SEWER CONSTRUCTION STANDARDS

Gravity Sewerage Code of Australia
(WSA 02-2014 Version 3.1)

Document Control

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Prior to being updated, any proposed amendments to this document shall be approved by Goulburn Mulwaree Council, following consultation with other key stakeholders. Following consultation and approval, amendments made to this document shall be updated on Council's website.

The following table outlines the amendments that have been made to this document since it was initially issued.

RECORD OF AMENDMENTS

Rev	Review Date	Issue Date	Reviewer	Comment
1		01/05/2018		N/A
2.1	09/08/2019		TS	Reformat and update
2.2	17/01/2020	17/01/2020	TS	Update Section 10, Section 25
2.3	22/07/2020	22/07/2020	TS	Amend Section 3.3.5 Amend Section 5.2.9 Amend Section 6.1 Amend Section 7.6.4.1 Amend Section 7.10 Amend Section 6.1 Add Section 17.2.2 Amend Section 20.1.2.1 Amend Section 21.1 Amend Section 24.2 Amend Section 24.3 Amend Section 24.4 Amend Section 24.8 Amend Section 25.1 Amend Appendix A Amend Appendix B

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1. GOULBURN MULWAREE COUNCIL'S SEWER CODE SPECIAL REQUIREMENTS

The WSAA Gravity Sewerage Code of Australia (WSA02-2014 V3.1) (the *Code*), together with this Supplement (the *Supplement*), comprises the GMC Water Sewerage Code for reticulated gravity wastewater systems up to and including 300mm diameter.

1.1 National Codes Initiative

The Water Services Association of Australia (WSAA) has developed a series of national codes of practice covering the design and construction of water and wastewater infrastructure. The benefits of these national codes are:

- to facilitate consistent national reform and regulation of the water industry;
- to provide a transitional mechanism for sharing water-industry specialist expertise as internal Water Authority resources diminish;
- to provide a common technical reference for the development of industry training and skills accreditation programs for private sector suppliers;
- to enhance the mobility of suppliers e.g. designers and constructors by reducing parochial technical impediments to trade; and
- improve the Australian water industry's interface with international companies

1.2 Document Improvement

The *Supplement* is a live document that will be continually reviewed and periodically updated to ensure it reflects authorities desire to be at the forefront of Water Industry Best Practice Procedures, and to reflect changes in Council's Policy.

Stakeholders are invited to comment on the Supplement at any time by using the Document Improvement Request Form on the following page. This form may be photocopied.

2. GRAVITY SEWER CODE OF AUSTRALIA

Part 1 of this document is Goulburn Mulwaree Council's Supplement to the Water Services Association of Australia Part 1 – Gravity Sewer Code of Australia (WSA 02-2011 Version 3.1)

A. VARIATIONS TO CODE PART 0: GLOSSARY OF TERMS, ABBREVIATIONS AND REFERENCES

WSA 02 Part 0 Page Ref.	Amendment and/or Addition
Page 15	**Concept Plan** A package of information that is to be provided as required by Goulburn Mulwaree Council to enable the appropriate planning/design of major sewerage system comments to be performed.
N/A	**Equivalent Tenement (ET)** The equivalent hypothetical residential 1 lot tenement that would produce the same peak dry weather flow as that contributed by the area under consideration i.e. all zonings including residential, commercial and industrial. 1ET = 3.5EP.

B. VARIATIONS TO THE CODE – WSA 02 (2014): PART 1 PLANNING & DESIGN

Section Ref. Page Ref.	Amendment and/or Addition
Chapter 1 – General (Design)	
Section 1 Page 46	**General** All references to "Equivalent Population" and "EP" can also be read as "Equivalent Tenements" and "ET", respectively where 1ET = 3.5EP. These shall be used unless specific circumstances warrant the use of different values. All limiting dimensions and grades are to be "as executed". The design shall allow for construction tolerances. All references to Maintenance Shafts (MSs), Horizontal and Vertical Bends shall be deleted, as these are not permitted for use by Goulburn Mulwaree Council. Pipe size of sewer mains and sewer junctions are to be a minimum of 150mm.
Chapter 2 – System Planning	
Section 2.3.2 Page 60	**Concept Plan** Goulburn Mulwaree Council shall approve any Concept Plans that may be required to be prepared before detailed sewer designs are undertaken. Concept Plans will generally include an appropriate point of sewer connection, future and proposed upstream sewer loadings and any downstream augmentation works that may be required. Concept Plans shall also address any operational issues that may arise as a result of proposed sewer works. The designer is to provide a Concept Plan, if required by Goulburn Mulwaree Council, for approval before a detailed sewer design is undertaken.

Chapter 3 – Flow Estimation	
Section 3.2 Page 66	**Design Flow Estimation** Other methods for estimating design flow may only be used with written permission by Goulburn Mulwaree Council.
Section 3.3.5 Page 67	**Flow Schedule** A flow schedule stating population projections, zoning, sizing and grades shall be prepared for all sewer deviations and the construction of sewers greater than DN225.
Chapter 4 – Products and Materials	
Section 4.6 Page 71	**PVC Gravity Sewers** PVC Gravity Sewer Mains are to be joined using flexible rubber ring (elastomeric) joints (either roll-on rubber ring (elastomeric) or skid type).
Section 4.7 Page 72	**Polyethylene Gravity Sewer** Polyethylene pipes are not permitted for use without written permission from Goulburn Mulwaree Council. Where permitted for use, PE pipe must be solid black with no coloured lines (e.g. blue, purple, etc.).
Section 4.8 Page 72	**Polypropylene Gravity Sewer** Polypropylene pipes are not permitted for use without written permission from Goulburn Mulwaree Council.
Section 4.9 Page 73	**GRP Gravity Sewers** Glass Reinforced Plastics (GRP) pipes are not permitted for use without written permission from Goulburn Mulwaree Council.
Section 4.10 Page 73	**Plastics-Lined Concrete Gravity Sewers** Plastics-Lined Concrete Gravity Sewers are not permitted for use without written permission from Goulburn Mulwaree Council.

Section 4.11 Page 74	**Vitrified Clay Sewers** Vitrified Clay sewer pipes are not permitted for use in Goulburn Mulwaree Council.
Section 4.12 Page 74	**Steel Gravity Sewers** Steel Gravity Sewers are not permitted for use in Goulburn Mulwaree Council.
Section 4.14 Page 76	**Marking Tapes** Non-detectable marking tapes are not permitted for use by Goulburn Mulwaree Council.
Chapter 5 – Detail Design	
Section 5.1 Page 80	**Detail Design Process** Goulburn Mulwaree Council shall be consulted regarding the means to address downstream impacts of flows from the proposed development.
Section 5.2.4.1 Page 82	**General** (Location of Sewer) Sewer reticulation mains not located in road reserve must have an easement placed over the sewer main. Easements must comply with Council's 'Clearance & Easement Requirements for Structures Adjacent to Sewer & Stormwater Mains Policy'. Sewer mains must also be offset from any property boundaries by a minimum of 1.2m. Inter allotment drainage for sewer is not permitted by Goulburn Mulwaree Council.
Section 5.2.7.3 Page 87	**Acid Sulfate Soils** Location maps of acid sulphate soils in NSW are published by the Department of Environment, Climate Change & Water (Refer: http://www.environment.nsw.gov.au/acidsulfatesoil/riskmaps.htm).
Section 5.2.8 Page 89	**Easements** Easements must comply with Council's 'Clearance & Easement Requirements for Structures Adjacent to Sewer & Stormwater Mains Policy'

Section 5.2.9 Page 90	**Disused Sewers** Disused/redundant sewer mains must be exhumed. Disused/redundant sewer junctions must be disconnected and sealed. If a developer/contractor wishes to complete the work: • The work must be carried out by a suitably trained plumber who holds an endorsed license or supervisor certificate in force under the *Home Building Act 1989* (as per S634 of the *Local Government Act 1993*); • A work methodology for completing the work must be submitted to Council and approved in writing before work commences; • The contractor or entity completing the work must have $20,000,000 Public Liability Insurance, as well as any other insurance required to complete the work; • A Council staff member must inspect and approve the disconnection and/or sealing before it is backfilled. If the Developer/Contractor wishes for Council to complete the work: • The Developer/Contractor must submit a sewer connection application form to Council and specify that the sewer is to be disconnected; • Council is to provide a written quotation to complete the work, and will carry out the work once the quotation is paid in full.
Section 5.3.2 Page 90	**Roads, Reserves and Open Spaces** A sewer within a public road or reserve is not considered to be available to an adjacent property, and therefore the sewer must be extended into the property. Sewer located within a drainage reserve should be avoided where practicable. If sewer is located within a drainage reserve, it should be located parallel to the drainage system. Manholes located within vegetated floodways or drainage reserves should rise a minimum of 400mm above the surrounding ground level.
Section 5.3.8 Page 92	**Horizontal Curves in Sewers** Horizontal curves in sewer reticulation mains is not permitted for use by Goulburn Mulwaree Council.

