

Policy 11: Land Development Guidelines

Section 5

5.0 Sewerage Reticulation – Design Requirements

Table of Contents

5.0	Sewerage Reticulation – Design Requirements	1
5.1	Introduction	3
5.2	Design Requirements – Sewerage Reticulation	3
5.2.1	General	3
5.2.2	Aim	3
5.2.3	Preliminary Sewer Concept Plan	4
5.2.4	Definition of Mains	4
5.2.5	Pipe Sizes for Function, Type and Class	5
5.2.6	Sewage Connection Point.....	6
5.2.7	Alignment of Gravity Mains	7
5.2.8	Depth of Sewers	9
5.2.9	Design Criteria	9
5.2.9.1	General	9
5.2.9.2	Capacity	10
5.2.9.3	Pipe Velocity	10
5.2.9.4	Minimum Grades.....	10
5.2.10	Access Structures	11
5.2.10.1	General	11
5.2.10.2	Location.....	11
5.2.10.3	Sizes, Types and Uses	12
5.2.10.4	Drops Through Structures.....	12
5.2.10.5	Specific Council Requirements for Access Structures	13
5.2.10.6	Specific Council Requirements for Bends	14
5.2.11	Pump and Lift Stations.....	15
5.2.11.1	General	15
5.2.11.2	Pump Design Criteria.....	16
5.2.11.3	Pump and Pump Well Criteria.....	17
5.2.11.4	Specific Council Requirements.....	17
5.2.11.5	Additional Surge Storage Holes.....	18
5.2.12	Pressure Mains	18
5.2.13	Odour Management Facilities	21
5.2.14	Private Pump Station and Pressure Main	21
5.2.15	Alternative Sewerage Systems.....	21
5.2.15.1	Vacuum Sewer System.....	21
5.2.15.2	Low Pressure Sewerage Systems.....	22
5.2.15.3	Waste Water Disposal System – Rural Developments	22
5.2.16	Overflows	22
5.2.17	Connections to Existing Mains (Works by Council)	22
5.2.18	Easements	22
5.2.19	Engineering Drawings.....	23
5.2.20	Specification.....	23
5.2.21	Alternate Approved Materials.....	23

5.2.22	Submission of Engineering Drawings/ Job Specification.....	23
5.2.23	Construction Procedures	23
5.2.24	'As Constructed' Requirements	23

5.1 Introduction

These Guidelines provide:

- Council's minimum standards for development encompassing sewerage reticulation including works required to join with existing and adjoining sewerage reticulation systems and works required to provide a connection point for servicing the allotment.
- Council's minimum standards for development encompassing major sewerage works (trunk sewers) including works required to join with existing and adjoining sewerage reticulation and trunk systems.

These Guidelines are a collation of **Sections 5.2 and 5.3** of the **2005 Guidelines** and as well now include Trunk Infrastructure guidelines.

This document now provides Council's **Reduced Infiltration Gravity Sewerage System (RIGSS)** concepts and components as an integral part of the sewerage reticulation system.

5.2 Design Requirements – Sewerage Reticulation

5.2.1 General

All sewerage trunk and reticulation mains shall be designed and certified in accordance with the following provisions:

- Council's general criteria as set out in these Guidelines and **Council's Standard Specifications and Drawings** that are based on the Desired Standards of Service; and
- the current **Department of Natural Resources and Water Planning Guidelines for Water Supply and Sewerage Schemes**; and
- for general guidance on infrastructure elements not contained within Council's documents, the criteria contained within the **WSAA Sewerage Code of Australia WSA 02-2002** may be used for guidance;
- the designer shall note the **Queensland Workplace Health and Safety – Guide to the Workplace Health and Safety Obligations of Designers of Structures** and the design shall include the required Safety Design Report.

Council's Land Development Guidelines and Standard Specifications and Drawings shall take precedence over the Water Resources Commission Guidelines and Drawings and the WSAA Sewerage Code and Drawings.

5.2.2 Aim

The aim of this Guideline is to provide Developers and their Consultants with Council's general criteria to ensure that:

- adequate consideration is given to the health and environmental issues that relate to the provision of sewer infrastructure;
- all sewerage reticulation and trunk schemes conform with Council's goals and objectives as summarised in **Section 2.2 – Preliminary Development Layout**;
- the reliability, safety and effectiveness of Council's sewerage infrastructure is maintained;
- long term Inflow and Infiltration management is carried out through the use of appropriate modern technologies and materials and system formats; and
- sewerage infrastructure is of adequate quality to minimise maintenance costs.

5.2.3 Preliminary Sewer Concept Plan

Prior to proceeding with detailed design the Consultant shall:

- a) Make application to Council for 'as constructed' sewer information relevant to the proposed development or infrastructure works and the approved connection points for the development or works.
- b) Liaise with Council to ascertain whether a **Preliminary Sewer Concept Plan** is required. Where Council requires a concept plan, it shall be completed by the Consultant and include the following information:
 - location, size and alignment of gravity sewers;
 - location, size and alignment of rising mains;
 - location of pump stations and lift stations and a listing of proposed easements and land to be dedicated to Gold Coast Water;
 - contour information generally at 5 m intervals;
 - approved sewer connection points;
 - contributing catchments (internal and external) showing the equivalent tenement (ET); and
 - the flow contributing to each section of main including the estimated design capacity. See example below:

ET 300	
PWWF	14.3 L/sec
Pipe Size	225 diameter
Max Pipe Cap	26.2 L/sec
Pipe Grade	1 in 190

Access for maintenance of the system should be considered when locating manholes, etc.

5.2.4 Definition of Mains

a) Trunk Mains

Trunk mains are those major components of Council's Sewerage Scheme deemed necessary to provide services on a regional and district basis. Gravity trunk sewers of 300mm and greater are generally referred to as Headwork mains and are outlined in Council's '**Our Living City' Planning Scheme Policy 3B – Policy for Infrastructure Sewerage Network Developer Contributions**. The design and construction of sewers larger than 300mm shall be undertaken in consultation with Gold Coast Water.

It is a mandatory Council requirement that no sewer connections will be allowed from trunk mains 375mm diameter or larger. In such cases a separate reticulation main shall be provided to service the development.

b) Reticulation Mains

Reticulation mains are those components of Council's Sewerage Scheme deemed necessary to provide services on a local basis.

Gravity sewers of 150mm to 300mm diameter are generally referred to as Reticulation mains and can be defined as those mains not identified as a Headwork mains as determination above in **Clause 5.2.4 a)** and where the main provides sewage services to allotments. An individual residential Class 1 Building connection may be 100mm diameter.

The design and construction of sewers larger than 300mm shall be undertaken in consultation with Gold Coast Water as a part of the development works.

5.2.5 Pipe Sizes for Function, Type and Class

a) Non-Pressure – Gravity Pipes

Non-pressure reticulation pipes shall be of the following diameters: 150 mm, 225 mm and 300 mm.

Non-pressure, single house connection branches shall be a minimum 100 mm diameter. House connection branches serving two houses shall be a minimum of 150 mm diameter prior to serving the individual houses with a 100 mm connection for each house.

Non-pressure trunk pipes shall be of the following diameters: 300 mm, 375 mm, 450 mm, 525 mm, 600 mm, 750 mm, 900 mm, 1000 mm and 1200 mm.

The type and class of pipes shall comply with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

Ductile iron PN35 (min) and other approved pipe materials may be used in special non-pressure circumstances (aqueduct or rail crossing) where approved by Council as shown on the engineering drawings.

b) Pressure – Rising Mains

Pressure reticulation mains shall be of the following diameters: 100 mm, 150 mm, 200 mm, 250 mm and 300 mm.

