor | <br>HAS<br>Accredited Contractor | <br>Constructionline<br>Supplier No. 000019 |
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number<br>S12809 - JNP - XX-XX- DR - C - 2000 |                                            |                                  | Revision<br>P01                             |
| Document/Drawing Number<br>JNP Group Internal Project Number: S12809                                                      |                                            |                                  |                                             |

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## HAZARD IDENTIFICATION BOX

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| Hazard Ref                                                                          | Hazard Type<br>(Construction/Maintenance/Operation/Decommission) | Hazard Description                                                  | Mitigation Measures/<br>Residual Risk                                                                            |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
|  | Construction                                                     | Works near live carriageway                                         | Appropriate traffic measures to be in place                                                                      |
|  | Construction                                                     | Works near existing utilities                                       | Exact position of utilities to be confirmed prior to construction                                                |
|  | Construction /<br>decommission                                   | Contamination and excavation instability near adjacent lower levels | Use safe excavation practices.                                                                                   |
|  | Construction                                                     | Possible high groundwater levels                                    | Possible localized dewatering. Temporary measures against flotation of tank or pumping stations may be required. |

|     |            |                                                                                              |                 |
|-----|------------|----------------------------------------------------------------------------------------------|-----------------|
| P07 | 10/11/2025 | FW pumping station now 1.8m diameter. Additional foul water pop-up picked up on plots 1 & 4. | SH              |
| P06 | 21/10/2025 | Plot 5&6 handed. Drainage updated to suit new block plans and drainage pop-up locations.     | SH / JTH        |
| P05 | 20/10/2025 | Tank amended. SW pumping station raised to suit.                                             | SH              |
| P04 | 09/10/2025 | Outfall to public sewer updated                                                              | SH              |
| P03 | 22/09/2025 | Plot 2 and 3 handed. Plot 2 lowered 300mm. Retaining walls updated.                          | SH              |
| P02 | 11/09/2025 | Tender issue.                                                                                | SH / LC         |
| P01 | 21/08/2025 | First Issue                                                                                  | SH              |
| Rev | Date       | Description                                                                                  | Drn / CWd / App |

S2 - Suitable for Information



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Client: \_\_\_\_\_

Lanswood Homes

College Lane, Hurstpierpoint

### Drainage Layout

Classification: 

FI\_60\_20

|                                                                                    |          |
|------------------------------------------------------------------------------------|----------|
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number | Revision |
|------------------------------------------------------------------------------------|----------|

|        |     |    |    |    |   |      |     |
|--------|-----|----|----|----|---|------|-----|
| S12809 | INP | YY | YY | DB | C | 2001 | P07 |
|--------|-----|----|----|----|---|------|-----|

STZ009 - JNF - AA - AA - DR - C - 2001

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| HAZARD IDENTIFICATION BOX                                                                                            |                                                                                                   |                    |                                       |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------|---------------------------------------|
| This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015 |                                                                                                   |                    |                                       |
| Hazard Ref                                                                                                           | Hazard Type<br><small>(Construction Method/ Material/<br/>Clearing/Excavation/Adaptation)</small> | Hazard Description | Mitigation Measures/<br>Residual Risk |
| ▲                                                                                                                    |                                                                                                   |                    |                                       |

Legend

- Area Subject to Urban Creep (10%)
- S1.000: 0.018 ha
- S1.002: 0.017 ha
- S1.003: 0.152 ha
- Total = 0.187 ha

|             |            |                       |                       |
|-------------|------------|-----------------------|-----------------------|
|             |            |                       |                       |
|             |            |                       |                       |
|             |            |                       |                       |
|             |            |                       |                       |
| P03         | 21/10/2025 | Site layout updated   | SH / JTH              |
| P02         | 22/09/2025 | Plots 2 and 3 handed. | SH                    |
| P01         | 12/09/2025 | First Issue           | AQ/SH/LC              |
| Rev.        | Date       | Description           | Drawn / Check / App'd |
| Suitability |            |                       |                       |

S2 - Suitable for Information

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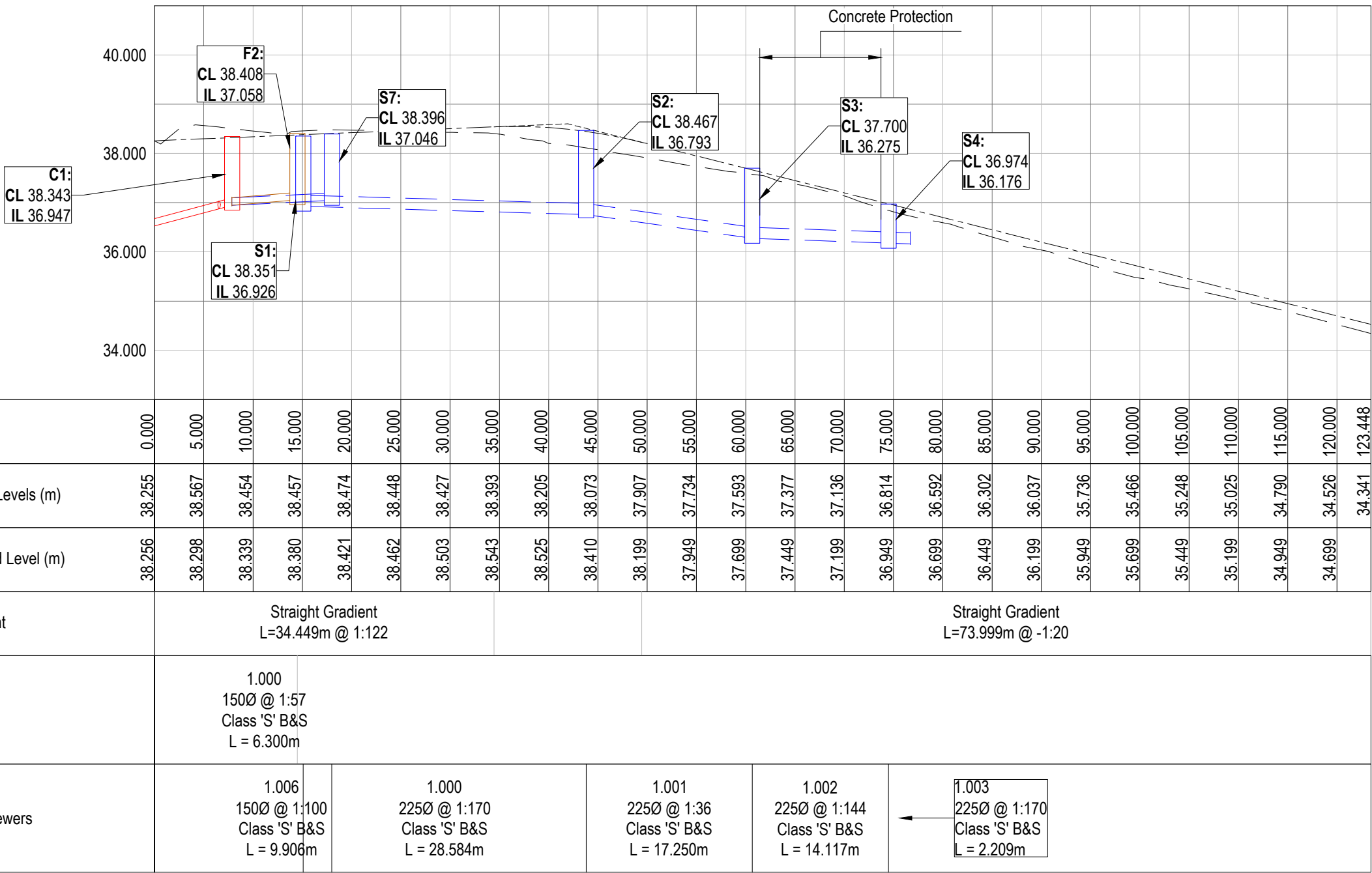
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|         |                              |
|---------|------------------------------|
| Client: | Earlswood Homes              |
| Job:    | College Lane, Hurstpierpoint |
| Title:  | Drainage Areas               |

Classification: FL\_60\_20  
Scale @ A1: 1:200

Accredited Contractor

|                                                                                    |          |
|------------------------------------------------------------------------------------|----------|
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number | Revision |
| S12809 - JNP-XX-XX- DR -C- 2004                                                    | P03      |
| Document/Drawing Number                                                            |          |



Road1 Longitudinal Section

Combined - Manhole Schedule

| Manhole Reference | Cover Level (m) | Invert Level (M) | Depth to Invert (m) | Manhole Size / Type (mm) | Cover Classification | Eastings   | Northings  |
|-------------------|-----------------|------------------|---------------------|--------------------------|----------------------|------------|------------|
| C1                | 38.343          | 36.947           | 1.396               | 1.350                    | D400                 | 529152.919 | 116907.474 |
| C2                | 37.757          | 34.800           | 2.957               | 1.350                    | D400                 | 529140.303 | 116915.628 |

Foul - Manhole Schedule

| Manhole Reference | Cover Level (m) | Invert Level (M) | Depth to Invert (m) | Manhole Size / Type (mm) | Cover Classification | Eastings   | Northings  |
|-------------------|-----------------|------------------|---------------------|--------------------------|----------------------|------------|------------|
| F1                | 34.250          | 32.680           | 1.570               | 1.500                    | D400                 | 529241.946 | 116949.387 |
| F2                | 38.408          | 37.058           | 1.350               | 1.350                    | D400                 | 529158.635 | 116904.822 |

Surface Water - Manhole Schedule

| Manhole Reference | Cover Level (m) | Invert Level (M) | Depth to Invert (m) | Manhole Size / Type (mm) | Cover Classification | Eastings   | Northings  |
|-------------------|-----------------|------------------|---------------------|--------------------------|----------------------|------------|------------|
| S1                | 38.351          | 36.926           | 1.425               | 1.350                    | D400                 | 529160.142 | 116906.874 |
| S2                | 38.467          | 36.793           | 1.675               | 1.350                    | D400                 | 529187.411 | 116898.303 |
| S3                | 37.700          | 36.275           | 1.425               | 1.350                    | D400                 | 529204.660 | 116898.356 |
| S4                | 36.974          | 36.176           | 0.798               | 1.350                    | D400                 | 529215.277 | 116907.660 |
| S5                | 34.339          | 31.580           | 2.759               | 1.500                    | D400                 | 529238.572 | 116950.163 |
| S6                | 34.100          | 31.540           | 2.560               | 1.050                    | D400                 | 529243.363 | 116952.013 |
| S7                | 38.396          | 37.046           | 1.350               | 1.350                    | D400                 | 529162.501 | 116905.021 |

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| HAZARD IDENTIFICATION BOX                                                                                            |                                                                                                           |                    |                                       |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------|
| This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015 |                                                                                                           |                    |                                       |
| Hazard Ref                                                                                                           | Hazard Type<br><small>(Construction Method/Work/</small><br><small>Cleaning/Operation/Evaluation)</small> | Hazard Description | Mitigation Measures/<br>Residual Risk |
|                                                                                                                      |                                                                                                           |                    |                                       |

|                               |            |                                                                                           |                     |
|-------------------------------|------------|-------------------------------------------------------------------------------------------|---------------------|
|                               |            |                                                                                           |                     |
|                               |            |                                                                                           |                     |
|                               |            |                                                                                           |                     |
|                               |            |                                                                                           |                     |
| P03                           | 21/10/2025 | Updated to suit revised site layout. Combined foul water outfall updated, S5 & S6 raised. | SH / JTH            |
| P02                           | 22/09/2025 | Vertical curve at high spot reduced in length.                                            | SH                  |
| P01                           | 12/09/2025 | First Issue                                                                               | SH / LC             |
| Rev.                          | Date       | Description                                                                               | Dim / CHK'd / App'd |
| Suitability                   |            |                                                                                           |                     |
| S2 - Suitable for Information |            |                                                                                           |                     |

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Client

Earlswood Homes

Job

College Lane, Hurstpierpoint

Title

Longitudinal Sections and Manhole Schedules

Classification

FL\_60\_20

Scale @ A1:

1:500 H & 1:100V

Project - Originator - Volume/System - Level/Location - Type - Discipline - Number

S12809 - JNP-XX-XX- DR -C- 2005

Revision

P03

Document/Drawing Number

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JNP Group Internal Project Number: S12809

S12809





Indicative overland route of



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| Hazard Ref | Hazard Type<br>(Construction/Maintenance/<br>Cleaning/Commission/Adaptation) | Hazard Description                                            | Mitigation Measures/<br>Residual Risk                                                                          |
|------------|------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1          | Construction                                                                 | Works near live carriageway                                   | Appropriate traffic measures to be in place                                                                    |
| 2          | Construction                                                                 | Works near existing utilities                                 | Exact position of utilities to be confirmed prior to works                                                     |
| 3          | Construction /<br>demolition                                                 | Contamination and excavation instability near abandoned sewer | Use safe excavation practices                                                                                  |
| 4          | Construction                                                                 | Possible high groundwater levels                              | Possible localised dewatering. Temporary measures against flotation of tank or pumping station may be required |

| P01         | 17/02/2008 | First Issue |            | SH |
|-------------|------------|-------------|------------|----|
| Rev.        | Date       | Description | Dm / Check |    |
| Suitability |            |             |            |    |



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College Lane, Hurstpierpoint

### Flood Routing Layout

|                 |          |
|-----------------|----------|
| Classification: | FI_60_20 |
| Scale @ A1:     | 1:200    |



Project - Originator - Volume/System - Level/Location - Type - Discipline - Number

S12809 - JNP-XX-XX- DR -C- 2009

① Material designated type 'A' shall consist of angular gravel or crushed rock graded in accordance with BS 882, or air cooled blast furnace slag to BS 1047, or sintered pulverised fuel ash to BS 3797, selected according to pipe size as follows:-

| Nominal Size of Pipes (mm) | Maximum Particle Size (mm) | Imported Granular Materials                                                                  |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------|
| 100                        | 10                         | 10mm nominal single-size                                                                     |
| Over 100 to 150            | 15                         | 10 or 14mm nominal single-size or 14mm to 5mm graded                                         |
| Over 150 to 300            | 20                         | 10, 14 or 20mm nominal single-size or 14mm to 5mm graded or 20mm to 5mm graded               |
| Over 300 to 600            | 20                         | 14 or 20mm nominal single-size or 14mm to 5mm graded or 20mm to 5mm graded                   |
| Over 600                   | 40                         | 14, 20 or 40mm single-size or 14mm to 5mm graded or 20mm to 5mm graded or 40mm to 5mm graded |

② Material designated type "B" shall consist of suitable native soil (see note 3), graded according to pipe size as follows:

| Nominal Size of Pipes (mm) | Maximum Particle Size (mm) |
|----------------------------|----------------------------|
| 200 or less                | 22                         |
| 201 to 600                 | 40                         |
| Over 600                   | 60                         |

Note: for pipes with nominal diameter of less than 100mm, all written instructions of the manufacturer shall be complied with.

③ Suitable Native (as-dug) Soil shall consist of uniform, readily compactable material, free from oversized particles, tree roots, waste, organic material, snow and ice, and exclude clay lumps larger than 75mm, as per BS EN 1610:2015 Cl. 5.2 and 5.3. Material to be compacted in 225mm layers.

**Note:**  
At each flexible pipe joint a joint filler (e.g. fibreboard or polystyrene) shall be used (see table below), and shall extend through the full thickness of any concrete in contact with the pipe. The concrete bed shall be cut away at each joint to give a clearance of at least 50mm, so that the joint does not bear on the bed.

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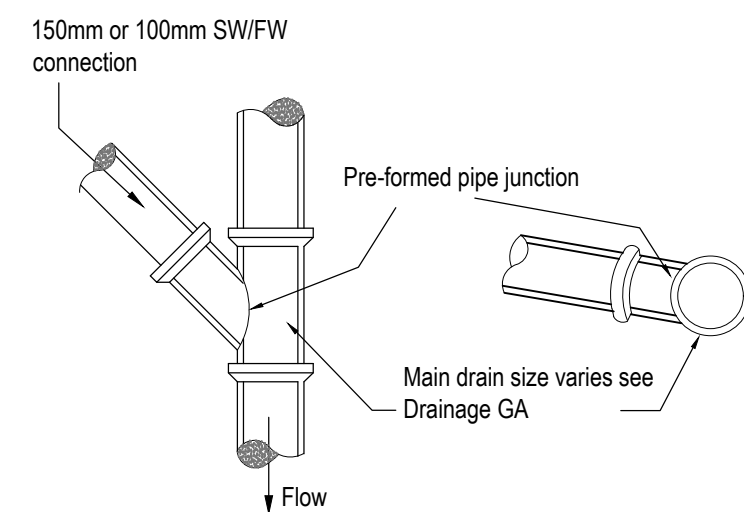
| Hazard Ref                                                                          | Hazard Type<br>(Construction/Maintenance/<br>Cleaning/Demolition/Adaptation) | Hazard Description | Mitigation Measures/<br>Residual Risk |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------|---------------------------------------|
|  |                                                                              |                    |                                       |

225mm dia x 550mm deep Hepworth  
Yard Gully, or similar, with 100mm  
outlet + medium duty grate.  
Grate to be set 6mm min below  
surrounding paving level.

6mm FND2 concrete  
round

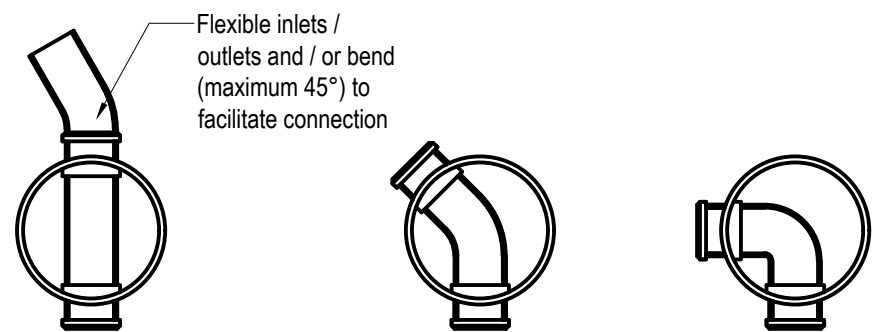
## Typical Section Through Yard Gully

(Scale 1:25)

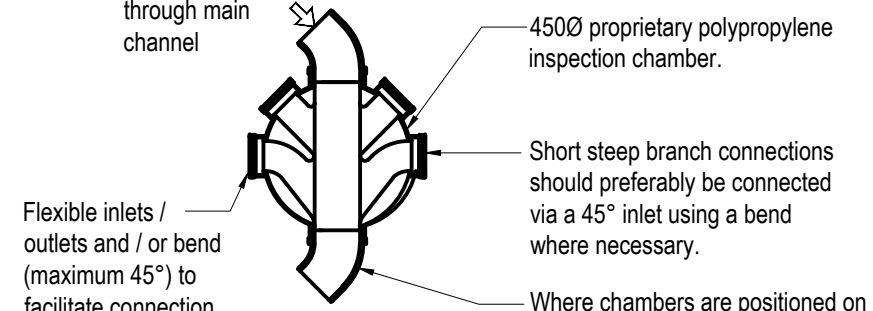


## Typical 'Y' Junction Connection

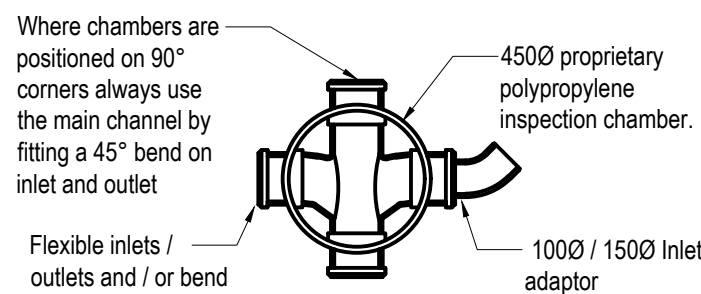
Scale 1:25)



Heaviest flow should always be directed through main channel



Note- inlet pipes and outlet pipe to be 100mm Ø with this arrangement.

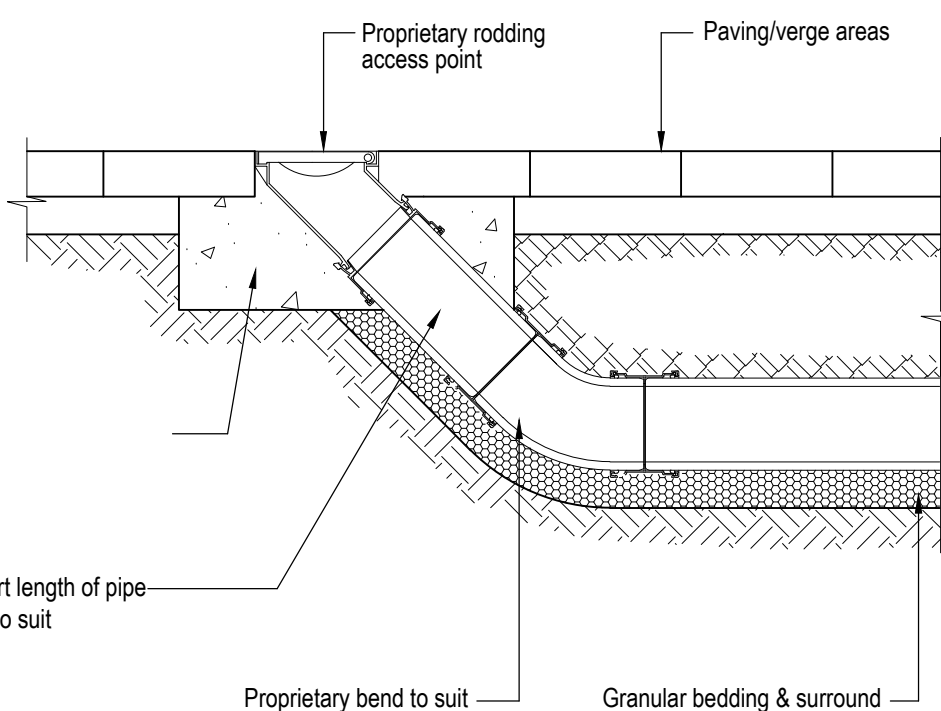


Note- inlet pipes and outlet pipe to be max 150mm Ø with this arrangement.

### Alternative Base Layouts For 450mm Dia Inspection Chambers

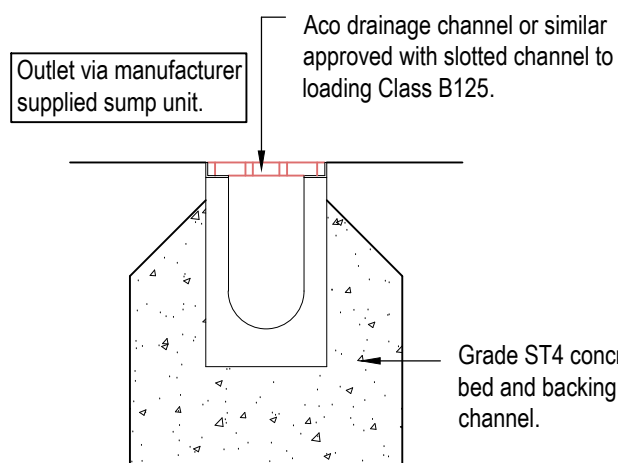
## Pipe Bedding Details

(Scale 1:25)



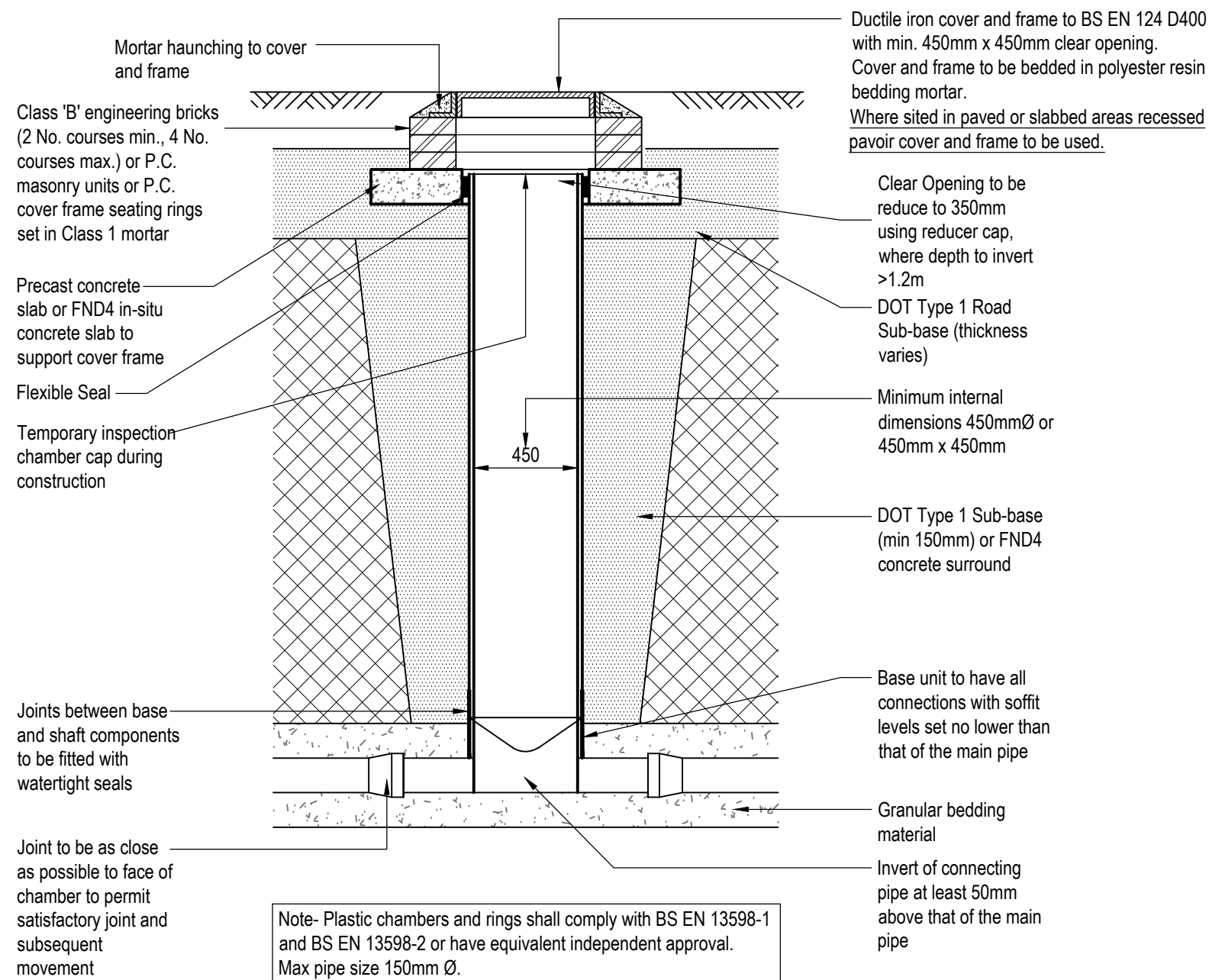
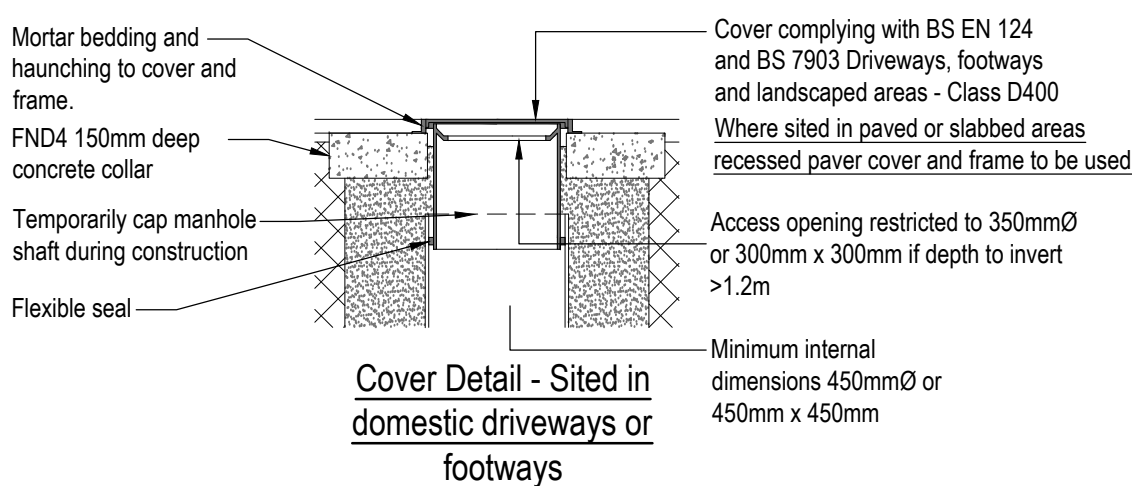
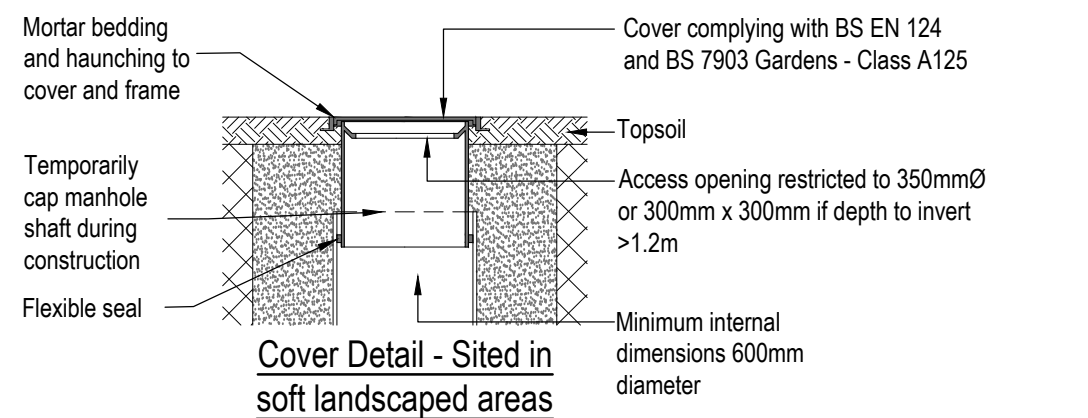
### Rodding Eye-Typical Detail

Scale 1:10

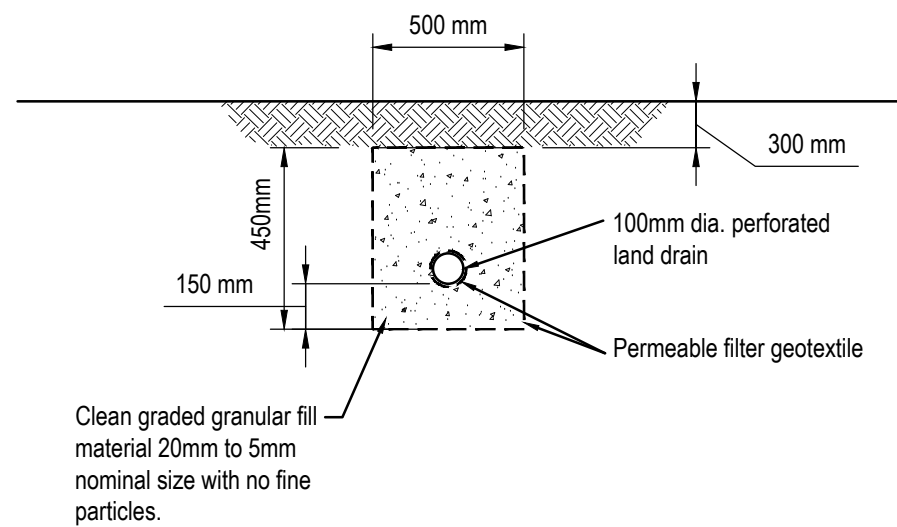


### Typical Section Through Drainage Channel

Scale 1:10



Maximum depth from cover level to invert of pipe in areas subject to vehicular loading 3m, non entry

