

25 July 2012

# DEVELOPMENT DESIGN SPECIFICATION

D12

## SEWERAGE SYSTEM

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### Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details provided below outline the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amend. Sequence No.	Key Topic addressed in amendment	Clause No.	Amend. Code	Author Initials	Amend. Date
0.	Customisation for Hastings Council Local Government Area	All	OAM	HC	16/12/03
1	Relocation of Contents page to beginning of document .	n/a	AOM	HC	26/02/04
2	Insert D12.09 - Building Over or Adjacent to Sewer Lines + minor adjustments to other clauses.	D12.01-1 & -2 D12.03 (a) & (b) D12.06-2 D12.07-3 D12.08-2, -9 to -11, D12.09 D12.10-7, -12 & -13 D12.27-2(a) 12 & 15	A A M A A A AM A		25/07/12

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**SPECIFICATION D12 - SEWERAGE SYSTEM**


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## DEVELOPMENT DESIGN SPECIFICATION D12 - SEWERAGE SYSTEM

### GENERAL

#### D12.01 SCOPE

- |   |                                   |
|---|-----------------------------------|
| <p>1. The work to be executed under this Specification consists of the design of a Council sewerage system, up to the point of lot connection, either as a stand-alone project or part of a development as well as requirements for building over or adjacent to sewer mains.</p>   | <b><i>Design</i></b>              |
| <p>2. The Specification contains procedures for the design of the following elements of the sewerage system:</p> <ul style="list-style-type: none"> <li>(a) Gravity sewers including junctions and property connection sewers.</li> <li>(b) Manholes and other structures.</li> <li>(c) Rising mains.</li> <li>(d) Pump stations (Including switchboards).</li> </ul> | <b><i>Elements</i></b>            |
| <p>3. The design of gravity sewer systems and pump station components shall comply with the DEVELOPMENT DESIGN SPECIFICATION D12 – SEWERAGE SYSTEM and should be constructed in accordance with the DEVELOPMENT CONSTRUCTION SPECIFICATION C402 – SEWERAGE SYSTEM.</p>  | <b><i>Compliance</i></b>          |
| <p>4. In the event of a specification clash or inconsistency, and for matters not covered in this specification, the issue is to be referred to Council’s Manager, Water &amp; Sewer for decision.</p>  | <b><i>Matters Not Covered</i></b> |

#### D12.02 OBJECTIVE

- |   |                               |
|---|-------------------------------|
| <p>1. The objective of the sewerage system is to collect and transport sewage from urban developments to the treatment plant in accordance with all current relevant legislation. Consumer requirements shall be met by providing a sewer main and allowing an appropriate point of connection for each individual property to the Council’s sewerage system.</p> | <b><i>Sewerage System</i></b> |
|---|-------------------------------|

#### D12.03 REFERENCE AND SOURCE DOCUMENTS

- |   |                             |
|---|-----------------------------|
| <p>1. Documents referenced in this Specification are listed below whilst being cited in the text in the abbreviated form or code indicated. The Designer shall possess, or have access to, the documents required to comply with this Specification.</p>  | <b><i>Documents</i></b>     |
| <p><b>(a) Council Specifications</b></p> <ul style="list-style-type: none"> <li>C402 Development Construction Specification Sewerage System.</li> <li>Port Macquarie-Hastings Council Sewage Pumping Station Technical Brief</li> <li>Port Macquarie-Hastings Council Minor Sewage Pumping Station Requirements</li> <li>Port Macquarie-Hastings Council Gravity Sewerage Main Grading Chart</li> </ul> | <b><i>Council Codes</i></b> |

The Designer shall include the requirements of the DEVELOPMENT CONSTRUCTION SPECIFICATION C402 - SEWERAGE SYSTEM.

**(b) Australian Standards**

***Australian Standards***

References in this Specification or the Drawings to Australian Standards are noted by their prefix AS or AS/NZS.