Pressure trunk mains shall be of the following diameters: 300 mm, 375 mm, 450 mm, 500 mm, 600 mm and 750 mm.

For pressure rising mains, the maximum pressure permitted within the main at any point is 90m. Where pressures exceed 90m then the written approval of Council shall be obtained prior to the lodgement of the engineering drawings.

The type and class of pipe shall comply with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

c) Vacuum System Pressure Pipes

Vacuum mains shall generally be of the following diameters in PE100 materials at SDR 13.6 minimum: 110 mm, 125 mm, 160 mm, 180 mm and larger accepted sizes.

Vacuum mains serving only a single Collection manhole and valve may be 90 mm in a PE100 material at SDR 13.6.

The type and class of pipes shall comply with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

d) Low Pressure Sewer Pipes

Low Pressure Sewerage mains shall generally be of the following diameters in PE100 materials at SDR 11 minimum: 63 mm, 90 mm and 110 mm and larger accepted sizes.

Council is currently conducting two trials of this technology and will not permit the further use of this technology until these trials are completed.

The type and class of pipes shall comply with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

e) Pipe Selection

Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works** provides a range of pipe materials.

The designers selection of the appropriate pipe material shall be made based on consideration of the following:

- geotechnical evaluation of the soil;
- the aggressive nature of the soil in respect of particular pipe materials;
- pipe availability for size, class and material;
- depth of trench and live loadings to be applied;
- service condition (industrial wastes, receiving pumped flow, rail crossing);
- service history of pipes in adjacent areas;
- specific Council requirements.

5.2.6 Sewage Connection Point

a) General

A single connection shall be provided at the lowest point of each allotment and at sufficient depth to serve the entire allotment.

Council will not permit combined house drains.

Individual house connections shall not be provided to each dwelling within a Duplex allotment. A single 150 mm connection point shall be provided at the lowest point of the Duplex allotment and at sufficient depth to serve the entire allotment.

Community Title Schemes (CTS) or similar types of development shall only be provided with a single connection point for the development at the lowest point of the allotment and at sufficient depth to serve the entire allotment.

The CTS connection point shall be sized for the development needs (based on area and ET loadings) and shall be a minimum of 150 mm. Internal sanitary drainage conforming to the Plumbing Code shall provide the internal servicing that connects to Council's single connection point. Council may Condition the development to provide sewerage reticulation (CTS Private main) to the Standard of Council's reticulation system, refer **Section 7.3.3** of the **Land development Guidelines** for details. The ownership of these 'CTS Private mains' remains with the Body Corporate.

For sewers located within the verge, house connection branches shall connect to the sewer main or into manholes wherever practical.

It is a mandatory Council requirement that where house connection branches cross or commence from road carriageways they shall connect into manholes and be 150 mm diameter minimum.

b) Size and Location

The location and minimum diameter of a single house connection shall be 100 mm for Detached Dwelling Domains (a single Class 1 Building) and 150 mm diameter in Industrial, Commercial and Residential Choice Domains as per Council's **Standard Drawing N° 08-07-106**.

c) Depth

The Control Point for the allotment is the House Drain Connection Tee either at Council's reticulation sewer or at the end of the House Connection Branch off Council's reticulation sewer and this connection tee shall be low enough to control the whole of the allotment to be serviced using the following criteria:

- minimum cover to top of house drain 300mm
- minimum grade for 100 dia 1 in 60
- minimum grade for 150 dia 1 in 80

For calculation purposes, the house drain alignment shall generally be 1 metre from side and rear boundaries and 6 metres from the front boundary (may vary in waterfront properties and reduced building alignments).

Subject to the above criteria being met the depth of any house drain connection tee as defined on Drawing No 08-07-106 shall be between:

- **minimum 600 mm to top of pipe**
- **maximum 1500 mm to top of pipe**

The maximum depth of 1500 mm is to recognise the O.H. & S. requirements for the plumbing connection and to minimise any trench shoring needs.

The house drain connection tee shall be provided with a vertical riser from the top connection point of the tee to a depth of 450 mm below finished surface level. The riser shall be provided with a sealed cap.

House drain connection tees shall be located 2000 mm clear of any Maintenance Shaft and to the depths nominated above in accordance with Council's **Standard Drawing N° 08-07-105**.

Council requires that the location of the house drain connection tee shall be marked within the allotment by the use of a buried HW timber stake placed at the upstream cap of the tee with orange coloured PVC tubing securely attached to the stake with the PVC tubing terminated one metre above finished surface.

d) Jump Ups

Jump ups are required for deeper sewers to allow the house drain connection tee to be located within the depth ranges defined in **Clause 5.2.6 c)** and shall be constructed in accordance with Council's **Standard Drawing N^{os} 08-07-106** and **08-07-107**.

Type A and B jump ups shall be used for sewers less than 2500mm deep.

Type D jump ups shall be used for sewers deeper than 2500mm.

Jump up fitting components shall be Council approved:

- fibreglass reinforced PVC oblique junctions; and
- fibreglass reinforced PVC bends; and
- fibreglass reinforced fabricated PVC drop sewer junction Type D; or
- fibreglass drop sewer junction Type D.

Where a Type D junction fitting is used, the Consultant shall select the appropriate format of the integral bend to ensure verticality of the installed vertical riser pipework. Design plans shall detail the specific sewer junction option Type, ie. Type D2 for sewers between 1:20 to 1:10.

5.2.7 Alignment of Gravity Mains

a) Buried Alignments

Reticulation mains shall be generally set out as shown in Council's **Standard Drawing N^o 08-07-001** and shall preferably be located buried within the footpath verge as shown in Council's **Standard Drawing N^o 05-02-005**. Any proposed alteration to the alignment must be approved by Council and the relevant Public Utility Authority.

Trunk sewers shall be buried and located in road reserves or in land under the control of the State or of Council. Reticulation and trunk sewers shall not be located within the same verge.

Trunk mains may be located within private property or Council property such as Parks, only where there is no other alignment available.

Easements shall be provided as detailed within **Clause 5.2.18** for sewers located within allotments, parks and reserves.

The acceptance of the installation of mains within roadways excludes the placement within the roadway of any asset element that is above the level of the roadway or footway. Where an asset element is above the level of the ground then it shall be located within a parcel of land that is either an easement or is a lot in Fee Simple dedicated to Gold Coast Water.

When designing the sewerage system, consideration must be given to:

- the accessibility of mains, manholes, maintenance shafts and rodding ends located within the property or the verge or the roadway;
- conflicts with other services both current and future;
- the sewers ability to economically fully serve the allotments.

The alignment of trunk sewers shall be defined following assessment of detailed engineering surveys, environmental impact and including pot-holing, of the route options.

Alignment locations and any changes to the selected alignment shall be approved by Council and any relevant Public and Private Utility Authority.

There is now an increasing use of retaining walls at the boundary of allotments. These walls provide additional costs to Council in the long-term operation of the sewerage system. When designing a sewerage system adequate clearance around access structures and house drain connection tees from the retaining wall shall be provided. For access structures, an area of 1.5 metre radius shall be provided around the central point of the facility to permit the set up and use of Confined Space equipment as well as the use of other maintenance equipment such as jet rodders and remote cameras.

House drain connection tees shall not be located under or within the zone of influence of the retaining wall.

Mains shall generally traverse the kerb and channel at 90°.

Common trenching for water and sewerage together with any other utility is not permitted. The minimum clearance between pipe side extremities for pipes of the same 'Utility' use (eg. sewer/ sewer) shall be the standard trench width for the Outside Diameter of the largest main in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

A solid or physical trench separation distance of 300mm minimum shall be maintained between the trenches for pipes of different 'utility' use, eg. power and water or sewerage and water.

