

TECHNICAL STANDARD**PRESSURE SEWER SYSTEMS**

Issued by: Manager Engineering

Issue Date: April 2010

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MAJOR CHANGES INCORPORATED IN THE XXXX EDITION

This is the first edition of TS 130.

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Purpose of this Document

This document has been developed to ensure that the implementation of pressure sewerage systems is done in a consistent and professional manner for the South Australian Water Corporation (SA Water). It will also suffice to:

- Provide the detail required to translate SA Water's Pressure Sewerage Policy Statement into the consistent purchase and installation of the pressure pumping units and supporting reticulation systems.
- To ensure that where the pressure sewerage technology is implemented there can be an expectation it will work, as it should.
- For inclusion in Supply Tenders to specify SA Water's minimal requirements in terms of the pumping units, design pipe material, etc. for any pressure sewerage system installed in the SA Water Regional area.
- For inclusion in Installation Tenders to guide Contractors and pipe layers on SA Water minimal requirements in respect to pressure sewerage applications.

As a principle, SA Water has a preference for gravity sewerage systems but recognises that in some circumstances this technology may not be economically viable. In these instances Pressure Sewerage may be adopted and therefore this document represents SA Water's minimum position in respect to all aspects of the pressure sewerage systems to be installed in South Australia. Where Tenders/ Contractors/ Pipe layers wish to offer higher standards than those that are contained in this document they will be welcome to submit these to SA Water for consideration.

This is one of a series of documents that link and form the overall direction and procedures for the adoption and installation of Pressure Sewerage Systems in South Australia. Other documents include:

- The SA Water Pressure Sewerage Policy Statement (Copy Included)
- The SA Water Design Manual for Pressure Sewerage Systems
- The Home Owners Manual for Pressure Systems in South Australia

If there is any perceived conflict between any of these documents, it needs to be resolved and the matter brought to the attention of SA Water. Interpretation on the part of the Pressure Sewerage Proponent is not acceptable.

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Section 1: Introduction

SA Water will permit Pressure Sewerage Systems, as an acceptable technology alternative to provide sewerage services in South Australia where they are determined to offer the best overall sewerage solution. SA Water's Policy Statement in respect to Pressure Sewerage Systems is included as Appendix 1 of this document and provides the background to the following sections.

This specification has been developed by SA Water to ensure that where pressure sewerage systems are allowed, there is consistency in the use of this technology, and that the sought after goals for this scheme are achieved. Any persons wanting to adopt this technology will therefore be required to demonstrate that their application meets or exceeds the requirements laid out in this specification and the SA Water Design Manual. This includes the cost evaluation methodology that needs to be carried out by the proponent, to allow the final choice of sewerage technologies to be made.

In adopting this technology SA Water will be pursuing proprietary products (i.e. the pressure sewerage pumping units), which have a proven track record of performance. SA Water's policy statement allows for SA Water to adopt a limited number of differing pressure sewerage technologies, (potentially starting with just the one). This is to ensure competition, whilst not creating problems due to the costs associated with holding a large range of spares.

Unit performance is critical and there is a preference that any technologies adopted should also have a demonstrated history as a pumping unit (preferably over a minimum 10 year period). In this manner SA Water can have confidence that the scheme will work in the desired application and the Technology Supplier remains liable for the adequacy of their system. SA Water however does not want to preclude newer technology but requires that any company proposing such newer technology provide SA Water with the reassurance it requires as to the reliability of the product. This may take the form of extended warranties or reference to other similar products where a performance record can be established.

It needs to be recognised that this specification is a performance based specification focussing on what SA Water requires from the pressure sewerage systems. It does not attempt to specify the detailed components of the pumping unit such as motor speeds, types of motor seals, electrical operation frequencies, etc, nor any of the other parts of the pumping unit. As such the document has been prepared to set out SA Water's specific requirements in relation to pressure sewerage systems and what it wants the Technology Supplier and the System Contractor/Pipelayer to meet. This includes:

- Procurement of the Pump and Pumping Units
- Delivery of the Pumping Units
- Design Procedures
- Pipe Materials to be Used
- Installation Procedure for the Pump and Pumping Stations
- Installation Procedure for the Reticulation Mains
- Testing of the Pumps and Reticulation Systems
- Alarms and Controls
- Warranties
- Handover Procedures

- *Maintenance Agreement Details*
- *Training of SA Water Staff and Others*
- *Information Packages to be Provided*

The Specification is organised into a number of sections each covering a defined area of the pressure sewerage systems. These sections have been progressively set out moving from design of the system, supply needs, through to construction, commissioning and then maintenance to provide a basic or logical sequence. Further to make this document user friendly some of the requirements will be duplicated in different areas so that the reader has to do minimal searching for additional requirements on their needs, in different sections.

For the purposes of this Technical Specification, a pressure sewerage system is defined herein as comprising:

- *An individual pumping unit usually installed on each property and draining those individual properties. Such pumping units having been specifically designed for pressure sewerage applications have been approved by regulatory bodies for that purpose.*
- *A grinder unit incorporated in these pumping units to permit the use of smaller diameter pipes for both the household connection and the system reticulation mains.*
- *The pump is to be installed underground in the storage vessel provided, as part of the overall pumping unit.*
- *Connection of these pumping units to SA Water's pressure sewerage reticulation system.*
- *Valving that allows the property to be isolated from the system and to also provide flow protection, preventing flow from other properties entering into the individual system under pressure.*
- *A reticulation system operating under pressure and capable of supporting a number of individual pumping units, to convey the domestic sewerage to the nominated discharged point.*
- *A reticulation system specifically designed for pressure sewerage application including isolation valves and system flushing points.*
- *An alarm system to warn residents and SA Water that the pumping unit has failed and to allow maintenance within an acceptable timeframe to ensure both an acceptable public health and environmental outcome.*
- *A connection into the property's electrical power board with the resident meeting the costs of that power.*
- *A formal maintenance arrangement, which further secures and exceeds the minimum acceptable environmental and public health outcomes and is acceptable to the relevant regulatory bodies.*

In pressure sewerage systems, household sewerage drains flow by gravity into the pumping unit. From the pumping unit, flows are then moved to the designated system discharge point, via the collective pressure generated by the on property pumps. In this process the pump's grinder prevents blockages occurring in the pipe systems, and the alarm system warns the resident that the unit is not operating within preset parameters.

The reticulation systems are based on much smaller pipelines, normally laid at minimum depth (generally following the contours of the land) and do not contain manholes or inspection openings of a conventional sewerage system. A further requirement is that a

number of spare pumps must be held by SA Water, so that failed pumps can be replaced within an acceptable timeframe once the alarm has been sounded. This is to ensure no spillage from the sewerage system should occur, under normal operation.

SA Water will generally only accept the handover of systems that have been specifically designed as a pressure sewerage system, and in general it is looking to adopt technology with a proven track record. Newer technology will be expected to overcome any lack of proven performance with extended warranties or similar so that SA Water may draw confidence in electing to use that newer technology and this will be taken into account both at the design and the handover stages.

SA Water will not be liable for any incorrect interpretation of this Technical Specification in the installing of the pressure sewerage system. If there is any uncertainty in relation to the application of this policy then clarity must be sought from SA Water. SA Water will also not be liable for any installations that are constructed without approval.

Section 2: DESIGN

SA Water has a separate design manual for pressure sewerage systems, which provides the basic direction in terms of the initial evaluation on whether to use a pressure sewerage system and then what needs to be carried out in the design of that system if and when it is accepted by SA Water. This section merely duplicates some of the key requirements for design and directs any person/ company wanting to pursue the installation of a pressure sewerage system to that Design Manual for the relevant details. This section must not be used as the basis for design without reference to the Design Manual itself. The Pressure Sewerage Design Manual can be viewed by interested parties on the SA Water website – www.sawater.com.au.

In summary however, correct design of the reticulation mains and the on-property assets is considered critical to the successful installation and operation of any South Australian pressure sewerage system. Accordingly SA Water requires that anyone designing pressure systems for installation in South Australia have some direct experience with the designing of these pressure sewerage systems or demonstrate how they will compensate for any such lack of experience. This should also be supported by general water and sewerage design experience.

In general the intent of any pressure sewerage system to be installed in a SA Water Region will be to:

- Remove all sewerage in a safe and reliable manner from the property and transport it to the sewage treatment plant or designated discharge point in the existing reticulated sewerage system.
- Ensure that the pipelines are scoured clean by moving the sewage at an appropriate velocity.
- Ensure the sewage is not too old, by the time it reaches the treatment facility, such that it creates either process difficulties in the treatment of the sewage or the generation of odours in the receiving system.
- Ensure that the pump's duty head is not exceeded as a result of excessive frictional losses in the pipe system, when added to the natural static head on the pump. Accordingly the design of the reticulation system should provide indicative pressures at a number of the properties being served. This will allow a pressure contour to be extrapolated.
- Minimise any inconvenience to the on-property resident (where the pressure system is being used to service an existing development/ town/ new development). This should also ensure that the home is protected from backflow in the system.
- Minimise any disturbance to the overall area where the reticulation mains are to be installed and in particular environmentally sensitive areas explore alternative trenchless installation technologies such as directional drilling.
- Ensure that there is minimal inflow and infiltration into the system.

The design of the systems must demonstrate how all of the requirements in the Design Manual have been achieved, when it is submitted to SA Water. Furthermore as a total design, both the cumulative effects of the on-property design and the reticulation design need to be taken into account in determining the designed pump head.

2.1 Standard Terminology

For the purposes of consistency Appendix 2 of this document sets out a number of standard terms that are used to describe the installation and the design aspects attached to pressure sewerage systems throughout this document. If there are any other terms that the reader does not understand, then they should contact SA Water.

2.2 On-Property Design

This is the design of the pressure sewerage layout on the private property from the Boundary Kit to the installation of the Pumping Unit and the Sewer Connection Inspection Point (IP). This IP is the point where the house drainage lines will connect to the SA Water system and is located just outside the pumping chamber (usually 1.0 metre from the pumping chamber). The design will also indicate any deviations required to divert the previous house drainage lines to the IP. Typically this design will involve:

- The installation of a pumping unit
- The installation of a Sewer Connection (or IP)
- The electrical connection to the household power board.
- The construction of the property delivery line
- The installation of the control /alarm panel
- All works required to make the pump operational
- Site specific requirements

In the case of existing homes, a preliminary audit of the house's electrical and plumbing systems will be required before design work can commence. This audit is to identify what work (if any) is required to bring these existing services up to the relevant standards, before the pressure sewerage system can be installed /connected. Refer section 2.16 for more detail on these audits. Particular caution however needs to be taken in case there is any asbestos in the power board and if discovered the relevant procedures applying at the time must be followed in dealing with this asbestos.

A fundamental requirement of the on-property design process is that it is to be carried out in consultation with the Property Owner/s, or their nominated representative and there is to be no exception to this requirement. Where possible the reasonable needs of the Property Owners are to be accommodated in the design and typically these might include moving the pipeline route, to avoid buried pipes, prized gardens, or placing the line to avoid future proposed property extensions, etc. This flexibility is one of the advantages of the pressure sewerage systems and these deviations need to be balanced against any potential compromising of the use of the property for future home owners.

This auditing and consultation is to result in a formal house layout plan, which when constructed will be kept by SA Water as a record of where the sewerage system is on the property.

The general requirements applying to the on-property design are:

- The typical residential design will be based upon a standard unit offered by the Technology Supplier that will be purchased and installed by SA Water. Non standard sized pressure units will typically be used in cases where:

- The property being serviced is non-residential in nature and may have flow requirements that exceed the capacity of the standard unit.
 - The host soils are rock or it is difficult to install a new standard unit in the particular property due to specific constraints. In these cases a squatter unit may for example be installed in the hole of the existing on site system or possibly even inside that system.
 - Other site specific needs.
- This standard sized pumping unit will be modified to accommodate the needs of any property where the property flows exceed what a standard unit is capable of discharging. Anyone requiring a non standard unit needs to discuss the size of this unit with SA Water and gain SA Water's permission for a deviation from this standard size.
 - The design for the property will not occur until the property's building application has been approved and construction has commenced.
 - The Property Owner must be given ten days prior notice of the meeting with the Designer and the meeting is to occur on the property, for which the design is intended. The ten day period can be reduced, if requested by the Property Owner, to fit in with their general availability.
 - The fundamental design and installation goal is to cause the minimum possible disturbance to the persons living on the property, or about to move onto the property in terms of:
 - The location of the pumping station and the proposed route of the property delivery line.
 - The equipment used for the installation of the works.
 - The time taken to install the pumping unit.
 - Working on the property just the one time (i.e. no repeated visits in the short term if possible).
 - Future household extensions
 - The preference is for all pipelines to be laid approximately 1.0m from the side and or rear property boundaries and their route is to run parallel to that boundary to minimise any impact on the property into the future.

Where the properties are large and this requirement is unreasonable, the property delivery line will be laid essentially perpendicular to the reticulation mains, but should essentially be in a straight line. It will be laid in a position sympathetic with the current property usage.

- The design head on the pump in the property, when operational, should not exceed the designed duty point head, detailed later in this specification (section 3.1). If this happens SA Water will view this occurrence as a potential shortening of the effective life of the pump and will reject the design. If this is discovered in the audit after the installation of the unit SA Water will not accept the handover of the installation.

An audit of a number of properties will be conducted in any proposed installations wherein the actual discharge heads will be measured to

confirm that the design criteria have been met and this will include further pressure testing of the pipe.

- Where the property has no residential dwelling on it and when the pressure sewerage system's, reticulation mains are being constructed, a Boundary Kit will be installed and this should be located, so as to not compromise the future use of the property.
- The pumping unit must be installed within a direct line of site of the pressure sewerage alarm/control panel.
- On steep and rocky properties, every attempt should be made to locate the pumping unit on the level platform formed by the compacted fill of the property excavation. This enables easier installation and access to the pumping unit.
- The electrical connection for the pumping station is to be on a separate circuit to the rest of the household electrical connections.
- Where there are unique features to the property, such as inground structures or prized gardens, the property delivery line can be laid along a route agreed with the Property Owner. In general the main should be laid so as to not compromise future household extensions.
- One tank per property is to be used for residential applications of pressure sewerage, but the one tank can service more than one building providing it has sufficient capacity.
- Where the property has separate Greywater and Blackwater pipelines, the pumping unit is to be installed in a location so that both the greywater and blackwater lines are able to gravitate into the pumping unit tank.
- The pumping station unit is to be installed as close as practical to the building contributing the majority of flow on the property, when the property has multiple dwellings.
- For industrial/ commercial properties (or body corporate applications) (i.e. those businesses generating large volumes of wastewater) multiple pump arrangements (pumps per pumping station) and/ or multiple pumping stations are to be used and the Technology Supplier will provide details on the appropriate units to be used for these applications. Where these applications however only generate small volumes of wastewater a standard unit will be used. Each of these applications will be assessed on a case by case basis.
- Ensure there is an overflow relief gully (ORG) on the private property drain, upstream of the IP and the drain is capable of being connected to the IP by gravity means. The private drain is to be connected to the IP in accordance with AS/ NZS 3500 part 2. The ORG is to be included by the Property Owner's plumber, and is required to prevent internal overflows. It must not be covered once the pump is operational.
- For properties with large spas or swimming pools, special arrangements will be required to prevent these triggering an alarm or an overflow by exceeding the sewerage pumping station's capacity. These will be accommodated on a case by case basis, but some of the design provisions in relation to these are set out in sections 2.11 & 2.12.
- The alarm panel must be fixed either to the wall of the house, garage, shed etc or on a stand alone post. In each of the above cases, the alarm panel shall be mounted at 1400mm above the finished surface level to the

underside of the panel. This standard height is a requirement for maintenance and OHS issues.

- Where the property is impacted by the 1 in 100 year flood level, the venting of the pumping station is to be provided to a minimum of 400 mm above the designated flood level.
- The boundary valve kit is to be a maximum of 1.0 metres inside the property boundary and to be on the same side of the property as the property delivery line (where this is known). There is a need to link with the on-property designs, in the reticulation construction.
- The boundary kit is to include a non return valve to isolate the property from the reticulated system, such that no system flows can return to the property. The Boundary kit is to also include an isolating valve and tee piece for inspection/ flushing purposes.

In a preferred installation it would be intended to place the pumping unit in close proximity to the house (less than 8 m), near the onsite treatment unit and with a clear line of site to the alarm panel. In some instances the alarm panel may be more practically located remote from the house (in excess of 8.0 m), which will require a remote mounted alarm panel. In these instances heritage coloured posts and panels to blend in with the environment should be considered and the full approval from the property owner is required.

2.3 On-Property Drawings

Following the initial meeting with the Property Owner, the Designer is to prepare an A3 drawing of the proposed on-property layout. The layout drawing is to be a plan view only arrangement as it will be assumed the property main will be minimum depth.

It is intended that this property layout drawing will become the property As Constructed drawing, providing that there are minimal variations to the design. It should also be in an electronic format compatible with SA Water's GIS system.

SA Water will provide the A3 template of the drawing format.

2.4 Reticulation Design

The following general principles will apply to any pressure sewerage reticulation design for SA Water.

- The mains are to be designed to achieve a minimum velocity of 0.6 m/s, for self cleaning purposes.
- Pipe diameters should be sized to achieve the total head requirement on the pumps (static plus friction losses) and the above self cleansing velocity.
- The diameter of the pipes should ensure that sewage is stored in the pipelines for the minimal time possible. Ideally the sewage should have spent no more than six to eight hours in the pressure sewerage lines. The retention time will vary depending upon the exact location, and could in long lines require the inclusion of odour suppression equipment. It is recommended that where sewerage is determined to be older than the 6-8hour requirement that preliminary discussions be held with SA Water over odour control.

- All valves and other fittings should be of a type recommended by the Technology Suppliers as appropriate for their particular technology. It is recognised that some technology suppliers have very clear preferences in respect to these valves and that these fittings will not be recognised as a reason for any non performance of the system.
- The pipeline will be laid in a fixed SA Water location in accordance with the requirements of “SERVICES IN STREETS” “Code for the placement of Infrastructure Services in New and Existing Streets”.
- Road crossings of sealed roads may be constructed, using directional drilling techniques.
- The reticulation mains are to include a number of flushing points, to allow the mains to be kept clean, particularly during the construction phase or initial stages of a large scheme. These should be fittings appropriate for the purpose and at minimum include the features set out in section 2.20
- The reticulation system must incorporate a number of designated isolating valves of a type nominated by the Technology Supplier, (to ensure they are compatible with the pumping units.). These are to be arranged to facilitate any repairs to the reticulation system that might be required at a later date.
- The reticulation system may require the use of air valves and details in respect to their use (or non use) must be provided to SA Water with the proposed design. These also should be of a type nominated by the Technology Supplier (to ensure they are compatible with the pumping units). The issue of the release of odours from these needs to be noted in the design with sufficient notes on this aspect provided for SA Water to draw reassurance this will not prove to be a significant problem.
- The mains should where practical, cross other services, particularly in-ground services, at as close to right angles as can be practically achieved.
- The mains are to be laid at the minimum depth specified later in this document (section 7.7), except where particular requirements make this impossible.
- The mains to be laid on a route that causes minimum disruption to the area involved.
- An additional non-return valve is to be used where a road crossing to service the property, is required. This valve should be located near the pipe joint and there should be no pipe joints under the sealed road area.

Should System Designers believe that any of the above requirements are inappropriate for their particular technology then they should pursue amendments to these with SA Water as part of the Preferred Tenderer Negotiations. A strong and well documented case will need to be made to secure any changes.

It is intended that all properties will be connected to the reticulation mains at the time of the construction of the reticulation mains where this can be achieved. Where there is a vacant lot the location of the Boundary Kit is to be agreed with the Property Owner.