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

- AS 1102 - Graphical symbols for electrotechnical documentation (various)
- AS 1214 - Hot dipped galvanised coatings on threaded fasteners (ISO metric coarse thread series)
- AS/NZS 1260 - PVC pipes and fittings for drain, waste and vent applications
- AS 1281 - Cement mortar lining of steel pipes and fittings.
- AS 1444 - Wrought alloy steels – Standard, hardenability (H) series and hardened and tempered to designated mechanical properties
- AS 1449 - Wrought alloy steels – Stainless and heat-resisting steel plate, sheet and strip
- AS/NZS 1477 - PVC pipes and fittings for pressure applications
- AS 1579 - Arc welded steel pipes and fittings for water and wastewater.
- AS/NZS 1594 - Hot rolled steel flat products
- AS 1631 - Cast grey and ductile iron non-pressure pipe and fittings
- AS 1646 - Elastomeric seals for waterworks purposes
- AS 1657 - Fixed Platforms, walkways, stairways and ladders – Design, construction and installation
- AS 1741 - Vitrified clay pipes and fittings with flexible joints - Sewer quality.
- AS 2129 - Flanges for pipes, valves and fittings
- AS 2159 - Piling code
- AS 2200 - Design charts for water supply and sewerage
- AS/NZS 2280 - Ductile iron pressure pipes and fittings
- AS/NZS 2566.1 - Buried flexible pipelines – Structural design
- AS 2837 - Wrought alloy steels – Stainless steel bars and semi-finished products
- AS 2870 - Residential slabs and Footings
- AS 3500 - National Plumbing and Drainage Code
- AS 3600 - Concrete Structures
- AS 3680 - Polyethylene sleeving for ductile iron pipelines.
- AS 3735 - Concrete structures for retaining liquid
- AS 3862 - External fusion-bonded epoxy coating for steel pipes
- AS 3996 - Metal access covers, road grates and frames.
- AS 4058 - Precast concrete pipes (pressure and non pressure)
- AS 4060 - Loads on buried vitrified clay pipes.
- AS 4087 - Metallic flanges for waterworks purposes
- AS 4100 - Steel structures
- AS/NZS 4129 (Int) - Fittings for polyethylene (PE) pipes for pressure applications.
- AS/NZS 4130 - Polyethylene (PE) pipes for pressure applications.
- AS/NZS 4131 - Polyethylene (PE) compounds for pressure pipes and fittings.
- AS/NZS 4158 - Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
- AS/NZS 4321 - Fusion-bonded medium-density polyethylene coating and

AS/NZS 4765 (Int) lining for pipes and fittings  
 Modified PVC (PVC-M) pipes for pressure applications  
 HB48 - Steel structures design handbook.

**(c) Other**

Institute of Public Works Engineering Australia (IPWEA)  
 - Streets Opening Conference Information Bulletin on Codes and Practices (Sections 3 and 4 detailing locations and depths of other services).

NSW Department of Public Works and Services (DPWS)  
 MEW E101 - Electrical Services Minimum Requirements  
 PWD - Safety Guidelines for fixed ladders, stairways, platforms and walkways for use in sewage treatment Works, pumping stations and manholes.  
 PWD-SD - Public Works Department Manual of Practice – Sewage Design.  
 PWD-PSD - Public Works Department Manual of Practice – Sewage Pumping Station Design (May 1986).

Building Codes Board of Australia  
 - Building Code of Australia - PART E1, Fire Fighting Equipment.

**(d) Standard Drawings****Drawings**

All designs are to be in accordance with Port Macquarie-Hastings Council Aus-Spec Standard Drawings – ASD 500 Series.

**DESIGN CRITERIA****D12.04 GENERAL**

1. The design shall be in accordance with the, PWD-SD and PWD-PSD unless specified otherwise herein. **Standard**
2. The Designer shall confirm the design criteria of Port Macquarie-Hastings Council and shall design a sewerage reticulation system with pump stations and rising mains, where necessary to comply with the requirements of this Specification, to transport fresh sewage, for treatment. **Sewerage Network**
3. No direct connection from lots to mains greater than 225mm Dia. will be permitted. **Connections**

**D12.05 DETERMINATION OF AREA TO BE SERVED**

1. The area to be served shall be agreed with Council's Manager, Water & Sewer. Provision for future development may be required. **Upstream Sewer**
2. The depth of sewer shall be sufficient to allow 100 per cent of available building area of each lot to be serviced, in accordance with AS 3500. **Depth**

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

**Provision of Sewerage**

#### **D12.06 DESIGN LOADING**

1. The Designer shall obtain the concurrence of Council's Manager, Water & Sewer for the flow to be used for the design of sewers serving industrial areas and developments not specifically listed in the PWD-SD.