No mains shall be located within the rear of a canal estate allotment.

Where Council approves gravity mains within allotments the following offsets shall generally apply:

- front and rear boundaries 1.5 metres
- side boundaries 1.5 metres

Attention is drawn to **Section 7.7 – Building Near or Over Council Water, Sewer and/or Stormwater Services** of these Guidelines.

Where **Water Sensitive Urban Design** principals provide swales and other stormwater management devices within the verge that will impact on sewer locations, ie. physical space or inundation of covers, then the Consultant shall liaise with Gold Coast Water to gain approval of any proposed alignment.

In these instances, Council may permit reticulation sewers to be installed within Access and Collector Street roadways following discussions with Council and in accordance with the following:

- soils shall have a minimum bearing capacity of 100 kPa;
- mains shall be no deeper than 3.0 metres from FSL to IL;
- junctions shall be Type A or Type B only and House Connection Branches may include a single vertical bend to accommodate a service conflict. The grade shall increase on the downstream side of this bend;
- the sewer main shall be located centrally within the traffic lane;
- the top of the bedding 5/ 7 gravel shall be provided with geo-fabric;
- the trench backfill material shall comply with Type 5 or 6 construction;
- on line bends are not permitted;
- access structures covers shall be Class 'D' and Type 'd' to AS3996 and shall include a incremental raising system for the frame, such as the Havestock system or equal.

b) Aerial Alignments

In general, the following points should be considered when designing a gravity sewer main crossing a creek or river or gorge:

- adequate horizontal clearance between services at the waterway bank to allow for construction and maintenance;
- sewer mains shall be Ductile Iron in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works** and any addenda;
- installation formats should support ongoing easy maintenance;
- grade shall be maintained for the entire crossing;
- designed generally in accordance with the **WSAA Standard Drawing SEW-1404**;
- public safety and restriction of access shall be designed for, refer **WSAA Standard Drawing SEW-1405**;
- the main shall be fixed to the Piers by SS316 straps and bolts;
- the main shall be designed to allow for thermal longitudinal movement of the pipeline;
- access structures shall be accessible to Council vehicles and shall allow for maintenance entry by the provision of an area of 1.5 metre radius around the central point of the access structure.

5.2.8 Depth of Sewers

Sewers shall be designed at the shallowest possible depth so that:

- a) For reticulation sewers, all allotments are served based on the house connection design criteria as per **Section 5.2.6**.
- b) For trunk sewers, all branch sewers can be connected with matching obvert levels.
- c) Council's minimum cover to the top of a reticulation sewer is:
 - allotments 0.45m to top of DN100 to DN 225 pipes
 - allotments 0.60m to top of DN300 pipes
 - footpath 0.6m to top of pipe
 - roadways 0.9m to top of pipe
- d) Council's minimum cover to the top of a trunk sewer is 0.9m to top of pipe.
- e) Where the above minimum covers cannot be achieved consideration may be given to special designs where approved by Council following discussions with Gold Coast Water, refer **Clause 5.2.3**.
- f) There are no clashes with other services including stormwater and Public Utilities and a minimum vertical clearance of 150mm is provided between services crossing each other.
- g) Council's target maximum cover to the top of a reticulation sewer is:
 - dwelling allotments 4.0m to top of pipe
 - footpath/ reserves 5.0m to top of pipe
 - roadways servicing 3.0m to top of pipe
 - roadways crossing 5.0m to top of pipe
- h) Council's target maximum cover to the top of a trunk sewer is 5.0m based on the specified pipe materials in Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**. Designers of trunk sewers, that are to be deeper than 5.0m, shall validate to Gold Coast Water that the pipe material is certified for the intended depth, bedding conditions and soil types.

Reticulation sewers may be deeper than nominated above where approved by Council following discussions with Gold Coast Water, refer **Clause 5.2.3**.

Where so approved:

- the reticulation sewer pipe type and class shall be certified for the embedment conditions and shall not exceed 6.0 metres to top of pipe; and
- no junctions shall connect to the deep parts of the sewer main.

In these approved instances, the Consultant shall design a reticulation **deep** sewer together with a reticulation **shallow** sewer or sewers to service each allotment by providing a junction off-take and branch and house drain connection tee as detailed in **Clause 5.2.6**.

Where deemed appropriate, sewers shall incorporate drainage of sewer trenches in accordance with the Council's **Standard Drawing N° 08-07-103**.

For existing mains, where its cover is reduced by the provision of a driveway to service a new allotment or a new roadway then the minimum cover shall be maintained as per **c)** above.

5.2.9 Design Criteria

5.2.9.1 General

Reticulation sewers shall be designed to accommodate flows from the Developments catchment as well as external catchments in accordance with Council's '**Our Living City**' Planning Scheme consistent with long-term development equivalent tenements (ET). The proposed sewerage scheme shall be extended to the boundary of the development as nominated by Council.

Trunk sewers shall be designed to accommodate flows from all of the catchments it serves in accordance with Council's '**Our Living City**' Planning Scheme consistent with long-term development equivalent tenements (ET).

The design of trunk sewers may be staged or may be to the ultimate capacity as approved by the Manager of Infrastructure Planning of Gold Coast Water.

5.2.9.2 Capacity

Population estimates shall be based on the densities set out in Council's 'Our Living City – Gold Coast Planning Scheme Policies' – Policy 3B – Policy for Infrastructure Sewerage Network Developer Contributions unless noted otherwise by a specific planning approval.

The minimum pipe capacity for reticulation sewers(Category 2) and trunk sewers (Category 1) shall be based on the details shown in **Table 5.2 – A**.

Table 5.2 – A

Average Dry Weather Flow (ADWF) for Category 2 Infrastructure	825 L/ ET/ d
Average Dry Weather Flow (ADWF) for Category 1 Infrastructure	750 L/ ET/ d
Peak Wet Weather Flow (PWWF) – Elanora, Merrimac, Coombabah and Beenleigh catchments	5 x ADWF
Peak Wet Weather Flow (PWWF) – Pimpama-Coomera catchment	4 x ADWF
Peak Dry Weather Flow (PDWF)	2.2 x ADWF

5.2.9.3 Pipe Velocity

Pipe velocities shall be based on the details shown in **Table 5.2 – B**.

Table 5.2 – B

Flow Equation	Mannings
Mannings 'n'	0.013
Minimum velocity @ PWWF	0.6 m/s
Minimum velocity @ PDWF	0.3 m/s
Depth of Flow @ PWWF – Existing system	Up to 1.0 m below MH cover level and no spillage through overflow structures
Depth of Flow @ PWWF – Proposed sewers	Max flow depth shall not exceed $\frac{3}{4}$ pipe full

All sewerage systems acting under pressure (ie. HGL > Pipe obvert) must include an appropriate allowance for pit losses in HGL calculations. Liaise with GCW to confirm appropriate loss coefficients.

Trunk sewers shall be designed on gradients such that the velocity for Maximum Dry Weather Flow ($C_2 \times 275L/ EP/ day$) exceeds 0.3 m/s and the velocity for Maximum Daily Flow ($C_1 \times 275L/ EP/ day$) should be at least 0.6 m/s.

The appropriate 'C' factor can be obtained from the old **Water Resources Commission Guidelines** at **Section 2, Drawing Number A3-99480**. Alternatively, the 'C' factor can be calculated from the details within the new **Department of Natural Resources and Mines Planning Guidelines for Water Supply and Sewerage, Chapter 5, Clause 5.2.2 and Chapter 7, Clause 5.5.4**.

5.2.9.4 Minimum Grades

Minimum grades for sewer reticulation mains that comply with the capacity and velocity requirements shall be as summarised in **Table 5.2 – C**.