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Clearance from Structures

Please refer to Council's 'Clearance & Easement Requirements for Structures Adjacent to Sewer & Stormwater Mains Policy' for clearance requirements.

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Clearance Requirements (Underground Obstructions and Services)

Please refer to Table GMC 5.4

Table GMC5.4

Utility (Existing Service)	Minimum Horizontal Clearance (mm)		Minimum Vertical Clearance [1] (mm)
	New Sewer Size		
	≤DN300	>DN300	
All Sewers	600	600	300
All Gas mains	600[3]	600	300
Telecommunication conduits & cables	600[3]	600	300
All Electricity conduits and cables	1000	600	300
Stormwater Drains [4, 8]	1000[3]	1000	300[5]
Water mains	1000[6]	600[6]	500[5]
Kerbs	300[7]	600[7]	600

Notes
1-7 – refer to WSA-02
8 - A sewer constructed under an existing or proposed stormwater pipe ≥ DN600 or a channel shall be concrete encased. The concrete encasement shall extend at least one meter each side of the stormwater pipe or one meter either side of the zone of influence of the channel. Clearances shall be determined from the top of the concrete encasement. Reference shall be made to GMC Building Over Sewers Policy
9 - Common trenching is not permitted by Goulburn Mulwaree Council.

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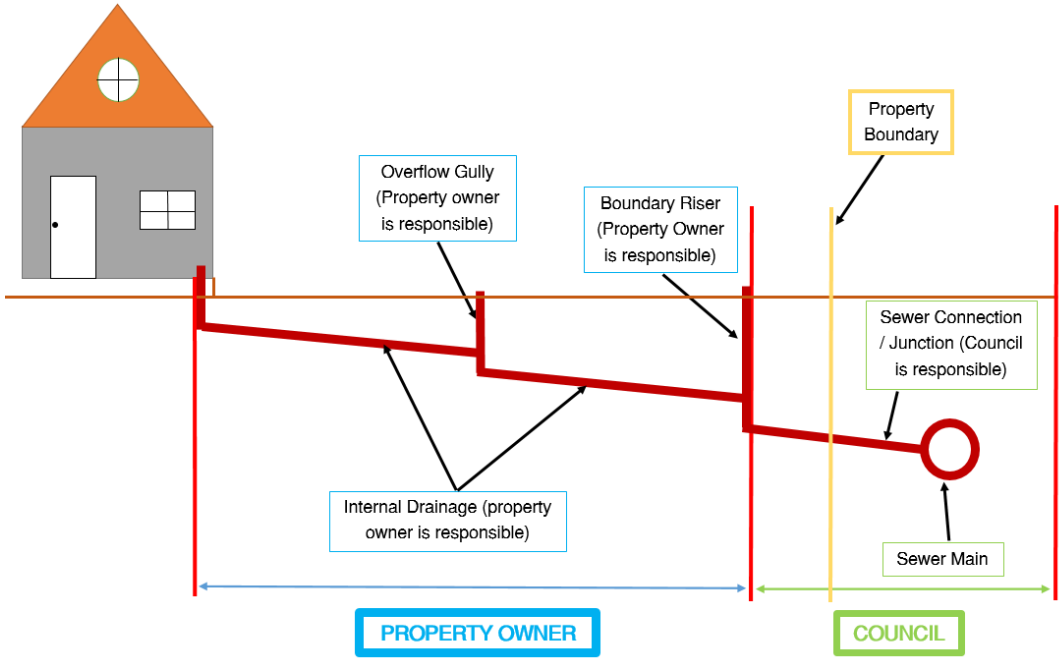
Minimum Pipe Sizes for Maintenance Purposes

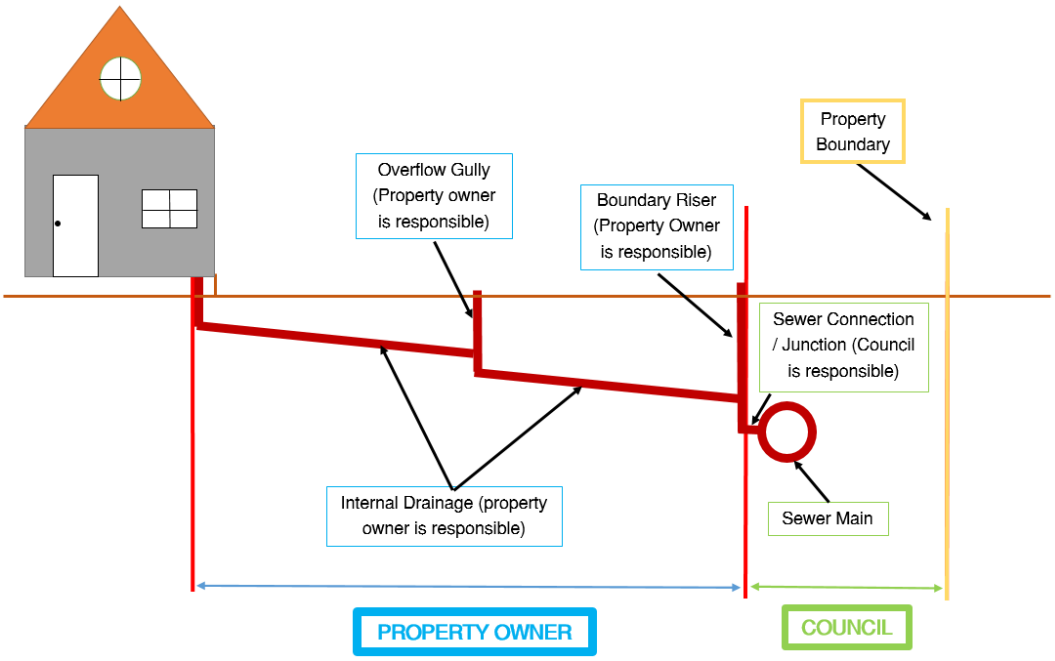
Please refer to Table GMC 5.5 for minimum sewer service connection sizes

Table GMC5.5

Sewer	Minimum Size DN[1]
Property connection sewers servicing single occupancy residential lots	150
Reticulation sewer servicing residential lots	150

	<table><tr><td>Property connection sewer servicing commercial and industrial lots <300m2</td><td></td></tr><tr><td>Reticulation sewer servicing commercial and industrial lots and other lots where large flows may be expected</td><td>150</td></tr></table> Notes 1 – The maximum length of a property connection sewer is 10m, however consideration may be given for junctions up to 20m with a minimum size of DN150 subject to written approval from Goulburn Mulwaree Council. Long junctions are not permitted to cross railway lines, drainage reserves or other types of properties which would make maintenance onerous. Detailed designs shall be provided to Council for approval for long sewer junctions (between 10m – 20m), to ensure correct grade has been achieved.
Section 5.5.7.2 Page 101	**Reticulation Sewers** (Minimum Grades for Self Cleansing) Reticulation sewers shall be graded to achieve self-cleansing at 75% of PDWF.
Section 5.6.2 Page 103	**Long Section Design Plan** Long section plans for sewer shall show the location of, and the invert levels for, any services that cross sewer reticulation mains.
Section 5.6.6.5 Page 109	**Large Falls at Manholes** (Grading Through Manholes) Internal drops shall only be used in exceptional circumstances and with the written permission of Goulburn Mulwaree Council.
Section 5.6.7 Page 113	**Vertical Curves in Sewers** Vertical Curves are not permitted for use by Goulburn Mulwaree Council.
Section 5.6.8 Page 113	**Compound Curves** Compound Curves are not permitted for use by Goulburn Mulwaree Council.
Chapter 6 – Property Connection	
Section 6.1 Page 114	**General** Inter-allotment drainage is not permitted for use by Goulburn Mulwaree Council.