**Flows**

2. The designer shall consult with Council's Manager, Water & Sewer, where design elements are not covered in the PWD-SD and PWD-PSD.

**Design Codes**

#### **D12.07 SEWER ALIGNMENT**

1. Where it is necessary for sewers to be located outside the development, the Designer shall obtain written approval from the affected property owner. Approval from an affected property owner shall constitute a **WITNESS POINT**.

**Consent of Owner**

**WP**

2. Where it is proposed to locate sewers within existing road reserves, the Designer shall check that the sewers do not impact on other utility services and locate the sewers in accordance with established protocols.

**Road Reserve**

3. Industrial and commercial subdivisions are to have the sewer main located on the frontage of the lot and sewers alongside boundaries are to be avoided where possible.

#### **D12.08 MANHOLES (SMHs)**

1. Manholes shall generally be placed on gravity sewers at change in grade, direction, line junctions or pipe size, with a maximum spacing of 90m

**Location & Spacing**

2. All upstream ends of sewers shall terminate in a manhole if the upstream end is more than 40m from the down-stream manhole. Dead ends shorter than 40 metres are to be provided with a proprietary "End of Line Termination Shaft" (Poo-Pit). Sewer junctions are not to be directly to the Poo Pit.

**Dead Ends**

3. Step irons shall be provided to all manholes. Step Irons shall be of 24mm diameter hot dip galvanised steel, cast aluminium or plastic encapsulated.

**Step Irons**

4. The Designer shall provide for the venting of manholes which accept pumped discharges as per Port Macquarie-Hastings Council Standard Drawing ASD517.

**Venting**

5. Connections to manholes or sewers of the existing sewerage system are to be based on the Port Macquarie-Hastings Council Sewerage Sections master plan.

**Connections to Existing Systems**

6. Access covers shall be manufactured in accordance with AS 3996, other materials may be used subject to approval of Council's Manager, Water & Sewer.

**Access Covers**

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- |     |   |   |
|-----|---|---|
| 7.  | Fall through manholes to be as follows:<br><br>Change in direction greater than 25° and less than 90°; drop = 30mm minimum<br><br>Change in direction 90° or greater; drop = 60mm minimum | <b><i>MH Falls</i></b>                              |
| 8.  | External drops only shall be permitted as per Port Macquarie-Hastings Council Aus-Spec Standard Drawing ASD 505.  | <b><i>External Drops</i></b>                        |
| 9.  | Sewer loads exceeding 2 ET are to be discharged to a manhole.   | <b><i>&gt;2 ET to Manhole</i></b>                   |
| 10. | Side lines and dead end lines are to have a maximum of 2 ET and be maximum six metres long (2 x 3 metre pipe lengths).  | <b><i>Maximum 2 ET on Side or Dead End Line</i></b> |
| 11. | One metre clear distance is to be provided around manhole lids and Inspection shafts. No structures are permitted over the clear area.  | <b><i>Manhole clearance</i></b>                     |

#### **D12.09 BUILDING OVER OR ADJACENT TO SEWER MAINS**

- |    |  |                       |
|----|--|-----------------------|
| 1. | To ensure the adequate protection of sewer lines which may be affected by building works and to allow access to these services for maintenance and repairs, the following general requirements will apply: | <b><i>General</i></b> |
|----|--|-----------------------|

All footings to structures within the zone of influence of a sewer main shall be designed and/or certified by a Registered Structural Engineer who will include schedule on the drawings certifying that the design is in accordance with Council's AusSpec Design Specifications with respect to building over or adjacent to sewers.

Footings founded on rock may generally be considered to be outside of the zone of influence, however, the advice of a Registered Structural Engineer should be obtained.

Footings for residential like buildings shall be designed in accordance with AS2870-1996 Residential Slabs and Footings. Footings for other structures and buildings shall be designed in accordance with AS3600 Concrete Structures Code and AS2159 Piling Code.

No part of a footing is to be closer than 300mm to the edge of the sewer trench.

Sewer junctions are not permissible under buildings.

