

7.0 SEWERAGE

7.1 GUIDELINES

The requirements of the Queensland Water Resources Commission Guidelines for Planning and Design of Sewerage Schemes shall be followed in general. The requirements of this document shall take precedence over the Queensland Water Resources Commission Guidelines.

7.2 DETAILED SEWERAGE RETICULATION PLANS

Refer to Sections 2.3.2.11 to 2.3.2.13

7.3 LONGITUDINAL SECTIONS

The information submitted on these drawings is to be that given on the sewer reticulation plans. For existing and proposed services, the actual location and height of services are to be shown wherever they cross the sewerage longitudinal sections.

Also, datum and depth of inverts are required on these drawings.

7.4 SEWERAGE NOTES REQUIRED ON CONSTRUCTION DRAWINGS

- (i)
 - (a) Less than 3m deep - uPVC Class SH - AS 1260
 - (b) Equal to or greater than 3m deep -uPVC Class SEH - AS 1260
 - (c) All pipe 225 diameter or greater - uPVC Class SEH - AS 1260

- (ii) Deep House Connection Branches - All house connections deeper than 2m are to be “Sugdon” heavy duty reinforced fibreglass junctions or approved equivalent.

- (iii) House Connection Standard drawing - See IMEAQ Standard Drawings.

- (iv) Manhole Standard Drawing - See IMEAQ Standard Drawings.

7.5 DESIGN STANDARDS

7.5.1 SEWERS

Sewers shall be located within the property being serviced except where adjacent properties are serviced and positioned on an alignment of 1.5m from the front and rear boundary and 1.0m from the side boundary. Sewers shall not generally be located within road reserves or park area. When constructed adjacent to roofwater drainage pipes an alignment of 2.0m shall be used.

Sewers shall be constructed to serve the entire area of an allotment using a fall of 1:40 for the internal allotment drains. In a steep allotment, the house pad site has to be fully served and the area of the house pad is to be shown on the lot.

In general, sewers shall be extended to the boundaries of the subdivision where the sewer can be extended to serve existing and future subdivisions.

In industrial subdivisions, the sewers are to be located in the front of the lots where possible. In commercial and business zones, the sewers shall not be located under possible building sites.

Generally, sewers shall be constructed at right angles or parallel to allotment boundaries, and not across boundaries at acute angles.

Written approval shall be obtained from the property owner and submitted to Council with the design drawings when sewers are proposed through land other than that owned by the Developer.

Bearings and distances shown on the drawings for the setting out of sewerage lines should only be used to assist in the setting out of these works. The required offsets for sewers from property alignments shall be nominated on the drawings. The drawings should state that the required offset from property boundaries take precedence over the bearings and distances shown on the drawings and that the offsets shall be checked prior to and on completion of installation of the sewerage mains. Property boundaries are to be pegged prior to setting out of sewer lines.

When sewers are constructed through filled allotments, compaction tests confirming adequate compaction of the allotment must be provided to Council prior to commencement of sewerage construction.

Where sewers are located adjacent to roofwater lines, the house connection branch for the sewer shall extend 1 metre beyond the outer edge of the roofwater line.

Where possible, the sewerage reticulation system shall be designed to minimise the number of pump stations required.

The size and shape of sewer pipelines are to be designed in accordance with the Queensland Water Resources Commission Guidelines. Consideration is to be taken of both minimum flows for self cleansing, as well as maximum pipe capacity at the designed grade.

Downstream sewer lines must always be at least the size of the maximum upstream sewer.

Sewers shall be graded with obverts to grade, with drops provided at change of diameter.

7.5.2 PIPE CLASS AND COVER

All sewers less than 3.0m in depth to invert shall to be constructed using uPVC minimum Class SH. All sewers with any section that has a depth equal to or greater than 3m are to be constructed using uPVC Class SEH. All sewers 225mm dia or greater shall be Class SEH or greater. The minimum cover for sewer pipes shall be 600mm for allotments and footpaths and 900mm for roadways. Where the above cover cannot be obtained, concrete or approved cement stabilised material encasement of the sewer shall be required. Where sewers cross stormwater pipelines, a minimum 100mm clearance is required.