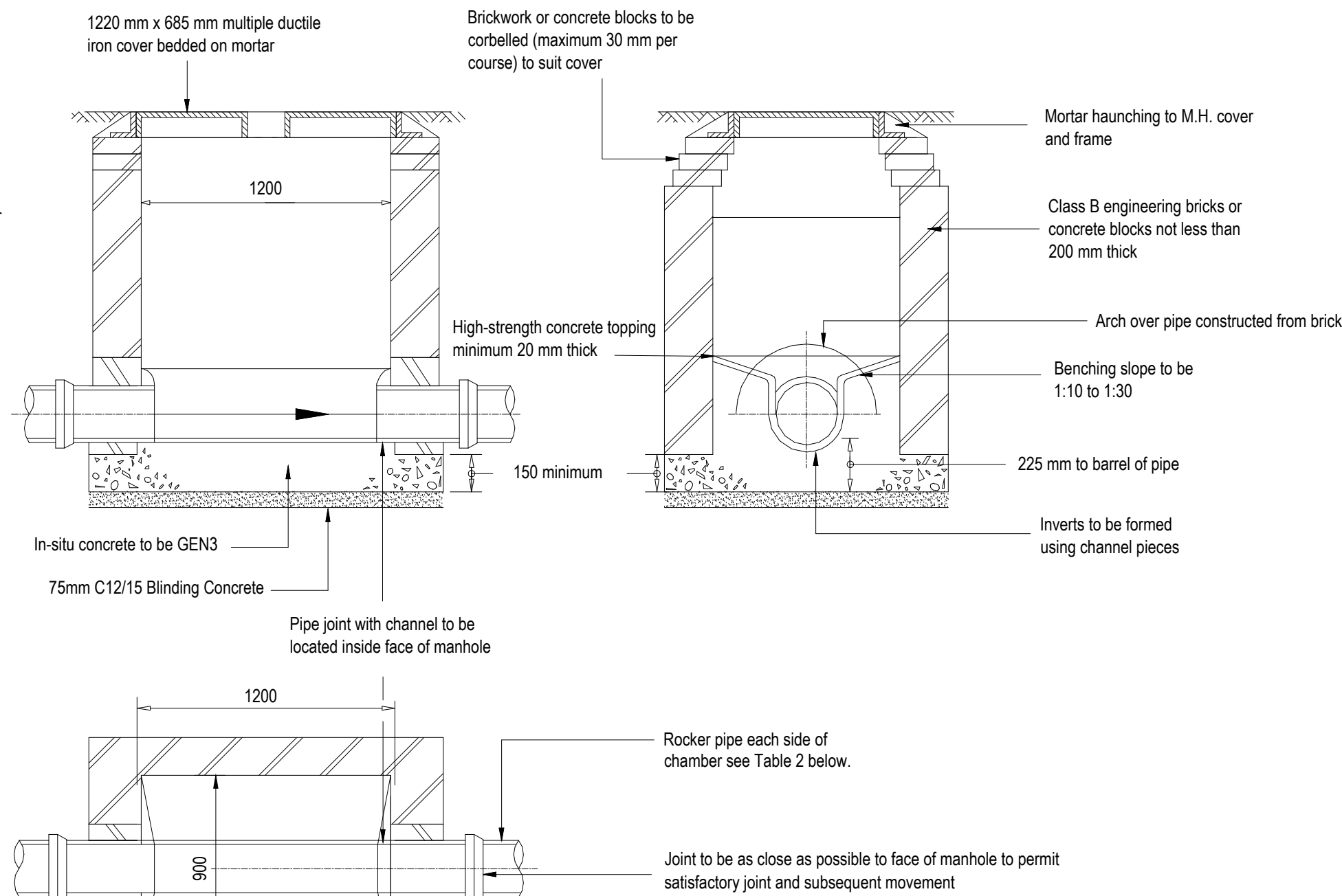
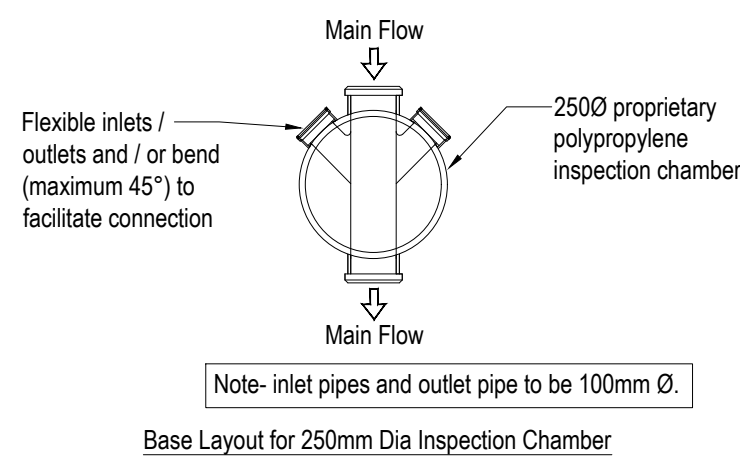
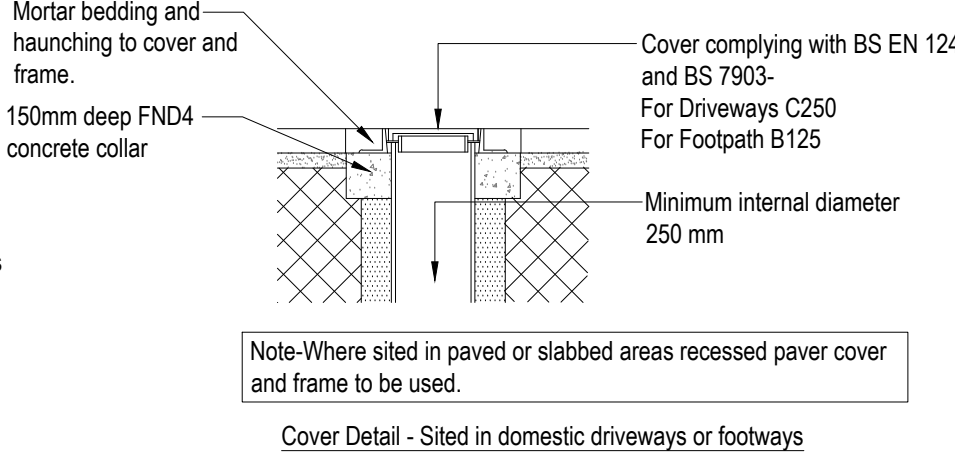
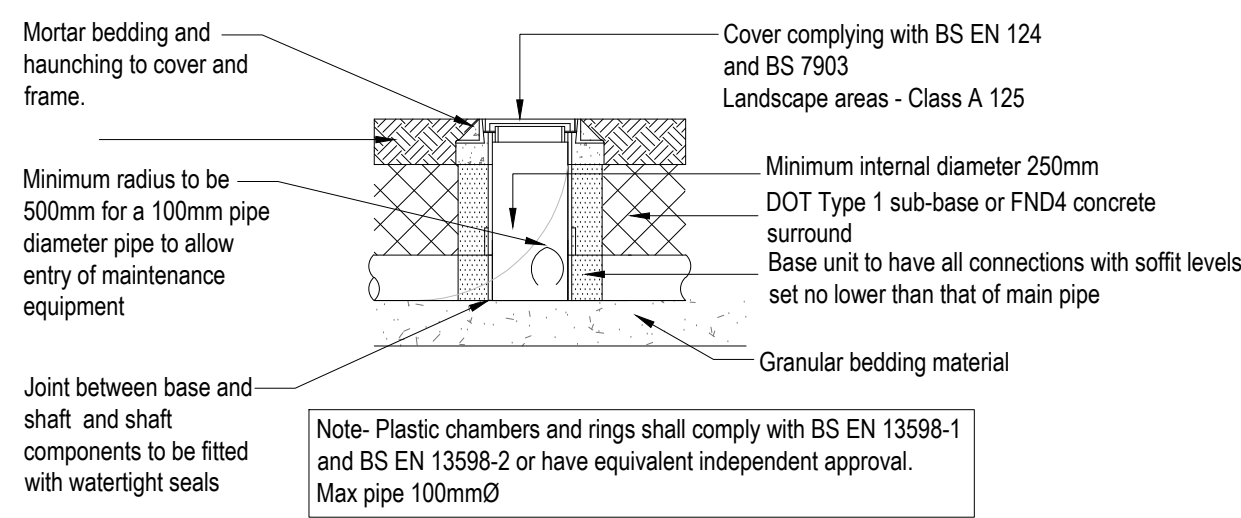


## Typical Land Drain

Scale 1:25

450mm Dia Inspection Chamber detail (Flexible Material) in areas subject to vehicle loading

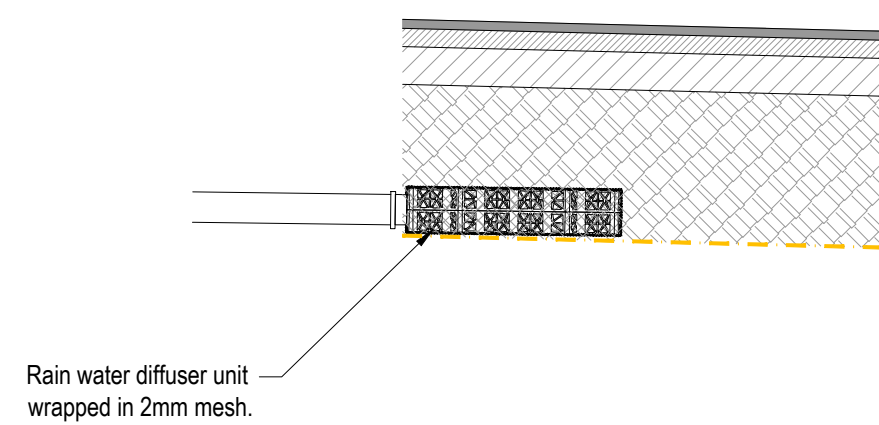
Scale 1:25



Typical Manhole Detail - Type 'C' Brick Chamber

Depth from ground level to soffit of pipe below 1.0m

Scale: 1:25

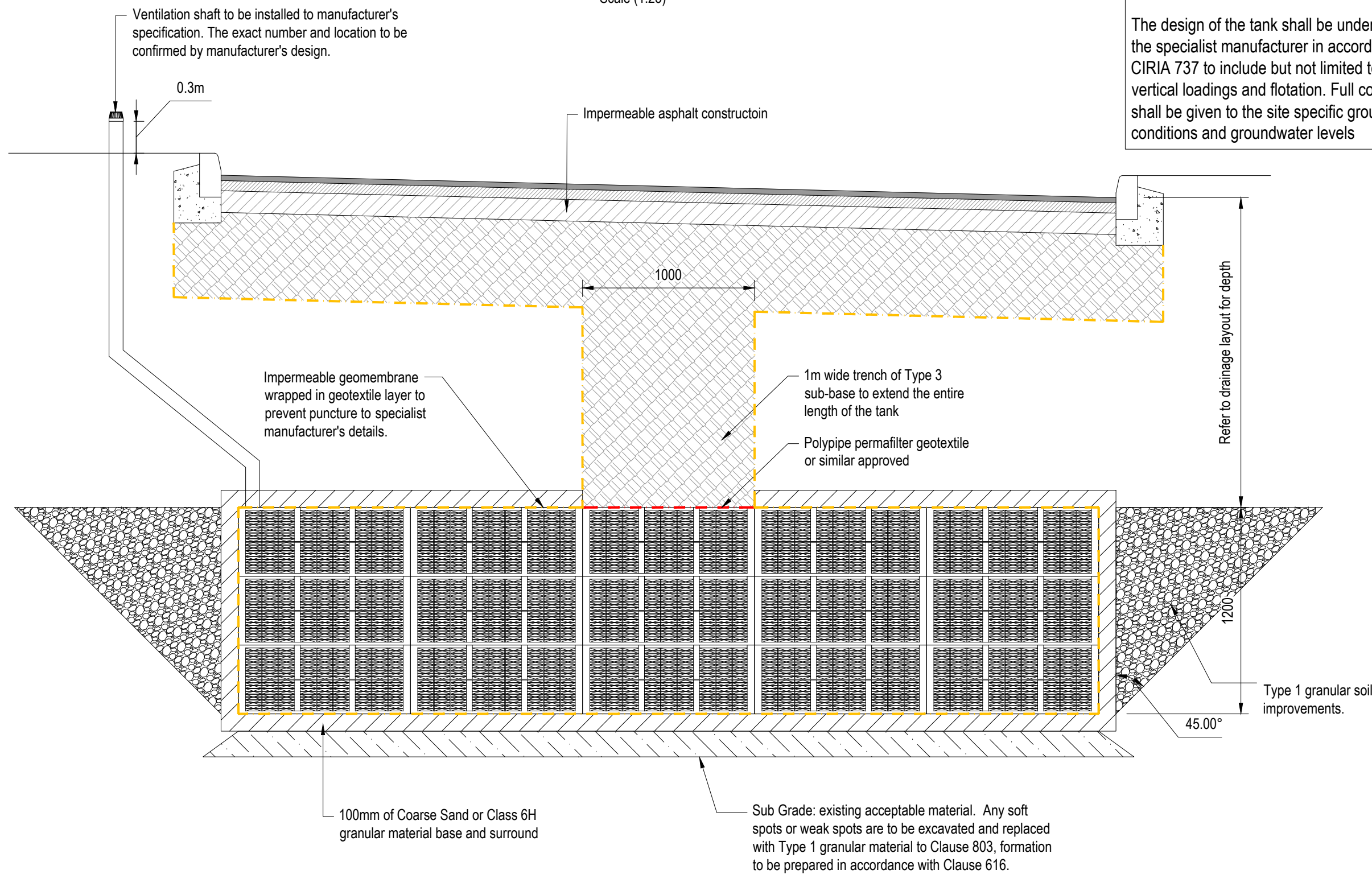


Permavoid Diffuser Detail

Scale (1:25)

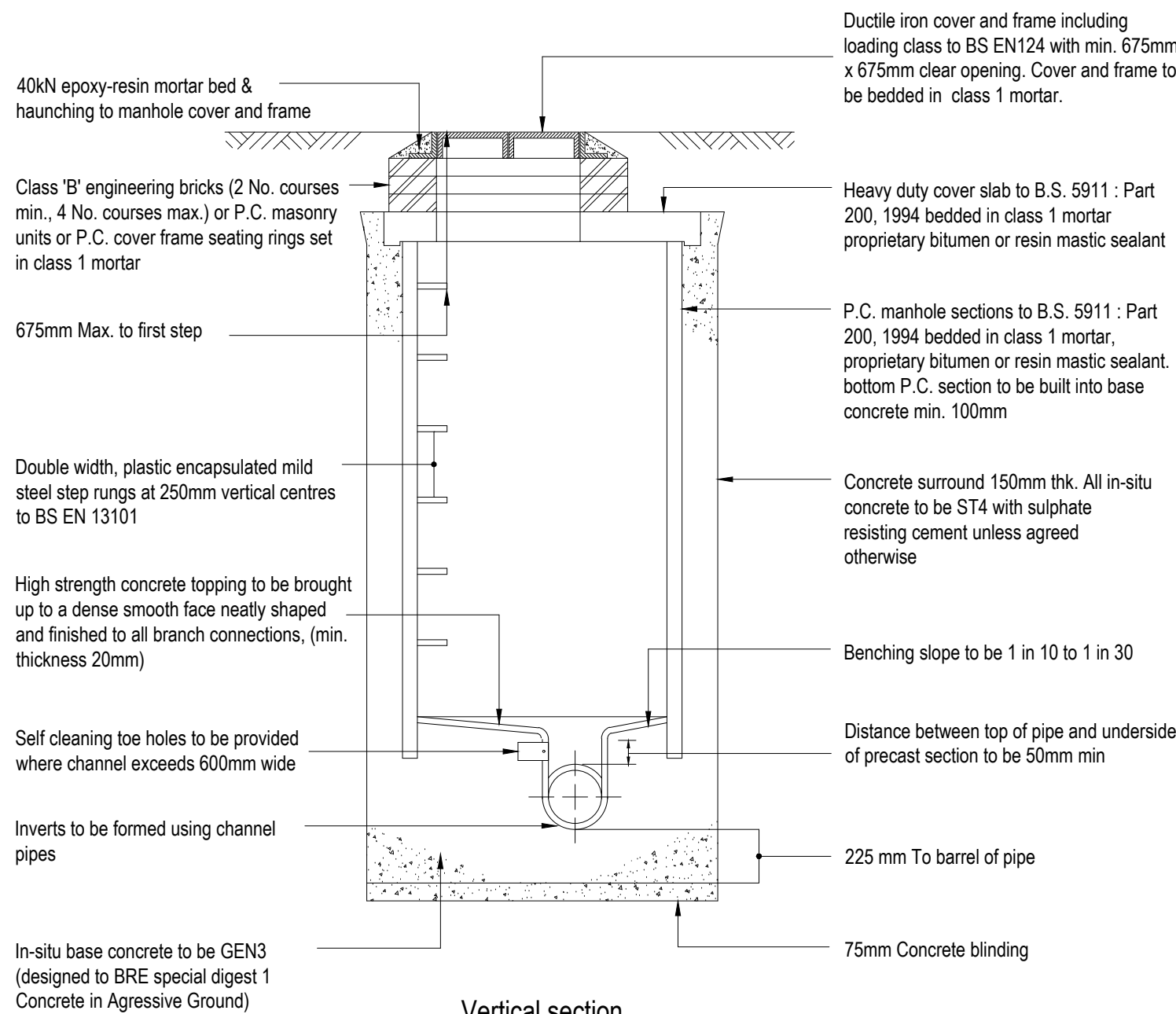
Tank details shown are indicative only.

The design of the tank shall be undertaken by the specialist manufacturer in accordance with CIRIA 737 to include but not limited to lateral and vertical loadings and flotation. Full consideration shall be given to the site specific ground conditions and groundwater levels

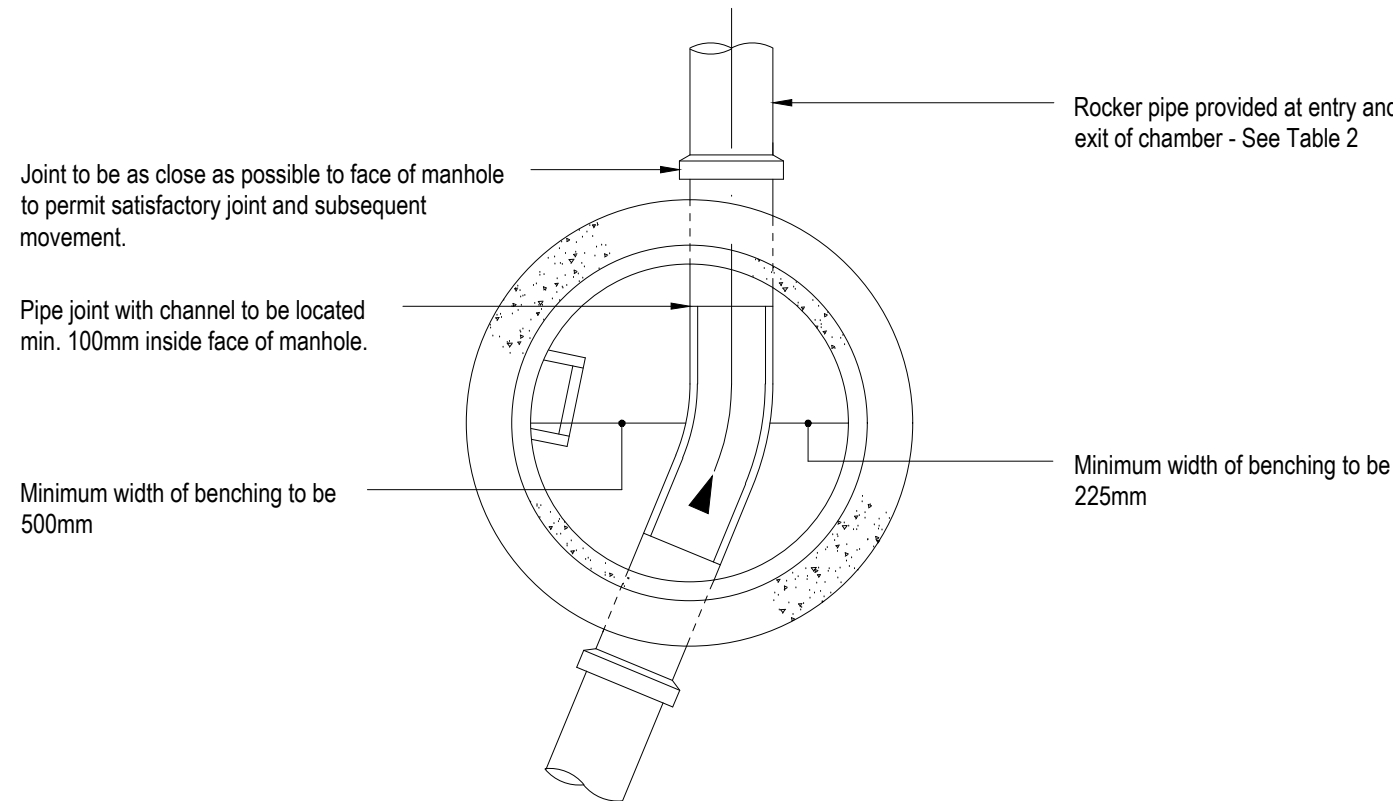


Typical Tanked Geo Cellular Crate Detail

Scale (1:25)



Vertical section



Plan section

Typical manhole detail - Type 'B'

Max. depth from ground level to soffit of pipe 3.0m

(1:25)

Typical manhole detail - Type 'E'

Depth from ground level to soffit of pipe 1.0m to 1.5m

(1:25)

Note: Double width, plastic encapsulated mild steel step rungs at 250mm vertical centres to BS EN 13101 are required if the distance between cover level and soffit level is greater than 675mm.

Precast concrete manhole rings shall not be cut under any circumstances. Where cutting of manhole rings may be required, alternative construction options shall be used, including manhole built up with concrete or brick work to the top of the pipe.

Table 2 - Rocker pipe length

| Nominal diameter of pipe (mm) | Effective length (m) |
|-------------------------------|----------------------|
| 150 to 600                    | 0.6                  |
| 675 to 750                    | 1.0                  |
| Over 750                      | 1.25                 |

Table 1 - Manhole diameter

| Diameter of largest pipe in manhole (mm) | Internal diameter of manhole (mm)                 |
|------------------------------------------|---------------------------------------------------|
| Less than 375                            | 1200 (1050 Where depth to soffit is 1.35m - 1.5m) |
| 375 to 450                               | 1500                                              |
| 500 to 700                               | 1500                                              |
| 750 to 900                               | 1800                                              |

Sizes shown are the minimum. Where 2 or more pipes enter a manhole, the manhole size should be sufficient to accommodate adequate benching.

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## HAZARD IDENTIFICATION BOX

This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015

| Hazard Ref | Hazard Type<br>(Construction/Maintenance/<br>Cleaning/Operation/Regulation) | Hazard Description | Mitigation Measures/<br>Residual Risk |
|------------|-----------------------------------------------------------------------------|--------------------|---------------------------------------|
| 1          |                                                                             |                    |                                       |

|            |            |                                   |                  |
|------------|------------|-----------------------------------|------------------|
| P02        | 21/10/2025 | Tank soil improvements specified. | SH / JTH         |
| P01        | 12/09/2025 | First Issue                       | SH / LC          |
| Rev.       | Date       | Description                       | Dim / CHK / Appd |
| Subsidiary |            |                                   |                  |

S2 - Suitable for Information



|        |                                              |
|--------|----------------------------------------------|
| Client | Earlswood Homes                              |
| Job    | College Lane, Hurstpierpoint                 |
| Title  | Drainage Construction Details (Sheet 2 of 2) |

|                                                                                    |                              |                         |          |
|------------------------------------------------------------------------------------|------------------------------|-------------------------|----------|
| Classification                                                                     | FL 60_20                     | Scale @ A1              | As Shown |
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number | S12809 - JNP-XX-XX-DR-C-3002 | Document/Drawing Number | P02      |

| California Bearing Ratio (CBR) Values | Minimum thickness (mm) of Type 1 sub-base<br>(Consolidated in accordance with MCHW Volume 1 Clause 801, table 8/1) |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Less than 2%                          | N/A refer to specialist design                                                                                     |
| 2% - 3%                               | 325                                                                                                                |
| 3% - 5%                               | 250                                                                                                                |
| 5% - 7%                               | 150                                                                                                                |
| 7% -20%                               | 100                                                                                                                |

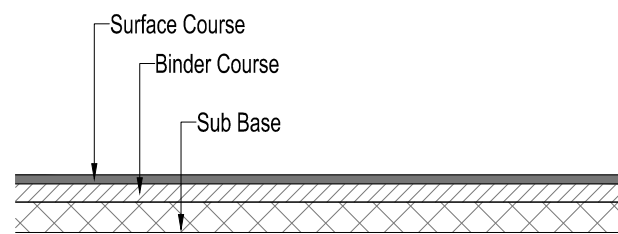
2) When laid to either 90 or 45 degrees herringbone pattern then the edge perimeter to be laid with one single row of stretcher bond set parallel to the edge restraint. Where block pavers are laid abutting drainage channels, gully grates and the like, the upper surface of the block pavers shall be set between 3mm and 6mm above the grating. Manufacturer's declared value markings W3 and S4 are acceptable if W3 is 1.0kg/m<sup>2</sup> or less and S4 is 45 or more based on '1 scale unit' (with regard to abrasion, Class A2, no test result is greater than 23mm; and class A1 = no performance determined).

4) Design CBR of 2% to be used

**General Note:**  
This drawing to be read in conjunction with  
The architect's/engineer's drawings indicating  
external work finishes requirements.

| Tarmac Footway Construction |                                   |           |                           |                     |                                                                                          |
|-----------------------------|-----------------------------------|-----------|---------------------------|---------------------|------------------------------------------------------------------------------------------|
| Layer                       | Material                          | Thickness | Nominal Size of Aggregate | Grade of Binder     | Comments                                                                                 |
| Surface Course              | Asphalt concrete: AC 6 Dense Surf | 20mm      | 0/6mm                     | 100/150 PEN Bitumen | BS EN 13108 Part                                                                         |
| Binder Course               | Asphalt Concrete: AC 20 Dense Bin | 50mm      | 0/20mm                    | 40/60 PEN Bitumen   | To BS EN 13108 Part 1 Clause 906                                                         |
| Sub Base                    | Granular sub base material Type 1 | 200mm     | -                         | -                   | To Clause 803 of S.H.W. 200mm Sub Base Thickness to be used for vehicle cross over areas |

Scale 1:25



Charcon Woburn, 100x134mm block on edge.

Pavers = 50mm thick. Charcon Woburn blocks, 100x134mm

Bedding Course = 50mm thick Sharp sand to BS 7533-3 category II of Annex D.

100

100

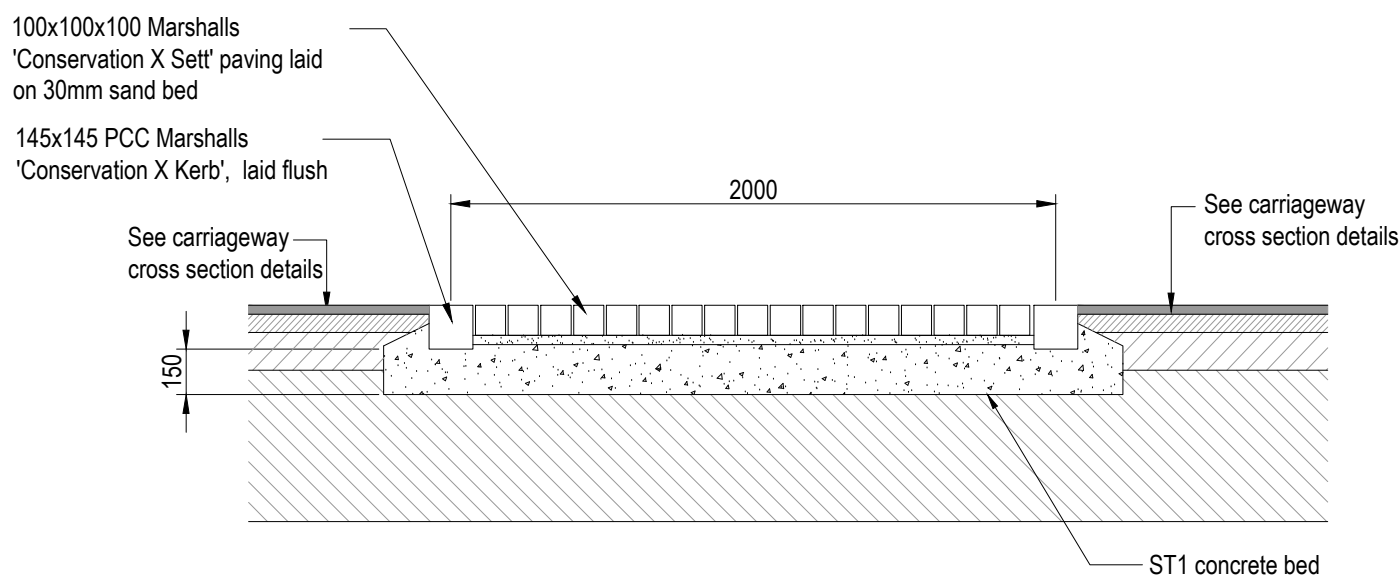
ST1 conc. bed & surround.

Sub-base = 350mm thick granular sub-base material Type 1 to Clause 803 Table 8/2 MCHW1 Series 800.

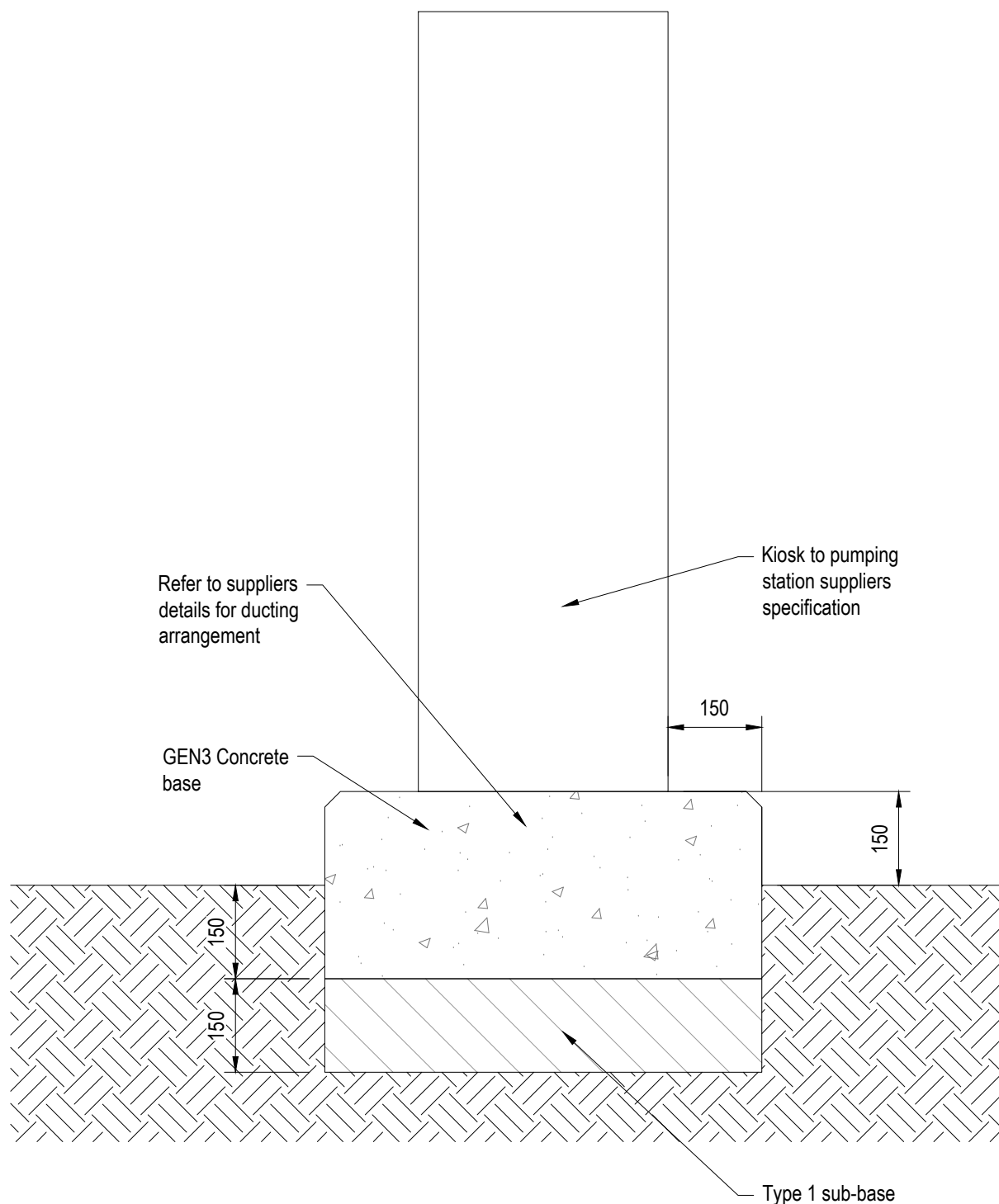
Sub-grade = Existing acceptable material. Any soft spots or weak spots are to be excavated and replaced with sub-base (as defined above), formation to be prepared in accordance with Clause 616.

## Scale 1-10

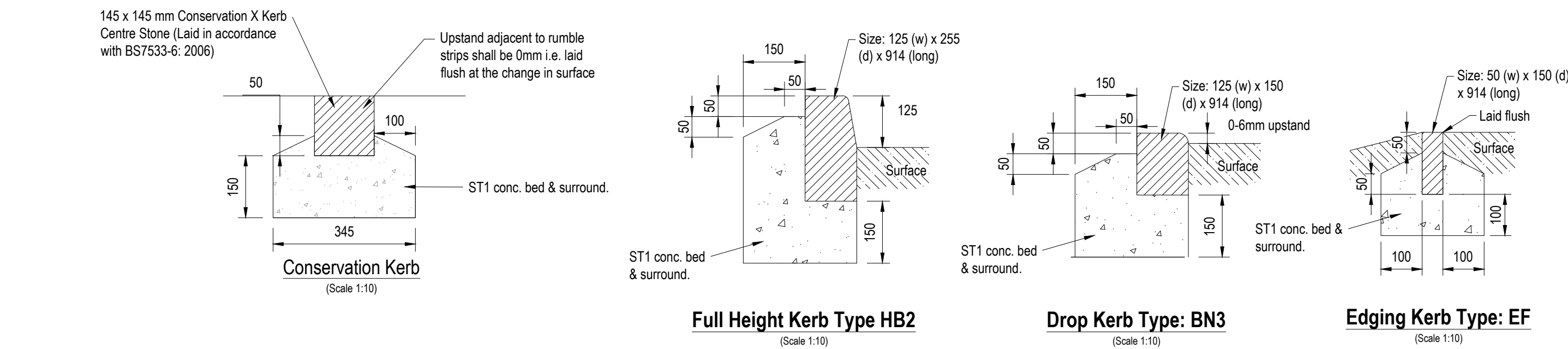
1. All linear dimensions are in millimetres unless stated otherwise.
2. The kerb base shall sit directly on sub-base at either its design level or lower.
3. The minimum depth of kerb base shall be 150mm. The minimum depth of edging base shall be 100mm.
4. The minimum thickness of sub-base below kerb base shall be 110mm or 150mm where no lower sub-base is specified.
5. All vertical faces on kerb base and backing shall be formed with shuttering.
6. Kerbs shall be backed up while the kerb base remains plastic (max. 6hrs after batching).
7. Mortar shall comply with BS45 Clause 2404 designation (i).
8. Kerb reference numbers are defined in BS EN 1340:2003.
9. For kerblines radii not exceeding 12m, appropriate curved kerbs shall be used.
10. For kerblines radii exceeding 12m but not exceeding 20m, 610mm long straight kerbs shall be used.
11. Bond coat to Clause 920 shall be applied to the carriageway surface in accordance with BS 5434: Part 2 prior to the laying of extruded asphalt kerbing.