Buildings or structures may be constructed over sewer mains except for carrier mains (ie 225mm diameter or greater) or any main conveying a pumped flow.

Tanks or stands are not to be located over or adjacent to sewer mains.

Any proposal to build over or adjacent to a sewer main is to include CCTV inspection of the sewer main at the proponent's cost and replacement of the main if this is deemed to be required by Council's Water & Sewer Manager.

- |    |  |                                   |
|----|--|-----------------------------------|
| 2. | When designing footings to support the building loads the following design parameters shall be taken into consideration: | <b><i>Design Requirements</i></b> |
|----|--|-----------------------------------|

Footings shall be designed to take into account the probability that the disturbed and/ or uncontrolled fill in the sewer trench may not provide adequate support for the adjacent footing loads.

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Footings shall be designed or located such that the additional forces within the soil, due to the footing load, that are transferred to the sewer main, along with the existing soil loads, do not exceed the permissible loads on the sewer main. Consideration should be given to the construction material and condition of the main. Reference should be made to manufactures information for allowable loads on sewer pipes.

In all cases, except sewer junctions, it can be assumed that Council would not excavate to access the sewer or that if they did, Council would take the necessary action to maintain support for the building foundations.

3. The following definitions will apply with regard to building over or near sewer mains:

**Definitions**

Clay - fine grained soil with plastic properties when wet. Includes gravelly, sandy or silty clays.

Footing - construction which transfers the load from the building to the foundation.

Foundation - ground which supports the building.

Registered Engineer - has the same meaning as set out in Council's Policy for the registration of Professional Engineers.

Sand - granular soil that may contain a small proportion of fines including silt or clay. The amount of fines may be assessed as small be a visual inspection or if the amount that passes a 75 micron sieve is 15% or less, material with a higher proportion of fines shall be treated as silt or clay.

Silt - fine grained soil that is no-cohesive and non-plastic when wet and can include some sand and clay.

Rock - strong material including shaley material and strongly cemented sand or gravel that does not soften in water or collapse under the combination of loading and wetting. Material that cannot readily be excavated with a backhoe may be taken as rock.

Zone of Influence - a footing would be determined to be within the zone of influence where the edge of the sewer trench is below a line drawn at 45-degrees in clay, or 30-degrees in sand or silt, from the underside of the footing. (See AusSpec Standard Drawing ASD 406)

**D12.10 PIPELINE**

1. Pipes and fittings for sewerage systems shall be unplasticised PVC, modified PVC, ductile iron cement lined, vitrified clay or coated steel. The material specifications for each pipe type are provided in Clauses D12.13 to D12.17 inclusive. Minimum pipe size for gravity lines shall be 150mm dia.

**Approved  
Material**

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

**WP**

2. Asbestos cement pipe and fittings shall not be used.

**Asbestos  
Cement**

3. Concrete pipes shall not be used.

**Concrete  
Pipes**

4. Above ground pipelines will only be accepted for special circumstances e.g creek crossings at bridges, culverts etc. subject to approval by Council's Manager, Water & Sewer.

**Above Ground  
Pipes****PORT MACQUARIE-HASTINGS COUNCIL AUS-SPEC-D12**

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- |   |                             |
|---|-----------------------------|
| 5. The Designer shall show on the Drawings the extent of external protection required to be undertaken by the Contractor. External protection shall be shown to comply with the DEVELOPMENT CONSTRUCTION SPECIFICATION - SEWERAGE SYSTEM.   | <b>External Protection</b>  |
| 6. Where sewer pipes or rising mains are to be located in close proximity to other services pipes or where there is the likelihood of the pipes not being recognised as sewerage pipes, the Designer shall provide for the pipes to be colour coded and shown on the Drawings accordingly as per Port Macquarie-Hastings Council specification D15. | <b>Colour Coding</b>        |
| 7. The pipeline alignment shall be such that no property connection sewer is to be more than six (6) metres in length.  | <b>Property Connection</b>  |
| 8. The Designer shall ensure that connections to the pipeline shall be not more than 1,500mm in depth below the finished surface.   | <b>Connection Depth</b>     |
| 9. The Designer shall allow for adequate working area, waste removal and transport arrangements where scouring points or inspection pipe locations are nominated.   | <b>Special Allowances</b>   |
| 10. The Designer shall design thrust blocks to resist maximum pressure of the pipe, not the estimated surge pressure.   | <b>Thrust Blocks</b>        |
| 11. The Designer shall provide for surge control by specifying an appropriate rising main material , class selection and location of air release valves.  | <b>Surge Control Method</b> |
| 12. Air valves shall be required on rising mains where column separation or negative pressures of more than five (5) metres head are shown to occur.  | <b>Negative Pressures</b>   |
| 13. Port Macquarie-Hastings Council's responsibility for sewer lines ends just prior to the inspection shaft or, if the sewer is outside the property, the property boundary.   | <b>Responsibility</b>       |

