

COFFS HARBOUR CITY COUNCIL



**DEVELOPMENT SPECIFICATION
DESIGN**

***0076 Sewerage systems - reticulation and pump
stations (Design)***

Version 1 01 January 2009

0076 SEWERAGE SYSTEMS - RETICULATION AND PUMP STATIONS (DESIGN)

1 SCOPE AND GENERAL

1.1 SCOPE

The work to be executed under this worksection consists of the design of a sewerage system either as a stand-alone project or part of a development.

The worksection contains procedures for the design of the following elements of the sewerage system:

- Gravity sewers including junctions and property connection sewers.
- Common effluent sewers both gravity and pressurised.
- Vacuum sewer system.
- Maintenance holes and other structures.
- Rising mains.
- Pump stations.

1.2 OBJECTIVE

The objective of the sewerage system is to transport sewage or effluent from domestic properties to the treatment plant in accordance with all current relevant legislation. Consumer requirements shall be met by providing a sewer main and allowing an appropriate point of connection for each individual property.

1.3 COMPLIANCE

The design of gravity sewer systems and pump station components shall comply with the Water Services Association of Australia's publication Sewerage Code of Australia unless specified otherwise herein and should be constructed in accordance with 1361 *Sewerage - reticulation and pump stations (Construction)*.

1.4 SUBSIDISED SCHEMES

Where the Specification forms part of a contract attracting Government Grant funds, the Principal shall identify

- Items which are not of the least cost option, that:
 - . Are intended to have a much longer design life than the normal asset service life detailed in the Asset Management Guidelines of the International Infrastructure Management Manual.
 - . Do not meet the project objectives and the requirements of the various Authorities for the least Net Present Value (NPV) but may become the preferred option for construction.
- Particular equipment which is procured without relevant competition through tendering.
- Duplication of equipment or unit processes in a system configuration.

1.5 SPECIFICATIONS TO BE USED BY THE DESIGNER

In designing a sewerage system it is assumed that the Designer shall possess, or have access to, the documents required to comply with this worksection.

The Designer shall include the requirements of the 1361 *Sewerage - reticulation and pump stations (Construction)*.

The Designer shall use the latest edition of the Australian Standards, including amendments and supplements, unless specified otherwise.

References to the Sewerage Code of Australia are identified by part and section numbers and enclosed in brackets thus (WSAA Part, Section).

Sewerage Code of Australia drawings are to be used in preference to DPWS Standard Drawings (WSAA 02 Part 4).

1.6 REFERENCED DOCUMENTS

The following documents referred to in this worksection shall be deemed as the latest edition of the Australian Standards, including amendments and supplements:

Worksection

1361 Sewerage - reticulation and pump stations (Construction)

Standards

AS 1102 series	Graphical symbols for electrotechnical documentation (Various)
AS 1214	Hot dipped galvanised coatings on threaded fasteners (ISO metric coarse thread series)
AS 1281	Cement mortar lining of steel pipes and fittings
AS 1444	Wrought alloy steels—Standard, hardenability (H) series and hardened and tempered to designated mechanical properties
AS 1579	Arc welded steel pipes and fittings for water and waste-water
AS 1646 series	Elastomeric seals for waterworks purposes (Series)
AS 1657	Fixed Platforms, walkways, stairways and ladders—Design, construction and installation
AS 1741	Vitrified clay pipes and fittings with flexible joints—Sewer quality
AS 2129	Flanges for pipes, valves and fittings
AS 2200	Design charts for water supply and sewerage
AS 2634	Chemical plant equipment made from glass-fibre reinforced plastics (GRP) based on thermosetting resins
AS 2837	Wrought alloy steels—Stainless steel bars and semi-finished products
AS 3571	Glass filament reinforced thermosetting plastics (GRP) pipes—Polyester based—Water supply, sewerage and drainage applications
AS/NZS 3735	Concrete structures retaining liquids
AS 3996	Access covers and grates
AS/NZS 4058	Precast concrete pipes (pressure and non pressure)
AS 4060	Loads on buried vitrified clay pipes
AS 4087	Metallic flanges for waterworks purposes
AS 4100	Steel structures
AS 4441	Oriented PVC (PVC-O) pipes for pressure applications
AS/NZS 1260	PVC pipes and fittings for drain, waste and vent application
AS/NZS 1477	PVC pipes and fittings for pressure applications
AS/NZS 2280	Ductile iron pipes and fittings
AS/NZS 2566	Buried flexible pipelines
AS/NZS 2566.1	Structural design
AS/NZS 2566.2	Installation
AS/NZS 3500	Plumbing and drainage
AS/NZS 3500.2	Sewerage
AS/NZS 3518	Acrylonitrile Butadiene Styrene (ABS) pipes and fittings for pressure applications
AS/NZS 3862	External fusion-bonded epoxy coating for steel pipes
AS/NZS 4129	Fittings for polyethylene (PE) pipes for pressure applications
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
AS/NZS 4131	Polyethylene (PE) compounds for pressure pipes and fittings
AS/NZS 4158	Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS 4321	Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
AS/NZS 4765(Int)	Modified PVC (PVC-M) pipes for pressure applications
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications

Other publications

NSW Department of Commerce

MEW E101	Electrical Services Minimum Requirements
PWD-SD	Public Works Department Manual of Practice—Sewage Design
PWD-PSD	Public Works Department Manual of Practice—Sewage Pumping Station Design (May 1986)

Water Services Association of Australia (WSAA)

WSAA 02 Sewerage Code of Australia, 2nd Edition Ver. 2.3

1.7 BIBLIOGRAPHY

Standards

- AS 1631 Cast grey and ductile iron non-pressure pipe and fittings
AS 3680 Polyethylene sleeving for ductile iron pipelines
SAA HB 48 Steel structures design handbook
BS EN 1091 Vacuum sewerage systems

Other publications

Institute of Public Works Engineering Australia (IPWEA)

Guide to Codes and Practices for Streets Opening - Streets Opening Conference 2007 (Sections 5 and 6 detailing locations and depths of other services and preferred location for water reticulation pipes)

NSW Department of Commerce

- WS-SPEC Technical Requirements (TRs) and Strategic products Specifications
PWD Safety Guidelines for fixed ladders, stairways, platforms and walkways for use in sewage treatment Works, pumping stations and maintenance holes

Water Services Association of Australia (WSAA)

- WSAA 04 Sewerage Pumping Station Code

Australian Building Codes Board

Building Code of Australia—PART E1, Fire Fighting Equipment

2 DESIGN CRITERIA

2.1 GENERAL

Standard

The design shall be in accordance with the Sewerage code of Australia, or PWD-SD and PWD-PSD unless specified otherwise herein (WSAA 02 Part 1).

Responsibility

Except where specified otherwise, the division of responsibilities between the Sewer Authority and the Designer shall be in accordance with the Sewerage code of Australia (WSAA 02 Part 1, Section 1.3).

Gravity system

The Designer shall confirm the design criteria with the Sewer Authority and shall design a gravity pipeline collection system with pump stations and rising mains, where necessary to comply with the requirements of this worksection, to transport fresh sewage, or common effluent, for treatment.

Pressurised or vacuum system

Pressurised common effluent or vacuum systems shall only be considered after consultation with the Sewer Authority.

Discharges to gravity sewers

The Designer shall not provide for common effluent or vacuum discharges to gravity sewers or conventional wastewater treatment plants without the concurrence of the Sewer Authority.

2.2 DETERMINATION OF AREA TO BE SERVED

PWD-SD and upstream provision

The area to be served shall be determined in accordance with PWD-SD except that the Sewer Authority may require provision for an upstream sewer.

In the design brief the Sewer Authority will indicate the level and size of existing pipe as well as anticipated flows to be allowed for in the design (WSAA 02 Part 1, Section 2.3.2).