In the instances where the pressure sewerage system is extended beyond any currently reticulated area, connection to it will not be compulsory, only those properties that SA Water has specifically designed the connection for, will be connected in the first instance. However residents may be charged a sewer rate on the basis that the property can be served. SA

Water will canvas others at the time of investigating this extension of supply and may require that a minimum number of homes be prepared to connect before it will carry out the extension. This will be for operational purposes in terms of keeping the sewer from these mains fresh and the mains themselves clear. All such extensions will be dealt with on a case by case basis.

Design calculations showing the friction losses and the estimated static heads for the pumps are to be included in any submission to SA Water on the proposed installation of pressure sewerage systems. SA Water may require that some reticulation main sizes be altered if it believes the heads on the pumps are likely to be too high or that further mains may be added in the future. These design calculations will be checked by field testing as set out in section 9.2

Given that the pump's life will be ultimately governed by its duty head as well as the mechanical aspects, there must be no alterations to reticulation pipe sizes, (as shown on the design layout) once the plans are approved, without a full certification of any changes by the system designer and these alterations must be noted on the plan and countersigned by the Designer. Pipe designs are to be based upon commercially available pipe sizes and delays in delivery will not be an acceptable reason for altering any pipe sizes.

2.5 Reticulation Zones

Where the design is for large ongoing developments, the design should be carried out in designated zones, leading away from the connection point (or discharge point) to the existing sewerage systems. These zones will be defined by the connection/ discharge point(s) and a series of isolation valves, or dead end lines that allow a discrete area to be isolated.

In this manner it will be possible to connect the properties in one zone (i.e. commence the installation process) once the pipelaying in that zone is complete. All zones should be clearly marked on the reticulation design drawings.

2.6 Reticulation Drawings

The reticulation drawings should be in plan and longitudinal section, showing the main location and the ground profile. Ultimately these design drawings will become the As Constructed drawings for the reticulation system and will be amended to record:

- Actual length of main laid
- Diameter of the main
- Open trench or directionally drilled sections
- Any deviation to pipeline route
- Actual host soils encountered
- Depths of pipeline
- Actual location of all fittings and markers.
- Lateral spurs
- Location (approximate) of any marker posts to be used, to show the location of the pipelines.

The drawing should also be in an electronic format compatible with SA Water's GIS system, and should also be presented in A1 paper format at a scale of 1:1000 or 1:500 for plan views, and 1:1000 or 1:500 horizontal, and 1:100 vertical for the longitudinal sections, and

shall be easily read by the naked eye. An A3 reduced copy will also be required for documentation purposes.

2.7 Engineering and Cadastral Surveys

The Designer shall engage an Approved Licensed Surveyor to carry out the engineering and cadastral surveys that are required to complete the Design.

SA Water's Survey Coordinator shall nominate a Licensed Surveyor from the Panel of Survey Consultants approved under the current SA Water Period Contract.

The Designer shall provide a Scope of Work to the Licensed Surveyor for work to be carried out to enable the design to be prepared.

In addition to the information required by the Designer, SA Water's Survey Coordinator will require the following:

- A hard copy in colour of all surveys on A3 size paper
- Two CD's containing all drawing files produced in both 2D and 3D and in ".dwg" and ".dxf" format.

2.8 Single Technology per Development

Within each specific development for which a design has been created, the Designer needs to clearly identify what type (brand) of pumping units that design has been based on. This also must be clearly marked on the reticulation drawings.

Once that design has been approved, only that type of technology will be used in that design area for both installation and design purposes. SA Water may however choose to replace the technology over time for reasons of its own determination but will only do so after it has assured itself (by independent audit) that the proposed new technology is compatible with the existing reticulation systems. Contractors of new systems will not be permitted to install a pumping unit other than that which is shown on the reticulation drawings they are constructing to.

2.9 Bill of Quantities

Accompanying every reticulation design there should be a list of quantities that describes what will be involved in the project.

2.10 Standards and Regulations

All designs for pressure sewerage systems and the associated house connections will be carried out in accordance with AS/ NZS 3500 part 2. If those carrying out the design believe there is any conflict with these and SA Water's Technical Specification then these matters should be raised to the attention of SA Water and their nominated Project Manager for the project.

Similarly, all designs will need to accommodate any local (SA Water) planning requirements and the Designer is expected to visit the site and determine these requirements, as well as any likely resident concerns.

2.11 Spa's

The size of (volume contained) the spa will essentially determine what is required to discharge from the spa without fear of setting off the high level alarm in the Alarm/Control panel or generating overflows from the Overflow Relief Gully.

Spa's with less than 250 litres in normal operating volume: These require no special provisions be made and as such they can be treated as a standard household water using appliance.

Spas between 250 litres and 700 litres capacity in normal operating volume: These may require that some additional measures be fitted to the pumping unit to avoid system alarms annoying neighbours unnecessarily. Typically these could involve the following and will be dealt with on a case by case basis, with the Property Owner to be advised by SA Water's Manager Engineering Services staff on what is the preferred option.

- Time delays to the alarm switch
- Restricting the discharge rate of the Spa into the pressure unit.
- Other approved measures.

Spas with a normal operating volume in excess of 700 litres: These will require that differing flow restriction devices be added to the system. Typically these will involve the following and will be dealt with on a case by case basis, with the Property Owner to be advised by SA Water's Manager Engineering Services staff on what is the preferred option.

- Providing some form of upstream storage with a limited discharge rate to more closely match that of the pressure sewerage unit.
- Providing a larger pressure sewerage storage unit.
- Time delays on the alarm.
- Other approved measures.

Spas with a backwash facility: These will be dealt with the same as for a swimming pool.

An alternative to the above might be to regulate the outlet of the spa to limit the flow rate that can be discharged from the spa. Where such an arrangement is permanently installed this might overcome the need for any of the actions above, but it will mean that the spa will take longer to empty.

2.12 Swimming Pools

The intention here will be to provide sufficient storage when the discharge from the pool backwash pump exceeds 0.45 L/s, and the pump operates for sufficient time to fill the pressure sewerage pumping unit to a level, that causes an alarm to be generated. An additional storage with a controlled discharge of less than 0.45 L/s will be placed between the pool's discharge pump and the sewerage pumping unit in these instances, unless the pool pump's discharge can be regulated to below 0.45 L/s or for quite brief periods of operation.

The interconnection of the swimming pools into the property system will be designed on a case by case basis, but all Property Owners will need to provide to SA Water the following information to allow for any modification of the sewerage pumping unit

- Pump backwash/ discharge rate in L/s.

- Duration of time the backwash is automatically operated for.
- What arrangements will the owner make to empty the pool, if it ever becomes necessary to do that.

SA Water also has a strong preference that cartridge filters be used in all new pools to avoid sand getting into the pumping units but if this is not possible then sand filters may be used.

2.13 Choice of Valves

Any proponent of a pressure sewerage system should include in their design only those valves supported by the Technology Supplier, as being suitable for use with their technology.

2.14 Discharge Point to SA Water Sewers

The pressure system needs to be discharged to a point where the receiving system has sufficient capacity to receive the discharges from the pressure sewerage systems and transport it to the sewage treatment plant. This termination or discharge point will have been specified by SA Water, based upon flow details provided to them or be based on their own calculations and is typically a manhole or pumping station.

If the receiving sewerage system's capacity is insufficient during peak periods and an alternative discharge point considered too far away, then a controlled discharge structure can be constructed to store peak system discharges, allowing these to discharge to the receiving sewer at a controlled rate and take advantage of the systems off peak flow capacity. This structure is to be designed by the overall System Designer.

Such structures will be constructed on the basis of:

- Costs
- System capacity
- Odour suppression of any stored sewage (if required)
- Ability to periodically clean the retaining structure

This discharge point may become a source of odour depending upon the age of the sewage being discharged and accordingly odour suppression devices may need to be fitted at the discharge point. This will be based upon:

- The Designer's estimated age of the sewage at the discharge point.
- Actual experience at the discharge point with the Contractor responsible for this performance as part of the normal defects liability maintenance.

2.15 Odour Control

Where there are unique system features, such as where there are long rising mains to the treatment plant, where there is a need for a flow control storage device, etc, then the Designer (for the pressure sewerage system) must detail all odour control arrangements to be used.

2.16 Household Audits

Where the connection is to an existing dwelling (older than twelve months) a formal audit will need be conducted on the following components:

- The property power board to which the pump is to be connected.
- The household drains to ensure both the adequacy of these and that no stormwater is gaining access to the system.

These audits should be carried out before the on property design work is commenced and will need to be carried out by appropriately qualified electricians and plumbers. If the audit finds that there is work to be done on either of these two connections (to bring them to compliance with current Industry of Local Standard's requirements) the Contractor/ Designer will provide SA Water with a detailed list and price to remedy these problems.

SA Water intends that the Property Owners will be given the choice to have these works carried out either by their own trade persons or through the installation process. These works are to be carried out at the home owner's expense. Both the plumber and the electrician used to install the pumping units will be required to formally sign off that the completed works are in accordance with:

- All relevant standards and codes.
- Compiles with Technology Suppliers requirements.

2.17 New Homes

The design for the on property installation of a new home can only be carried out once the Building Applications are approved and construction has commenced. Installation will not occur until the building activities are complete.

The plumbing and electrical layout in the new home should be designed with the location of the pumping unit in mind. The electrician shall allow for an additional circuit to be provided and the cable installed to the location of the alarm panel / control unit. (refer House Electrical Requirement Note, Appendix 3).

2.18 Installation of Pumping Units on Public Property

Where the pumping units are to be installed on what is public land, the lids to be these structures are required to be locked in place to prevent entry by non-authorized personnel. A standard SA Water master keyed lock is to be used to achieve this.

2.19 Designing for Highly Fluctuating Loads

Where the loads on the pumped mains, particularly rising mains may fluctuate considerably during the year the Designer needs to give consideration to the use of dual and different sized mains.

2.20 Flushing Points

For all SA Water applications a flushing point needs to include the following as a minimum:

- The flushing point is to be accommodated in a valve box capable of accommodating trafficable loads given the main may be in the road reserve or parts off the road that may receive vehicle traffic.
- A flushing point should be located at the end of the reticulation main, (opposite from the discharge point) so that the mains can be flushed particularly during the early stages of development in the area.

- The flushing point should have an isolating valve so that the flushing point can be turned off when not in service.
- Connections to the flushing point should be through Camlock connectors.
- The flushing point needs to have some form of protection device for the reticulation system should the tanker inadvertently move off whilst it is still connected to the flushing point that a part of the flushing point downstream of an isolating valve will fail.

The Designer is to provide all details of their design so that SA Water may explore if it appears fit for the intended purpose.

2.21 Flushing Program

This program effectively is about how often the above flushing points need to be used and the nature of the usage, i.e. when they are used is it for flushing water through the mains or the extraction of sewage from the system. Any pressure sewerage design needs to include a flushing program that sets out the frequency of any flushing that must be carried out to ensure the system remain viable.

Flushing programs are particularly critical in new developments where the pressure system will struggle until the development reaches that critical or minimal number of homes connected that make the overall design work effectively. Accordingly any new development submission must include the following in relation to the flushing program.

- The frequency of flushing, based on the number of houses connected at any time, within the area being served. A table will be required to provide a guide to maintenance activities. If the flushing requirements for the development are too onerous then SA Water may refuse handover until they become less onerous.
- The Designer's signature must be attached to the enclosed flushing program stating that the program has been designed by them.
- The minimal numbers that the design for the scheme has been based upon.
- Development estimated growth rate that has been assumed i.e. the time when this minimum number of connected homes will be reached

Where homes are being connected whilst the construction activity is still occurring, the Constructor/ Pipelayer will be responsible for all flushing activities until handover has been accepted by SA Water, who will then take over responsibility for Flushing.

Section 3: PUMPING UNIT DETAILS

The pumping unit is the core element of the pressure sewerage systems and as such needs to be dealt with separately and in detail. The pumping unit is defined as comprising the following elements.

- *The Pump*
- *Storage Vessel*
- *Alarm System*
- *Pipe System*
- *Pump Protection Switches*
- *Electrical Connections*

The pumping unit is located on the property and its reliability, ability to meet pump duty requirements and overall robustness are critical to the success of the pressure sewerage system.

This section sets out the minimum parameters acceptable to SA Water in relation to the pumping units, with the pump's overall operational performance (track record) being the primary guide to the real reliability of the technology. As indicated in section 1.0 this is a performance based specification and the following sections set out SA Water's requirements in relation to the pumping units. The Technology Supplier needs to be able to demonstrate the pumps performance including detailing its robustness, reliability and frequency of repair. Independent referees to support any claimed performance track record, are required in any tender submission to SA Water, along with their contact details.

This section includes:

- *A guide to Prospective Technology Suppliers as to what SA Water is looking for in its purchase of the pumping units.*
- *A guide to Designers contemplating alternative pressure sewerage technology as to what are SA Water's minimum requirements.*
- *Minimal protection requirements*

3.1 Pump Duty Points

Within the operational areas of SA Water, the pump will need to be capable of meeting the following duty points.

| | |
|------------------|----------------------------------------------|
| Minimum Head | = 45 m (required for topographical reasons). |
| Minimum Flowrate | = 0.45 L/s |

Typically the rated or design head once a pumping unit has been selected should be taken as the maximum head the pump should be designed to accommodate, i.e. the total static head plus the friction losses that will occur in the reticulation system. A pump with a duty head may be chosen but for topographical reasons a head of less than 45m will not be accepted.

The flow rate of 0.45 L/s should be taken as the minimum flow rate the pump should be capable of discharging under normal operating requirements. Higher flow rates are permissible in SA Water applications, providing the minimal head requirement is not altered

and the total dynamic head requirement for the system is met under normal operating conditions.

3.2 Grinder Units

The pump is to be equipped with a grinder unit, whose long term performance needs to be well demonstrated. Any submission for the supply of the pressure pumping unit needs to document:

- The history and details of the grinder unit, particularly its use in pressure sewerage systems and/or its association with that particular pumping unit.
- The association between the grinder and the pump on offer to SA Water i.e. have the two been paired for a period of time or will this be the first time the two have been used together for reticulated sewerage purposes.
- What the unit is capable and not capable of grinding, under normal pressure sewerage operations.
- Any certification on the suitability of the grinder unit for the purpose.
- The repair record of the grinder unit.
- Names and contact numbers of independent individuals (referees) who can attest to the performance of the grinder units.
- The materials the grinder is constructed from.
- The nature of the grinding/ cutting action.
- If there is an alarm warning systems associated separately with grinder unit.
- What the grinder is not capable of grinding under normal domestic situations.
- The home owner's manual will identify what can and cannot be discharged into the pressure sewerage system.

3.3 Pump Protection

The pump is to be provided with protection devices, to protect the pump against the following possible scenarios:

- No flow through the pump due to no inflow into the pumping station. This might occur if the pump off switch fails to activate or if the pump on switch triggers when there is effectively no sewerage in the storage vessel.
- No flow through the pump due to a blocked line on the discharge side of the pump or large numbers of units already pumping, significantly increasing pump heads.
- Thermal overload if the pump is not functioning appropriately or something becomes jammed in the pump and in particular the grinder.
- Other potential pump failure modes, which the Technology Supplier believes need to be provided for.
- Low voltage protection.
- Over pressure protection system (see 3.4).

The pump is also to be protected by at least two non-return valves to prevent flows from the pressure sewerage network flowing back through the pump. Additional pump protection devices are permissible and the Technology Supplier should identify what these will be.

3.4 Over Pressure Protection

Under this arrangement the pump is to be protected from trying to pump against a significantly increased head, such as might occur when there are already a number of pumping units operating. The actual setting for this overpressure protection to be engaged is to be determined with the Technology Supplier, depending upon the duty points for their particular technology.

The over pressure protection device is to contain a reset mechanism to restart the pump later, when discharge pressures might have decreased. This reset mechanism must however be quite robust as the overall pressure sewerage system may require some time to clear. Of particular concern with any overpressure device is that its reset mechanism must be able to restart the pump after a power failure when it can be expected that all of the pumping units in the system will have large volumes of effluent in their wells and they all will be trying to start simultaneously. The over pressure device must assist in facilitating an orderly clearing of the overall pressure sewerage system when these power failures occur.

3.5 Pump Materials

The pump should be made of materials that are fit for the purpose intended, and will not readily promote corrosion or breakdown under significant wear. This is one aspect of the pump's performance as mapped out in section 3.9 that needs to be well documented in any submission to SA Water.

The pump should be of a strong construction, and its robustness and reliability should also be confirmed as per section 3.9. Ideally the pumps should be manufactured through a quality based process. A performance warranty as specified in section 8.6 will be mandatory for any pump to be used in SA Water's pressure sewerage systems.

3.6 Australian Standards

All pumps and their component parts (to be used in any SA Water specific applications) are to comply with all relevant Australian Standards and any local regulator requirements.

3.7 Pump Operating Levels and Controls

The pumping unit should at minimum incorporate the following control devices:

- **Pump on control device/switch**, which should be set as low as possible, i.e. at a level to minimise the volumes of sewage stored in the pumping station after the pump ceases to operate.
- **Pump off control device/switch**, with the storage volume between "pump off" and "pump on" to be of a limited volume. This is to promote relatively frequent pumping for short durations and minimise the time the sewage is stored in the storage vessel.

- **An alarm control device/switch**, which activates should the “pump on” switch fail to operate. This level should be set such that alarms are not activated, when normal high output applications such as domestic washing machines (and the like) discharge into the storage vessel. A minimum of 400 litres of emergency storage must be maintained above this alarm level.
- **Redundant Switches**, to be provided to protect the pump should any of the key switches identified above fail.

The pumps should be capable of being fitted with an hours run meter, if SA Water wishes at a later time to monitor system performance and operation. SA Water has a preference that the control switches be pressure based arrangements, and any perspective supplier will need to demonstrate the performance of their “switching” arrangements.

3.8 Single Phase Operation

The pumping units are intended to be incorporated into the residential power board. They must therefore be capable of being operated on single phase power, without the need to augment a standard residential power supply. If the proposed pumping unit requires any modification to the property power board then the Technology Supplier will need to provide these details in any submission on their technology.

The system however is to be protected from voltage fluctuations in areas of South Australia where the quality of the power might be suspected of having such fluctuations and in particular low voltage scenarios.

3.9 Pump Performance Track Record

SA Water is generally looking for a pump that can demonstrate a minimum of a 10 years performance. (i.e. track record of performance as a pressure sewerage pumping unit). If a newer model is contemplated, for any proposed SA Water applications, reference to the performance of previous models, along with the details of how the pumps differ, need to be provided with the submission.

The Technology Supplier will need to provide details of where the pump has been installed elsewhere, including the number of the units that were installed, type of units that were installed, dates the units were installed, the number of units that have been subsequently purchased by that operator etc.

The names and verified contact numbers of referees that will support the Technology Supplier’s claim must be included with any submission. There should be a minimum of 3 referees and at least one of these (if possible) should be from an Australian Water Authority. Where overseas referees are used an indication of appropriate contact times (based upon Australian Eastern Standard Time) should be included. English speaking referees are preferred.

Where no referees can be given then the Technology Supplier will need to:

- Provide all details on all components.
- Provide a convincing argument as to why SA Water should abandon a proven system in favour of this technology.

For newer pumping units SA Water will be looking to the Technology Supplier to provide extended warranties to cover this lack of performance and provide SA Water with the confidence to explore this technology. Whilst SA Water is happy to explore new technology it does not believe it should be the Technology Supplier’s proving installation.

3.10 Alarm/Control Panel and Alarm Switches

The Alarm/Control panel needs to include the following:

- A weather proof surround that is corrosion resistant to a high order.
- Stainless steel hinges on the door of the panel
- A safety shield to prevent inadvertent contact with live wires, when the panel is opened by operators.
- A lock to prevent unauthorised entry. This locking system to be common to all Alarm/Control boxes in a particular system.
- Bottom mounted, gland sealed arrangements for the connection of the electrical control cables to the Alarm/Control panel so as to prevent moisture travelling along the line and into the Alarm/Control panel.
- An audible alarm with a resident activated kill switch to silence the audible component of the alarm.
- A visual alarm that can only be switched off by the maintenance authority.
- All wiring inside the panel and pump to be to the appropriate Australian Standards.
- A sticker that includes the emergency contact numbers for the operational authority, to be affixed to the outside of the Alarm/Control panel.