#### D12.11 JOINTS

- |  |                    |
|--|--------------------|
| 1. Gravity sewers and rising mains shall generally be spigot and socket joints with rubber rings (elastomeric) complying with AS 1646,                 | <b>Rubber Ring</b> |
| 2. Flanged connections on pipes, fittings, valves and pumps shall comply with AS 2129 (Flanges shall be Table C) or AS 4087, Class 16, as appropriate. | <b>Flanges</b>     |

#### D12.12 AREAS OF SLIPPAGE

- |   |                             |
|---|-----------------------------|
| 1. The Designer shall accommodate the movement associated with the ground strain for the area in a known or expected area of subsidence or slippage. The design ground strain for the development shall be detailed on the Drawings.  | <b>Ground Strain</b>        |
| 2. The pipe jointing system selected shall be capable of accepting ground movements, without impairing the water tightness of the joint, for the ground strain. For areas with high ground strains a pipe jointing system using shorter effective length pipes and/or deep socket fittings shall be used. This action constitutes a <b>WITNESS POINT</b> . The Principal shall advise at the time of notification by the Designer whether the option to confer is required. | <b>Pipe Jointing System</b> |

<b>WP</b>
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## MATERIALS

### D12.13 UNPLASTICISED PVC (UPVC) GRAVITY PIPE

- |  |                            |
|--|----------------------------|
| 1. Unplasticized PVC (UPVC) pipe, manufactured in accordance with AS/NZS 4020, AS/NZS 1477 and with rubber ring (elastomeric) spigot and socket joints, shall be specified. The pipe shall be not less than Class SN8. | <b>Standard</b>            |
| 2. The Designer shall ensure that the PVC pipe specified have couplings suitable for connection to ductile iron (DICL) pipe where necessary.   | <b>DICL<br/>Compatible</b> |
| 3. Fittings for use with UPVC pipe shall be specified to be elastomeric seal jointed.  | <b>Fittings</b>            |

### D12.14 UNPLASTICISED AND MODIFIED PVC (UPVC) and PVC-M) PRESSURE PIPE

- |   |                            |
|---|----------------------------|
| 1. Unplasticized PVC (uPVC) pressure pipe shall be specified to be manufactured in accordance with AS/NZS 1477 and AS/NZS 4765, designed in accordance with AS/NZS 2566.1, and with rubber ring (elastomeric) spigot and socket joints. Modified PVC (PVC-M) pipes and fittings shall be specified to be manufactured in accordance with AS/NZS 4765, designed in accordance with AS/NZS 2566.1, and with rubber ring (elastomeric) spigot and socket joints. The pipe class shall be selected based on pumping design and site conditions. | <b>Standard</b>            |
| 2. The Designer shall ensure that the PVC pressure pipe specified have couplings suitable for connection to DICL where necessary.   | <b>DICL<br/>Compatible</b> |
| 3. Fittings for use with PVC pressure pipe shall be specified to be elastomeric seal jointed.   | <b>Fittings</b>            |