Alternatively, the Authority may require the designer to determine the future and ultimate upstream sewer loading and provide adequate allowance for such loadings to the satisfaction of the approving authority.

Depth

The depth of sewer shall be sufficient to allow a minimum of 90% of each lot to be serviced.

Provision of sewerage

All lots shall be able to be served by gravity sewers wherever possible.

2.3 DESIGN LOADING

Flows

The Designer shall obtain the concurrence of the Sewer Authority for the flow to be used for the design of sewers serving industrial areas and developments not specifically listed in the Sewerage Code of Australia or PWD-SD (WSAA 02 Part 1, Section 3).

Design codes

The design shall take account of AS 2200, AS/NZS 2566.1, AS/NZS 3500.2, AS/NZS 3735, the Sewerage Code of Australia and, where design elements are not covered elsewhere in these codes, PWD-SD and PWD-PSD.

2.4 SEWER ALIGNMENT (WSAA 02 PART 1, SECTION 4.3)

Consent of owner

Where it is necessary for sewers to be located outside the development, the Designer shall obtain written approval from the affected property owner.

Preparation of any application for approval from an affected property owner shall constitute a WITNESS POINT (WP).

The Principal shall advise whether the option to review and direct on the application is taken at the time of notification by the Designer.

Road reserve

Where sewers are proposed to be located within existing road reserves, the Designer shall check that the sewers do not conflict with other utility services and locate the sewers in accordance with established protocols (WSAA 02 Part 1, Section 4.4). Special provisions are to be made to protect the pipe at all road crossings by use of Ductile Iron Pipe where Cover from construction traffic is less than 900mm.

Easement

Pressure Sewers Mains and Trunk Gravity Mains located on private property must be located in an easement of minimum width three (3) metres. Unless there are compelling reasons to the contrary the sewer shall be located in the centre of the easement.

A Registered Surveyor shall survey easements and pipelines (WSAA 02 Part 1, Section 4.5).

Trench width

Where control of the trench width is practical or effective, the design may be based on wide trench condition.

The Designer shall call up the need, in the Construction Specification, for the Contractor to supply special construction control with a method statement when there is economic justification to design to narrow trench condition.

2.5 MAINTENANCE HOLES (MHS) (WSAA 02 PART 1, SECTION 6.6)

Spacing

Maintenance holes shall generally be placed on gravity sewers as specified in PWD-SD Clause 6.1, except that the maximum spacing shall be 70 m (WSAA 02 Part 1, section 6.3).

Terminal maintenance hole

All upstream ends of sewers shall terminate in a maintenance hole if the upstream end is more than 30 m from the down stream maintenance hole.

Step irons

Step irons shall be provided to all maintenance holes where the depth from top of cover to the invert of the outlet pipe exceeds 1200 mm. Step Irons shall be of 24 mm diameter hot dip galvanised steel, cast aluminium or plastic encapsulated.

Venting

The Designer shall provide for the venting of maintenance holes which accept pumped discharges.

Connections to existing systems

Connections to existing maintenance holes or sewers of the existing sewerage system is to be based on the Sewer Authority's sewerage master plan.

Access covers

Access covers shall be manufactured in accordance with AS 3996.

2.6 MAINTENANCE SHAFTS (MSS) AND TERMINAL MAINTENANCE SHAFTS (TMSS)

As required by sewer authority

Maintenance shafts and terminal maintenance shafts shall be provided only as required by the Sewer Authority.

MH Layout

The provision of maintenance shafts and terminal maintenance shafts shall not affect the layout of maintenance holes or terminal maintenance holes unless directed by the Sewer Authority.

Maximum spacing

Where used, a terminal maintenance shaft shall be no further than 80 m from the nearest maintenance hole.

Conditions limiting use

The Designer shall take account of conditions limiting the use of maintenance shafts (WSAA 02 Part 1, Section 6.7).