	Vertical sewer junctions are not permitted for use in Goulburn Mulwaree Council. Sewer junctions are to be installed to ensure the 45 degree junction is horizontal or near horizontal. Newly installed sewer connections must have a 90 degree bend at the end, and the connection brought up to 300mm below ground level with a cap glued to the end. Road crossings for sewer property connections are not permitted for use by Goulburn Mulwaree Council. Sewer main extensions will need to be completed where road crossings are required, with a manhole installed at the upstream and downstream of the sewer main.
Section 6.3.1 Page 114	**General** (Methods of the Property Connection) Property Connections should be a combination of Inspection Opening (IO) Interface and Buried Interface. Figure GMC 6.1.1 and GMC 6.1.2 shows this.  Figure GMC 6.1.1 - Diagram of Typical Sewer Connection (Sewer Main in Road Reserve)

	 Figure GMC 6.1.2 - Diagram of Typical Sewer Connection (Sewer Main on private property)
Section 6.3.3 Page 115	**Buried Interface Method** <u>Where the sewer main is within the property</u> - The point of connection is a buried DN150 IO installed immediately upstream from a DN150 slope junction (SJ) installed in the sewer within the customer's property. The IO is plugged at the time of construction. GMC owns the junction and downstream sewer. The customer is responsible for providing, connecting and maintaining an IO/Riser and sanitary drain in accordance with AS/NZS 3500.2.2. <u>Where the sewer main is not within the property</u> - The point of connection is a buried DN150 IO installed at the end of a property connection sewer terminating within the customer's property or as approved by GMC. GMC owns the property connection sewer (up to the base of the IO, not including the 90 degree bend) and downstream sewer. The customer is responsible for providing, connecting and maintaining an IO/Riser and sanitary drain in accordance with AS/NZS 3500.2.2.
Section 6.5.2 Page 119	**Vacant Lots** (Location of Property Connection Points) A second 150mm PVC sewer junction is to be installed at the opposite end of vacant blocks for future potential development.

Section 6.6.1 Page 120	**General** (Property Connection Sewers) Vertical Risers (Jump up) can only be used with written permission from Goulburn Mulwaree Council.
Section 6.6.2 Page 120	**'Type 7 Spur' (Y) Property Sewer Connections** Type 7 Spur (Y) property service connections are not permitted for use by Goulburn Mulwaree Council.
Chapter 7 – Maintenance Structures	
Section 7.1 Page 122	**Types of Maintenance Structures** Maintenance Holes are the only structures permitted for use by Goulburn Mulwaree Council.
Section 7.2 Page 122	**Locations of Maintenance Structures** Horizontal and vertical curves are not permitted for use by Goulburn Mulwaree Council. Maintenance structures (manholes) must be installed at the end of all permanent or temporary sewer reticulation mains.
Section 7.3.1 Page 123	**General** (Spacing of Maintenance Structures) Only Maintenance Holes are permitted for use by Goulburn Mulwaree Council.
Section 7.3.2 Page 126	**Maintenance Structure Spacing – Reticulation Sewers** For reticulation sewers the maximum distance between any two consecutive maintenance holes shall be 120m. Permanent end of line sewers shall terminate with a maintenance hole. The maintenance hole must have a sewer connection feeding into it (to avoid a 'dry' sewer main).
Section 7.3.3 Page 127	**Maintenance Structure Spacing – Branch and Trunk Sewer** For branch and trunk sewer mains, the maximum distance between any two consecutive maintenance holes shall be 120m.

Section 7.4 Page 127	**Special Considerations for Location of Maintenance Structures** Maintenance holes shall not be located within vegetated floodways or drainage channels where practicable. If this cannot be avoided, the top of the manhole shall be a minimum of 400mm above the surrounding ground level. Maintenance structures must be installed at the end of all permanent sewer reticulation mains.
Section 7.6.2 Page 128	**Types of Maintenance Hole Construction** GMC will only permit concrete Maintenance Holes either cast in-situ or base cast channels in-situ and raised to ground level with pre cast components.
Section 7.6.3 Page 129	**Design Parameters for Maintenance Holes** GRP, PP & PE Maintenance Holes are not permitted for use by Goulburn Mulwaree Council.
Section 7.6.4 Page 129	**Design Requirements for Connection of Sewers to Maintenance Holes** When sewer reticulation mains enter a maintenance hole at a high level, only external drops are permitted for use by Goulburn Mulwaree Council.
Section 7.6.4.1 Page 129	**Pre-cast Concrete Maintenance Hole Base Units** Pre cast concrete Maintenance Hole base units are not permitted for use by Goulburn Mulwaree Council. Maintenance Hole bases must be cast in-situ.
Section 7.6.5 Page 134	**Connection of Property Connection Sewers into Maintenance Holes** When property connections enter a maintenance hole at a high level, only external drops are permitted for use by Goulburn Mulwaree Council. Internal drops shall only be used with written permission from Goulburn Mulwaree Council.
Section 7.6.6 Page 134	**Maintenance Hole Drops** Internal Drops are not permitted for use by Goulburn Mulwaree Council.

Section 7.6.7 Page 137	**Diameters of Maintenance Holes** The minimum permitted diameter for maintenance holes is 1050mm.
Section 7.7 Page 138	**Maintenance Shafts/Maintenance Chambers** Maintenance Shafts and Maintenance Chambers are not permitted for use by Goulburn Mulwaree Council.
Section 7.8 Page 151	**Inspection Shafts** Inspection Shafts are not permitted for use on sewer reticulation mains by Goulburn Mulwaree Council.
Section 7.8.5.2 Page 153	**Permanent Ends of Pipes** Maintenance Holes are to be installed at the ends of permanent sewer reticulation mains.
Section 7.9.1 Page 153	**General (Maintenance Structure Covers)** Steel bolt-down gatic lids are to be used for maintenance holes.
Section 7.10 Page 156	**Sewers from Junctions** Maintenance holes must be installed at all junctions, unless the junction is for a single sewer connection for a single lot (Inter allotment drainage is not permitted). An Inspection Opening (IO) is to be installed for all sewer property connections.
Section 7.11 Page 157	**Other Maintenance Structures at Interface of Property Connection Sewers and Sanitary Drains** An Inspection Opening (IO) is to be installed for all sewer property connections. The IO will be the responsibility of the property owner.
Chapter 8 – Ancillary Structures	
Section 8.2.3 Page 162	**Water-sealed Maintenance Holes and Gas Check Maintenance Holes** Water seal and gas checked maintenance holes are not permitted for use by Goulburn Mulwaree Council unless specifically permitted by writing.

Section 8.3.2
Page 166
	Design Parameters for Bored, Exposed and Encased Vertical and Near Vertical Sewers
	
	<u>For Near Horizontal Boreholes under Minor Road</u>
	• Near horizontal bores may be installed without an encasing pipe (subject to approval under Section 138 Requirements) however the annulus between the carrier pipe and the bore hole shall be grouted;
	• The bore hole shall have a nominal diameter 100mm larger than the OD of the carrier pipe;
	• The carrier pipe shall have a minimum stiffness class of SN10 or pressure rating of PN16 (whichever is applicable);
	• The carrier pipe shall be supported on skids/spacers to ensure the pipe is centrally located within the bore hole, and to prevent scoring of the pipe. The skids/spacers shall be installed so pipes cannot be pushed past the witness marks;
	• The annulus between the carrier pipe and the bore hole shall be fully grouted with an appropriate grout mix (such as Boral Concrete Batch Card No. 935705):
	  • Cement Type SL 120kg/m3
	  • Fly ash 150kg/m3
	  • Water 550L/m3
	  • Fluidifier (Grace DEF) 2.5kg/m3
	
	<u>For Near Horizontal Boreholes under Driveways and in Private Property</u>
	• Near horizontal bores may be installed without an encasing pipe and without grouting between the carrier pipe and the bore hole;
	• The bore hole shall be slightly larger than the OD of the carrier pipe to ensure a snug fit and to minimise ground settlement;
	• The carrier pipe may be PVC-U, PVC-M, PVC-O, DICL, MSCL, GRP and shall have a minimum pressure rating of PN16 or stiffness class SN10 (whichever is applicable);
	• The carrier pipe shall be supported on skids/spacers to ensure the pipe is centrally located within the borehole, and to prevent scoring of the pipe. The skids/spacers shall be installed so pipes cannot be pushed past the witness marks;
	• No grouting is required.
	
	Despite the requirements of this supplement, the installation of an encasing pipe may be required if ground conditions do not permit an unsupported bore hole.
	