### D12.15 DUCTILE IRON CEMENT LINED (DICL) PIPE AND FITTINGS

- |  |                                 |
|--|---------------------------------|
| 1. DICL pipes and fittings shall be specified to be manufactured and cement mortar lined in accordance with AS/NZS 2280 minimum Class SN22 for rubber ring (elastomeric) joints. Where pipes are flanged, Class SN 32 shall be specified.  | <b>Standard</b>                 |
| 2. External protection shall be specified to be epoxy coated to AS 3862, sleeved or wrapped, depending on the type of corrosion protection required.   | <b>Corrosion<br/>Protection</b> |
| 3. Generally, pipe and fitting joints shall be specified to be spigot and socket type using a rubber ring (elastomeric) push in seal made of natural rubber, or ethylene propylene rubber with compounds complying with AS 1646. The seal shall be a single jointing component shaped to provide both groove lock and seal mechanisms. | <b>Joints</b>                   |
| 4. Flanges shall be specified to be manufactured in accordance with AS 2129. Bolts and nuts for flanged joints shall be in accordance with AS 2129 and galvanised in accordance with AS 1214 or stainless steel in accordance with AS 2837   | <b>Flanges</b>                  |

**D12.16 VITRIFIED CLAY (VC) PIPES AND FITTINGS**

1. Vitrified Clay pipes and fittings where approved for use by Council's Manager, Water & Sewer shall be specified to be manufactured in accordance with AS 1741 and designed in accordance with AS 4060. **Standard**
2. Pipes and fittings shall be spigot and socket type, using roll on rubber ring (elastomeric) joints. Natural rubber shall not be used. **Joints**

**D12.17 STEEL PIPE AND FITTINGS**

1. Steel pipes and fittings where approved for use by Council's Manager, Water & Sewer shall be specified to be manufactured in accordance with AS 1579 and AS/NZS 1594 and designed to AS/NZS 2566.1. **Standard**
2. The Designer shall specify the jointing system where long-term corrosion resistance, ease of construction or special circumstances dictate the need. The pipe jointing shall be either: **Joints**
- (a) Rubber ring (elastomeric) jointed to conform to AS 1646.
- (b) Flanges shall be specified to be manufactured in accordance with AS 2129. Bolts and nuts for flanged joints shall be in accordance with AS 2129 and galvanised in accordance with AS 1214 or stainless steel in accordance with AS 2837

**D12.18 RESERVED****D12.19 RESERVED****PUMP STATIONS****D12.20 GENERAL**

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

**Location****WP**

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

All designs shall be in accordance with Port Macquarie-Hastings Council Aus-Spec Standard Drawings for Pumping Stations numbers ASD 518 to ASD 523.

2. The Designer shall provide designs for pump stations comprising a single wet well with submersible pumping units, a valve chamber and an external pad-mounted switchboard to house electrical controls and instrumentation.

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- |                     |   |                                     |
|---------------------|---|-------------------------------------|
| 3.                  | In the design and construction of the station structures and installations the Designer shall take into consideration the ground and site conditions.   | <b>Conditions</b>                   |
| 4.                  | Preformed components or systems, which comply with Standard Drawings, may be used in lieu of in-situ construction provided: <ul style="list-style-type: none"> <li>(a) Preformed concrete pipe wet-well sections are to be manufactured to AS4058. The Designer shall take into account the cover requirements for reinforcing steel and cement types.</li> <li>(b) Preformed pipe sections shall be internally jointed and finished flush on both faces.</li> <li>(c) The Designer shall ensure selected components provide watertight structures and have a satisfactory surface finish.</li> </ul> | <b>Preformed Components</b>         |
| 5.                  | Where the pump station site is flood affected, the Designer shall provide for the top of pump well to be 300mm above the 1 in 100 year flood level or to such other level as provided by Council's planning instruments, whichever is the higher.   | <b>Protection Against Flooding</b>  |
| 6.                  | The Designer shall include provisions in the design of pump wells to prevent them from flotation both during the construction/installation stage and whilst operating under flood conditions.   | <b>Protection Against Flotation</b> |
| 7.                  | Package pump station units may be installed, with the prior approval of Council's Manager, Water & Sewer, where the area being serviced is small and/or their inclusion contributes to an overall lesser depth of excavation in the system.   | <b>Package Units</b>                |
| 8.                  | The Designer shall provide for internal concrete surfaces of wet wells and valve chambers to be prepared and coated with an epoxy paint system approved by the Superintendent. All bolted connections within wet wells shall be stainless steel complying with AS 1449 grade 316.   | <b>Surfaces</b>                     |
| 9.                  | The Designer shall size pipes and pump station capacity to avoid surcharges under design flow conditions.   | <b>Capacity</b>                     |
| 10.                 | The Designer shall provide for alarms and signals systems as required by Council's Manager, Water & Sewer.  | <b>Alarms and Signals</b>           |
| <b>D12.21 PUMPS</b> |   |                                     |
| 1.                  | The Designer shall specify special requirements, if any, for materials to be used in the pump station, taking into consideration the nature and composition of the sewage to be pumped. One hydraulically operated self-flushing valve shall be installed on one of the pumps in accordance with the manufacturer's recommendations.  | <b>Special Requirements</b>         |
| 2.                  | The Designer shall provide for pump stations to be fitted with suitably sized pumps, consistent with other pumps in service, in conventional duty pump/standby pump arrangement.  | <b>Size</b>                         |
| 3.                  | Each pump shall be designed and suitably equipped for being removed with the aid of fixed guide rails.  | <b>Removal</b>                      |
| 4.                  | Pump sets are to be interchangeable within each pump station.   | <b>Inter-changeable</b>             |