7.5.3 HOUSE CONNECTIONS

House connections are to be constructed in accordance with Council's Standard Drawings. House connection branches shall be located generally 1.0 to 1.2m upstream of the allotment boundary or manhole, at the lowest part of the allotment and at sufficient depth to serve the whole allotment. For sewers deeper than 2.0m, the house connections are to be "Sugdon" heavy duty reinforced fibreglass junctions or an equivalent type approved by Council. House connection branches shall generally be connected into a line and not manholes. They may be connected into the last manhole on a line.

For deep vertical house connections the house connection is to rise vertically from the sewer to reach a depth of 1.5m below the finished allotment surface level. The house connection is then branched through a 45° Y junction and a 45° bend. Where the sewer is in the adjoining lot, the house connection is extended into the allotment and be turned vertically with a 90° bend and terminate 300mm below the finished allotment surface.

House drains shall be designed at 1 in 40 with a minimum depth at the head of the line of 0.5m to invert. A grade of 1 in 60 is acceptable for control of allotments in residential low density areas and in areas with flat terrain.

Industrial lots may have house connections graded at 1 in 60 with 0.5 cover at the head of the line. The minimum connection size shall be 150mm dia.

Site earthworks for building platforms are to be considered when grading house connections and sewers and locating manholes.

The minimum depth to invert of a house connection branch shall be 1.0m.

7.5.4 EXTENDED 150 & 100 HOUSE CONNECTIONS

Where the sewer main lies within an adjoining allotment, the house connections are to be extended a distance of 1.5m into the allotment. For battleaxe blocks, if the house connection lies within the access strip, the house connection is to be extended up the access strip to a point 1.5m within the main part of the allotment, prior to the construction of the concrete driveway.

7.5.5 BEDDING OF SEWERS

The bedding requirements are as set out in the Queensland Water Resources Commission guidelines.

7.5.6 SEWER DROPS

Council will permit up to a maximum of two internal drops in deep sewer manholes (>3.0m) for any side sewer of 150 dia entering at a level higher than 300mm above the invert of the manhole. For 225 dia side sewers, only one internal drop is permitted in any one manhole.

Manholes shall also be provided at all junctions and drops, at changes of sewer diameter, and at all ends of sewer lines. End manholes for sewer segments not exceeding 40m in length may be “lampholes”.

Drop manholes and intersection manholes are to be designed to minimise turbulence. Manholes receiving discharge from pressure mains should also be ventilated. Consideration should be given to protective lining of the manhole and the downstream sewer.

Bolt down covers are required on manholes in the following instances:-

- (a) Below flood level;
- (b) In parks or reserves;
- (c) In all trunk sewers whose diameter is over 375mm;

Concrete filled C.I. covers are required in private property. Cast iron covers are required in all trafficable areas.

7.5.7 SEWER INSPECTION POINTS

Each house connection is to have a screwed inspection opening located according to IMEAQ Standard Drawing.

7.5.8 SEWER EASEMENTS

Sewer easements are required for sewer lines within properties for all sewers greater than 2.0m deep. The easement is to be the depth of the sewer minus 500mm added to the sewer distance from the property boundary.

A rising main shall not be permitted in private property. Where this is not possible, an easement of minimum 3.0m width is required to be established in favour of Council.

7.5.9 SCOUR STOPS

Sewer lines laid on grades in excess of 1 in 6 shall be provided with concrete scour stops. Refer to Council's Standard Drawing for details.

7.6 MANHOLES

Manholes are required at every change in direction and change in grade at a maximum spacing of 90m along straight lengths of sewer mains. Manholes are to be constructed in accordance with IMEAQ Standard Drawing.

Precast manholes are preferred. For details see IMEAQ Drawing.

The drop through manholes shall be as set out in the Queensland Water Resources Commission Guidelines. Refer to Standard Drawings.

