

2. Wastewater

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2.A MINIMUM REQUIREMENTS

- 2.A.1** The wastewater system shall be capable of serving the entire natural upstream catchment for land uses likely to prevail during the economic life of the system. Where required by reason of sound engineering design practice, the system shall be designed and built to include pumped flow to and from adjacent areas. The design period shall not be less than 50 years.
- 2.A.2** Unless otherwise approved, all subdivisions shall be designed and constructed with a piped wastewater gravity system that will provide an adequate connection, no less than 100mm diameter, to each intended building site, residential or commercial unit, tenancy or allotment and provide a suitable outlet to an approved means of wastewater disposal.
- 2.A.3** Developments that occur in areas within the Metropolitan Urban Limits without adjoining water and wastewater services may be required to contribute to the costs of making those services available to the property in addition to the network Growth Charge.
- 2.A.4** Isolated small subdivisions in rural areas outside the Auckland Metropolitan Limits may be adequately serviced by individual on-site ground disposal systems, in accordance with the [ARC Technical Publication No. 58](#) and require Discharge Permits where necessary. Developments that occur in rural areas outside the MUL will be required to pay a rural NGC. This will be calculated on a case by case basis depending on the nature of services provided by Manukau Water Limited.
- 2.A.5** Where the proposed development cannot be adequately serviced by a gravity system a public wastewater pump station, in accordance with section C, will be considered provided it is located and designed to service the entire area of land beyond reach of the gravity system.
- 2.A.6** The wastewater system shall be designed to prevent direct stormwater entry into the reticulation system and pump stations.

2.B MEANS OF COMPLIANCE

2.B.1 DESIGN STANDARDS

B1.1 Domestic Flows

- 2.B.1.1** The wastewater system shall be designed to cater for a peak domestic flow without surcharge of 5 times the average dry weather flow of 230 litres/person/day for the anticipated population density over the 50-year design life of the system. The system shall generally not be sized for less than 0.60 l/s per hectare. Specific design for development in pump station catchments shall be required.
- 2.B.1.2** The design flow shall be based on a "Colebrook - White" pipe roughness coefficient $k_s=1.50$ mm and velocity greater than 0.75 m/s. Terminating lines shall have a minimum grade of 1% for 150mm diameter lines and 1.67% for 100mm diameter lines. All lines shall be assumed to flow a minimum of half full.

2.B.2 Trade Waste

- 2.B.2.1** The specific provision for trade waste disposal within industrial and commercial developments need not be addressed at the subdivisional stage. Any subsequent trade waste application for a specific site or industry will be subject to approval by

application to [Watercare Services Ltd.](#)

2.B.2 RETICULATION LAYOUT

2.B.2.1 Layout

2.B.2.1.1 The wastewater reticulation system shall generally consist of pipelines with a minimum internal diameter of 150mm laid to a true grade and line between access manholes located at each change of direction, grade and pipe size. The space between manholes shall not exceed 90m. Refer to [drawing DS-4](#) for a typical layout.

2.B.2.1.2 Wastewater lines of 150mm diameter or greater shall join the main line at a manhole junction.

2.B.2.1.3 In subdivisions with lot areas less than 600m², the public wastewater system shall be located in the road reserve or shared access ways, preferably along the footpath with a point of connection accessible from public open space.

2.B.2.1.4 In subdivisions with lot areas of 600m² or more, wastewater lines may be located within private properties, subject to approval by Manukau Water Limited, provided they are:

- i) In areas that will not reduce the building area available i.e. within front, side and rear yard areas,
- ii) Clear of permitted building sites,
- iii) As far as practicable, on the low side of proposed sites.

2.B.2.1.5 Where a private pump station is permitted, the rising main shall be connected to the public system through a separate manhole located no less than 1.5m from the public wastewater drains.

2.B.2.2 100mm Branch lines

2.B.2.2.1 Multi-units are non-free standing buildings. Multi-level units are buildings with separate titles on more than one floor.

2.B.2.2.2 100mm diameter public branch lines may be used in accordance with drawing S4. Such lines shall comply with the following:

- i) Service a maximum of six units in residential or shopping areas, and
- ii) Have a maximum length of 40m, and
- iii) Have no other connections along the length of the 100mm branch line.

2.B.2.3 Minimum Cover and Connection depth

2.B.2.3.1 The wastewater system shall be designed with sufficient depth not to interfere with other utilities and any future driveway construction, particularly for lots with potential basement development.