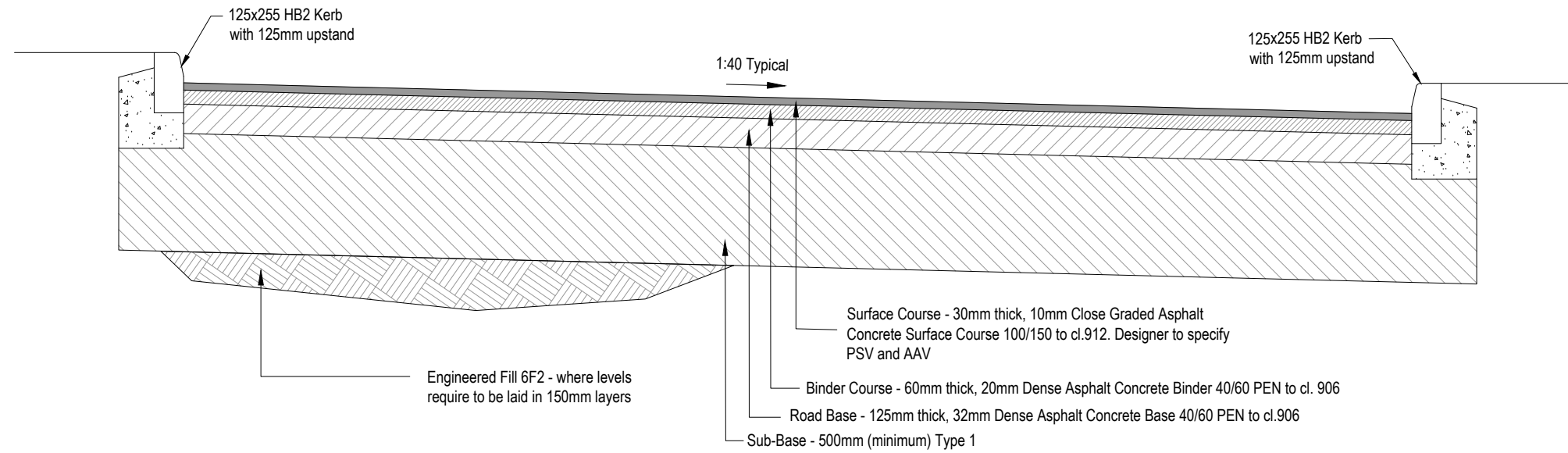
Scale 1:25



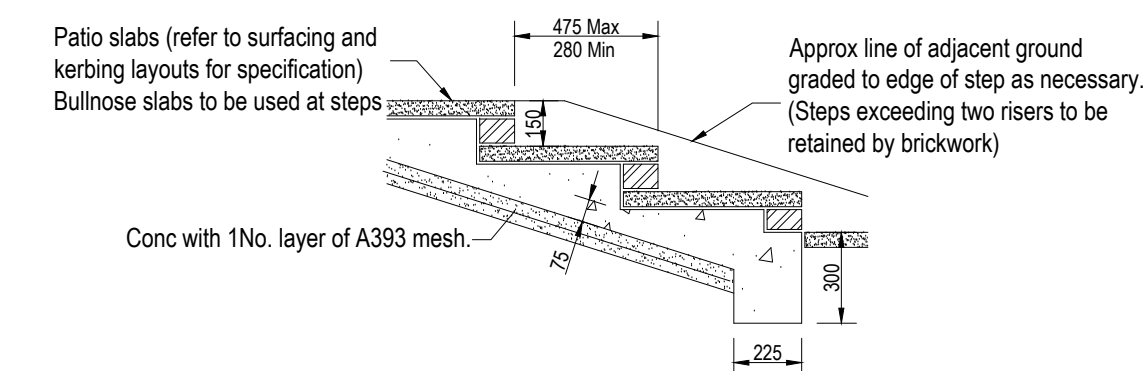
Scale 1:10



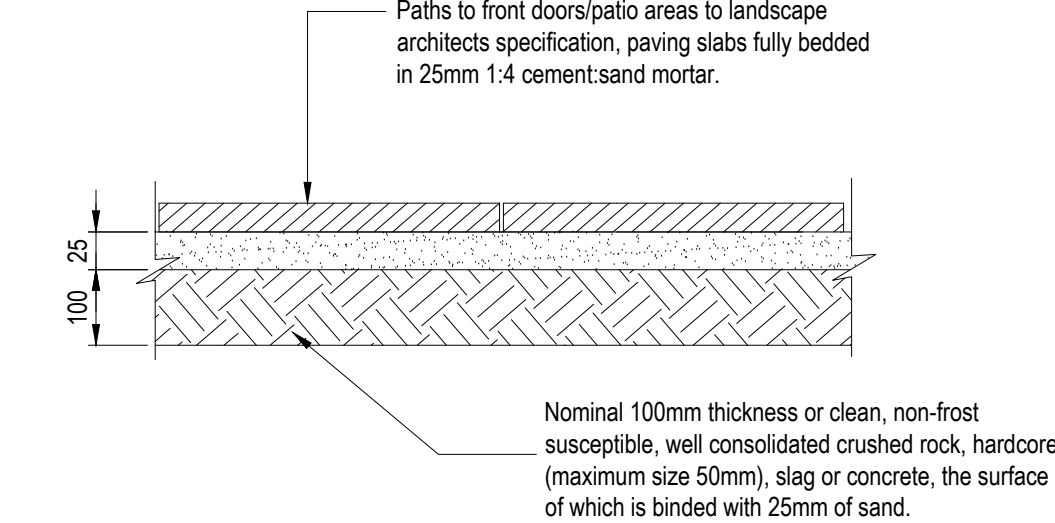
(Scale 1:20)



(Scale 1:20)

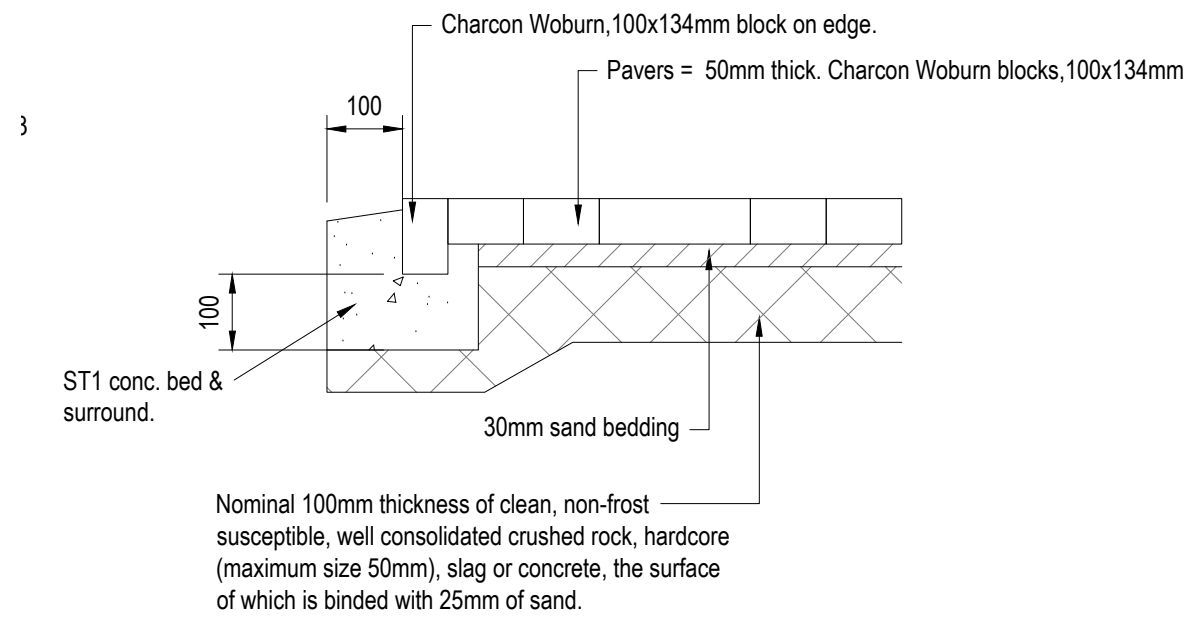


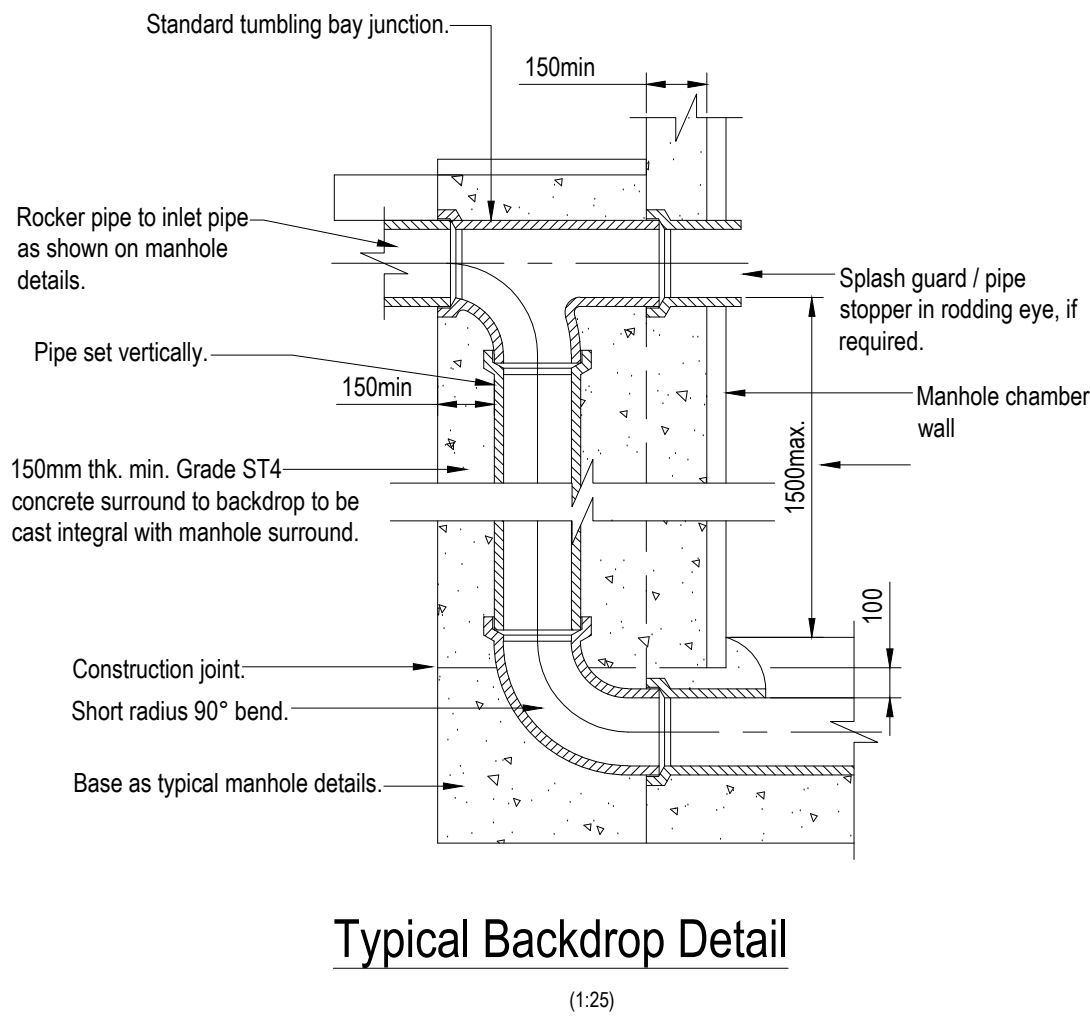
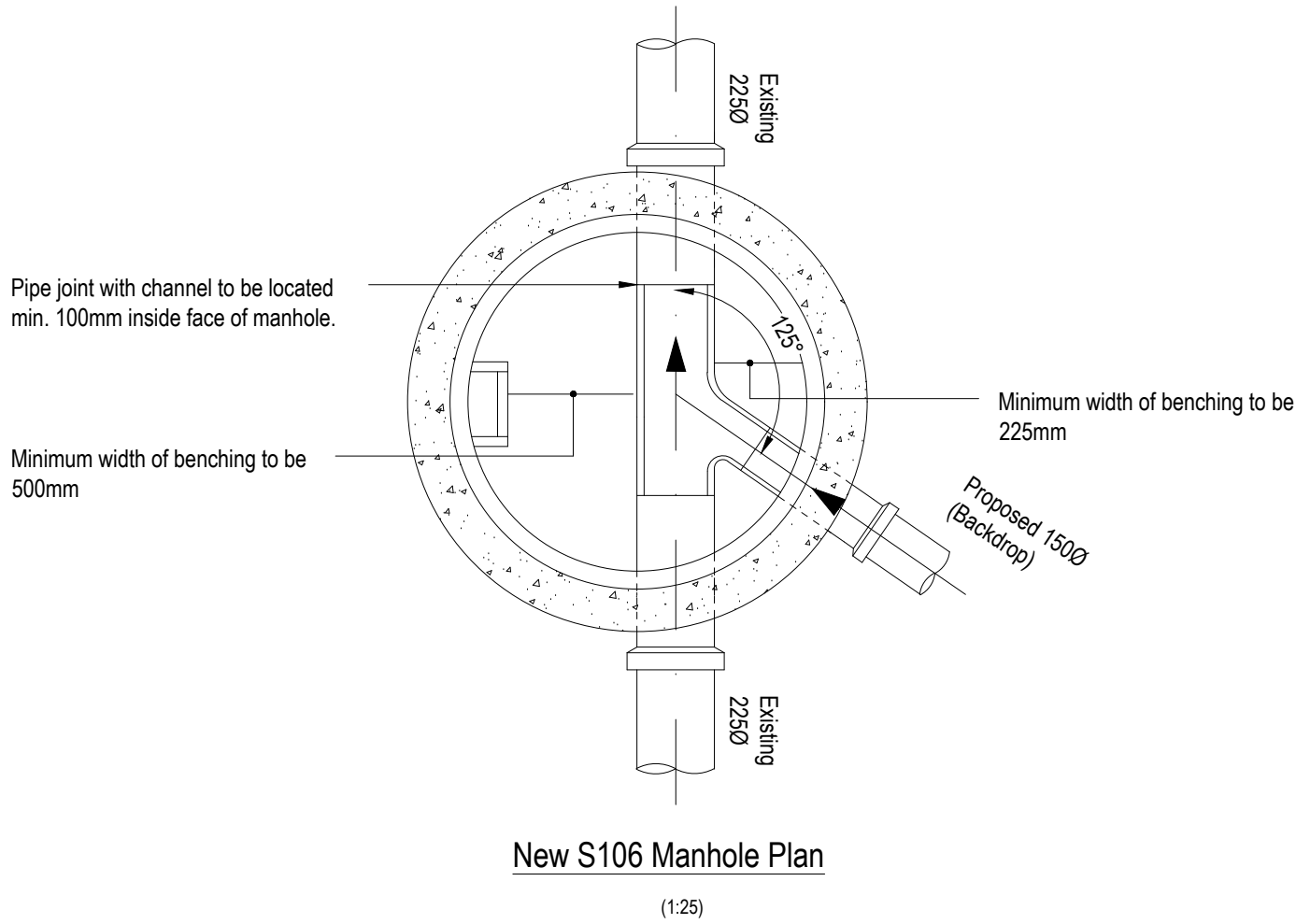
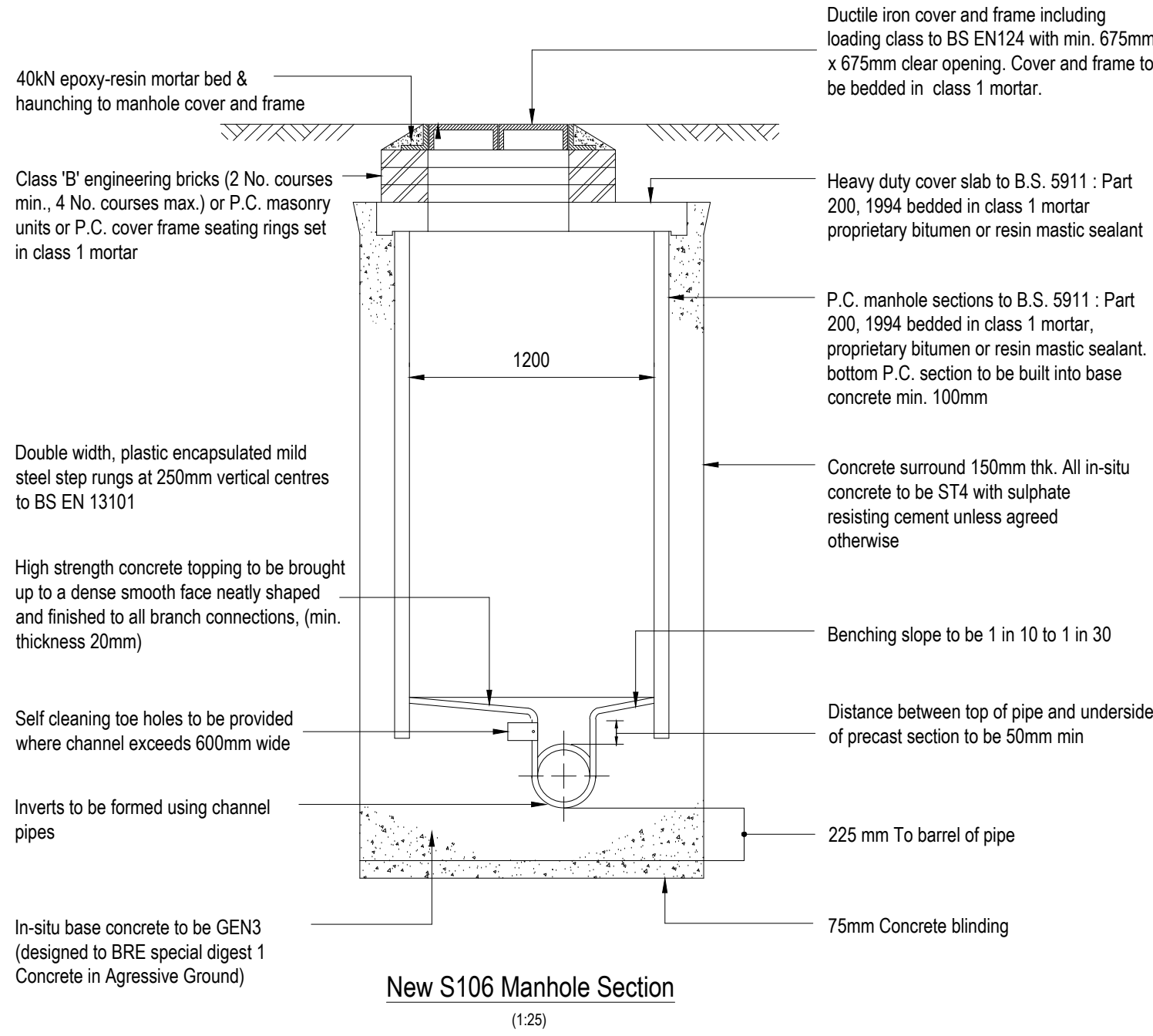
Scale 1:25



Scale 1:10

Scale 1:10





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| HAZARD IDENTIFICATION BOX                                                                                            |                                                                                 |                    |                                       |
|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------|---------------------------------------|
| This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015 |                                                                                 |                    |                                       |
| Hazard Ref                                                                                                           | Hazard Type<br>(Construction/Maintenance/<br>Cleaning/Remediation/Regeneration) | Hazard Description | Mitigation Measures/<br>Residual Risk |
|                                                                                                                      |                                                                                 |                    |                                       |

|                               |            |                                               |                            |
|-------------------------------|------------|-----------------------------------------------|----------------------------|
|                               |            |                                               |                            |
|                               |            |                                               |                            |
|                               |            |                                               |                            |
|                               |            |                                               |                            |
| P02                           | 21/10/2025 | Step rungs omitted at Southern Water request. | SH / JTH                   |
| P01                           | 09/10/2025 | First Issue                                   | SH                         |
| Rev.                          | Date       | Description                                   | Drawn / Checked / Approved |
| Suitability                   |            |                                               |                            |
| S2 - Suitable for Information |            |                                               |                            |



|                                                                                    |                                 |  |          |
|------------------------------------------------------------------------------------|---------------------------------|--|----------|
| Client:                                                                            | Earlswood Homes                 |  |          |
| Job:                                                                               | College Lane, Hurstpierpoint    |  |          |
| Title:                                                                             | S106 Manhole Connection Details |  |          |
| Classification:                                                                    | FL_60_20                        |  |          |
| Scale @ A1:                                                                        | As Shown                        |  |          |
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number |                                 |  | Revision |
| S12809 - JNP -XX-XX- DR -C- 3004                                                   |                                 |  | P02      |
| Document/Drawing Number                                                            |                                 |  |          |

# **Appendix C**

## **Network Calculations**

### Nodes

| Name | Area<br>(ha) | T of E<br>(mins) | Cover<br>Level<br>(m) | Diameter<br>(mm) | Easting<br>(m) | Northing<br>(m) | Depth<br>(m) |
|------|--------------|------------------|-----------------------|------------------|----------------|-----------------|--------------|
| 1    | 0.018        | 5.00             | 38.351                | 1200             | 529160.142     | 116906.874      | 1.425        |
| 2    |              |                  | 38.432                | 1200             | 529187.411     | 116898.303      | 1.674        |
| 3    | 0.017        | 5.00             | 37.700                | 1200             | 529204.660     | 116898.356      | 1.425        |
| 4    | 0.152        | 5.00             | 36.974                | 1350             | 529215.277     | 116907.660      | 0.798        |
| 5    |              |                  | 34.339                | 1350             | 529238.572     | 116950.163      | 3.189        |
| 6    |              |                  | 34.100                | 1200             | 529243.363     | 116952.013      | 2.990        |
| 7    |              |                  | 34.100                | 1200             | 529253.007     | 116954.839      | 3.057        |

### Links

| Name  | US<br>Node | DS<br>Node | Length<br>(m) | ks (mm) /<br>n | US IL<br>(m) | DS IL<br>(m) | Fall<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | T of C<br>(mins) | Rain<br>(mm/hr) |
|-------|------------|------------|---------------|----------------|--------------|--------------|-------------|----------------|-------------|------------------|-----------------|
| 1.000 | 1          | 2          | 28.584        | 0.600          | 36.926       | 36.758       | 0.168       | 170.1          | 225         | 5.48             | 75.0            |
| 1.001 | 2          | 3          | 17.250        | 0.600          | 36.758       | 36.275       | 0.483       | 35.7           | 225         | 5.61             | 75.0            |
| 1.002 | 3          | 4          | 14.117        | 0.600          | 36.275       | 36.176       | 0.099       | 142.6          | 225         | 5.82             | 75.0            |
| 1.003 | 4          | 5          | 48.469        | 0.600          | 36.176       | 31.150       | 5.026       | 9.6            | 450         | 5.95             | 75.0            |
| 1.004 | 5          | 6          | 5.135         | 0.600          | 31.150       | 31.110       | 0.040       | 128.4          | 150         | 6.04             | 75.0            |
| 1.005 | 6          | 7          | 10.050        | 0.600          | 31.110       | 31.043       | 0.067       | 150.0          | 150         | 6.25             | 75.0            |

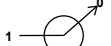
| Name  | Vel<br>(m/s) | Cap<br>(l/s) | Flow<br>(l/s) | US<br>Depth<br>(m) | DS<br>Depth<br>(m) | Σ Area<br>(ha) | Σ Add<br>Inflow<br>(l/s) |
|-------|--------------|--------------|---------------|--------------------|--------------------|----------------|--------------------------|
| 1.000 | 0.999        | 39.7         | 4.9           | 1.200              | 1.449              | 0.018          | 0.0                      |
| 1.001 | 2.196        | 87.3         | 4.9           | 1.449              | 1.200              | 0.018          | 0.0                      |
| 1.002 | 1.093        | 43.4         | 9.5           | 1.200              | 0.573              | 0.035          | 0.0                      |
| 1.003 | 6.575        | 1045.7       | 50.7          | 0.348              | 2.739              | 0.187          | 0.0                      |
| 1.004 | 0.885        | 15.6         | 50.7          | 3.039              | 2.840              | 0.187          | 0.0                      |
| 1.005 | 0.818        | 14.5         | 50.7          | 2.840              | 2.907              | 0.187          | 0.0                      |

### Pipeline Schedule

| Link  | Length<br>(m) | Slope<br>(1:X) | Dia<br>(mm) | Link<br>Type | US CL<br>(m) | US IL<br>(m) | US Depth<br>(m) | DS CL<br>(m) | DS IL<br>(m) | DS Depth<br>(m) |
|-------|---------------|----------------|-------------|--------------|--------------|--------------|-----------------|--------------|--------------|-----------------|
| 1.000 | 28.584        | 170.1          | 225         | 1 STANDARD   | 38.351       | 36.926       | 1.200           | 38.432       | 36.758       | 1.449           |
| 1.001 | 17.250        | 35.7           | 225         | 1 STANDARD   | 38.432       | 36.758       | 1.449           | 37.700       | 36.275       | 1.200           |
| 1.002 | 14.117        | 142.6          | 225         | 1 STANDARD   | 37.700       | 36.275       | 1.200           | 36.974       | 36.176       | 0.573           |
| 1.003 | 48.469        | 9.6            | 450         | 1 STANDARD   | 36.974       | 36.176       | 0.348           | 34.339       | 31.150       | 2.739           |
| 1.004 | 5.135         | 128.4          | 150         | 1 STANDARD   | 34.339       | 31.150       | 3.039           | 34.100       | 31.110       | 2.840           |
| 1.005 | 10.050        | 150.0          | 150         | 1 STANDARD   | 34.100       | 31.110       | 2.840           | 34.100       | 31.043       | 2.907           |

| Link  | US<br>Node | Dia<br>(mm) | Node<br>Type | MH<br>Type | DS<br>Node | Dia<br>(mm) | Node<br>Type | MH<br>Type |
|-------|------------|-------------|--------------|------------|------------|-------------|--------------|------------|
| 1.000 | 1          | 1200        | Manhole      | 1 STANDARD | 2          | 1200        | Manhole      | 1 STANDARD |
| 1.001 | 2          | 1200        | Manhole      | 1 STANDARD | 3          | 1200        | Manhole      | 1 STANDARD |
| 1.002 | 3          | 1200        | Manhole      | 1 STANDARD | 4          | 1350        | Manhole      | 1 STANDARD |
| 1.003 | 4          | 1350        | Manhole      | 1 STANDARD | 5          | 1350        | Manhole      | 1 STANDARD |
| 1.004 | 5          | 1350        | Manhole      | 1 STANDARD | 6          | 1200        | Manhole      | 1 STANDARD |
| 1.005 | 6          | 1200        | Manhole      | 1 STANDARD | 7          | 1200        | Manhole      | 1 STANDARD |

### Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Connections                                                                          | Link | IL (m) | Dia (mm) |     |
|------|-------------|--------------|--------|-----------|----------|--------------------------------------------------------------------------------------|------|--------|----------|-----|
| 1    | 529160.142  | 116906.874   | 38.351 | 1.425     | 1200     |    | 0    | 1.000  | 36.926   | 225 |
| 2    | 529187.411  | 116898.303   | 38.432 | 1.674     | 1200     |    | 1    | 1.000  | 36.758   | 225 |
| 3    | 529204.660  | 116898.356   | 37.700 | 1.425     | 1200     |    | 1    | 1.001  | 36.758   | 225 |
| 4    | 529215.277  | 116907.660   | 36.974 | 0.798     | 1350     |    | 1    | 1.002  | 36.275   | 225 |
| 5    | 529238.572  | 116950.163   | 34.339 | 3.189     | 1350     |    | 1    | 1.003  | 36.176   | 450 |
| 6    | 529243.363  | 116952.013   | 34.100 | 2.990     | 1200     |  | 1    | 1.003  | 31.150   | 450 |
| 7    | 529253.007  | 116954.839   | 34.100 | 3.057     | 1200     |  | 0    | 1.004  | 31.150   | 150 |
|      |             |              |        |           |          |  | 1    | 1.004  | 31.110   | 150 |
|      |             |              |        |           |          |  | 1    | 1.005  | 31.110   | 150 |
|      |             |              |        |           |          |  | 1    | 1.005  | 31.043   | 150 |

### Simulation Settings

|                      |          |                            |        |                         |   |
|----------------------|----------|----------------------------|--------|-------------------------|---|
| Rainfall Methodology | FEH-22   | Analysis Speed             | Normal | Starting Level (m)      |   |
| Rainfall Events      | Singular | Skip Steady State          | x      | Check Discharge Rate(s) | x |
| Summer CV            | 1.000    | Drain Down Time (mins)     | 240    | Check Discharge Volume  | x |
| Winter CV            | 1.000    | Additional Storage (m³/ha) | 20.0   |                         |   |

### Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|
| 2                     | 0                     | 0                     | 0                     |
| 30                    | 30                    | 0                     | 0                     |
| 100                   | 45                    | 0                     | 0                     |

### Node 6 Online Depth/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 31.110

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 0.100     | 2.000      | 0.600     | 2.000      | 1.100     | 2.000      | 1.600     | 2.000      | 2.100     | 2.000      | 2.600     | 2.000      |
| 0.200     | 2.000      | 0.700     | 2.000      | 1.200     | 2.000      | 1.700     | 2.000      | 2.200     | 2.000      | 2.700     | 2.000      |
| 0.300     | 2.000      | 0.800     | 2.000      | 1.300     | 2.000      | 1.800     | 2.000      | 2.300     | 2.000      | 2.800     | 2.000      |
| 0.400     | 2.000      | 0.900     | 2.000      | 1.400     | 2.000      | 1.900     | 2.000      | 2.400     | 2.000      | 2.900     | 2.000      |
| 0.500     | 2.000      | 1.000     | 2.000      | 1.500     | 2.000      | 2.000     | 2.000      | 2.500     | 2.000      | 3.000     | 2.000      |

#### Node 5 Depth/Area Storage Structure

|                             |         |               |      |                           |        |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0  | Invert Level (m)          | 31.150 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.95 | Time to half empty (mins) |        |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|
| 0.000     | 142.0     | 0.0           | 1.200     | 142.0     | 0.0           | 1.201     | 0.0       | 0.0           |

#### Node 5 Carpark Storage Structure

|                             |         |                           |        |               |       |
|-----------------------------|---------|---------------------------|--------|---------------|-------|
| Base Inf Coefficient (m/hr) | 0.00000 | Invert Level (m)          | 33.639 | Slope (1:X)   | 40.0  |
| Side Inf Coefficient (m/hr) | 0.00000 | Time to half empty (mins) | 0      | Depth (m)     | 0.500 |
| Safety Factor               | 2.0     | Width (m)                 | 5.200  | Inf Depth (m) |       |
| Porosity                    | 0.30    | Length (m)                | 26.000 |               |       |

**Results for 2 year Critical Storm Duration. Lowest mass balance: 98.91%**

| Node Event        | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|-------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 15 minute summer  | 1       | 10          | 36.973    | 0.047     | 3.4          | 0.0646        | 0.0000     | OK         |
| 15 minute summer  | 2       | 11          | 36.788    | 0.030     | 3.3          | 0.0338        | 0.0000     | OK         |
| 15 minute summer  | 3       | 11          | 36.335    | 0.060     | 6.4          | 0.0826        | 0.0000     | OK         |
| 15 minute summer  | 4       | 9           | 36.235    | 0.059     | 34.5         | 0.3104        | 0.0000     | OK         |
| 240 minute summer | 5       | 176         | 31.344    | 0.194     | 12.2         | 26.4289       | 0.0000     | SURCHARGED |
| 240 minute summer | 6       | 176         | 31.343    | 0.233     | 2.1          | 0.2633        | 0.0000     | SURCHARGED |
| 60 minute winter  | 7       | 31          | 31.081    | 0.038     | 2.0          | 0.0000        | 0.0000     | OK         |

| Link Event<br>(Upstream Depth) | US Node | Link  | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|--------------------------------|---------|-------|---------|---------------|----------------|----------|---------------|--------------------|
| 15 minute summer               | 1       | 1.000 | 2       | 3.3           | 0.748          | 0.083    | 0.1283        |                    |
| 15 minute summer               | 2       | 1.001 | 3       | 3.3           | 0.588          | 0.038    | 0.1004        |                    |
| 15 minute summer               | 3       | 1.002 | 4       | 6.4           | 0.797          | 0.147    | 0.1176        |                    |
| 15 minute summer               | 4       | 1.003 | 5       | 34.8          | 3.869          | 0.033    | 0.6500        |                    |
| 240 minute summer              | 5       | 1.004 | 6       | 2.1           | 0.358          | 0.134    | 0.0904        |                    |
| 240 minute summer              | 6       | 1.005 | 7       | 2.0           | 0.567          | 0.138    | 0.0355        | 44.6               |

**Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 98.91%**

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 15 minute summer  | 1          | 10             | 37.010       | 0.084        | 10.8            | 0.1166           | 0.0000        | OK         |
| 15 minute summer  | 2          | 11             | 36.811       | 0.053        | 10.7            | 0.0595           | 0.0000        | OK         |
| 15 minute summer  | 3          | 10             | 36.390       | 0.115        | 20.7            | 0.1578           | 0.0000        | OK         |
| 15 minute summer  | 4          | 10             | 36.274       | 0.098        | 111.9           | 0.5130           | 0.0000        | OK         |
| 360 minute winter | 5          | 352            | 31.835       | 0.685        | 16.0            | 93.3686          | 0.0000        | SURCHARGED |
| 360 minute winter | 6          | 352            | 31.834       | 0.724        | 2.1             | 0.8187           | 0.0000        | SURCHARGED |
| 15 minute summer  | 7          | 9              | 31.081       | 0.038        | 2.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link  | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|-------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 15 minute summer               | 1          | 1.000 | 2          | 10.7             | 1.046             | 0.268    | 0.2943           |                       |
| 15 minute summer               | 2          | 1.001 | 3          | 10.6             | 0.786             | 0.121    | 0.2370           |                       |
| 15 minute summer               | 3          | 1.002 | 4          | 20.6             | 1.126             | 0.474    | 0.2612           |                       |
| 15 minute summer               | 4          | 1.003 | 5          | 111.4            | 4.324             | 0.106    | 2.9963           |                       |
| 360 minute winter              | 5          | 1.004 | 6          | 2.1              | 0.363             | 0.135    | 0.0904           |                       |
| 360 minute winter              | 6          | 1.005 | 7          | 2.0              | 0.567             | 0.138    | 0.0355           | 66.1                  |

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.91%**

| Node Event        | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|-------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 15 minute summer  | 1          | 10             | 37.027       | 0.101        | 15.2            | 0.1403           | 0.0000        | OK         |
| 15 minute summer  | 2          | 10             | 36.821       | 0.063        | 15.0            | 0.0709           | 0.0000        | OK         |
| 15 minute summer  | 3          | 10             | 36.417       | 0.142        | 29.2            | 0.1952           | 0.0000        | OK         |
| 15 minute summer  | 4          | 10             | 36.292       | 0.116        | 157.0           | 0.6081           | 0.0000        | OK         |
| 600 minute winter | 5          | 585            | 32.208       | 1.058        | 15.0            | 144.2331         | 0.0000        | SURCHARGED |
| 600 minute winter | 6          | 585            | 32.207       | 1.097        | 2.1             | 1.2406           | 0.0000        | SURCHARGED |
| 15 minute summer  | 7          | 8              | 31.081       | 0.038        | 2.0             | 0.0000           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link  | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|-------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 15 minute summer               | 1          | 1.000 | 2          | 15.0             | 1.150             | 0.378    | 0.3766           |                       |
| 15 minute summer               | 2          | 1.001 | 3          | 14.9             | 0.851             | 0.170    | 0.3062           |                       |
| 15 minute summer               | 3          | 1.002 | 4          | 28.9             | 1.242             | 0.665    | 0.3326           |                       |
| 15 minute summer               | 4          | 1.003 | 5          | 156.4            | 4.346             | 0.150    | 4.0205           |                       |
| 600 minute winter              | 5          | 1.004 | 6          | 2.1              | 0.350             | 0.134    | 0.0904           |                       |
| 600 minute winter              | 6          | 1.005 | 7          | 2.0              | 0.567             | 0.138    | 0.0355           | 93.0                  |

# **Appendix D**

## **Pumping Station Information**

# Saturn Package Pumping Station

**Planet**  
range

**Below Ground Pump Station**

User Information Manual



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## Introduction

Thank you for selecting the **T-T Planet Range of Package Pumping Stations**. This Operation & Maintenance manual contains important product information, including the correct method of civil installation and precautions regarding its safe use.