Table 5.2 – C

Diameter		Minimum Grade	
100mm	House Connection Branches	1 in 60	1.66%
150mm	House Connection Branches	1 in 80	1.25%
150mm	First MH length, head of sewer	1 in 100	1.00%
	Second MH Length	1 in 150	0.67%
	Remaining MH lengths (see Notes below)	1 in 150	0.67%
225mm		1 in 290	0.34%
300mm		1 in 420	0.24%
375mm		1 in 570	0.18%
450mm		1 in 730	0.14%
525mm		1 in 900	0.11%
600mm		1 in 1000	0.10%
675mm		1 in 1200	0.08%
> or = 750mm		1 in 1500	0.07%

Notes:

- 1 **Where deemed appropriate a minimum grade of 1 in 200 for 150mm control sewers may be adopted based on the following criteria:**
 - **the sewer is located in flat country (reclamation areas, canal estates) with resultant high water tables and associated excavation difficulties;**
 - **a minimum 20ET are serviced; and**
 - **the Consultant has obtained specific written approval from Council.**
- 2 **Design of gravity sewers of diameter greater than 300mm shall be undertaken in consultation with Gold Coast Water.**

On steeper grades, to prevent longitudinal and lateral movement of the gravity sewer main, **bulkheads shall be provided** as per Council's **Standard Drawing N° 08-07-101**. Where bulkheads are located that prevent or impede the migratory flow of ground water streams via the bedding material, then diversion drains shall be provided in accordance with the details shown on Council's **Standard Drawing N° 08-07-103**.

5.2.10 Access Structures

5.2.10.1 General

For reticulation sewers up to and including 300mm diameter, manholes, maintenance shafts and rodding ends shall be designed in accordance with Council's **Standard Drawing N°s 08-07-108 to 08-07-116**. Council limits the use of certain access structures to certain sewer sizes.

Manhole requirements for trunk sewers 300mm diameter larger shall be designed in accordance with Council's **Standard Drawing N°s 08-07-109** or shall be as directed by Council within the development or Project approval.

5.2.10.2 Location

Reticulation manholes and maintenance shafts shall be placed at the following locations:

- at changes in grade;
- changes in direction;
- changes in pipe diameter;
- changes in alignment;
- at intersections with other sewers (maximum change 90°);
- at changes in pipe material;
- as a manhole at the intersection of house connection branches or sewer lines crossing carriageways (refer **Section 5.3.6**);
- at the ends of sewer lines 60 metres long or greater;
- maintenance shafts shall be not more than 80 metres apart;
- manholes shall not be more than 90 metres apart without any other structure between the manholes;
- manholes with multiple intervening maintenance shafts shall be not more than 200 metres apart with a minimum of 3 and a maximum of four (4) maintenance shafts between these manholes.

Trunk manholes for 300mm to 600mm diameter sewers shall be placed at the following locations:

- at changes in grade;
- changes in direction/ alignment;
- changes in pipe diameter;
- at intersections with other sewers (maximum change 90°);
- at changes in pipe material;
- not more than 180 metres apart.

Trunk manholes for 675mm diameter and larger sewers shall be based on the above and placed as directed by Council following the discussions associated with the **Preliminary Sewer Concept Plan**.

Rodding ends shall be located as follows:

- at the ends of all 150mm sewer lines between 30 metres and 60 metres in length; and
- shall be provided with a 600mm long 'pipe short' immediately down stream of the concrete surround or with a Variable bend where the sewer grade exceeds 5%.

5.2.10.3 Sizes, Types and Uses

Cast *in-situ* manholes shall be of the following minimum sizes:

- 150-225 mm sewers use 1050 mm structures
- 300-600 mm sewers use 1500 mm structures
- 675-900 mm sewers use 1800 mm structures
- > 900 mm sewers, discuss with Council

Vacuum Collection manholes shall not contain the Vacuum Valve and shall be of the following minimum sizes:

- 1050 mm structures serving one Vacuum Valve in a separate pit
- 1200 mm structures serving two Vacuum Valves in a separate pit
- > two valves, by design

Maintenance shafts shall be of the following minimum sizes:

- 150-225mm sewers use Type 'G', 'H' and 'J' with a minimum of a 225mm shaft
- 150-225mm sewers use pre-cast concrete maintenance shaft (Quicktee or approved equal), shaft shall be minimum 600 mm diameter

Pre-cast concrete manholes shall be pre-benched at the manufacturing plant and of the following minimum sizes:

- 150-225 mm sewers use pre-cast concrete manholes that shall be a minimum of 1050 diameter with either standard factory benching or factory bowled benching

Rodding ends shall be of the following minimum sizes:

- 150 mm diameter and only on 150 mm sewers to a maximum depth to sewer invert of 2.5 metres

Dual and/or single house connection branches less than 30 metres in length that either commence from an access structure or a sewer main shall be ended as shown on Council's **Standard Drawing N° 08-07-106** via the appropriate detail '**Dual House Connection Outside Private Property Not Crossing Road**'.

The use of the above reticulation access structure shall be based on the following percentages per development population:

- manholes at 1050mm diameter minimum shall be 35% of structures
- maintenance shafts shall be 40% of structures
- in-line bends shall be 15% of structures
- rodding ends or HCB terminal ends shall be 10% of structures

5.2.10.4 Drops Through Structures

a) Manholes

The type and dimension of drops through manholes shall be as specified in Council's **Standard Drawing N° 08-07-108**.

For 150 mm to 225 mm diameter reticulation sewers Council permits Type 'V', 'W', 'X' and 'Y' drops. Type 'W' and 'Y' drops shall be monolithic with the cast *in-situ* manhole.

Council only permits Type 'V' drops for 300mm diameter and larger sewer pipes within the same sewer line. Branch sewer lines entering these sewers shall provide Type 'V' Obvert to Obvert installations at the manhole.

Where the grade and depth of a sewer entering a 300mm diameter and larger sewer is such that compliance with the above will cause step grades and deep excavations, then Gold Coast Water may permit:

- for a 150 mm to 225 mm reticulation sewer the use of an 'X' drop; and
- for a trunk sewer, where the Invert levels could differ by greater than 2.0 metres, the use of a Vortex drop is permitted.

For Invert level differences less than 2.0 metres, the sewers shall be a 'V' drop with standard dimension 'A' or Obvert to Obvert installation.

For 150 mm diameter reticulation sewers where a 'X' drops is used and the grade of the incoming sewer exceeds 10% then a long radius bend shall be used on the incoming sewer line at the up stream side of the 'X' drop fitting.

For 225 mm diameter reticulation sewers, 'X' drops may be used where the grade of the incoming sewer is less than 10.1%. For grades in excess of this, an 'X' drop shall not be used.

For 150 mm to 225 mm diameter sewers, where more than one (1) type 'X' drop is located within a manhole, then a 1200 manhole shall be constructed.

For 300 mm diameter and larger sewers, where a Vortex drop is used, a manhole of the next size up shall be constructed.

b) Maintenance Shafts

Drops through Type 'G', 'H' and 'J' maintenance shafts shall be as per the manufactured form of the structure and shall be as specified in Council's **Standard Drawing N° 08-07-114**.

For Type 'J' maintenance shafts, the up stream sewer lines shall be graded only to the bottom centre invert and shall transition to this invert via the ball radius to a maximum of 1 in 1 grades.

'Z' drops are permitted to enter the shaft of a Type 'G', 'H' and 'J' maintenance shaft as specified in Council's **Standard Drawing N° 08-07-114**.

Maintenance shafts shall be limited to one 'Z' drop for sewers up to 2.5 metres deep and a maximum of two 'Z' drops for sewers between 2.5 and 4.0 metres deep.