2.B.2.3.2 All wastewater lines shall have a minimum cover from the finished ground level of 800mm in private land and 1200mm within the road reserve.

2.B.2.3.3 The minimum level of the private system overflow shall be 1.2m from the service connection invert. At the time of the subdivision, there should be at least a 1.2m fall from the lowest ground level within the building site to the service connection invert.

2.B.3 PIPES

2.B.3.1 Accepted Pipe Materials

2.B.3.1.1 A wastewater reticulation system constructed of the following pipe materials will be accepted:

- i) **Solid wall PVC** manufactured to AS/NZS 1260:2002 class SN16 for both 100 and 150mm nominal diameter pipes with minimum wall thickness of 4.1mm and 6.3mm respectively. The pipe shall be coloured grey and marked according to AS/NZS 1260 (showing the manufacturer's name, nominal size, the letters "PVC DWV SN16 AS/NZS 1260" and date of manufacture),
- ii) **Sandwich wall uPVC** Manukau Water Limited approved and manufactured to AS/NZS 1260:2002 class SN16 for both 100 and 150mm nominal diameter pipes,
- iii) **Vitrified clay** to comply with EN295.

2.B.3.1.2 For specific applications the following materials may also be considered:

- i) **Concrete Lined Spiral Welded Steel** manufactured to NZS 4442:1988, with one of the following external protection systems:
 - (a) High Density Polyethylene Sleeve, 'Black Jacket' to comply with AS 1518,
 - (b) 'Polyken Synergy' wrapping,
 - (c) 'Polyken YG111' wrapping.

The pipe shall be internally lined with cement mortar lining in accordance with NZS 4442:1998.

For pipes above ground and pipe bridges a zinc metal spray sealed with vinyl or epoxy coating to comply with AS/NZS 2312:2002 must be applied,

- ii) **Ductile Iron**, concrete lined, class K9 or PN 35, manufactured to AS 2280:2004 The pipe shall be externally painted with a bituminous coating and covered with a loose polythene protective sleeve to comply with AS 3680:1989 and applied in accordance with AS 3681,
- iii) **MDPE**, PE80B or PE80C manufactured to AS/NZS 4130:2003, SDR 17, coloured black,
- iv) **mPVC**, to comply with Manukau Water Limited approval.

2.B.3.1.3 The use of PVC, mPVC and MDPE pipe will not be permitted in the following situations without specific approval.

- i) Mains with a nominal diameter greater than 150mm,
- ii) In all non-residential developments,
- iii) Pipelines exceeding 4m in depth.

- 2.B.3.1.4** Consideration for the installation of wastewater pipes by the use of “trenchless technology” will only be given where open cut is not practical from depth and environmental considerations. Limitations may be placed on the material, length, gradient, jointing and grouting depending on the method of installation. Refer to C1

C1

Under verticals are not permitted on all trenchless installations. The maximum over vertical shall be one half of pipe bore.

The following shall also apply:

- i) A minimum grade of 2 % for directional drilling (pipe thrusting) and maximum length of 20m,*
- ii) A minimum grade of 1 % for laser guided drilling and maximum length of 50m,*
- iii) A minimum grade of 1 % for micro tunnelling and maximum length of 90m.*

On short lengths of line, socket pipes as in clause 2.B.3.3.1 may be used provided the oversize installation hole is appropriately grouted.

2.B.3.2 Pipe Fittings

- 2.B.3.2.1** All fittings and service connections shall be factory fabricated of similar material to the proposed system chosen and comply with the relevant standard or Manukau Water Limited approvals.

- 2.B.3.2.2** Where the reticulation system is of PVC or MDPE the main line invert connector to each manhole structure is to be of composite PVC or MDPE/Vitrified Clay Manukau Water Limited approved connector. The requirements for drop connectors are detailed in the appropriate Manukau Water Limited approved drawings.

