AUS-SPEC 2022

Infrastructure Specifications

0076 Sewerage Systems – Reticulation (Design)

REV	STATUS	DATE	PREPARED	CHECKED	AUTHORISED
0	Final	29/06/23	Ben Golding / MCC Planning	Tracey Hamer	Tracey Hamer

Disclaimer

This document is regularly updated. Please ensure the latest version is used which is available from MidCoast Council's website.

0076 SEWERAGE SYSTEMS – RETICULATION (DESIGN)

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the MidCoast Council (Council) area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) MidCoast Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown in brown text like this.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and MidCoast Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Application: This worksection is applicable to design and documentation requirements for a sewerage system, either a stand-alone project or part of a development in a regional Council area. It is aligned to the Water Services Association of Australia WSA 02, WSA 04, WSA 06 and WSA 07. It provides for the design of the following elements of the sewerage system:

- Gravity, pressure and vacuum sewers up to DN 600 nominal size.
- Rising mains up to DN 600 nominal size.
- Standard appurtenances such as maintenance holes, maintenance shafts and property connection sewers.

Requirement: Provide design and documentation for a sewerage system to transport sewage from properties to the treatment plant or to a defined discharge point on an existing sewerage reticulation system, conforming to the requirements of WSA codes and MidCoast Council, as documented.

Performance

Authority requirements: To applicable DA consent conditions.

1.2 CROSS REFERENCES

General

Requirement: This is not a self-contained design document, conform to the following worksection(s):

- *0010 Quality requirements for design*.
- *0077 Sewerage systems - pump stations (Design)*
- *1361 Sewerage systems - reticulation (Construction)*
- *1362 Sewerage systems - pump stations (Construction)*

1.3 STANDARDS

General

Gravity sewerage system: To WSA 02 regional code (2021).

Sewage pumping stations: To WSA 04 (2022) Part 1.

Vacuum sewerage system: To WSA 06 (2008) Part 1.

Pressure sewerage system: To WSA 07 (2007) Part 1.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- ADWF: Average Dry Weather Flow, see Clause 2.3.
- DN: Nominal Diameter.
- EP: Equivalent Population
- ET: Equivalent Tenements
- MH: Maintenance hole.
- PDWF: Peak Dry Weather Flow, see Clause 2.3.
- PWWF: Peak Wet Weather Flow, see Clause 2.3.
- SA: Storm Allowance, see Clause 2.3.

Definitions

General: For the purposes of this worksection the definitions given in the following apply:

- Equivalent Tenements: The measure of demand that a development will place on MidCoast Council's infrastructure in terms of water consumption and sewage discharge, compared to a single average residential allotment. Refer to Council's Equivalent Tenement Policy for further details.
- Gravity sewerage systems: WSA 02 (Regional code 2021).
- Sewage pumping stations: WSA 04 (2022).
- Vacuum sewerage systems: WSA 06 (2008).
- Pressure sewerage systems: WSA 07 (2007).
- Principal Certifier: In NSW, private certifiers cannot hold accreditation in respect of water supply or sewerage infrastructure. As such, MidCoast Council is the Principal Certifier for all design and construction of water supply and sewerage infrastructure within the MidCoast area.
- Water Agency: MidCoast Council.

2 PRE DESIGN PLANNING

2.1 GENERAL

Environmental impact assessment

Requirement: To applicable DA consent conditions and WSA 02 (clauses 2.4.5 and 5.1) and WSA 04 (clause 3.6.1).

Concept plan

Requirements: Generally required prior to DA approval, to WSA 02 (clause 1.2.5) and WSA 04 (clauses 1.5.2 and 1.5.3).

Format: Electronic PDF and DWG/DXF formats (or accepted alternative), and hardcopies are to be provided when requested by MidCoast Council.

Water Agency requirements: As specified by any DA consent conditions. Refer also to WSA 02 clauses 1.2.5 and 1.2.7.1, WSA 06 clauses 1.5.3 and 1.7.1, and WSA 07 clauses 1.1 and 1.7.1.

Critical infrastructure protection

All hazards risk assessment: To WSA 02 (clause 1.2.6.3).