In affixing the Alarm/Control panel to the building, the Contractor and their Electrician are to:

- Ascertain the 1 in 100 year flood plain levels for the property and ensure that the bottom of the Alarm/Control panel is a minimum of 400mm above that level designated for that flood event.
- Ascertain the local electrical supplier requirements in relation to such an installation and ensure that Contractors always meet those requirements.
- Ensure that the Alarm/Control panel and the pumping station always remain within a clear line of sight of the pump storage vessel.
- Affix the emergency phone contact numbers sticker when the installation is complete.

The Alarm/Control panel is to be generally mounted on the dwelling/garage/shed wall. Where the pumping unit is to be installed away from the dwelling the alarm/control panel may be installed on a standalone post as supplied by the Technology Supplier. The alarm/control panel and the post should be heritage coloured to suit the surrounding environment.

In each of the above cases, the alarm panel shall be mounted at 1400 mm above the finished surface level to the underside of the panel. This standard height is a requirement for maintenance and OHS issues.

3.11 Electrical Connections

All electrical connections are to be carried out in accordance with AS 3000 and must be carried out by an appropriately qualified electrician.

The Contractor should also check with **ETSA**, as the energy supplier to the area to determine if they have any unique requirements in relation to pressure sewerage systems in the proposed location.

3.12 Hydraulic Connections

The home's plumbing is to be tested in accordance with the AS/ NZS 3500 part 2 prior to connection to the pumping station. The plumber will then need to attest in the supporting document that the house lines meet this requirement.

For existing homes a preliminary audit will be required to ensure they are not just fit for purpose but also that there are no upstream cross connections with the on-property stormwater system that might allow stormwater inflow into the pressure sewerage system.

For new homes the lines need to be flushed to ensure no construction debris is in the lines before connecting it to the pumping station.

3.13 Venting

The Pressure Sewerage Proponent is to provide details of how the pump is to be vented in their submission to SA Water on their pumping unit. The venting will then be installed in accordance with those requirements.

3.14 Origin of Manufacture.

The origins of the pump's manufacture and its assembly locations need to be detailed in any submission to SA Water. This is so that any dollar fluctuations can be determined as well as the issues of any rise and fall arrangements. Where this point of origin is overseas, details must be provided in terms of delivery time from the date of order.

The percentage of overseas content also needs to be declared so that any impacts due to changes in the Australian Dollar can be accommodated.

3.15 Installation of Pump in other Storage Vessels

The Technology Supplier should indicate the suitability of their pumping unit for the following applications:

- Installation in an existing septic tank, which might be required in some tight applications where access to the property and or site soil conditions make installing a new pumping unit almost impossible. The Technology Supplier should detail what would be required in these applications and what are the potential disadvantages of such applications.
- Installation in competitor's storage vessels. Supply of most units will be achieved through periodic tenders and if SA Water has installed other units then knowing the suitability or not of the proposed unit to be installed in these other units will assist SA Water with its ongoing spares management.

It is understood that not all pumping units will work in a system designed for another pumping unit. Thus the Technology Supplier must advise in relation to this interchangeable part of any tender submission but at this time SA Water has no other pressure sewerage units.

3.16 Generator Options

There will be some potential applications of the pressure sewerage technology in applications where there will be prolonged power outages that should require special

connections for frequent generator operation in SA Water. These will be specifically identified in any unique application and the plug-in connections will be provided. For the remainder of the applications it is expected that these should simply be capable being connected to a generator in an unexpected emergency but will not require a special plug.

The selected Technology Supplier will be expected during their training of SA Water Staff and any other nominated Contractors to demonstrate how the units are to be connected to a generator and any additional components that might be required in doing this.

3.17 Serial Numbers

The pump is to have a serial number, which can be recorded in the property installation information and As Constructed drawings. This number should be readily distinguishable and must be unique to each pump. The serial number should also be:

- In a position that can be easily checked
- Verified in the delivery documents as the units supplied to SA Water.
- Durable such that if desired the number can be checked several years after installation.

The pump is to have a unique serial number as set out below:

SAW _____ _____
 Year Manufactured Number

Section 4: PUMPING STATION

This section of the Technical Specification covers the storage vessel that holds the pump, much of the pump control equipment and potentially the level controls and as such is something of an extension of section 3.0. However this section of the Technical Specification applies solely to the storage vessel as that component by itself has a significant impact on the overall success of any pumped sewerage system. For example its storage capacity regulates peak inflows until the pump is able to discharge them. Its shape controls the installation methodology, its weight determines what plant is required and as a water retaining structure, its watertightness controls potential environmental pollution, as well as health concerns.

The lid of the pumping station needs to be capable of withstanding any likely traffic that it might be subject to. It should be visually pleasant and at the same time it should deter access to the pumping unit by property residents. Finally it can represent a working environment that would be considered a confined space application, unless controls are put into place to ensure those OH&S requirements are not applicable to this technology. All of these aspects associate directly with the pumping unit or the storage vessel, and are pursued in detail in this section.

4.1 Minimum Storage Requirements - Residential

The basic residential pumping unit is to have a minimum effective storage of 600 litres, with the requirements for a minimum emergency storage, as specified in 3.7 still to be accommodated in this volume. Therefore by including the house drains and the overflow relief gully provided in the yards this should give most homes a minimum of around 700 litres of effective storage before an overflow can occur or around one day's average discharges from the home. Some of the departures that may occur from this standard sized tank for other residential applications will be:

- Where rock excavation is a problem in the installation areas, SA Water would in these instances prefer that the storage vessel be of a shallower depth to minimise the excavation in rock. Possibly even allowing existing septic tanks (or their holes) to become the location of the storage vessel, or even just the pump itself, are further options that might need exploring. Hence SA Water requires that there be differing tank dimensions (sizes) available for differing installation scenarios in the Technology Suppliers product range. This shallower tank will still have to provide the minimum of 600 litres storage, but SA Water accepts that under these circumstances the volumes retained in the tank after the pump has been turned off, might be increased over the "standard" size tank.
- Some non urban residential applications will have unique requirements such as protracted and frequent power interruptions, or be located such that it may be a long time before SA Water can respond, or they may be cut off by flood waters etc and as such these might require additional storage over and above the set minimal requirements. The size of these units will be determined on a case by case basis and will be marked separately on any design plans for the areas, as well as any associated specifications.
- Unique residential applications where the loadings exceed the capacity of the pumping unit.

SA Water therefore requires in any tendering application that the supplier also provide details and costs of their full range of storage vessels. Any costing estimate should include all fittings that will be required in construction process as well, and this includes boundary kits. In short when SA Water enters into a supply contract it requires that all of the Tenderer's product range should effectively be priced through the tender arrangements so that SA Water is able to avail themselves of these components where and as they become necessary.

4.2 Minimum Storage Requirements – Non -Residential

The storage requirements for these non-residential installations will range from the standard minimum 600 litre storage vessel (as set out in 4.1 above) to the largest of the multiple pump pressure sewerage units available, based upon the nature of the water usage on the property. The minimum storage can therefore only be determined on a case by case basis and this will need to be done with the System Designer certifying that any such applications are sized appropriate to the application. Where any multiple pump units fall within a reticulation design they are to be clearly identified on any reticulation plans, as set out in section 2.6.

4.3 Specific Requirements of Each Storage Vessel

Each storage vessel will need to meet the following criteria:

- It is preferable for the tank to be made of lightweight materials so that it can be installed without a crane (or other significant lifting equipment). This is required to allow these units to be installed in already developed properties, where access of this lifting equipment might prove difficult.
- Be a single structure, not requiring construction in the excavation hole.
- Be of a material that is not impacted either by the corrosiveness of the sewage or the ground conditions that might be experienced. The material should not result in any galvanic action on the pump and fittings inside the storage vessel.
- The tank is to be leak-proof.
- Have a shape, or external mouldings that assist with any anti-buoyancy provision. Such provisions must be able to readily bond with the structure to ensure they will continue to act as an anti-buoyancy device for the life of the pumping station.
- Be able to withstand a distributed or moving load of the order of 500 kg when the lid is closed.

In general SA Water's requirements are that the diameter of the storage vessel should be of a size that can readily be installed by a commonly available auger and preferably an auger that can be used by smaller excavation plant. Ideally the shape of the tank should be such that it minimises the volume of sewage stored in the storage vessel at the pump turned off level.

The storage vessel is to be effectively packaged to allow it to be safely transported to site / SA Water depot from the Technology suppliers premises and each unit should come with appropriate (fit for purpose) instructions on how the unit is to be handled during the installation phase. Any specific requirements such as not rolling the units, not storing them in sunlight, lifting using dedicated lifting lugs are to be clearly identified to both SA Water and any installation Contractor in relation to these storage vessels.

Where the Contractor is to cut through the storage vessel (for the installation of the inlet pipe) appropriate fit for purpose instructions are to be provided by the Technology Supplier along with any restrictions in respect to this action. The instructions should also include guides so that the hole is cut at the appropriate depth for the installation and any minimal requirements for that purpose as well.

4.4 Storage Tank Lid

SA Water has no specific requirements in relation to the nature of the lid of the tank. Accordingly it will consider any lid on its merits, including the details of any venting to be provided through the lid.

SA Water's fundamental requirements towards the pumping station lid are:

- The lid should not be capable of being removed without tools, to minimise the potential for unauthorised entry.
- The lid should be capable of being locked. SA Water is not looking to install locked lids in the first instance on private property applications, but would like this provision where it encounters problems with unauthorised entry.
- All lids in public areas are to be locked using padlocks supplied by SA Water.
- The lid should be capable of meeting the structural load requirements as set out in section 4.3.
- The lid should be kept clear of obstructions i.e. it is not to be landscaped or built over.
- The lid should also be made of a material that allows it to be easily removed by a single maintenance person.
- If the controls for the pump are included in the lid then this needs to be appropriately documented along with any special precautions that might be required to maintain these controls.

4.5 Access onto the Private Property

In most pressures sewerage systems it is expected that the pumping unit installation will be in property backyards and will occur either after the house/building has been constructed (existing homes) or when the house/ building is nearing construction in the case of new dwellings. As such there could be some access problems and the first of these is access to the pumping unit itself as indicated above but the second is the issue of repair personnel accessing the unit itself. The latter is dealt with in section 4.6.

If there is no access to the backyard then the unit has to be installed in the front yard and the Property Owner will be required to meet any additional costs attached to such a connection. If access becomes impossible after the unit is installed then the Property Owner will meet the costs of any cranes or other specialist equipment that might be required and any levels of service to the unit will no longer apply.

The basic requirements in terms of SA Water access to the pumping units are:

- The pumping unit is not to be buried, paved over, concreted over, or permanently covered in any other manner.

- When the SA Water repair agent comes to repair the unit, it must be accessible to these repair officers. If the SA Water officers are unable to locate the unit because it has been covered, SA Water may refuse to carry out repairs until the owner exposes the unit, and it may charge the resident a service call even if the unit is not repaired.

At minimum SA Water, may pass on to the resident any costs to locate and uncover the unit and it may choose to impose fines for covering of the asset.

- If pets are not secured SA Water officers may refuse to enter the property and carry out any repair works where they cannot contact the resident to secure the pets. In these instances SA Water will not be held liable for any repairs not being carried out and SA Water may pass on to the resident any costs incurred.
- Access from any gates to the pumping unit for a trolley device will be required. Any resident that closes off this access may be responsible for any additional costs incurred and if additional equipment, such as cranes etc that may be required.
- Any residents with “secured” properties must be present to allow the SA Water repair officers access to the yard at the agreed time based upon arrangements made when the resident calls to notify SA Water of the system failure.
- Those accessing the pumping unit will have photographic identification with them.

A detailed home owner’s manual will set out these basic access requirements, which the Property Owners and Residents will be required to observe. This will include sufficient space for (at minimum) a lifting trolley. This manual will be further supported by Call Centre Staff reminding residents when they call to report an alarm of the need to:

- Ensure that any property gates are unlocked.
- Ensure that the driveway or pathway leading to these gates is clear to allow access.
- Lock up any pets that might escape the property.
- Ensure the lid of the pumping station is clear of any mulch, pot plants etc, and clearly visible.
- All landscaping that can be removed for around the pumping station if possible should be removed.
- Ensure any obstacles in the yard that might prohibit the trolley from gaining access to the pumping station are cleared away and you have a preferred pathway for the unit.

4.6 Access into the Pumping Unit

In the case of access into the pumping unit itself the pumping station should incorporate provisions for the removal of the pump and other mechanical devices without the need to enter the pumping station. The intention is to avoid the creation of a confined space working environment. Any Technology Supplier should indicate how this is to be achieved with their proposed product including detailing the following:

- The lifting device that is incorporated so that it facilitates the removal of the pump without the need to enter the storage vessel.

- Coupling arrangements to allow the pump to be released from the electrical and hydraulic connections without the need to enter the pumping unit.
- In addition to the above the nature of the opening to the storage vessel and its lid must be such that a basic SA Water lifting device can be easily fitted above the opening to facilitate the removal of the pump.
- Any venting arrangements that need to be carried out before attempting to remove the pump.

4.7 Anti-buoyancy Features

The pumping station when made from lightweight materials will have a tendency to float when empty particularly in a location with a raised water table. To prevent any potential of the units floating the following steps need to be applied in relation to all pressure sewerage pumping unit installations in the SA Water area.

- The pumping station is not to be installed in a ground depression, where rainfall runoff water would normally pond.
- A concrete ring beam or ballast is to be poured around the base of the storage vessel. The size of the ballast will be in accordance with the Technology Supplier's requirements. The shape of the storage vessel should facilitate the ballast permanently attaching to the storage vessel structure and prevent any sudden un-attachment of the ring beam.

The supply of any pumping station should contain instructions on the size of the ballast to be installed with the pumping unit to achieve this anti buoyancy requirement. This includes different instructions for the differing dimensions of the various size storage vessels in the technology suppliers range. All pumping units installed in South Australia will have this anti-buoyancy protection provided during the installation phase.

4.8 Multiple Pump Applications

It is expected that all of the requirements set out previously in both sections three and four of this specification will apply to any multiple pump applications. Typically these will be used in non-residential applications such as clubs, motels, small industries, some strata titles etc.

The storage vessels clearly will be larger than domestic applications and as such will no longer be readily installed by an auger, so some of the installation requirements will need to be modified to accommodate these structures. In general however SA Water will require the following requirements to be incorporated into any multiple pump operation:

- Automatic alternation of the primary duty pump, particularly in locations where there is seasonal/diurnal fluctuation of the inflows into the pumping station.
- One pump is to be located lower or have its operational points set considerably lower to ensure minimal storage in the storage vessel when it is at pump off settings. How this is to be achieved with alternative duty arrangements is to be detailed in the Technology Supplier's submission.
- Progressive commencement of the pumps to meet increased inflows into the pumping station.
- Consideration of the use of multiple rising mains particularly where there is seasonal fluctuation of flows. A caravan park in a holiday destination might

be a typical example of this seasonal fluctuation, requiring a second rising main.

- The base of any multiple pump unit however must be arranged so as to minimise any storage in the larger wet well at the “pump off” setting
- The potential for these larger tanks to generate odours will be a key criteria for SA Water to explore with any proposed multiple pump application before it will allow that particular unit to be installed.
- Alarm arrangements in respect to these units need to be detailed along with background on potential response times.

For any SA Water’s Supply Tender the Technology Supplier will be expected to provide the following:

- Details for all of their multiple applications, indicating duplexes triplexes etc and their overall dimensions and shape for installation purposes.
- Details of the total storage volumes including identifying any on and off volumes stored as well as the alarm and emergency storage volumes.
- Costs of each of the units as per the supply tender. Any costing estimate should include all fittings that will be required in construction process as well, and this includes boundary kits.
- Details on the normal flow rates that each of the pumping stations is capable of discharging (assuming a 40 metre discharge head).
- Modified anti-buoyancy provisions
- Any additional electrical requirements for connection to the property power board.
- Details of pump lifting and replacement arrangements under multiple applications.
- Preferred locations and limitations on the installation of these units.
- If there is more than one discharge line from the station these need to be clearly identified.
- Any special fittings and the number of these that will be required.

4.9 Inlets and Outlets

Pipe connections to the tank should be capable of being made without leakage through these joints. The pumping station thus should be supplied with appropriate sealing devices for these connections.

A sewer connection (inspection point or IP) will be constructed on the inlet to the tank, as part of the SA Water infrastructure This is located approximately 1.0m from the tank and is the point the Property Owner will be required to connect the private household drain.

4.10 Pumping Station and Internal Pipework

The pump is to be provided with all discharge pipework and valves to allow the pipeline to be extended from the pumping unit to the boundary kit. At minimum this discharge pipework should be:

Section 5: PIPES

For a pressure sewerage system however, the reticulation pipe networks are only a small portion of the overall pressure sewerage project, possibly they comprise as little as 25% - 35% of the total system costs.

Pressure sewerage reticulation and on-property pipe networks:

- *Do not need to be laid on grade rather they are simply laid at minimum depth, considerably reducing pipe laying costs.*
- *Are smaller in diameter than conventional sewerage systems.*
- *Are a fully sealed system and as such minimise the ingress of inflow, infiltration and tree roots, which can cause problems in conventional sewerage systems and represent a considerable portion of the operational costs of those systems.*
- *Do not require the construction of maintenance holes and inspection points, again removing high cost elements from the pipelaying costs.*
- *Can be laid in long pipe rolls, reducing the number of joins where polyethylene pipes are used, and the flexible pipes can negotiate gradual changes in direction.*
- *Are only laid down one side of the road reserve with road crossings similar to a water main.*
- *Can be easily raised or lowered to navigate other services.*
- *Should take significantly less time to construct than conventional sewerage systems particularly in terms of the main laying component.*

In support of the above this section seeks to detail the following supporting requirements in respect to the pipes themselves so that the systems can achieve the above listed features.

- *The choice of the pipe materials.*
- *The pipe colour, to designate it is sewage that the pipe is transporting.*
- *The marking of the pipeline system.*
- *The minimum pipe depth.*
- *The pipe joining techniques.*

Each of these is discussed in more detail in the following pages but the pipe materials can essentially be divided into two categories, these being those for the residential works and those for the reticulation mains.

5.1 Residential Pipe Materials

The property delivery lines for all SA Water applications will be:

- 40 mm diameter polyethylene pipe
- The pipe will be Class PN 16.
- The pipe should occur in long rolls such that in most cases the only joints on the property should be to the pumping station and to the boundary kit.
- Laid at the depths set out in section 6.5.

5.2 Reticulation Pipe Materials

The reticulation mains for all pressure sewerage systems in SA Water pressure sewerage systems are to be:

- Of varying diameter (50 mm – 125 mm), and primarily in polyethylene (PE) pipes, but other pipe materials may be authorised by SA Water. When and if larger sizes become available in longer rolls, these will also be considered.
- Class PN 16 pipe (unless otherwise stated in dedicated areas.)
- 100 m as the minimum lengths of the pipe rolls.
- Readily available in the commercial market place so that additional lengths can be purchased for repair, or extension purposes.
- Capable of being crimped if required to effect repairs.
- Laid at depths set out in section 7.7.

5.3 Pipe Colours

Only black PE pipe with a cream coloured stripe is to be used for pressure sewerage systems in SA Water applications.

Should SA Water discover any of these mains inadvertently laid with an incorrect coloured pipe it will not accept handover until the pipes have been replaced with pipes that comply with the Australian Standards for the colour coding of sewerage pipes.

Caution needs to be exercised because there will have been some water mains that may have been laid in the black pipes.

5.4 Joining the Pipes

All pipes are to be joined by mechanical or electro fusion welding techniques in accordance with the manufacturer's requirements. Those carrying out pipe joining, are to be appropriately qualified, capable of demonstrating their experience with these techniques and have the right equipment to affect the welds. SA Water will inspect the quality of the welds and will witness the welding processes from time to time. Defect welds if discovered may lead to uncovering of pipes and a reinspection of all welds at the Pipelayer's cost.

SA Water will also consider butt welding of the pipes by persons with the appropriate qualifications, equipment and experience. Similar auditing provisions will also prevail.

5.5 Marking the Pipes

The location of pressure sewerage pipes are to be marked in the following manner:

- Reticulation pipelines are to have markers installed at 200 metre intervals on straight sections or at any significant change of direction. In general these markers are to be:
 - 1500 (L) x 150 (W) x 150mm (D).
 - Must have SA Water metal warning plates.
- Tracer wire, (capable of being energised) is to be laid in the trench for both the reticulation and residential pipe materials. In the on-property works the tracer wire should be extended to end at the power board and boundary kits. The wire should be laid near to the pipe or alongside the pipe so that 350mm minimum cover over the wire is achieved,
- Pipes are to be laid at the standard depth and as indicated on the longitudinal section of the reticulation main. For on property drains where the main is laid at depths greater than the standard depth, this will be marked clearly on the house layout plan.
- A cream coloured marker tape is to be laid 250mm above the top of the pipe. This marker tape should indicate that there is a pressure sewerage system below it. SA Water's preference is that the tape be cream and at least have the letters PS on it, but is happy to negotiate these colours with the Pipelayer, if cream is not readily available at the time.

5.6 Pipe Protection

The pipe can in most instances simply be backfilled with the excavated material from the trench, where the trench has been dug by a trenching machine such as a Ditchwitch. This assumes that the trench is excavated in soil conditions that are relatively clean and free of potential abrasives.

Where rock or gravel is encountered in the trench or in some circumstances where there are a large number of sharp items that might puncture the pipe then the pipe is to have a minimum of 80mm of sand backfilling on all sides. Where sandfill is required the trench is to be excavated an additional 80mm in depth with the pipe to be laid on top of a sand bed. The trench excavation will need to be wide enough to allow for this 80mm of sand filling around the pipe.

Where it is difficult to gain the minimum depth due to excavation difficulties, SA Water is to be advised. The specific requirements may alter from case to case and will need to be determined by the SA Water Project Manager.

5.7 Valves and Fittings

The valves and fittings to be used in the SA Water pressure sewerage reticulation and on-property applications need to be:

- Compatible with the pipe and the class of pipe used.
- Readily available in the commercial market place
- Be of a type recommended by the Technology Supplier.
- Comply with the relevant Standards for valves and fittings for the class of pipes being used.

5.8 Repairs to Mains

Being a sealed pipe, tree root ingress is not expected and thus there should be fewer repairs to the pressure sewerage pipelines than for conventional sewerage. Where such repairs are required these will be achieved through either crimping of the pipe or the isolating of a section of the pipe using the various isolating valves (property and reticulation system).

All repairs will be in accordance with the methods of repair for pipes as defined by the pipe manufacturer and the defined Australian Standard for that pipe.

The pumping units must be capable of cycling and tripping out on their overprotection device to facilitate these repairs. Any potential system Designer of pressure sewerage systems in South Australia needs to effectively address this factor in their submission to SA Water.

5.9 Subsequent Connections

Where subsequent connections are required into the pressure sewerage pipelines these will be achieved by either:

- The use of pipe saddles generally where live connections are contemplated.
- Isolation of the pipe section and welding in a new connection, which will require a temporary shut down of the mains.
- Only SA Water is to carry out these subsequent Connections to existing mains unless the contractor is approved by SA Water to carry out these cut-ins.

Section 6: ON THE PROPERTY INSTALLATION

The success of pressure sewerage systems will, to some extent be determined by the ease and time taken in the on-property installation works, the quality of the works and the overall reliability and performance of the pumping unit, post the installation process.

SA Water has set out in this section of the specification its preferred installation methodologies for these on- property installations, wherein the general intent of these minimal requirements is:

- *To accommodate the reasonable needs of the Property Owners, where this is possible and to ensure that they have had a say in the design for their property.*
- *To ensure minimum disturbance to the property results from the works and that all works are restored to a state as close as possible to that which existed before the main was laid.*
- *To set a maximum time limit for works to occur on the property for existing occupied homes, with a penalty to be applied to the Contractor if they do not comply with this maximum time limit.*
- *To ensure the works occur in a logical sequence that reinforces both the minimal disturbance and the time limit on site.*
- *To ensure residential access to the property is lost for the smallest amount of time possible where an existing property is being serviced by the pressure sewerage works.*
- *To test the unit before departing the property, so as not to have to return to the property for a long time, certainly not until the unit requires that maintenance that would be expected with the units.*
- *To establish a basic quality procedure to ensure that all Property Owners are dealt with consistently across any pressure sewerage installation and across the entire SA Water Regional Area.*

In addition to the above, SA Water will only accept the handover of the on property works if they are installed by appropriately accredited Contractors. The certification or accreditation process for these Contractors is to be provided by the Technology Supplier.

SA Water will consider alternative installation methodologies to the preferred installation procedures set out in this section so long as they:

- *Achieve the above objectives.*
- *Demonstrate how the alternative methodology adds further value over the process laid out in this section of the Technical Specification.*

6.1 Basic Layout

The overall layout should (as much as can be practically achieved) be a collaborative effort between the Contractor and either the Property Owner or their designated representative. This representative's identity is to be communicated to SA Water, in writing, by the Property Owners prior to the meeting.

The basic property system layout will incorporate the following features:

- Sewer Connection or Inspection Point (IP)

- Pumping Unit
- Property Delivery Line
- Upstream House Drainage Lines
- Connection to the Property Power Board
- Installation of an Alarm/Control Panel
- Connection to the Boundary Kit

The “on-property” installation is defined as that section from (but not including) the Boundary Kit to the IP, on the household side of the pumping unit. In general the pumping unit is to be located in a position, as close as practical to the building and within a clear line of sight of the Alarm/Control panel. Where there is more than one building on the site the pumping unit will be located next to the building contributing the greatest flow volume to the pumping unit assuming it is the building which has the power board on it, if there is only one such powerboard. This close proximity minimises overall installation costs and will be the basis of any quotes provided by or to SA Water on installation costs.

If the Property Owner wants to locate the pumping unit at another location and this can be practically achieved, then the owner’s wishes will be accommodated and a quote for the additional costs (to the Property Owner) will be produced. Basic quotations for the work installing the pumping unit are to be based upon the unit not being any further than 10m from the building (and Alarm/Control panel). All work in excess of this being considered an extra over, which is to be paid for by the Property Owners.

Where there are multiple units on the property the above principles of locating the units close to the buildings will essentially remain the same, excepting that where practical, the units will also be laid out in such a manner so that any property delivery line (joining these units) is minimised in its overall length or multiple connections are to be used (see section 6.13).

As indicated in the sections on design, the property delivery line should be parallel to the property boundaries where practical, but can be diverted to accommodate the following typical obstacles:

- Unique or solid structures, in the case of existing homes.
- Unique or prized gardens in the case of existing homes.
- Buried pets in the case of existing homes.
- Proposed structures or driveways in the case of new homes.
- Rock outcrops on the property.
- Topographical features such as sudden inclines or falls.
- Future property extensions or structures such as swimming pools.
- Unique features where the property is quite large and the pipeline is not in a close proximity to property boundaries.

Some of these aspects might actually be discovered during the installation phase and require a redesign of the basic layout hence these principles are included here.

The boundary valves (referred to as the boundary kit) are to be installed within one metre of the property boundary and should be in a dedicated valve box, and this will have been installed by the Pipelayer (see section 7.4), when the reticulation mains are laid.

6.2 On-Property Procedures

The following steps set out what SA Water regards as a logical (and minimal) procedure to be followed for any on-property installation of a pressure sewerage unit. Details of each of the steps are set out throughout the specification:

1. Contact the Property Owner and organise to meet the Property Owners on site and design the on-property layout.
2. Record contact dates and times in the property information file that needs to be compiled for each property.
3. Where the property is vacant no property design will be possible.
4. Compile an “on-property” layout diagram. Provisions should be made to also indicate the information requested in section 10.0 of this document in a property information file. Have the Property Owners sign the diagram, with the original to be provided to SA Water.
5. Where the installation is in an existing home there will need to be an audit of the existing property’s power board and hydraulic connections, typically this will be done concurrently with the design work. The results of these audits are to be set out in the property information file including:
 - The Tradesman’s names and license details.
 - The Tradesman’s signatures that the connection meets current requirements.
 - When work is required to bring these connections up to standards before the pumping units can be installed then the tradesman’s signature certifying that the works carried out are in accordance with relevant standards and any unique site requirements.
6. Take digital pictures of the property as well as any video to show the condition of the property before any work has commenced on the property. The importance of this video would be easily identified for properties with significant cracking visible but given the low cost of current digital technology it is required that this should be done on all properties.
7. Co ordinate with the Pipelayer to ensure that the boundary kit is installed in the correct location as appropriate.
8. The drawing number and the property information file should share a common identifying number. The property file is to ultimately be handed to SA Water.
9. Complete any SA Water permits required to enter the property (if a prerequisite).
10. Gain permission from SA Water and the Property Owner to go ahead with the installation.
11. Provide 5 days minimum notice to the resident prior to entry onto the property to start these works.
12. Check that the property matches the approved audit and layout diagram, before the commencement of any works.
13. Install the pumping unit (as per section 6.3) and carry out the operational testing of this unit (as per section 9.1), prior to any decommission of the existing sewerage systems.

14. Install the property delivery line from the pumping unit to the boundary kit and open the valves to allow discharge into the reticulation systems. This activity to be concurrently carried out with 13 above.
15. Install the sewer connection or IP adjacent to the pumping unit. It is the homeowner's responsibility to arrange for the house plumbing to be connected to the IP.
16. Formal Commission of pump as set out in 9.1.
17. Installation of any pipeline markers.
18. SA Water plumbing inspection of the final installation.
19. Complete any QA information (includes copies of all permits and receipts) and ensure copies are included in property file.
20. Complete all As Constructed information on the drawings and include these in property files.
21. Property construction works to be cleared up and site vacated.
22. Hand over pumping unit and property line to SA Water.
23. Provide the residents with a copy of the homeowner's manual
24. Forward property information file to SA Water.

6.3 Installation of Pumping Unit

The pumping unit is to be installed in the following manner and at all times in accordance with the Technology Suppliers Instructions.

1. Excavation of hole as per the Technology Suppliers requirements i.e. minimum diameter of hole and depth. Excavation to be via an auger to minimise the on-property damage and auger transport to be rubber tyred.
2. Cut inlet hole into the storage vessel at the desired location.
3. Insert storage vessel in the hole, carrying, not rolling it into place. This should also be done in accordance with the Technology Supplier's requirements.
4. The storage vessel is to be buried to the depth of the burial level decal on the tank. However the final ground level of the storage vessel should be such that it is not located in a position where stormwater might naturally collect.
5. Pour the concrete ballast around the base of the pumping unit in accordance with the Technology Supplier's instructions and ensure the concrete ballast, bonds with the storage vessel material.
6. The pumping unit hole is to be back filled with sand up to a depth of 200 mm below the burial level decals; or to be installed as per the manufacturers installation instructions.
7. The remainder 200 mm to be filled with acceptable quality topsoil as agreed with the SA Water Project Manager.
8. The storage unit is to be visually inspected during the installation phase to ensure that no damage has been done to the unit in the transportation and installation process.

9. The pump inlet / outlet pipelines to be installed in the storage vessels in accordance with the Technology Supplier's requirements.
10. The sewer connection or IP is to be installed and connected to the pumping unit.
11. The Alarm/Control panel is to be installed on the house/ shed/ garage or on a dedicated post if away from the above (see section 6.6).
12. The Alarm/Control panel to be wired into property power board.
13. The pumps and all electrical connections are to be tested and the unit made operational.
14. As Constructed information to be compiled and recorded.
15. Final restoration of property.
16. Formal commissioning certificate to be gained from the Technology Supplier.
17. Property file to be checked that all of the information as requested above (and in section 10 of this spec) has been placed in the file and the file is to be handed over to SA Water.

Excavated holes for the pumping unit are not to be left open overnight, therefore excavation on the property should not be commenced unless the Contractor can guarantee that the storage vessel will be installed and backfilled that day. Alternatively if the Contractor can place suitable covers over the hole that guarantee that the resident and visitors to the property, cannot under reasonable circumstances, gain access to the excavation hole, then the excavation can proceed.

The installation of the unit is only to be done by a Contractor that is formerly accredited and trained by the respective Technology Supplier. SA Water requires that a formal commissioning certificate be submitted for each pump once they are operational. This certificate will be the basis of any warranty that is to apply to the pumping units.

A sewer connection or IP is to be provided on the inlet side of the pumping unit for the householder to connect to. The householder will be responsible for the connection to the pumping unit.

6.4 Installation of Property Delivery Line

The route of the property delivery main should be agreed between the Contractor/ Designer and the Property Owner. The route is not to be altered during the installation process unless unforeseen circumstances are encountered, such as underground structures.

Where a modification is necessitated, the Contractor should seek to agree on any new route with the Property Owner before making that change. Where the Contractor is unable to contact the owner within 24 hours, they should proceed on the basis of endeavouring to stay with the general design agreed in the layout drawing.

The following steps represent the basic acceptable installation process for the Property Delivery Line. Contractors wishing to amend this process should gain SA Water concurrence before proceeding.

The property delivery line is to be installed in the following manner:

1. Confirm layout diagram for the property has the correct pipeline route and is indeed for the correct property.

2. Determine if any of the pipeline excavation should involve directional drilling.
3. Mark out the pipeline, cut and remove any high quality turf before commencing trench excavation. If the weather is hot this turf is to be watered, sufficiently often to keep it alive and appropriate for restoration.
4. The pipelines are then excavated to a minimum depth of 450mm plus the external diameter of the pipe.
5. The pipeline is to be installed in the trench and joined to the length of pipe that is protruding from the pumping station. A tracer wire capable of being energised is to also be installed. It is intended that there be no joint between the Boundary Kit and the pumping station but this will not always be possible.
6. The excavation is to be carried out using rubber tyred trench diggers.
7. Pipe Bends or significant changes in direction of the delivery line are to be tied to fixed locations on the properties where possible, for marking on the As Constructed drawings.
8. Pipelines may be backfilled with the material excavated from the trench. Where there is rock or sharp materials in that fill that might puncture the pipeline the pipe must be backfilled with sand to 80 mm around the pipe.
9. Install marker tape as part of the backfilling of the trench.
10. Trenches to be compacted to a minimum depth of 100 mm below surface level. They are to be filled to the surface with topsoil and seeded with a grass similar to existing lawn.
11. Replace any cut out turf, placing it carefully and filling any gaps with topsoil and grass seed. The trench should have been compacted before replacing the grass to avoid subsidence. Water grass well.
12. Where there is gravel material at the bottom of the trench, excavate another 80 mm in depth and backfill with sand to a depth 80 mm above the top of the pipe.
13. Clean up site, removing all excess material (if any.)
14. Record all notes on the pipeline route including, detailing the nature of the host soils encountered, where sand is being used (if required). Complete As Constructed drawings.
15. Put all of the information required (see section 10) in a property information file, which is to be passed on to SA Water at the completion of the project.

6.5 Locating the Pipeline

The As Constructed diagrams should clearly indicate the route of the pipeline including any tie measurements. However as properties change with time, the following are to be provided in the property installation to assist with locating the pipe at a later date.

- The pipeline is to be laid in fixed locations, where possible with appropriate tie measurements at any point where direction changes.

- Tracer wire, which is capable of being energised, is to be installed with the pipe. The tracer wire to end in the Boundary Kit and the other to end near the property's power box where that is possible.
- A marker tape indicating that pressure sewer has been laid 250 mm below the tape. The tape should be cream coloured, and have the words Pressure Sewer or PS printed on it.

6.6 Installation of the Alarm/Control Panel

Set out below is a set of steps which would be regarded as the basic methodology for installing the Alarm/Control panel

- Agree the location of the Alarm/Control panel with the homeowner, as part of the property installation.
- Determine if a heritage coloured standalone post is required and if so obtain one.
- Determine the 1 in 100 year flood level (if applicable) and mark out a location for the Alarm/Control panel so that the bottom of the panel is a minimum of 400 mm above that level.
- The alarm panel must be fixed either to the wall of the house, garage, shed etc or on a stand alone post. In each of the above cases, the alarm panel shall be mounted at 1400 mm above the finished surface level to the underside of the panel. This standard height is a requirement for maintenance and OHS issues.
- Install the Alarm/Control panel in accordance with the Technology Supplier's instructions and the relevant standards and codes. The Alarm/Control panel is to be in clear sight of the pumping unit and preferably no more than 7-8 metres away (max 10 m). The Alarm/Control panel is then to be connected to the household power board.
- The connection of the electrical cable to the Alarm/Control panel is to be fixed to the underside of the alarm panel to prevent moisture entering.
- Once all connections have been made the protective cover is to be inserted.
- The Alarm/Control panel is to be tested both for normal operation of the pump and for the alarm modes.
- Assuming all test requirements have been met, the valve box is locked and the Contractor is to affix an SA Water alarm instruction sticker to the outside of the box.

6.7 Connection of the Pump to the Property Powerboard

The pump is to be connected into the property's power board in accordance with the following:

- The pump is to be installed on a separate circuit to all other household uses. Residents should be capable of isolating all of the other in the house power supplies if so required.
- This connection is to include the connection to the Alarm/Control panel, which must be in accordance with the Technology Supplier's

requirements. Ideally both should be within a line of site of one another, but that is not always possible.

- The connection should be in accordance with any local energy supplier requirements.
- The household power board must comply with relevant Australian Standards.
- Caution over asbestos in power boards is to be exercised, in accordance with local energy supplier's requirements.
- The powerboard is to be clearly marked in a professional manner to identify the pressure sewerage circuit.

6.8 Household Audit (Existing Homes)

Where the connection is to an existing dwelling a formal audit should be carried out before the property layout design has been commenced. The requirements of that audit are set out in section 2.16.

The Contractor will need to either carry out the work previously identified in the audit or check that the Property Owner's tradespeople have carried out this work. These audits will need to be carried out by appropriately qualified electricians and plumbers. The Contractors Electricians and Plumbers are required to sign off that the final connections are in accordance with both the Technology Supplier's instructions and the relevant Australian Standards for the respective connections.

6.9 Carrying Out the Installation

SA Water intends that the on-property installation will be carried out in the following manners.

For New Homes (Extension of an Existing Sewerage System)

SA Water will provide a quote for the extension of the system to the properties boundary kit and the installation of the pressure sewerage pumping unit. The householder will meet the costs of this installation.

For Existing and New Homes (Backlog Areas)

Where there are a number of existing homes or new homes proposed in Backlog Areas, SA Water will let a tender for the installation of both the reticulation systems and the property installations. The successful tenderer will ultimately be responsible for the on property works. They will carry out these works in accordance with this specification and the installation tender. SA Water will however make available to all prospective tenderers the names and contact numbers of all of its accredited Contractors, although the Tenderer will not be compelled to use them.

For Existing Homes (Adjacent to Existing Reticulated Areas)

In these cases the Property Owner will approach SA Water who will provide them with an estimate to carry out the works required to have them connected to a reticulated system via a pressure sewerage system. SA Water will thereafter use one of the accredited Contractors to carry out the works.

6.10 Contractor Information

In backlog areas the Contractor will need to carry out the initial designs and provide a copy of this design to the Pipelayer, if the Pipelayer is a different individual/ company to the Contractor. This will allow the Pipelayer to know where to place the boundary kit, which is part of the reticulation pipework. The Contractor therefore needs to be provided with the agreed works program by the pipelayer, i.e. when the reticulation zones are to be constructed, so that it then can co-ordinate these works with the Pipelaying. In this manner the Contractor is not to unreasonably delay the Pipelayer.

When the Contractor and Pipelayer are from the same company, then there still needs to be an initial focus on getting property designs completed early in the project, to assist with the pipelaying activities such as where the Boundary Kits are to be located.

6.11 New Homes – General

It is intended that all internal fit outs should be completed before the connection to the pressure sewerage system is made. The sewerage lines are then to be flushed to ensure all building debris is removed from the new drainage system before connection to the pumping unit is made.

The builder is to make provision for the flushing water to escape from where the installation is being made. Once the Contractor is happy there is no building debris remaining in the household pipes, they will connect to the pumping station and that unit will commence full operation.

The builder is also required to provide an electrical cable, on a designated separate circuit, for connection of the alarm panel. Refer to Appendix 3.

6.12 Identification of Employees

As a significant amount of the pressure sewerage works occur on the property, SA Water and its Contractors (including subcontractors and installers) will be required to have photographic identification with them at all times.

The formal identification process will be:

- When the Contractor's employees first enter the property they must show this photographic identification to the resident.
- The Contractor's employees must also provide this identification to SA Water's Project Manager on request.
- A Contractor's employee that does not have their identification with them cannot be allowed to work on the property.
- The Contractor shall provide SA Water with a detailed list of all employees to be used on this project.
- Where individuals leave the employment of the Contractor, the Contractor will be responsible to recover the photographic identification.
- Should a Contractor no longer proceed as a nominated contractor, then they will be responsible to return all identification.
- Where identification is lost then it will only be replaced after a statutory declaration has been made.

6.13 Confidentiality

The Contractor will be required to enter into a formal confidentiality agreement with SA Water that binds the Contractor and all of their staff in respect to all information provided on the pressure sewerage projects. The Contractor is to thereafter ensure that their staff adheres to this confidentiality agreement.

SA Water will provide to the Contractor, the names of the Property Owners and their contact numbers (where it has this information) to assist the Contractor with the on-property works. This information must only be used for this installation purpose and shall not be copied. This information must be handed back to SA Water at the completion of the project.

6.14 Multiple Dwellings/ Non Residential Properties

Design of the on-property works must in these instances be conducted by an experienced designer as indicated in section 2. This will determine either the number of pumping units to be installed and the size of the units to be installed (i.e. single or multiple pumping units).

The installation of these units will in general be in accordance with the general directions of this section excepting:

- Any contractually imposed proposed time limits on site (see section 6.16) will be varied to be more appropriate to the works required. This will be identified in the Installation Tender.
- The size of the property delivery line and lateral spur may alter.
- Multiple connections to the reticulation system may be used to assist with the internal arrangements.
- All testing should be done concurrently, but it will be possible to progressively connect parts, as their testing is completed.

6.15 Separate Greywater and Blackwater Lines

As part of the property installation for existing homes the initial site investigation will need to determine if there are separate greywater and blackwater lines. These then need to be factored into the design for the property and this should be done by an experienced designer, particularly if multiple units need to be contemplated. It is therefore strongly recommended that any Contractor make use of an experienced Designer for these installations, until they have considerable experience of these types of installations.

The pumping unit should be sited to be able to accept flows from both of these sources. Possibly a second pumping unit might be required in some circumstances, but ideally this should be avoided. At minimum this design needs to be discussed with SA Water before proceeding to install the unit/s.

6.16 Testing Procedures – General

The Contractor is to carry out the tests set out in section 9 of this specification on the pumping unit and property delivery line before making the unit operational. A separate commissioning may be required at a later date, with the Technology Supplier or their nominated representative present. SA Water wants these accredited Contractors to be capable of formally commissioning the pump so that there is no need to revisit the property.

The pumping unit will be tested using the town's water supply. Only after all of the tests have been successfully carried out, is the final connections to be made and the pump made operational. A formal commission certificate is to be issued to SA Water to verify that the pump is fully operational and as a minimum this certificate should include:

- A unique number related to the pump's serial numbers.
- Certificate of the pumping unit's serial numbers.
- The property address.
- Date of Commissioning
- Name of the individual carrying out commissioning and their signature.
- Name of the SA Water Employees the tests were conducted in front of.

6.17 Time Limits for Carrying Out Works on the Property

All installation work is to be completed within 3 days of the Contractor entering the property to carry the installation. This limits any inconvenience to the home owners as result of the installation works. The only exceptions to this 3 day rule are:

- Where weather intervenes and the work cannot be completed within the time frame without incurring damage to the property. New work should not be commenced if wet weather is likely to occur.
- The pump and/or storage vessel needs to be replaced as it is not performing to specification, and this was not as a result of the installation activities.
- The resident requests additional works on site, and the Contractor and resident agree on a new time frame.
- Where commissioning of the pumping unit needs to be delayed until the reticulation mains have been completed.
- SA Water's Project Manager insists on sighting some aspect and abnormally, causes a significant delay, due to unforeseen circumstances.

SA Water's installation contract may include penalties that reduce the payment to the Contractor for each day over these time line limits in completing the work. The commencement points and finishing points for the on property work will be:

Commencement: When Contractor's employees arrive at the site or the Contractor places any equipment on the site.

Finish: After the pumping unit property delivery line is made fully operational and formally commissioned. All plant and equipment removed and the site restored to a satisfactory condition.

6.18 Consultative Process

The intention of the on-property design is to endeavour to accommodate the Property Owner's wishes in the design where this can be practically achieved. Thereafter the remaining process is about ensuring the minimum disturbance and inconvenience to the resident on the property for existing homes or delays to the new homeowner.

In summary the key elements of the consultative process are:

- Initial letter to residents providing details of the pressure sewer scheme and connection of their property to the sewer system. (Action SA Water)
- Obtain homeowners approval to commence the scheme design by having them complete the PSS Agreement Form. (Action SA Water)

- Contractor to contact the Property Owner and meet on site to discuss the layout, identify greywater/ blackwater needs etc. (Action Contractor)
- For existing homes the results of any property audits are to be provided to Property Owner whereafter the Property Owner must be given at least 10 working days notice to allow them to engage their own tradespeople, if that is the preferred direction.
- Copy of layout/ Contractors drawing for Property Owner's signature. (Action Contractor)
- Prior notification (5 days) to resident before works commence on site.(Action Contractor)
- Introduce staff to the property resident at the commencement of work and commence work. Provide property resident with 24 hour a day emergency contact numbers.(Action Contractor)
- Final inspection of property with resident invited to participate. (Action Contractor)
- Hand over a copy of the detailed homeowner's manual as well as discussing with the resident the instructions in that document on how to use the system.
- Emergency contact numbers to be affixed to the Alarm/Control panel.

6.19 Maintenance Covenant

For existing properties a property owner is required to enter into a formal service agreement with SA Water.

SA Water does not in the first instance propose to take an easement on the property but reserves that right, if it has difficulties in gaining access to the units.

SA Water's PSS Agreement will be in force until such time the Sewerage Act is amended, when it is intended to attach an encumbrance to each property title.

6.20 Homeowner Manual

SA Water will provide each of the Contractors with a number of detailed homeowner manuals, to hand out when the unit has been installed. This manual provides instructions on how to use the pressure sewerage system and what to do if an alarm is activated. The Contractor should explain the manual to the resident and make them familiar with the emergency and general contact numbers included in the document. They should also clarify what can and cannot be discharged into the pressure sewerage system.

If the Contractor requires additional copies of the manual they should approach SA Water, who will provide these. The detailed homeowner's manual will be maintained on the SA Water's website and contains such information as

- Modifications to the home.
- Installing spa's/swimming pools.
- What to do in floodplains
- Where to obtain spare copies of the manuals and house service diagrams.

6.21 Information File

The information file as described in Section 10 is to be filled in then handed on to SA Water as part of the handover process. SA Water will use this file as part of its development of a data base on the performance of the pressure sewerage pumps.

The information file will include the As Constructed drawing for the property, but is meant to provide a more complete history. The minimum information required is set out in section 10 of this specification however the Contractor may include any other information they consider relevant. It is envisaged that the “file” will be little more than a manila folder, appropriately titled with the information sought contained inside. SA Water may provide basic proformas setting out the information sought for the Contractor to complete

Section 7: RETICULATION INSTALLATION

Overall the reticulation system comprises all of the mains, which collects the sewerage from the homes serviced by the pressure sewerage unit, and ultimately delivers it to the sewerage treatment plant. In general for most SA Water applications, the reticulation system will be about those pipelines that connect the property /properties to the town's sewerage system. However as some subdivisions may in the future also be serviced by pressure sewerage systems, the reticulation system will more broadly be defined as including:

- A series of mains, generally laid in the road reserve as per "Services in Streets".
- Lateral Spurs from the common or reticulation pipe networks to connect up a unique property, including the Boundary Kit on that property.
- Discharge point to an existing sewerage system or Treatment Plant.

In some instances pressure sewer systems may be selected as the preferred sewer system in areas where the terrain and environment is difficult to install conventional sewer systems. In these instances SA Water may allow the pressure main to be installed in the road verge or footpath area, but this should be done with the approval of the local authorities.

The reticulation system is to be installed by the Pipelayer, who may or may not be the on-property Contractor. Where the Pipelayer is separate from the on-property Contractors, then the Pipelayer will negotiate with the Contractor as to the location of the Boundary Kit (as discussed in section 6). The latter having determined the preferred location from the Property Owner. This requirement highlights the need for both the reticulation mainlaying and the on property installations to be occurring concurrently.

Set out in this section are SA Water's basic requirements in relation to a pressure sewerage reticulation system. However it will be expected that the Pipelayer will have an Occupational and Health Strategy as well as Environmental Management strategies in place to support these. Where the project is sufficiently large more specific strategies for the project itself will need to be developed and these will include a detailed works program that the Pipelayer will be expected to meet.

7.1 Basic Layout

The basic layout of the reticulation involves:

- The laying of the main, which should be in a fixed allocation for sewerage mains in the road reserve i.e. in accordance with SA Water's Standards as per the development manual or in a location as agreed by SA Water.
- The main will be laid down one side of the street, with properties on the opposite side of the road connected, via designated road crossings.
- The reticulation mains are to incorporate flushing points, air valves and isolating valves in accordance with the design of the overall system.
- The line is to be appropriately marked as a pressure sewerage main, when constructed.
- Formal connection of a pipe from the property Boundary Kit to the reticulation main, including the installation of the Boundary Kit. This size of main to vary for commercial/ industrial connections.

As the main is not laid on grade, it will be laid at a similar depth to other services, including water. It is to be appropriately colour coded (black with cream stripe only), a tracer wire to be installed with the pipework for subsequent location purposes and have a marker tape laid above it to ensure it is not confused with any other mains. If there are other non sewage pipelines installed in black polyethylene in a particular location, SA Water may re-evaluate the minimum depths and allocations for the mains with the Pipelayer.

7.2 Reticulation Design Interface

Given that the pump's life will be ultimately governed by its duty head as well as the mechanical aspects of the pump, there must be no alterations to reticulation pipe sizes, (as shown on the design layout drawings) without a full certification of the changes by the System Designer. Pipe designs are to be based upon commercially available pipe sizes and delays in delivery will not be an acceptable reason for altering any pipe sizes.

Another critical aspect of the design is the location of a suitable discharge point into an existing reticulation system, where the pressure sewerage system does not discharge directly to the sewage treatment plant. The discharge point will have been identified by SA Water, based upon design flow calculations and sized to be able to accommodate those flows. Therefore the discharge point is not to be moved once the plans are approved without the written permission from the SA Water Project Manager. If the Pipelayer in the act of trying to connect to the designated discharge point discovers obstacles that make it too difficult to connect they are to approach SA Water over the next appropriate discharge point.

Some discharge points might also as indicated in section 2 require a small retention structure to limit the rate of entry into the system particularly from surcharges that may result from a start up after a power failure in the system. The Pipelayer will be responsible for the construction of this structure as well as any odour suppression equipment required by the System Designer. This retention structure will be monitored for a minimum period of six months to determine if it is achieving what was intended in its construction.

If an odour is discovered it is to be reported to SA Water so that they can question the Designer on the odour and potentially identify the nature of any odour suppression control devices (temporary or permanent) that are required.

7.3 Permits and Prerequisite Plans

Before commencing any activities the Pipelayer is to:

- Obtain any road crossing permits that may be required.
- Obtain any other permits required such as if the pipeline route crosses a rail line, near a major telecom cable etc.
- Prepare a Traffic Management Plan, if required depending upon nature of the project.
- Prepare an Environmental Management Plan if required by SA Water.
- Prepare an OH&S Plan for the project if required by SA Water.
- Confirm the availability of the pipelines in the sizes and lengths specified.

These permits will need to be sighted by the assigned SA Water Project Manager before construction work can commence.

7.4 Reticulation Zones

Where there are a large number of properties to be serviced, by the pressure sewerage system, these may be broken down into a number of reticulation zones if the overall scheme is to proceed within a short timeframe as per section 2.5 of this technical Specification. The Pipelayer needs to understand how these zones are meant to work and organise their works program to accommodate this zoning.

Depending upon the terms of the specific contract used, failure to achieve the specific zoning may be grounds for the termination of all pipelaying activities until the installation of the pumping units catches up.

Reticulation zones will not usually be used on smaller projects.

7.5 Concept and Final Design

The Pipelayer needs before commencing construction to confirm that any design drawings handed to them are final design drawings. These differ from a concept design, which shows the intended layout of the lines for initial investigation or pre-design.

Typically some of the differences that the final design might have in addition to the concept plan are:

- Pipe sizes and class listed clearly on the drawings.
- Longitudinal Section drawings.
- Location and size of spur lines will be shown.
- Location of isolating valves, flushing points, etc, also shown.
- Details of services crossings, shown clearly.
- Details of areas to be direction drilled also shown.
- Any pegging out details.

The final design drawing is to be marked as final design and be dated and signed by the System Designer/s. Any subsequent amendments will be marked as “Amended Drawings” including the amendment number and date, along with the Designer’s signature indicating they support this change.

Any plan produced as an As Constructed drawing, without the designer’s signature on any significant amendment, will be rejected as will be the handover of the mains. If the design has been facilitated by SA Water then SA Water will ensure that all details in respect to contacting the Designer will be provided. Details in respect for costs associated here will be set out in any applicable tender documents.

7.6 Reticulation Installation Procedures

The following steps are seen as the minimalist approach that must be carried out by the Pipelayer, in constructing any reticulation system. The steps provide a logical sequence to enable an efficient construction program to commence with minimal disruption to the surrounding environment. If the Pipelayer wishes to amend this installation methodology, they will need to convince SA Water of the benefits of the new installation procedure.

1. Complete, obtain and submit all QA information/ documentation for approval (Traffic management plans, environmental management plans, OH&S plans etc for approval by SA Water, if required).

2. Submission of a works program, indicating a detailed timetable of activities as well as the resources and plant to be used.
3. Ensure all pipes are ordered in sufficient time so that all sizes are available before construction commences. Similarly order the fittings, valves, etc so these are also available.
4. See that all road crossing/ rail crossing etc approvals required for the project are secured before construction commences and copies are forwarded to SA Water.
5. Formally agree the location of any site office for the works with SA Water (if required).
6. Confirm all drawings are the final drawings for construction purposes.
7. Confirm the location and layout of the reticulation mains.
8. Confirm the length and position of any directional drilling that is to occur on the project.
9. Confirm the location of any spur lines that might be required.
10. The material and method of laying shall be in accordance with drawings B1, B2, B3 and B4 of the Water Supply Construction Manual.
11. Confirm the location of any flushing points and valves as required.
12. Gain approval for any proposed pipeline markers to be used on the project.
13. Take photographic/ video evidence of pre existing conditions on all areas of proposed construction, prior to any works commencing.
14. Obtain approval from SA Water's Project Manager to commence works in particular zones, where the work has been sectionalised.
15. Erect traffic signage where applicable.
16. Locate all other services and expose these where necessary.
17. All work to be carried out in accordance with the OH&S and Environmental Management Plans submitted to SA Water, where required.
18. Excavate trench to depth, to provide required cover for pipework as set out in section 7.7, with excavation to be carried out by rubber tyred trenching machinery. Alternatively the lines may be directionally drilled rather than having an open excavation.
19. Install the pipe as per this specification and the relevant Australian Standards. A tracer wire to be installed with pipework for subsequent location purposes.
20. Install the marker tape during backfill.
21. Where test points are to be left exposed, barricading is to be erected around all open trenching, all other trenching it to be closed at the end of each day.
22. Flush pipeline prior to testing (use of both compressed air and water.)
23. Pressure test installed pipe work, as per relevant Australian Standards.
24. Leave tested pipeline full of water.
25. Complete backfill and compaction of trenches.
26. Install pipe location markers.
27. Site to be restored to condition as similar to that which existed before the works commenced, as can be practically achieved.

28. Check the performance of system, to ensure that pumps are performing at the designed pump head.
29. Carry out any rectification works if required.
30. Hand the reticulation pipelines over to SA Water, in accordance with SA Water's Handover Procedure (see section 9.5).
31. Compile all As Constructed information and other information as required by SA Water. This should include linking of reticulation drawing numbers with property drawings numbers.
32. Formally hand the main over to SA Water, along with all As Constructed drawings.

7.7 Depth and Location of Pipework

All pipework is to be laid in accordance with SA Water's standards as per the Development Manual or in the location as approved by SA Water. The pipe will be laid to a depth where there is a minimum cover over the pipeline of

- 450 mm in the footpath (not the preferred location)
- 600 mm in sealed roads
- 750 mm in unsealed roads.
- 600 mm of cover over the pipe in open drains and where erosion is occurring there might be need to be backfilled with concrete. This factor is to be discussed with the SA Water Project Manager and agreement reached on if this concrete backfill is required but any tenderers exploring this document should assume that in most applications this concrete backfill will be required for open drains.

Excavation is to be via rubber tyred trenching equipment.

The material and method of laying shall be in accordance with drawings B1, B2, B3 and B4 of the Water Supply Construction Manual.

Alternative methods are to be approved in writing by SA Water.

Where other services have been installed in the pressure sewerage location in the road reserve, these will be dealt with on a case by case basis. As a general principal however, it is proposed to cross these services as close to perpendicular as can be practically achieved. The depth of the pressure sewerage pipeline in these instances will be varied to suit the particular circumstances.

7.8 Road Crossings

Where the road is a sealed surface, the pipeline may be excavated using under road (directional) drilling techniques. For unformed roads, excavation can be by either open trench excavation or under boring of the road.

The directional drilling must be done allowing sufficient width of the sealed road so as not to compromise the integrity of the normal operation of the road carriageway and be in accordance with the traffic management plan agreed with SA Water for the project.

79 Property Connections

The property (Boundary Kit) is to be connected to the reticulation mains at the same time the reticulation mains are being installed with this being carried out by the Pipelayer.

Where the connection is being made to an existing home, the location of the valve kit will be as per the property design, a copy of which will be provided to the Pipelayer by the Contractor. Where the connection is being made to a vacant block of land the location should be agreed with the Landholder. For large properties (greater than 1 acre in size), then such a property may be too difficult to pre-determine and may have to be installed at a later date.

The Boundary Kit should be laid a maximum of 1.0 metres inside the property away from fencing or other boundary markers to allow subsequent connection to it by the property delivery line.

7.10 Flushing Points

The reticulation system will need to contain a number of flushing points where water can be added or sewage extracted from the system in sufficient volumes to allow the cleaning of the reticulation network.

These are to be installed as per the Designer's drawings. Some Technology Suppliers may have "off the shelf" flushing point structures and where approved these may be installed and will be normally purchased by SA Water as part of the supply contract.

The Design will have included a flushing program for adoption by SA Water during the ongoing development of the scheme. However during the construction phases the Pipelayer will be responsible for carrying out any required flushing.

7.11 Residential Access/ Driveways

Where the access driveways are traversed by the pipeline and these driveways are made of the following materials, the pipeline may be under bored for the crossing.

- Sealed surfaces (irrespective of nature).
- Paved Surfaces
- Decorative Surfaces

Where there is no defined driveway and the pipeline is installed by open excavation then the driveway is to be compacted as soon as possible to minimise the loss of access to the property. No resident should be denied overnight access to their properties.

The Pipelayer needs to provide a minimum of three working days notice to any existing residents, prior to constructing the works in that street and inform residents how it might impact their access.

The Pipelayer may provide this notice by letterbox drop, but the information should include

- Date the works to be constructed.
- Estimated time pipe trenches are to be open.
- Contact numbers for further resident enquiries.
- Method of excavation for the driveway.
- Estimated time the driveway will be unavailable.

7.12 Other Services

The Pipelayer is required to walk the proposed pipeline route and determine the proximity of other services to the pressure sewerage lines. Where other services are parallel to the pressure sewer mains and these intrude into the pressure sewer allocation, the Pipelayer will need to work with both SA Water and the other service provider to stay inside the allocated area for the pressure sewerage systems for the project.

Where these other services are in a similar pipe material, then the marker tape needs to clearly indicate the pressure sewerage pipe to minimise any potential confusion. The matter must be discussed with the Project Manager before a final decision is made.

Where the pressure sewerage main is to cross other services the depth and nature of these services is to be determined prior to construction and the pressure sewerage main may be either raised over or taken below these services. This decision will be made with the SA Water Project Manager and the Pipelayer with reference to the reticulation system designer, if required. Existing services need to be crossed at as close to right angles as can be practically achieved.

7.13 Testing Procedures

The reticulation mains are to be tested by filling them with water and raising the pressures to the heads set aside in the Australian Standards for the class of pipe used. This test must be witnessed by a SA Water officer or a representative designated by SA Water and the results recorded.

7.14 Trench Left Open

In relation to the excavation of the pipe trenches, the following guidelines should be adhered to:

- No trench should be left open overnight, unless approved by SA Water.
- The minimum possible length of trench should be left open at anytime with the trench backfilled once the pipeline is laid and any lateral spurs cut in.
- Where it is desirable to leave open a key point for subsequent installation of other material etc, these should be provided with covers that reasonably prevent entry from members of the public or their animals.
- Barricading (and night lights if required) is to be used, where any trench needs to be left potentially exposed.

7.15 Locating the Pipeline

The location of the reticulation pipes is to be marked in the following ways:

- A formal marker is to be installed every 200 m on straight length and at any change in direction of the pipes. Details of that marker are provided in section 5.5.
- A tracer wire that is capable of being energised is to be laid with the pipeline trench at a similar level to the pipe.
- A marker tape indicating that a pressure sewerage pipe is laid 250 mm below the tape is to be included in the pipe test. The tape is to be cream coloured and have the words "Pressure Sewerage pipe" printed on it or at least the letters "PS".

- All pipes and their location are to be tied to the cadastre and marked on the As Constructed drawings.

7.16 Restoration

All ground surfaces are to be restored to a condition as close as possible to that which existed before the pipelaying occurred. When all pipelaying has been completed (or progressively for larger areas) a formal walk along the pipeline will be conducted as part of the handover to SA Water.

Where the units are installed during a dry period SA Water will require a further inspection after significant rainfall (30 mm in two days) has occurred, where this can be practically achieved although that will be a contractual arrangement between SA Water and the Pipelayer.

To assist with this process the Pipelayer is to take digital photographs and a video of the lines prior to construction and provide SA Water with a copy of these photos before any construction work commences.

7.17 Pipe Cleaning

All reticulation mains are to be cleared prior to connection. All mains within a dedicated zone are to be cleared by the injection of both compressed air and water to ensure the lines are free of all soil and grit prior to the commencement of operating for that zone.

Where commissioning trials indicate heads on the pumps are in excess of design figures and the correct size mains have been installed then the lines will be cleared again, to determine if there is some system blockages that were missed.

7.18 Information File

An information file will be kept on the reticulation construction phase to provide SA Water with details of the project. Typically examples of the information required are, the nature and location of traffic management signs, any vehicle accidents that might occur in the reticulation zones, pressures test results etc.

This file will be given to SA Water as part of the hand over process.

7.19 Odour Suppression

In some locations particularly those on long lines to the sewerage treatment plant an odour suppression plant may be required. This will be in accordance with the particular design for that pressure sewerage application. (Refer to section 2.14)

These works will not be included in the reticulation tender but rather will become a separate specialist tender or work to be carried out in conjunction with any general pipelaying.

Section 8: SUPPLY OF PUMPS AND FITTINGS

Sections 3 and 4 have defined SA Water's minimal requirements in respect to the procurement of the pumping units and associated fittings. This section is to cover the supply aspects of these units initially by the Technology Supplier to SA Water and then by SA Water to others as may become appropriate over time. Whilst SA Water may enter into some form of bulk contractual arrangement to secure the pumping units and fittings at the best possible prices, the costs of those units will be impacted by a number of supply arrangements such as:

- Service warranties on the pumps
- Defective units and how they are to be returned
- Minimum stock levels
- Delivery and picking up arrangements
- Goods received arrangements

Specific contractual arrangements entered into by SA Water for the supply of these units may alter some of these requirements and where it does that Contract will be taken as correct. However SA Water may limit the number of pumping unit technologies that it will support at any one time and it will do this so as to:

- Ensure that the technology SA Water will ultimately take ownership of (and maintain on behalf of the residents), is a product that SA Water believes is fit for this purpose and that there is some consistency in the technology applications within the areas of SA Water's responsibility.
- Minimise the overall spares inventory and training required for SA Water staff and any other agencies SA Water may subsequently elect to use for repairs.
- Ensure that there are sufficient spare pumping units held in stock so that when a unit might fail as there is a consistency of technology and a relatively small range of spares inventories required as mentioned above.

8.1 Supply of Pumping Units – To SA Water

Delivery of any units will normally be based upon a specific delivery program for backlog areas as set out in the contract that pertains to that area and on an as needed basis for periodic supplies where SA Water is maintaining its overall inventory. In the case of periodic deliveries, the delivery of pumping units will occur when the number of stored units reduces to a number SA Water has set as its minimum level.

SA Water's intention will be to turn over the units in its stores in as short a period as is possible and as such units will either be installed or subsequently distributed to Contractors in the order in which they are received.

Pumps as obtained through a bulk tender will be delivered to one of SA Water's storage depots or directly to a prescribed job site, in some of the backlog areas. The delivery location will be specified in any tender documents or in any subsequent tender negotiations with the Preferred Tenderer.

These pumping units will be delivered in a manner agreed in the purchase tender negotiations as the most economically advantageous method to both parties. These pumping units will be formally received by SA Water's nominated storemen, who will receive the units in the form of sealed boxes or sealed plastic wrapped units. The boxes or the sealed wrapping are to indicate the contents and any serial numbers applicable so these can be checked against any delivery documents without the need to open boxes or remove wrappings. SA Water will then store those delivered units in a secure storage enclosure, until they are issued for installation. The selected Technology Supplier will be given the SA Water Storeman's contact numbers and it will be expected that a call will be made to the storeman whilst the truck is being loaded in the Technology Suppliers yard.

SA Water or its nominated contractor will be responsible for unloading the vehicle but requires 48 hours minimum notice to arrange unloading equipment. The units will not be opened during storage, but if there is any unloading or storage incident this will be appropriately recorded and details will be made available to the Technology Supplier if the part is found to be defective. If any of the units are returned to SA Water by the Contractor, with defective components, these will be returned to the Technology Supplier. If the Technology Supplier would prefer a formal goods received arrangement can be established and this will be accommodated as part of any final tender negotiations.

Hours and days for the receiving of sewerage pumps will be

Monday to Friday (excluding Public Holidays)
7:30am – 2:30pm

A letter confirming delivery of the units will be forwarded to the Technology Supplier.

8.2 Supply of Valves and Fittings to SA Water

The Technology Supplier will nominate the preferred valves to be used in the reticulation system so that they bear the ultimate responsibility if the pressure system is found to not perform to the appropriate standards. These valves and fittings are to include:

- Air Valves
- Isolating Valves
- Check Valves
- Any Valve Boxes
- Flushing points

SA Water will purchase through its supply tender a number of these valves and will maintain a limited number of the valves in its stores, so that Contractors may secure these for their pressure sewerage installations. Delivery of these valves is to occur with the pumping units.

8.3 Allocation of Pumps to Contractors

Where units are to be installed by other accredited Contractors, SA Water will make available the following components for the initial installation on the properties, with the Contractor to provide any other components required. These units will need to be procured first by the Contractor and proof of purchase brought to the Store.

- Pump
- Storage Vessel
- Alarm/Control Panel

- Pumping Station Fittings
- Boundary Valve Kit and Box (if required but these will normally be part of the reticulation installation)
- Valves Pressure Switches (or other as required)

These will be made available to appropriately qualified Contractors from the nominated SA Water depot. These will be formally issued to the accredited Contractor once they have paid for them. The Contractor is to formally sign for the units against the serial numbers provided.

The units can be obtained Monday to Friday (exception of public holidays) between the hours of 9:00am and 3:00pm. Twenty four hours prior notice of the number of units required will be necessary, to ensure that the units are available for pickup.

Any Contractor wanting a larger number of these units within a set period should provide SA Water with 16 weeks minimum prior notice to ensure the units are available at the SA Water Stores at the required time.

It is the Contractor's responsibility to program their works to ensure that the units are available where required. The Contractor will be required to account for the units based upon the serial numbers used being shown on the As Constructed information. These will be periodically audited.

The Contractor will be issued with the wrapped units and if any parts are found to be defective they will be changed over by SA Water but only on the basis of the returned component.

8.4 Contractors

All on property installations of the pumping units will need to be carried out by appropriately accredited Contractors if not SA Water employees. These Contractors will be required to complete an accreditation course with the Technology Supplier and any subsequent refresher training courses deemed necessary by the Technology Supplier. Documented proof of the accreditation will be required. They are to have sufficient resources to be able to carry out the installations that SA Water will require.

The Contractor is to become sufficiently skilled to:

- Be capable of carrying out basic residential design for the installation of the pumping unit and the property delivery line.
- Audit property power boards and hydraulic connections in the case of existing homes before the design is conducted
- Be capable of fully installing the pumping units including all works to make them operational.
- Be capable of carrying out the operational testing as per section 9.
- Be able to formally commission the pump on behalf of the Technology Supplier
- Be able to carry out any warranty repairs on behalf of the Technology Supplier.

8.5 Pump Warranty

The pump and all connections are to come with a minimum 12 months in the ground warranty, to apply from the date the pump is formally commissioned, see section 9.4. The

final details of these arrangements will be negotiated in the design and supply tender and hence lie outside this specification.

Where SA Water elects to choose a new model pump, and that pump has no significant time oriented track record of performance, then a minimum of 4 years warranty will need to be provided and this period is to apply from when the unit is installed and formally commissioned.

The pumps will have to spend some time in storage, but as indicated in 8.1 SA Water will endeavour to reduce the period of time in storage. Units for maintenance purposes (i.e. spares) will be taken from each new supply of pumps, with repaired pumps to be used for replacement purposes once a sufficiently large pool of these repairs has been achieved.

The warranty is to cover:

- All parts, including alarms, pump controls and all of the required equipment to operate the pump, including the pump itself.
- All electrical connection cables etc
- Any labour to remove and replace/ repair the faulty equipment.

8.6 Replacement of Defective Equipment

Where the Contractor discovers defective equipment or pumps, these are to be returned to SA Water's store along with a formal notification from the Contractor. That notification should set out:

- Date the unit was picked up from the SA Water Store.
- Date the installation was attempted.
- Where there are more than two days between the above dates the Contractor should provide details on where and how the unit has been stored.
- The nature of the problem with equipment and how it was detected.

All such defective units will be replaced by SA Water, providing the serial numbers match those issued to the Contractor in the first instance.

8.7 Returning the Units to the Technology Supplier

Where a unit is found to be defective it will be sent to the Technology Supplier for repairs/ replacement under warranty. A returned unit will include a copy of the Contractor Defect notification, as provided for in section 8.7.

Where a unit is outside of the warranty period, SA Water would propose to attempt repairs/ maintenance in the first instance and if it is unable to repair the pump it will forward the pump to the Technology Supplier.

Where a unit is returned from the Technology Supplier, it is expected that it will be accompanied by a brief report setting out:

- What was actually wrong with the pump.
- What was done to fix the pump.
- Any warning signs to be watched for (in case of a potential repeat of the problem).

The warranty of the defective parts (only) will commence again from when the unit is returned to SA Water.

8.8 Available Stores

SA Water would expect that sufficient stores will be held by the Technology Supplier to meet a small delivery (less than 10 units) to SA Water within two weeks of an order being placed.

For larger deliveries the Technology Supplier should provide guidelines as to the anticipated delivery periods.

Section 9: TESTING PROCEDURES

A key component of any pressure sewerage installation will be the need to complete the works in a timely manner, and not have to come back in order to repair any problems within the system. Similarly as both reticulation and the on-property assets will eventually be handed over to SA Water, there is a need to quickly verify the performance of the following elements, before that handover can occur.

- Performance of the pumping units.
- Performance of the property delivery line.
- Performance of the reticulation mains and fittings.
- Performance of the system design.
- Quality of the restoration on both the reticulation lines and the on-property work.

This section sets out what testing procedures will need to be independently carried out and collectively certified by at least two of the following:

- The Contractor (as appointed by SA Water.)
- An independent referee (as appointed by SA Water).
- A SA Water Officer.

9.1 On-property Test

All operational tests are to be conducted using SA Water's mains water with the pumping unit only being connected to the sewerage system after these tests have been successfully carried out. The steps required to bring the pumps into operation should be set out in the Technology Supplier's Installation Instructions but over and above those instructions, SA Water requires the following tests to be performed on all on-property works:

1. Leakage Test

Once the installation is completed the pump storage vessel should be filled to a set (but high) level and marked on the storage vessel. That level should be observed for a minimum period of 2 hours. The system alarm would be switched off during this period. If there is no leakage then the Contractor can proceed to the simulated power failure test, set out below.

2. Simulated Power Failure Test

It is expected that the leakage test will be conducted immediately before other tests for operational readiness and as such the initial operational tests will commence with the pump storage vessel being filled to a high water level. It will thus be expected that the pump should commence in an alarm mode, as per a power failure scenario, when the power is switched on. This will be the first test to determine if the alarms will automatically turn on and then off, as the pump reduces the volume stored in the well.

The time taken for the simulated power failure test is to be included in the time based operational test (Test 3).

3. A time based operational test

The pumps will be considered operationally ready when they have successfully operated for a period of approximately one to two hours with a constant inflow rate of around 0.1 to 0.2 L/s (this is the typical inflow from a garden hose operated at reasonable pressure). Such a test should involve three to four on and off cycles of the pump.

4. An alarm test

In addition to the above operational test the Contractor will also need to have several large storage containers that can discharge water quickly into the pumping unit's storage vessel, such that the alarm level is exceeded. The pumping unit is then observed to see if the alarm initially comes on and subsequently if the alarm will automatically shut off after normal pumping levels have been achieved. This cycle should be repeated at least three times, and be part of the overall four-hour time based test. Again the number of tests may be lessened by the SA Water Project Manager, under drought conditions to minimise any wastage of water.

5. A Pump Protection Test

The pump is also to be tested at a head of 20% above the maximum dynamic head likely to be encountered under normal operating conditions. These operating heads are to be provided by the designer as part of the design process for that particular system. This test need be conducted only once and due precautions should be taken against sudden pipe failure.

6. A Visual Inspection:

This test requires all parties keep their eyes open during the installation process and rectify any damage immediately. In addition before the site is vacated a final inspection to make sure the site is clean and that all restoration is complete is to be conducted. Typically this requires:

- The inlet pipework is to be visually inspected at the exposed connections after a connection has been made to the pumping station to determine if there are any visible leaks in the pipework before backfilling the trench.
- The concrete ring beam has been poured to provide protection against buoyancy and that this has been done as per the Technology Supplier requirements.
- The pumping station is to be examined for possible leaks before backfilling, after structure has been filled with water.
- The pumping station lid is to be checked to insure that after restoration the lid is not sitting in a low point, where rain water may pond. If it is found that this is the case minor re-landscaping is to be carried out to ensure the surface drains away from pumping station.
- The pumping installation appears stable and unlikely experience significant erosion or compaction problems.
- All pipelines are to be visually inspected to ensure compaction to natural surface levels has been achieved. The pipelines should then be reinspected to ensure no subsequent settlements at the lower interval of
 - 50 days after the installation has been completed
 - After significant rainfall (30 mm in 2 days) has occurred.

Where any subsequent subsidence is found, it is to be repaired.

Once the tests have, in the opinion of the Project Manager been successfully concluded, the Project Manager will issue a certificate of operational readiness. The Contractor may then interconnect that unit into the household system if that is required under the contract. In the case of existing homes they can then commence the process of rendering the on-site treatment system safe if they have been engaged to do those works as well. Otherwise the home owner will have a maximum of 90 days to ensure that the existing septic tank is rendered safe.

Where the pumping unit as supplied by SA Water or a component, fails to operate for the period required or fails to operate at an acceptable operational standard (duty point), SA Water will make available additional units of the failed component.

Any faulty components will be returned to the SA Water store as per section 8.8 for replacement. It is stressed that this testing process is not the formal commissioning of the pump, which needs to be agreed with the Technology Supplier to meet the requirements.

9.2 Testing of the Reticulation Design

Pressure gauges are to be placed on the discharge side of the pumps and the pressures recorded should not exceed 45 m. It should also reflect the design estimates for pressure sewerage provided for that property. Where a variation of +10% to -15% has been measured a full and sufficient explanation must be provided to SA Water in respect to these deviations. Where the pump heads exceed 48m SA Water may refuse to take handover of both the pumping station and the reticulation mains.

Pump discharge pressures must be verified by the following or a combination of the following:

- An accredited Contractor (as approved by SA Water)
- An Independent Agent (as appointed by SA Water)
- A SA Water Officer with the appropriate skills

SA Water may elect to retest any pump pressure it deems necessary.

It is not expected that there will be a pressure test carried out at all properties rather that some 15% of properties will have the test conducted (in the case of a new development or village of significant size). If a significant number of deviations from the designed heads are discovered then the number of tests may be increased.

In the cases of simple extensions of the service to properties outside of the designated sewerage area the number of such tests will be determined by the SA Water Project Manager.

9.3 Testing of the Reticulation Pipelines

In addition to the reticulation testing set out in 7.7 the testing certification for the reticulation pipelines will need to include:

- Verification that the lines have been cleaned, by the use of compressed air.
- Verification that the lines have been flushed clean using water and have been left full.
- Verification that the sealed pipes have been raised to the maximum operation pressures for Class PN16.0 pipe as laid out in the relevant Australian Standards.

The dates and any notes on the above to be set out in the information to be recorded for the reticulation system, see section 10.0. All such tests are to be verified by an Independent Agent appointed by SA Water, or a SA Water officer.

Air valves and any isolation valves should be operated to confirm that they work and that there is no leaks occurring, when the system is operating normally. Initial tests will be based upon town water before the pumping units are connected to the reticulation mains.

A visual inspection of the completed pipelines is to be carried out to ensure there has been no subsequent settlement of the pipe trenches. This inspection will take the form of walking the lines. This should be carried out at the lower interval of:

- 50 days after the pipelines have been constructed.
- After significant rainfall (30 mm over a period of 2 days) has occurred.

If no rainfall has occurred the inspection may occur after SA Water handover.

9.4 Commissioning of Pumps

Whilst the pump may have been made operational, as per section 9.1., the pump will not be deemed to have been fully commissioned until it has been certified by the Technology Supplier and a formal Commissioning Certificate (individually numbered) provided to SA Water.

The Technology Supplier may have their own requirements before they will formally certify the pump is commissioned and any Contractor will need to make themselves aware of these requirements and what is required to gain this Commissioning Certificate. SA Water's preferred position is that once the Contractors (to be appointed by SA Water) have done the appropriate accreditation testing they should formally commission the pumping unit to avoid another visit to the site.

The date shown on the Commissioning Certificate will be:

- The commencement date for the inground warranty.
- The commencement date for any defects liability period that might apply to the on-property works.

9.5 Handover to SA Water

SA Water will ultimately be responsible for the ongoing maintenance and operation of the pressure sewerage system. Thus these assets need to be formally handed over to SA Water before it will begin to carry out this maintenance.

SA Water therefore only wants to take over assets that are fit for the purpose for which they are intended. It therefore has a number of set procedures that it needs to be reassured before it is prepared to formally accept the assets. These procedures are set out below

9.5.1 Reticulation Mains

SA Water will accept handover for the reticulation mains for a particular reticulation zone, subject to the following:

- Verification as set out in section 9.3 that the mains have been cleaned out.
- Completion of independently verified pressure tests on the reticulation mains that indicate the compliance with both the relevant standards and the designs for the system.

- Verification that the mains as installed are of the design and classes indicated in the design drawings.
- The pump pressures meet the design specifications and the reticulation mains are not recording any significant deviations in pump pressures.
- In areas where these pressures cannot be confirmed at the time of the reticulation construction handover will be conditional/ provisional on this pump pressure test being achieved at a later date.
- Visual inspection of the pipeline to ensure that they appear to be:
 - Laid in the correct location
 - Appropriately marked as set out in section 7.6
 - Appropriately compacted.

Where no significant rainfall has occurred, SA Water may grant provisional handover subject to the Contractor being required to make good any subsequent trench subsidence when it does rain. This provision does not relieve the Contractor from the normal defects liability work where the installation occurs under contract to SA Water.

A formal inspection of the pipelines will be part of the handover and this is to confirm:

- All fittings (valves, air valves, flushing points, etc) are in working order.
- A flushing program has been attached to the handover application and all flushing points are working as per the specification.
- All connections to the residential boundary kit are made.
- All As Constructed information has been provided.
- All information as required in section 10 has been provided to SA Water.

A handover application needs to be made in writing to SA Water, indicating exactly what works the Contractor wants SA Water to take over and the date they want handover to occur. A minimum of 10 business days notice must be provided to SA Water, in relation to the handover and SA Water will endeavour to accommodate the desired handover dates, but will not be constrained by it.

As part of the handover process SA Water may require the Pipelayer to uncover a section/ or sections of the pipe to confirm.

- It has been laid at the correct depth.
- It has been laid in the correct easements.
- The Household connections have been provided
- The correct pipe has been used.

SA Water will however endeavour to carry out random audits during the works to ensure that the need for above uncovering are minimised. The reticulation handover can be independent of the property handover and the handover can be done on a zone by zone basis.

9.5.2 On-Property Works

SA Water will accept handover for the on-property delivery line and plumbing unit for a particular property subject to:

- The pump has been made operational as per section 9.1 and has been independently verified in terms of its performance. This handover is provisional pending the delivery to SA Water of the Technology Suppliers Commissioning Certificate.
- Pump tests as set out in section 9.2 confirm the unit is performing to the design specifications.
- Confirmation that the alarm panel is installed in an appropriate location, out of any floodplains.
- Confirmation that the storage tank is not in a location where rainwater will pond.
- The venting arrangements for the pumping station are installed in accordance with the Technology Suppliers requirements and out of any floodplain.
- Visual inspection of the property delivery line to confirm:
 - The line has been laid as per the household drawings
 - The line is appropriately marked.
 - The line has been appropriately compacted
- All As Constructed information has been provided.
- All property information as requested in section 10 is provided.

Similar to 9.5.1 SA Water might require the property delivery line to be exposed to confirm it has been laid in accordance with the specification and the property design drawing. It will also require that a formal handover application be made in writing to SA Water indicating exactly what works the Contractor wants SA Water to take over and the date they want the handover to occur, particularly if there is more than one property involved.

Ideally the property handovers should be done in parcels of a minimum of 5 properties in backlog areas. For new homes they will be done individually but can be done in larger numbers if so desired. In all other aspects the conditions as per 9.5.1 will also apply here.

Where any handover is subject to later works, such as the provision of commissioning certificates, qualification of any deviations from design pressure etc, these handovers will be provisional, until these additional requirements are provided. Failure to provide the additional works within a reasonable time (3 months maximum) will see the works returned to the care of the Contractor until these works are undertaken, and SA Water's costs for a second handover are met.

9.6 New Homes - Testing for Debris in Lines

In addition to the above tests there is a need to flush out the new home drainage lines prior to the connection to the storage vessel. This is to ensure that all building debris (and possibly any builder's tools) are flushed from the system before a connection to the storage vessel is made.

This test should be carried out only after all external construction has been completed and the internal household fit out works have also been completed and immediately before any new residents move into the house.

The bath will be filled and all internal taps turned on immediately after the bath plugs are released. The taps will be left to run for approximately 5 minutes to flush away building debris from the system, before connection is made to the storage vessel.

The 5 minute period is only a minimum guideline and will be governed by what is coming out of the pipelines. This test period can be lengthened if debris is still being flushed out of the pipelines.

Section 10: INFORMATION TO BE PROVIDED TO SA WATER THE CONTRACTOR AND PIPELAYER

The installation of pressure sewerage systems requires that a significant amount of information be provided to SA Water for both the reticulation mains and the on-property works.

Sections 6 and 7 identified that an individual file should be kept on each property as well as a file on the reticulation system. This information is required to build an effective profile on the performance of the pressure sewerage pumps over time and the factors that might impact on their performance.

The sections below set out what information is required for inclusion in these files and SA Water will have a standard proforma that it will provide to Contractors and Pipelayers but they will be required to provide all additional notes in support of these basic forms .

SA Water will make available copies of the relevant parts of the files for the Contractors/Pipelayers information at a later date if they need to update their records.

10.1 Reticulation Mains

The following is seen as the minimal information that is required to be provided to SA Water in relation in the reticulation system information file:

- As Constructed plans and longitudinal sections of the reticulation mains showing all of the usual information such as location of line, fittings, and points of connection from residential property etc.
- Where the depth of the pipeline changes from the standard minimum cover for the laterals, these are to be noted and the actual depths recorded.
- The sections of the pipelines that have been directionally drilled.
- The sections where the pipe has had to be laid in sand bedding.
- The sections where the pipe has had to have special protection.
- Nature of host soils where these differ from clay/soil materials
- Location where other services (water, power, gas, etc) were encountered and crossed. Plus any details of intrusion of these services into the set allocation for the SA Water mains.
- The dates on which the sections of mains were actually laid and what traffic measures were taken on those dates.
- Copies of any photographs/ videos that show the pipeline routes before construction and the pipelines after construction.
- Location details of the installation process. This includes the locations of any marker posts and tie measurements.
- Details of all subcontractors used and nature of their works.
- Verification of pipe size and type.
- Date construction completed for a reticulation zone. Date made operational.
- Dates boundary kits installed on the property

- Pipe Head tested/ verified.
- Verification lines cleared and secured.
- Pressure test results/ verified.
- Date property connection line laid.
- Persons with whom property Boundary kit location determined, if servicing a vacant property.
- Date of handover to SA Water.
- Any provisional details determined from handover.
- Any road audits in the area and details in respect to traffic management activities.
- Any incidents during construction that should be noted.

10.2 On the Property Information

The following is seen as the minimal information to be provided to SA Water in the on-property information file:

- As Constructed plans based upon the property design, highlighting any deviation from this design. It is assumed that the layout design will become the As Constructed drawing unless there have been significant changes made.
- The date the property owner was originally contacted to organise onsite meeting.
- The date the property owner was provided with a copy of the household designs.
- The date the Contractor contacted the resident for construction purposes.
- The date work commenced on the property.
- The date/s the work was completed and the Contractor left the property.
- The date the property works were handed over to SA Water.
- A discrete number linking the property drawings and the reticulation drawings.
- The date the pump made operational.
- Results of the pressure test on the pump (if carried out).
- Date and number of the pump commissioning certificate.
- Serial number of pump.
- Serial number of pump station.
- Tradesman verification that the electrical connection into the household complies with regulatory requirements of ETSA and the relevant Australian Standards.
- Tradesman verification that the plumbing connections into the household lines are in accordance with AS/NZS 3500 part 2
- Copies of photographs/ videos of properties before the onsite activities commenced plus any photographic evidence including photos of the site after the work has been completed.

- Property owner's name.
- Name of Resident if different from property owner.
- Property owner's representative (if a representative was used) and copy of the letter of authority.
- Nature of any additional storage provided.
- Date and officer to whom all confidential information was returned and their signature
- Details in respect to any carting away of septic sewage if applicable including the certificate for the waste from an authorised facility.
- Other information as the Contractor sees appropriate.
- Ensure homeowners / occupiers have been issued with the Homeowners Manuals

10.3 Information Files

These files can be an electronic file in Excel format, but a separate file for each property and reticulation zone is required. It should at minimum contain the following:

- Any SA Water Information Proforma provided but be completed supplying all information requested.
- Copy of the Household As Constructed drawing
- File number relevant to the drawing number
- Clear identification of the property that the file is applicable to in a manner that avoids confusion
- Any final copies of photographs taken.
- Any further information as required in this Section.
- Any other information
- Copies of the initial property audit (where applicable)
- Copies of all pump commissioning tests carried out
- Signatures of the tradespeople verifying that the connection to the power board and the household connections is in accordance with appropriate standards.
- Any other information that the Contractor no longer requires.

The file should be readily identifiable from the cover of the file and ideally should be presented as whole streets in backlog areas. Failure to produce such a file will be deemed to have not completed the As Constructed information and may see SA Water's handover revoked. Specific conditions in respect to this may apply to any installation contract SA Water may put in place.

Section 11: MAINTENANCE ARRANGEMENTS

The use of pressure sewerage systems allows for a significant departure in the ways in which the pressure sewerage system is maintained, as opposed to more conventional gravity systems.

The emergency storage contained in the storage vessel and the system alarms translate into considerable prior warning of a failure of the on-property sewerage system before a sewerage overflow may occur. Also with non return valves at the property boundary, there is no chance of sewerage overflows occurring from the reticulation systems connecting the private property.

SA Water intends to mirror service levels for the pressure sewerage systems with those of the more conventional sewerage systems as defined in the customer service standards periodically published by SA Water. This will allow for the obvious differences in Technology but the emergency storage should take much of the urgency from the pressure sewerage systems

11.1 Notification of Alarm

The following will be the notification and response mechanisms for those properties where a pressure sewerage pumping unit is installed and where a problem is experienced with the pressure sewerage pumping unit.

- Resident to contact SA Water's 24 hour emergency call centre
- Customer services (call) operator to enquire if:
 1. Alarm has activated.
 2. If the alarm has activated following a power outage.
 3. If an overflow is occurring on the property.
 4. If there is anything else that the resident may wish to report

The call operator will draw the resident's attention to the relevant sections of homeowner's manual over what to do if an alarm activates and will notify SA Water's maintenance staff who will attend as per their customer charter, which will alter from time to time to reflect customer requirements.

If the alarm follows a power outage then resident will be asked to call back in 1 hour's time, if the alarm has not cleared itself. If the resident calls back, then the actions will be as above.

SA Water is looking to the Technology Supplier to provide either basic training for the call centre operators on these systems or preferably a basic information package so that they are familiar with the issues that the residents are raising.

The resident however remains responsible to report all alarms and SA Water will not be held liable for any breach of its levels of service if the resident has failed to notify SA Water of the Alarm. Where SA Water is required to attend to a property due to complaints from neighbours or others where a resident has failed to either contact SA Water or notify SA Water then SA Water may charge that resident for the costs incurred in making that service call.

11.2 Repairs Procedure

SA Water will carry out the repairs and will maintain sufficient of a spares inventory to leave it in a position where it is able to carry out these repairs. SA Water officers will replace the existing pumping unit with one of the spare pump cores where they cannot simply diagnose the problem on site and will bring the faulty unit back to the workshop where repairs will be carried out. The pump will then be place in the pool of spare units until it is reinserted into another household.

SA Water will amend all records on the serial numbers of the pumps.

11.3 Repair Reports

A full report is to be prepared on any property that has its unit repaired. That report at minimum should include the following information.

- The call operator's name and time of notification.
- Method of notification
- The nature of the complaint.
- The person who reported it to SA Water.
- The time and date repairs were affected.
- The time the Repairer left the site.
- Nature of the repairs.
- Serial numbers observed on the pump and pumping station (including the numbers of the replacement pump).
- If pump was replaced the serial numbers of the new pump.
- Time taken for the repairs on site
- Any relevant observations whilst on site that SA Water needed to be aware of.
- Date pump delivered to repair depot
- Person who took delivery of pump at repair depot.

This information will be used to establish a performance record in the pressure sewerage systems based upon:

- Individual pumps
- Set areas
- Types of homes served

Hopefully this performance record will assist SA Water to minimise overall operation costs of the pressure sewerage systems over time.

11.4 Accredited Repairers

Only SA Water employees (and possibly approved agencies), who have been fully trained by the Technology Supplier, will be used to carry out repairs on the pressure sewerage units.

These individuals are to gain a certificate of currency from the Technology Supplier and undergo regular refresher training.

11.5 Proof of Identity

Any persons carrying out repairs will be provided with photographic identification by SA Water and the repairers are not to enter onto the property to carry out works without first showing this identification to the resident. If there is no one at home then the property may be entered for the repairs, but an appropriate notification including Repairer and SA Water contact numbers should be left in the mailbox to state that the repairs have been carried out.

The resident will be instructed in their contact with SA Water's call centre that the repair agency will produce this photographic identification. The resident will also be informed to turn away any individual that does not have such identification and immediately inform SA Water and the police. This procedure is also set out in the resident's homeowners manual.

11.6 Access to the Property

The provisions for access to the property are set out in the home owner's manual and if the resident has failed to provide such access the repair agency may refuse to come onto the site until it is safe to do so. Where this occurs they will contact the resident and rearrange another time when the repairs may be carried out.

11.7 Accounting for the Pump Cores

Any external repair agency will be required to account for the serial numbers of all spare pump provided to them. If any of these repair agencies become external to SA Water they will be required to fill in a monthly sheet stating the following and return it to the SA Water officer nominated in the Repairer Tender.

- Pumps used and the addresses at which they are now located based on pump serial numbers.
- The serial numbers of units now retained in the repair agencies "spares" supply.
- The serial numbers of any units returned to SA Water for on forwarding to the Technology Supplier.
- The serial numbers of any new units gained from SA Water.

A nil return still needs to be submitted each month so that a full acquittal is regularly performed given the cost of these cores. Where a company no longer continues as a preferred repair agency by SA Water, then they will be required to hand back to SA Water all spare cores and account for all pump cores used. Missing cores will be paid for at the rates set out in the tender documents.

SA Water reserves the right to periodically and without warning audit the spare cores in any repairer's premises.

11.8 Replacement of Spares Inventory

The Repair Agency if external should submit with the spare cores return, a detailed list of any spares inventory used and detailing how and where that spares inventory was used. SA Water may from time to time request that the replaced parts be presented as proof that the works have been carried out or just to gain a better understanding of the failure mechanisms.

SA Water will periodically order further spares inventory and replenish its own spares inventory as well as that of the external repair agency.

11.9 Review of Repair Arrangements

SA Water will periodically review how the repairs are to be carried out

Section 12: NEW SUBDIVISIONS

SA Water does not make provision for developer funded pressure sewer systems

POLICY for the use of PRESSURE SEWERAGE SYSTEMS (PSS)

PURPOSE

To state SA Water's position in relation to the use of Pressure Sewerage Systems (PSS) as part of its sewage collection network.

BACKGROUND

SA Water's policy has traditionally been to utilise gravity drainage systems coupled with sewage pumping stations for its sewerage system. This has excluded a number of potential customers living in difficult to service areas who have had to resort to inadequate on-site sewage treatment solutions or their own private pump systems.

Environmental requirements are driving SA Water to identify alternative systems for providing sewage collection. PSS are one of these new systems and because of its different methodology they require a new policy for their adoption and use.

- A PSS consists of the following key elements:
 - A small package pumping unit located on each property, and
 - A 40 mm PE delivery pipeline from the pumping unit to either:
 - A small diameter pressure collection main located in the road reserve and laid to minimum cover, or
- Reticulation mains are to be located in the road reserve.

The use of PSS allows much greater flexibility in the design of the wastewater network and reduces the requirements for special easements.

A diagram showing the key components of a PSS is attached on the final page of this policy.

USE OF PRESSURE SEWERAGE

Any proposal for the adoption of a pressure sewerage system will require that the proposal first meets the requirements laid out in the SA Water Design Manual for Pressure Sewerage Systems. However as a guide pressure sewerage will only be adopted where:

- It represents a significantly lower cost alternative than conventional gravity sewerage systems.
- It is being used to service those isolated properties or small clusters of properties that remain un-sewered, as they were not economically viable to initially sewer, using the technology used to sewer the rest of the area/development.
- In areas where inflow and infiltration are proving to be a significant problem as a means of reducing those added loads on the sewage treatment plant.
- In areas where there are environmental or social constraints that require a system that can effectively be installed using directional drilling.

The proponent will need to complete all of the requirements in the SA Water Design Manual including the cost comparison and then seek formal approval from SA Water to adopt a pressure sewerage system. Once approved, the PSS will be installed in accordance with SA Water's Technical Specification for Pressure Sewerage Systems.

Some of the requirements of pressure sewage will require changes to the Sewerage Act or Regulations. In such cases an alternative interim proposal has been included.

OBJECTIVE AND SCOPE

The aim of this policy is to clarify how PSS will be installed, maintained, operated and funded by SA Water and its customers. It includes the criteria for PSS use, clarifies the respective responsibilities of both SA Water and the Customer as well as highlighting key regulation and process changes that SA Water must pursue to enable legal and practical implementation of this policy.

The policy applies only to PSS provided by SA Water within the normal sewerage network arrangements and does not apply to customer supplied pumping systems.

POLICY STATEMENT

Where a PSS is to be installed, SA Water will:

1. Obtain a signed PSS Agreement Form from the property owner(s) that they agree to:
 - the installation of the PSS unit and associated pipework on their property
 - an electrical connection to their switchboard and paying for the power used
 - an encumbrance being placed on their title to advise and bind future property owners of the PSS access requirement.

Refer to Appendix 4 for the PSS Agreement Form.

2. Meet all Lands Titles Office costs associated with encumbering the title.
3. Provide all components necessary to install the PSS including the collection tank and Pressure pumping unit for each property to be serviced;
4. Locate the unit on the property in accordance with the design plan for the scheme and in consultation with the property owner;
5. A PSS pump unit must be installed prior to an existing septic tank or AWT – this is to ensure that the PSS is used to pump sewage not effluent i.e. a complete service for the property;
6. Connect the Pressure unit to SA Water’s downstream gravity or Pressure system;
7. Connect the unit to the household power supply, provided the supply meets relevant code and standards requirements;
8. Retain ownership of the tank, pump and connection to its system and also of the electrical connection (including an isolation switch / fuse) between the tank and alarm panel;
9. Carry out maintenance and provide a breakdown repair service for all parts that it owns. This service will be similar to what is provided for other sewerage systems with obvious allowances for the differences in technology. These levels of service will be reviewed from time to time and will be advised through the SA Water published Customers Service Standards.

These levels of services will include the availability of a 24 hour a day call centre for the reporting of any problems, with a pressure sewerage system.

10. Meet the costs of all repairs and maintenance, provided the systems has been used according to instructions and has not been damaged by the property owner or occupier;
11. Provide instructions on the proper use of the system, by ensuring a home owner’s manual is provided to every property owner, where a pressure sewerage system is installed.
12. Carry out, at its sole discretion, replacement of any faulty units or parts based on service and breakdown history; and
13. In all other matters be bound by existing Customer Contracts and Licences.
14. SA Water will only support the one unit per property with the exception of non-residential properties, where the number of pumping units and the type of pumping units needs to be matched to the particular application.

Where PSS are proposed and/or installed, property owner(s) and/or occupier(s) are responsible for:

1. Committing to SA Water that they will connect to the PSS and agreeing to the requirements listed below:
2. Execute an agreement in registrable form and consent to its registration on the property title as an encumbrance;
3. Operate the pumping unit in accordance with the home owner’s manual provided by SA Water setting out what is expected of the property resident and what to do if the system fails;
4. Paying the current capital contribution towards the capital cost of the project and the initial connection fee. Usual ongoing service charges and sewage disposal charges are also payable in accordance with legislative provisions of the Sewerage Act, 1929.

5. Paying all costs associated with connecting their household plumbing to the system in accordance with the relevant codes and standards;
6. Paying for all elements beyond the provisions of the design plan for the area, while complying with relevant codes and specifications. This will include items such as provision of additional storage for slow release of backwash water from swimming pools, where backwash rates and cycle duration will exceed pump and tank capacity;
7. Meeting all costs associated with upgrading of property power boards and supply lines, where they are found to be below current AS/NZS 3000 wiring requirements.
8. Maintaining the electricity supply to the system including meeting the costs for the electricity used by the pump for their property;
9. Meeting all costs associated with service or repairs necessary as a result of the owner or occupant's failure to operate the system in accordance with the instructions provided, eg putting inappropriate substances or materials into the system or by damage to the system.
10. Maintaining access onto and within the property for maintenance and breakdown service. This will include a reasonable passage way for pumping unit exchange.
11. Keeping the cover clear of obstructions i.e. it is not to be landscaped or built over.
12. Ensuring that stormwater discharge or roof runoff does not flow into the pump unit.
13. Residents must not attempt to enter the pumping unit or they may null-in-void the warranty applying to that pumping unit and as a result, the resident will then meet all additional costs incurred by SA Water. The storage vessel also represents a confined spaces environment and residents should not attempt to enter it without the proper training and safety equipment.

LIMITED TECHNOLOGIES

SA Water will only support a limited number of different types of pressure sewerage technologies. This is to overcome the high costs of maintaining a wide range of different pumping units, to avoid the risk of placing the wrong pump in the wrong application and to minimise possible delays in repairs, by first having to determine which pump is installed in a particular area.

ELIGIBILITY

SA Water will only provide PSS to properties in accordance with this policy where:

- The proposal complies with SA Water's Mains Extension Policy or is part of an approved sewer backlog program, (the provision of a PPS will be viewed as a mains extension in the Mains Extension Policy)
- SA Water has identified that it is the most economical method of providing a sewerage service for the customer's property,
- SA Water have identified the property is within the designated drainage area or zoning category and qualifies for a PSS under this policy,
- the property owner(s) agree to the PSS being connected to their electrical power supply and to pay for the cost of power to operate the pump,

- the property owner(s) agree to allow an encumbrance to be placed on the land title and access to SA Water staff or contractors for inspection and maintenance activities, and
- the property owner(s) agree to complete the connection of their internal sewerage system to the PSS system within 30 days of the PSS pumping unit being installed.

PPS are not to be used in Land Divisions except where approved by SA Water. SA Water will only grant permission where the gravity alternative is viewed as non-viable and after legislative changes have been implemented to allow rating of vacant land.

REVIEW

The PSS policy is to be subject to review annually.

SUPPORTING DOCUMENTS

Further documentation in support of PSS are:

- The SA Water Design Manual for Pressure Sewerage
- The SA Water Technical Specification TS130 for Pressure Sewerage
- The Home Owner's Manual for Pressure Sewerage Applicants in SA

Appendix B: GLOSSARY OF TERMS

Set out below is a series of commonly used terms throughout this technical specification to ensure a consistency in the interpretation of the document. If there are any other terms that require further interpretation then this will be provided by SA Water's Manager Engineering Services.

- **Accredited Contractor** – an Contractor accredited by the Technology Supplier in accordance with Section 11.4 of the Pressure Sewer Policy for undertaking all of the on-property works and is on SA Water's Accreditation list of Approved Contractors
- **Actual Pump Head** – This is the actual static head plus the frictional losses that the pump has to meet in discharging the storage vessel's contents. The final or actual pump head is determined from field measurement, to confirm previous design calculations of the pump head.
- **Alarm/Control Panel** – Small box that houses either or both the electrical controls for the pressure sewerage pumping unit and the alarm control system for the pumping unit. Composition of what this box includes can vary from Technology Supplier to Technology Supplier. It will normally be affixed to the property wall or a separate stand alone post.
- **Alarm Volume** – This is that volume of sewerage that is stored in the on-property storage vessel, before the alarm for the storage vessel activates. It is measured from the normal pump on setting to immediately before the alarm activates.
- **As Constructed Drawings** – the drawings submitted to SA Water after all construction works have been completed, and includes all changes to the design drawings during the construction process. These drawings are to be signed off by the Contractor. The drawings of the reticulation mains are to be submitted on A1 paper format plus an A3 copy. The on property installation details are to be submitted on A3 paper. Electronic copies of each drawing shall be submitted in a format compatible with SA Water systems.
- **Backlog Area** - existing residential areas that do not currently have a centralised (or reticulated) sewerage system
- **Boundary Kit** – This is a valve box at the property boundary incorporating an isolating valve, flow directional valve and an inspection tee piece.
- **Construction Contractor** – This is the company/ individuals responsible for constructing the off property works, such as the reticulation mains or the lateral spurs. This company/ individuals might or might not also be the Contractor, but in most of the initial applications of pressure sewerage in South Australia, the Contractor and the Construction Contractor will be the same.
- **Designer** – This is the individual responsible for the design of either the pressure sewerage reticulation system or the on-property design (or both).
- **D&C** – Design and Construction Tender/ Contract.

- **Drainage Line** – This refers to the household sewerage drainage pipework.
- **Emergency Volume**- This is the volume, which is stored in the pressure sewerage storage vessel from just above the alarm activation level to just before the overflow relief gully begins to discharge.
- **Flushing Point** – This is a formal point in the reticulation system to which a large supply of water can be connected under pressure to flush out the reticulation pipelines, or alternatively to remove sewerage from the reticulation system. Typically this connection will be to a water (wastewater) tanker.
- **Handover** – This the formal procedure for the transfer of the assets from any external body or even SA Water’s Construction arm to the maintenance arm of SA Water. It comprises a number of requirements that the constructor needs to be able to demonstrate to SA Water’s satisfaction that the new pressure sewerage system can achieve.
- **High Level Alarm** – This is both an audio and visual alarm system activated when the level of the sewage in the on-property pressure sewer storage vessel reaches the alarm volume level.
- **House Layout Plan** – That plan that shows the works that need to be done on each property to connect it to the pressure sewerage system.
- **Contractor** – This is the company/ individual responsible for carrying out all of the on-property works.
- **IP** – This is the point where the house drainage lines connect to the SA Water system, and is located just outside the pumping chamber (usually 1.0metre from the pumping chamber).
- **Lateral Spur** – This is the continuation of the property delivery line from the boundary kit to the reticulation system pipeline and includes any road crossings (where applicable).
- **Pressure Sewerage Scheme** – This is a different name also often used to describe pressure sewerage schemes.
- **Multiple Pump Units** – These are pumping units that have more than one pump located in their storage vessel.
- **On-property Works** – These are the total works to be carried out on the residential/ commercial/ industrial property and include any excavation, installation, compaction and restoration associated with the following.
 - The pumping unit
 - The property delivery pressure line
 - Wiring of the pumping unit to the property power board
 - Connection of existing property sewerage lines to the pumping unit.
- **Overflow Relief Gully** – This is a control overflow device to prevent overflows occurring inside the dwellings on the property, by ensuring that as such overflows occur outside of the dwelling. Its arrangements and dimensions are contained in the SA Water plumbing Code - AS/ NZS 3500 part 2.

- **Pressure Sewerage Reticulation System** – the series of pipelines laid in the streets connecting the properties to either a treatment plant or some designated discharge point in an existing sewerage system.
- **PE Pipe** Polyethylene Pipe
- **The Pipelayer** – This is the company/ individuals responsible for constructing the off property works, such as the reticulation mains or the lateral spurs. This company/ individuals might or might not also be the Contractor,
- **Pressure Sewerage Systems** – This is a specialist system wherein all of the property sewage is connected to an on-property pumping unit (or series of pumping units). This dedicated pumping unit incorporates a grinder to reduce solids in the sewage to watery slurry. The pumping unit then discharges through small diameter pipelines laid minimum depth.
 SA Water’s pressure main reticulation systems rely on the pressure generated by all the “on property” pumps in the system to move sewage from the pumping unit to the treatment plant or the set discharge point in a gravity reticulation network.
- **Property Delivery Pressure Line** – The pipeline that connects the on-property pumping unit to the boundary valve kit.
- **Pumping Units (or Station)** – this includes the pumps, storage vessel, alarm system, pump pressure switches, etc and is installed on the property.
- **Reticulation Zone** – This is a collection of properties, that are capable of being isolated from upstream and downstream areas during the construction phase and are clearly marked as such on the reticulation drawings. The zones are used to allow one area to become operational whilst the upstream areas are still being constructed.
- **SA Water** – This term should be interpreted to mean the South Australian Water Corporation.
- **SA Water Project Manager** – This will be the designated SA Water officer for a specific project involving the installation of pressure sewerage in South Australia.
- **Storage Vessel** – This is the water tight container in which the on-property pump is located and is typically made from plastic compounds or fibreglass.
- **Technology Supplier** – That company which supplies the pumping units. This company may be the manufacturer of the technology or an appointed agent of the manufacturer.

Appendix C: HOUSE ELECTRICAL WIRING REQUIREMENT

A separate 20 A short circuit protective device (motor rated circuit breaker or fuse) is to be provided in the switchboard and a 2C+E insulated and sheathed cable of not less than 2.5 sq mm in size is to be installed between the switchboard and the alarm panel location. The cable is to be left disconnected with sufficient tails at both ends for later connection by others. Cable tails exposed to the weather are to be provided with suitable protection. The circuit breaker or fuse and cable ends are to be labelled "Sewage Pump".

In addition, a heavy duty PVC conduit of not less than 40 mm diameter is to be installed from the alarm panel location and underground towards the pump location to a distance of at least 100 mm beyond the edge of footings or perimeter pathways. The conduit is to be provided with a polypropylene draw wire and concealed in the wall cavity where possible.

All work is to be carried out in accordance with the Wiring Rules.



SA Water Reference:
 Application No:
 Account No:

PRESSURE SEWER CONNECTION AGREEMENT

CUSTOMER NAME

.....

..... ("The Customer") the owner of land ("the Property") at

LOT/SECTION/NUMBER

.....

STREET/ROAD

.....

TOWN/HUNDRED/SUBURB

.....

The South Australian Water Corporation ("the Corporation") has agreed, subject to certain terms and conditions, to connect the Property to a pressurised sewerage system (a drawing of the key components of a pressure sewerage system are set out in attachment 1).

By signing this Agreement, the Customer acknowledges that all of the following terms and conditions form part of the Agreement between the Customer and the Corporation.

1. The terms and conditions set out in this Agreement (including this condition) apply to the Customer and to all of the Customer's agents, employees, representatives and assigns. The Customer undertakes to inform any prospective purchaser, lessee, licensee or mortgagee of the Property of the existence of the Agreement between the Customer and the Corporation and of these terms and conditions which form part of it.
2. The Customer undertakes to include in any contract of sale of the Property a condition that the new purchaser will enter into a new Pressure Sewer Connection Agreement with the Corporation in terms similar to this Agreement.
3. A pump unit and pressure pipe line will be located on the Property in an agreed location.
4. The Corporation will arrange the electrical connection to the works but will not be responsible for the ongoing electricity costs. The Customer will be responsible for paying the cost of on-going electricity supply to the works.
5. The Corporation will own the pump unit and pressure pipeline from the pump unit to the reticulated sewer located in the street, and the Corporation will be responsible for maintaining those works. The Customer must not repair the works and undertakes to advise the Corporation of any failure of the pump and pressure line.

6. The Corporation will bear the cost of maintaining, repairing or replacing the pump unit and pressure pipe line arising out of fair wear and tear. The Customer will be responsible for any cost of repair or replacement resulting from damage/destruction caused by the Customer, the Customer's employees, agents, contractors, invitees and visitors and other persons.

7. The Customer will be responsible for arranging and funding a licensed plumbing contractor to connect the household gravity pipe to the pump connection point (IP) and will be responsible for maintaining this pipe.

8. The Customer understands and acknowledges that to connect to the reticulated sewer; the Customer will be required to pay the current capital contribution towards the capital cost of the project and the initial connection fee. Usual ongoing service charges and sewage disposal charges are also payable in accordance with legislative provisions of the Sewerage Act, 1929.

9. The capital value on which sewerage rates are levied in respect of the Property is the capital value determined from time to time, pursuant to the provisions of the Valuation of Land Act 1971, as amended.

10. The Customer will ensure that additional flows, such as backflow wash flow from swimming pools, spas and similar is restricted to a maximum flow rate of one half (0.5) litres per second.

11. The sewer connection is provided for the discharge of such matters as in the opinion of the Corporation constitutes normal domestic waste and the Customer agrees that no other waste including stormwater or surface runoff shall be discharged without first obtaining the prior written approval from the Corporation.

12. The Customer will ensure that the pump unit and pipework will remain accessible at all times.

13. The Corporation does not require an easement over the pump unit or the pressure pipeline. Instead the owner's responsibilities will be recorded on Corporation records by way of an Encumbrance in the form of Attachment 2 to this Agreement to ensure that any future purchaser is made aware of the servicing requirements.

14. Where an upgrade of part of the Property's internal plumbing or electrical system is an identified requirement, the Customer is responsible for arranging the upgrade work at the Customer's cost. The Corporation will not permit the final connection of the Property to the reticulated sewerage system until the upgrade works are completed in accordance with the requirements of the relevant plumbing and electrical standards.

15. The Customer consents to the construction of the reticulated sewers, pump unit, pipe works and any other associated works on the Property and gives permission for the Corporation and its agents and contractors to enter onto the property to carry out construction works and any future maintenance.

16. The Customer will comply with all reasonable requests of the Corporation to enter into such further documentation that may replace this Agreement.

SEVERABILITY

If any clause or part thereof is held by a court to be invalid or unenforceable such clause or part thereof shall be deemed deleted from this Agreement and the Agreement shall otherwise remain in full force and effect.

GOVERNING LAW

This Agreement shall be governed by and construed in accordance with the laws for the time being in force in the State of South Australia and the parties agree to submit to the jurisdiction of the courts of that State.

WAIVER

- 1. A waiver of any provision of this Agreement must be in writing.
- 2. No waiver by one party of one breach of a term or condition contained in this Agreement shall operate as a waiver of another of the same or of any other term or condition contained in this Agreement.
- 3. No forbearance, delay or indulgence by either party in enforcing the provisions of this Agreement shall prejudice or restrict the rights of that party.

NOTICES

Any notice or other communication to or by any party shall be in writing addressed:

- a. In the case of a company to the registered or principal office of that company in South Australia;
- b. In the case of a natural person to the last known address of that person;
- c. Signed on behalf of the sender;
- d. Deemed to be duly given or made in the case of:
 - i. Delivery in person, when delivered; or
 - ii. Delivery by post, the third day after posting or
 - iii. A facsimile, upon a transmission report being printed by the senders facsimile machine stating the document has been sent to the recipient's facsimile machine or
 - iv. If delivery is not made before 4.00 pm on any day it shall be deemed to be made at 9.00 am on the next working day in that place.

Signature of Customer(s): **X** Date:...../...../.....

Postal Address: **X**

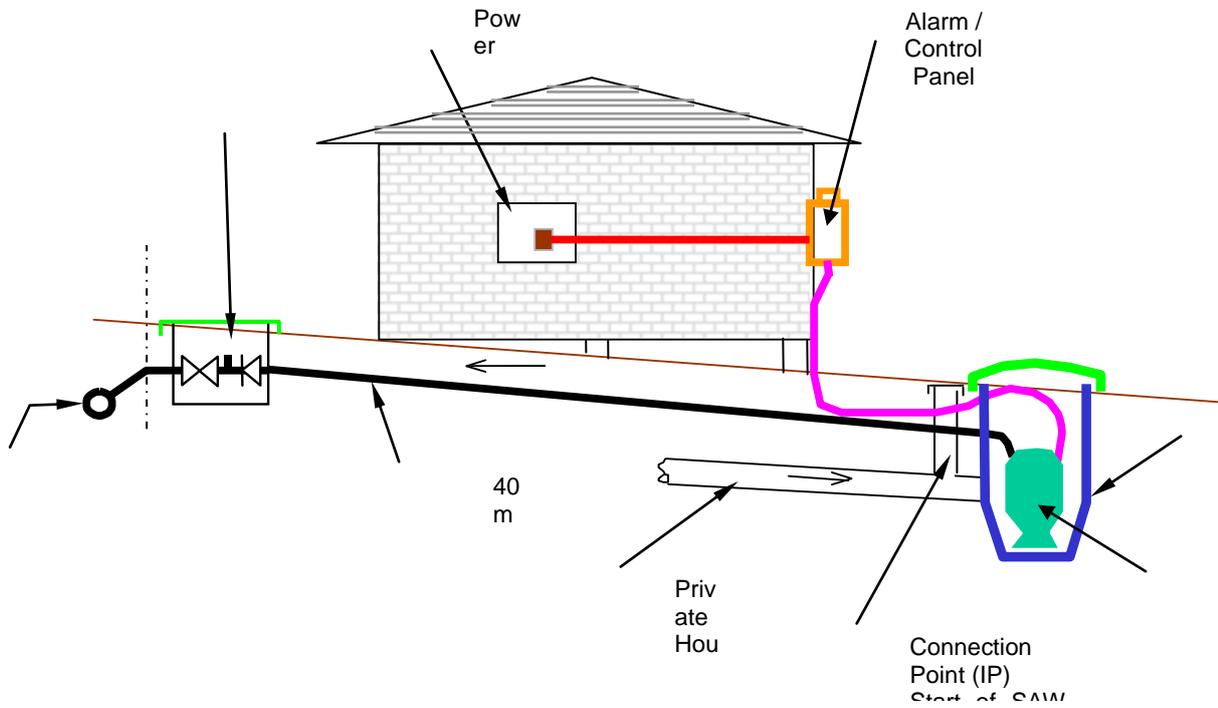
Signed for and on behalf of the)
 SOUTH AUSTRALIAN WATER CORPORATION)
 By a person duly authorised so to do)
 in the presence of:).....
Signature

Witness **Print Name**

.....
Print Name of Witness **Print Title/Position**

.....
Print Title/Position

KEY COMPONENTS OF A PRESSURE SEWERAGE SYSTEM



Attachment 2

ENCUMBRANCE

This Property is being served by a Pressure Sewer system connected to SA Water's sewerage infrastructure.

A pump unit and pressure pipeline connecting the dwelling to the reticulated sewer is located on the Property. The pump unit and pressure pipeline is owned by the South Australian Water Corporation ("the Corporation") and the Corporation will be responsible for maintaining those works. The Customer must not repair those works and will advise the Corporation of any failure of the pump and pressure line.

The Customer will be responsible for paying the cost of on-going electricity supply to the works.

The Customer shall ensure that additional flows, such as backwash flow from swimming pools, spas and similar is restricted to a maximum flow rate of 0.5 litres per second. No stormwater or surface runoff is permitted to enter the pump unit or pressure pipeline.

The Corporation will bear the cost of maintaining, repairing and replacing the pump unit and pressure pipe line arising out of fair wear and tear and the Customer will be responsible for any other costs of the Corporation for maintenance, repair or replacement resulting from damage/destruction caused by the Customer, the Customer's employees, agents, contractors, invitees and visitors and other persons.

The Corporation does not require an easement over the pump unit or associated pressure pipeline. In the place of an easement the owner's responsibilities will be recorded on Corporation records to ensure that any future purchaser is made aware of the servicing requirements.

The Customer undertakes to include in any contract of sale of the Property a condition that the new purchaser will enter into a new Pressure Sewer Connection Agreement with the Corporation in terms similar to this Agreement.