7.7 SEWERAGE RETICULATION WITHIN FILL AREAS

Where sewers are laid on land that is to be filled, such fill is to be placed and compacted prior to the sewers being laid. Site filling shall be in accordance with Section 2.6.6 of these Guidelines.

7.8 CONNECTION TO EXISTING SEWERAGE SYSTEM

All new sewer lines and manholes are to be tested for infiltration prior to connection to the existing sewerage system. Connection of the new sewer lines to existing manholes sewers shall be made by Council Staff.

7.9 RISING MAINS

7.9.1 PIPE MATERIALS

All rising mains up to 200mm dia are to be constructed in cream coloured uPVC to AS 2977-1988 (Blue Brute or Vinyl Iron) Class 12 or white uPVC to AS 1477-1988 Class 12.

7.9.2 DISCHARGE MANHOLES

Rising main discharge manholes are to be prefabricated polyethylene lined in accordance with details given in Section 7.11.14 of WRCG.

7.9.3 DESIGN STANDARD

The rising main is to be capable of withstanding pressures twice the pump station maximum pump pressures. In special situations, a water hammer analysis may be required.

7.9.4 AIR VENTS

Where possible, an air vent is to be installed in all rising main discharge manholes.

7.9.5 ODOUR CONTROL REQUIREMENTS

The design of the sewer rising main/pump size is to be such that the detention time of sewerage in the rising main is kept to a minimum.

7.10 CONSTRUCTION SURVEY

As each sewer and rising main is laid, the developer is to carry out a survey of the pipeline under construction, picking up locations and inverts of all manholes, sewer lines, house connections, rising mains, air valves etc.

7.11 SUBMERSIBLE SEWERAGE PUMP STATIONS

7.11.1 GENERAL

The Consulting Engineer shall prepare detailed drawings and specifications for the pump station. The documentation shall reflect the requirements of these Guidelines. The requirements of the Water Resources Commission "Guidelines for Planning and Design of Sewerage Schemes" are to be followed.

Pumps shall pass a minimum 75mm sphere. Pumps shall be fitted with wet well agitating valves.

The pump station structure shall be of cast in situ concrete construction. At least two pumps shall be installed at a sewerage pump station. Rising mains shall be 100mm diameter minimum. The pump duty flow rate and rising main size shall be selected on the basis of the greatest flow from the following criteria:-

- (i) Minimum scour velocity;
- (ii) Single pump operation 4xADWF at maximum head;
- (iii) Parallel pump operation before overflow 5xADWF.

Average dry weather flow 250 l/day/equivalent person (for Residential A zoning).

A concrete valve pit shall be provided to enclose the pump isolating valves, check valves and tee. The general arrangement of the well shall be in accordance with IMEAQ Standard Drawings. The location of the pumping station shall be located as far as possible from existing or proposed habitable dwellings, but in no case shall the pump station be closer than 30m from an existing or proposed habitable dwelling. A 100m setback is a desirable requirement. The pump station shall be located on a freehold lot to be transferred to Council.

7.11.2 ACCESS

A 3m width reinforced concrete driveway, interlocking pavers or compacted gravel and AC sealed access road shall be constructed to the pump station from a roadway over a standard crossover. The road shall have a pavement depth of a minimum 200mm (subject to subgrade investigation).

A turnaround area shall be provided for service vehicles. The pump station layout shall be arranged for convenient access by Council's truck mounted crane for pump removal. A sealed standing area 4m x 3m wide shall be constructed adjacent to the pump well access lids, with the access road leading to this standing area. The position of switchboard, vent and access lid opening shall suit the standing bay position for pump removal. A pumping station site plan shall detail the access facilities and finished ground levels.

7.11.3 FINISHED GROUND LEVEL

The roof of the pump station shall be at least 50mm above finished ground level. The surrounding ground shall be trimmed and shaped to fall away from the pump station.

7.11.4 WATER SUPPLY AND SPRINKLER SYSTEM

An internal wet well sprinkler system is to be installed to provide automatic station cleaning and odour suppression.