2.B.3.3 Pipe Joints

- 2.B.3.3.1** All joints on pipes and fittings shall be factory made flexible type complying with the following specification:

- i) **PVC** - Spigot and Socket Rubber Ring Joints to AS/NZS 1260:2002. Solvent Cement Joints to AS/NZS 1260:2002 may be used on trenchless installations provided the manufacturer’s guidelines are adhered to, including the required period to set.
- ii) **Vitrified Clay** – Spigot and socket rubber ring joints to EN295,
- iii) **Ductile Iron** - AS/NZS 2280:2004,
- iv) **Concrete Lined Spiral Welded Steel** – Factory build flange joints, Butt-welded with welding band or welded socket and spigot joints. The welded joints shall be protected with ‘Polyken Synergy’ or ‘Polyken YG111’ wrapping,
- v) **MDPE** - Any jointing method is to be detailed upon application,
- vi) **mPVC** - Spigot and socket rubber ring joints to PINZ14-1:1997.

2.B.4 MANHOLES

2.B.4.1 Location

2.B.4.1.1 Manholes shall be located at a maximum spacing of 90m and at the end of all terminal lines greater than 40m in length.

2.B.4.1.2 150mm branch lines may be terminated with either a blank cap adjoining the terminating 'London Junction' or a level invert connector in accordance with clause 2.B.6.7, provided the branch lines are:

- i) Less than 40m long,
- ii) A maximum of four service connections,
- iii) Located within a grassed front or side yard area clear of driveways and other services.

2.B.4.1.3 Wherever possible, manholes shall be located clear of overland flow paths.

2.B.4.2 Construction

2.B.4.2.1 Manholes shall be of 1050 mm diameter precast concrete with factory fitted bases as detailed on [drawing DS2](#). Shallow manholes of 675mm as detailed on drawing S3 may be installed to a maximum depth of 1200mm at the end of 100mm and 150mm diameter lines.

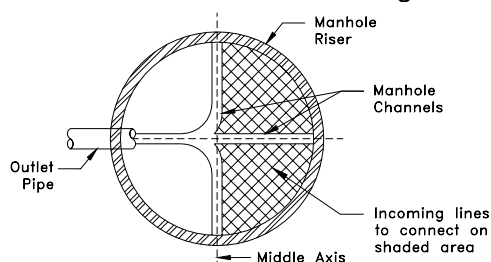
2.B.4.2.2 Outlet pipes from manholes shall have a soffit level, lower than that of the lowest incoming lines, of 20mm plus 5mm per 10 degrees of angle change between the two lines. For trunk wastewater lines with high flows the grade across the invert of a manhole shall not be less than the general grade of the wastewater line.

2.B.4.2.3 All manholes shall use Manukau Water Limited approved manhole covers and frames. Heavy-duty manhole lids are required for use on all roads.

2.B.4.2.4 All manholes with a depth exceeding 1.2m shall be provided with Manukau Water Limited approved manhole steps. In non residential areas and other highly corrosive environments, only stainless steel manhole steps shall be used.

2.B.4.2.5 Each line connecting to a manhole structure shall have an approved flexible joint within 600mm of the manhole wall. For PVC pipes, the approved manhole connector serves as a flexible joint.

2.B.4.2.6 All incoming wastewater lines shall connect at a minimum angle of 90° from the manhole outlet and have a discharge point located along the middle axis of the manhole in accordance with figure below



2.B.4.2.7 A maximum of 3 invert or 2 internal drop connections (in addition to the through line) shall be allowed into a standard 1050mm diameter manhole. A 675mm diameter concrete shallow manhole shall have a maximum of 3 invert connections.

2.B.4.3 Larger Manholes

- 2.B.4.3.1** The manhole diameter shall be increased to compensate for the reduced access space where more than two internal drop connections or more than three invert connections (in addition to the through line) are to be installed. Specific design will be required in sizing such manholes.
- 2.B.4.3.2** The manhole diameter shall be increased to 1200mm for all manholes greater than 4.5 meters deep.

2.B.5 BEDDING AND PROTECTION

2.B.5.1 Bedding and Backfill

- 2.B.5.1.1** All wastewater lines shall be thoroughly bedded, haunched and backfilled in accordance with [drawing DS7](#) for PVC, MDPE and mPVC pipelines and drawing S8 for Vitrified Clay, Ductile Iron and Concrete Lined Steel pipelines. Backfilling shall be carried out as soon as possible after pipe laying has been completed.
- 2.B.5.1.2** Where pipes may be subject to special loadings such as traffic, tree roots or buildings, special bedding and protection may be required.
- 2.B.5.1.3** For wastewater lines laid at grades steeper than 10% (including service connections) the bedding and surround material shall be of a low-grade (5MPa) scoria concrete. For lines exceeding a grade of 20% anchor blocks shall be located at pipe joints, not exceeding 6m spacing as shown on [drawing DS-09](#).
- 2.B.5.1.4** Where unstable material is encountered in the bottom of the trench prior to pipe laying the material shall be undercut either until suitable material is reached or until the Engineer considers a suitable foundation can be achieved.