	Goulburn Mulwaree Council may require grouting to occur to prevent against tree root ingress into gravity sewer mains.

Section 8.6 Page 169	**Inverted Syphons** Inverted Syphons are not permitted for use by Goulburn Mulwaree Council.
Section 8.7.2.2 Page 172	**Design Parameters for Emergency Relief Structures** For sewers discharging to a pumping station wet well, requirements for provision of Emergency Relief Structures and emergency storage facilities shall be as required by Goulburn Mulwaree Council.
Chapter 9 – Structural Design	
Section 9.7 Page 192	**Special Embedment Concrete and Stabilised Supports** Concrete encasement shall only be used with written consent from Goulburn Mulwaree Council. A design shall be submitted to Council for approval before work can begin.
Chapter 10 – Design Review and Drawings	
Section 10.5 Page 207	**Recording of Work As Constructed Information** WAE drawings shall be in accordance with Goulburn Mulwaree Council's standards for engineering Works As Executed (WAE) drawing points 9 and 10. Electronic data file requirement refer attachments. Refer to attachment A & B. WAE drawings are to be submitted to Council in pdf and dwg format, or as hard copies (in A1 size and A3 size). Survey points for Work As Constructed Drawings are to be taken by a Registered Surveyor, and certified by the Registered Surveyor that the Work As Constructed drawings are a full and accurate representation of the constructed works. Certification may be achieved by the Registered Surveyor stamping and signing each plan. Engineering design plans are to be prepared to Council's standards by a person, either holding qualification acceptable for Corporate membership of the Institute of Engineers Australia, or a person of proven experience in the field.

C. VARIATIONS TO PART 2 OF THE CODE: CONSTRUCTION

Section Ref. Page Ref.	Amendment and/or Addition
Chapter 11 - General	
Chapter 12 – General Construction	
Section 12.5.1 Page 219	**Protection of Other Services** Work Health and Safety Requirements must be adhered to at all times.
Section 12.5.2.1 Page 219	**Road Opening Permits** A Section 138 (under the Roads Act 1993) must be obtained from Goulburn Mulwaree Council before any work can be carried out within a road reserve.
Section 12.5.2.2 Page 220	**Treatment of Pavements and Other Surfaces** Detailed video and/or photographic record shall be made of all damage and defects to infrastructure in the vicinity of the works, particularly on private or Council-owned property, prior to construction activities commencing. This record should cover, but is not limited to, • Buildings • Roads • Pavements • Reserves • Kerb & gutter • Vegetation • Drains • Pits
Section 12.6 Page 224	**Disused Sewers** Redundant and/or disused sewers are to be disconnected and sealed by Goulburn Mulwaree Council. If this work is requested by a third party (not at Council's request), the work is to be completed at the third party's expense.
Chapter 13 – Products and Materials	
Section 13.1 Page 226	**Approved Products and Materials** The following outlines the main stream of products approved for use in GMC's gravity sewerage network. If there are any variations to the default purchase specification these will also be listed.

	The following list generally follows the order found in the document “Product & Material Information & Guidance” which can be found on the WSAA website at www.wsaa.asn.au
Section 13.1.1 Additional to WSA-02	**Unplasticised Polyvinyl Chloride (PVC-U) Gravity Sewers** Approved for use. Ribbed and sandwich wall construction will not be accepted. Solvent cement joints will only be accepted where shown on the standard drawings.
Section 13.1.2 Additional to WSA-02	**Vitrified Clay Gravity Sewers** Not permitted for use by Goulburn Mulwaree Council.
Section 13.1.3 Additional to WSA-02	**Ductile Iron Gravity Sewers** Approved for use.
Section 13.1.4 Additional to WSA-02	**Centrifugally Cast Glass Reinforced Plastic (CC-GRP) Gravity Sewers** Not permitted for use by Goulburn Mulwaree Council.
Section 13.1.5 Additional to WSA-02	**Polyethylene (PE) Gravity Sewers** Approved for use in near horizontal borehole applications and other applications.
Section 13.1.6 Additional to WSA-02	**Maintenance Holes** Approved for use. The use of Precast MH bases is not permitted for use by Goulburn Mulwaree Council.
Section 13.1.7 Additional to WSA-02	**Maintenance Shafts** Not permitted for use by Goulburn Mulwaree Council.

Section 13.1.8 Additional to WSA-02	**Variable Bend, Post-Formed PVC Non Pressure Fittings** Not permitted for use by Goulburn Mulwaree Council.
Section 13.1.9 Additional to WSA-02	**Ladders and Step Irons** Plastic Encapsulated Step Irons approved for use. Ladders are generally not required in Goulburn Mulwaree Council Gravity Sewer systems with manhole depth <1.5m.
Section 13.1.10 Additional to WSA-02	**Vent shafts** Vent shafts approved for use.
Section 13.1.11 Additional to WSA-02	**Surface Fittings** Surface fittings approved for use. Variations to Purchase Specification WSA PS-290: Class B MH covers shall comply with AS 4198-1994: Precast Concrete Access Chambers for Sewerage Applications. Class D MH covers shall comply with the requirements of WSA PS-290.
Section 13.1.12 Additional to WSA-02	**Jointing Components** Jointing components approved for use.
Section 13.1.13 Additional to WSA-02	**Corrosion Protection** Corrosion protection approved for use.
Section 13.1.14 Additional to WSA-02	**Pipe Embedment Materials** Pipe embedment materials approved for use. Compaction sand complying with WSA PS-350 and single sized aggregate of nominal sizes 7, 10 or 14 complying with WSA PS-351 will be accepted for pipe embedment materials. Crushed and graded aggregate using 5mm or 7mm.

Section 13.4 Page 228	**Concrete Works** Backfilling of concrete encased sewer mains shall not occur within 24 hours of pouring concrete unless approved in writing by Goulburn Mulwaree Council.
Section 13.5 Page 229	**Supply of Water to the Works** Hydrants shall not be used without written permission from Goulburn Mulwaree Council.
Chapter 14 – Excavation	
Section 14.1 Page 230	**Precautions** All excavation work must comply with the Code of Practice for Excavation. Dial Before You Dig plans of the area must be sourced before excavation can begin. Plans provided by Goulburn Mulwaree Council of Council's underground infrastructure is indicative only, and must be checked before work is carried out.
Section 14.4 Page 230	**Blasting** The Superintendent must ensure that the Contractor is suitably qualified and/or experienced to carry out blasting works, and is adequately insured. Blasting is only to be carried out with written permission from Goulburn Mulwaree Council.
Chapter 15 – Bedding for Pipes and Maintenance Structures	
Chapter 16 – Pipe Laying and Jointing	
Section 16.1 Page 237	**General** PVC Gravity Sewer Mains are to be joined using flexible rubber ring (elastomeric) joints (either roll-on rubber ring (elastomeric) or skid type).
Section 16.2 Page 238	**Horizontal and Vertical Deflection of Sewers** Maintenance Holes must be installed for any change in direction for sewer reticulation mains. Horizontal and Vertical curves are not permitted for use by Goulburn Mulwaree Council.

Section 16.8 Page 240	**Dead Ends** Sewer reticulation mains must be terminated with a maintenance hole.
Section 16.11.1 Page 240	**Non-detectable Marking Tape** Non-detectable marking tape is not permitted for use by Goulburn Mulwaree Council.
Section 16.13 Page 241	**Aqueducts** Aqueducts are not permitted for use by Goulburn Mulwaree Council.
Chapter 17 – Maintenance Holes	
Section 17.2.2 Page 247	**Pre-Cast Concrete MH Systems** Manhole component type is to be consistent with existing Council manholes.
Section 17.2.3 Page 247	**Cast In-Situ Concrete Maintenance Holes** Cast in-situ concrete maintenance holes are not permitted for use by Goulburn Mulwaree Council.
Section 17.3 Page 248	**Glass Reinforced Plastics (GRP) Maintenance Holes** GRP Maintenance Holes are only to be used with written permission by Goulburn Mulwaree Council.
Section 17.4 Page 248	**Polyethylene (PE) Maintenance Holes** PE Maintenance Holes are only to be used with written permission by Goulburn Mulwaree Council.
Section 17.5 Page 248	**Polypropylene (PP) Maintenance Holes** PP Maintenance Holes are only to be used with written permission by Goulburn Mulwaree Council.