5.2.10.5 Specific Council Requirements for Access Structures

- a) Access structures shall not be constructed within road intersections, central medians, roundabouts and kerb and channel alignments. Access structures for new developments shall not be designed to be located within property driveways allocations.
- b) The centre of access structure covers located within Access and Collector Streets (refer **Section 5.2.7** of these Guidelines) shall be located as follows:
 - Access Streets 1.5 metres from carriageway centrelines
 - Collector Streets 2.0 metres from carriageway centrelines
- c) Manhole lids, risers and frames shall be manufactured to **Australian Standard AS3996** and comply with the following:
 - 600mm diameter round or 600mm x 600mm square;
 - Class 'D' in street and road carriageways; and
 - Class 'B' in locations other than street and road carriageways;
 - Class 'C' in approved Plastics for maintenance shafts in locations other than street and road carriageways.
- d) Manhole bedding shall include bypass drainage in accordance with Council's **Standard Drawing N° 08-07-103**.
- e) Approved pre-cast manhole pre-benched base units sewer pipe connections shall be completed using a Council approved rubber compression seal.
- f) Access structures shall not be located in areas subject to detention storage, flooding or intermittent flooding. Where this is unavoidable or where HGL surcharge occurs, Council may permit at its discretion the access structure to be built to a level 300mm above the top water level or as a cast *in-situ* manhole with Bolt Down Covers (Type M).
- g) Pre-cast concrete surrounds shall be proprietary products approved by Council. The joint between the squat cone or straight back taper and concrete surround shall be sealed as detailed within Council's **Standard Drawing N° 08-07-110**. Where the grade of the finished surface exceeds the capability of the pre-cast concrete surround then cast *in-situ* concrete surrounds shall be provided.
- h) External drops are not permitted for use with pre-cast manholes.
- i) All holes in pre-cast manhole walls shall be drilled or cored.
- j) Step irons are not permitted.
- k) Cast *in-situ* manholes as detailed within the Standard Drawings may only be constructed to a maximum depth of 5000mm. Where deeper installations are approved by Council, an individual Certified design for each manhole shall be provided. Pre-cast manholes depths shall be to the manufacturer's recommendations.

- l) Rectangular manholes shall only be used within footpath verges where there is insufficient space due to Public Utilities.
- m) Maintenance shafts are not permitted within a sewerage system where storage is required to prevent surcharge.
- n) A manhole shall be provided as the receiving structure for a pump/ lift station. Maintenance shafts are not permitted as the receiving structure for a pumping/ lift stations or for a rising main and are not permitted as the connection structure for a future development.
- o) Cast *in-situ* manholes shall utilise the formats shown within Council's **Standard Drawing N° 08-07-110** for construction joints and pipe couplings and convertor slabs.
- p) Maintenance shafts shall be used to a maximum depth of 4.0 metres from FSL to top of sewer pipe.
- q) uPVC and PP maintenance shafts shall be supported by a concrete cradle or under-support, refer Council's **Standard Drawing N° 08-07-114**.
- r) Maintenance shafts shall be rubber ring jointed at all sewer main connections. The vertical shaft may be either rubber ring jointed or solvent welded.
- s) Testing of maintenance shafts shall generally be carried out in conjunction with the testing of the sewer main as nominated within Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**. It is advisable for the Contractor to test maintenance shaft and sewer installations as the system is constructed to minimise any future rectifications.
- t) House connection branch inspection tees shall be 2000mm clear of the centre of the Maintenance Shaft.
- u) Council may approve the limited use of vertical and horizontal bends only at the connection of the access structure to the sewer main.

5.2.10.6 Specific Council Requirements for Bends

For guidance in the use of bends, please refer to Council's **Standard Drawing N°s 08-07-115** and as well, to the **WSAA Sewerage Code of Australia Standard Drawing SEW-1314 to SEW-1317**.

Council approves the limited use of 150mm diameter vertical and horizontal uPVC bends that are to be located:

- only at the connection point of the maintenance shaft to the sewer main;
- at the high level connection point of the maintenance shaft to the sewer main/ house connection branch;
- at the connection point of an 'X' type drop and the sewer main/ house connection branch;
- as the sweep bend of a rodding end;
- within the verge as a replacement for two access structures at a road intersection as shown within Council's **Standard Drawing N° 08-07-115** or for similar instances within the allotment.

Approved 150mm diameter uPVC sewer line bends shall be:

- proprietary product 150 mm diameter long radius bends with the minimum 'centreline of pipe radius' being 3000mm;
- a maximum deflection of 45° horizontal or vertical or a cumulative total of 45° in both horizontal and vertical at the connection point;
- rubber ring jointed through the use of factory fabricated moulded sockets;
- provided with socket and spigot ends that are aligned to the centre line of the pipe; and
- able to pass a round testing ball (not the skid format testing tool).

Approved bends for rodding ends shall be 90° short radius bends with the minimum 'centreline of pipe radius' of 635mm and shall be rubber ring jointed through the use of factory assembled solvent weld jointed adaptor fittings.

Bends for sewers 225mm are shown within Council's **Standard Drawing N° 08-07-115**. Prior to commencing design, refer to Council for advice on any proposed uses.

5.2.11 Pump and Lift Stations

5.2.11.1 General

For standard wet well pump and lift stations with submersible pumps, the Developer is responsible for the supply and installation of all equipment and materials associated with pump and lift stations. This includes the concrete benching in the wet well base, provision of the wet well protective coating system, access cover anti-slip coating systems, pumps, electrical cabinet and associated wiring, level control, telemetry, internal and valve chamber pipework, odour management facility and safety netting system. Pump and lift station shall be provided within a lot in Fee Simple dedicated to Gold Coast Water.

Vacuum pump stations and their associated vacuum mains and rising mains shall comply with **SS13 - Guidelines and Standard Specification for Vacuum Sewerage Systems**.

Locating Pump Stations in Parks and 'green' areas should only be considered if it can be shown by an economic and environmental assessment that no other suitable site is available. Further, should a park location be chosen, the design must be undertaken in consultation with the park asset custodian.

Council requires that for each station the location and access to the station be shown on the engineering drawings in accordance with Council's **Standard Drawing N° 08-07-125**.

Overflows are required, refer **Section 5.2.16**, and shall be provided in accordance with Council's **Standard Drawing N°s 08-07-118** and **08-07-119**.

Where stations are not readily accessible from a public road, particular attention to Council's criteria is required as follows:

- a) Environmental impact assessment for both construction and future maintenance requirements of the proposed location. Environmental impact assessment should include proposed mitigation measures.
- b) Vehicle access and site manoeuvrability. For large stations attention should be given to the vehicle type accessing the site.
- c) Access road cross-section and drainage.
- d) Width of land required for pump station and for access road.
- e) Dedication of land for pump and lift stations and access road to Council in fee simple.
- f) Access roads for pumping and lift stations shall not be utilised as a part of a stormwater flow path.
- g) Fencing and landscaping is required for all pumping and lifting stations as follows:
 - in remote or isolated locations;
 - in Commercial and Industrial Land Zonings;
 - as required by Council.

The fenced area as shown on Council's **Standard Drawing N° 08-07-125 – Typical Fenced Area Plan** shall be set back a minimum 8 metres from the NKL to provide off street parking for Maintenance trucks and to provide for the improvement of the visual amenity of the site through landscaping.

Pump and lift stations shall be designed in accordance with Council's Standard Drawings including completion of the required details on the diagrammatic layout drawing. The details shown on Council's Standard Drawings are typical only and it is the Consultant's responsibility to provide engineering drawings for the specific pump station.

The noise emitted by infrastructure elements shall conform with the current Noise Protection provisions.