When installed and maintained correctly, your pumping station should provide reliable operation over a long period. It is essential that regular maintenance, and if necessary, prompt repairs are carried out to ensure satisfactory and reliable operation. Therefore we urge you to use the T-T PUMPS Service Agreement system, for continued attention to your pumping station by T-T PUMPS Service Engineers.

Our products are manufactured to high standards at economic prices and are complemented by our warranty, which covers all items for 12 months from date of delivery or the date of commissioning, when T-T PUMPS is employed to commission the pumping station. We offer full after sales support for your pumping station for spares, repairs and servicing. For warranty claims please contact our Pumping Stations Department who will always give you a prompt response.

T-T Pumps Limited  
Onneley Works  
Newcastle Road  
Woore  
CW3 9RU

**All inquiries made to T-T PUMPS in connection with this equipment should include these details, please complete upon receipt of your pumping system:-**

**T-T Pumps Contract Number:**

**Original Purchasers Name:**

**Customer order Number:**

**Pump Chamber:**

**Pump Type:**

## About the Saturn Package Pumping Station

Our Saturn package pumping station has been developed to provide a robust and cost-effective solution to larger, more expensive alternatives. It is an effective means for collecting and removing excess water and sewage.

The Saturn has been designed to suit a multitude of applications, including, but not limited to:

- Domestic/small housing developments
- Industrial & commercial developments
- Small hotels
- Nursing homes
- Caravan sites
- Applications where access to mains drainage is not available via gravity means.

The tank is constructed from a strong virgin grade polyethylene, whilst the internal pipework, dependent on size, is generally made up of either ABS pipework and fittings, or ductile iron pipework and fittings. Stainless steel ancillary items are also used to provide long-lasting, corrosion resistance and give a high quality finish.

The fully automatic unit is designed and built for reliability and long life and employs a high performance pump range that can be selected to meet your specific application.

T-T can provide a range of access covers to suit numerous applications.

## Required tools for socket cut out

To install the Ø160mm inlet pipes and Ø110mm cable ducts you will need the following equipment...



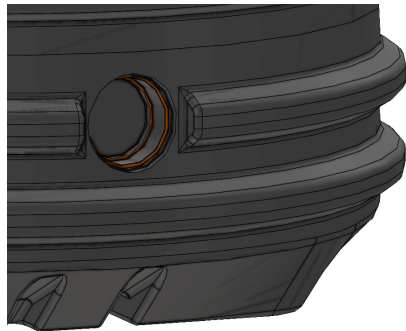
Cordless drill



138/140mm Hole Saw  
DN160 inlet pipe socket  
Turret gasket seal



89mm Hole Saw  
DN100 cable duct socket



When drilling/cutting sockets, take care not to damage the pipe stops (highlighted orange)

## Safety Instructions.



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.



Warns of hazards that **WILL** cause serious personal injury, death, or major property damage.



Warns of hazards that **CAN** cause serious personal injury, death, or major property damage.



Warns of hazards that **CAN** cause personal injury or property damage

Become thoroughly familiar with the instructions in the documents consigned with the pump(s). This will enable you to work in complete safety and to obtain the best performance the pump is able to offer.

The following instructions apply to the standard version of the electric pumps operating in normal conditions. Special versions, shown by the product code, may not fully comply with the instructions herein [when necessary, the manual will be supplemented with additional information].

As it is our policy to continually improve our products, the data in the documentation and the product itself may be subject to modification without the manufacturer being obliged to give advance warning.



All electrical work must be performed by a qualified electrician to regulatory guidelines. Any queries should be directed to your local electrical inspector. Failure to follow regulatory guidelines and safety standards may result in personal injury or equipment damage. Failure to follow manufacturers installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, provide unsatisfactory performance and may void manufacturer's warranty.

Disconnect and isolate electrical power before installing or servicing any electrical equipment. Many pumps are equipped with automatic thermal overload protection which may allow an overheated pump to restart unexpectedly.

Do not lift, carry, or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death.



## Safety Instructions [cont.]

### **WARNING**

Install the supply and connect the pump as per the regulatory guidelines.

The electrical supply voltage and phase must match all equipment requirements. Incorrect voltage or phase can cause fire, motor, and control damage, and voids the warranty.

Failure to permanently ground the pump, motor, and controls before connecting to power can cause shock, burns or death.

### **CAUTION**

Where possible manual lifting should be avoided and mechanical lifting devices such as sack trucks or trolleys should be used whenever possible.

Please take note of the following important safety precautions:

- Discharge connections **MUST** be correctly made to relevant fittings prior to use.
- All installation works must be carried out by competent trained person[s].
- Installers / maintainers should be aware of the latest manual handling advisories prior to use.
- Mechanical loading and unloading should always be used.
- Site / environment relevant personal protective equipment [PPE] should be worn and used while installing and maintaining the product.
- Access to the supplied equipment should be restricted to trained persons as much as reasonably practical to the site conditions and risks.

**Any and all manual handling must follow the ‘Manual Handling Operations Regulations 1992’ and be carried out by trained, competent persons.**

## Transportation & Storage

The Saturn Package Pumping Station will be delivered fully assembled, and ready to install. It should only be loaded/unloaded via suitable mechanical means.

Please check inside the tank for loose items, such as any ancillary items ordered.

Check that the delivery is complete and undamaged. Any damage detected should be confirmed on the original consignment note and reported to us immediately.

The chamber is moulded from polyethylene which gives the tank high strength and excellent durability. However it is of vital importance that great care is taken to prevent accidental damage to the chamber walls, arising from accidental blows from tools or concentrated pressure on the chamber walls.

### CAUTION

Similarly, sharp corners or edges of bricks and stones should be avoided all times. Impact from a sharp object during the handling and/or installation of the product could fracture the tank wall. The chamber must only be lifted using certified lifting slings, and under no circumstances should the internal pipe connections or fittings be used as lifting points. If the optional extension neck is included, it is important that this is not used as a lifting point.

Structural damage to the tank resulting from the above will render the warranty void. When unloading, pay attention to weight and centre of gravity of the pump station.

Store the product in a dry place, sheltered from the weather. All connections should be checked for tightness before and after transportation.

The submersible pump[s] must be handled with care. The free ends of the cables must never be immersed or wetted in any way.

All lifting equipment is to be correctly calibrated prior to use, this equipment is to be operated by trained individuals only, all lifting and manual handling should be done in accordance with the 'Manual Handling Operations Regulations 1992'.

**Failure to do so may invalidate any claim.**

## Site Design

Initial planning can save a lot of time and effort in the later stages, and we suggest that you carefully consider the following points:-

1. Location of pumping station, usually at the lowest ground level on site. Will it be accessible for future service work?
2. Will the incoming pipework have sufficient gradient?
3. At what level will the lowest inlet invert level be in relation to the base level of the chamber and will this allow a sufficient storage volume?

For standard installations we recommend a minimum of 800mm below the lowest incoming inlet invert level to the base of the pump chamber to allow the pumping station to operate efficiently. For non standard installations this may have to be reduced owing to site restrictions. If in doubt please contact our Internal Sales Department.

4. Will the inlet and rising main pipe work be sufficiently buried underground, in-line with the pipe work manufacturer's recommendations?
5. Will the power supply be adequate and will the size of supply cable be sufficiently sized to allow for any voltage drop?
6. All necessary health and safety measures must be observed during the installation process of the pumping station chamber and cover slab.

## Product Receipt Check

Prior to your receipt of the pumping station, all of the equipment has been subject to a full in-house, pre delivery inspection. This is to ensure that all of the components and parts are packed correctly and reach site safely. On receipt of delivery, please ensure that the Polythene chamber is intact and has not been damaged in anyway. Please also check that the items you have received are in accordance with your order, as any claims for missing or lost items must be made within 24 hours of receipt.

A major items check-list makes up part of the delivery note for the goods; this lists the key items so that they may be thoroughly checked on delivery. Please note that any items included within the delivery notes that are not signed for will be deemed delivered and correct.

## Prior to Installation

Please follow these simple checks prior to lifting and installing the chamber:

- Complete a visual check of the unit for any visible signs of damage.
- Check that all fittings and attachments are secured and fastened.
- Ensure all excavations for the tank are safe for working around.
- Ensure base slab has been cast at the correct depth, is level and dry

We recommend that you engage the services of:-

- A competent civil engineer/ building contractor for the installation of your chamber in the ground and pipework connections.
- A competent electrical contractor is required for all electrical items and services including the provision of the power supply and the installation and connection of the pump and control cabling.



## Driveways & Roads

If the pumping station is located in a driveway, it is essential that the concrete cover slab and the access cover are sufficiently rated to accept the required loading. A pedestrian-loading cover is supplied as standard with this pumping station. This may be upgraded to suit the relevant loading requirements and a selection of covers to suit the drive way finish, i.e. block paving are available on request.

It is important that a structural engineer is employed at an early stage prior to excavation, to ensure that sufficient strength is obtained from the cover slab and access cover. A ground condition survey is also strongly recommended to ensure the correct selection of backfill concrete.

The chamber itself will not be taking any load as it acts purely as a former; the concrete around the chamber takes the loading which is directed from the access cover and cover slab so correct structural preparation is essential.

## Concrete Specification

Please refer to BS EN 206, BS 8500-1 & BS 8500-2, the two documents must be read in conjunction.

As mentioned previously within this manual, we strongly suggest that you employ the services of a ground condition surveyor to establish the quality of the ground that the system is to be installed into, and also to provide you with a recommendation as to the type of concrete pre-mix you should use. Below is a list of information that you may find beneficial:

RC25 pre-mixed concrete is the minimum specification of concrete with a slump class of S2 for type DC1 ground conditions. For ground conditions other than DC1, it is the responsibility of the site designer or appointed ground surveyor to recommend otherwise.

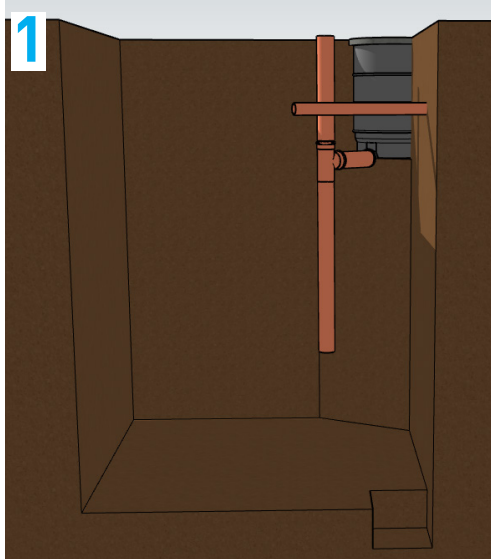
The concrete must be compacted thoroughly throughout the backfilling process to eliminate the chance of voids. **Please avoid prolonged contact between the chamber wall and the concrete pokers used to avoid poker burns and damage to the chamber.**

The site designer must also take into consideration the strength and condition of the ground for this type of installation, i.e. peaty ground etc. The base of the excavation may require strengthening, also bearing in the mind the loading requirement from the cover level.

It is of vital importance that the excavation is kept dry throughout the installation process. For high ground water conditions, the use of drainage pumps will be required to keep the excavation dry. This is imperative, as the strength of the concrete backfill can be affected, resulting in irreparable damage to the chamber.

T-T PUMPS Ltd will not accept any liability for a damaged chamber which is the direct result of a poor concrete selection or installation. No claims will be considered unless a concrete certificate is provided by a certified pre-mix supplier.

## Saturn Tank Civil Installation Guide - Pedestrian area



Prepare the excavation for installation of the package pump station. Level the base of the sump as much as possible.

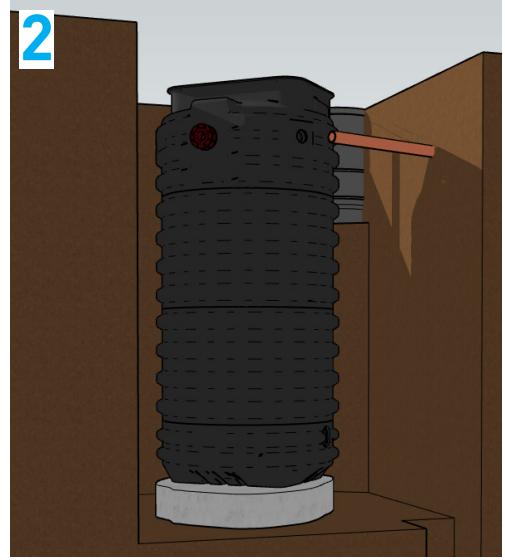
We recommend the inclusion of a small sump in the base of the excavation. A pump may be required should excessive ground water be an issue.

Before lowering in the chamber, plan the installation of the station by selecting from 3(no.) inlet positions in relation to the direction of the discharge rising main.

Create a concrete cradle in the base of the chamber minimum 250mm high in the centre of the excavation in readiness to puddle the pumping station chamber into position.

Take note of pipe and duct positions as holes will need to be cut in the shuttering to accommodate the connections.

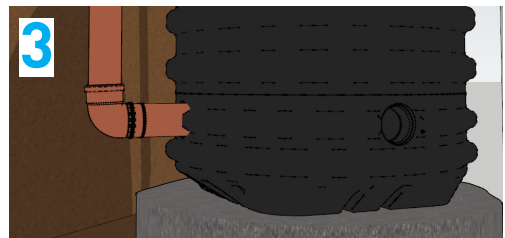
Ensure all health & safety obligations are



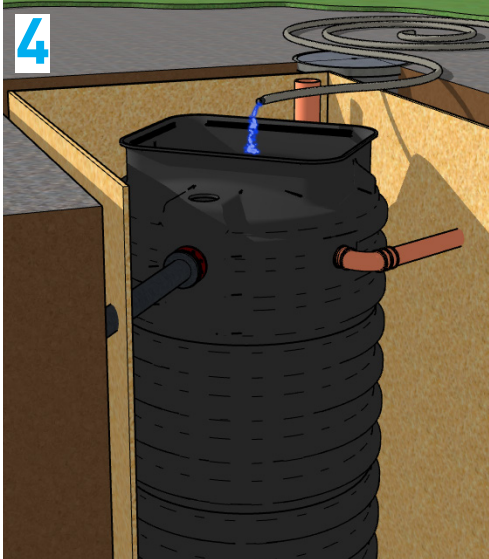
Puddle the tank into position on the concrete cradle, ensuring that no air pockets remain (important).

The tank comes with a ductile iron flange termination point to connect the rising main to. Connect Ø110mm cable duct, and where required, a Ø110mm air vent duct to the top sockets of the tank.

Connect the inlet pipe to the Ø160mm sockets at the lower end of the tank, using a (min of) 300mm length of pipe, so the remaining pipework can be connected outside the concrete surround.

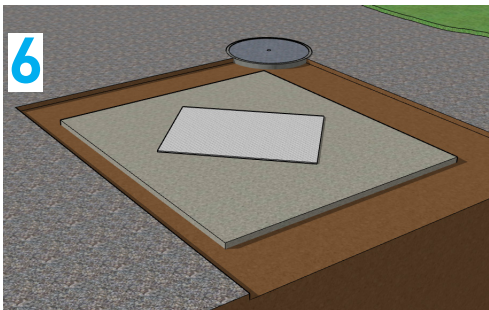


## Civil Installation Guide [cont.]



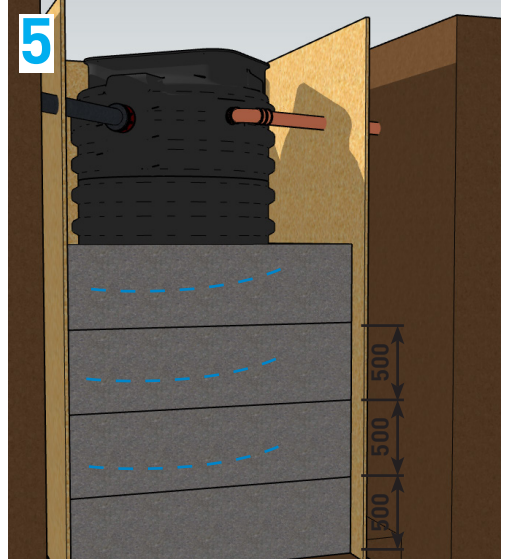
With all connections to the tank made, prepare shuttering around the tank for the concrete backfill.

Fill the first 1 metre with clean water ready for the first concrete pour.



Once concrete surround has dried, fit the access cover in the cover slab, then back fill and make good the ground in preparation for final finish.

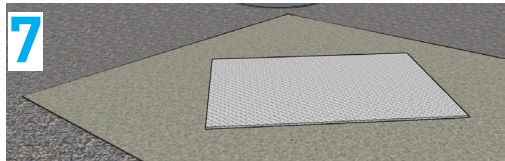
**See page 12 & 13 for installation drawing.**  
**Optional turret install detail page 14-16**



(Front view of shuttering omitted for clarity, dims shown as guidance, not to scale) The rising main **must** be connected to the discharge pipe.

The concrete pour needs to be done in 500mm increments (max) ensuring adjacent surfaces are prepared to avoid cold joints occurring, and in accordance with best practice.

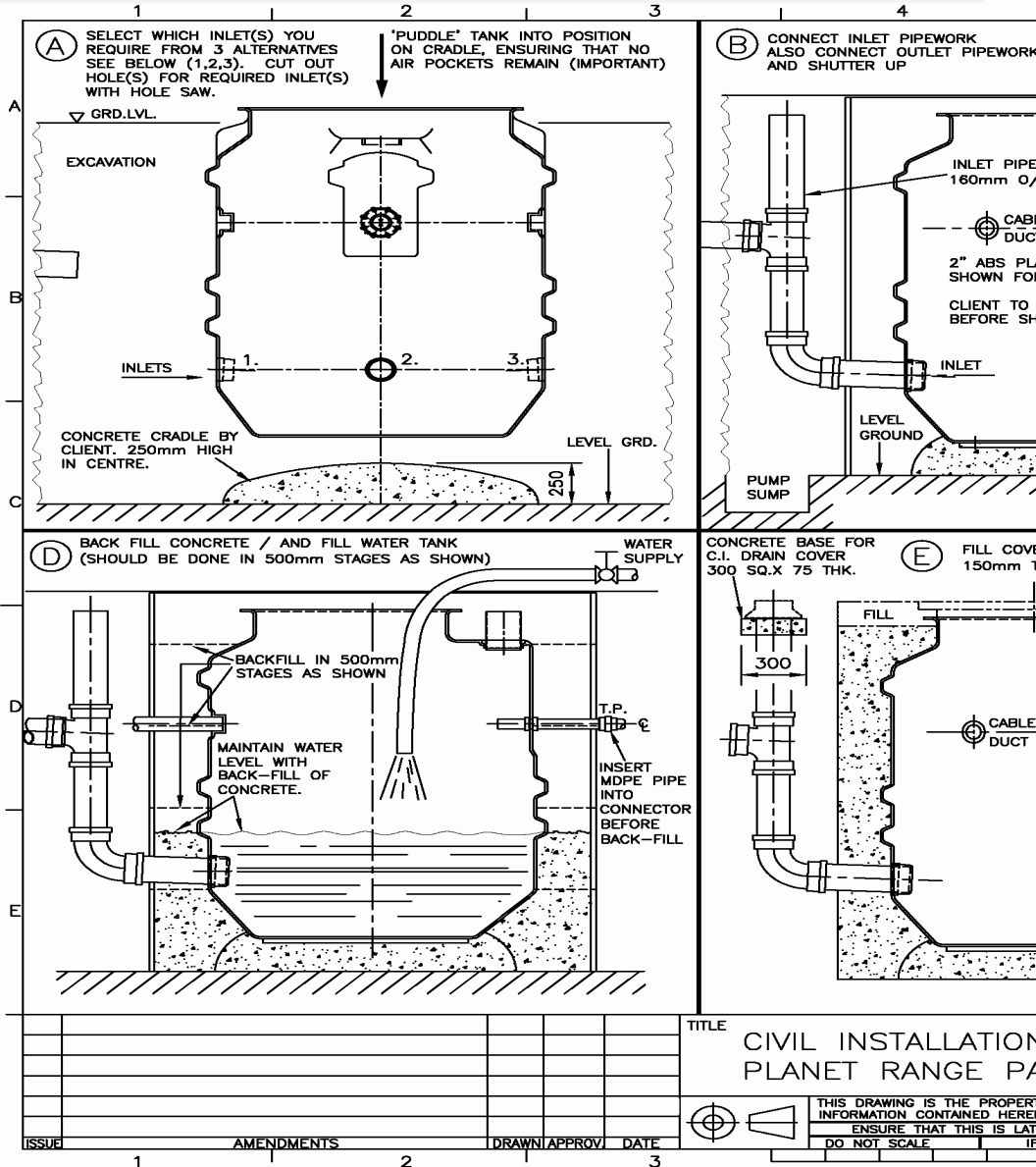
During each concrete pour, maintain the water level above the back fill level of the concrete pour, by a minimum of 500mm.

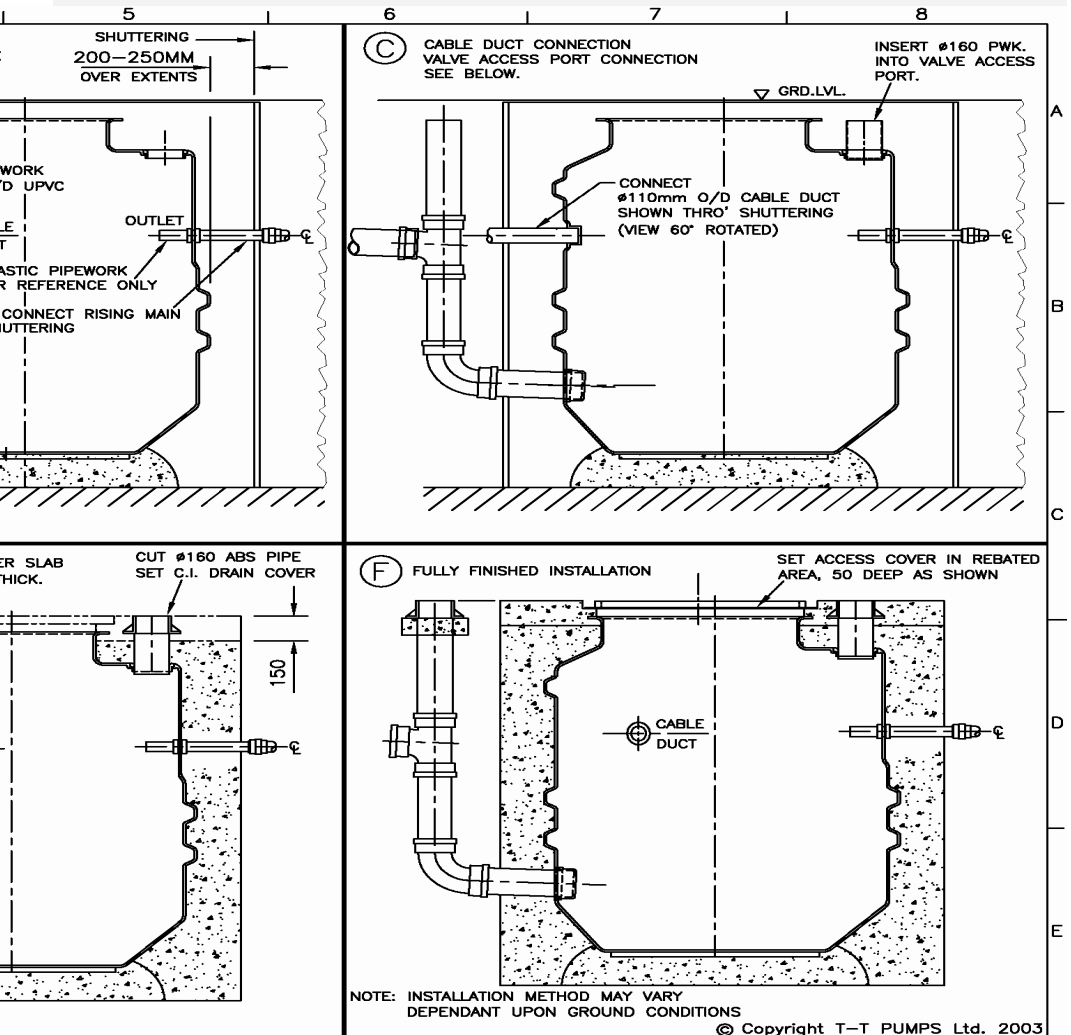


Back fill remaining area with concrete. Use suitable grouting material to make good the recess around the access cover frame. Then secure cover to frame with supplied locking screws.

**For Drive & Road installation see on page 9**

# Civil Installation Drawing





# DIAGRAM PACKAGE PUMP STATIONS

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| APPROVED BY    | R.D.     |
| DATE           | 12:04:00 |
| ORIGINAL SCALE | 1:25/A3  |

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Woore, Cheshire, CW3 9RU

● ttpumps.com

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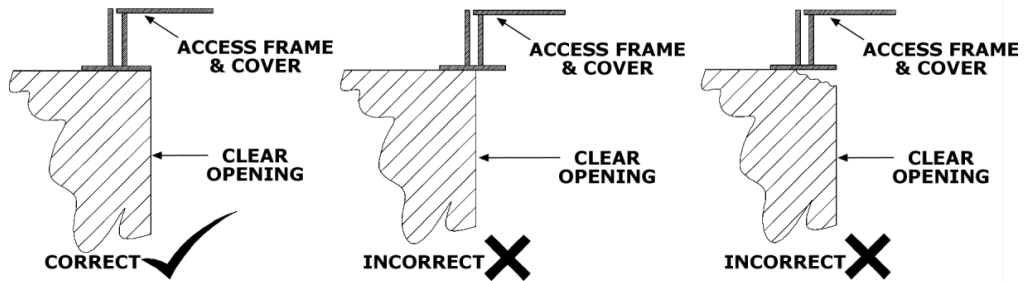
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## Fabricated Steel Access frames & covers

1. Covers and frames are manufactured as a unit – ensure that corresponding covers and frames match and fit correctly before commencing installation.
2. The frame of an access cover must be fully supported. Any load placed onto the access cover is transferred to the structural opening via the frame. If the frame is only partially supported, the unit will not carry the load it is designed for and will ultimately fail. Please see diagrams below.
3. Recessed covers (excluding paving infill) must be fully in filled with grade C25 concrete, by volume, 1 cement, 2 sand, 3 coarse aggregate (9.5 to 3mm), to achieve their stated loading capacity.



### Single Unit Covers

1. Place empty frame (cover and frame with hinged units) around the chamber, centralizing it to the structural opening. Pack up the frame to the required level with suitable hard packing material, such as tile. Care must be taken to ensure the frame does not overhang the opening. If the frame is provided with fixing pads, these must be used to bolt the frame to the sub-floor.
2. Replace the lid momentarily and ensure that no rocking occurs. Re-pack if necessary.
3. Fill the unsupported areas of the frame with suitable grouting material. The underside of the frame must be fully supported. Allow grout to fully harden.
4. Replace cover, taking care not to disturb the frame. If locking, lock down the cover but do not tighten down.
5. Recessed Concrete Infill Covers. 1 to 4 as above, then proceed as follows:  
The cover can now be in filled. Care must be taken not to get debris in the lifting/locking points – ‘Denso-tape’ or similar provides ideal protection. Allow the concrete to harden before continuing installation.  
For block paving / slab infill products, it is acceptable to infill the lid and around the frame at the same time. To eliminate sand seepage we would recommend that Typar SF32 is fitted within the lid recess with a 20/30mm lip to the lid sides.
6. The frame can now be back-filled. On hinged covers care must be taken not to get concrete into the hinge mechanism points – ‘Denso-tape’ or similar provides ideal protection.
7. When the backfilling has hardened sufficiently, any cover locking bolts / devices can be tightened.

## Access frames & covers cont...

### Twin and multiple unit covers

The majority of twin and multiple unit covers are fitted with removable support beams and support pockets. Multiple leaf units will also often have intermediate beams running between the main support beams and main support beams to chamber wall face. If supplied pay particular attention to a numbered layout.

1. Fit support pockets and support beams at the correct position. It is imperative that the support pockets that cradle these beams are fitted / bolted at the correct level to provide support to the cover joins across the chamber opening. In some instances fixing straps may be fitted to the frame; these are to eliminate distortion in galvanising and damage during transportation. These fixing straps should be removed.
2. Place the empty frame (cover and frame with hinged units) around the chamber, centralizing it to the structural opening. Pack up the frame to the required level with suitable hard packing material, such as tile. Please ensure the frame does not overhang the opening.
3. If the frame is provided with fixing pads, these must be used to bolt the frame to the sub-floor.

On large multiple units, frame bolting points may be provided, therefore the frames must be bolted together. Ensure that the frames are true, level and square and will allow the lids to be fitted. Continue as points 2 to 6 on previous 'single unit' page.



## Control System, Floats & Electrical Connections

The pumping station is controlled via a control panel that will be supplied as standard with the system. The basic features of this system are to control the pumps and to alert the user(s) of the system in the event of a failure which will give an audible and visual alarm locally, or remotely via a telemetry system, dependent upon the system specification.

Float switches are the standard method of level control used in conjunction with the control panel (ultrasonic level control can also be used, again dependent upon the site specifications).

### Float switch set up and adjustment

For single pump stations two float switches are supplied. The duty float switch will be marked with one band of white tape and the high level will be marked with two bands. For dual systems a similar labelling method is used but in this case with the addition of a standby float which is marked with two white bands; the high level float is then marked with three bands.

The float switch assembly inclusive of lifting chain and counter weight will be pre-set at our works to provide an estimated start, stop and high level setting to suit the site and the depth of the chamber involved. If required, the settings may be changed by altering the float cable securing positions on the lifting chain. If you are not sure, please contact our Internal Sales Department for further instruction.

It is our recommendation that the high level float switch is positioned just below the lowest inlet invert position of the incoming pipe on site. This will alert you of any problem with the system prior to any surcharging of the incoming pipe work.

It is also important that on dual stations, when the standby float switch is in a raised (start) position, it is above the duty float switch raised position. The standby float switch when it is in a lowered (stop) position, must also be lower than the lowered position of the duty float.

On some system designs, the type of float switch used may be different so please always refer to the control panel drawing supplied with the system.

### Electrical Connections

Please employ the services of a competent electrical engineer / contractor.

Our T-T Engineers may attend site to complete this task for you if required. Please contact our Sales Department to discuss this if you have not already received our quotation.

Before attempting to make any electrical connections, please ensure that the pump(s) is lowered into the chamber and the cable from the pump(s) is not trapped and is free. The pump and the float switch cables need to be pulled through the cable ducting on site and you must refer to the electrical wiring diagram supplied with the control system for the electrical installation.

## Part P Compliance

For domestic installations, we always request that the power to our control panel equipment is provided by others and connected to our control panel so that it is live but isolated. We only make the final connections of the pump and float switch to the control panel ourselves.

It is therefore the responsibility of the person making the alterations to the electrical circuit in order to provide power to our equipment, to certify that the installation complies with Part P (by being a competent person registered with an electrical self-certification scheme authorised by the Department for Communities and Local Government).

Alternatively, notification of proposals to carry out the electrical installation must be given to a Building Control body before work begins.

## Pump Station Commissioning

Having satisfied yourself that all the connections are correct, a brief test run of the system is required as follows:

Raise the pump(s) to the surface and rest on the ground so that the impeller can be seen at the base of the pump unit(s).

To test the pump on a single pump station, lift the duty float into its start position and you should see the impeller turn and the pump operate. Carry out this procedure for a few seconds only and then return the float switch back to its stop position to turn the pump off.

For dual pumping stations this procedure should be carried out twice. The first time you should see one pump running, and the second time, the other pump should operate, proving that the stepping relay within the panel is operating correctly.

The standby float on a duty standby system is purely a backup in case the initial duty float fails. To test the standby float switch on a duty-assist pumping station, carry out the procedure as above but keep the duty float in its start position and then lift the standby float into the same position. You will see that the second pump unit will also operate at the same time. Once this has been completed, return both float switches to the stop position and the pumps will turn off.

To test the high level alarm float switch, simply lift this float into its start position and it will operate the alarm features of the control panel.



## Operation, Maintenance & Safety Procedures

Package pumping stations can be very hazardous, and appropriate working practices must be always followed. The instructions and information given in this manual are as explicit as reasonably practicable and both competence and expertise are necessary in the maintenance of the system.

To ensure reliable and trouble-free operation of the system, we strongly recommend that the servicing of the system is only undertaken by experienced and authorized personnel. The operation and maintenance of this system must be carried out in compliance with all current health, safety and welfare legislation.

Sewage pumping stations, where applicable, are safe in operation, however because of the media being pumped, gases such as methane and hydrogen sulphide can build up. It is therefore important that sensible precautions are taken.

Package Stations have been designed to be maintained from the outside of the chamber as the pump[s] and float switches are all fully removable from the chamber.

### CAUTION

The following check list should help...

- Never work or maintain a sewage pumping station on your own.
- Isolate the electrical supply before working on a pumping station.
- Never enter the pump chamber under any circumstances unless fully qualified to do so, i.e., confined space trained, using appropriate safety equipment.
- Keep naked flames away from pumping stations.
- Never leave the pump chamber open or unattended.
- Always secure the access cover lid when leaving the pumping station.
- Never use a wander light in or around the pump chamber unless the light is intrinsically safe.
- The Plant/Equipment must not be used for work for which it is not design intended.

## Impeller Rotation

On a three-phase submersible pump, it is important to test the rotation of the impellers to ensure that the pump is wired correctly to the control panel. Carry out the duty float switch test as above and then look at the pump through the pump base so that you can see the impeller. If wired correctly, the impeller should be spinning anti-clockwise. If the impeller runs clockwise, this means that two of the phases have been wired incorrectly and need to be corrected.

Please note that care and attention must be taken at all times when carrying out the about as electrical circuits will be live and the pumps contain rotational and sometimes very sharp parts to their design.

**Never use the pump cables to lift the pump, as the cable gland may be damaged allowing water into the pumps motor, damaging the motor beyond repair. Always use the lifting chains and lifting equipment provided.**

## Removal / Installation of pumping equipment

For safe removal of pumping equipment we recommend the use of a lifting davit: Lifting davits and sockets are optional extras and are designed for lifting equipment safely from pump stations. If using a davit the following procedure should be adhered to.