Chapter 18 – Maintenance Chambers, Maintenance Shafts and Inspection Openings/Inspection Shafts

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General

Maintenance Chambers, Maintenance Shafts and Inspection Openings/Inspection Shafts are not permitted for use by Goulburn Mulwaree Council on sewer reticulation mains.

Chapter 19 – Pipe Embedment and Support

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Embedment Materials

7mm Blue Metal Aggregate is to be used around newly laid mains. The following table (Table 4.2, AS/NZS 2566.2:2002) specifies the embedment depth and trench width, with the following figure (Figure 1.2, AS/NZS 2566.2:2002) providing detail of the embedment dimensions.

TABLE 4.2

MINIMUM EMBEDMENT ZONE DIMENSIONS

millimetres

D_e	Minimum dimension			
	l_b	l_c (see Note 2)	l_o	$B = D_e + 2l_c$
≥75, ≤150	75	100	100	275 – 350
>150, ≤300	100	150	150	450 – 600
>300, ≤450	100	200	150	700 – 850
>450, ≤900	150	300	150	1050 – 1500
>900, ≤1500	150	350	200	1600 – 2200
>1500, ≤4000	150	$0.25D_e$	300	2250 – 6000

NOTES:

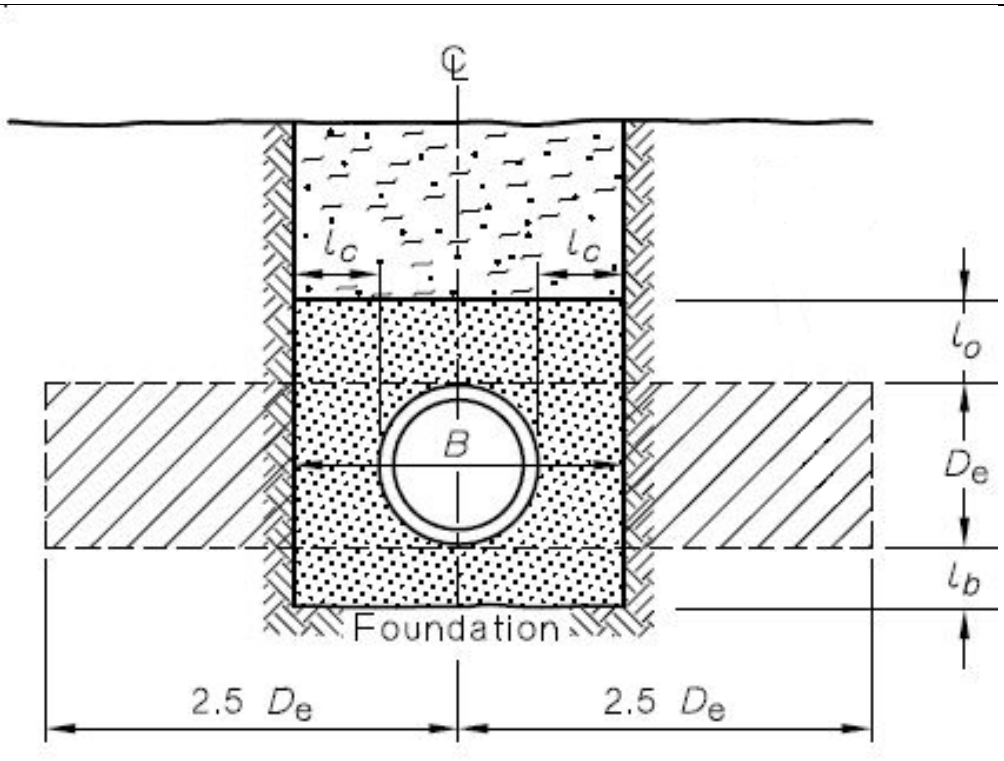
1 The objective is to achieve uniform compaction of the embedment material.

2 The tabulated values may provide insufficient clearances for installation purposes in certain circumstances.

3 The minimum spacing between adjacent parallel pipelines shall be determined from Clause 5.2.6.

4 Refer to Figure 1.2 for definitions of l_b, l_c, l_o.

Figure 1.2



Section 19.3.1 Page 251	**Methods (Compaction of Embedment)** Embedment material to be compacted must be compacted in 150mm (maximum) layers.
Section 19.6 Page 252	**Concrete Embedment and Encasement** Concrete encasement/embedment is to only be used with written consent from Goulburn Mulwaree Council. A design must be submitted to and approved by Council before work can be completed.

Chapter 20 - Fill

Section 20.1.2.1
Page 254

Trafficable Areas (Material Requirements)

Where the sewer main is to be placed beneath a road or road shoulder, backfill material shall be a mixture of sand and cement in the ratio of 27 parts sand to 1 part cement. The sand shall meet the requirements specified in Table GMC20.1 below and be mixed with the cement before being placed in the trench.

Table GMC20.1

Sieve Size Aperture Width (AS 1152)	Equivalent BS Sieve Size (BS 410)	Percentage Passing

	<table><tr><td>9.5 mm</td><td>3/8 inch</td><td>100</td></tr><tr><td>6.7 mm</td><td>1/4 inch</td><td>90-100</td></tr><tr><td>425 µm</td><td>No. 36</td><td>40-90</td></tr><tr><td>150 µm</td><td>No. 100</td><td>0-40</td></tr></table> The sand cement material shall be supplied and compacted in 150mm layers to the full depth of the trench. For existing roads, the final road finish shall be either 2 Coat or Hot-Mix, depending on the material of the existing road.
Section 20.1.2.2 Page 254	**Non-Trafficable Areas** (Material Requirements) Any trenches dug in non-trafficable areas shall be backfilled with soil/clay mix and compacted in 150mm layers. If the new water main is to be placed beneath a footpath, backfill material is to be DGB20 compacted in 150mm layers.
Section 20.1.4 Page 255	**Compaction of Trench Fill** Trench fill is to be completed in 150mm layers.
Chapter 21 – Acceptance Testing	
Section 21.1 Page 257	**General** All testing is to be completed by a NATA-accredited third party (i.e. testing is not to be completed by the company/entity that installed the infrastructure).
Section 21.2 Page 257	**Visual Inspection – Above Ground** All sewer reticulation mains and property connections are to be inspected by Council before being backfilled.
Section 21.4.5 Page 264	**Testing of Concrete Maintenance Holes** 100% of all maintenance holes must be tested regardless of construction method.
Chapter 22 – Tolerances on As-Constructed Work	

Chapter 23 – Connection to Existing Sewers	
Section 23.1 Page 273 / Additional to WSA 02	**General** (Connection to Existing Sewers) Contractors shall perform work on Council's sewer reticulation mains provided they meet the following criteria: • The contractor is a suitably trained plumber who holds an endorsed license or supervisor certificate in force under the *Home Building Act 1989* (as per S634 of the *Local Government Act 1993*); • A detailed sewer design is submitted to Council's Utilities department and approved in writing before work commences; • A sewer connection application form is submitted to Council's Utilities' department and approved in writing before work commences; • A work methodology for completing the work is submitted to Council and approved in writing before work commences; • The contractor or entity completing the work has $20,000,000 Public Liability Insurance, as well as any other insurance required by the contractor to complete the work; • A Council staff member inspects and approves the new/existing main before it is backfilled.
Section 23.2 Additional to WSA 02	**Liquid Trade Waste** If industrial trade wastes are to be disposed of into the sewer, a Trade Waste Approval must be obtained from Council. Such Approval will document the acceptability of the liquid wastes to be disposed of to the sewerage system taking into account the concentration, type and volume of the liquid wastes. Charges apply to the disposal of liquid trade wastes to Council's sewerage system.
Chapter 24 – Restoration	
Section 24.2 Page 274	**Pavements** 50mm of cold mix is to be placed over the trench and compacted. Permanent footpath restoration is to be completed as soon as practicable.
Section 24.3 Page 274	**Lawns** Grassed areas that have been trenched are to be seeded. Lawn area is to be restored to an equivalent or better condition.

