BMConstruction

Method Statement / Safe System of Work

1.0 Project Particulars

1.1 Project Title

Turkey Mill

1.2 Project Location

Turkey Court
Ashford Road
Maidstone ME14 5PP

1.3 Client

Judge Architects

1.4 Scope of Work Covered by this Method Statement / Safe System of Work

Drainage Installation (Private and Adoptable)

1.5 Proposed Commencement Date

04/05/2021

Serial Number

BMC.RAMS.DRAIN.1

Revision Number

1

Revision Due Date

See index sheet

PTW required

○ Yes ○ No

● Dependent on Client, Contract, or Activity

3rd Party Approval required?

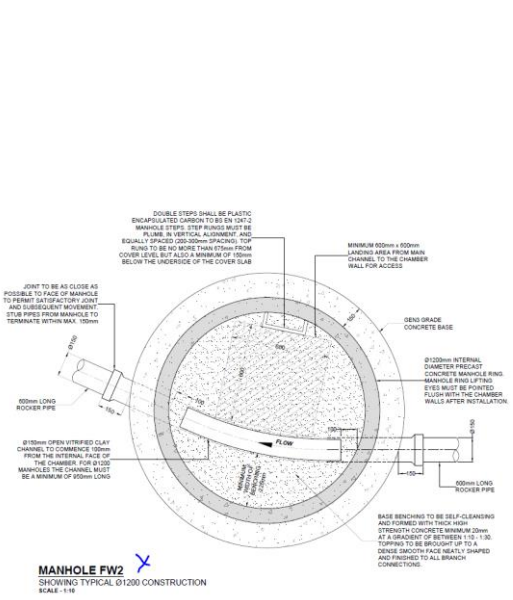
○ Yes ● No

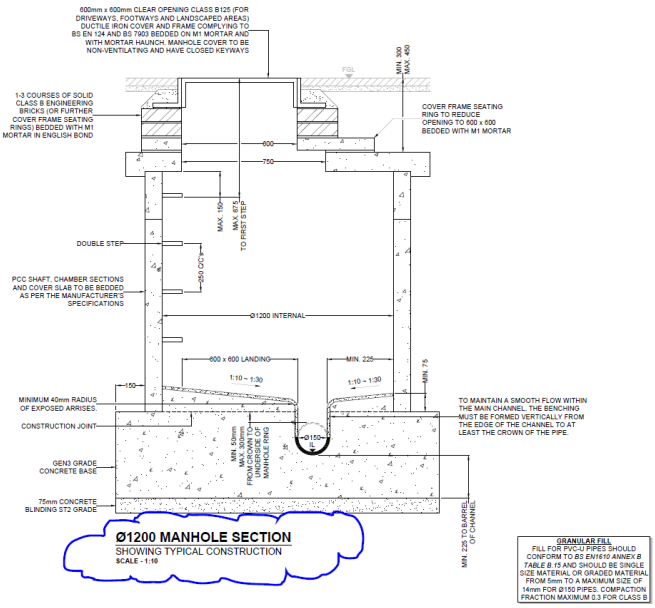
2.0 Introduction

Drainage installation dealt with within this Method Statement falls into two distinct categories; Adoptable drainage, generally laid under estate roads with a connection to an existing adopted drainage system usually constructed from clay, concrete or a combination of both. Private drainage usually falls within the demise of the property boundaries and is constructed from plastic, clay or a combination of both. The laying of drainage will involve a large degree of excavation for which reference must be made to TC-MS-001 Excavations which details all required trench support with the exception of manhole 'boxes' which are covered within this Method Statement.

Please Note:
All deliveries are not to be offloaded into the bridge due to a weight restriction on the bridge. Materials are to be transported with the use of a dumper.