The sprinkler system shall have a Queensland Water Resources Commission approved backflow prevention device such as 'Watts 909, 50mm Backflow Preventer' or prior approved equivalent, fitted between the station and the town water supply. The system shall comprise of a 50mm dia Reduced Pressure Zone Valve, including 2 reflux valves, a bypass and an air breaker. A solenoid valve and timer shall provide variable 2-5 minutes per hour sprinkling. The water supply shall be metered.

The sprinkler head shall be a 'Nelson Rotator R30' type Nozzle No 10, Rotor Plate 02 (as supplied by Southern Cross) and shall be fitted to the underside of the roof slab. Pipe work shall be 20mm dia Grade 316 stainless steel with stainless steel brackets and fasteners.

The backflow prevention device shall be housed in an aluminium cabinet above ground on a minimum 100mm thick concrete slab and be located upstream of any pump station water supply service.

A 40mm camlock connection fitted to a post above ground shall be provided beside the pump station. The water service shall be 63mm OD Class 12 polyethylene minimum for short runs. The pipework above ground to the connection shall be 40mm diameter copper.

7.11.5 FASTENERS

All bolts, nuts and screws used on the pump station, switchboard (including brackets), air compressor pit and valve box shall be stainless steel.

Bolts - grade 316 stainless steel

Nuts - grade 304 stainless steel

Screws - grade 316 stainless steel

Loctite 222 or 567 shall be used on all threads and between stainless steel mating surfaces as an anti-galling lubricant.

7.11.6 PUMPWELL ACCESS

- (a) ACCESS LID - Hinged access lids shall be provided for the valve pit and over the pumps and shall be in accordance with Council's Standard Drawing. Access lids are to be constructed from marine grade aluminium checker plate. Access lids shall have perimeter stiffeners, as well as longitudinal and transverse intermediate stiffeners. An aluminium handle shall be provided. The access lid over the pumps shall be in two parts and positioned and sized for convenient pump removal. Where the aluminium frame touches concrete, the aluminium surface shall be coated with bituminous paint. All lids are to be locked with Council's standard water and sewerage padlocks. Council will supply these locks upon request and the cost shall be payable by the developer.
- (b) LADDERS - An aluminium ladder shall be provided to the valve pit floor. Handgrips are to be provided at roof level and are to be aluminium. Access to the bottom of the wet well shall be provided by a suitable aluminium ladder from the valve pit floor to the wet well. A safety handrail between the valve chamber and the wet well shall be provided and shall be of aluminium construction.

7.11.7 PUMP LIFTING CHAIN

A heavy duty hot dipped galvanised lifting chain shall be provided for each pump. Grade 316 stainless steel 'D' shackles shall be provided at 1500mm centres and on the chain end for connection to the pump. A stainless steel hook arrangement shall be provided to fix the chain to a point near the access lid.

7.11.8 PIPEWORK

Valve pit pipework shall be supported by concrete plinths. Pipework shall be flanged cement lined Class K12 ductile iron. Ductile iron pipes and fittings shall be coated externally with a minimum two coats of two-pack tar epoxy to give a minimum dry thickness of 400 microns. A 20mm air release cock shall be provided upstream of each pump isolating.

7.11.9 PUMP STATION OVERFLOW

A pump station overflow shall be provided to the wet well. The inlet to the overflow shall be provided with a stainless steel screen. The outlet shall be provided with a flap valve. The overflow pipe line shall be graded to an approved outlet (eg open drain, stormwater pipe) subject to Council's approval and Department of Environment licence.

The overflow shall be licensed by the Department of Environment prior to drawings being submitted for approval. If the overflow is not licensed, standby power generators shall be required.

7.11.10 STATION ISOLATING VALVES

- (a) Discharge Valves - Discharge valves on outlet pipework to the rising main shall be Rislon Nylon 11 coated resilient seated sluice valves, OBE 'Elypso' or Tubemakers Tubeline 'Series 500' Class 16 or approved equivalent.
- (b) Reflux Valves - Reflux valves are to be FBE (fusion bonded epoxy) coated both internally and externally. An extension spindle and lever arm shall be provided.