Section 24.4 Page 275	**Grassed Areas** Grassed areas that have been trenched are to be seeded. Lawn area is to be restored to an equivalent or better condition.
Section 24.8 Additional to WSA 02	**Road and Shoulder Restoration** 50mm of cold mix is to be placed over the trench and compacted. Permanent road and/or shoulder restoration is to be completed as soon as practicable.
Chapter 25 – Work As Constructed Details	
Section 25.1 Additional to WSA 02	**General** Work As Constructed drawings with the amendments to the original design plan to represent the 'as constructed' information must be completed for presentation to, and approval by, Goulburn Mulwaree Council prior to Pressure Testing and the issue of the Certificate of Practical Completion/Certificate of Compliance. Refer to attachment B. Survey points for Work As Constructed Drawings are to be taken by a Registered Surveyor, and certified by the Registered Surveyor that the Work As Constructed drawings are a full and accurate representation of the constructed works. Certification may be achieved by the Registered Surveyor stamping and signing each plan. WAE drawings shall be provided in hard copy and PDF electronic format on CD (or equivalent). The WAE plans are to be the design plans amended to indicate the as-built nature of the work and must include the following: • any departure from the approved plans; • any additional work that has been undertaken; • the location of Council conduits, subsoil drains associated with road pavements, stop valves, hydrants, sewer manholes, sewer junctions, interlot drainage inlet junctions and stormwater drainage pits; • all other details of works to be handed over to Council; • certification by the developer's registered surveyor that the WAE drawings are a full and accurate representation of the constructed works. This may be achieved by the stamping and signing of each plan.

Section 25.2 Additional to WSA 02	**Information on WAE for Water, Sewer and Stormwater Junctions** Work-as-executed drawings shall indicate sewer and stormwater junction information for each lot as below: • Chainage from downstream manhole/pit • Depth to invert of main • Sideline length (if present) • Depth to invert of end of sideline (if present). STANDARDS FOR ENGINEERING WORKS, 2013 This information shall be depicted in dialogue boxes on the WAE drawings the following manner. Sewer junction out of main J 27.3 D 1.5 SL 3.0 SLD 0.9 Sewer Junction - Main J 2.34 D 1.5 SL 3.0 JOMH D 1.7 SL 0.0 Where: • J is distance from downstream manhole • D is depth to invert at the main • SL is length of sideline (if one) • SLD is depth to invert at property junction Sewer junction out of manhole JOMH D 1.5 SL 3.0 SLD 0.9 Sewer Junction - Manhole SWJ 2.34 SWD 1.5 SWSL 3.0 JOPIT SWD 1.7 SWSL 0.0 Where: • JOMH indicates a junction out of a manhole • D is depth to invert at the manhole • SL is length of sideline (if one) • SLD is depth to invert at property junction
Section 25.3 Additional to WSA 02	**GPS Electronic Data** The GPS electronic data below is required. The provider shall certify that the data provided complies with this clause.

	Survey Type/Standard Real Time Kinematic (RTK) by registered surveyor Projection GDA94 (MGA55) Position quality Within 20mm horizontal, 30mm vertical File format Co-ordinates to be provided in Excel *.xls spreadsheet or comma delimited *.txt or .csv Data required Co-ordinates, AHD height, point codes. Levels in MGA (AHD) A code legend is to be provided Points required: <u>Property</u> • Individual lot boundary points Roads • Kerb and gutter at invert to show line and length, including at tangent points • Footpaths on both edges to show line and length • Traffic island around the outside edge to show size and shape Water Supply • Water mains at T-junctions • Hydrants at the centre of the cover • Stop valves at the centre of the cover • Meter boxes at the centre of the box <u>Sewer</u> • Manholes at centre of lid
Section 25.4 Additional to WSA 02	**Standard Drawings** Where information on a drawing refers to a standard drawing used the designer shall refer to same drawing number with GMC after the number. E.g., in SEW1300 reference is made to SEW1307, however this drawing is not used, then the designer shall refer to SEW1307GMC.

3. APPENDIX A – ELECTRONIC DATA FILE

Survey Type Real Time Kinematic (RTK)

Data Required Co-ordinates, AHD height, point codes and code legend, and 3D quality data on ach point. All levels to be given in MGA (AHD).

Projection GDA94 (MGA55) projection.

Position Quality Readings within: 2cm horizontal and 3cm vertical.

File Format Co-ordinates to be provided in Excel*.xls spreadsheet or comma delimited*.txt file or .csv file.

Points Required

Sewer

- Sewer manholes at centre of manhole lid
- Sewer junction locations at the intersection point with the main at the surface and at the end of the junction at the surface.
- Sewer vents, immediately adjacent to the sewer vent.

Water mains

- Water mains at the intersection point between two mains
- Water mains at bends and tee sections
- Water main hydrants at the centre of the hydrant cover.
- Water main stop valves at the centre of the stop valve cover.
- Water main air valves and scour valves at the centre of the air valve/scour valve cover.
- Water main tapers at the midpoint of the taper.
- Water Main creek/river crossings, at each end of the creek/river crossing
- Water main puddle flange and thrust blocks.
- Meter boxes at the centre of the meter box.

Stormwater

- Stormwater pits and headwalls at the centre of the pit lid or headwall.
- Stormwater junction locations at the intersection point with the pipe at the surface, and at the end of the junction at the surface.
- Culverts should have points taken on the centre of the headwall either side of the road.

Property

- Lot boundary points

Road

- Footpaths on both outside edges to clearly show line, length and any deviations.
- Kerb and gutter at invert of the kerb to clearly show line, length and any deviations. Points also to be taken at all tangents points.
- Traffic island point locations around the outside edge to clearly show size and shape of the feature.

Other

- Points of any other relevant features such as water quality devices ie swales, bio-detention basins etc.

4. APPENDIX B – WORKS AS EXECUTED DRAWINGS

This Standard Technical Specification was developed by Goulburn Mulwaree Council to be used for compilation of WAE plans for Water Supply and Sewerage works for Developer constructed and Capital projects. It is intended that this Specification be used in conjunction with various Goulburn Mulwaree Council's Sewer and Water Supplements to the WSA codes (Water Supply and Sewer Code) and specific drawings and design requirements as defined by Goulburn Mulwaree Council for each particular project. Goulburn Mulwaree Council does not consider this Standard Technical Specification suitable for use for any other purpose or in any other manner. Use of this Standard Technical Specification for any other purpose or in any other manner is wholly at the user's risk.

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GENERAL

1. Scope

This Specification details requirements for the preparation of Work As Executed (WAE) plans for water supply and sewerage works constructed where works are to be accepted/owned by Goulburn Mulwaree Council.

These specifications are available online at *http://goulburn.nsw.gov.au*

2. Interpretation

"Construction Drawings" are all drawings defining the physical characteristics of the works to be constructed.

"Work As Executed Drawings" (WAE) are all drawings defining the physical characteristics of the works constructed.

SURVEY

To determine any location co-ordinates required by this specification use:

- A registered surveyor; or
- A surveyor accredited with AS9001 or AS9002.

State co-ordinates in Map Grid of Australia (GDA94 Zone 56) and levels in Australian Height Datum (AHD).

Table GMC B1

Feature	Level Accuracy	Co-ordinate Accuracy
Buried work (located by prodding or electronic detector	± 0.05m/m depth	± 0.05m/m depth
Fencing		± 0.10m
All other features	± 0.005m	± 0.05m

DRAWING REQUIREMENTS
General

Revise the electronic version of all Construction Drawings in accordance with Preparation of Civil and Structural Engineering Drawings Document and Goulburn Mulwaree Council's Sewer and Water Supplements to WSAA Code to accurately depict the work as constructed. Check and revise all dimensions, co-ordinates, levels, materials, boundary ties and other drawing notations.

Provide a table of co-ordinates for all constructed surface fitting on the General Arrangement drawing. Below is an example of the information required:

Table GMC B2

CHAINAGE	EASTING	NORTHING	R.L
547.15	345448.54	6383845.98	
548.98 - Hyd	345448.55	6383847.81	
549.58 - SV	345448.56	6383848.41	
551.97 – Hyd	345448.58	6383850.80	
578.50	345449.59	6383860.60	
600.36	345443.53	6383880.20	
670.95	3454438.80	6383830.32	
722.04	345443.98	6383850.42	
731.00 - Tee	345465.97	6383851.62	
SV	345433.58	6383850.41	

Scour Pit	345423.18	6383853.64	
1339.71 - Hyd	345445.38	6383850.23	
1342.37 - SV	345446.95	6383857.10	
1345.44 - Tee	345442.91	6383859.12	

Indicate the accuracy of the measurement of the GPS co-ordinates (i.e. GPS, Measured, Survey quality, etc.).