2.7 PIPELINES (WSAA 02 PART 2)

Type

Pipes and fittings for sewerage systems shall be of unplasticised PVC, modified PVC, ductile iron, vitrified clay, steel, polyethylene, polypropylene or glass reinforced plastic. The material specifications for each pipe type are provided in Section 3.

Witness Point

The choice of pipe type constitutes a WITNESS POINT (WP). The Principal shall advise at the time of notification by the Designer whether the option to confer is required.

Fibre cement pipes and fittings

Fibre cement pipe and fittings shall not be used.

Concrete pipes

Concrete pipes shall not be used.

Buried pipes

Pipelines shall be buried. Above ground sewers may be designed in a gravity system only where other options are less practical (WSAA 02 Part 1, Section 8.7).

The action to provide for above ground sewers constitutes a WITNESS POINT.

The Principal shall advise at the time of notification by the Designer whether the option to confer is required.

External protection

The Designer shall show on the Drawings the extent of external protection required to be undertaken by the Contractor.

External protection shall be shown to comply with 1361 *Sewerage - reticulation and pump stations (Construction)*.

Colour coding

Where sewer pipes or rising mains are to be located in close proximity to other services pipes or where there is the likelihood of the pipes not being recognised as sewerage pipes, the Designer shall provide for the pipes to be colour coded and shown on the Drawings accordingly.

Piers

Piers for any above ground sewer pipeline shall be in accordance with the Sewerage code of Australia Drawing SEW-1404.

Property connection

The pipeline alignment shall be such that no property connection sewer is to be more than 10 m in length.

Connection depth

The Designer shall ensure that connections to the pipeline shall be not more than 1500 mm in depth below the finished surface.

Special allowances

The Designer shall allow for adequate working area, waste removal and transport arrangements where scouring points or inspection pipe locations are nominated.

Thrust blocks

The Designer shall design thrust blocks to resist maximum pressure of the pipe, not the estimated surge pressure.

Surge control method

The Designer shall provide for surge control by specifying an appropriate rising main material and class selection.

2.8 JOINTS

Elastomeric seal or butt welded

Gravity sewers and rising mains shall generally be spigot and socket joints with elastomeric seals complying with AS 1646, or butt welded in the case of polyethylene pipe.

Flanges

Flanged joints connecting pipes, fittings, valves and pumps shall comply with AS 2129 (Flanges shall be Table C) or AS 4087, Class 16, as appropriate.

The concurrence of the Sewer Authority shall be obtained for the type of joint to be used (WSAA 02 Part 2, Section 10.3.2).

2.9 MINE SUBSIDENCE AREAS AND AREAS OF SLIPPAGE

Ground strain

The Designer shall accommodate the movement associated with the ground strain for the area, as advised by the Mine Subsidence Board for sewerage jointing systems in proclaimed Mine Subsidence Areas, or in a known or expected area of subsidence or slippage.

The design ground strain for the development shall be detailed on the Drawings.

Pipe jointing system

The pipe jointing system selected shall be capable of accepting ground movements, without impairing the water tightness of the joint, for the ground strain as advised by the Mine Subsidence Board. For areas with high ground strains a pipe jointing system using shorter effective length pipes and/or deep socket fittings shall be used.

This action constitutes a WITNESS POINT.

The Principal shall advise at the time of notification by the Designer whether the option to confer is required.

Areas applicable

Where the Mines Subsidence Board does not cover an area of known, or suspected, subsidence or slippage, the above requirements shall still apply.

3 MATERIALS

3.1 PVC GRAVITY PIPE

Standard

PVC pipe shall be specified to be manufactured in accordance with AS/NZS 1260, designed in accordance with AS/NZS 2566.1 and with elastomeric seal spigot and socket joints (WSAA 02 Part 2, Table 10.1). The pipe shall be not less than Class SN 8.

Ductile iron pipe compatibility

Where PVC pipe is used in conjunction with DI fittings, the Designer shall ensure the jointing system is appropriate.

Fittings

Fittings for use with PVC pipe shall be elastomeric seal jointed.