- Isolate electrically and hydraulically before commencing the removal of any pump.
- Install the lifting davit in the davit socket, then locate the lifting chain in one of the holes at the top of the davit using 'D' shackle provided.
- Remove the access cover over the pump that is to be removed (do not remove more covers than necessary).
- Lower the chain block hook and secure in the lowest accessible large ring of the pump lifting chain.
- Begin to lift the pump and this will break the seal between the pump delivery port and the auto coupling pedestal, and enable the pump to slide up the guide rails.
- The pump is lifted until the staging chain safety hook can be secured into the large ring on the pump lifting chain. When this has been achieved, the chain block hook can then be removed and lowered to the lowest accessible ring on the pump lifting chain and the above process repeated until the pump reaches a point above ground level. The access cover should then be closed, to aid safe working around the pump.
- The pump can then be swung round to a desired position away from the access opening.

To re-install the pump in the wet well, reverse the above procedures.

Any defects in, or damage to, plant or equipment must be reported immediately.



## Hygiene

### WARNING

When working on a live pumping station take sensible precautions about hygiene. Always wear protective overalls, gloves and footwear. When work is completed remove soiled clothing for laundering or disposal and always wash thoroughly.

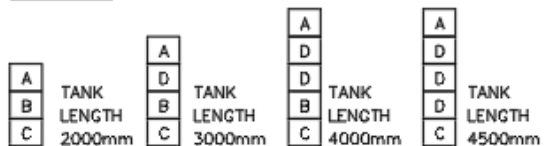
Much of the equipment installed on this plant is designed to operate automatically and may start without warning. Before working on any item of the plant or equipment, ensure it is correctly, electrically and mechanically isolated.

## Regular Maintenance - Sewage Applications

It is important that the pumping station is checked frequently, to ensure that it is in full working order and that there is not an excessive build-up of fats and materials.

If there is a build-up of fatty materials, pour a reasonable quantity of household detergent onto the affected area, leave for a little while and then hose down, repeat if necessary. This will ensure that the float switches and pumps operate freely without a build-up of fatty matter. In areas where large amounts of grease are expected, the fitting of a grease trap prior to the pumping station is recommended.

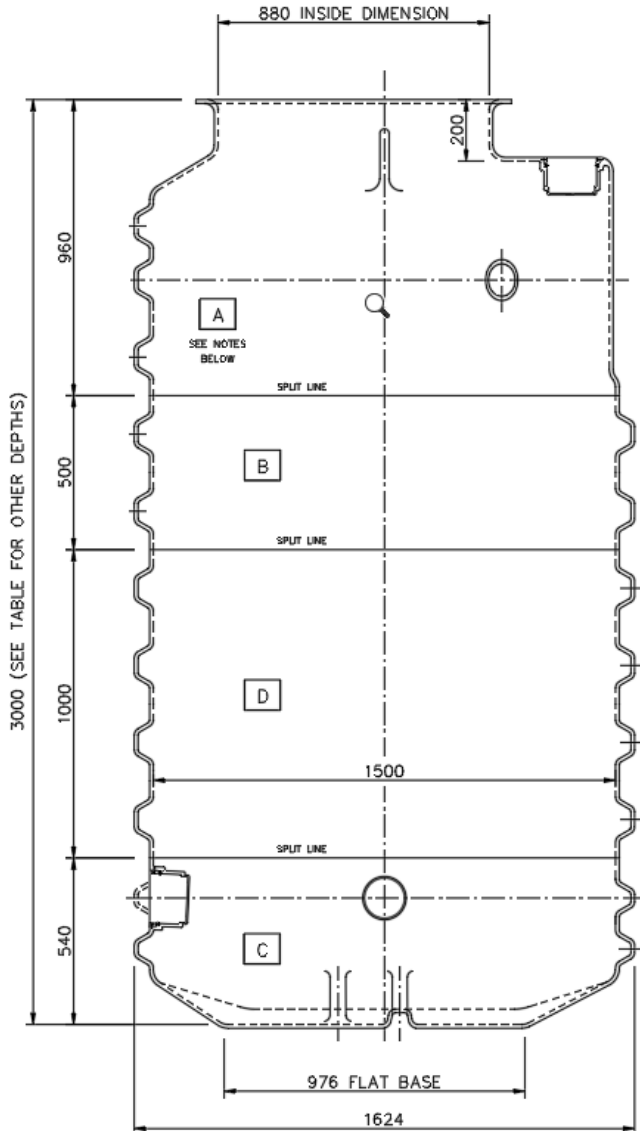
### ARRANGEMENT OF TANK SECTIONS:—



WHERE 'B' = 500mm  
'D' = 1000mm

## Saturn Tank Dimensions

See tank arrangements  
on page 20.



## Fault Finding

| SYMPTOM                                         | POSSIBLE CAUSE                                                                                                          | CORRECTIVE ACTION                                                                                                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Pump does not start                             | Check and rectify power supply, including check for excessive cable length or incorrect cable size causing voltage drop | Check and rectify power supply, including check for excessive cable length or incorrect cable size causing voltage drop                 |
|                                                 | Power not switched on at all points, or connections not secure                                                          | Check all switches and cable connections                                                                                                |
|                                                 | Fuse failed or circuit breaker operated                                                                                 | Check fuses / circuit breaker                                                                                                           |
|                                                 | Control panel overload tripped                                                                                          | Check setting / condition of overload unit - reset/ replace. If satisfactory, investigate cause; do not reset continuously.             |
|                                                 | Control panel fault                                                                                                     | Investigate and rectify                                                                                                                 |
|                                                 | Motor fault                                                                                                             | Investigate and rectify                                                                                                                 |
|                                                 | Cable damaged                                                                                                           | Replace                                                                                                                                 |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |
| Pump does not stop                              | Level switches obstructed or at incorrect level                                                                         | Check manual switching satisfactory [except on pumps with integral level switches]. Ensure level switches are correctly set to operate. |
|                                                 | Level switches obstructed                                                                                               | Ensure switches are free to operate                                                                                                     |
| Pump does not stop                              | Control panel fault                                                                                                     | Investigate and rectify                                                                                                                 |
| Pump starts and stops repeatedly                | Level switches obstructed or at incorrect level                                                                         | Clear or reset                                                                                                                          |
|                                                 | Power supply fault                                                                                                      | Investigate and rectify, including check for voltage drop on starting                                                                   |
|                                                 | Pump impeller obstructed                                                                                                | Clear or reset                                                                                                                          |
|                                                 | Non-return valve[s] obstructed or faulty, allowing back flow when pump stops.                                           | Clear or repair/replace                                                                                                                 |
| Pump starts but overload protection trips       | Overload setting incorrect                                                                                              | Check setting / condition - reset / replace. If satisfactory, investigate cause - do not reset continually                              |
|                                                 | Power supply fault                                                                                                      | Investigate and rectify, including check for availability of 3 phases [for 3-phase motor]                                               |
|                                                 | Connections faulty                                                                                                      | Investigate and rectify                                                                                                                 |
| Pump runs but gives no output or reduced output | Discharge obstructed                                                                                                    | Clear pipework                                                                                                                          |
|                                                 | Valve(s) partly or fully closed or obstructed                                                                           | Open or clear valves                                                                                                                    |
|                                                 | Discharge leak in pumping chamber                                                                                       | Secure discharge connections                                                                                                            |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |
|                                                 | Pump impeller worn                                                                                                      | Replace                                                                                                                                 |
|                                                 | Pump air locked                                                                                                         | Release air                                                                                                                             |
|                                                 | Pump wrong rotation                                                                                                     | Rectify electrical connections (3 phase motor only)                                                                                     |
|                                                 | Incorrect pump selection                                                                                                | Re-assess system                                                                                                                        |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |

## Fault Finding [cont.]

| SYMPTOM                          | POSSIBLE CAUSE                                       | CORRECTIVE ACTION                    |
|----------------------------------|------------------------------------------------------|--------------------------------------|
| Pump runs, but noisy or vibrates | Pump / impeller air locked                           | Release air                          |
|                                  | Pump impeller worn or damaged, or pump shaft damaged | Investigate and replace as necessary |

## Disposal



The chamber is manufactured from virgin High-density Polyethylene, and the symbol displayed above and on the tank indicates it can be recycled. HDPE is accepted at most recycling centres in the world, as it is one of the easiest plastic polymers to recycle. Most recycling companies will collect HDPE products and take these to large facilities to be processed.

Please check with your local authority for recycling capabilities.

Please refer to the specific pump manual for disposal instructions.

## After Sales Support

Your product should have a long and reliable life if it is cared for and maintained correctly. We would strongly recommend that the pumping system is serviced thoroughly at least every six months. This should be undertaken by component electrical/mechanical engineers.

T-T Pumps offers a full after sales service, including our Service Agreement scheme. This can give you peace of mind, allowing you to achieve maximum reliability and efficiency from your product.

For full details of our Service Agreement scheme, please contact our Service Department who will be pleased to provide you with a quotation **+44 (0)1630 647200**.

## Notes

## Notes





# Mercury & Venus Package Pumping Station

**Planet**  
range

**Below Ground Pump Station**

User Information Manual



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## Introduction

Thank you for selecting the **T-T Planet Range of Package Pumping Stations**. This Operation & Maintenance manual contains important product information, including the correct method of civil installation and precautions regarding its safe use.

When installed and maintained correctly, your pumping station should provide reliable operation over a long period. It is essential that regular maintenance, and if necessary, prompt repairs are carried out to ensure satisfactory and reliable operation. Therefore we urge you to use the T-T PUMPS Service Agreement system, for continued attention to your pumping station by T-T PUMPS Service Engineers.

Our products are manufactured to high standards at economic prices and are complemented by our warranty, which covers all items for 12 months from date of delivery or the date of commissioning, when T-T PUMPS is employed to commission the pumping station. We offer full after sales support for your pumping station for spares, repairs and servicing. For warranty claims please contact our Pumping Stations Department who will always give you a prompt response.

T-T Pumps Limited  
Onneley Works  
Newcastle Road  
Woore  
CW3 9RU

## About the T-T Package Pumping Station range

Our package pumping station range has been developed to provide a robust and cost-effective solution to larger, more expensive alternatives. They are an effective means for collecting and removing excess water and sewage.

The Mercury and Venus tanks have been designed to suit a multitude of applications, including, but not limited to:

- Domestic Sewage situations
- Domestic Surface water situations
- Basement / Cavity Wall / Damp Drainage applications
- Small Domestic foul water applications, extensions, annexes etc
- Applications where access to mains drainage is not available via gravity means.

The tanks are constructed from polyethylene, whilst the internal pipework, dependent on size, is generally made up of either ABS pipework and fittings, or ductile iron pipework and fittings. Stainless steel ancillary items are also used to provide long-lasting, corrosion resistance and give a high quality finish.

The fully automatic unit is designed and built for reliability and long life and employs a high performance pump range that can be selected to meet your specific application.

**The access covers provided are suitable for pedestrian loading only.**

## Required tools for socket cut out

To install the Ø160mm inlet pipes and Ø110mm cable ducts you will need the following equipment...



Cordless drill



138/140mm Hole Saw  
DN160 inlet pipe socket  
Turret gasket seal



89mm Hole Saw  
DN100 cable duct socket



*When drilling/cutting sockets, take care not to damage the pipe stops, only the area highlighted blue.*

## Safety Instructions.



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.



Warns of hazards that **WILL** cause serious personal injury, death, or major property damage.



Warns of hazards that **CAN** cause serious personal injury, death, or major property damage.



Warns of hazards that **CAN** cause personal injury or property damage

Become thoroughly familiar with the instructions in the documents consigned with the pump(s). This will enable you to work in complete safety and to obtain the best performance the pump is able to offer.

The following instructions apply to the standard version of the electric pumps operating in normal conditions. Special versions, shown by the product code, may not fully comply with the instructions herein [when necessary, the manual will be supplemented with additional information].

As it is our policy to continually improve our products, the data in the documentation and the product itself may be subject to modification without the manufacturer being obliged to give advance warning.



All electrical work must be performed by a qualified electrician to regulatory guidelines. Any queries should be directed to your local electrical inspector. Failure to follow regulatory guidelines and safety standards may result in personal injury or equipment damage.

Failure to follow manufacturers installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, provide unsatisfactory performance and may void manufacturer's warranty.

Disconnect and isolate electrical power before installing or servicing any electrical equipment. Many pumps are equipped with automatic thermal overload protection which may allow an overheated pump to restart unexpectedly.

Do not lift, carry, or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death.



## Safety Instructions [cont.]

### **WARNING**

Install the supply and connect the pump as per the regulatory guidelines.

The electrical supply voltage and phase must match all equipment requirements. Incorrect voltage or phase can cause fire, motor, and control damage, and voids the warranty.

Failure to permanently ground the pump, motor, and controls before connecting to power can cause shock, burns or death.

### **CAUTION**

Where possible manual lifting should be avoided and mechanical lifting devices such as sack trucks or trolleys should be used whenever possible.

Please take note of the following important safety precautions:

- Lifting **must** be done by the tank neck only.
- Discharge connections **MUST** be correctly made to relevant fittings prior to use.
- All installation works must be carried out by competent trained person[s].
- Installers / maintainers should be aware of the latest manual handling advisories prior to use.
- Mechanical loading should be used.
- Site / environment relevant personal protective equipment [PPE] should be worn and used while installing and maintaining the product.
- Access to the supplied equipment should be restricted to trained persons as much as reasonably practical to the site conditions and risks.

**Any and all manual handling must follow the 'Manual Handling Operations Regulations 1992' and be carried out by trained, competent persons.**

## Transportation & Storage

All our package pumping stations are delivered fully assembled, and ready to install. It should only be loaded/unloaded via suitable mechanical means.

Please check inside the tank for loose items, such as any ancillary items ordered.

Check that the delivery is complete and undamaged. Any damage detected should be confirmed on the original consignment note and reported to us immediately.

The chamber is moulded from polyethylene which gives the tank high strength and excellent durability. However it is of vital importance that great care is taken to prevent accidental damage to the chamber walls, arising from accidental blows from tools or concentrated pressure on the chamber walls.

Similarly, sharp corners or edges of bricks and stones should be avoided all times. Impact from a sharp object during the handling and/or installation of the product could fracture the tank wall. The chamber must only be lifted using certified lifting slings, and under no circumstances should the internal pipe connections or fittings be used as lifting points. If the optional extension neck is included, it is important that this is not used as a lifting point.

### CAUTION

Structural damage to the tank resulting from the above will render the warranty void. When unloading, pay attention to weight and centre of gravity of the pump station.

Lifting must be done by the tank neck only.

Store the product in a dry place, sheltered from the weather.  
All connections should be checked for tightness before and after transportation.

The submersible pump[s] must be handled with care. The free ends of the cables must never be immersed or wetted in any way.

All lifting equipment is to be correctly calibrated prior to use, this equipment is to be operated by trained individuals only, all lifting and manual handling should be done in accordance with the 'Manual Handling Operations Regulations 1992'.

**Failure to do so may invalidate any claim.**

## Site Design

Initial planning can save a lot of time and effort in the later stages, and we suggest that you carefully consider the following points:-

1. Location of pumping station, usually at the lowest ground level on site. Will it be accessible for future service work?
2. Will the incoming pipework have sufficient gradient?
3. At what level will the lowest inlet invert level be in relation to the base level of the chamber and will this allow a sufficient storage volume?

For standard installations we recommend a minimum of 1000mm below the lowest incoming inlet invert level to the base of the pump chamber to allow the pumping station to operate efficiently. For non standard installations this may have to be reduced owing to site restrictions. If in doubt please contact our Internal Sales Department.

4. Will the inlet and rising main pipe work be sufficiently buried underground, in-line with the pipe work manufacturer's recommendations?
5. Will the power supply be adequate and will the size of supply cable be sufficiently sized to allow for any voltage drop?
6. All necessary health and safety measures must be observed during the installation process of the pumping station chamber and cover slab.

## Product Receipt Check

Prior to your receipt of the pumping station, all of the equipment has been subject to a full in-house, pre delivery inspection. This is to ensure that all of the components and parts are packed correctly and reach site safely. On receipt of delivery, please ensure that the Polythene chamber is intact and has not been damaged in anyway. Please also check that the items you have received are in accordance with your order, as any claims for missing or lost items must be made within 24 hours of receipt.

A major items check-list makes up part of the delivery note for the goods; this lists the key items so that they may be thoroughly checked on delivery. Please note that any items included within the delivery notes that are not signed for will be deemed delivered and correct.

## Prior to Installation

Please follow these simple checks prior to lifting and installing the chamber:

- Complete a visual check of the unit for any visible signs of damage.
- Check that all fittings and attachments are secured and fastened.
- Ensure all excavations for the tank are safe for working around.
- Ensure base slab has been cast at the correct depth, is level and dry

We recommend that you engage the services of:-

- A competent civil engineer/ building contractor for the installation of your chamber in the ground and pipework connections.
- A competent electrical contractor is required for all electrical items and services including the provision of the power supply and the installation and connection of the pump and control cabling.



## Driveways & Roads

If the pumping station is located in a driveway, it is essential that the concrete cover slab and the access cover are sufficiently rated to accept the required loading. On a Venus or Mercury pumping station, a pedestrian-loading cover is supplied as standard. This may be upgraded to suit the relevant loading requirements and a selection of covers to suit the drive way finish, i.e. block paving are available on request.

It is important that a structural engineer is employed at an early stage prior to excavation, to ensure that sufficient strength is obtained from the cover slab and access cover. A ground condition survey is also strongly recommended to ensure the correct selection of backfill concrete.

The chamber itself will not be taking any load as it acts purely as a former; the concrete around the chamber takes the loading which is directed from the access cover and cover slab so correct structural preparation is essential.

## Concrete Specification

Please refer to BS EN 206, BS 8500-1 & BS 8500-2, the two documents must be read in conjunction.

As mentioned previously within this manual, we strongly suggest that you employ the services of a ground condition surveyor to establish the quality of the ground that the system is to be installed into, and also to provide you with a recommendation as to the type of concrete pre-mix you should use. Below is a list of information that you may find beneficial:

RC25 pre-mixed concrete is the minimum specification of concrete with a slump class of S2 for type DC1 ground conditions. For ground conditions other than DC1, it is the responsibility of the site designer or appointed ground surveyor to recommend otherwise.

The concrete must be compacted thoroughly throughout the backfilling process to eliminate the chance of voids. **Please avoid prolonged contact between the chamber wall and the concrete pokers used to avoid poker burns and damage to the chamber.**

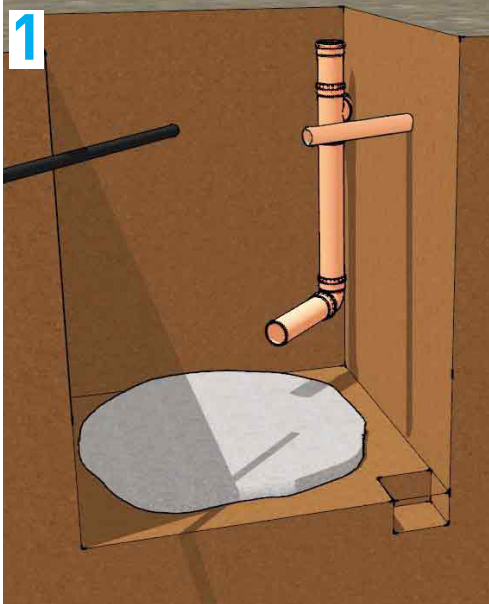
The site designer must also take into consideration the strength and condition of the ground for this type of installation, i.e. peaty ground etc. The base of the excavation may require strengthening, also bearing in the mind the loading requirement from the cover level.

It is of vital importance that the excavation is kept dry throughout the installation process. For high ground water conditions, the use of drainage pumps will be required to keep the excavation dry. This is imperative, as the strength of the concrete backfill can be affected, resulting in irreparable damage to the chamber.

T-T PUMPS Ltd will not accept any liability for a damaged chamber which is the direct result of a poor concrete selection or installation. No claims will be considered unless a concrete certificate is provided by a certified pre-mix supplier.



## Venus Plus Tank Civil Installation Guide - Pedestrian area



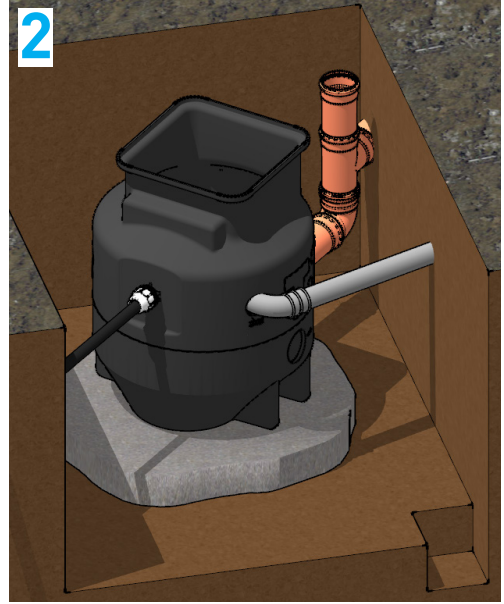
Prepare the excavation for installation of the package pump station. Level the base of the sump as much as possible.

We recommend the inclusion of a small sump in the base of the excavation. A pump may be required should excessive ground water be an issue.

Before lowering in the chamber, plan the installation of the station by selecting from 3(no.) inlet positions in relation to the direction of the discharge rising main.

Create a concrete cradle in the base of the chamber minimum 250mm high in the centre of the excavation in readiness to puddle the pumping station chamber into position.

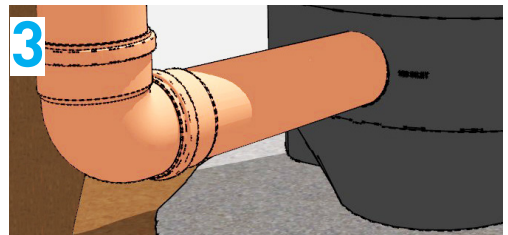
Take note of pipe and duct positions as holes will need to be cut in the shuttering to accommodate the connections.



Puddle the tank into position on the concrete cradle, ensuring that no air pockets remain (important).

Connect the rising main to the tank discharge adaptor, connect the cable duct to the Ø110mm sockets where required, if including an air vent, use the opposite Ø110mm duct socket.

Connect the inlet pipe to the Ø160mm sockets at the lower end of the tank, using a (min of) 300mm length of pipe, so the remaining pipework can be connected outside the concrete surround.



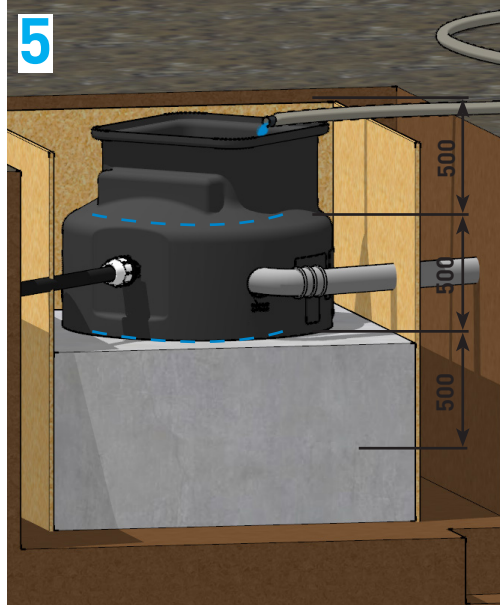
## Civil Installation Guide [cont.]

4



With all connections to the tank made, prepare shuttering around the tank for concrete pours.

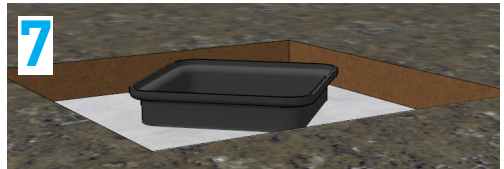
5



(Front view of shuttering omitted for clarity, dims shown as guidance, not to scale) The concrete pour needs to be done in 500mm stages (max.) ensuring adjacent surfaces are prepared to avoid cold joints occurring, & in accordance with best practice.

The MDPE adaptor must be connected to the discharge pipe. During each concrete pour, maintain the water level above the back fill level of the concrete pour, by a minimum of 500mm.

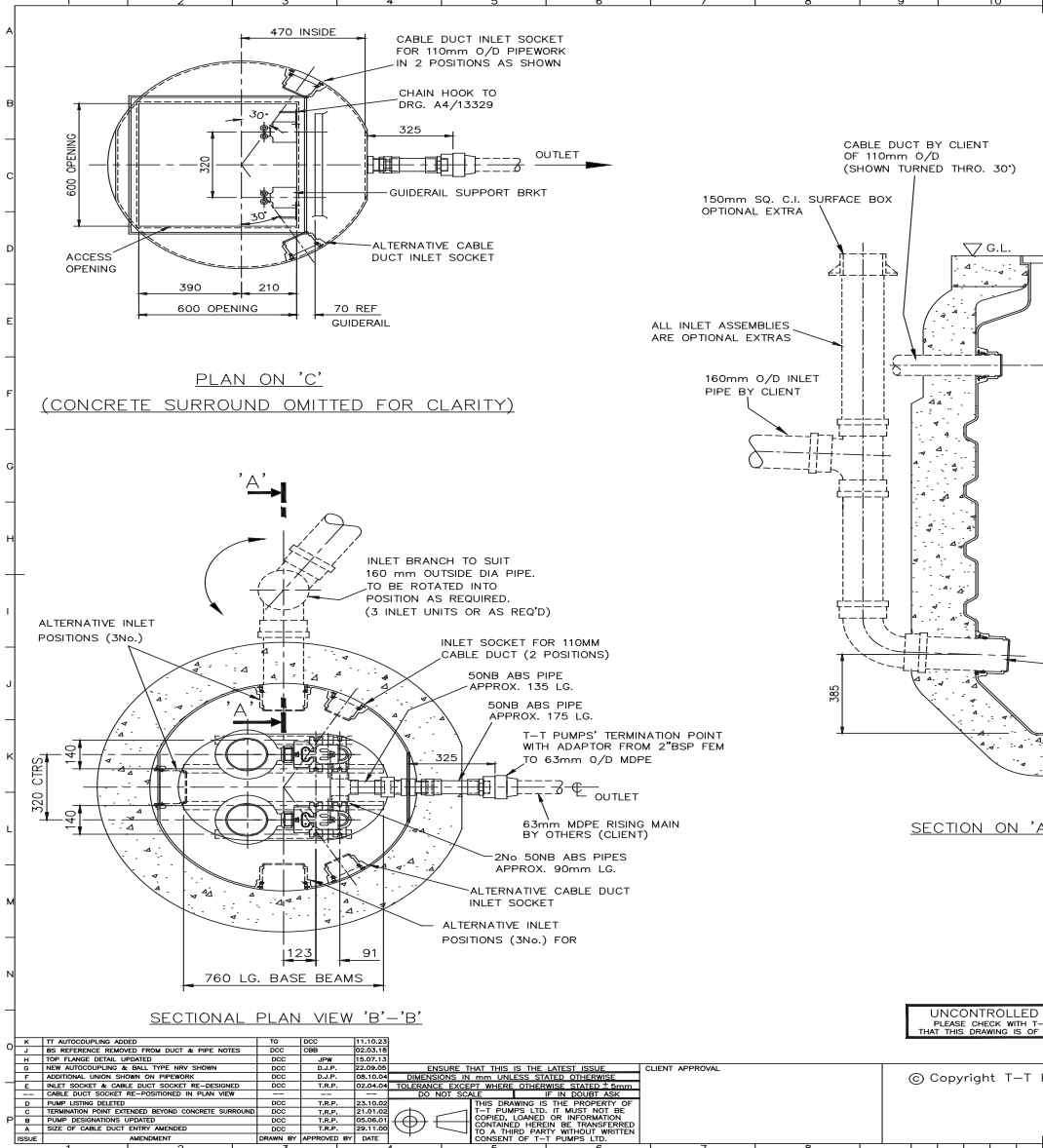
7

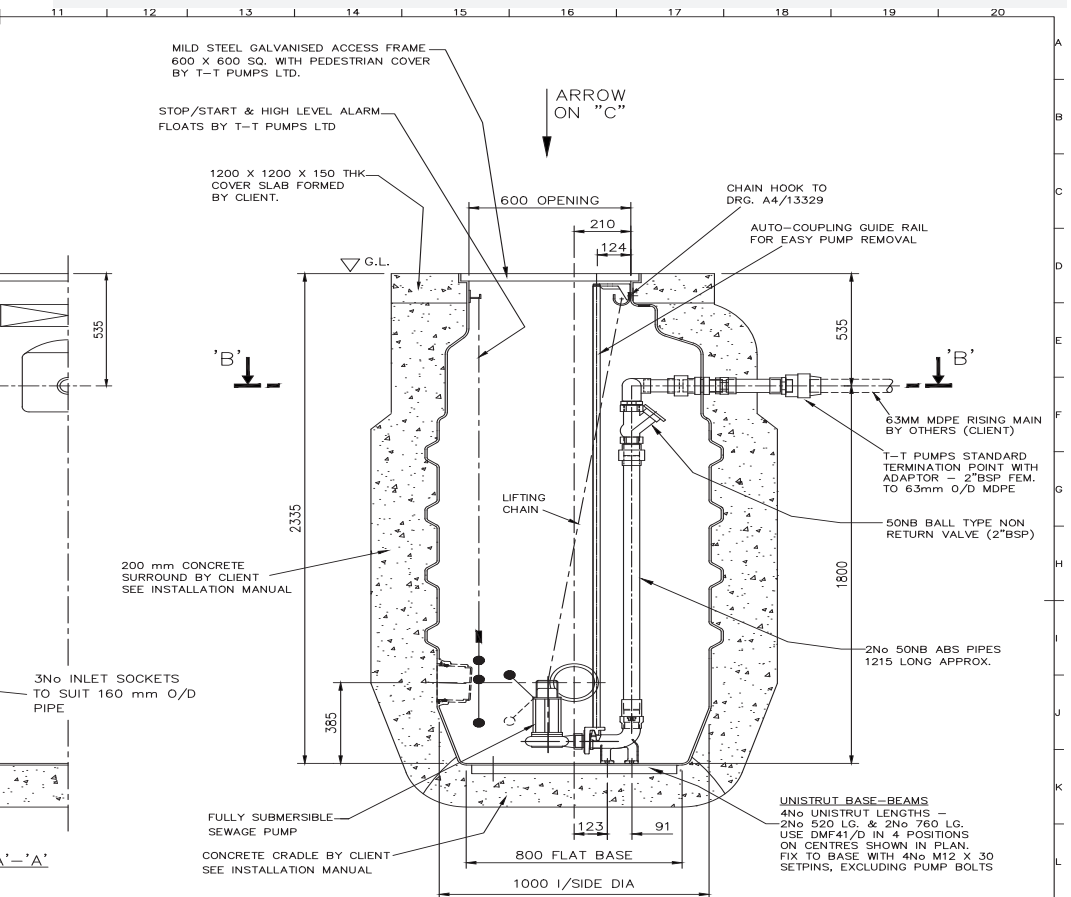


Once concrete surround has dried, back fill and make ground good, in preparation for the cover slab.

Prep the area for the pour or installation of your pre cast concrete slab. One set/installed, fit access cover as manufacturers instructions.

# Civil Installation Drawing





SECTIONAL ELEVATION ON OUTLET CENTRE LINE

## NOTES

1. POLYETHYLENE TANK SUPPLIED C/W PIPEWORK & VALVES TO TERMINATION POINT, FOR CLIENT TO INSTALL INTO GROUND - SEE SEPARATE INSTALLATION DATA SHEET.
2. ALL CIVILS WORK TO BE BY CLIENT.
3. PUMP STARTER OR CONTROL PANEL MUST BE FIXED INDOORS OR IN A WEATHERPROOF ENCLOSURE.

DRAWING  
T-T PUMPS LTD  
THE LATEST ISSUE

PUMPS Ltd. 2003

TITLE: GENERAL ARRANGEMENT FOR VENUS DUAL (50 NB ABS P'WK)  
PACKAGE PUMPING STATION

CLIENT:

SCHEME:

DRAWN BY: P.S.T.

APPROVED BY: R.D.

DATE: 06.10.99

ORIGINAL SCALE: 1:10

**T-T Pumping Solutions**

Onsley Works, Newcastle Road,  
Worce, Cheshire, CW3 9HJ

PROXY NUMBER: DRAWING NUMBER: PP/5200/K

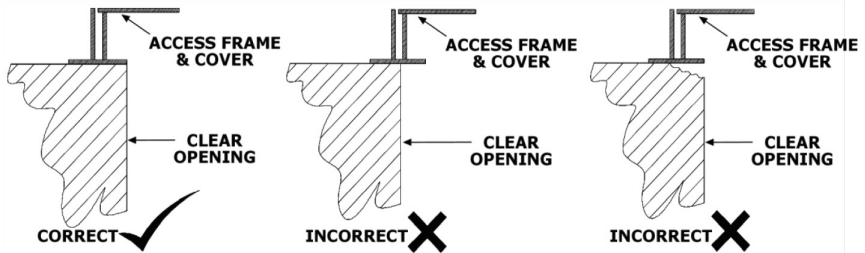
ISSUE: SHEET 1 OF 1

11 060 06.21

## Fabricated steel covers - Fitting Instructions

1. Covers and frames are manufactured as a unit – ensure that corresponding covers and frames match and fit correctly before commencing installation.
2. The frame of an access cover must be fully supported. Any load placed onto the access cover is transferred to the structural opening via the frame. If the frame is only partially supported, the unit will not carry the load it is designed for and will ultimately fail. Please see diagrams below.
3. Recessed covers (excluding paving infill) must be fully filled with grade C25 concrete, by volume, 1 cement, 2 sand, 3 coarse aggregate (9.5 to 3mm), to achieve their stated loading capacity.

**Covers and frames are not designed to take traffic when not fully fitted.**



**To structural engineers detail**

## Single Unit Covers

For other cover designs, refer to cover specific instructions

## Control System

The pumping station is controlled via a control panel that will be supplied as standard with the system. The basic features of this system are to control the pumps and to alert the user(s) of the system in the event of a failure which will give an audible and visual alarm locally, or remotely via a telemetry system, dependent upon the system specification.  
(See page for important panel location consideration.)

Float switches are the standard method of level control used in conjunction with the control panel (ultrasonic level control can also be used, again dependent upon the site specifications).

## Float Switch Adjustment

For single pump stations two float switches are supplied. The duty float switch will be marked with one band of white tape and the high level will be marked with two bands. For dual systems a similar labelling method is used but in this case with the addition of a standby float which is marked with two white bands; the high level float is then marked with three bands.