The trench shall then be backfilled to bedding level with approved hard fill material placed in 250mm layers and properly compacted.

- 2.B.5.1.5** Backfilling of the trenches shall be undertaken in such a way to ensure all settlement has occurred during the phases of sub divisional earthworks, prior to building construction. Where over width or extra deep trenching is used, the extent and nature of the backfill should be identified on as built fill plans to signify the appropriate use of that area for house construction with respect to foundation and settlement conditions.

2.B.5.2 Crossing pipelines

- 2.B.5.2.1** The minimum clearance between any two crossing pipelines should be 300mm.

2.B.5.3 Loading on Pipes

- 2.B.5.3.1** All wastewater lines shall be designed and constructed to withstand all the likely loads they will be subject to during the life of the system. The load carrying capacity in relation to their installation conditions shall be calculated in accordance with AS/NZS 3725:1989 "Loads on buried concrete pipes" and AS/NZS 2566:1998 "Buried flexible pipelines" where appropriate.

2.B.6 SERVICE CONNECTIONS

2.B.6.1 General

- 2.B.6.1.1** To provide a service connection to each building a 100mm diameter line shall be extended in accordance with drawing S1 from the public wastewater system to terminate a minimum of 1.0m within each site, whether created by cross lease, unit title or subdivision. Service connections into a concrete manhole shall comply with [drawing DS4](#).
- 2.B.6.1.2** All service connections, from the main wastewater line to the site boundary or concrete shallow manhole, shall form part of the public system.
- 2.B.6.1.3** Service connections shall be laid true to line and grade at right angles to the main line, and may be connected by a Manukau Water Limited approved London Junction. Where manholes are conveniently located, service connections shall be directed to the manholes.
- 2.B.6.1.4** The maximum length of all service connections not connected to the manhole shall be 6.0m from the main line to the site boundary.
- 2.B.6.1.5** Service connections shall not be permitted to connect directly to a main line that is deeper than 4 metres. Connections for the lots to be served shall be provided from a new shallower branch line laid from a manhole on the deep main.
- 2.B.6.1.6** In the case of “fee simple” subdivisions where potential exists for further cross lease development, additional connections may be deferred when the likely siting of dwellings cannot be readily determined. In these cases, the need for possible additional servicing will be identified on the [LIR](#).
- 2.B.6.7** Where substantial improvements can be made to the drainage alignment by the deletion of the London Junction at terminal ends of lines, a level invert connector can be authorised for use in lieu of a London Junction.

2.B.7 WASTEWATER AS-BUILT REQUIREMENTS

- 2.B.7.1** The as-built plan is to be submitted by the sub-dividers representative to the Manukau Water Limited field officer at the final testing. They shall submit 5 x A3 sized copies to a scale that is clear to read and not less than 1:1000 and shall contain the following information:
- 2.B.7.1.1** The Title Plan boundaries and Lot numbers,
- 2.B.7.1.2** All existing and new sanitary sewer lines. All new lines to be coloured “Red”,
- 2.B.7.1.3** All services shall be labelled with:
- A/. Flow direction
 - B/. Pipe nominal internal diameter in mm (NB/. PE pipes to show OD)
 - C/. Pipe material e.g. PVC, DI, CLS etc
 - D/. Distance of house connection from centre of downstream manhole, and
 - E/. Depth of each Manhole to 0.1m. Each manhole should be identified as existing or new e.g. EXMH1 and the nominal diameter should be shown for all sizes other than the standard 1050mm size,