2.2 SYSTEM PLANNING

Planning principles

System selection: To WSA 02 (clause 2.2.4.2) Low pressure sewer systems will only be considered if MCC is satisfied that it is the preferred option over conventional gravity sewer reticulation and pump stations. If an area can be serviced by conventional gravity sewer reticulation and pump stations, then it will be the preferred option in most cases. Factors that should be considered when comparing options include, but are not limited to, the number of conventional pump stations required, number of low pressure pumps required, number of lots to be serviced, ongoing operation and maintenance costs, and ease/complexity of ongoing operation and maintenance.

Future gauging needs: If required by MidCoast Council, to WSA 02 (clause 2.3.4).

Planning parameters

Sewer mining operations: Location-specific analysis or measures as required by MidCoast Council, to WSA 02 (clause 2.4.9).

Concept design for pressure sewers

Staging: To WSA 07 (clause 2.7).

Health and safety: To WSA 07 (clause 2.12.3).

Commissioning: To be undertaken by Water Agency representatives to WSA 07 (clause 2.13.3).

2.3 FLOW ESTIMATION

General

Design flow: To WSA 02 (clauses 3 and 5.5.1). MidCoast Council-specific clause M4 (refer to Annexure M).

Preferred method of design flow estimation: To WSA 02 (clauses 3 and 5.5.1). MidCoast Council-specific clause M4 (refer to Annexure M).

Flow schedule format: A flow schedule indicating population projections, zoning, sizing and minimum grades shall be prepared for all sewer designs. Designs for sewer deviations shall be accompanied by relevant flow schedule documentation. The designer shall advise MidCoast Council of any adverse impacts of the design on system capacity. Refer also to WSA 02 (clause 3.3.5).

Design flow verification: Design flow limits for pressure sewers for certification by the system supplier.

2.4 SUBSIDISED SCHEMES

Funding

Government grant funds: If the works form part of a contract attracting Government grant funds, identify the following:

- Items which are not of the least cost option, that:
  - Are intended to have a much longer design life than the typical asset design lives listed in WSA 02 Table 1.2 for gravity sewerage, WSA 07 (2007) Table 1.1 for pressure sewerage and WSA 06 (2008) Table 1.1 for vacuum sewerage.
  - Do not meet the project objectives and the requirements of the various Agencies for the least Net present value (NPV) but may become the preferred option for construction.
- Particular equipment which is procured without relevant competition through tendering.
- Duplication of equipment or unit processes in a system configuration.

2.5 CONSULTATION

Council and other authorities

Requirements: Consult with the Council and relevant authorities during the preparation of design. In addition to the requirements of this worksection, identify the specific design requirements of these authorities.

Authorities: To WSA 02 (clause 1.3), WSA 06 (clause 1.5.4) and WSA 07 (clause 1.5.4), including the consent authority (if not Council), affected roads authorities and utility operators, and other parties as required by any DA consent conditions.

Public consultation

Requirements: Undertake public consultation on design in conformance with Council policy.

Utilities services plans

Existing services: Obtain service plans from all relevant utility providers and other organisations whose services exist within the area of proposed development. Plot these services on the relevant drawings including on plan and cross-sectional views.

3 DESIGN CRITERIA

3.1 MATERIALS

General

Protection against degradation: To WSA 02 (clause 4.4), WSA 06 (clause 4.2) and WSA 07 (clause 3.10).

Reticulation sewers

Colour identification of fittings: To WSA 02 (Table 4.1).

Surface fittings and surrounds: To WSA 02 (Table 4.1 and clause 4.15.2).

Signage: To WSA 02 (Table 4.1), WSA 06 (clause 15.7) and WSA 07 (clause 6.7).

Property connection sewers

Colour identification of fittings: To WSA 02 (Table 4.1).

Colour identification of valves (body): To WSA 02 (Table 4.1).

Colour identification of surface boxes (lids): To WSA 02 (Table 4.1).

3.2 DETAIL DESIGN

Detail design considerations

Network layout requirements: To WSA 02 (clause 5.2.3), WSA 06 (clause 9.2) and WSA 07 (clause 5.1.3).

Minimum offset from boundary: To WSA 02 (clause 5.2.4.1) and WSA 07 (clause 6.5)

Gravity sewer depth ≥ 3.5 m: As required by MidCoast Council, to WSA 02 (clause 5.2.4).

Sewers located in small lots: To WSA 02 (clause 5.2.4.4). Where possible, sewer mains servicing several lots at the back of properties should be designed to be relocated at the front of properties in road reserves to prevent future build of asset issues.