The float switch assembly inclusive of lifting chain and counter weight will be pre-set at our works to provide an estimated start, stop and high level setting to suit the site and the depth of the chamber involved. If required, the settings may be changed by altering the float cable securing positions on the lifting chain. If you are not sure, please contact our Internal Sales Department for further instruction.

It is our recommendation that the high level float switch is positioned just below the lowest inlet invert position of the incoming pipe on site. This will alert you of any problem with the system prior to any surcharging of the incoming pipe work.

It is also important that on dual stations, when the standby float switch is in a raised (start) position, it is above the duty float switch raised position. The standby float switch when it is in a lowered (stop) position, must also be lower than the lowered position of the duty float.

On some system designs, the type of float switch used may be different so please always refer to the control panel drawing supplied with the system.

## Electrical Connections

Please employ the services of a competent electrical engineer / contractor.

Our T-T Engineers may attend site to complete this task for you if required. Please contact our Sales Department to discuss this if you have not already received our quotation.

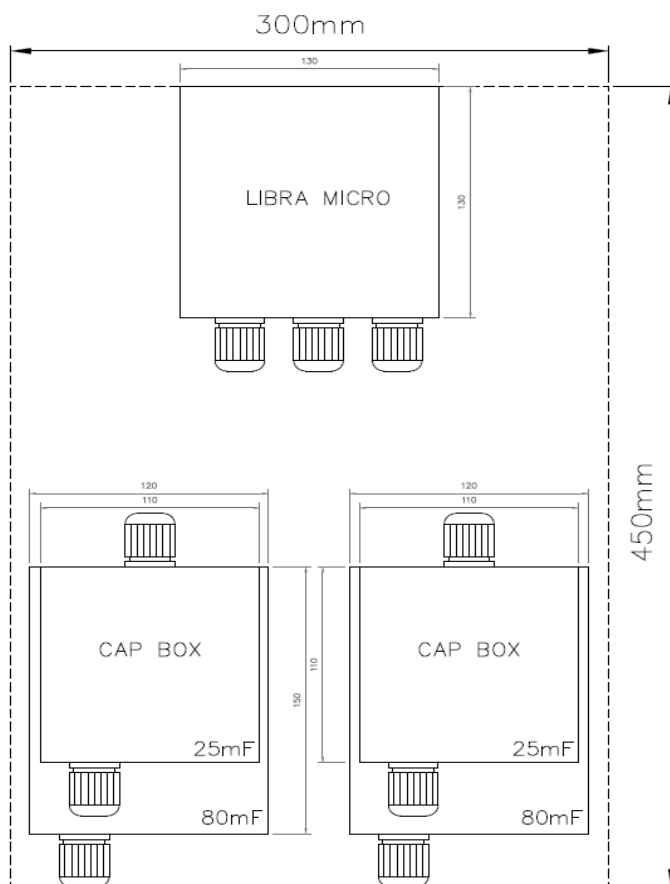
Before attempting to make any electrical connections, please ensure that the pump(s) is lowered into the chamber and the cable from the pump(s) is not trapped and is free. The pump and the float switch cables need to be pulled through the cable ducting on site and you must refer to the electrical wiring diagram supplied with the control system for the electrical installation.



## Control Panel location considerations

Ensure the pump manufacturer's manuals are consulted to ascertain if pump start or pump run capacitors are required.

If these are necessary, ensure these are mounted in a suitable location adjacent to the Libra Micro Controller and connected in circuit as per the pump installation instructions.



The above image indicates required space for capacitor boxes.

## Part P Compliance

For domestic installations, we always request that the power to our control panel equipment is provided by others and connected to our control panel so that it is live but isolated. We only make the final connections of the pump and float switch to the control panel ourselves.

It is therefore the responsibility of the person making the alterations to the electrical circuit in order to provide power to our equipment, to certify that the installation complies with Part P (by being a competent person registered with an electrical self-certification scheme authorised by the Department for Communities and Local Government).

Alternatively, notification of proposals to carry out the electrical installation must be given to a Building Control body before work begins.

## Commissioning of your Pumping Station

Having satisfied yourself that all the connections are correct, a brief test run of the system is required as follows:

To test the pump on a single pump station, lift the duty float into its start position and you should feel that the pump is operational. Carry out this procedure for a few seconds only and then return the float switch back to its stop position to turn the pump off.

For dual pumping stations this procedure should be carried out twice. The first time you should see one pump running, and the second time, the other pump should operate, proving that the stepping relay within the panel is operating correctly.

To test the high level alarm float switch, simply lift this float to its start position and it will operate the alarm features of the control panel.



## Operation, Maintenance & Safety Procedures

Package pumping stations can be very hazardous, and appropriate working practices must be always followed. The instructions and information given in this manual are as explicit as reasonably practicable and both competence and expertise are necessary in the maintenance of the system.

To ensure reliable and trouble-free operation of the system, we strongly recommend that the servicing of the system is only undertaken by experienced and authorized personnel. The operation and maintenance of this system must be carried out in compliance with all current health, safety and welfare legislation.

Sewage pumping stations, where applicable, are safe in operation, however because of the media being pumped, gases such as methane and hydrogen sulphide can build up. It is therefore important that sensible precautions are taken.

Package Stations have been designed to be maintained from the outside of the chamber as the pump[s] and float switches are all fully removable from the chamber.

### CAUTION

The following check list should help...

- Never work or maintain a sewage pumping station on your own.
- Isolate the electrical supply before working on a pumping station.
- Never enter the pump chamber under any circumstances unless fully qualified to do so, i.e., confined space trained, using appropriate safety equipment.
- Keep naked flames away from pumping stations.
- Never leave the pump chamber open or unattended.
- Always secure the access cover lid when leaving the pumping station.
- Never use a wander light in or around the pump chamber unless the light is intrinsically safe.
- The Plant/Equipment must not be used for work for which it is not design intended.

## Impeller Rotation

On a three-phase submersible pump, it is important to test the rotation of the impellers to ensure that the pump is wired correctly to the control panel. Carry out the duty float switch test as above and then look at the pump through the pump base so that you can see the impeller. If wired correctly, the impeller should be spinning anti-clockwise. If the impeller runs clockwise, this means that two of the phases have been wired incorrectly and need to be corrected.

Please note that care and attention must be taken at all times when carrying out the about as electrical circuits will be live and the pumps contain rotational and sometimes very sharp parts to their design.

**Never use the pump cables to lift the pump, as the cable gland may be damaged allowing water into the pumps motor, damaging the motor beyond repair. Always use the lifting chains and lifting equipment provided.**

## Removal / Installation of pumping equipment

For safe removal of pumping equipment we recommend the use of a lifting davit:

Lifting davits and sockets are optional extras and are designed for lifting equipment safely from pump stations. If using a davit the following procedure should be adhered to.

- Isolate electrically and hydraulically before commencing the removal of any pump.
- Install the lifting davit in the davit socket, then locate the lifting chain in one of the holes at the top of the davit using 'D' shackle provided.
- Remove the access cover over the pump that is to be removed (do not remove more covers than necessary).
- Lower the chain block hook and secure in the lowest accessible large ring of the pump lifting chain.
- Begin to lift the pump and this will break the seal between the pump delivery port and the auto coupling pedestal bend and enable the pump to slide up the guide rails.
- The pump is lifted until the staging chain safety hook can be secured into the large ring on the pump lifting chain. When this has been achieved, the chain block hook can then be removed and lowered to the lowest accessible ring on the pump lifting chain and the above process repeated until the pump reaches a point above ground level. The access cover should then be closed, to aid safe working around the pump.
- The pump can then be swung round to a desired position away from the access opening.

To re-install the pump in the wet well, reverse the above procedures.

Any defects in, or damage to, plant or equipment must be reported immediately.



## Hygiene

### WARNING

When working on a live pumping station take sensible precautions about hygiene. Always wear protective overalls, gloves and footwear. When work is completed remove soiled clothing for laundering or disposal and always wash thoroughly.

Much of the equipment installed on this plant is designed to operate automatically and may start without warning. Before working on any item of the plant or equipment, ensure it is correctly, electrically and mechanically isolated.

## Regular Maintenance - Sewage Applications

It is important that the pumping station is checked frequently, to ensure that it is in full working order and that there is not an excessive build-up of fats and materials.

If there is a build-up of fatty materials, pour a reasonable quantity of household detergent onto the affected area, leave for a little while and then hose down, repeat if necessary. This will ensure that the float switches and pumps operate freely without a build-up of fatty matter. In areas where large amounts of grease are expected, the fitting of a grease trap prior to the pumping station is recommended.

## Disposal



The chamber is manufactured from virgin High-density Polyethylene, and the symbol displayed above and on the tank indicates it can be recycled. HDPE is accepted at most recycling centres in the world, as it is one of the easiest plastic polymers to recycle. Most recycling companies will collect HDPE products and take these to large facilities to be processed.

Please check with your local authority for recycling capabilities.

Please refer to the specific pump manual for disposal instructions.

## After Sales Support

Your product should have a long and reliable life if it is cared for and maintained correctly. We would strongly recommend that the pumping system is serviced thoroughly at least every six months. This should be undertaken by component electrical/mechanical engineers.

T-T Pumps offers a full after sales service, including our Service Agreement scheme. This can give you peace of mind, allowing you to achieve maximum reliability and efficiency from your product.

For full details of our Service Agreement scheme, please contact our Service Department who will be pleased to provide you with a quotation [+44 \(0\)1630 647200](tel:+441630647200).



## Fault Finding

| SYMPTOM                                         | POSSIBLE CAUSE                                                                                                          | CORRECTIVE ACTION                                                                                                                       |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Pump does not start                             | Check and rectify power supply, including check for excessive cable length or incorrect cable size causing voltage drop | Check and rectify power supply, including check for excessive cable length or incorrect cable size causing voltage drop                 |
|                                                 | Power not switched on at all points, or connections not secure                                                          | Check all switches and cable connections                                                                                                |
|                                                 | Fuse failed or circuit breaker operated                                                                                 | Check fuses / circuit breaker                                                                                                           |
|                                                 | Control panel overload tripped                                                                                          | Check setting / condition of overload unit - reset/ replace. If satisfactory, investigate cause; do not reset continuously.             |
|                                                 | Control panel fault                                                                                                     | Investigate and rectify                                                                                                                 |
|                                                 | Motor fault                                                                                                             | Investigate and rectify                                                                                                                 |
|                                                 | Cable damaged                                                                                                           | Replace                                                                                                                                 |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |
| Pump does not stop                              | Level switches obstructed or at incorrect level                                                                         | Check manual switching satisfactory [except on pumps with integral level switches]. Ensure level switches are correctly set to operate. |
|                                                 | Level switches obstructed                                                                                               | Ensure switches are free to operate                                                                                                     |
| Pump does not stop                              | Control panel fault                                                                                                     | Investigate and rectify                                                                                                                 |
| Pump starts and stops repeatedly                | Level switches obstructed or at incorrect level                                                                         | Clear or reset                                                                                                                          |
|                                                 | Power supply fault                                                                                                      | Investigate and rectify, including check for voltage drop on starting                                                                   |
|                                                 | Pump impeller obstructed                                                                                                | Clear or reset                                                                                                                          |
|                                                 | Non-return valve[s] obstructed or faulty, allowing back flow when pump stops.                                           | Clear or repair/replace                                                                                                                 |
| Pump starts but overload protection trips       | Overload setting incorrect                                                                                              | Check setting / condition - reset / replace. If satisfactory, investigate cause - do not reset continually                              |
|                                                 | Power supply fault                                                                                                      | Investigate and rectify, including check for availability of 3 phases [for 3-phase motor]                                               |
|                                                 | Connections faulty                                                                                                      | Investigate and rectify                                                                                                                 |
| Pump runs but gives no output or reduced output | Discharge obstructed                                                                                                    | Clear pipework                                                                                                                          |
|                                                 | Valve(s) partly or fully closed or obstructed                                                                           | Open or clear valves                                                                                                                    |
|                                                 | Discharge leak in pumping chamber                                                                                       | Secure discharge connections                                                                                                            |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |
|                                                 | Pump impeller worn                                                                                                      | Replace                                                                                                                                 |
|                                                 | Pump air locked                                                                                                         | Release air                                                                                                                             |
|                                                 | Pump wrong rotation                                                                                                     | Rectify electrical connections (3 phase motor only)                                                                                     |
|                                                 | Incorrect pump selection                                                                                                | Re-assess system                                                                                                                        |
|                                                 | Pump impeller obstructed                                                                                                | Clear                                                                                                                                   |

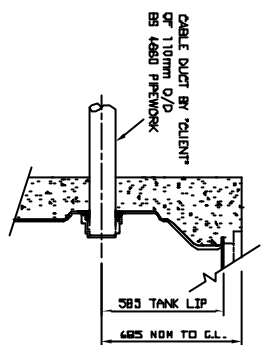
## Fault Finding [cont.]

| SYMPTOM                          | POSSIBLE CAUSE                                       | CORRECTIVE ACTION                    |
|----------------------------------|------------------------------------------------------|--------------------------------------|
| Pump runs, but noisy or vibrates | Pump / impeller air locked                           | Release air                          |
|                                  | Pump impeller worn or damaged, or pump shaft damaged | Investigate and replace as necessary |

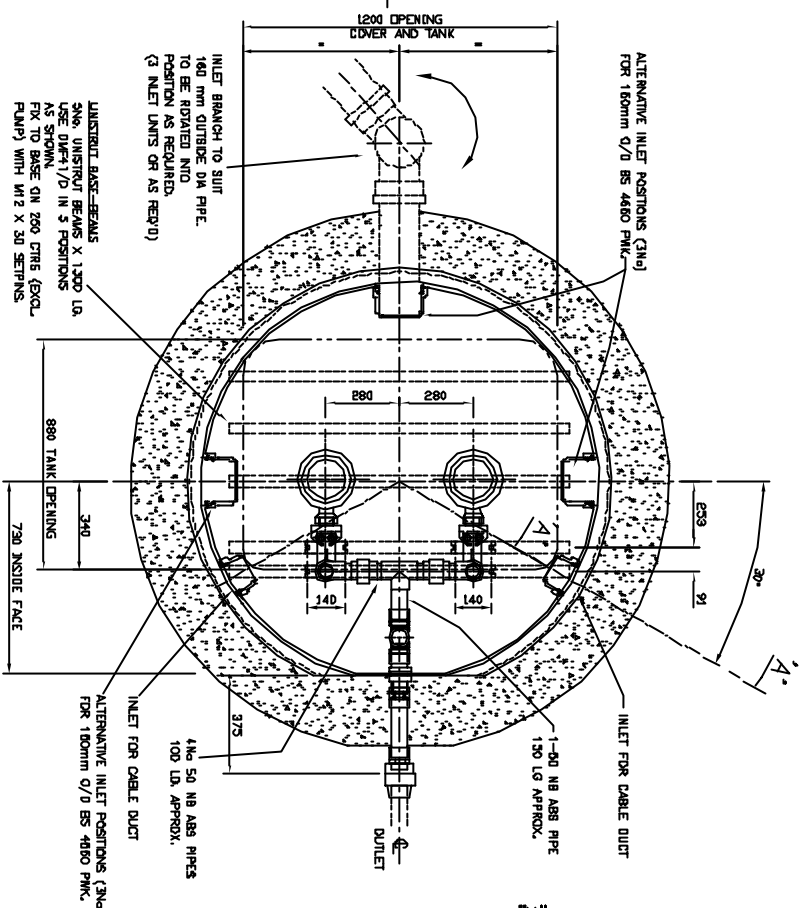








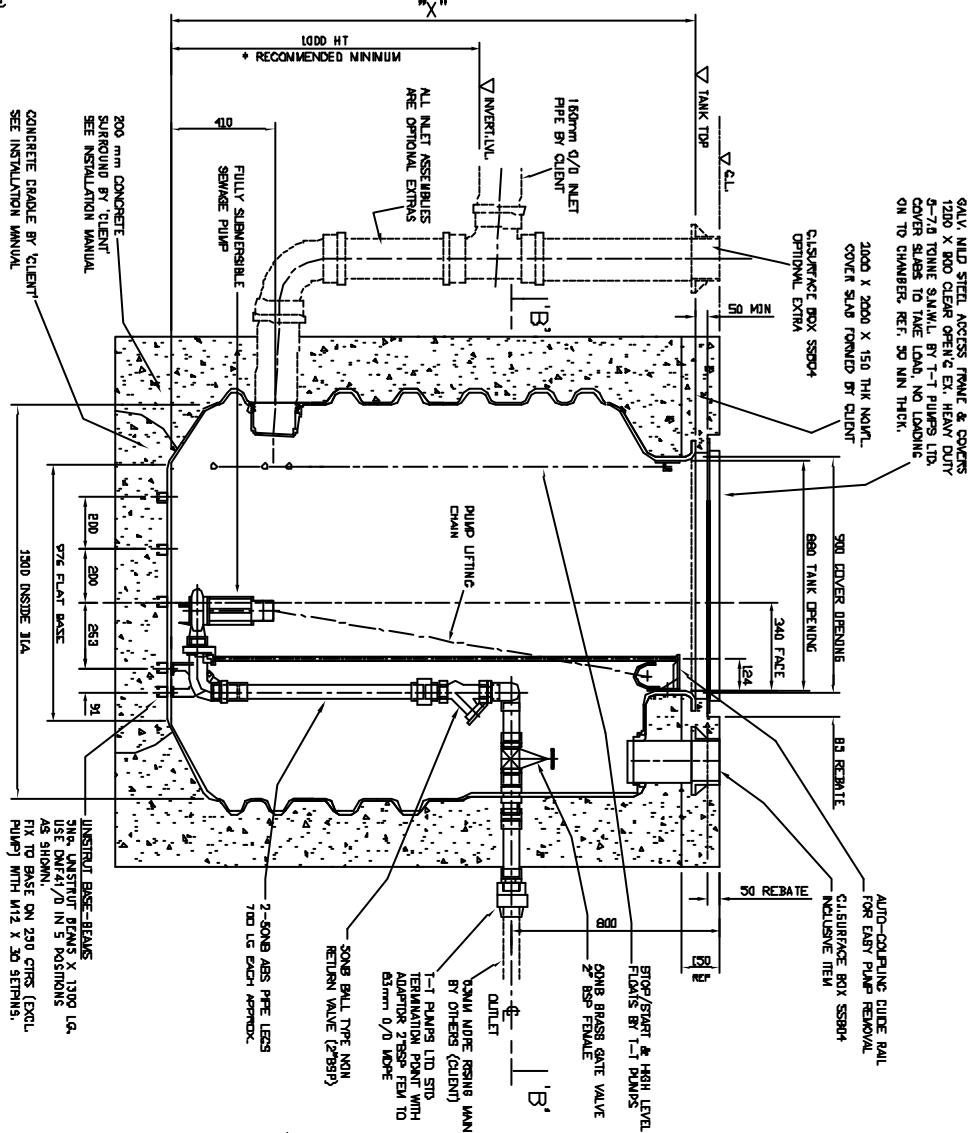
PART SECTION ON 'A'-'A'



SECTIONAL PLAN VIEW 'B'-'B'

| TANK      | DEPTH   |
|-----------|---------|
| TANK REF. | DMN 'X' |
| A         | 2000    |
| B         | 3000    |
| C         | 4000    |
| D         | 4500    |

**\* STANDARD TANK**



### SECTION ELEVATION ON OUTLET CENTRE LINE

1. POLYETHYLENE TANK SUPPLIED C/W PIPING & VALVES TO TERMINATION POINT, FOR CLIENT TO INSTALL AND GROUND - SEE SEPARATE INSTALLATION DATA SHEET.
2. ALL CIVILS WORK TO BE BY CLIENT.
3. PUMP STARTER OR CONTROL PANEL MUST BE FIXED INDOORS OR IN A WEATHERPROOF ENCLOSURE.
4. A MINIMUM OF 1000mm IS REQUIRED BETWEEN INLET INVERT HT. AND SLUMP BASE F. IN DOUBT CONSULT T-Y-PUMPS LTD. (SEE DIM X ABOVE)

## NOTES

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**TITLE**  
GENERAL ARRANGEMENT FOR SATURN DUAL (DD) NB ABS PMK  
PACKAGE PUMPING STATION

UNCONTROLLED DRAWING  
PLEASE CHECK WITH T-T PUMPS LTD  
WHAT THIS DRAWING IS OF THE LATEST ISSUE

GALV. MILD STEEL ACCESS TRUNK & COVER  
1200 X 800 CLEAR OPENING EX. HEAVY DUTY  
5-7.0 TONNE S.M.M.L. BY T-T PUMPS LTD.  
COVER SLABS TO TAKE LOAD, NO LOADING  
ON TO CHAMBER, REF. 50 MM THICK.

FOR EASY PLUM-REMOVAL  
C1515FACE BOX SS804

A vertical dimension line with arrows at both ends, indicating the height of the bed tank opening. The text "BED TANK OPENING" is written vertically along the line.

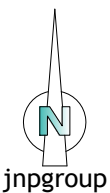
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# **Appendix E**

## **External Levels Layout**



#### Legend

- Site boundary
- Proposed level
- Gradient
- XC EB
- XC WP
- Xm RW
- Xm GB
- Plot finished floor level DPC level, refer to architects details
- Proposed road contour levels (0.1m intervals)
- Tree Root Protection Areas
- Linear drainage channel
- Private yard gully

#### External Level Notes

- This drawing to be read in conjunction with and checked against all other drawings, engineering details, specification and any structural, geotechnical or other specialist document provided.
- In accordance with NHBC standards and technical guidance, the requirements for Raised Damp Proof Course or Waterproofing is outlined below:
  - 2.1.1.  $\leq 2$  courses over less than or equal to 15% of building perimeter = raised damp proof course
  - 2.1.2.  $\leq 2$  courses over more than 15% of building perimeter = water proofing
  - 2.1.3.  $> 2$  courses = water proofingRefer to architect's / specialist's details for all RDPC / Waterproofing specifications.
- All low spots on driveways to have yard gullies.
- Where dwellings require compliance with Lifetime Homes or Code for Sustainable Homes, a level access shall be provided to all dwelling entrances with principal path gradients no steeper than 1:60 with 1:40 crossfall. Where this cannot be achieved due to topography, the following shall apply to meet the minimum requirements of Building Regulations Part M for Visitable Dwellings Category M1
  - 4.1. Requirements for gradients (M1 category):
    - 4.1.1. Level / gently sloping approach - gradient of approach does not exceed 1 in 20 and has a width not less than 900mm.
    - 4.1.2. Ramped approach - gradient of approach not exceed 1 in 15 for lengths up to 10m and 1 in 12 for lengths up to 5m and has a width not less than 900mm with min 1200mm long level landings at top and bottom of ramps.
    - 4.1.3. Stepped approach - rise of flight between landings does not exceed 1.8m. Landing lengths not less than 900mm, minimum 280mm going, uniform 75-150mm riser. Handrails to be provided where 3 or more risers are indicated.
    - 4.1.4. Principal access to be front door unless indicated otherwise.
- For threshold detail to principal access, refer to architects drawings.

#### General Notes

- Where this drawing has been issued in electronic .dwg format, it has been done so in good faith. JNP Group do not take any responsibility for any inaccuracies in the electronic data, which should be checked against the paper (or .pdf) drawing issue. Any apparent discrepancies should be immediately reported to JNP Group. The electronic .dwg file should not be assumed to be to scale and should not be used for 'overlying', setting out or checking of any third party information. All dimensions should be taken from the paper (or .pdf) version of the drawing. Electronic drawings may contain third party information. JNP Group take no responsibility for this information, which should be checked against the originators paper drawing(s).
- All dimensions are millimetres (mm), and levels are in metres (m) unless noted otherwise and should be checked on site prior to construction/fabrication.
- Do not scale from this drawing. Only figured dimensions are to be relied upon. Don't hesitate to get in touch with JNP Group if additional information is required.
- Any discrepancies between drawings of different scales and between drawings and specifications, where appropriate, to be reported to JNP Group for decision.
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- This drawing should only be used for construction if the drawing status is "A4 - Approved/Stage Complete". JNP Group takes no responsibility for construction works undertaken to drawings that are not marked with this status.



#### Health & Safety Note

The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.

#### HAZARD IDENTIFICATION BOX

This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015

| Hazard Ref | Hazard Type<br>(Construction/Retention/<br>Clearing/Demolition/Adaptation) | Hazard Description                          | Mitigation Measures/<br>Residual Risk                             |
|------------|----------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------|
| Y1         | Construction                                                               | Works near live carriageway                 | Appropriate traffic measures to be in place                       |
| Y2         | Construction                                                               | Works near existing utilities               | Exact position of utilities to be confirmed prior to construction |
| Y3         | Construction /<br>demolition                                               | Contamination and<br>excavation instability | Use safe excavation<br>practices.                                 |

| Rev. | Date       | Description                                                                                                                                       | Dim / CHK'd / App'd |
|------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| P05  | 21/10/2025 | Plot 1 patio updated.                                                                                                                             | SH / JTH            |
| P04  | 20/10/2025 | Site layout updated to suit revised block plans. Plot 5 & 6 handed. ASHPs relocated, retaining adjusted to suit. Retaining added to plot 7 patio. | SH                  |
| P03  | 22/09/2025 | Plot 2 and 3 handed. Plot 2 lowered 300mm. Patios now flush to plot FFL. Levels and retaining updated to suit.                                    | SH                  |
| P02  | 11/09/2025 | Updated to reduce retained heights.                                                                                                               | SH / LC             |
| P01  | 04/09/2025 | First issue                                                                                                                                       | AQ / SH             |

S2 - Suitable for Information



|         |                              |
|---------|------------------------------|
| Client: | Earlswood Homes              |
| Job:    | College Lane, Hurstpierpoint |
| Title:  | External Levels              |

|                 |          |                       |                     |  |  |
|-----------------|----------|-----------------------|---------------------|--|--|
| Classification: | FL_60_20 |                       |                     |  |  |
| Scale @ A1:     | 1:200    | Accredited Contractor | Supplier No. 000000 |  |  |

|                                                                                    |          |
|------------------------------------------------------------------------------------|----------|
| Project - Originator - Volume/System - Level/Location - Type - Discipline - Number | Revision |
| S12809 - JNP-XX-XX- DR -C- 2002                                                    | P05      |

# **Appendix F**

## **Tank Calculations**

## Preliminary Polystorm Performance Assessment

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### 1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) for further details on typical product testing procedures and the calculation methodology proposed

### 1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

| Polystorm unit                                                                | - Description<br>- Product Code | Deep<br>PSM5 |
|-------------------------------------------------------------------------------|---------------------------------|--------------|
| Ultimate compressive strength [kN/m <sup>2</sup> ]                            | - Vertical, $X_{k;VC}$          | 610          |
|                                                                               | - Lateral, $X_{k;LC}$           | 146.0        |
| Short term deflection [kN/m <sup>2</sup> per mm]                              | - Vertical, $X_{k;VD}$          | 60           |
|                                                                               | - Lateral, $X_{k;LD}$           | 10.1         |
| Creep equation co-efficient, $x$ [mm]<br>[ $x \ln(\text{design life; hrs})$ ] | - Vertical, $X_{k;VGr}$         | 0.2798       |
| Allowable deflection [mm]                                                     | - Vertical, $\delta_{k;V}$      | 9.0          |
|                                                                               | - Lateral, $\delta_{k;L}$       | 14.0         |
| Allowable creep deformation [mm]                                              | - Vertical, $\varepsilon_{k;V}$ | 9.0          |

### 1.2 Recommended Material and Partial Factor of Safety

| Factor of safety    | ULS  | SLS |
|---------------------|------|-----|
| Material, $f_{m,*}$ | 2.75 | 1.5 |

(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)

| Partial factor of safety           | ULS  | SLS |
|------------------------------------|------|-----|
| Variable loads, $\gamma_Q$         | 1.60 | 1.0 |
| Permanent loads, $\gamma_G$        | 1.4  | 1.0 |
| Lateral earth pressure, $\gamma_e$ | 1.35 | 1.0 |
| Hydrostatic, $\gamma_u$            | 1.35 | 1.0 |

(Based on CIRIA C680, Clause 4.6)

### 1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

#### Depths

|                                       |         |
|---------------------------------------|---------|
| Depth to structure invert, $H$        | 2.467 m |
| Polystorm structure depth, $h_1$      | 1.200 m |
| Design depth, $z$<br>( $= H - 0.2m$ ) | 2.267 m |
| Cover depth, $h_c$<br>( $= H - h_1$ ) | 1.267 m |

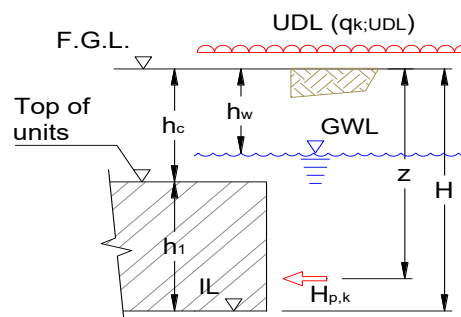


Figure 1) Idealised illustration of installation

Please note that the information in this document is of an illustrative nature and is supplied by Polypipe Civils without charge. It does not form part of any contract or intended contract with the user. Final determination of the suitability of any information or material for the use contemplated and the manner of use is the sole responsibility of the user and the user must assume all risk and liability in connection therewith. Refer to [www.polypipe.com/disclaimer](http://www.polypipe.com/disclaimer) for further information.

## Preliminary Polystorm Performance Assessment

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### Assumed ground conditions

Based on the description given in Ibex CE Ltd SI report Ref: ICE0391-GAR-JAN25; BH: Various

#### Native soil

Shearing resistance,  $\phi$  26°  
Density,  $\gamma_k$  20.0 kN/m<sup>3</sup> [Assumed]

Active earth pressure co-efficient,  $K_a$  0.390  
(=  $[1 - \sin \phi] / [1 + \sin \phi]$ )

#### Ground water

Depth below FGL,  $h_w$  0.273 m  
Density,  $\gamma_w$  10.0 kN/m<sup>3</sup> [Assumed]

### 1.4 Assumed Transient (Live) Loads

For illustrative purposes, vehicle loading assumed

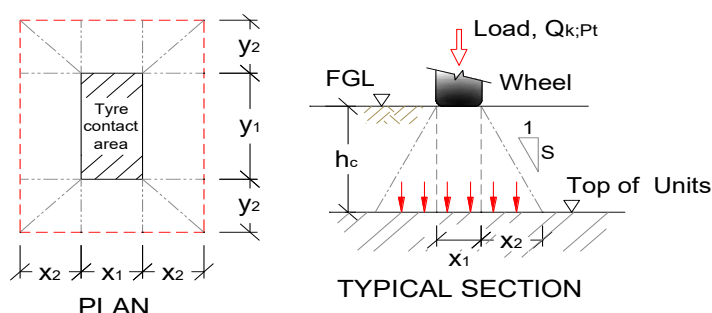


Figure 2) Concentrated load parameters

|                                                         |                                                             |                         |
|---------------------------------------------------------|-------------------------------------------------------------|-------------------------|
| Loading classification                                  | Rigid HGV parking, access or small estate road [ $<15$ mph] | [CIRIA C680; Table 4.2] |
| DIN 1072 classification                                 | 30/30                                                       | [CIRIA C680; Table 4.2] |
| Max Gross vehicle weight                                | $< 30,000$ Kg                                               | [CIRIA C680; Table 4.2] |
| Uniformly distributed load, $q_{k;UDL}$                 | 10.0 kN/m <sup>2</sup>                                      | [CIRIA C680; Table 4.2] |
| Concentrated wheel load, $Q_{k;Pt}$                     | 50.0 kN                                                     | [CIRIA C680; Table 4.2] |
| Dynamic load factor, $\Phi$                             | 1.0                                                         | [Assumed]               |
| Contact area - Length, $y_1$                            | 0.400 m                                                     | [CIRIA C680; Table 4.2] |
| - Width, $x_1$                                          | 0.200 m                                                     | [CIRIA C680; Table 4.2] |
| Load distribution, $S$                                  | 1 in 2.0                                                    | [Assumed]               |
| Additional load spread, $x_2$ & $y_2$<br>(= $h_c / S$ ) | 0.633 m                                                     |                         |

### Unfactored

Imposed load,  $q_{k;Pt}$  **20.4 kN/m<sup>2</sup>** [ $>$  Uniformly distributed load]  
(=  $[Q_{k;Pt} \cdot \Phi] / [(x_1 + 2x_2) \times (y_1 + 2y_2)]$ )

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### 2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782).