- 2.B.7.1.4** Relevant surface structures,
- 2.B.7.1.5** Final contour plan is only required where changes to the design ground level occurred that affect servicing and require further restrictions. Show “Proposed Floor Level” restriction on Lots that have less than 1.1m from Ground Level (lowest contour) Wastewater Invert level,
- 2.B.7.1.6** Schedule of all centre line coordinates of Manholes and terminal points of branch lines (which are greater than 5m long). Schedule of coordinates to 0.1metres in terms of NZDG2000,
- 2.B.7.1.7** Schedule of Manhole Lid levels, Invert levels in and Invert levels out in terms of LINZ datum and to 0.01m accuracy.
- 2.B.7.1.8** Certification of “As-builts” to be by a Chartered Professional Engineer or NZIS Registered Surveyor. This is to be recorded on the as-built to confirm accuracy within normal acceptable engineering and surveying tolerances. Council will accept as-built preparation by a person holding a NZ Certificate in Engineering and/or Surveying provided the person is working under the direction of a Chartered Professional Engineer or NZIS Registered Surveyor. For “minor works” in developments as set out in “Appendix 4”, Council will accept as-builts from Registered Drainlayers and Plumbers.
- 2.B.7.2** **Connections to Manukau Water Limited’s System**
- 2.B.7.2.1** Connections to public system may only be made under permit by approved licensed contractors ([ALC's](#)).
- 2.B.7.3** **Tests**
- 2.B.7.3.1** All new work shall be inspected and tested before being allowed to be connected to the existing public wastewater system.
- 2.B.7.3.2** All testing including the supply of necessary testing apparatus shall be at the expense of the developer. The developer must arrange for testing by suitable contractor(s) in the presence of representative(s) of Manukau Water Limited.
- 2.B.7.3.3** All wastewater lines shall be air-tested according to the ARC Watercare Services requirements as shown on C3.
- 2.B.7.3.4** Upon a satisfactory passing of the air test, at least one and up to a maximum of 20 % of manholes shall be subjected to a rainfall simulation test.
- 2.B.7.3.5** The rainfall simulation test shall be as described on C4. Upon failure, the manhole shall be repaired and re-tested. Testing of manholes beyond the limits specified in clause 2.B.7.2.4 maybe required at the discretion of field officers of Manukau Water Limited.

2.B.7.3.6 Prior to the acceptance test, the developer's representative shall supply the Manukau Water Limited with 'as-built' drawings of the work to be tested. The Engineers final certification of the work will be required prior to commencement of use.

2.B.7.3.7 The works will only be deemed to have passed once all testing including rainfall simulation and air testing have been achieved successfully.

C3

The section under test shall be sealed off by means of airtight plugs or bulkheads. Pressure shall be applied until the differential head of 300mm of water has occurred. The test will be regarded as satisfactory if the drop in pressure does not exceed 50mm in 5 minutes

C4

A moat 300mm below the lid/riser joint shall be dug around the manhole. The moat and lid will then be flooded to just below the top of the cast iron frame and maintained at the level with the introduction of a fluorescent dye, for a period of 10 minutes. The manhole will be deemed to have failed, if during an internal visual inspection of the manhole there is evidence of infiltration through any joint or deflection of the manhole structure.

2.C PUMP STATIONS

2.C.1 MINIMUM REQUIREMENTS

2.C.1.1 Where a proposed development cannot be adequately serviced by a gravity system, a public wastewater pump station will be considered, provided it is located and designed to service the entire area of land beyond the reach of the existing gravity system.

2.C.1.2 Where required and approved, the pump station shall comply with standard drawings [PS-01 to PS-13](#).

2.C.2 MEANS OF COMPLIANCE

2.C.2.1 SITE REQUIREMENTS

2.C.2.1 Layout and Site Requirements

The layout, site selection, building site requirements and vehicle access shall comply with standard drawings PS-01 and PS-02.

2.C.2.2 PUMPING SYSTEM DESIGN

2.C.2.2.1 Design Flow

Pump stations shall be designed to cater for catchment flows as specified in clause 2.B.1

2.C.2.2.2 Satellite Manhole

Pump stations shall have a satellite manhole in accordance with drawing PS-12.

2.C.2.2.3 Wet Well

Pump stations shall have a wet well in accordance with drawing PS-04. The access hatch shall comply with drawings PS14a to PS14j or PS15a to PS15j. The volume of the sump, between duty pump start and stop levels, shall be designed to limit pump starts to a maximum of 15 per hour under peak flow conditions and be adequate to prevent short cycling of pump motors.

The maximum time in the wet well under peak flow conditions shall be 30 minutes.

2.C.2.2.4 Pump

Pump stations shall have two identical constant speed pumps operating on a duty-standby arrangement.