Sewers servicing industrial/commercial lots: To WSA 02 (clause 5.2.4.5)

Environmental, cultural and heritage considerations: To applicable DA consent conditions and WSA 02 (clause 5.2.7.1).

Tree removal: To applicable DA consent conditions and WSA 02 (clause 5.2.7.4).

High tide or storm surge level: To applicable DA consent conditions and WSA 02 (clause 5.2.7.5).

Easements:

- Width of easement: 3 meters standard easement to WSA 02 clause 5.2.8.
- Placement of the sewer and associated structures within the easement: Centrally where practicable, or as required by MIDCOAST COUNCIL in accordance with MidCoast Council's *Policy for Building Over or Adjacent to Water, Sewers and Sewerage Rising Mains*.

Disused sewers: To WSA 02 (clause 5.2.9), WSA 06 (clause 3.13) and WSA 07 (clause 3.14). Where a private property service is no longer required, it shall be disconnected and sealed in accordance with AS/NZS 3500, with details to be shown on the Drawings. When dealing with disused sewers constructed from asbestos cement pipe, refer to MidCoast Council's *Asbestos Management* Policy.

Grease traps: To MidCoast Council's Trade Waste Policy and WSA 07 (clause 3.15.2).

Horizontal alignment of sewers

Requirement: To WSA 02 (clause 5.3).

Minor roads: Generally to be treated as major roads to WSA 02 (clause 5.3.2).

Railway reserves: To WSA 02 (clause 5.3.3).

Horizontal curves in sewers: Not permitted.

Use of manufactured and variable bends in reticulation sewers: To WSA 02 generic code (clause 5.3.8.2).

Obstructions and clearances

Reduced clearances: To WSA 02 (clause 5.4.5). See MidCoast Council's *Building Over of Adjacent to Water, Sewers and Sewerage Rising Mains* Policy.

Pipe sizing and grading

Sewerage design charts: To AS 2200 (2006).

Minimum pipe sizes: To WSA 02 (clause 5.5.4), WSA 06 (clause 9.5) and WSA 07 (clause 4.5.2).

Maximum ET for reticulation sewers: To WSA 02 (clause 5.5.5)

Minimum grade of reticulation sewer for self-cleansing velocity: Minimum grades required to achieve self-cleansing shall be calculated using either the Colebrook-White equation for k = 3.0 mm or the Manning equation for nM equivalent to k = 3.0 mm. Grades shall not be less than those specified in Table 5.7 and Table 5.8 in WSA 02 (clause 5.5.7)

Maximum grade: To WSA 02 (clause 5.5.9).

Slime stripping: To WSA 02 (clause 5.5.8).

Vertical alignment of sewers

Gravity sewer depth > 3 m: Where the sewer depth exceeds 3 m the Designer shall consult MIDCOAST COUNCIL for any specific requirements to mitigate future operational and maintenance risks, to WSA 02 (clause 5.6.1).

Intervals for documentation of levels: To WSA 02 (clause 5.6.2) and WSA 07 (clause 3.3).

Minimum cover: To WSA 02 (clause 5.6.3) and WSA 06 (clause 9.2.4)

Partial lot servicing: Generally not permitted. Refer to WSA 02 (clauses 5.6.4.4).

Servicing of basements: To WSA 02 (clause 5.6.4.5).

Minimum soffit depth requirement: To WSA 02 (clause 5.6.5.2)

Vertical bend before the MH: Generally not permitted. Refer to WSA 02 (clause 5.6.6.1).

Major sewer junctions: To be included in the design report submission to MidCoast Council, to WSA 02 (clause 5.6.6.4).

Large falls at manholes: MidCoast does not permit the installation of internal drop structures. Written approval must be obtained should no alternative be available.

Vertical curves in sewers: To WSA 02 generic (clause 5.6.7). Label on the Drawings for MidCoast Council approval.

Compound curves: Not permitted. Refer to WSA 02 generic (clause 5.6.8).

3.3 PROPERTY CONNECTION

General: Reticulation sewers up to and including DN 375mm shall normally be considered to be available for property connections. Connections are to be established via junctions typically DN 150mm. DN 450mm carrier sewers and above are not available for property connections, except where suitable inlets have been provided at maintenance structures or where special junctions are installed prior to sewer commissioning.

Methods of property connection

Inspection opening (IO) interface method: Generally not permitted. May be located in boundary lots to show Council assets depending on depth of main and junction. Written approval required.