3.2 PVC PRESSURE PIPE

Standard

PVC pressure pipe shall be specified to be manufactured in accordance with AS/NZS 1477, AS 4441 or AS/NZS 4765, designed in accordance with AS/NZS 2566.1, and with elastomeric seal spigot and socket joints (WSAA 02 Part 2, Table 10.3). The pipe class shall be selected based on pumping design and site conditions.

Ductile iron pipe compatibility

Where PVC pipe is used in conjunction with DI fittings, the Designer shall ensure the jointing system is appropriate.

Fittings

Fittings for use with PVC pressure pipe shall be elastomeric seal jointed.

3.3 DUCTILE IRON PIPE AND FITTINGS

Standard

Ductile iron pipes and fittings shall be specified to be manufactured and cement mortar lined in accordance with AS/NZS 2280, with minimum Class PN 20 for elastomeric seal joints. Where pipes are flanged, AS/NZS 2280 Flange Class pipe shall be specified (WSAA 02 Part 2, Table 10.1).

Corrosion protection

The Designer shall specify cement mortar lining in accordance with AS/NZS 2280, or fusion-bonded medium density polyethylene to AS/NZS 4158.

External protection shall be epoxy coating to AS 3862 where not otherwise specified as sleeved or wrapped, taking into account the type of corrosion protection required.

Joints

Generally, pipe and fitting joints shall be specified to be spigot and socket type using an elastomeric seal made of natural rubber, or ethylene propylene rubber with compounds complying with AS 1646.

Flanges

Flanges shall be specified to be manufactured in accordance with AS 2129 Table C. Bolts and nuts for flanged joints shall be in accordance with AS 2129 and galvanised in accordance with AS 1214 or stainless steel in accordance with AS 2837 as for pumps specified in 1361 *Sewerage - reticulation and pump stations (Construction)*.

3.4 VITRIFIED CLAY (VC) PIPES AND FITTINGS

Standard

Vitrified Clay pipes and fittings shall be specified to be manufactured in accordance with AS 1741 and designed in accordance with AS 4060 (WSAA 02 Part 2, Table 10.2).

Joints

Pipe and fitting shall be spigot and socket type using an elastomeric seal joints. Natural rubber shall not be used.

3.5 STEEL PIPE AND FITTINGS

Standard

Steel pipes and fittings shall be specified to be manufactured in accordance with AS 1579 and designed to AS/NZS 2566.1.

Joints

The Designer shall specify the jointing system where long-term corrosion resistance, ease of construction or special circumstances dictate the need. The pipe jointing shall be either:

- Elastomeric seal jointed with seals complying with AS 1646, or
- Butt welded, welded spigot and socket, or welding using a welding collar, and with the application of a polyethylene heat shrunk sleeve over the weld, or wrapped, or
- Flanged to comply with AS 4087 Table C. Bolts and nuts for flanged joints shall be in accordance with AS 2129 and galvanised in accordance with AS 1214, or stainless steel in accordance with AS 1444 as for pumps specified in 1361 *Sewerage - reticulation and pump stations (Construction)*.

3.6 POLYETHYLENE PIPE AND FITTINGS

Polyethylene pressure pipe and fittings shall be manufactured to comply with AS/NZS 4129 and AS/NZS 4130 and designed to AS/NZS 2566.1 (WSAA 02 Part 2, Table 10.2).

3.7 GLASS REINFORCED PLASTIC (GRP) PIPE AND FITTINGS

Glass reinforced thermosetting plastics (GRP) pipes and collars shall be manufactured to comply with AS 3571 and designed to AS/NZS 2566.1 (WSAA 02 Part 2, Table 10.2).

Fittings shall comply with AS 2634. Ductile iron fittings complying with AS/NZS 2280 with appropriate elastomeric seals to AS 1646 may also be used.

3.8 POLYPROPYLENE PIPE AND FITTINGS

Standard

Polypropylene pipes and fittings shall be specified to be manufactured to AS 5065 and designed to AS/NZS 2566.1 (WSAA 02 Part 2, Table 10.2).