Amend the notation to indicate actual details of features noted on the Construction Drawing to be located, sized or determined during construction. For example:

- A drawing note indicates pipe work as being either M or O PVC, HDPE or DICL. Amend the note to show what was actually used.
- A drawing note indicating concrete encasement of pipe work is required where cover is less than 700mm. Indicate the actual extent of encasement installed with start and finish chainages.
- When the dimension or size on a Construction Drawing is nominal (eg. Pipe diameter) only correct the dimension if a different size is used. For cast in-situ concrete work, only correct dimensions when the work constructed is outside the tolerances defined in AS3610 Formwork for Concrete.

State the origin of all levels and co-ordinates on each drawing as well as any additional survey control marks.

When specified, modify contours to depict the work as constructed.

On each drawing state the month and year by which all field work on the drawing was completed.

Add a “WAE” notation in the Revision table located on each drawing to indicate that it is Work-As–Executed even if no other changes have been made to the Construction Drawing.

Supply completed WAE drawings on CD/DVD in AutoCAD.dwg and Adobe.pdf file format in the latest release of AutoCAD or previous two versions. Provide signed A3 + A1 hardcopy prints of the drawings.

Sewer Fitting Co-ordinates
Record each of the sewer fitting easting and northing co-ordinates and / or boundary ties if not already provided under Clause 4.1, on the WAE drawing.

- Maintenance Hole (MH)
- (Access Chamber)
- Flow meter
- Odour Control Dosing Unit
- Air valve
- Gate valve
- Scour discharge point
- Dead end
- Inspection chamber
- Stop valve
- Detention structure
- Vent Stack

Measured Location of Fittings in Gravity Sewer Mains

Record the information below on supplied Junction Sheets (see Appendix C). Supply Junction Sheets in hard copy and PDF format with the AutoCAD drawing. Scanned Junction Sheets shall be a minimum resolution of 300 dpi.

- Fitting type
- The orientation of the junction (J-Back, RJ-Left, RJ-Right, Sewer Inlet, YJ-Left, YJ-Right)
- Material
- Depth (ground level to invert level)
- Downstream MH and MS number
- Distance to the centre of the downstream MH or MS
- Distances to any convenient prominent features such as property boundaries

Include the following items on the Junction Sheets where applicable:

- Bulk head spacing
- Start of thrust bore or directional drill
- Junction
- Cap
- End of thrust bore or directional drill
- Vertical bend
- Change of material type
- Line junction
- Bedding
- Start of concrete encasement
- Horizontal bend
- End of concrete encasement
- Horizontal or vertical bend

Sewer Vents

Determine the information required for Table GMC B3 below (if not already provided under Clause 4.1), and present the table on WAE drawing.

Table GMC B3

Description	Details
Vent number	
Easting co-ordinate	
Northing co-ordinate	
Vent material	
Vent diameter at base (mm)	
Vent height (m)	
Vent Stack Type (tapered, straight walled etc)	
Surface level (Ground level)	

Sewer Flow Relief/Emergency Detention Structures and pipe work

Determine the information required for Table GMC B4 below (if not already provided under Clause 4.1), and present the table on WAE drawing

Table GMC B4

Description	Details
Flow relief or detention structure number	
Surface level (Ground Level)	
Easting co-ordinate	
Northing co-ordinate	
Invert levels of incoming and any outgoing pipe work	
Invert levels where overflow or detention structure pipe connects to gravity sewer	
Overflow outlet type (duckbill, flap valve etc)	

Water/Recycled water fittings Co-ordinates and / or Boundary Ties

Record the easting and northing co-ordinates if not already provided under Clause 4.1 of each of the water fittings on the WAE drawing.

- Air valve
- Double air/control valve
- Pressure reducing valve
- Auto inlet valve
- Hydrant
- Pressure sustaining valve
- Ball Valve
- Hydrant bend
- Reflux valve
- Blank hydrant
- Hydrant control valve
- Scour
- Booster control valve
- Manhole
- Strainer
- Borewell
- Meter
- Stop valve
- Butterfly valve
- Pitot cock valve
- Water pump
- Cluster box
- Chlorine Dosing Unit
- Flushing trap
- Built-in Bypass valves

Measured Location of Fittings in Water/Recycled Water and Sewer Rising Mains

Record the following information on the Construction drawing as the work progresses. Transfer the information to the WAE drawing.

- Fitting type
- Pipe sizes and materials
- Chainage from the start of the water, recycled water or rising main
- Distances to any convenient prominent features such as boundary fences

Provide a copy of the original marked up Construction drawing showing all field measurements with the WAE AutoCAD drawing.

- Bend
- End of thrust bore or directional drill
- Tapping
- Blank flange
- Gibault joint
- Tee
- Cap
- Start of concrete encasement
- Cross
- Start of thrust bore or directional drill
- End of concrete encasement
- Taper

SUBMISSION OF WAE INFORMATION

Complete and submit all WAE information with a completed Appendix C WAE checklist.

TECHNICAL DATA

Complete and supply copies of the supplied schedules of technical data.

5. APPENDIX C – LINE/JUNCTION SHEET

LINE/JUNCTION SHEET

SCHEME: .....

CONTRACT No. ..... **File No** .....

CONTRACTOR: ..... **Page No** .....

STREET..... SUBURB..... LINE/TM.....

PIPE DIAMETER ..... TYPE ..... CLASS.....

CHAINAGE/MAINTENANCE HOLE No.: ..... to .....DATE UPSTREAM REACHED .....

CHAINAGE	DEPTH TO INVERT	DEPTH TO ROCK	SCHEMATIC REPRESENTATION OF LINE	LOT DETAILS	COMMENTS
			SHOW LENGTH OF JUNCTION FROM MAIN		
			UPSTREAM		
0.00					
			DOWNSTREAM		

This Line Sheet represents a true, accurate and complete representation of the Works as constructed.

....

Signature of Authorised Contractor Representative Date

I have checked the information recorded on this sheet and certify that the accuracy is in accordance with requirements contained in the Survey Practice Regulations of the Surveyor's Act 1929.

....

Signature of Registered Surveyor Date

UPSTREAM MANHOLE DETAILS

MAINTENANCE HOLE TYPE .....

LID TYPE .....

TAPERED CONE TYPE .....

DEPTH OF MAINTENANCE HOLE .....

CHAMBER HEIGHT .....

SPACER HEIGHT .....

6. APPENDIX D – WAE CHECKLIST

Requirements	Yes	No	Comments
Work-As-Executed (WAE) location co-ordinates determined by registered surveyor or surveyor accredited with AS9001 or AS9002.			
Co-ordinates stated in Map Grid Australia (GDA94 zone 56)			
Levels in Australian Height Datum (PM or SSM)			
Electronic version of Construction Drawing revised depicting work as executed			
Dimensions, co-ordinates, levels, materials and other drawing notations checked and revised			
Constructed surface fittings table of co-ordinates provided on General Arrangement Drawing.			
Measurement accuracy indicated (eg. GPS, Measured, Survey quality)			
Amended notation supplied indicating actual details of features noted on the Construction Drawing located, sized or determined during construction			
Origin of all levels, co-ordinates and additional survey control marks stated on each plan.			
Contours modified to depict work as executed.			
Month and year by which all field work was completed stated on each drawing			
“WAE” notation added in Revision table even if no other changes have been made to the Construction Drawing			
Completed WAE drawings supplied on CD/DVD in AutoCAD.DWG and Adobe.PDF format in the latest release of AutoCAD or previous two versions			
Signed A3 hardcopy prints of drawings provided			

Sewer fittings	Sewer fitting co-ordinates recorded on WAE drawing			
Gravity sewer mains	Completed junction sheets supplied in hard copy and PDF format with AutoCAD drawing			
	Junction sheets scanned at 300 dpi			
Sewer vents	Completed table presented on WAE drawing			
Sewer Flow Relief/Emergency Detention Structures and pipe work	Completed table of all relief or detention structure components and pipe work presented on WAE drawing			
Requirement		Yes	No	Comments
Water/Recycled water fitting co-ordinates	Easting and northing co-ordinates of each water fitting recorded on WAE drawing			
Measured location of fittings in Water/Recycled water and sewer mains	Information recorded on Construction drawing and transferred to WAE drawing			
	Copy of original marked up Constructed drawing showing all field measurements provided with WAE AutoCAD drawing			
Supplied Schedules A, B and C completed				

WAE submission complies with the requirements of Work-As-Executed (WAE) Information
Contractor Name.....
Contractor Signature / Date.....
Surveyor's Name..... Surveyor's Signature / Date.....