7.11.11 PUMP STATION CONTROL MANHOLE

A gravity manhole shall be provided close to the pump station with only one pipeline connecting to the pump well.

7.11.12 AIR COMPRESSOR PIT OR OXYGEN INJECTION FACILITIES

Odour control facilities may be required if rising main detention times exceed one hour. A compressor if required, shall be of an oil free piston type and not a rotary vane.

If required by Council, the pumping station shall be smoke tested before it is commissioned, to determine the likely path of exhausted gases. If, in the opinion of Council, the direction of travel of the gases is likely to cause a nuisance to existing or proposed habitable dwellings, an odour control unit shall be installed. This unit shall take the form of an activated carbon filter or other approved device, suitable for the purpose.

7.11.13 PUMP STATION NUMBER

The pump station designer shall contact Council to have the pump station designated a Council sewerage pump station number (eg. C1, RB1, EP2). This number shall be used on all drawings.

A plastic sign with this number shall be fixed to the switchboard door with stainless steel screws. The letters shall be at least 100mm high.

7.11.14 DISCHARGE MANHOLE

The rising main discharge manhole shall be of the fabricated polyethylene type with integral benching, bottom, top, access neck and pipe stubs.

7.11.15 SWITCHBOARD

All electrical work shall be in accordance with the electricity authority's requirements. Electrical switchboards shall be constructed from heavy gauge marine grade aluminium, including the frame. The mains supply to the switchboard shall be underground. The mains supply conduit shall be above ground as short a distance as possible and designed to afford maximum mechanical protection to the cable. The switchboard shall have two doors fitted with Council's sewerage switchboard locks. The lower door shall access a compartment for the pump electrical cable termination.

A well designed three phase plug and socket connection arrangement shall be provided for each submersible pump. The pump cable conduit shall be completely sealed to prevent pump well air entering the switchboard cubicle. The sealing arrangement shall be capable of being resealed after pump removal.

The upper door shall access a compartment for the electricity authority's meters and control equipment. The door shall be provided with wire reinforced glass windows for meter reading.

Electrical equipment specifications can be requested from Council.

Electrical protection equipment shall include:-

- Water void
- Thermal overload
- Motor Thermistor Relay
- Phase failure
- Copy of electrical layout plan in plastic cover in cabinet - all wires numbered

When the pump station requires its own substation, ground level substations are required. Council shall not approve pole mounted substations.

The pump station shall be fitted with a Radio Telemetry unit compatible with the existing Livingstone Shire Council system. The Council specification for the telemetry unit shall be made available upon request to Council.

7.11.16 LEVEL CONTROL ELECTRODE

Pump operation shall be controlled by the 'MULTIRODE' system or submersible pressure transducer (Proprietary system with a single PVC pipe and stainless steel button electrodes). Float valves and separate electrodes shall not be acceptable. The station shall be provided with a high wet well level flashing light mounted above the switchboard. The pump control system shall have the following electrode positions (descending):-

- Overflow flashing light on (light to go out if level drops)
- Standby pump on
- Duty pump on
- All pumps off

7.11.17 VENTILATION

- (a) The pumping station shall be provided with a properly designed ventilation system incorporating fresh air inlet, vent pole of appropriate height. (depending on the topography) and air-tight access openings. The vent pole shall be fitted with a PVC inner pipe.
- (b) If directed by Council, a mechanical ventilation system shall be installed whereby the air space in the pumping station shall be exchanged not less than 10 times per hour on a continuous basis. Fresh air shall be drawn through an opening suitable for the design air flow and withdrawn at a point as far removed as possible from the inlet. The fan shall be mounted so that its discharge is directed into the vent pole. The fan shall be protected against corrosion both internally and externally and shall be secure against vandalism. The fan shall maintain a nett negative suction head in the well under all operating conditions.