The odour impacts associated within the pumping system and within the receiving sewerage system shall be assessed to the requirements of the **Environment Protection Agency Guideline for Odour Impact Assessment from Developments** that is available at the EPA web site as per the following '<http://www.epa.qld.gov.au/publications?id=1344>'.

The design submission for the pumping infrastructure and the receiving system shall be accompanied by the **Odour Impact Assessment Report**.

Facilities to manage odour are discussed at **Clause 5.2.13**.

The size of trunk pump stations shall be determined from consideration of the pump capacity and the storage requirements. The Physical size of the pumps to be installed will govern the minimum diameter of the pump station and access roadway. The storage to be provided in a wet well may influence the selection of a larger diameter pump station in order to minimise the stations depth or an additional surcharge storage hole combined with the above may meet the storage requirements for the system.

Pumping stations shall be located 10 metres clear of any ground mounted Energex transformer and preferably 20 metres clear of the nearest dwelling.

The location and design of pump stations will be such that they do not create inconvenience to any adjacent residences in respect to visual amenity and odour refer **General Planning Principals Section 2.2.3.3 (i)**.

The Consultant shall complete and submit for approval all tabulations and level information required on Council's Standard Drawings together with the odour report.

5.2.11.2 Pump Design Criteria

a) Reticulation System and Small Trunk System Pumps

The capacity of individual pumps should be selected after consideration of the following criteria:

- four (4) times the average dry weather flow for the Pimpama-Coomera catchment and five (5) times the average dry weather flow for all other catchments for 100 mm and 150 mm diameter rising mains (as shown below) and based on the minimum velocity criteria of 0.75 m/s with the pump able to pass a sphere of 76mm;

$$\frac{ET \times 770 \text{ L/ ET/ day} \times (5 \text{ or } 4 \text{ as appropriate})}{24 \times 3600} = \text{L/sec}$$

- C1 times the design daily flow for rising mains of 200 mm diameter to 450mm diameter with the provision that with both pumps operating the flow rate shall be 4 times the average dry weather flow for the Pimpama-Coomera catchment and 5 times the average dry weather flow for all other catchments (as shown below) and based on the minimum velocity criteria of 0.75 m/s with the pump able to pass a sphere of 100mm;

$$\begin{aligned} &\text{Single Pump} = C1 \times \text{ADWF} \\ &24 \times 3600 \\ &\text{Pimpama-Coomera Catchment } C1 = 8.407 \times ET^{-0.1249} \\ &\text{where } C1 \text{ is between 3 to 4 and approved by Gold Coast Water} \\ &\text{All other Catchments } C1 = 12.79 \times ET^{-0.1587} \\ &\text{where } C1 \text{ is between 3.5 and 5 and approved by Gold Coast Water} \end{aligned} = \text{L/sec}$$

- Wet Well volume shall be calculated as shown below;

$$\text{Wet Well Storage Capacity m}^3 = \frac{0.9 \times \text{Pump Rate (L/sec)}}{N \text{ (start per hour)}}$$

(See Notes 1 and 2)

Notes:

- N = 12 for motors less than 100 kW and 8 for motors 100-200 kW 5 for motors greater than 200 kW.***
- Refer Section 5.2.11.5 for guidance on additional storage facilities and Section 5.2.16 for system storage capacity.***
- No system spills shall occur at PWWF with the level in the wet well at 300mm below the overflow level.***

b) Trunk System Pumps

For rising mains larger than 450mm diameter, the size and number of pumps and the storage volume shall be designed as directed by Gold Coast Water.

5.2.11.3 Pump and Pump Well Criteria

Pump and pump wells shall meet the following criteria:

- pumps shall operate in a duty/ standby mode that shall cycle automatically after each duty pump start;
- Council may require soft start/ stop and variable speed controls;
- when determining the well diameter and opening size, particular attention should be paid to the type and volute size of the pumps chosen to ensure the pumps are free of obstruction for installation and removal and shall be 2100 mm diameter for 0-30 L/s and 2400 mm diameter for 30-80 L/s and 3200mm diameter for 80-160 L/s and 4000 mm diameter for 160-250 L/s;
- stations with incoming sewers of 600mm and larger shall have a control valve located on the down stream outlet of the receiving/ collection manhole in accordance with Council's **Standard Drawing N^{os} 08-07-140 to 08-07-143**;
- the minimum storage depth allowable is 300mm; and
- the recommended maximum storage depth shall be 2m for any of the standard well diameters;
- each station shall have only one inlet sewer. A receiving/ collection manhole shall be provided where more than one sewer main is to discharge to the station;
- all internal wet well surfaces shall be protected by a suitable protective coating system;
- when determining the civil design of pump station structures over 4.0m deep, calculations shall be provided to Council with regard to flotation where applicable. The design factor of safety shall be 15% (structure only);
- the velocity for sewerage pump and lift station internal pipework shall be in the range of 1.5 to 2.5 m/sec;
- flanged pipes within the wet well shall be provided with a factory applied external epoxy protective coating system;
- flanged fittings within the wet well shall be provided with a factory applied thermal bonded polymeric protective coating system;
- pump and lift station light weight aluminium covers shall be externally coated with an anti-slip protective coating system in accordance with Council's **Standard Drawing N^o 08-07-127**;
- pump well and valve chamber openings shall be provided with an approved safety netting system in accordance with **Council's SS1 – Specification for Construction of Wastewater Mains and Associated Works**.

5.2.11.4 Specific Council Requirements

All works are to be carried out in accordance with Council's current specifications as follows:

- **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**
- **Standard Specification SS12 – General Requirements for Electrical Installations**
- **Standard Specification SS14 – General Requirements for Mechanical Installations**

Within Council's **Standard Specifications SS12** and **SS14** are specific requirements for Asset Numbering, 'As Constructed' drawings, Operating and Maintenance Manuals, Asset Valuations and other specific asset information such as physical attributes, locations and ratings.

Gold Coast Water's procedures **SD-22 – Asset Hierarchy and Numbering Definition** and **SD-23 – Asset Creation Requirements** are available from Gold Coast Water.

At the completion of the Odour Assessment and the design of the mechanical and electrical facilities, the Developer is required to submit the following for approval prior to commencement of any work on the station:

- pump curves and schedules of technical details for the selected pumps (3 off) as nominated in the specification;
- Odour Report and the designs of any associated odour controls;
- the design drawing of the control cabinet including schematic drawings detailing components to be installed as well as telemetry drawings and radio survey report where required (3 off);
- an ENERGEX application for power, fully completed, for signing by Council as the owner of the station;
- a copy of Council's receipt for a 25 mm water application. The Developer shall complete the water application; and
- the technical Standards and Specifications for the protective coating system;

- all drawings and data correctly defining Asset details in accordance with Gold Coast Water's procedures **SD-22 – Asset Hierarchy and Numbering Definition** and **SD-23 – Asset Creation Requirements**.

The Developer will be responsible for payment of all fees associated with the pump station fit out, including those for power and water connections.

5.2.11.5 Additional Surcharge Storage Holes

Where the design of the pumping system wet well storage requires volumes greater than the ability of the wet well to accommodate these volumes then additional surcharge storage may be provided within the sewer pipes connecting to the pump station by upsizing these pipes or the required storage may be provided within a additional surcharge storage hole as detailed in Council's **Standard Drawing N° 08-07-139**.

The storage shall be designed to provide an access structure at each end of the storage and for this storage hole (not the sewer pipe storage) air balance pipes from each access structure to the connecting sewer or wet well, prevention against floatation to the same criteria as a wet well and protective coating systems to the same standard as a wet well.