Job Specific Drawing Detail



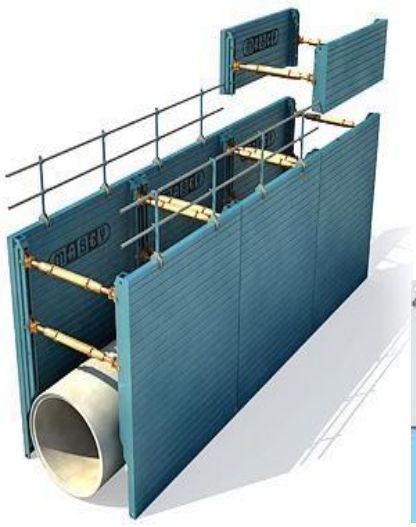


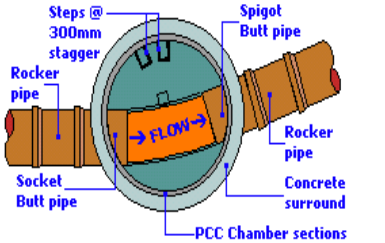
3.0 Procedure Analysis

3.1.0 Activity - **Adopted Drainage**

3.1.1 Prior to excavation the site engineer shall set out the line of the drainage to be installed (refer to TC-MS-002 Conduct of Engineering & Management Staff On Site)

3.1.2 **Adoptable Manholes.** The excavation shall then be dug to the level as indicated by the engineer (reference shall be made to TC-MS-001 Excavations and TC-MS-008 Plant Operations (Including Quick Hitches)). A 'manhole box' (see illustration) shall then be lowered into the excavation such that it comes to rest on a ledge to a maximum of 1 metre above the base of the excavation (in wet or previously dug soils then the box should be inserted further into the excavation to prevent soil from coming in from under the box), concrete (ST1 Sulphate Resistant) shall then be poured in to form the base of the manhole before the 'spigot/ socket butt pipe' and 'rocker' (two 1m long pipes placed at any entry or exit point to/from the manhole) are lowered into place by the (appropriately Certified for lifting) 360˚ Excavator, the correct fall shall be set either by means of pipe laser or site engineer before the 'channel' is installed into the base and the 'benching' is roughly shaped (for finishing later), see diagrams below.





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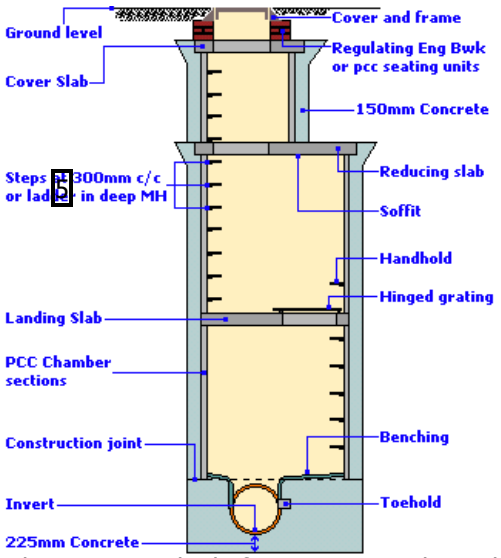


3.1.3 The first Pre-Cast Concrete (PCC) manhole ring shall then be installed resting on a bed of concrete just above the level of the socket/spigot butt pipes (see diagram above), a second and possibly third PCC section shall be placed before a manhole shutter is placed around the PCC sections with 150mm gap all around the installed sections, a temporary cover slab safety frame shall be placed over the uppermost PCC Section, this will provide access for an operative to stand on whilst concrete is poured into the shutter,(see photo below), the operative will apply a vibrating poker to ensure suitable compaction of the concrete within the shutter. Once the concrete has cured sufficiently the shutter is removed by unbolting it at the join (this operation is done from a secured ladder within the manhole box). Once the shutter is removed the excavation shall be backfilled to approximately 100mm below the finished concrete line.

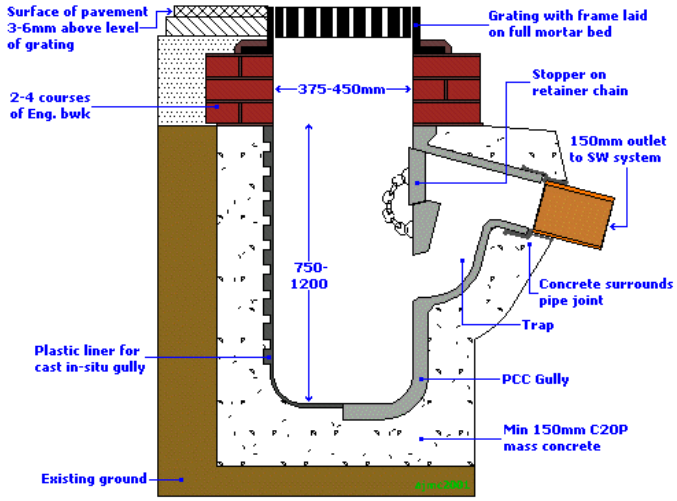
3.1.4 The placement of PCC manhole rings shall continue with concreting carried out every two or three ring sections as described in 3.1.3 above until the cover slab level is reached, the cover slab shall be lowered into position by means of a suitably rated and certified 360° excavator utilising suitably rated and certified chains connected to the cover slab by means of the pre-cast lifting eyes within the slab and seated on the uppermost PCC ring, a bed of mortar may be used to seat the cover slab (optional, to specification). Occasionally, as in the illustration above, the chamber size reduces, here the method varies only in as much as a reducing slab shall be installed (using the same means as above for the cover slab) and the manhole construction shall continue with the placement of reduced size PCC manhole rings as described in 3.1.3 above until the cover slab level is reached. Similarly, on occasion a 'landing slab' shall be incorporated within the manhole construction, this shall be fitted at the required level and construction shall continues described in 3.1.3 above.