4 PUMP STATIONS

4.1 GENERAL

Location

The Designer shall take into account access, site maintenance and restoration, easement, power supply and working area when locating pump stations in road reserves or on private property.

This action constitutes a **WITNESS POINT**.

The Principal shall advise at the time of notification by the Designer whether the option to confer on the locations is required.

Type

Where not provided as a vacuum sewerage system, the Designer shall provide for all pump stations to be of the single wet well submersible pump style with self contained freestanding switchboards suitable for external use.

Conditions

The Designer shall provide for the construction of the pump well after taking into consideration the ground and site conditions.

Preformed components

Preformed components or systems, complying with the Drawings, if any, may be used in lieu of in-situ construction provided:

- Preformed concrete cylindrical wall units are to be manufactured to AS/NZS 4058. The Designer shall take into account the cover requirements for reinforcing steel and cement types.
- Joints shall be internal flush
- The Designer shall ensure selected components make a watertight system and have a satisfactory surface finish.

Protection against flooding

Where the pump station site is exposed to possible flooding, the Designer shall provide for the top of pump well to be one (1) metre above the 1 in 100 year flood level or to such other level as provided by Council's planning instruments, whichever is the higher.

Protection against flotation

The Designer shall provide for the design of pump wells against flotation both during the construction/installation stage and whilst operating under flood conditions designed as above.

Package units

Package pump station units may be designed, with the prior concurrence of the Sewer Authority, where the area being serviced is small and/or their inclusion contributes to an overall lesser depth of excavation in the system.

Surfaces

The Designer shall provide for internal surfaces of wet wells to be prepared and coated with an epoxy paint system approved by the Superintendent. All bolted connections within wet wells shall be stainless steel complying with AS 2837 Grade 316.

Surcharges and overflows

The Designer shall size pipes and pump station capacity to avoid surcharges under design flow conditions. The Designer shall provide for overflows in strict accordance with the conditions of the licence, if any, permitting sewage overflow.

Alarms and signals

The Designer shall provide for alarms and signals systems with the concurrence of the Sewer Authority.

4.2 PUMPS

Special requirements

The Designer shall specify special requirements, if any, for materials to be used in the pump station, taking into consideration the nature and composition of the sewage to be pumped. Each pump shall be fitted with a flushing valve installed in accordance with the manufacturer's recommendations.

Size

The Designer shall provide for pump stations to be fitted with suitably sized pumps, consistent with other pumps in service, in conventional duty pump/standby pump arrangement.

Impeller clearance

Each pump shall be capable of passing solids of not less than 75 mm diameter unless grinding equipment is incorporated

Removal

Each pump shall be capable of being removed with the aid of fixed guide rails.

Inter-changeable

Pump sets are to be interchangeable within each pump station.

Structural steelwork

The Designer shall design structural steelwork in accordance with AS 4100 or HB 48.

4.3 ELECTRICAL

The Sewer Authority is to be contacted for its Standard Design requirements for SCA and Switchboards.

Design responsibility

Notwithstanding other clauses mentioned herein, the Designer shall be responsible for the design of the equipment as suitable for the purpose.

Equipment design shall comply with the requirements of the relevant standard specification.

SCA and electrical

The Designer shall provide for Switchgear Control Assembly (SCA), SCA housing and electrical requirements as detailed in 1361 *Sewerage - reticulation and pump stations (Construction)*.

Inter-changeability

Where more than one (1) item of equipment is designed to form a particular function, all such items of equipment shall be identical and completely interchangeable (eg. pilot lights, pushbuttons, relays, etc.).

Switchboard

The switchboard shall be installed visibly and physically accessible above areas at risk of flooding.

Ambient conditions

Ambient conditions shall be within the normally accepted limits of 0°C to 45°C.

Connection to local supply

The switchboard shall be connected to the local electricity supply system.