5.2.12 Pressure Mains

a) Alignment

Reticulation rising mains shall comply with **Clause 5.2.7** herein and shall generally be set out as shown in Council's **Standard Drawing N° 08-07-001** and shall preferably be located within the footpath verge as shown in Council's **Standard Drawing N° 05-02-005**.

Trunk rising mains shall comply with **Clause 5.2.7** herein and shall generally be located in road reserves or in land under the control of the State or of Council.

Trunk rising mains may be located within private property or Parks only where there is no other alignment available. Easements shall be provided as detailed within **Clause 5.2.18** for sewers located within allotments, parks and reserves.

Reticulation and trunk rising mains shall not be located within the same verge.

Easements shall be provided as detailed within **Clause 5.2.18** for sewers located within allotments, parks and reserves.

For bridge crossings, the preferred location for reticulation sewerage rising mains is within the service allocation area of the pedestrian walkway, refer **Option 1** on **WSAA Standard Drawing SEW-1406**. For trunk sewerage rising mains the preferred location is attached to the side of the bridge structure as shown by **Option 3** and **4** on **WSAA Standard Drawing SEW-1406**.

The sewerage rising main location shall be considered in conjunction with other services (ie. water main, Energex, telecommunications and gas) where applicable.

A general arrangement drawing showing the service allocations within the footpath should be submitted to Council for approval prior to detailed drawings commencing.

In general the following points should be considered:

- adequate horizontal clearance between services to allow construction and maintenance;
- thermal expansion and contraction of the rising main and the bridge structure shall be allowed for;
- sewerage rising mains shall be in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**; and
- installation formats should support ongoing maintenance for the main and specifically for the Gas Release valves often associated with the bridge crossing;
- access platforms shall be provided at the gas release valve with public access to be restricted.

Where an Aqueduct crossing is proposed then the general details shown on **WSAA Standard Drawing SEW-1404** and **WAT-1310** shall be followed with any scours or gas release valves to be easily accessible and maintainable at the crossings edge abutment(s). The grade of the main shall be a constant grade at or above the minimums when crossing the aqueduct.

Any part of the rising main that comes within 5.0 metres of the rising mains HGL when the pumps are not operating shall be considered as potentially corrodible from gas attack. The design for these sections shall provide pipe, pipe fitting and manhole materials that are non-corrosive.

Pressure mains shall be located clear of Energex transformers.

b) Capacity

Pressure mains shall in general conform to the **Department of Natural Resources Planning Guidelines**.

Mains shall be sized to take the design flow at a minimum velocity of 0.75 m/s (occurring once per day) and a maximum velocity of 2.0 m/s. Velocities up to 2.5 m/sec may be permitted subject to written approval of Council.

Where plastic pipes are to be used, a surge analysis of the system shall be undertaken in order to determine the magnitude of the surge pressure and the amplitude and number of cyclic loadings applicable to give a design life of 50 years at PNI6 for the system. This shall be achieved through re-rating the pipe class for both surge and fatigue in accordance with the manufacturer's recommendations.

Pressure mains shall be designed so that they remain full at all times ie pressure mains should not be designed to drain from a high point to the pressure main discharge manhole. For pressure mains the minimum grades are:

- main rising 1 in 500
- main falling 1 in 250

Flatter grades may be permitted, subject to Council assessment of preliminary engineering design.

All rising mains shall connect to a separate discharge manhole that then connects to a gravity sewerage system manhole by a gravity main.

Designs for this connection shall focus on creating a laminar flow for the sewage at the discharge manhole and at its entry to the gravity system manhole.

The designer shall assess the material and condition of the receiving gravity system as a whole and specifically any corrosion potential in the length of sewer for 90 metres downstream of the pressure main connection (the gravity manhole).

Council's requirements for any down stream degraded or potentially corrosive pipe materials, including concrete manholes are as follows:

- the installation of non-corrosive pipework;
- the provision of inert linings to all surfaces of the pressure main discharge manholes and any downstream manholes in accordance with Council's **Standard Drawing N° 08-07-117**.

c) Valves for Pressure Mains

1. Gas Release Valves

Valves shall be of a size and type suitable for the particular application. All gas release valves shall be approved by Council and be of a design which guarantees that there is an air gap between the effluent and sealing system at the gas discharge point.

Valves shall be located as shown on the Engineering Drawings and in general shall be positioned at major and minor high points. The construction of the main shall not contain any localised high points that are provided as a Variation to the approved design through the discovery of unknown service conflicts.

No sudden vertical alignment shifts to the main will be allowed either side of the valve to accommodate the valve installation. The Consultant shall ensure that cover over the pressure main is increased in the area of the gas release valve such that the valve can be installed in accordance with Council's **Standard Drawing N° 08-07-123**.

For above ground installation including bridges, etc, the Consultant shall submit for Council approval the proposed design specific to the location. Maintenance issues to be considered in the design include access to the valve and its associated facilities and damage protection of the main at and adjoining the installation (eg. fisher persons using the main as a platform and cutting bait and line on the main).

The odorous emissions from the valve shall be managed as recommended within the **Odour Impact Assessment Report** as discussed at **Clause 5.2.11.1** herein.

2. Scour Valves

Pressure mains shall be provided with scours at all low points with a recommended maximum spacing of 500 metres between scours. Scours shall be designed to facilitate maintenance of the pressure main.

Scours shall connect to either the pumping stations wet well, a sewer main manhole or be provided in accordance with Council's **Standard Drawing N° 08-07-122**.

3. Section Valves

Section valves shall be installed at strategic locations along the pressure main to provide for the effective operation and maintenance of mains over 500 metres long. Section valves shall be provided at not less than 500 metre intervals.

4. Injection Point Valves

Where a new pressure main injects into an existing pressure main, a sluice valve shall be installed on the new pressure main at the injection point. In addition a sluice valve shall be installed on the upstream side of the injection point on the existing pressure main. The format of the injection point fitting shall provide for the best possible hydraulic flow such as a flanged 'Y' Ductile Iron fitting.

d) Fittings for Pressure Mains

All fittings for pressure mains shall be provided with either a factory applied thermal bonded polymeric protective coating system or another Council approved anti-corrosion coating system such as Sintaline or CAC.

e) Cover to Pressure Mains

1. New Pressure Mains

The maximum and minimum cover to pressure mains shall be in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

Where the cover to pressure mains does not comply with Council's Standard Specification then the written approval of Council shall be obtained prior to the lodgement of the engineering drawings. The drawings will detail the cover, pipe type and class as well as the construction requirements that are not in accordance with Council's Standard Specification.

2. Existing Pressure Mains

For existing mains that are not Ductile Iron or Steel mains (ie. Non-metallic mains), where any form of Development provides or extends a roadway or upgrades or changes surface levels over the top of these types of existing main or where a major service such as a storm water main interferes with the existing main, then the section of existing main under the Development works or near the interfering service shall preferably be relocated at the alignments shown in Council's **Standard Drawing N° 05-02-005** and shall be replaced with a section of ductile iron or steel main as appropriate that is laid in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

For existing mains that are Ductile Iron or Steel mains and the surface levels are increased or decreased over a section of existing main then those sections of existing main shall be relayed or replaced at Council's standard cover in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**.

3. Clearance Between Pressure Mains

Horizontal

- the minimum horizontal clearance between pipe side extremities for pipes of the same 'Utility' use (eg. sewer/ sewer) shall be the Outside Diameter of the largest main in accordance with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**;
- a solid or physical trench separation distance of 300mm minimum, shall be maintained between the trenches for pipes of different 'Utility' use eg. power/ water, sewerage/ water.

Vertical

- the minimum vertical clearance between pressure mains shall be a clear 150mm.

f) Location marking of pressure main and fittings

For all developments, the location of all valves, road crossings and other fittings shall be marked on the kerb, on the pavement and on marker posts in accordance with Council's **Standard Drawing N° 08-07-124**.