Pump units shall:

- i) Be Manukau Water Limited approved,
- ii) Be submersible centrifugal pumps of the single end suction radial flow type,
- iii) Be capable of discharging the peak flow with the other pump on standby,
- iv) Have a minimum outlet of 75mm internal diameter,
- v) Operate between 60-100% of best efficiency point.

2.C.2.2.5 Rising Main

The rising main shall:

- i) Have a gradient that eliminates or minimises over verticals and under verticals,
- ii) Have a nominal bore at least equal to the pump outlet.
- iii) Provide velocities between 1.2m/s and 2.0m/s
- iv) Use PE100 pipes conforming to AS/NZS4130:2003 subject to a minimum wall thickness of SDR17 and Stiffness SN16.

Emergency Storage Tank

2.C.2.2.6

All pump stations shall have a storage tank with a minimum of 8-hour average dry weather flow capacity for emergency storage. The size and construction of the emergency storage tank is to suit site conditions. Provisions for automatic wash down to be included.

2.C.2.2.7 Connection to Outlet

Rising mains shall terminate at a discharge manhole in accordance with drawing PS-13 prior to gravitating to the outlet system.

The capacity of the receiving gravity network to which the pump station discharges shall be able to accommodate combined peak flows from both the pump station and adjoining gravity system.

2.C.2.3 TESTING AND ACCEPTANCE

2.C.2.3.1 WASTEWATER PUMPING STATION AS-BUILT REQUIREMENTS

The as-built plans are to be submitted by the sub-dividers representative to the Manukau Water Limited field officer at the final testing. They shall submit 5 x A3 sized copies of the overall layout of the Pump Station. A schedule of coordinates for all Wet Wells, Storage Wells, Satellite Manholes, Valve Chambers, and Rising Main Inspector Chambers etc shall be supplied as well as lid and invert level details of all incoming wastewater lines and rising mains. These as-builts will be used for plotting on to our GIS system and are to be certified in accordance with the "Wastewater As-built Requirements".

In addition to the above, Manukau Water Limited will require for their records, 3 full copies of the standard drawings PS-01 to PS13 and/or fully approved construction drawings including emergency storage tank, stamped "As-Builts" and should show any changes made during construction. These as-builts should detail all aspects of the Pump Station construction and to include Wet Well depths/sizes, Overflow Levels, Pump types, Rising Main Long sections, Valve Chamber layout details, Storage tank size/capacity, Electrical layout etc.

2.C.2.3.2 Pre-construction

A pre-construction meeting shall be arranged with the Manukau Water Limited Electro-Mechanical Engineer. The meeting shall be held on site, where Manukau Water Limited shall provide a checklist to be completed before any construction can start.

2.C.2.3.3 Inspection and Testing

Before allowing the pump station to be connected to the public system, Manukau Water Limited shall carry out the following:

- i) Visual inspections of pump station components,
- ii) A draw-down test of the pump station, and
- iii) Pressure test of the rising main in accordance with the Water Supply requirements.



MW APPROVED PRODUCTS, MANUFACTURERS AND SUPPLIERS FOR USE IN WASTEWATER APPLICATIONS

DRAWING NUMBER	PRODUCT	MANUFACTURER	SUPPLIER
MS-1	uPVC Manhole Invert Connector	Solo Plastics;	Humes; Mico Wakefield; Hynds Pipe Systems Ltd.; Hygrade Products Ltd.
MS-2	uPVC London Junction	Solo Plastics;	Humes;
MS-3	Vitrified Clay Drop Junction	Clark Pipes;	Humes
MS-4	Fabricated PVC Drop Junction	Solo Plastics	Humes; Iplex Pipelines;
MS-5	PVC Access Bend Drop Junction	Solo Plastics	Humes; Iplex Pipelines;
MS-6	PE Manhole Connector	Solo Plastics;	
MS-7	Forms for In-situ Formed Channels	NZ Channel Forms;	
MS-8	Eezi liner PE Manhole Channels	Eezi liner Ltd.	
MS-9	uPVC Sandwich Wall Pipe	Keyplas Ltd.; Marley NZ Ltd.	
MS-10	mPVC Sewer and Stormwater Pipe	Iplex Pipelines	
MSR-1	Metal Banded Flexible Couplings	Aqualine Synapco Keramo	Hygrade
MSR-2	150mm Clay to uPVC Coupler	Solo Plastics	
MSR-3	Patch Liner Repair	Drain Shift Services	