5. The Designer shall design structural steelwork in accordance with AS4100.

**Structural  
Steelwork**

#### **D12.22 ELECTRICAL**

1. Notwithstanding other clauses mentioned herein, the Designer shall be responsible for the design of the equipment as suitable for the purpose. Equipment design shall comply with the requirements of the relevant standard specification.

**Design  
Responsibility**

2. The Designer shall provide for Switchgear and Control Assembly as detailed in the current adopted version of the "Port Macquarie-Hastings Council Minor Sewage Pumping Station Requirements" specification.

**SCA and  
Electrical**

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

**Connection to  
Local Supply**

Nominal system parameters:

- (a) 415 volt, 3-phase, 4-wire, 50 Hz, solidly earthed neutral system.  
(b) Prospective Fault Current: As specified by the Local Supply Authority.

4. The works shall be designed in accordance with and subject to the provisions of MEWE101 except where modified by this Specification.

**Standards**

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

**Automatic  
Operation**

#### **D12.23 PUMP STATION WATER SUPPLY**

1. The Designer shall make provision for the installation of an automatic well washer.

**Cleaning**

2. The Designer shall provide at all pump stations for an adequate water supply for cleaning purposes. The minimum desirable supply conditions are a water pressure of 30m head for a flow rate of 1.5 L/sec. This supply shall be protected from contamination due to backflow by the installation of a registered break tank or reduced pressure zone device in accordance with AS 3500.

**Contamination  
Protection**

#### **D12.24 LADDERS**

1. Ladders shall comply with AS 1657 and applicable Occupational Health and Safety (OH&S) legislation, including OH&S Regulations 2001.

**Standard**

2. If required, the Designer shall set intermediate landings in wells to achieve the minimum head room clearance. Wherever possible, the landing shall be located adjacent to fittings and machinery requiring maintenance.

**Ladder  
Landings**

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

**Ladder Cages**

**D12.25 TELEMETRY**

1. The Designer shall provide for telemetry requirements in accordance with the schedule detailed in the current version of the "Port Macquarie-Hastings Council Minor Sewage Pumping Station Requirements" specification.

**Schedule****D12.26 OTHER APPURTENANCES**

1. The Designer shall provide for venting of each pump station, by erection of a vent shaft either at the station or at a suitable site within the area served, after consultation with Port Macquarie-Hastings Council.

**Venting**

2. The Designer shall provide for machinery lifting equipment including stainless steel pump chains and davit insert sleeves for anchoring personal fall arrestors at wet wells and valve chambers.

**Lifting  
Equipment**

3. The Designer shall provide  $\frac{3}{8}$ " BSP (or metric equivalent) pressure tapping, complete with M/F bronze plug cock, for gauges at all valves, including isolation and non-return valves

**Gauges**

4. The Designer shall take account of the possibility of site flooding ingress and overflow, and Occupational Health and Safety requirements in providing for access and inspection covers.

**Covers****DOCUMENTATION****D12.27 SEWERAGE SYSTEM**

1. The Principal shall submit, to Council's Manager, Water & Sewer for approval three (3) copies of the proposed sewerage system design including a completed Port Macquarie-Hastings Council SPS Technical Brief when an SPS is proposed, prior to commencement of construction. This action constitutes a **WITNESS POINT**.