Trunk mains shall be provided with marker posts at changes in direction and at a minimum of 100 metre intervals.

g) Pipe Anchorage

Thrust blocks designed to withstand testing pressures of 900 kPa shall be provided at all points along the pressure main where thrust will develop.

Where the requirements of Council's **Standard Drawing N°s 08-07-104** and **08-07-105** are exceeded, the design criteria for calculation of thrust at 900 kPa as shown in **Clause 4.2.17.1** herein, shall be utilised to calculate the thrust and required bearing area.

For vertical upwards thrust, a concrete block must be installed with a weight of at least 1.2 times the resultant thrust, refer vertical bend detail on Council's **Standard Drawing N° 08-07-104**.

5.2.13 Odour Management Facilities

The odour impacts associated with pumping systems including the receiving sewerage system shall be assessed to the requirements of the **Environment Protection Agency Guideline for Odour Impact Assessment from Developments** that is available at the EPA web site as per the following '<http://www.epa.qld.gov.au/publications?id=1344>'.

The design submission for the pumping infrastructure shall be accompanied by the **Odour Impact Assessment Report**.

The design of the system shall preferably be based on passive odour management systems that include Induct/ Educt systems and easily accessible carbon canisters. Odour management facilities shall be within a lot in Fee Simple dedicated to Gold Coast Water.

Activated odour management facilities shall be approved by Gold Coast Water.

5.2.14 Private Pump Station and Pressure Main

For details related to Private Pump Station and Pressure Main installations refer to **Section 7.3.4** of these Guidelines.

5.2.15 Alternative Sewerage Systems

5.2.15.1 Vacuum Sewer System

Council has a set of Vacuum Sewer Guidelines and Standard Specifications that are to be utilised for the planning and design of the system.

Council acceptance of any Vacuum Sewerage System shall be based on best management practice.

The Consultant shall submit an initial report and associated recommendations for consideration by Council prior to any detailed design.

As a minimum the report should include:

- reason for and benefits to Council for a vacuum system;
- approved connection points to the existing system;
- **Preliminary Concept Plan** as per **Section 5.2.3** of these Guidelines; and
- maintenance issues.

Subject to Council's assessment of the Consultant's initial report and prior to any detailed design, Council may engage an independent Consultant to act for Council in assessing the initial report and recommend suitable system parameters.

In addition, the independent Consultant will audit for compliance with Council's **Construction Procedures** as per **Section 9** of the Guidelines.

All costs associated with the engagement of the independent Consultant shall be at the Developer's expense.

Notwithstanding **Section 9** of the Guidelines, the 'On Maintenance' period for alternative sewage pumping station shall be twelve (12) months from the date approved by Council.

5.2.15.2 Low Pressure Sewerage Systems

Council is currently trialling two Low Pressure systems where Council owns the Low Pressure main and the property owner has the ownership responsibilities for the on lot pumping and pressure main requirements.

No further use of these systems is permitted at this time.

5.2.15.3 Waste Water Disposal System – Rural Developments

For details related to Waste Water Disposal Systems in Rural Developments refer to **Section 7.3.5** of these Guidelines.

5.2.16 Overflows

Where the sewage system has been designed to these guidelines, overflows may be installed under Gold Coast Water's Integrated Authority from the EPA (Licence Conditions) for the particular sewage catchment.

Specifically, no overflows shall occur for inflows to the pumping station up to the design factor times ADWF for the specific catchment and pumping stations shall be designed with sufficient in system storage (in the well and/or upstream sewers and/or within a storage hole) so that in the event of pump or power failure, no overflows occur for a period of 4 hours with inflow at ADWF and on the basis that all upstream pump stations are not pumping.

In-system storage shall be measured from duty start level to the level of the lowest system relief point.

Gravity system extensions generally do not require an overflow.

Pumping systems shall be provided with an overflow.

Where overflows are provided, the Consultant shall provide for the visible indicators nominated in Council's **Standard Drawing N° 08-07-118**. In addition, the Consultant shall provide notification to Council of the overflow format on Council's **Standard Drawing N° 08-07-134**.

Criteria that must be addressed in the design submission associated with the sewerage system are:

- the design and operation of the system has had a risk assessment carried out to ensure that the potential for harm from an overflow event has been minimised;
- the risk assessment has considered the environmental values of the receiving environments;
- the community's exposures to the overflows and any associated health impacts have been addressed.

5.2.17 Connections to Existing Mains (Works by Council)

All connections and disconnections to live sewer mains shall be made by Council at the Developer's expense. The contract for development work shall make provision for adequate liaison with Council regarding Council's scheduling of the works.

All requests for works to Council's live mains shall be in writing and include design details of the work required.

The Contractor is responsible for any 'as constructed' data associated with connections to existing mains.

5.2.18 Easements

An easement in favour of Council shall be provided by the Developer as follows:

- a) Over all sewers (gravity or pressure) within private property including residential lots, parks and reserves, industrial and commercial sites and within group title developments.
- b) Easements shall be:
 - 3.0 metres wide minimum for a single reticulation mains up to DN300 (with no other Council Service installed); and
 - 4.0 metres wide minimum where two Council Services up to DN375 are installed (eg. sewer and stormwater); and
 - 6.0 metres wide minimum for trunk mains up to DN600; and
 - 8.0 metres wide minimum for trunk mains larger than DN600; and
 - for each additional trunk main co-located within the easement an additional 3.0 metres minimum shall be provided.

The width and format of an easement shall recognise any physical constraints for access and maintenance including the depth and size of the asset, disjointed access due to allotment formats and topographical features preventing continuous travel along the easement. In poor soils where thrust blocks can become very large, the design of the main and the easement shall be such that the thrust block is contained wholly within the easement.

The width of the easement shall be at the discretion of Council.

Council is supportive of Contractual agreements between the Contractor and the land owner for the temporary use of lands to provide suitable construction corridors adjacent to the easement.

5.2.19 Engineering Drawings

The information to be detailed on the sewerage drawings is set out in **Section 8.2.3 c)**. The scales for Sewerage drawings shall be:

- a) Plans – generally at a scale of 1:500 or 1:1000.
- b) Longitudinal Sections – at a scale of 1:1000 Horizontal and 1:100 Vertical.

Longitudinal Sections shall show the equivalent populations, flow and design capacity of all sections of mains.

Consultants are to comply with the requirements of **Section 8.2.4** and furthermore complete the **Engineering Drawing – Application** checklist as required by **Section 8.2.5** of the Guidelines.

5.2.20 Specification

The specification for sewerage reticulation shall conform with the technical requirements of Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works**, Council's **Standard Specification SS12 – General Requirements for Electrical Installations** and Council's **Standard Specification SS14 – General Requirements for Mechanical Installations**, as appropriate and any addendums.

5.2.21 Alternate Approved Materials

Council may approve acceptable alternative materials or products to those nominated within the Standard Specification. Any such approval will be in the form of an 'Approval of Use' letter nominating the alternative item and its interaction with the **Land Development Guidelines, Standard Specification** and **Standard Drawings**.

Council maintains a register of those items that have been provided with an Approval of Use.

5.2.22 Submission of Engineering Drawings/ Job Specification

The submission of Engineering Drawings/ Job Specification shall comply with **Section 8.2.7** of the Guidelines.

5.2.23 Construction Procedures

All construction procedures including testing and certification shall comply with Council's **Standard Specification SS1 – Specification for Construction of Sewerage Mains and Associated Works** and **Section 9** of the Guidelines.

5.2.24 'As Constructed' Requirements

All 'as constructed' requirements shall comply with **Section 10** of the Guidelines and any addendums.