3.1.5 Once the cover slab is fitted the final finish can be applied to the benching (using a mortar mix of sharp/soft sand, 'grano dust' and sulphate resistant cement) and the required brickwork can be built up on top of the cover slab to ground level, the specified manhole cover frame shall be fixed to the brickwork and the manhole cover fitted.

3.1.6 The line of the drainage run shall initially be marked on the surface of the ground to be dug following setting out by the site engineer, a 'pipe laser' shall be placed in the nearest manhole to ensure exact line and level are maintained. Drainage pipe work shall be fitted one length at a time, reference shall be made to TC-MS-001 Excavations for details of trench digging and support requirements. Assuming good ground conditions the trench shall be 'overdug' to a depth of no less than 150mm to allow for a bed of shingle (to specification) of 150mm depth to be placed in the bottom of the trench by means of the excavator bucket, smoothed out by a pipe laying operative. The pipes shall be lowered into the trench by means of a suitably rated and certified 360° excavator utilising suitably rated and certified strops wrapped around the pipe. 'Pipe lube' (non-toxic, water based) shall be applied to the socket/spigot, on pipe sizes below 300mm the pipe shall be rested on the bed of shingle, the strops removed and the pipe pushed home by means of a 'pipe bar' used by the pipe layer to lever the pipe home, on pipes over 300mm the machine shall lower the pipe to the surface of the shingle and support weight whilst the pipe layer uses the 'pipe bar' to lever the pipe home. The line and level of the pipe shall be checked using the 'pipe laser'. NOTE: On pipes less than the diameter specified by the adopting authority a 5 minute 'air test' shall be carried out on every length fitted, pipes over the diameter specified by the adopting authority shall be subject to a visual inspection following fitting. Backfilling over installed pipes begins by placing shingle over the pipe before gently and slowly removing the trench box allowing the shingle to infill the void it leaves as it rises. With the trench box fully removed shingle is added until the level of the shingle is 150mm above the pipe across the width of the trench, backfill above this level will be dependant upon whether a road or other formation is to be formed over the pipe run, compaction (usually utilising a remote control roller (such as the Rammax RW1504 or similar)) shall always take place to prevent excessive post installation settlement of the ground. Compaction and ground formation shall otherwise be to specification provided by the client.

3.1.7 Drainage runs are continued by repeating excavation, protection, installation, test/inspection, backfill as described above installing manholes as per construction issued drawings, fencing shall be erected to keep nonBM Construction Group LTD personnel outside of the working area, trench boxes shall usually provide the necessary edge protection to the excavation itself although these may occasionally require further supplementary fencing protection. When completed all excess materials shall be removed and the site cleared.

3.1.8 **Road gullies and interceptors**; The connecting pipe-run and location of the road gully shall be set out and excavated as outlined above. A concrete base for the gully shall be poured and the gully positioned, pipework shall be laid connecting the storm sewer to the gully, if a petrol interceptor is required this shall be installed as per the clients/manufacturers specification (attached if applicable). A concrete surround to the pipework and gully shall be poured following which brickwork and covers/gratings shall be fixed.