**Review****WP**

Plans resubmitted after initial assessment by Port Macquarie-Hastings Council are to be accompanied by a report, cross referenced to assessment item numbers and detailing the alterations made. Alterations to other infrastructure items such as road, stormwater and water main levels that may affect sewer infrastructure design are also to be detailed.

2. The Drawings shall show to scale:

**(a) A plan showing:****Plan**

- (1) Lot boundaries and lot numbers
- (2) Location and chainage of all manholes and dead ends, plus indicative location of junctions
- (3) Manhole types
- (4) Location and size of all gravity and rising mains and pump stations
- (5) Location of vents

- (6) Sewer main number and manhole number
- (7) Existing sewer mains, junctions and manholes
- (8) Where directed by Council's Manager, Water & Sewer, spot levels at the lot extremities to show that 100 per cent of the area of the lot can be connected to the sewer by gravity.
- (9) Hatching shall show the area of any lot not serviced.
- (10) Site contours
- (11) Existing and proposed features and services
- (12) North point, height datum and scale bar or scale in the form of (for example) 1 : 500 @ A1
- (13) Easement location
- (14) Arrangement of other utilities.
- (15) Original Plan date, revision number and revision date

**(b) Longitudinal section showing:*****Longitudinal Section***

- (1) Reduced levels for natural surface and design surfaces at all changes in grade
- (2) Manhole locations and type
- (3) Invert levels for manholes inlet and outlet
- (4) Cover from finished surface level
- (5) Size, type, class and grade of pipe
- (6) Location, invert level and size of all drainage lines, water mains, and other utility services crossing the main
- (7) Notation regarding all joining lines
- (8) Property ownership
- (9) Note upstream ET's at each manhole
- (10) Note "In road" trench conditions

**(c) Pumping Station Drawings following HC ASD 518 to 523*****Pump Stations***

Including the general arrangement of pump stations with site plan; concrete outlines, including levels for finished surface of site, top, floor and bottom of station and design maximum flood height; number, make, model and details of pumps; inlet and outlet pipework details and levels; pump cut in, cut out and alarm levels, including overflow alarm level; switchboard location; pump station access details; design starts per hour.

**(d) Details of corrosion protection required for pipes and fittings.*****Pipe Protection*****(e) Areas designated for trenchless pipe installation.*****Trenchless Installation***

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

***Drawing Scale***

4. Drawings shall be "A3" size and/or 'A1' after consultation with Council's Manager, Water & Sewer. **Drawing Size**

#### D12.28 PUMP STATION SCA

1. The Principal shall submit, to Council's Manager, Water & Sewer for approval, prior to commencement of the manufacture of any pumps and control equipment, three (3) copies of the following: **Review**

(a) Switch and Control Gear Assemblies - Proposed fully dimensioned manufacturing details, general arrangement (showing internal/external details) and foundation/gland plate details.

(b) Common Control - Complete circuit diagram and description of operation.

(c) Schedule of Equipment - Completed as to the equipment to be provided.

(d) Other Engineering drawings as required to fully describe the proposed equipment.

The submission of the documents constitutes a **WITNESS POINT**.

<b>WP</b>
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2. The Designer shall take into consideration the technical requirements to minimise all risks associated with entry into confined space. **Risk**

3. Drawings shall be on "A3" size. All symbols used shall conform to AS 1102 and all wires and terminals shall be numbered. **Drawing Size**

#### D12.29 ASSET REGISTER

1. The Designer shall provide asset schedules and Work-As-Executed Drawings in a form consistent with Port Macquarie-Hastings Council Specifications D14 & D15. **Consistency**

### SPECIAL REQUIREMENTS

#### D12.30 ACID SULPHATE SOILS

1. All sites are to be assessed against the Acid Sulphate Soil Risk Maps prepared by the Soil Conservation Service of NSW (June 1995) **Risk Maps**

2. A Management Plan for acid sulphate soils must be prepared for all developments likely to disturb acid sulphate soils. A full description of the management procedures to be applied must provide a framework for the ongoing management and monitoring of the impacts of acid soil material throughout the construction and after completion of any development. **Management Plan**

#### D12.31 RESERVED

#### D12.32 RESERVED