Buried interface method: Use the buried interface method in the MidCoast area, to WSA 02 (clause 6.3.3).

Number of property connection points

Single occupancy lots: To WSA 02 (clause 6.4.1)

Multiple occupancy lots: To WSA 02 (clause 6.4.2)

Location of property connection points

Boundary offset distance in vacant lots: To WSA 02 (clause 6.5.2). Offset distances within one meter of side boundaries to ensure inspection openings are not located in driveways.

Property connection sewers

Type: Nominate the type on the Drawings, to WSA 02 (clause 6.6.1). A minimum DN 150mm shall be used for property connection sewers for residential, commercial and industrial property in the MidCoast area.

Connecting two lots: ‘Type 7 spur’ or ‘Y’ junctions not permitted. Individual minimum DN 150mm service lines preferred. No shared shaft unless approved by MidCoast Council. Refer to WSA 02 (clause 6.6.2).

3.4 PRESSURE AND VACUUM SEWERAGE

Hydraulic design - design inputs and outputs

General: To WSA 06 (clause 5) and WSA 07 (clause 4).

Sanitary drainage flows: WSA 06 (clause 5.2) and WSA 07 (clause 4.4.1) reference the WSA 02 estimation method. **Determine design flows using the method in clause M4.**

Discharge point and flow rates of discharge: As per DA consent conditions or as specified by MIDCOAST COUNCIL. Refer to WSA 07 (clause 4.3(c)).

Maximum detention time: Refer to WSA 07 (clause 4.3(d)).

Volume of sewage in each tank: Minimum volume for pressure sewer collection tanks is typically 600 L. Standard volumes for vacuum pots are nominally 1,100 L, with larger volume pots required for commercial users according to design flows.

Written guarantee: To WSA 06 (clause 9.4.1) and WSA 07 (clause 4.3).

Hydraulic design - design flows and their variability

Maximum discharge restrictions: To WSA 07 (clause 4.4.3). Confirm with MidCoast Council whether discharges from swimming pools into the system will be prevented by restrictions on future users. If not restricted, include flow attenuation measures to the satisfaction of the Water Agency.

Hydraulic design - sizing of pressure sewers

Design flow method: To clause M4. Also see WSA 07 (clause 4.5.1).

Minimum pipe diameter: To WSA 07 (clause 4.5.2).

Preferred procedure for calculating head losses: To WSA 07 (clause 4.5.3.2).

Pressure sewer design - provision for condition monitoring, sampling and maintenance

Monitoring requirements: To the satisfaction of the MidCoast Council to WSA 07 (clause 5.6.1).

Pressure sewer design - flow meters

Flow meter type: To WSA 07 (clause 5.7).

On-property design

Method for terminating laterals in vacant lots: Generally, provide lots with a pressure sewer lateral (or pay a contribution for future installation) to the satisfaction of MidCoast Council to WSA 07 (clause 6.3).

Design and layout of new on-property components: To WSA 07 (clause 6.5).

Control and alarm panels: To WSA 07 (clause 6.6).

Signage: To WSA 07 (clause 6.7).

3.5 MAINTENANCE STRUCTURES

Locations of maintenance structures

Type of structure: To WSA 02 (clause 7.2). Written approval required for installation of maintenance shafts (MS) or terminal maintenance shafts (TMS)

Spacing of maintenance structures

Requirement: In the MidCoast area, the maximum distance between any two consecutive maintenance structures shall be 100 m in road reserves and 60 m in private property, and subject to the provisions of WSA 02 (clause 7.3.1, 7.3.2 and 7.3.3).

Special considerations for location of maintenance structures

Requirement: A minimum clearance of 1.5 m shall be provided between existing structures and the outside rim of the maintenance structure entry point to WSA 02 (clause 7.4).

Special considerations for connection of new sewers to existing sewers

Requirement: MidCoast does not allow the installation of internal drops. Written approval must be obtained should no alternative be available, subject to provisions to WSA 02 (clause 7.5).

Water seals installed upstream to prevent back venting: To WSA 02 (clause 7.5).

Maintenance holes

Special MH construction options: To WSA 02 (clause 7.6.2). Written approval required for plastic manholes.

Surcharged or water charged ground: To WSA 02 (clause 7.6.3).

External MH drops: To WSA 02 (clause 7.6.4 Table 7.2)

Internal diameters for MHs: To WSA 02 (clause 7.6.7).