3.1.9 **Connection into live sewers**; Typically connection between new and existing (live) sewers will involve either connection at an existing manhole or the construction of a new manhole over and around the line of the existing live sewer, in either case the methodology is broadly similar to that outlined above with the exception in the latter case of, once the manhole is constructed the pipe of the existing run is cut to form the channel. In some instances it will be necessary to 'over-pump' from/to manholes either side of the new connection whilst work takes place. Where applicable the details relating to a live sewer connections shall be inserted in the attached 'Site Specific Assessment'. For all entry into live manholes operatives shall wear harnesses (attached to a tripod and escape winch) emergency escape breathing apparatus and a 'top man' shall be present at all times, gas detectors shall be used prior to and throughout any entry into a live manhole/sewer. **NOTE**: The relevant water authority MUST be consulted prior to connection to a live sewer and if required a Permit to Work must be issued before works start.

3.1.10 **Pumped Rising Mains**; These are often installed where due to the distance from local mains drainage (usually foul) it is impossible to achieve the required 'fall' on the drainage run. Pumped Rising Mains require the installation of a sump or 'wet-well', this usually houses a submerged pump which is controlled by float switches, the installation of pumping and electronic control gear is undertaken by specialist contractor under the cover of a separate Method Statement. The formation of the 'wet-well' itself is as per the construction of adoptable manholes (3.1.2-3.1.3 above) with three exceptions; 1. the bottom of the manhole is a flat slab formation; 2. one of the upper PCC rings will be slotted such that the output pipe from the pumps can exit at the specified level, this will be done prior to installation using a 'Stihl' saw (or similar). 3. The cover slab for the wet-well shall be custom made on-site to specifications supplied by the client/pump providers. The cover slab shall be formed on a flat plywood base to which suitable 'formers' shall be attached, reinforcement mesh shall be added before concrete to supplied specification is added, once set the cover slab shall be lifted into place by a certified 360° excavator utilising suitably rated and certified chains connected to the cover slab by means of the pre-cast lifting eyes within the slab and seated on the uppermost PCC ring.

3.1.11 The pipework for pumped rising mains is usually constructed of thermoplastic pipe-work (polyethylene (PE)) which can be jointed either by butt fusion welding (the ends of two pipes are inserted into a machine which heats the ends of the pipes before hydraulically driving them together thus fusing the pipes into one) or electrofusion welding (which involves the ends of the two pipes being inserted into a special fitting, an electrical charge is then applied which controls the welding). See below for welding details. Pipes are installed to line and level as set out by the site engineer to clients specification, welding takes place in situ as installation progresses in all other respects installation is as per other types of adoptable drainage above.

3.1.12 The **butt fusion welding technique** is used for welding pipes made from polyethylene (PE), for the water and

gas industries, and from polypropylene (PP) and polyvinylidene fluoride (PVDF) for the chemical industries. The pipes are mounted in the clamps of the butt fusion equipment and checked for initial alignment. The pipe ends are then planed to ensure that they are flat and square. The final alignment of the pipes is then checked. The welding sequence begins when a flat hot plate, at a pre-set temperature, is positioned between the two pipe ends. The pipes are pushed towards each other until the pipe ends come into contact with the hot plate and the pressure is increased to give good thermal contact. The pipe ends melt and the interface pressure forces the molten material outwards to form 'weld beads' at the outside and inside pipe surfaces; hence the term 'bead-up'

stage. At the end of this stage, the pressure is reduced to a value sufficient only to maintain the pipe in contact with the hot plate. This allows the melt depth to increase without increasing the size of the weld beads. At the end of this 'heat soak' stage, the pipe ends are pulled away from the hot plate. The hot plate is removed, and the two molten pipe ends are pushed together at the same pressure as used during the initial bead-up stage. This causes further growth of the weld bead and is called the 'bead roll over' stage. The pressure is maintained until the weld is fully cooled. Butt fusion welding of thermoplastic pipes can be carried out on a wide range of pipe sizes, typically between 63 and 1500mm outside diameter. Manual, automatic and semi-automatic butt fusion welding machines are available commercially from a number of suppliers.
The **electrofusion technique** permits joining, of pre-assembled pipes and fittings, to be carried out with minimum equipment. It also offers a number of practical advantages to the installer. It is easy to use for repairs and where the available space and pipe movement is limited. The electrofusion welding process involves the use of a fitting. This is basically an outer sleeve which the two pipe ends slide into. An internal stop at the centre of the fitting prevents the pipe ends from meeting. Fusion indicators are commonly designed into the fitting, such that when sufficient melt pressure has been generated the indicators will protrude - giving the operator a visual indication that the welding process has been carried out successfully. If the indicators fail to protrude, then the welded fitting should be cut out from the pipeline, and a new fitting should be welded in place. For successful joining of pipes, at least three important pipe preparation stages must be followed. Firstly the pipe ends must have finished squared ends. This ensures that the central cold zones function to contain the melt. Secondly, the pipe surfaces to be joined must be properly scraped to reveal uncontaminated material. With the electrofusion joining process, there is little or no relative movement between the pipe and the coupler. Therefore, any contamination on the pipe surface is retained at the joint interface, which can significantly reduce the strength of the joint. Finally, the pipe and fitting should be clamped during welding to eliminate relative movement. This ensures that the molten polymer is contained at the fusion interface, allowing the development of a strong joint.