#### 2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit.

##### Unfactored

Pressure derived from concentrated load gave worst case transient parameter, refer to Section 1.4

|                               |                              |                                           |
|-------------------------------|------------------------------|-------------------------------------------|
| Live load, $q_{k,*}$          | <b>20.4 kN/m<sup>2</sup></b> | [* - Pt; refer to Section 1.4]            |
| Dead load, $G_k$              | <b>25.3 kN/m<sup>2</sup></b> | [Worst case load - Ignoring ground water] |
| ( $= [h_c \times \gamma_k]$ ) |                              |                                           |

##### Factored

|                                                         |                              |                                                    |
|---------------------------------------------------------|------------------------------|----------------------------------------------------|
| ULS, $V_{d;ULS}$                                        | <b>68.2 kN/m<sup>2</sup></b> | [ < 221.8 kN/m <sup>2</sup> Therefore OK ]         |
| ( $= [q_{k,*}] \gamma_{Q;ULS} + [G_k] \gamma_{G;ULS}$ ) |                              |                                                    |
| Degree of utilization, $\Lambda_{STR}$                  | <b>31%</b>                   | ( $= X_{k;VC} / f_{m;ULS}$ ; Refer to Section 1.0) |
| SLS, $V_{d;SLS, \delta}$                                | <b>20.4 kN/m<sup>2</sup></b> |                                                    |
| ( $= [q_{k1;Pt}] \gamma_{Q;SLS}$ )                      |                              |                                                    |
| SLS, $V_{d;SLS, \epsilon}$                              | <b>25.3 kN/m<sup>2</sup></b> |                                                    |
| ( $= [G_k] \gamma_{G;SLS}$ )                            |                              |                                                    |

#### 2.2 Lateral Load Imposed at Depth z

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

##### Unfactored

|                                                                                |                              |
|--------------------------------------------------------------------------------|------------------------------|
| Live load, $q_{k;UDL}$                                                         | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$                                                            | <b>25.4 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$                                                        | <b>19.9 kN/m<sup>2</sup></b> |
| Where $h_w < z$                                                                |                              |
| ( $W_{Gk} = [h_w \times \gamma_k] + [(z - h_w) \cdot (\gamma_k - \gamma_w)]$ ) |                              |
| ( $U_k = [z - h_w] \times \gamma_w$ )                                          |                              |
| Where $h_w > z$                                                                |                              |
| ( $W_{Gk} = z \times \gamma_k$ )                                               |                              |

|                                 |                              |
|---------------------------------|------------------------------|
| Lateral pressure, $H_{p;k}$     | <b>33.8 kN/m<sup>2</sup></b> |
| ( $= Ka [q_k + W_{Gk}] + U_k$ ) |                              |

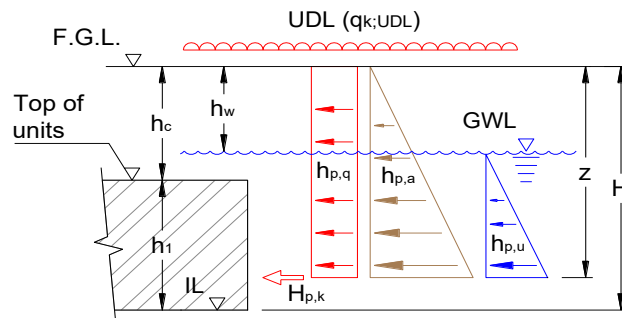


Figure 3) Idealised illustration of lateral pressure(s)

##### Factored

|                                                                 |                              |                                           |
|-----------------------------------------------------------------|------------------------------|-------------------------------------------|
| ULS, $H_{d;ULS}$                                                | <b>45.6 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> Therefore OK ] |
| ( $= Ka [q_k + W_{Gk}] \gamma_{e;ULS} + [U_k] \gamma_{U;ULS}$ ) |                              |                                           |
| ( $= X_{k;LC} / f_{m;ULS}$ ; Refer to Section 1.0)              |                              |                                           |

Therefore protective measures would be required to reduce the expected lateral imposed pressure below the Polystorm unit's design lateral strength

Consider ground improvement measures; refer to Section 2.2.1

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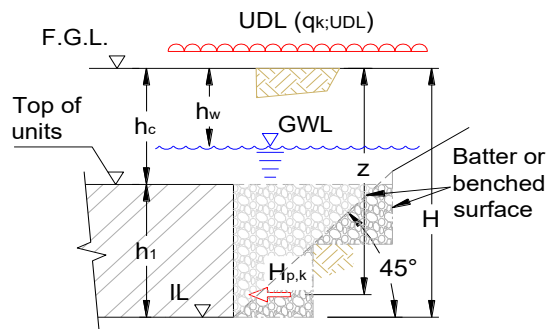
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### 2.2.1 Lateral Load Imposed at Depth $z$ - Assuming Ground Improvement

Where the native soil conditions, adjacent to the proposed Polystorm structure, is such that it is expected that it would result in excessive imposed lateral loads; ground improvement measures may be considered.

One such method is to over excavate around the perimeter of the proposed structure and replace with a suitably compacted granular material. Provided the native soil is battered/stepped back up to a maximum  $45^\circ$  to the horizontal, the parameters of the imported material may be used to estimate the expected imposed lateral loads (refer to figure 4). Further guidance is available within CIRIA Report C680 (2008; RP782), Section 6.5.

It should be noted that the above assumes the native soil is an homogeneous material and that the proposed excavation would not intersect pre-existing slip failure surfaces within the native soil; which could result in imposed loads greater than those predicted from the assumed drained shear strength stated below. Advice should be sought from a suitably qualified geotechnical engineer where it is believed these conditions may exist.



**Figure 4)**  
Idealised illustration  
of additional soil  
excavation and  
granular material  
replacement

#### Assumed imported granular material properties

*Suitable selected granular material to achieve the minimum undrained shear strength stated below*

|                                           |                        |                                             |
|-------------------------------------------|------------------------|---------------------------------------------|
| Shearing resistance, $\phi$               | 30°                    | [Min angle of shearing resistance required] |
| Density, $\gamma_k$                       | 20.0 kN/m <sup>3</sup> | [Assumed]                                   |
| Active earth pressure co-efficient, $K_a$ | 0.333                  |                                             |

#### Unfactored

|                         |                              |
|-------------------------|------------------------------|
| Live load, $q_{k;UDL}$  | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$     | <b>25.4 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$ | <b>19.9 kN/m<sup>2</sup></b> |

#### Factored

|                                                                    |                              |                            |               |
|--------------------------------------------------------------------|------------------------------|----------------------------|---------------|
| ULS, $H_{d;ULS}$                                                   | <b>42.8 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> | Therefore OK] |
| SLS, $H_{d;SLS}$                                                   | <b>31.7 kN/m<sup>2</sup></b> |                            |               |
| $( = K_a [q_k + W_{Gk}] \gamma_{e; SLS} + [U_k] \gamma_{U; SLS} )$ |                              |                            |               |

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### 3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

#### 3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced.

|                                                                       |                               |            |               |
|-----------------------------------------------------------------------|-------------------------------|------------|---------------|
| Design strength; $X_{d;VD}$                                           | 40.0 kN/m <sup>2</sup> per mm |            |               |
| <i>( = <math>X_{k;VD} / f_{m;SLS}</math> ; refer to Section 1.0 )</i> |                               |            |               |
| SLS, $V_{d;SLS}$                                                      | 20.4 kN/m <sup>2</sup>        |            |               |
| Deflection, $\delta_V$                                                | 0.51 mm                       | [ < 1.0 mm | Typically OK] |
| <i>( = <math>V_{d;SLS} / X_{d;VD}</math> )</i>                        |                               |            |               |

#### 3.2 Vertical Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

|                                                                                             |                         |                             |                                                        |
|---------------------------------------------------------------------------------------------|-------------------------|-----------------------------|--------------------------------------------------------|
| Creep test load, $X_{d;V,cr}$                                                               | 162.0 kN/m <sup>2</sup> |                             |                                                        |
| SLS, $V_{d;SLS}$                                                                            | 25.3 kN/m <sup>2</sup>  | [ < 162.0 kN/m <sup>2</sup> | Therefore OK]                                          |
| Degree of utilization, $\Lambda_{STR}$                                                      | 16%                     |                             |                                                        |
| Creep data limit, t                                                                         | 60 years                |                             | <i>[Unit has a durability life in excess of 50yrs]</i> |
| Estimated unit creep, $\epsilon_{h,c}$                                                      | 3.7 mm                  | [ < 9.0 mm                  | Therefore OK]                                          |
| <i>( = <math>0.2798 \ln [\text{design life, } t] \text{ } ; t \text{ in hours}</math> )</i> |                         |                             |                                                        |
| Degree of utilization, $\Lambda_{STR}$                                                      | 41%                     |                             | <i>[Refer to Section 1.1; based on test load]</i>      |

#### 3.3 Lateral Deflection

|                                                                       |                              |             |                                                   |
|-----------------------------------------------------------------------|------------------------------|-------------|---------------------------------------------------|
| Design strength; $X_{d;LD}$                                           | 6.7 kN/m <sup>2</sup> per mm |             |                                                   |
| <i>( = <math>X_{k;LD} / f_{m;SLS}</math> ; refer to Section 1.0 )</i> |                              |             |                                                   |
| SLS, $H_{d;SLS}$                                                      | 31.7 kN/m <sup>2</sup>       |             |                                                   |
| Deflection, $\delta_L$                                                | 4.71 mm                      | [ < 14.0 mm | Therefore OK]                                     |
| <i>( = <math>H_{d;SLS} / X_{d;LD}</math> )</i>                        |                              |             |                                                   |
| Degree of utilization, $\Lambda_{STR}$                                | 34%                          |             | <i>[Refer to Section 1.1; based on test load]</i> |

### Note

Where ground water is expected to be present above the invert level of the proposed geocellular structure, due consideration should be given to undertaking a buoyancy (Uplift limit state, UPL) check

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### 1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) for further details on typical product testing procedures and the calculation methodology proposed

### 1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

| Polystorm unit                                                                | - Description<br>- Product Code                         | Deep<br>PSM5 |
|-------------------------------------------------------------------------------|---------------------------------------------------------|--------------|
| Ultimate compressive strength [kN/m <sup>2</sup> ]                            | - Vertical, $X_{k;VC}$<br>- Lateral, $X_{k;LC}$         | 610<br>146.0 |
| Short term deflection [kN/m <sup>2</sup> per mm]                              | - Vertical, $X_{k;VD}$<br>- Lateral, $X_{k;LD}$         | 60<br>10.1   |
| Creep equation co-efficient, $x$ [mm]<br>[ $x \ln(\text{design life; hrs})$ ] | - Vertical, $X_{k;VGr}$                                 | 0.2798       |
| Allowable deflection [mm]                                                     | - Vertical, $\delta_{k;V}$<br>- Lateral, $\delta_{k;L}$ | 9.0<br>14.0  |
| Allowable creep deformation [mm]                                              | - Vertical, $\varepsilon_{k;V}$                         | 9.0          |

### 1.2 Recommended Material and Partial Factor of Safety

| Factor of safety                                                                                     | ULS  | SLS |
|------------------------------------------------------------------------------------------------------|------|-----|
| Material, $f_{m,*}$                                                                                  | 2.75 | 1.5 |
| <i>(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)</i> |      |     |

| Partial factor of safety                 | ULS  | SLS |
|------------------------------------------|------|-----|
| Variable loads, $\gamma_Q$               | 1.60 | 1.0 |
| Permanent loads, $\gamma_G$              | 1.4  | 1.0 |
| Lateral earth pressure, $\gamma_e$       | 1.35 | 1.0 |
| Hydrostatic, $\gamma_u$                  | 1.35 | 1.0 |
| <i>(Based on CIRIA C680, Clause 4.6)</i> |      |     |

### 1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

#### Depths

|                                       |         |
|---------------------------------------|---------|
| Depth to structure invert, $H$        | 3.129 m |
| Polystorm structure depth, $h_1$      | 1.200 m |
| Design depth, $z$<br>( $= H - 0.2m$ ) | 2.929 m |
| Cover depth, $h_c$<br>( $= H - h_1$ ) | 1.929 m |

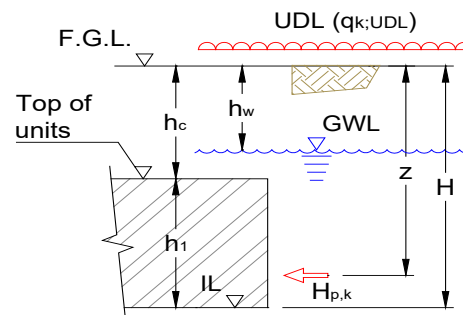


Figure 1) Idealised illustration of installation

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### Assumed ground conditions

*Based on the description given in Ibex CE Ltd SI report Ref: ICE0391-GAR-JAN25; BH: Various*

#### Native soil

|                             |                        |           |
|-----------------------------|------------------------|-----------|
| Shearing resistance, $\phi$ | 24°                    |           |
| Density, $\gamma_k$         | 20.0 kN/m <sup>3</sup> | [Assumed] |

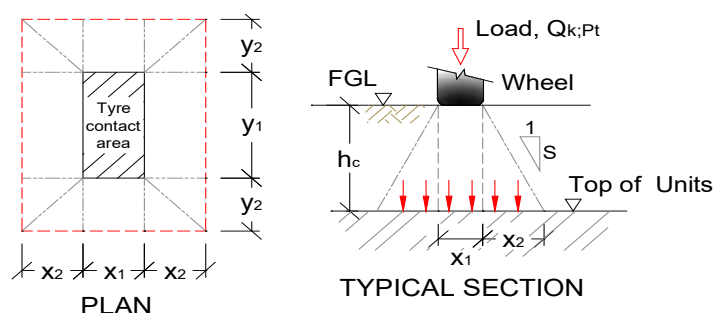
|                                           |       |  |
|-------------------------------------------|-------|--|
| Active earth pressure co-efficient, $K_a$ | 0.422 |  |
| $(= [1 - \sin \phi] / [1 + \sin \phi])$   |       |  |

#### Ground water

|                        |                        |           |
|------------------------|------------------------|-----------|
| Depth below FGL, $h_w$ | 0.935 m                |           |
| Density, $\gamma_w$    | 10.0 kN/m <sup>3</sup> | [Assumed] |

### 1.4 Assumed Transient (Live) Loads

*For illustrative purposes, vehicle loading assumed*



**Figure 2) Concentrated load parameters**

|                                         |                                                             |                         |
|-----------------------------------------|-------------------------------------------------------------|-------------------------|
| Loading classification                  | Rigid HGV parking, access or small estate road [ $<15$ mph] | [CIRIA C680; Table 4.2] |
| DIN 1072 classification                 | 30/30                                                       | [CIRIA C680; Table 4.2] |
| Max Gross vehicle weight                | $< 30,000$ Kg                                               | [CIRIA C680; Table 4.2] |
| Uniformly distributed load, $q_{k;UDL}$ | 10.0 kN/m <sup>2</sup>                                      | [CIRIA C680; Table 4.2] |
| Concentrated wheel load, $Q_{k;Pt}$     | 50.0 kN                                                     | [CIRIA C680; Table 4.2] |
| Dynamic load factor, $\Phi$             | 1.0                                                         | [Assumed]               |
| Contact area - Length, $y_1$            | 0.400 m                                                     | [CIRIA C680; Table 4.2] |
| - Width, $x_1$                          | 0.200 m                                                     | [CIRIA C680; Table 4.2] |
| Load distribution, $S$                  | 1 in 2.0                                                    | [Assumed]               |
| Additional load spread, $x_2$ & $y_2$   | 0.964 m                                                     |                         |
| $(= h_c / S)$                           |                                                             |                         |

### Unfactored

|                                                                  |                              |                                |
|------------------------------------------------------------------|------------------------------|--------------------------------|
| Imposed load, $q_{k;Pt}$                                         | <b>10.1 kN/m<sup>2</sup></b> | [> Uniformly distributed load] |
| $(= [Q_{k;Pt} \cdot \Phi] / [(x_1 + 2x_2) \times (y_1 + 2y_2)])$ |                              |                                |

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### 2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782).

#### 2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit.

##### Unfactored

Pressure derived from concentrated load gave worst case transient parameter, refer to Section 1.4

|                               |                              |                                           |
|-------------------------------|------------------------------|-------------------------------------------|
| Live load, $q_{k,*}$          | <b>10.1 kN/m<sup>2</sup></b> | [* - Pt; refer to Section 1.4]            |
| Dead load, $G_k$              | <b>38.6 kN/m<sup>2</sup></b> | [Worst case load - Ignoring ground water] |
| ( $= [h_c \times \gamma_k]$ ) |                              |                                           |

##### Factored

|                                                         |                              |                                                    |
|---------------------------------------------------------|------------------------------|----------------------------------------------------|
| ULS, $V_{d;ULS}$                                        | <b>70.1 kN/m<sup>2</sup></b> | [ < 221.8 kN/m <sup>2</sup> Therefore OK ]         |
| ( $= [q_{k,*}] \gamma_{Q;ULS} + [G_k] \gamma_{G;ULS}$ ) |                              |                                                    |
| Degree of utilization, $\Lambda_{STR}$                  | <b>32%</b>                   | ( $= X_{k;VC} / f_{m;ULS}$ ; Refer to Section 1.0) |
| SLS, $V_{d;SLS, \delta}$                                | <b>10.1 kN/m<sup>2</sup></b> |                                                    |
| ( $= [q_{k1;Pt}] \gamma_{Q;SLS}$ )                      |                              |                                                    |
| SLS, $V_{d;SLS, \epsilon}$                              | <b>38.6 kN/m<sup>2</sup></b> |                                                    |
| ( $= [G_k] \gamma_{G;SLS}$ )                            |                              |                                                    |

#### 2.2 Lateral Load Imposed at Depth z

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

##### Unfactored

|                                                                                |                              |
|--------------------------------------------------------------------------------|------------------------------|
| Live load, $q_{k;UDL}$                                                         | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$                                                            | <b>38.6 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$                                                        | <b>19.9 kN/m<sup>2</sup></b> |
| Where $h_w < z$                                                                |                              |
| ( $W_{Gk} = [h_w \times \gamma_k] + [(z - h_w) \cdot (\gamma_k - \gamma_w)]$ ) |                              |
| ( $U_k = [z - h_w] \times \gamma_w$ )                                          |                              |
| Where $h_w > z$                                                                |                              |
| ( $W_{Gk} = z \times \gamma_k$ )                                               |                              |

|                                 |                              |
|---------------------------------|------------------------------|
| Lateral pressure, $H_{p;k}$     | <b>40.5 kN/m<sup>2</sup></b> |
| ( $= Ka [q_k + W_{Gk}] + U_k$ ) |                              |

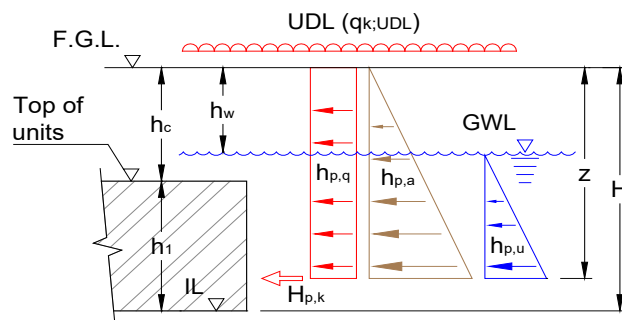


Figure 3) Idealised illustration of lateral pressure(s)

##### Factored

|                                                                 |                              |                                   |
|-----------------------------------------------------------------|------------------------------|-----------------------------------|
| ULS, $H_{d;ULS}$                                                | <b>54.6 kN/m<sup>2</sup></b> | [ > 53.1 kN/m <sup>2</sup> FAIL ] |
| ( $= Ka [q_k + W_{Gk}] \gamma_{e;ULS} + [U_k] \gamma_{U;ULS}$ ) |                              |                                   |
| ( $= X_{k;LC} / f_{m;ULS}$ ; Refer to Section 1.0)              |                              |                                   |

Therefore protective measures would be required to reduce the expected lateral imposed pressure below the Polystorm unit's design lateral strength

Consider ground improvement measures; refer to Section 2.2.1

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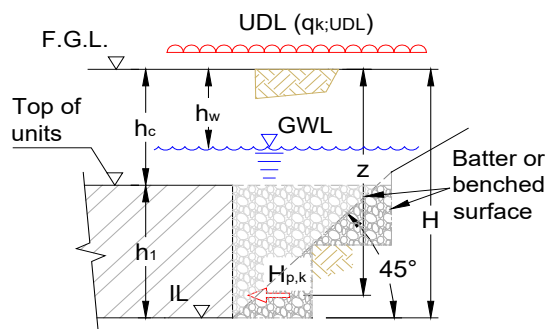
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One such method is to over excavate around the perimeter of the proposed structure and replace with a suitably compacted granular material. Provided the native soil is battered/stepped back up to a maximum  $45^\circ$  to the horizontal, the parameters of the imported material may be used to estimate the expected imposed lateral loads (refer to figure 4). Further guidance is available within CIRIA Report C680 (2008; RP782), Section 6.5.

It should be noted that the above assumes the native soil is an homogeneous material and that the proposed excavation would not intersect pre-existing slip failure surfaces within the native soil; which could result in imposed loads greater than those predicted from the assumed drained shear strength stated below. Advice should be sought from a suitably qualified geotechnical engineer where it is believed these conditions may exist.



**Figure 4)**  
Idealised illustration  
of additional soil  
excavation and  
granular material  
replacement

#### Assumed imported granular material properties

*Suitable selected granular material to achieve the minimum undrained shear strength stated below*

|                                           |                        |                                             |
|-------------------------------------------|------------------------|---------------------------------------------|
| Shearing resistance, $\phi$               | 30°                    | [Min angle of shearing resistance required] |
| Density, $\gamma_k$                       | 20.0 kN/m <sup>3</sup> | [Assumed]                                   |
| Active earth pressure co-efficient, $K_a$ | 0.333                  |                                             |

#### Unfactored

|                         |                              |
|-------------------------|------------------------------|
| Live load, $q_{k;UDL}$  | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$     | <b>38.6 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$ | <b>19.9 kN/m<sup>2</sup></b> |

#### Factored

|                                                                    |                              |                              |               |
|--------------------------------------------------------------------|------------------------------|------------------------------|---------------|
| ULS, $H_{d;ULS}$                                                   | <b>48.8 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> ] | Therefore OK] |
| SLS, $H_{d;SLS}$                                                   | <b>36.2 kN/m<sup>2</sup></b> |                              |               |
| $( = K_a [q_k + W_{Gk}] \gamma_{e; SLS} + [U_k] \gamma_{U; SLS} )$ |                              |                              |               |

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## Preliminary Polystorm Performance Assessment

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### 3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

#### 3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced.

|                                                                       |                                     |            |               |
|-----------------------------------------------------------------------|-------------------------------------|------------|---------------|
| Design strength; $X_{d;VD}$                                           | <b>40.0 kN/m<sup>2</sup> per mm</b> |            |               |
| <i>( = <math>X_{k;VD} / f_{m;SLS}</math> ; refer to Section 1.0 )</i> |                                     |            |               |
| SLS, $V_{d;SLS}$                                                      | <b>10.1 kN/m<sup>2</sup></b>        |            |               |
| Deflection, $\delta_V$                                                | <b>0.25 mm</b>                      | [ < 1.0 mm | Typically OK] |
| <i>( = <math>V_{d;SLS} / X_{d;VD}</math> )</i>                        |                                     |            |               |

#### 3.2 Vertical Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

|                                                                           |                               |                             |                                                        |
|---------------------------------------------------------------------------|-------------------------------|-----------------------------|--------------------------------------------------------|
| Creep test load, $X_{d;V,cr}$                                             | <b>162.0 kN/m<sup>2</sup></b> |                             |                                                        |
| SLS, $V_{d;SLS}$                                                          | <b>38.6 kN/m<sup>2</sup></b>  | [ < 162.0 kN/m <sup>2</sup> | Therefore OK]                                          |
| Degree of utilization, $\Lambda_{STR}$                                    | <b>24%</b>                    |                             |                                                        |
| Creep data limit, t                                                       | <b>60 years</b>               |                             | <i>[Unit has a durability life in excess of 50yrs]</i> |
| Estimated unit creep, $\epsilon_{h,c}$                                    | <b>3.7 mm</b>                 | [ < 9.0 mm                  | Therefore OK]                                          |
| <i>( = <math>0.2798 \ln [\text{design life, } t]</math> ); t in hours</i> |                               |                             |                                                        |
| Degree of utilization, $\Lambda_{STR}$                                    | <b>41%</b>                    |                             | <i>[Refer to Section 1.1; based on test load]</i>      |

#### 3.3 Lateral Deflection

|                                                                       |                                    |             |                                                   |
|-----------------------------------------------------------------------|------------------------------------|-------------|---------------------------------------------------|
| Design strength; $X_{d;LD}$                                           | <b>6.7 kN/m<sup>2</sup> per mm</b> |             |                                                   |
| <i>( = <math>X_{k;LD} / f_{m;SLS}</math> ; refer to Section 1.0 )</i> |                                    |             |                                                   |
| SLS, $H_{d;SLS}$                                                      | <b>36.2 kN/m<sup>2</sup></b>       |             |                                                   |
| Deflection, $\delta_L$                                                | <b>5.37 mm</b>                     | [ < 14.0 mm | Therefore OK]                                     |
| <i>( = <math>H_{d;SLS} / X_{d;LD}</math> )</i>                        |                                    |             |                                                   |
| Degree of utilization, $\Lambda_{STR}$                                | <b>38%</b>                         |             | <i>[Refer to Section 1.1; based on test load]</i> |

### Note

Where ground water is expected to be present above the invert level of the proposed geocellular structure, due consideration should be given to undertaking a buoyancy (Uplift limit state, UPL) check

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## Preliminary Polystorm Performance Assessment

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### 1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) for further details on typical product testing procedures and the calculation methodology proposed

#### 1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

| Polystorm unit                                                                | - Description<br>- Product Code | Deep<br>PSM5 |
|-------------------------------------------------------------------------------|---------------------------------|--------------|
| Ultimate compressive strength [kN/m <sup>2</sup> ]                            | - Vertical, $X_{k;VC}$          | 610          |
|                                                                               | - Lateral, $X_{k;LC}$           | 146.0        |
| Short term deflection [kN/m <sup>2</sup> per mm]                              | - Vertical, $X_{k;VD}$          | 60           |
|                                                                               | - Lateral, $X_{k;LD}$           | 10.1         |
| Creep equation co-efficient, $x$ [mm]<br>[ $x \ln(\text{design life; hrs})$ ] | - Vertical, $X_{k;VGr}$         | 0.2798       |
| Allowable deflection [mm]                                                     | - Vertical, $\delta_{k;V}$      | 9.0          |
|                                                                               | - Lateral, $\delta_{k;L}$       | 14.0         |
| Allowable creep deformation [mm]                                              | - Vertical, $\epsilon_{k;V}$    | 9.0          |

#### 1.2 Recommended Material and Partial Factor of Safety

| Factor of safety                                                                                     | ULS  | SLS |
|------------------------------------------------------------------------------------------------------|------|-----|
| Material, $f_{m,*}$                                                                                  | 2.75 | 1.5 |
| <i>(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)</i> |      |     |

| Partial factor of safety                 | ULS  | SLS |
|------------------------------------------|------|-----|
| Variable loads, $\gamma_Q$               | 1.60 | 1.0 |
| Permanent loads, $\gamma_G$              | 1.4  | 1.0 |
| Lateral earth pressure, $\gamma_e$       | 1.35 | 1.0 |
| Hydrostatic, $\gamma_u$                  | 1.35 | 1.0 |
| <i>(Based on CIRIA C680, Clause 4.6)</i> |      |     |

#### 1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

##### Depths

|                                       |         |
|---------------------------------------|---------|
| Depth to structure invert, $H$        | 2.594 m |
| Polystorm structure depth, $h_1$      | 1.200 m |
| Design depth, $z$<br>( $= H - 0.2m$ ) | 2.394 m |
| Cover depth, $h_c$<br>( $= H - h_1$ ) | 1.394 m |

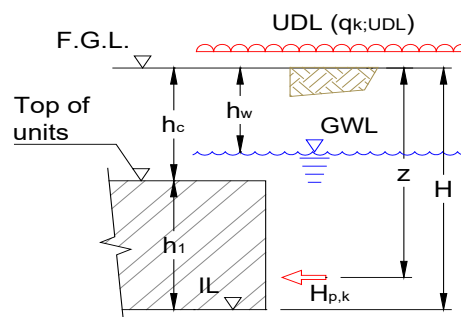


Figure 1) Idealised illustration of installation

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### Assumed ground conditions

*Based on the description given in Ibex CE Ltd SI report Ref: ICE0391-GAR-JAN25; BH: Various*

#### Native soil

Shearing resistance,  $\phi$  24°  
Density,  $\gamma_k$  20.0 kN/m<sup>3</sup> [Assumed]

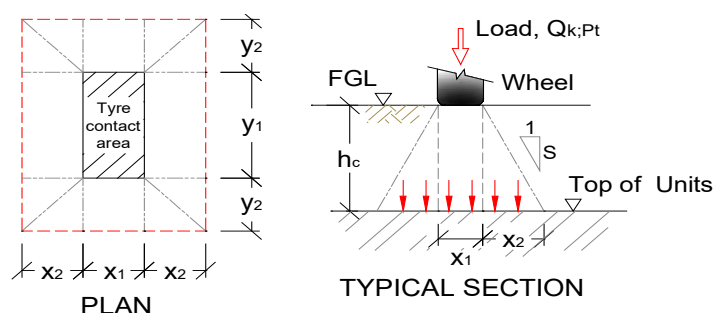
Active earth pressure co-efficient,  $K_a$  0.422  
(=  $[1 - \sin \phi] / [1 + \sin \phi]$ )

#### Ground water

Depth below FGL,  $h_w$  0.000 m  
Density,  $\gamma_w$  10.0 kN/m<sup>3</sup> [Assumed]

### 1.4 Assumed Transient (Live) Loads

*For illustrative purposes, vehicle loading assumed*



**Figure 2) Concentrated load parameters**

|                                                         |                                                             |                         |
|---------------------------------------------------------|-------------------------------------------------------------|-------------------------|
| Loading classification                                  | Rigid HGV parking, access or small estate road [ $<15$ mph] | [CIRIA C680; Table 4.2] |
| DIN 1072 classification                                 | 30/30                                                       | [CIRIA C680; Table 4.2] |
| Max Gross vehicle weight                                | $< 30,000$ Kg                                               | [CIRIA C680; Table 4.2] |
| Uniformly distributed load, $q_{k;UDL}$                 | 10.0 kN/m <sup>2</sup>                                      | [CIRIA C680; Table 4.2] |
| Concentrated wheel load, $Q_{k;Pt}$                     | 50.0 kN                                                     | [CIRIA C680; Table 4.2] |
| Dynamic load factor, $\Phi$                             | 1.0                                                         | [Assumed]               |
| Contact area - Length, $y_1$                            | 0.400 m                                                     | [CIRIA C680; Table 4.2] |
| - Width, $x_1$                                          | 0.200 m                                                     | [CIRIA C680; Table 4.2] |
| Load distribution, $S$                                  | 1 in 2.0                                                    | [Assumed]               |
| Additional load spread, $x_2$ & $y_2$<br>(= $h_c / S$ ) | 0.697 m                                                     |                         |

### Unfactored

Imposed load,  $q_{k;Pt}$  **17.5 kN/m<sup>2</sup>** [ $>$  Uniformly distributed load]  
(=  $[Q_{k;Pt} \cdot \Phi] / [(x_1 + 2x_2) \times (y_1 + 2y_2)]$ )

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### 2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782).

#### 2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit.

##### Unfactored

Pressure derived from concentrated load gave worst case transient parameter, refer to Section 1.4

|                             |                              |                                           |
|-----------------------------|------------------------------|-------------------------------------------|
| Live load, $q_{k,*}$        | <b>17.5 kN/m<sup>2</sup></b> | [* - Pt; refer to Section 1.4]            |
| Dead load, $G_k$            | <b>27.9 kN/m<sup>2</sup></b> | [Worst case load - Ignoring ground water] |
| $(= [h_c \times \gamma_k])$ |                              |                                           |

##### Factored

|                                                       |                              |                                                          |
|-------------------------------------------------------|------------------------------|----------------------------------------------------------|
| ULS, $V_{d;ULS}$                                      | <b>67.0 kN/m<sup>2</sup></b> | [ < 221.8 kN/m <sup>2</sup> Therefore OK ]               |
| $(= [q_{k,*}] \gamma_{Q;ULS} + [G_k] \gamma_{G;ULS})$ |                              |                                                          |
| Degree of utilization, $\Lambda_{STR}$                | <b>30%</b>                   | $(= X_{k;VC} / f_{m;ULS} ; \text{Refer to Section 1.0})$ |
| SLS, $V_{d;SLS, \delta}$                              | <b>17.5 kN/m<sup>2</sup></b> |                                                          |
| $(= [q_{k1;Pt}] \gamma_{Q;SLS})$                      |                              |                                                          |
| SLS, $V_{d;SLS, \epsilon}$                            | <b>27.9 kN/m<sup>2</sup></b> |                                                          |
| $(= [G_k] \gamma_{G;SLS})$                            |                              |                                                          |

#### 2.2 Lateral Load Imposed at Depth z

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

##### Unfactored

|                                                                              |                              |
|------------------------------------------------------------------------------|------------------------------|
| Live load, $q_{k;UDL}$                                                       | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$                                                          | <b>23.9 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$                                                      | <b>23.9 kN/m<sup>2</sup></b> |
| <u>Where <math>h_w &lt; z</math></u>                                         |                              |
| $(W_{Gk} = [h_w \times \gamma_k] + [(z - h_w) \cdot (\gamma_k - \gamma_w)])$ |                              |
| $(U_k = [z - h_w] \times \gamma_w)$                                          |                              |
| <u>Where <math>h_w &gt; z</math></u>                                         |                              |
| $(W_{Gk} = z \times \gamma_k)$                                               |                              |

|                               |                              |
|-------------------------------|------------------------------|
| Lateral pressure, $H_{p;k}$   | <b>38.3 kN/m<sup>2</sup></b> |
| $(= Ka [q_k + W_{Gk}] + U_k)$ |                              |

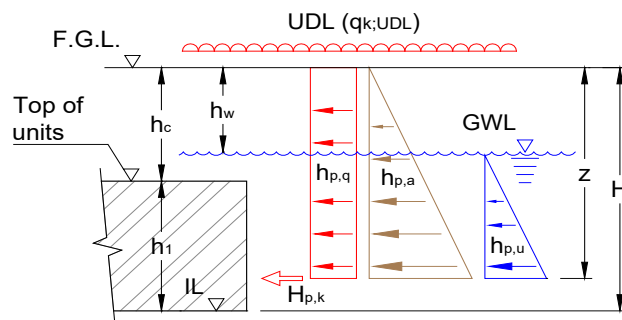


Figure 3) Idealised illustration of lateral pressure(s)

##### Factored

|                                                               |                              |                                           |
|---------------------------------------------------------------|------------------------------|-------------------------------------------|
| ULS, $H_{d;ULS}$                                              | <b>51.6 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> Therefore OK ] |
| $(= Ka [q_k + W_{Gk}] \gamma_{e;ULS} + [U_k] \gamma_{U;ULS})$ |                              |                                           |
| $(= X_{k;LC} / f_{m;ULS} ; \text{Refer to Section 1.0})$      |                              |                                           |

Therefore protective measures would be required to reduce the expected lateral imposed pressure below the Polystorm unit's design lateral strength

Consider ground improvement measures; refer to Section 2.2.1

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## Preliminary Polystorm Performance Assessment

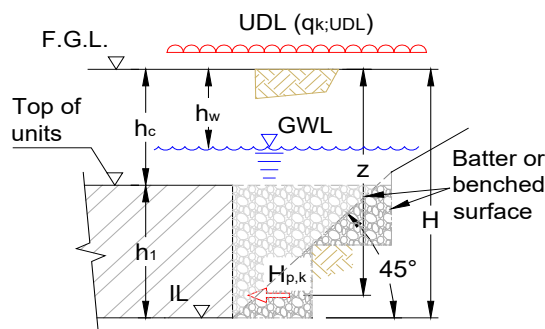
**124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks**

### 2.2.1 Lateral Load Imposed at Depth $z$ - Assuming Ground Improvement

Where the native soil conditions, adjacent to the proposed Polystorm structure, is such that it is expected that it would result in excessive imposed lateral loads; ground improvement measures may be considered.

One such method is to over excavate around the perimeter of the proposed structure and replace with a suitably compacted granular material. Provided the native soil is battered/stepped back up to a maximum  $45^\circ$  to the horizontal, the parameters of the imported material may be used to estimate the expected imposed lateral loads (refer to figure 4). Further guidance is available within CIRIA Report C680 (2008; RP782), Section 6.5.

It should be noted that the above assumes the native soil is an homogeneous material and that the proposed excavation would not intersect pre-existing slip failure surfaces within the native soil; which could result in imposed loads greater than those predicted from the assumed drained shear strength stated below. Advice should be sought from a suitably qualified geotechnical engineer where it is believed these conditions may exist.