7. APPENDIX E – DATA SCHEDULES

SCHEDULE A – WATER/RECYCLED WATER AND SEWER PIPES

Contractor				Contract No.			Date Works Completed		
Ref / Drawing Note 1	Pipe Material Note 2	Pipe Lining Note 3	Structured Wall Note 4	Series (if applicable)	Pressure Class (PN)	Stiffness Class (SN) Note 5	Joint System Note 6	Manufacturer	Supplier

Note 1	Drawing number or other reference if applicable
Note 2	DI (Ductile Iron) CI (Cast Iron) S (Steel) PVC-U PVC-M PVC-O HDPE (Polyethylene) PP (Polypropylene) GRP ABS Cu RC VC MSCL
Note 3	If applicable – CL (Cement Lined) FBPE (Fusion Bonded Polyethylene) PL (Plastic lined – eg: plastiliner for concrete pipes)
Note 4	If applicable – Profile, sandwich
Note 5	Required for PVC non-pressure pipe (eg: SN6, SN8) and all GRP (eg: SN5000 or SN10000)
Note 6	RRJ (rubber ring joint) W (Welded) RRJL (Rubber ring joint with locking segments eg: “Tyton-Lok” MC (Mechanical coupling) EF (Electrofusion welded) LJ (Lead joint) SCJ (Solvent cement joint)

GMC USE ONLY	GMC Rep		Project/Task No.		SWIMS Reference	

SCHEDULE B – WATER AND SEWER PIPE REHABILITATION

Contractor			Contract No.			Date Works Completed	
Ref/Drawing/MHs Note 1	Host Pipe Material Note 2	Replacement Pipe System Note 3	Material Class Note 4	Pressure Class (PN)	Technology Note 5	Junction/Lateral Sealing Method Note 6	Liner Trade Name

Note 1	Drawing number, upstream and downstream MH or MS numbers or other reference if applicable
Note 2	DI (Ductile Iron) CI (Cast Iron) S (Steel) PVC-U PVC-M PVC-O HDPE (Polyethylene) PP (Polypropylene) GRP ABS Cu RC VC MSCL
Note 3	PE (Polyethylene) ERIF (Epoxy Resin Impregnated Felt) PRIF (Polyester Resin Impregnated Felt) EP (Epoxy – sprayed or spread)
Note 4	If applicable – generally for PE only eg: 80B
Note 5	PC (Pipe Cracking) SL (Slip Lining) CIPL (Cured-in-Place Liner) CF (Close Fit Liner) SW (Spiral Wound) SWL (Swage Lining) PJ (Pipe Jacking) PEAT (Pipe Eating)
Note 6	None PU (Polyurethane Grout) CF (Cementitous Fully grouted annulus) EP (Epoxy) THJL (Top Hat Junction Lining) FJL (Full Junction Liner)

GMC USE ONLY	GMC Rep		Project/Task No.		SWIMS Reference	

SCHEDULE C – PIPE FITTINGS AND MISCELLANEOUS

Contractor			Contract Number		Date Works Complete	
Item	Ref / Drawing	Materials	Pressure Class (PN)	Supplier	Manufacturer	
Stop valves						
Hydrants & Riser						
Gibault Joints						
Bends						
Tapping Bands						
Services Valves						
SV Box						
Hydrant Box						
Junctions						
Reflux Valves						
Sluice Valves						
Gate Valves						
Air Valves						
Concrete						
Cement						
Stainless Steel Ladders						
Pre-cast Manholes						
Vent shafts						
GMC USE ONLY	GMC Rep			Project/Task No.	SWIMS Reference	

8. APPENDIX F – DESIGN DRAWINGS REQUIRENMENTS

GOULBURN MULWAREE COUNCIL REQUIREMENTS FOR SEWER DESIGN DRAWINGS

PLANS

- Plans are to be prepared on sheets sizes no greater than A1 and no smaller than A3,
- and shall have sheet borders.
- Plans are to be drawn at a scale of 1:500 unless greater detail needs to be shown in which case a scale of 1:250 may be used.
- Generally plans are to clearly elaborate the extent of works to be undertaken and are to be free of any superfluous information.
- Lots proposed to be serviced are to be shown in their entirety.
- Boundaries of lots to be serviced in the plan are to be highlighted by bold lines and numbering.
- All lots shown on the plan are to be properly numbered.
- Adjoining lot information (Lot and DP No.s) is to be shown on the plan in stippled lettering.
- Contours at a minimum 0.5m interval are to show over the entire area of the lots to be serviced and major contour values clearly shown.
- In general the plan is to clearly show the works to be undertaken with all other information in thinner, smaller or fainter line types to avoid confusion.(Internal sewer drainage lines are not to be shown or to be identified as not part of approval)
- Contours and levels shown are to be on Australian Height Datum (AHD).
- Bench Marks showing levels on AHD are to be shown on the plan – minimum spacing for benchmarks is to be 200m.
- North point to be shown on plans – should be to the top of page or to the right of the page.
- Proposed roads showing kerb lines (or if applicable edge of bitumen) and existing/proposed stormwater drainage systems (including interallotment drainage lines) are to be shown on the plan. Thin or light lines are to be used for this additional information.
- Existing and proposed (if known) street names are to be shown on the plan
- Proposed sewer lines are generally to be located within property boundaries with consideration given to the possible impact of the sewer lines and structures to future building sites. Where possible zones of influence (as defined in Council's Building GMC Policy) should not extend into building area.
- In cases where sewer lines are to run up the side of properties, these lines shall be concrete encased. Encasing is to be shown commencing a minimum 1.0m outside the building line and extend a minimum 75% of the depth of the building area.
- Proposed sewer lines are to be shown with bearings and distances on each line (distances measured from centre of structures)
- All structures (i.e. Maintenance holes) are to be clearly numbered commencing from the downstream end and numbered progressively to the end of the line. Numbering is to be kept simple e.g. A/1, A/2 etc. and the used of complex manhole number e.g. XAC1/3 avoided.
- All structures are to be clearly dimensioned in relation to existing or proposed boundaries, sufficient to enable proper setting out by survey. Where dimensioning not possible or unworkable MGA co-ordinates may be shown for all sewer structures.
- All sewer junctions are to be clearly shown and noted as to their type i.e. slope junction (SJ), riley junction (RJ), or vertical junction (VJ), with the chainage of the junction shown from the centre downstream manhole/structure. NB –Lots where sewer mains are located outside lot to be served, shall be serviced by riley junction and lots with sewer located inside lot shall be serviced by slope junction (excludes VJ, MHJ & junction extending from terminal maintenance shafts).

- A table is to be included on the plan which details the fall at the centre of the maintenance holes and corresponding minimum required fall across the maintenance hole giving consideration to grade.
- All new sewer mains are to drawn as thick unbroken lines and maintenance holes, terminal maintenance shafts etc. drawn as shown on the attached plan.

LONGITUDINAL SECTIONS

- Longitudinal sections are to be prepared at a standard scale of 1:500 horizontal and 1:100 vertical unless greater detail needs to be shown in which case a horizontal scale of 1:250 may be used.
- Sections are to commence with the downstream maintenance hole on the left hand side of the page.
- Sections are to show lengths of lines, natural surface (and design surface where applicable), invert levels (inlet and outlet) at centre of proposed and existing maintenance holes or structures and depth of line at structures from natural and design surface to inverts and any storm water or water main crossings.
- Sections are to show a datum line (in bold) with level clearly denoted.
- Levels are to be shown to an accuracy of no greater than 0.005.
- Structures are to be clearly numbered with numbering coinciding with that shown on the plan.
- Grades of sewer lines are to be clearly shown both in percentage and ratio ie. 1:XX (to a maximum of 2 decimal places)
- Grades of proposed lines are to be no flatter than the minimum grades as defined in WSA Codes. Where possible absolute minimum grades are to be avoided, but if design constraints dictate the use of minimum grades, a note is to be added to the long section indicating this and stating the requirement for lines to be checked by survey prior to backfilling to ensure design requirements have been met.
- Size and type of sewer pipe to be shown.
- The concrete encasing of sewer lines is to be clearly shown on the long section together with start and finish chainages.
- Details of vertical junctions showing height of junction riser above the main is to be shown on the long section.
- The general description of property type in which the sewer line is to run should be shown along the top of the section i.e. private, public reserve, road, etc.
- Location/invert levels of other services that intersect with sewer mains must be displayed to ensure minimum clearances are met.