3.2.0 Activity - **Private Drainage**

3.2.1 Prior to excavation the site engineer shall set out the line of the drainage to be installed (refer to TC-MS-002 Conduct of Engineering & Management Staff On Site)

3.2.2 The drainage run shall then be dug by 360˚/180˚ Excavator to the indicated depth allowing for a bed of shingle beneath the pipe run (reference shall be made to TC-MS-001 'Excavations'). NOTE; Generally private drainage will not exceed 1.5m in depth

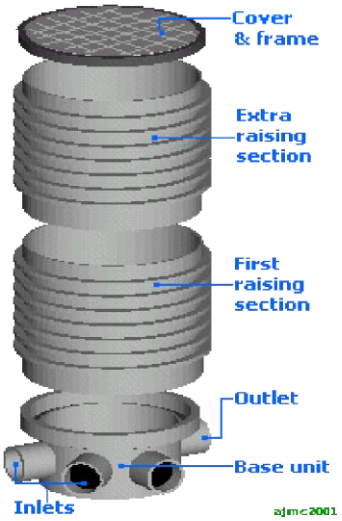
Inspection Plastic

Chamber inspection

Base

Unitchamber

showing base, raising pieces and cover with frame



3.2.3

Plastic pipes shall be laid to the required level with the specified fall (typically 1:80) using a spirit level to determine fall. Plastic pipe fittings generally incorporate a rubber seal, jointing lubricant (non-toxic, water based) may be used to assist coupling.

3.2.4 Private drainage manholes are of plastic construction placed on a 150mm bed of shingle, incoming/outgoing pipes are connected and 300mm preformed plastic raising sections are then attached (as many as required to reach ground level) with any excess being trimmed with a saw, a manhole frame then clips onto the top of the final raising section and the cover can then be placed.

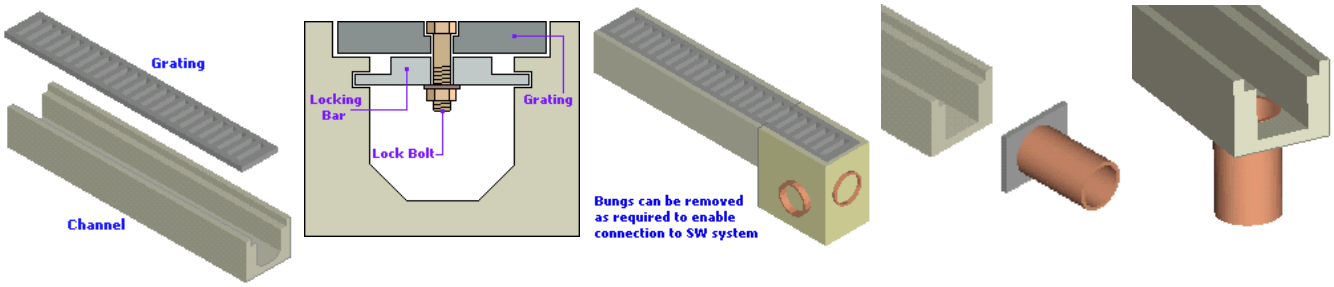
3.3.0 Activity - **Drainage Installation in Poor (Waterlogged) Ground Conditions**

3.3.1 Methodology for drainage installation where excessive water ingress into excavations poses additional challenges is nonetheless broadly similar to the methodology for adopted drainage above (private drainage is not generally affected due to its shallow depth).

3.3.2 Significant alterations to methodology involve 'over-digging' excavations for manholes and drainage runs and placing a deep bed of shingle to accommodate flowing water.