**Figure 4)**  
Idealised illustration  
of additional soil  
excavation and  
granular material  
replacement

#### Assumed imported granular material properties

*Suitable selected granular material to achieve the minimum undrained shear strength stated below*

|                                           |                        |                                             |
|-------------------------------------------|------------------------|---------------------------------------------|
| Shearing resistance, $\phi$               | 30°                    | [Min angle of shearing resistance required] |
| Density, $\gamma_k$                       | 20.0 kN/m <sup>3</sup> | [Assumed]                                   |
| Active earth pressure co-efficient, $K_a$ | 0.333                  |                                             |

#### Unfactored

|                         |                              |
|-------------------------|------------------------------|
| Live load, $q_{k;UDL}$  | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$     | <b>23.9 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$ | <b>23.9 kN/m<sup>2</sup></b> |

#### Factored

|                                                                    |                              |                              |               |
|--------------------------------------------------------------------|------------------------------|------------------------------|---------------|
| ULS, $H_{d;ULS}$                                                   | <b>47.6 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> ] | Therefore OK] |
| SLS, $H_{d;SLS}$                                                   | <b>35.3 kN/m<sup>2</sup></b> |                              |               |
| $( = K_a [q_k + W_{Gk}] \gamma_{e; SLS} + [U_k] \gamma_{U; SLS} )$ |                              |                              |               |

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### 3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

#### 3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced.

|                                                         |                               |            |               |
|---------------------------------------------------------|-------------------------------|------------|---------------|
| Design strength; $X_{d;VD}$                             | 40.0 kN/m <sup>2</sup> per mm |            |               |
| $(= X_{k;VD} / f_{m;SLS}; \text{refer to Section 1.0})$ |                               |            |               |
| SLS, $V_{d;SLS}$                                        | 17.5 kN/m <sup>2</sup>        |            |               |
| Deflection, $\delta_V$                                  | 0.44 mm                       | [ < 1.0 mm | Typically OK] |
| $(= V_{d;SLS} / X_{d;VD})$                              |                               |            |               |

#### 3.2 Vertical Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

|                                                               |                         |                             |                                                 |
|---------------------------------------------------------------|-------------------------|-----------------------------|-------------------------------------------------|
| Creep test load, $X_{d;V,cr}$                                 | 162.0 kN/m <sup>2</sup> |                             |                                                 |
| SLS, $V_{d;SLS}$                                              | 27.9 kN/m <sup>2</sup>  | [ < 162.0 kN/m <sup>2</sup> | Therefore OK]                                   |
| Degree of utilization, $\Lambda_{STR}$                        | 17%                     |                             |                                                 |
| Creep data limit, t                                           | 60 years                |                             | [Unit has a durability life in excess of 50yrs] |
| Estimated unit creep, $\epsilon_{h,c}$                        | 3.7 mm                  | [ < 9.0 mm                  | Therefore OK]                                   |
| $(= 0.2798 \ln [\text{design life, } t]); t \text{ in hours}$ |                         |                             |                                                 |
| Degree of utilization, $\Lambda_{STR}$                        | 41%                     |                             | [Refer to Section 1.1; based on test load]      |

#### 3.3 Lateral Deflection

|                                                         |                              |             |                                            |
|---------------------------------------------------------|------------------------------|-------------|--------------------------------------------|
| Design strength; $X_{d;LD}$                             | 6.7 kN/m <sup>2</sup> per mm |             |                                            |
| $(= X_{k;LD} / f_{m;SLS}; \text{refer to Section 1.0})$ |                              |             |                                            |
| SLS, $H_{d;SLS}$                                        | 35.3 kN/m <sup>2</sup>       |             |                                            |
| Deflection, $\delta_L$                                  | 5.24 mm                      | [ < 14.0 mm | Therefore OK]                              |
| $(= H_{d;SLS} / X_{d;LD})$                              |                              |             |                                            |
| Degree of utilization, $\Lambda_{STR}$                  | 37%                          |             | [Refer to Section 1.1; based on test load] |

### Note

Where ground water is expected to be present above the invert level of the proposed geocellular structure, due consideration should be given to undertaking a buoyancy (Uplift limit state, UPL) check

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## Preliminary Polystorm Performance Assessment

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### 1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) for further details on typical product testing procedures and the calculation methodology proposed

#### 1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

| Polystorm unit                                                                | - Description<br>- Product Code | Deep<br>PSM5 |
|-------------------------------------------------------------------------------|---------------------------------|--------------|
| Ultimate compressive strength [kN/m <sup>2</sup> ]                            | - Vertical, $X_{k;VC}$          | 610          |
|                                                                               | - Lateral, $X_{k;LC}$           | 146.0        |
| Short term deflection [kN/m <sup>2</sup> per mm]                              | - Vertical, $X_{k;VD}$          | 60           |
|                                                                               | - Lateral, $X_{k;LD}$           | 10.1         |
| Creep equation co-efficient, $x$ [mm]<br>[ $x \ln(\text{design life; hrs})$ ] | - Vertical, $X_{k;VGr}$         | 0.2798       |
| Allowable deflection [mm]                                                     | - Vertical, $\delta_{k;V}$      | 9.0          |
|                                                                               | - Lateral, $\delta_{k;L}$       | 14.0         |
| Allowable creep deformation [mm]                                              | - Vertical, $\varepsilon_{k;V}$ | 9.0          |

#### 1.2 Recommended Material and Partial Factor of Safety

| Factor of safety                                                                                     | ULS  | SLS |
|------------------------------------------------------------------------------------------------------|------|-----|
| Material, $f_{m,*}$                                                                                  | 2.75 | 1.5 |
| <i>(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)</i> |      |     |

| Partial factor of safety                 | ULS  | SLS |
|------------------------------------------|------|-----|
| Variable loads, $\gamma_Q$               | 1.60 | 1.0 |
| Permanent loads, $\gamma_G$              | 1.4  | 1.0 |
| Lateral earth pressure, $\gamma_e$       | 1.35 | 1.0 |
| Hydrostatic, $\gamma_u$                  | 1.35 | 1.0 |
| <i>(Based on CIRIA C680, Clause 4.6)</i> |      |     |

#### 1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

##### Depths

|                                       |         |
|---------------------------------------|---------|
| Depth to structure invert, $H$        | 3.117 m |
| Polystorm structure depth, $h_1$      | 1.200 m |
| Design depth, $z$<br>( $= H - 0.2m$ ) | 2.917 m |
| Cover depth, $h_c$<br>( $= H - h_1$ ) | 1.917 m |

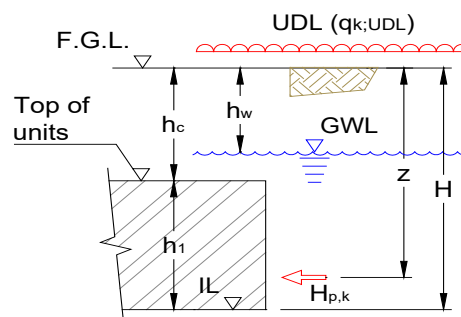


Figure 1) Idealised illustration of installation

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### Assumed ground conditions

*Based on the description given in Ibex CE Ltd SI report Ref: ICE0391-GAR-JAN25; BH: Various*

#### Native soil

|                             |                        |           |
|-----------------------------|------------------------|-----------|
| Shearing resistance, $\phi$ | 24°                    |           |
| Density, $\gamma_k$         | 20.0 kN/m <sup>3</sup> | [Assumed] |

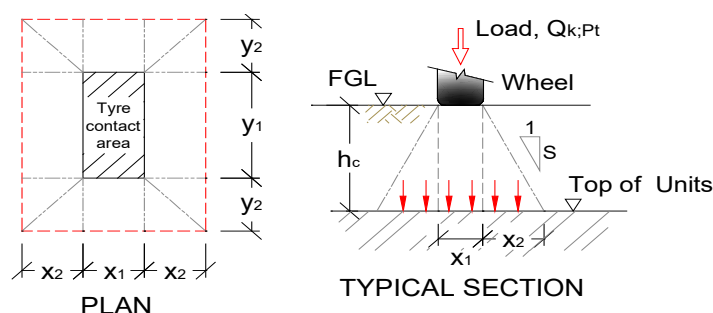
|                                           |       |  |
|-------------------------------------------|-------|--|
| Active earth pressure co-efficient, $K_a$ | 0.422 |  |
| ( $= [1 - \sin \phi] / [1 + \sin \phi]$ ) |       |  |

#### Ground water

|                        |                        |           |
|------------------------|------------------------|-----------|
| Depth below FGL, $h_w$ | 0.523 m                |           |
| Density, $\gamma_w$    | 10.0 kN/m <sup>3</sup> | [Assumed] |

### 1.4 Assumed Transient (Live) Loads

*For illustrative purposes, vehicle loading assumed*



**Figure 2) Concentrated load parameters**

|                                         |                                                             |                         |
|-----------------------------------------|-------------------------------------------------------------|-------------------------|
| Loading classification                  | Rigid HGV parking, access or small estate road [ $<15$ mph] | [CIRIA C680; Table 4.2] |
| DIN 1072 classification                 | 30/30                                                       | [CIRIA C680; Table 4.2] |
| Max Gross vehicle weight                | $< 30,000$ Kg                                               | [CIRIA C680; Table 4.2] |
| Uniformly distributed load, $q_{k;UDL}$ | 10.0 kN/m <sup>2</sup>                                      | [CIRIA C680; Table 4.2] |
| Concentrated wheel load, $Q_{k;Pt}$     | 50.0 kN                                                     | [CIRIA C680; Table 4.2] |
| Dynamic load factor, $\Phi$             | 1.0                                                         | [Assumed]               |
| Contact area - Length, $y_1$            | 0.400 m                                                     | [CIRIA C680; Table 4.2] |
| - Width, $x_1$                          | 0.200 m                                                     | [CIRIA C680; Table 4.2] |
| Load distribution, $S$                  | 1 in 2.0                                                    | [Assumed]               |
| Additional load spread, $x_2$ & $y_2$   | 0.958 m                                                     |                         |
| ( $= h_c / S$ )                         |                                                             |                         |

### Unfactored

|                                                                    |                              |                                |
|--------------------------------------------------------------------|------------------------------|--------------------------------|
| Imposed load, $q_{k;Pt}$                                           | <b>10.2 kN/m<sup>2</sup></b> | [> Uniformly distributed load] |
| ( $= [Q_{k;Pt} \cdot \Phi] / [(x_1 + 2x_2) \times (y_1 + 2y_2)]$ ) |                              |                                |

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## Preliminary Polystorm Performance Assessment

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### 2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782).

#### 2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit.

##### Unfactored

Pressure derived from concentrated load gave worst case transient parameter, refer to Section 1.4

|                             |                              |                                           |
|-----------------------------|------------------------------|-------------------------------------------|
| Live load, $q_{k,*}$        | <b>10.2 kN/m<sup>2</sup></b> | [* - Pt; refer to Section 1.4]            |
| Dead load, $G_k$            | <b>38.3 kN/m<sup>2</sup></b> | [Worst case load - Ignoring ground water] |
| $(= [h_c \times \gamma_k])$ |                              |                                           |

##### Factored

|                                                       |                              |                                                          |
|-------------------------------------------------------|------------------------------|----------------------------------------------------------|
| ULS, $V_{d;ULS}$                                      | <b>70.0 kN/m<sup>2</sup></b> | [ < 221.8 kN/m <sup>2</sup> Therefore OK ]               |
| $(= [q_{k,*}] \gamma_{Q;ULS} + [G_k] \gamma_{G;ULS})$ |                              |                                                          |
| Degree of utilization, $\Lambda_{STR}$                | <b>32%</b>                   | $(= X_{k;VC} / f_{m;ULS} ; \text{Refer to Section 1.0})$ |
| SLS, $V_{d;SLS, \delta}$                              | <b>10.2 kN/m<sup>2</sup></b> |                                                          |
| $(= [q_{k1;Pt}] \gamma_{Q;SLS})$                      |                              |                                                          |
| SLS, $V_{d;SLS, \epsilon}$                            | <b>38.3 kN/m<sup>2</sup></b> |                                                          |
| $(= [G_k] \gamma_{G;SLS})$                            |                              |                                                          |

#### 2.2 Lateral Load Imposed at Depth z

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

##### Unfactored

|                                                                              |                              |
|------------------------------------------------------------------------------|------------------------------|
| Live load, $q_{k;UDL}$                                                       | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$                                                          | <b>34.4 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$                                                      | <b>23.9 kN/m<sup>2</sup></b> |
| <u>Where <math>h_w &lt; z</math></u>                                         |                              |
| $(W_{Gk} = [h_w \times \gamma_k] + [(z - h_w) \cdot (\gamma_k - \gamma_w)])$ |                              |
| $(U_k = [z - h_w] \times \gamma_w)$                                          |                              |
| <u>Where <math>h_w &gt; z</math></u>                                         |                              |
| $(W_{Gk} = z \times \gamma_k)$                                               |                              |

|                               |                              |
|-------------------------------|------------------------------|
| Lateral pressure, $H_{p;k}$   | <b>42.7 kN/m<sup>2</sup></b> |
| $(= Ka [q_k + W_{Gk}] + U_k)$ |                              |

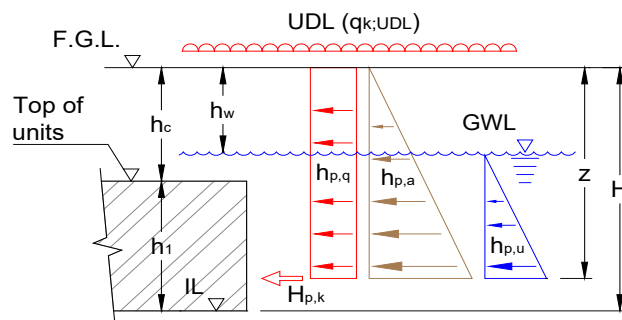


Figure 3) Idealised illustration of lateral pressure(s)

##### Factored

|                                                               |                              |                                   |
|---------------------------------------------------------------|------------------------------|-----------------------------------|
| ULS, $H_{d;ULS}$                                              | <b>57.6 kN/m<sup>2</sup></b> | [ > 53.1 kN/m <sup>2</sup> FAIL ] |
| $(= Ka [q_k + W_{Gk}] \gamma_{e;ULS} + [U_k] \gamma_{U;ULS})$ |                              |                                   |
| $(= X_{k;LC} / f_{m;ULS} ; \text{Refer to Section 1.0})$      |                              |                                   |

Therefore protective measures would be required to reduce the expected lateral imposed pressure below the Polystorm unit's design lateral strength

Consider ground improvement measures; refer to Section 2.2.1

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## Preliminary Polystorm Performance Assessment

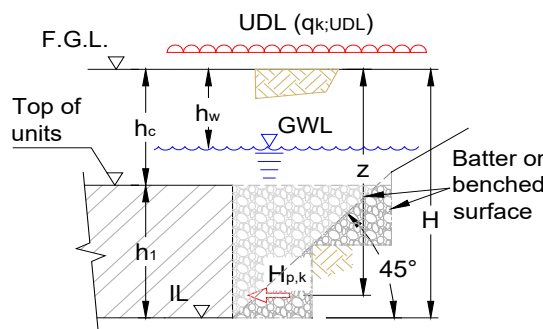
**124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks**

### 2.2.1 Lateral Load Imposed at Depth $z$ - Assuming Ground Improvement

Where the native soil conditions, adjacent to the proposed Polystorm structure, is such that it is expected that it would result in excessive imposed lateral loads; ground improvement measures may be considered.

One such method is to over excavate around the perimeter of the proposed structure and replace with a suitably compacted granular material. Provided the native soil is battered/stepped back up to a maximum  $45^\circ$  to the horizontal, the parameters of the imported material may be used to estimate the expected imposed lateral loads (refer to figure 4). Further guidance is available within CIRIA Report C680 (2008; RP782), Section 6.5.

It should be noted that the above assumes the native soil is an homogeneous material and that the proposed excavation would not intersect pre-existing slip failure surfaces within the native soil; which could result in imposed loads greater than those predicted from the assumed drained shear strength stated below. Advice should be sought from a suitably qualified geotechnical engineer where it is believed these conditions may exist.



**Figure 4)**  
Idealised illustration  
of additional soil  
excavation and  
granular material  
replacement

#### Assumed imported granular material properties

*Suitable selected granular material to achieve the minimum undrained shear strength stated below*

|                                           |                        |                                             |
|-------------------------------------------|------------------------|---------------------------------------------|
| Shearing resistance, $\phi$               | 30°                    | [Min angle of shearing resistance required] |
| Density, $\gamma_k$                       | 20.0 kN/m <sup>3</sup> | [Assumed]                                   |
| Active earth pressure co-efficient, $K_a$ | 0.333                  |                                             |

#### Unfactored

|                         |                              |
|-------------------------|------------------------------|
| Live load, $q_{k;UDL}$  | <b>10.0 kN/m<sup>2</sup></b> |
| Dead load, $W_{Gk}$     | <b>34.4 kN/m<sup>2</sup></b> |
| Hydrostatic load, $U_k$ | <b>23.9 kN/m<sup>2</sup></b> |

#### Factored

|                                                                    |                              |                              |               |
|--------------------------------------------------------------------|------------------------------|------------------------------|---------------|
| ULS, $H_{d;ULS}$                                                   | <b>52.3 kN/m<sup>2</sup></b> | [ < 53.1 kN/m <sup>2</sup> ] | Therefore OK] |
| SLS, $H_{d;SLS}$                                                   | <b>38.7 kN/m<sup>2</sup></b> |                              |               |
| $( = K_a [q_k + W_{Gk}] \gamma_{e; SLS} + [U_k] \gamma_{U; SLS} )$ |                              |                              |               |

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## Preliminary Polystorm Performance Assessment

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### 3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

#### 3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced.

|                                                         |                               |            |               |
|---------------------------------------------------------|-------------------------------|------------|---------------|
| Design strength; $X_{d;VD}$                             | 40.0 kN/m <sup>2</sup> per mm |            |               |
| $(= X_{k;VD} / f_{m;SLS}; \text{refer to Section 1.0})$ |                               |            |               |
| SLS, $V_{d;SLS}$                                        | 10.2 kN/m <sup>2</sup>        |            |               |
| Deflection, $\delta_V$                                  | 0.25 mm                       | [ < 1.0 mm | Typically OK] |
| $(= V_{d;SLS} / X_{d;VD})$                              |                               |            |               |

#### 3.2 Vertical Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

|                                                               |                         |                             |                                                 |
|---------------------------------------------------------------|-------------------------|-----------------------------|-------------------------------------------------|
| Creep test load, $X_{d;V,cr}$                                 | 162.0 kN/m <sup>2</sup> |                             |                                                 |
| SLS, $V_{d;SLS}$                                              | 38.3 kN/m <sup>2</sup>  | [ < 162.0 kN/m <sup>2</sup> | Therefore OK]                                   |
| Degree of utilization, $\Lambda_{STR}$                        | 24%                     |                             |                                                 |
| Creep data limit, t                                           | 60 years                |                             | [Unit has a durability life in excess of 50yrs] |
| Estimated unit creep, $\epsilon_{h,c}$                        | 3.7 mm                  | [ < 9.0 mm                  | Therefore OK]                                   |
| $(= 0.2798 \ln [\text{design life, } t]); t \text{ in hours}$ |                         |                             |                                                 |
| Degree of utilization, $\Lambda_{STR}$                        | 41%                     |                             | [Refer to Section 1.1; based on test load]      |

#### 3.3 Lateral Deflection

|                                                         |                              |             |                                            |
|---------------------------------------------------------|------------------------------|-------------|--------------------------------------------|
| Design strength; $X_{d;LD}$                             | 6.7 kN/m <sup>2</sup> per mm |             |                                            |
| $(= X_{k;LD} / f_{m;SLS}; \text{refer to Section 1.0})$ |                              |             |                                            |
| SLS, $H_{d;SLS}$                                        | 38.7 kN/m <sup>2</sup>       |             |                                            |
| Deflection, $\delta_L$                                  | 5.75 mm                      | [ < 14.0 mm | Therefore OK]                              |
| $(= H_{d;SLS} / X_{d;LD})$                              |                              |             |                                            |
| Degree of utilization, $\Lambda_{STR}$                  | 41%                          |             | [Refer to Section 1.1; based on test load] |

### Note

Where ground water is expected to be present above the invert level of the proposed geocellular structure, due consideration should be given to undertaking a buoyancy (Uplift limit state, UPL) check

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## Polystorm Uplift / Buoyancy Check - Based on Eurocode 7

124636 - Land At, 147 - 149 College Lane, Hurstpierpoint, Hassocks

### Design factor of safety (FoS)

| Ultimate Limit State  |                                   | Uplift (UPL) |                                          |
|-----------------------|-----------------------------------|--------------|------------------------------------------|
| Permanent actions (G) | - Stabilising, $\gamma_{G,stab}$  | 0.9          | [Table A.NA.15, NA to BS EN 1997-1:2004] |
|                       | - Destabilising, $\gamma_{G,dst}$ | 1.1          | [Table A.NA.15, NA to BS EN 1997-1:2004] |
| Variable actions (Q)  | - Stabilising, $\gamma_{Q,stab}$  | 0            | [Table A.NA.15, NA to BS EN 1997-1:2004] |
|                       | - Destabilising, $\gamma_{Q,dst}$ | 1.5          | [Table A.NA.15, NA to BS EN 1997-1:2004] |

### Assumed installation parameters

|                  |                                                                          |                        |           |
|------------------|--------------------------------------------------------------------------|------------------------|-----------|
| Material density | - granular backfill, $\gamma_{BK}$                                       | 20.0 kN/m <sup>3</sup> | [Assumed] |
|                  | - water, $\gamma_{Wk}$                                                   | 9.81 kN/m <sup>3</sup> | [Assumed] |
|                  | - saturated backfill, $\gamma'_{BK}$<br>(= $\gamma_{BK} - \gamma_{Wk}$ ) | 10.2 kN/m <sup>3</sup> |           |
| Depths           | - GL to structure IL, H                                                  | 2.594 m                |           |
|                  | - GL to GWL, $h_w$                                                       | 0.000 m                |           |

### Proposed Polystorm structure

|                        |         |
|------------------------|---------|
| Unit description       | Deep    |
| Product code           | PSM5    |
| Structure depth, $h_1$ | 1.200 m |
| Cover depth, $h_c$     | 1.394 m |

### Actions

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| Displaced water volume, $Vol_{cell}$ | 1.20 m <sup>3</sup> /m <sup>2</sup> |
|--------------------------------------|-------------------------------------|

### Characteristic destabilising

|                                                                |                         |
|----------------------------------------------------------------|-------------------------|
| Water uplift, $U_{Gk}$<br>(= $\gamma_{Wk} \times Vol_{cell}$ ) | 11.77 kN/m <sup>2</sup> |
|----------------------------------------------------------------|-------------------------|

### Characteristic stabilising

|                |                                                                                                        |                         |                           |
|----------------|--------------------------------------------------------------------------------------------------------|-------------------------|---------------------------|
| Self weight of | - Polystorm structure, $W_{Gk1}$                                                                       | 0.65 kN/m <sup>2</sup>  | [Polypipe technical data] |
|                | - Backfill, $W_{Gk2}$<br>( If $h_w < h_c = \gamma_{BK} \times h_w$ ; else = $\gamma_{BK} \times h_c$ ) | 0.00 kN/m <sup>2</sup>  |                           |
|                | - Saturated fill, $W'_{Gk2}$<br>(= $\gamma'_{BK} \times [h_c - h_w]$ )                                 | 14.20 kN/m <sup>2</sup> |                           |

### Effects of Actions

|                                                                                           |                         |                      |
|-------------------------------------------------------------------------------------------|-------------------------|----------------------|
| Destabilising design vertical actions, $V_{d,dst}$<br>(= $\gamma_{G,dst} \times U_{Gk}$ ) | 12.95 kN/m <sup>2</sup> |                      |
| Stabilising design vertical actions, $V_{d,stab}$<br>(= $\gamma_{G,stab} \times W_{Gk}$ ) | 13.37 kN/m <sup>2</sup> |                      |
| Degree of utilization, $\Lambda_{UPL}$<br>(= $V_{d,dst} / V_{d,stab}$ )                   | 97 %                    | < 100%; Passes Check |

### Traditional Verification of Stability Against Uplift

|                                                     |     |
|-----------------------------------------------------|-----|
| Traditional lumped FoS, F<br>(= $W_{Gk} / U_{Gk}$ ) | 1.3 |
|-----------------------------------------------------|-----|

### Notes

- 1 Groundwater assumed to act as a permanent destabilising action
- 2 If uncertainty in the level of ground or free water exists, consideration should be given to the application of a safety margin to the assumed characteristic water level
- 3 The above assessment assumes that the Polystorm structure is completely flexible and that there is negligible frictional resistance between the geocellular structure and the native soil. The uplift stability verification has therefore been simplified, based on a m<sup>2</sup> (plan area) basis.

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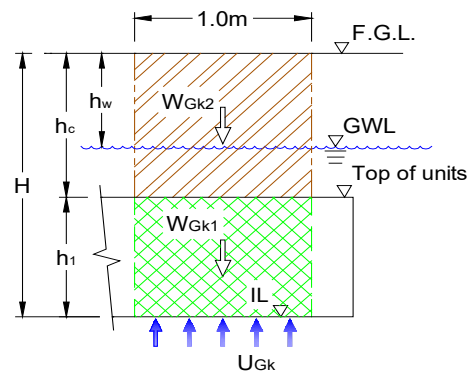


Fig 1) Definitions illustration

# **Appendix G**

## **Southern Water Correspondence**



Mr Samuel Hinson  
MBP2  
Meadowhall Business Park  
Carbrook Hall Road  
Sheffield  
South Yorkshire  
S9 2EQ

Your ref  
22110

Our ref  
DSA000046881

Date  
22 October 2025

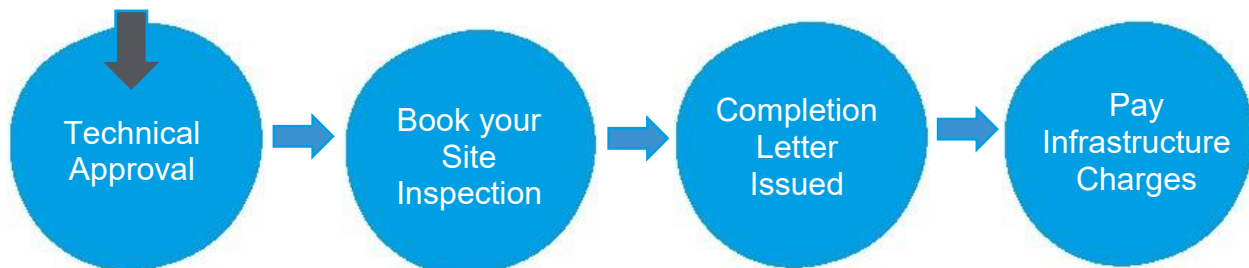
Contact  
Tel: 07460 644246

Dear Mr Hinson,

Application to Connect to the Public Sewerage System - Section 106.

Location: College Lane, Hurstpierpoint, West Sussex, BN6 9AJ.

You are here



#### What happens next?

1. This is your technical approval.
2. Construction of the wastewater connection begins. Once completed, ensure you book a site inspection, so we know the connection is in line with your application.
3. Once the site inspection has confirmed the work is satisfactory, a completion letter will be issued. See the Essential Sewer Connection Information document to find out why this letter is important.
4. Your infrastructure charge invoice will be issued (if applicable\*).

#### How to book your site inspection

To progress, select the '**Accept**' option on the Get Connected customer dashboard. Or, if you have further questions, please select the 'Query' option. If you do not wish to progress with the application, then please select the 'Withdraw' option.

Southern Water, Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX  
[southernwater.co.uk](https://www.southernwater.co.uk)

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670



Now you have received our approval, you will need to arrange with your contractor to carry out your works on site to connect into our sewer. Once the connection has been made it is a mandatory requirement for the point of connection to be inspected by one of our Assistant Adoption Managers.

To arrange this inspection, please select '**Ready for Inspection**' on your Get Connected customer dashboard. Once this has been selected, please contact **Malcolm Penny** our Assistant Adoption Manager for this area on **07922 860784** and request an inspection giving at least two full working days' notice.

Once we are happy that your connection to the public sewer complies with our requirements and have passed our inspection, we will send you a completion letter within 7 working days. It's important to ensure your connection is inspected to prevent any risk of disconnection at a later date.

### Technical Approval

We are pleased to advise that your Section 106 application to connect **Foul & Surface Water** to the public **Foul** sewer, as shown on your drawing **S12809 JNP XX XX DR C 2001**, revision **P04**, dated **09/10/2025**, is approved by Southern Water. Our approval means we are satisfied with your connection method. Inspection of the wastewater connection is required to complete your Section 106 application. Please note approval is valid for 2 years from date of issue.

Connections to existing/new Southern Water assets (i.e., manholes) and the arrangement of Southern Water assets (i.e., pipe junctions within manholes) should always be in accordance with the new Design and Construction Guidance manual ("the Code") and Southern Water's guidance documentation. [water.org.uk/sewerage-sector-guidance-approved-documents/](https://www.southernwater.co.uk/sewerage-sector-guidance-approved-documents/)

This Section 106 approval does not confirm that public sewer network capacity is available at your location for the proposed development. The availability of capacity may be assessed through the Pre-Planning Enquiry process.

Please note that your connection should not proceed if:

- There are unapproved changes to your submitted plan or to the intended connection point. Any unapproved changes may lead to us disconnecting your connection under Section 109 of the Water Industry Act 1991.
- The relevant Planning Authority has set out conditions relating to the site's drainage and those conditions have not yet been discharged.
- You have not consulted our Health and Safety Advisory that can be viewed at the following link [southernwater.co.uk/developing-building/health-and-safety](https://southernwater.co.uk/developing-building/health-and-safety)
- You have not obtained the necessary Building Regulations Approvals or, if relevant, obtained a Highway Authority Road Opening License.
- Landowner consent has not been obtained where your connection is to be made through another Party's land.

Please contact the Developer Services Team via the Get Connected customer dashboard / on 0330 303 0119 should you require any further advice.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Dale Hughes', with a horizontal line drawn underneath it.

**Dale Hughes**  
**Technical Coordinator - Wastewater**  
**Developer Services**  
**07460 644246**



## Essential Sewer Connection Information

1. Site Inspection Checklist
2. What happens if the sewer connection is not inspected?
3. Adoption of a sewer
4. Infrastructure charges
5. Enforcement Policy

### 1. Site Inspection Checklist

We have prepared a site inspection checklist so that inspection of your sewer connection can be passed first time [southernwater.co.uk/media/3028/ds-site-inspection-checklist.pdf](https://southernwater.co.uk/media/3028/ds-site-inspection-checklist.pdf)

### 2. What happens if the sewer connection is not inspected and a completion letter is not issued?

Incidences where construction of the sewer connection has been completed but a site inspection has not been requested then the sewer connection application is not completed. You will need to request for a site inspection to finalise the application. If the sewer connection has not been built as per the designs submitted then we will ask you to rectify.

### 3. Adoption of a sewer

When a new development is planned, the developer can construct the sewers using approved materials and to a standard, which makes them suitable for adoption by Southern Water when construction is complete.

An adoption agreement can be entered into under Section 104 of the Water Industry Act 1991, prior to the sewers being built. This is the most desirable arrangement and if all new developments were covered by such adoption agreements, there would be few, if any, new private sewers on housing estates. However, there are many kilometres of existing private sewers that were built without an adoption agreement in place.

Section 102 of the Water Industry Act 1991 provides for the adoption of such sewers to be considered. It is important to draw a distinction between sewers, drains, and lateral drains:

- Sewers are pipes carrying sewage from more than one property
- Drains are pipes carrying sewage from only one property to the curtilage of the building or premises
- Lateral drains are those pipes which extend from the curtilage of a single building to the point of connection with an existing public or private sewer



To start the process of having the private sewer adopted, please visit our website and fill in the S102 Adoption Form.

#### **4. Infrastructure charges**

New developments increase the load on our networks and may require investment in upstream network reinforcement. This investment is funded through the Infrastructure Charge where the cost of network reinforcement is levied per property at the time of final connection.

\* In addition to the sewer connection application charge, a charge for sewerage infrastructure is levied on each dwelling connecting onto the sewerage system. Non domestic properties will be individually assessed according to the number of appliances/fittings producing wastewater. Infrastructure charges are applicable even if the connection is made via a private sewer providing that the private sewer ultimately discharges into the public system.

There are three scenarios:

1. Water and wastewater connections are made within Southern Waters supply area. Infrastructure charges will be included in you water connection quote.
2. Water connections are made within another water company's supply zone and Wastewater is within the Southern Water supply area. Infrastructure charges will be invoiced following connection of the meters as advised by each water company.
3. You already have a water connection and require a wastewater connection in the Southern Water supply area. Infrastructure charges will be invoiced directly following completion of the wastewater connection.

For information and our current Connection Charges please refer to section 2 of the Southern Water Charging Arrangements [Connection charging arrangements \(southernwater.co.uk\)](https://www.southernwater.co.uk/connection-charging-arrangements)

#### **5. Enforcement Policy**

It is an offence to not comply with the requirements of a S106 Water Industry Act 1991, which are detailed in the body of the letter. This can result in prosecution and a fine and/or removal of the illegal connection.



Mid Sussex District Council  
Oaklands  
Oaklands Road  
Haywards Heath  
West Sussex  
RH16 1SS

Your ref  
DM/25/2724

Our ref  
DSA000048847

Date  
25<sup>th</sup> November 2025

Contact  
Tel 0330 303 0119

Dear Sir/Madam,

**Proposal:** Discharge of planning conditions nos 4, 5, 6, 8 and 20 relating to planning application DM/25/1379

**Site:** Land at 147 To 149 College Lane, Hurstpierpoint, West Sussex, BN6 9AF.

Thank you for your correspondence. Please see our comments below regarding the above planning consultation application.

Southern Water can discharge Condition 4 as required details have been recieved

We cannot comment on Conditions 5 (External Levels), 6 (Bat Method Statement) ,8 (Materials Schedule) and 20 (Hard Landscaping) as theses do not relate to drainage.

For further advice, please contact Southern Water, Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX (Tel: 0330 303 0119).

Website: [southernwater.co.uk](https://southernwater.co.uk) or by email at: [SouthernWaterPlanning@southernwater.co.uk](mailto:SouthernWaterPlanning@southernwater.co.uk)

Yours faithfully,  
Future Growth Planning Team  
[southernwater.co.uk/developing-building/planning-your-development](https://southernwater.co.uk/developing-building/planning-your-development)