Nominal system parameters:

- 415 volt, 3-phase, 4-wire, 50 Hz, solidly earthed neutral system.
- Prospective Fault Current: as specified by the local supply Authority.

Standards

The works shall be designed in accordance with and subject to the provisions of MEW E101, except where modified by this worksection.

Automatic operation

The pump station shall be designed for fully automatic operation in the unmanned condition.

4.4 WATER SUPPLY

Cleaning

The Designer shall provide for automatic well washers and flush valves to be installed at each pump station and controlled so that they operate when the duty pump is operating.

Contamination protection

The Designer shall provide at all pump stations for an adequate water supply for cleaning purposes. This supply shall be protected from contamination due to backflow by the installation of a registered break tank or reduced pressure zone device in accordance with AS 3500.2.

4.5 LADDERS

Standard

Ladders shall comply with AS 1657 and applicable Occupational Health and Safety legislation (WSAA 02 Part 1, Section 6.6.8).

Ladder landings

If required, the Designer shall set intermediate landings in wells to achieve the minimum head room clearance.

Wherever possible, the landing shall be located adjacent to fittings and machinery requiring maintenance.

Ladder cages

Ladder cages shall not be used on ladders in pump station wet wells.

4.6 TELEMETRY

Schedule

The Designer shall provide for telemetry requirements in accordance with the schedule supplied by the Sewer Authority.

Compatibility

The telemetry system is to be compatible with the existing system, if any, in use.

4.7 OTHER APPURTENANCES

Venting

The Designer shall provide for venting of each pump station, and in built up areas, after consultation with the local Council.

Lifting equipment

The Designer shall provide for machinery lifting equipment including pump chains.

Gauges

The Designer shall provide pressure tapping and gauges for all valves, including isolation and non-return valves and as detailed in 1361 *Sewerage - reticulation and pump stations (Construction)*.

Covers

The Designer shall take account of the possibility of site flooding ingress and overflow, and occupational health and safety requirements in providing for access and inspection covers.

5 DOCUMENTATION

5.1 SEWERAGE SYSTEM

Approval

The Principal shall submit, to the Sewer Authority for approval, four (4) copies of the proposed sewerage system design, including calculations prior to commencement of construction (WSAA 02 Part 1, Section 9).

This action constitutes a WITNESS POINT.

The Principal shall advise at the time of notification by the Designer whether the option to direct the submission to the Sewer Authority is taken..

Drawings

The Drawings shall show to scale:

- Plan showing:
 - . Lot boundaries and lot numbers.
 - . Location and chainage of all maintenance holes, junctions and dead ends.
 - . Maintenance hole types.
 - . Location and size of all gravity and rising mains and pump stations.
 - . Location of vents.
 - . Sewer main number and maintenance hole number.
 - . Existing sewer mains, junctions and maintenance holes.
 - . For level lots, spot levels at the lot extremities to show that at least 90% of the area of the lot can be connected to the sewer by gravity.
 - . Hatching shall show the area of any lot not serviced.
 - . Site contours.
 - . Existing and proposed features and services.
 - . North point and scale bar.
 - . Easement location.
 - . Arrangement of other utilities.
- Longitudinal section showing:
 - . Reduced levels for natural surface and design surfaces at all changes in grade.
 - . Maintenance hole locations and type.
 - . Maintenance holes numbered in accordance with the Sewer Authority's Asset Register.
 - . Invert levels for maintenance holes inlet and outlet.
 - . Size, type, class and grade of pipe.
 - . Location, invert level and size of all drainage lines, water mains, and other utility services crossing the main.
 - . Notation regarding all joining lines.
 - . Property ownership.
 - . Note upstream ET's at each maintenance hole.

- . Note 'In road' trench conditions.
- Pump stations—General arrangement of pump stations with site plan; concrete outlines; number, make, model and details of pumps; inlet and outlet pipework details and levels; pump cut in; cut out and alarm levels; switchboard location; pump station access details; design starts per hour.
- Pipe protection—Details of corrosion protection required for pipes and fittings.
- Trenchless installation—Areas designated for trenchless pipe installation.