3.3.3 Where the deep bed of shingle alone cannot accommodate/control the excessive water ingress a sump shall be dug into the shingle and a pump used to discharge (with appropriate licence from the EA) excess water. Where such problems are encountered on site then the methodology to be employed shall be detailed in the attached 'Site Specific Assessment'.

3.4.0 Activity - **Linear Drainage Installation**



Above; Illustrations showing typical linear surface water drainage system components with from the left; an expanded view of a complete section, a grate fixing detail, a 'silt-box' type connection, a pipe union end cap and bottom outlet connections

3.4.1 The connecting pipe-run and location of the linear drainage system shall be set out and excavated as outlined above. A concrete base for the polymer concrete units shall be poured and the units positioned, pipework shall be laid connecting the storm sewer to the linear drain, if a petrol interceptor is required this shall be installed as per the clients/manufacturers specifications (attached if applicable). A concrete surround to the pipework shall be poured following which the gratings shall be fixed.

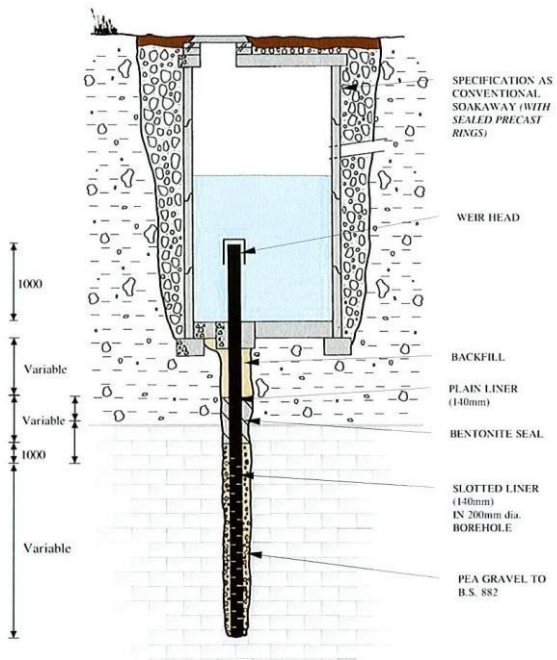
3.5.0 Activity - **Soakaway Installation**

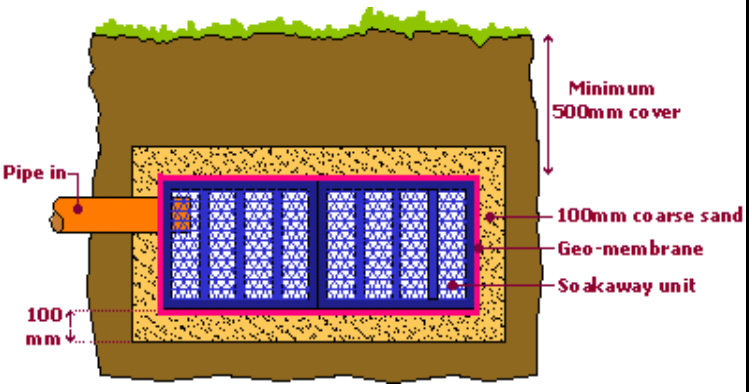
3.5.1 Soakaway installation will obviously depend upon client specification, notably there are two quite distinct types of soakaway; shallow and deep. Additionally within this section the construction of storm-water holding cells will be included.

3.5.2 **All soakaways and storm-water holding cells** will require setting out by the site engineer (refer to TC-MS002 Conduct of Engineering & Management Staff On Site) following which they shall require excavation and (dependant on depth, ground conditions and whether operatives are to access the excavation), support (refer to TC-MS-001 Excavations)

3.5.3 **Shallow soakaways** typically involve an excavation of between 1-2.5 metres, they may be left unlined but are often lined with a geo-textile (Teram or similar) before being filled with aggregate, hardcore or alternatively a proprietary modular system (such as 'Aquacell'™ by Wavin, as illustrated below top right) may be specified, once the specified fill is completed and the incoming pipe-work installed the top is sealed, again with a geotextile

(Teram or similar) before back-filling and finishing works to client specification.