Ladders and step irons in MHs less than 6 m depth: Shall not be used without MidCoast Council approval. If approved, conform to WSA 02 (clause 7.6.9).

Maintenance shafts and maintenance chambers

General: To WSA 02 (clause 7.2). Written approval required for installation of maintenance shafts (MS) or terminal maintenance shafts (TMS)

Maintenance structure covers

Locations: To WSA 02 (clause 7.9.1). MidCoast does not allow poly covers.

Modification to existing MH cover levels: To be documented on the Drawings for approval. Refer to WSA 02 (clause 7.9.3).

Other maintenance structures at interface of property connection sewers and sanitary drains

Additional fittings: MidCoast requires a vertical extension of the property connection sewer to be brought up to surface level with 50mm PVC conduit and marker tape, subject to provisions to WSA 02 (clause 7.11).

3.6 ANCILLIARY STRUCTURES

General

Structures requiring Water Agency approval: To WSA 02 (clause 8).

Water seals, boundary traps, water-sealed MHs and gas check MHs

Boundary trap designated area: As required by MidCoast Council, to WSA 02 (clause 8.2.1.1).

Installation of the boundary trap: To WSA 02 (clause 8.2.1.2), generally as part of the Works Certificate design (i.e. by the constructor).

Water seals on reticulation sewers entering branch or trunk sewers: Required to WSA 02 (clause 8.2.2.2).

Water seals on branch sewers entering trunk sewers: To WSA 02 (clause 8.2.2.3).

Water-sealed MHs and gas check MHs: To WSA 02 (clause 8.2.3.1).

Vertical and near vertical sewers

Energy dissipater: To the satisfaction of MidCoast Council, to WSA 02 clause 8.3.2.

Ventilation

Forced ventilation (fan stations): To the satisfaction of MidCoast Council, to WSA 02 clause 8.4.1.

Inverted syphons

Requirement: Not permitted in the MidCoast area. Refer to WSA 02 (clauses 8.5 and 8.6).

Emergency relief structures

Requirement: In the MidCoast area, provide emergency storage volume equivalent to 6 hours at Average Dry Weather Flow (ADWF). Also comply with WSA 02 (clause 8.7.1).

Location: If required, to be shown on the Drawings to the satisfaction of MidCoast Council.

Operation: To WSA 02 (clause 8.7).

Flow measuring device

Functional requirements: To the satisfaction of MidCoast Council. Refer to WSA 02 (clause 8.8).

Flow meter for pressure sewer system: To WSA 07 (clause 5.7).

Wet weather storage

Requirements: To the satisfaction of MidCoast Council, to WSA 02 (clause 8.9).

3.7 STRUCTURAL DESIGN

Geotechnical considerations

Foundation and groundwater control: To the recommendations of any approved assessment by a professional geotechnical engineer, applicable DA consent conditions, WSA 02 (clause 9.6.1) and WSA 06 (clause 14.2.7).

Slip areas: To WSA 02 (clause 9.6.6)

Special embedment concrete and stabilised supports

Sewer: Site-specific, to the satisfaction of MidCoast Council and to WSA 02 (clause 9.7.1).

Acceptable method of connection: Site-specific, to the satisfaction of MidCoast Council and to WSA 02 (clause 9.7.2).

Above ground crossings

Requirements: To WSA 02 (clause 9.8), WSA 04 (clause 12.3.7) and WSA 06 (clause 14.2.8).

Pipe cover

Requirement: To WSA 04 (clause 12.3.4.2), WSA 06 (clause 14.2.5.2) and WSA 07 (clause 9.2.2).

Bulkheads and trenchstops

Spacing of bulkheads and trenchstops: To WSA 04 (clause 12.3.8)

Additional criteria: WSA 06 (clause 14.2.9).

Pressure mains

Unbalanced thrust: To WSA 04 (clause 11.3.7) and WSA 06 (clause 14.2.11.2).

4 DOCUMENTATION

4.1 GENERAL

Approvals

Requirement: Document the approval conditions advised by the appropriate authority which contribute to the basis for the design of the water supply reticulation system.

Concept plan: Document and review the concept plan for the sewer system.

Design reports

Requirements: Provide a design report including the following:

- Design criteria.
- Site investigation reports supporting the design.
- Calculations, studies and references supporting the design.
- Demonstrated conformance with the approved concept plan and the requirements of WSA 02 clause 10.1 and WSA 06 (2008) clause 18 for vacuum sewerage.

- Details of any hazardous structural features, material, procedures or practices that remain in the design. Refer to WSA 02 Introduction and NOHSC 2016.
- The use of chemical dosing to avoid excessive septicity. Refer to WSA 02 clause 2.5.1 (e).
- Issues related to any proposed emergency relief structures. Refer to WSA 02 clause 8.7.1.

Design certification

Requirement: Provide a signed and dated design certificate conforming to *0010 Quality requirements for design* worksection.

Final certification of completed works

Requirements: To Council-specific clause M3 (refer to Annexure M).

4.2 DRAWINGS

General

Requirements: Provide drawings and/or computer output defining the works and assumed operating and maintenance procedures to WSA 02 clause 10.2 and WSA 06 (2008) clauses 19.1 and 19.2 for vacuum sewerage.

Drawings content

Requirement: Provide drawings to the requirements of WSA 02 clause 10.2 and WSA 06 (2008) clause 19.2 for vacuum sewerage.

Scale: To WSA 02 (clause 10.2.3) and WSA 06 (clause 19.3.2).

Work-as-executed drawings

General: Provide an additional set of final construction drawings for the purpose of recording the work-as-executed by the Contractor.

Required format: To WSA 02 (clause 10.5) and WSA 06 (clause 19.3.3), in digital model (DWG or DXF) format, portable document format (PDF) and, if requested, hardcopy at A1 size. The work-as-executed digital models are to be provided to Council as part of the handover package under Council-specific clause M3 below.

4.3 SPECIFICATIONS

Construction documentation

Requirement: Prepare technical specifications using the AUS-SPEC Construction worksection Templates from the National Classification System workgroups 02, 03, 11 and 13.

5 ANNEXURE

5.1 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 2200	2006	Design charts for water supply and sewerage
MidCoast Council Policy		MidCoast Council Trade Waste Policy
MidCoast Council Policy		MidCoast Council Asbestos Management Policy
MidCoast Council Policy		MidCoast Council Equivalent Tenement Policy
MidCoast Council Policy		MidCoast Council Policy for Building over or Adjacent to Watermains, Sewers and Sewer Rising Mains
NOHSC 2016	1996	National Code of Practice for the Control of Major Hazard Facilities
WSA 02 generic code	2014	Gravity sewerage code of Australia
WSA 02 regional code	2021	Gravity sewerage code of Australia - Regional NSW edition version 1
WSA 04	2022	Sewage Pumping Station Code of Australia
WSA 06	2008	Vacuum sewerage code of Australia
WSA 07	2007	Pressure sewerage code of Australia

6 ANNEXURE M – MIDCOAST COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's *Development Engineering Handbook*. Acceptance is to be obtained in writing from: a) an authorised representative of Council's Director of Infrastructure and Engineering Services, or b) an accredited certifier where they are the Principal Certifier and hold the relevant accreditation category for the type of work.	**Variation procedure**
M2.	This specification applies in addition to any development consent (DA) conditions (including Section 68 and subdivision work certificate). If there is any inconsistency, the conditions of consent shall prevail.	**DA conditions**
M3.	Refer to the MidCoast Council *Development Engineering Handbook* for final inspection, works-as-executed and handover requirements.	**Completion**
M4.	MidCoast Council uses the design flow estimation method as set out in WSA 02 (clauses 3, 5.5.1 and Appendix C). Equivalent future tenements shall be calculated for each land use type to be developed in accordance with the *MidCoast Council Equivalent Tenement Policy*. - Use the ET loadings per property type listed in *MidCoast Council Equivalent Tenement Policy*. - Calculate ET as the sum of the products of unit numbers multiplied by ET/unit rates. Design flow estimates are required for designing networks and input to pump station designs. Design flow is the peak flow to be contained within the sewer system. It is the sum of the three components of flow as illustrated in equation B1 and is also known as the Peak Wet Weather Flow (PWWF). The design flow is based on the Peak Dry Weather Flow (PDWF, equation B2), Ground Water Infiltration (GWI, equation x) and Rainfall Dependant Inflow & Infiltration (RDI, equation y): $Design\ Flow\ PWWF(L/s) = PDWF + GWI + RDI$ … (B1) The Peak Dry Weather Flow (PDWF) in equation B2 is defined as the most likely peak sanitary flow in the pipe during a normal day. It exhibits a regular pattern of usage with morning and evening peaks related to water usage for toilets, kitchen conveniences etc. PDWF is related to Average Dry Weather Flow (ADWF) by a peaking factor 'd': $PDWF(\ L/s) = d \times ADWF$ … (B2) The peaking factor d is a function of the gross development area in hectares. Values of d is calculated by equation B3. $d = 0.01(log10 \times A)^4 - 0.19(log10 \times A)^3 + 1.4(log10 \times A)^2 - 4.66(log10 \times A) + 7.57$ …for Area (A) < 1000 Ha (B3) ADWF is the combined average daily sanitary flow into a sewer from domestic, commercial, industrial and special case sources. ADWF is calculated using equation B4:	**Flow Estimation**

$$ADWF\ (L/s) = 0.0021\ EP \qquad \text{(B4)}$$

For reference, Table 1 below details EP/ET occupancy ratios per service area in the MIDCOAST COUNCIL area of operations.

Table 1: EP/ET Ratios Based on Service Area

Service Area	Occupancy Ratio (EP/ET)
Bulahdelah	2.3
Coopernook	2.3
Forster	2.2
Gloucester	2.1
Hallidays Point	1.8
Harrington	2.1
Hawks Nest/Tea Gardens	1.9/2.1 ~ 2.0
Lansdowne	2.5
Manning Point	1.8
North Karuah[2]	2.1
Old Bar	2.3
Stroud	2.5
Taree	2.3
Wingham	2.4

Groundwater infiltration (GWI) is caused where the long-term non-rainfall dependent groundwater table or seawater level exceeds pipe inverts and enters the sewer network. GWI is calculated using equation B5:

$$GWI\ (L/s) = 0.025 \times A \times Portion_{Wet} \qquad \text{(B5)}$$

Where A is gross plan area of the development's catchment, in hectares. PortionWet is the portion of the planned pipe network estimated to have groundwater table levels in excess of pipe inverts. For example if 70% of the sewer system is below groundwater table levels, then PortionWet = 0.7

In MIDCOAST COUNCIL, PortionWet is to be inferred based on review of nearby groundwater bore data or flood maps. A nominal value of 0.5 is to be adopted if groundwater information is unknown.

RDI is the peak (rainfall dependent) inflow and infiltration that may enter the sewer network. RDI is calculated using equation B6:

$$RDI\ (L/s) = 0.028 \times A_{Eff} \times C \times I \qquad \text{(B6)}$$

Where A_{Eff} is the effective area capable of contributing rainfall dependant infiltration. Refer to WSA 02 for calculation of A_{Eff} for residential & non-residential development.

	C is the leakage severity coefficient and defines the contribution of rainfall run-off to sewer flows via inflow and infiltration. For new developments, MIDCOAST COUNCIL require a nominal C value of 1 to be adopted. I is a function of spatial rainfall intensity, catchment area size and specified sewer containment standard as shown in equation B7: $I = I_{1,39.35\%} \times Factor_{Size} \times Factor_{Containment}$ (B6) Where $I_{1,39.35\%}$ is the 1 hour duration rainfall intensity at a specific location, for an annual exceedance probability (AEP) of 39.35%, which corresponds to an average recurrence interval of 2 years. As MIDCOAST COUNCIL operates over a large spatial area, the $I_{1,39.35\%}$ value shall be determined for a location-specific basis directly from the Bureau of Meteorology (Rainfall IFD Data System: Water Information: Bureau of Meteorology (bom.gov.au)). $Factor_{size}$ and $Factor_{containment}$ are calculated in accordance with WSA 02. MIDCOAST COUNCIL require a 18.13% Annual Exceedance Probability (1 in 5 year ARI) containment standard.	
M5.	Sewer easements shall be at least 3m wide, centrally located over sewer mains, for up to and including DN 375mm. For mains greater than DN 375 contact MIDCOAST COUNCIL for advice. Refer also to WSA 02 clauses 5.2.4 and 5.2.8. The use of aqueducts to cross waterways is not usually acceptable due to adverse hydraulics and aesthetic reasons. Where the sewer is located within a drainage reserve, it should ideally be located parallel and adjacent to the drainage system at a minimum offset distance of 1.5 m (if applicable). Sewers should be clear of grassed waterways to minimise the effect of trenches on groundwater levels.	**Land Matters and Easements**

7 AMENDMENT HISTORY

0	29/06/23	For Submission