Drawing scale, size and format

Detail plans shall be drawn to a scale of 1:500 and longitudinal sections to a horizontal scale of 1:1000 and a vertical scale of 1:100.

Drawings shall be 'A3' size and/or 'A1' after consultation with the Sewer Authority.

Drawings shall be provided also in electronic form after consultation with the Sewer Authority.

5.2 PUMP STATION

Approval

The Principal shall submit, to the Sewer Authority for approval, prior to commencement of the manufacture of any pumps and control equipment, four (4) copies of the following:

- Switch and Control Gear Assemblies—Proposed fully dimensioned manufacturing details, general arrangement (showing internal/external details) and foundation/gland plate details.
- Common Control—Complete circuit diagram and description of operation.
- Schedule of Equipment—Completed as to the equipment to be provided.
- Other Engineering drawings as required to fully describe the proposed equipment.

The submission of the documents constitutes a WITNESS POINT.

The Principal Shall advise at the time of notification by the Designer whether the option to direct the submission to the Sewer Authority is taken.

Confined space risks

The Designer shall take into consideration the technical requirements to minimise all risks associated with entry into confined space.

Drawing Size and format

Drawings shall be on 'A3' size. All symbols used shall conform to AS 1102 and all wires and terminals shall be numbered.

Drawings shall also be provided in electronic form after consultation with the Sewer Authority.

Asset register

The Designer shall provide asset schedules and Drawings in a form consistent with the existing or proposed Asset Register after consultation with the Sewer Authority. (WSAA 02 Part 1, Section 9.3.2).

6 ANNEXURE A

6.1 INSTRUCTION FOR SPECIFICATION PREPARATION

Incorporation of Local Requirements for Sewerage System Design

This worksection recognises that each Council may need to vary the Specifications to meet local requirements. The items below may be taken into account in varying this design specification and 1361 *Sewerage - reticulation and pump stations (Construction)*.

The Water Directorate, a close partner of the Institute of Public Works Engineering Australia (IPWEA), may provide additional information regarding the following:

- A complete list of Australian Standards relevant to Sewerage System compiled as a result of a survey of Standards in use.
- A schedule of training organisations available to provide accreditation to Contractors and Superintendents.
- A schedule of products in use compiled as a result of a survey of users.
- Advice on handling different requirements between the Council and any subsidising Authority. Differences identified include:
 - . Provision of more expensive materials, fittings and pumps.
 - . Automation (eg Sewerage pump station well washers and flushing valves **Pumps**).
 - . Depth of gravity sewers versus increased number of pump stations.

- . Dimensional variations, including:
 - * Sewer maintenance hole spacing **Maintenance Holes**.
 - * Length of sewer dead ends **Maintenance Holes**.
 - * Length of sewer service connections **Pipelines**.
 - * Cover requirements to 1361 *Sewerage - reticulation and pump stations (Construction)*.
 - * Depth to sewer connections **Determination of area to be served** and **Pipelines**.

The grading requirements called up for sand bedding may need to be checked where Council wishes to facilitate local acquisition. See 1361 *Sewerage - reticulation and pump stations (Construction)*, **Pipe bedding** and Table 3.4).

Valve opening direction varies within and between Water Authorities. The requirements of the specifications may need to be checked against existing installations. See 1361 *Sewerage - reticulation and pump stations (Construction)* **Valves**.

The requirement for the location of property services varies between Councils. The requirements of the specifications may need to be checked against existing installations. See 1361 *Sewerage - reticulation and pump stations (Construction)* **Junction and property connection sewers**.

The number and timing for receipt of documents called up varies between Councils. The requirements of the worksection may need to be checked against existing requirements.

Councils require varying lead times for notices to be given. The requirements of the worksection may need to be checked against existing requirements.

Council may wish to consider the option for installation of curved pipes (eg in cul-de-sacs).

Council may wish to include provision for inverted syphons and associated venting.