3.5.4 **Deep Soakaways** are usually only suitable where there are permeable strata at depth e.g: Clay with flints over Chalk (parts of Kent, Sussex, Hants, Berks, Bucks, Herts, Beds, Cambs), as the illustration above left shows (indicative illustration only-not all elements will be included in all deep soakaways) the soakaway consists of pre cast manhole rings sufficient to create an adequately sized 'holding chamber' with an augered borehole in the base of the chamber to allow water to dissipate. Construction of the 'holding chamber' is largely as per adoptable manholes above, specifically; following setting out an excavation shall then be dug to the level as indicated by the engineer (reference shall be made to TC-MS-001 Excavations). A 'manhole box' (see illustration) shall then be lowered into the excavation such that it comes to rest on a ledge approximately ½ metre above the base of the excavation, a suitably sized (in the case of a 200mm borehole 225mm duct would be appropriate) section of twin-wall duct (or similar) shall be placed where the borehole is to be augered concrete (ST1 Sulphate Resistant) shall then be poured in to form the base of the soakaway 'holding chamber'.
The first Pre-Cast Concrete (PCC) manhole ring shall then be installed resting on the concrete base, if the clients specification requires a concrete surround to be applied then a second and possibly third PCC section shall be placed before a manhole shutter is placed around the PCC sections with 150mm gap all around the installed sections, a temporary cover slab (with sealed access hole) shall be placed over the uppermost PCC Section, this slab will provide access for an operative to stand on whilst concrete is poured into the shutter, the operative will apply a vibrating poker to ensure suitable compaction of the concrete within the shutter. Once the concrete has cured sufficiently the shutter is removed by unbolting it at the join (this operation is done from a secured ladder within the manhole box). Once the shutter is removed the excavation shall be backfilled to approximately 100mm below the finished concrete line. The placement of PCC manhole rings shall continue with concreting carried out every two or three ring sections as described above until the cover slab level is reached, Alternatively the specification may call for the PCC rings to be bedded upon mortar without the concrete surround, in these circumstances PCC ring installation is carried out as described above with safe access (a secured ladder) being used to gain entry to the constructed elements of the chamber in order to place mortar for the jointing of the PCC rings prior to their being installed, on placing each third PCC ring, rather than the concreting operation described above, reject material or other as per clients specification shall be used to backfill around the installed PCC rings. The placement of PCC manhole rings shall continue with backfilling carried out every two or three ring sections as described above until the cover slab level is reached. Once cover slab level is reached the final concreting/backfilling is carried out before the area is made safe with Heras fencing for hand-over to the drilling contractor (supplied by others) whom will auger the borehole from the top of the chamber, once these works are complete BM Construction Group LTD will retake possession of the chamber and the cover slab shall be lowered into position by means of a suitably rated and certified 360° excavator utilising suitably rated and certified chains connected to the cover slab by means of the pre-cast lifting eyes within the slab and

seated on the uppermost PCC ring, a bed of mortar may be used to seat the cover slab (optional, to specification) the required brickwork can be built up on top of the cover slab to ground level, the specified manhole cover frame shall be fixed to the brickwork and the manhole cover fitted.

3.5.5 **Storm Water Holding Cells** can come in a variety of shapes and sizes, specifications vary in the load that they are capable of taking as well as the volume of water they can hold, all of these factors are entirely dependant upon client specification. In general however, their construction methodology varies little, following excavation the area is lined with an impermeable membrane before being filled with a proprietary modular system (such as 'Aquacell'™ by Wavin, as illustrated above lower right), once the specified fill is completed and the pipe-work installed the top is sealed, again with an impermeable membrane before back-filling and finishing works to client specification.

4.0 Resourcing

4.1 Labour All works will be carried out by BM Construction Group LTD direct operatives

4.2 Plant
360˚/180˚ Excavator
Dumper
Slings, chains, shackles etc.
Assorted hand tools

4.3 Materials All materials will be sourced from suppliers on BM Construction Group LTDs approved list

4.4 PPE Hard Hat - EN397 Gloves - EN420 (as required) Boots - EN345
Eye Protection - EN166 (as required)
High-Vis Vest - EN471

5.0 Organisation

5.1 Supervision

Construction Director	Dave Lee
Site Supervisor	Adrian

5.2 Advisors

Bjorn Murphy	Director of BMC
Joanna Straham	Safety Advisors

5.3 First Aid

Site Supervisor	First Aider

6.0 Distribution

Bjorn Murphy	BM Construction Group LTD Limited - File Copy
Site Foreman	BM Construction Group LTD Limited - Site Copy
Site Manager	Client Copy

Signed:	Print name:	Date: