



DESIGN GUIDELINES

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PINE RIVERS SHIRE COUNCIL

DESIGN GUIDELINES



DG 02

**ENGINEERING DRAWINGS FOR CIVIL
INFRASTRUCTURE**

DG 02

ENGINEERING DRAWINGS FOR CIVIL INFRASTRUCTURE

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1.0.0**PURPOSE**

To outline the requirements for the preparation and presentation of engineering design drawings for works associated with civil infrastructure. These drawings may be the subject of:-

- ❖ an application for an Operational Works Permit under a Transitional Planning Scheme;
- ❖ a commission for a Pine Rivers Shire Council project.

2.0.0 SCOPE

2.1.0 INCLUDED WORKS

This Guideline covers the presentation of design drawings for the construction of civil infrastructure, including:-

- ❖ bulk earthworks
- ❖ road works
- ❖ allotment earthworks
- ❖ allotment conditioning works
- ❖ retaining structures
- ❖ stormwater drainage infrastructure
- ❖ stormwater quality improvement devices
- ❖ wetlands
- ❖ water supply mains and associated works
- ❖ pits and chambers housing water supply, sewerage or stormwater works
- ❖ sewerage mains and associated works
- ❖ "standard" sewerage pumping stations
- ❖ all works generally associated with a project except as discussed in 2.2.0 below

These standards shall apply to all works whether they are constructed in association with new or existing developments, and shall also apply to such works to be constructed in privately or publicly owned land.

2.2.0 WORK NOT COVERED BY THIS GUIDELINE

This guideline does not cover the following:-

- ❖ landscaping works on public land
- ❖ reservoirs and elevated storage tanks
- ❖ major pumping installations
- ❖ raw water delivery systems
- ❖ associated major infrastructure such as treatment plants etc.

3.0.0 REFERENCE DOCUMENTS

Design Guideline DG-03: *Provision of As Constructed Drawings and Asset Information for Civil Infrastructure*

ADAC (Asset Design and As Constructed) website for general references and PRSC specific technical guides.

4.0.0 DEFINITIONS

- ❖ Council – The Pine Rivers Shire Council
- ❖ Director, Assets and Infrastructure Services Division - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative
- ❖ Manager, Development Services - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative
- ❖ General Manager, Pine Water - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative
- ❖ Manager, Electrical and Mechanical Services - the person occupying that position within the Pine Rivers Shire Council, or their nominated representative
- ❖ A Pine Rivers Shire Council engineer - the engineer employed by the Pine Rivers Shire Council to approve, supervise or inspect civil infrastructure construction, or their nominated representative.
- ❖ Developer - the company, organisation or person whom, under the provisions of the Planning Scheme, approval has been given to carry out the works and who acts as principal for the purpose of works carried out by contract.
- ❖ Consulting Engineer - the registered professional engineering company or registered professional engineer engaged by the principal to carry out the investigation, and design of the civil infrastructure to be constructed by the principal. When engaged for the construction phase, the company or engineer shall act as superintendent for the purpose of works carried out by contract.
- ❖ Contractor - as defined in AS 2124, the company, organisation or person engaged to carry out the construction of water supply works.
- ❖ ADAC – Asset Design and As Constructed electronic system used to facilitate the collection and lodgement of detailed information on contributed civil infrastructure and associated assets provided by the private sector to Councils.

5.0.0 PREPARATION OF DRAWINGS

5.1.0 GENERAL

Drawings shall be prepared by a consulting engineer or designer competent in each discipline of the proposed work.

A consulting engineer or a registered engineer shall approve the engineering drawings prior to their submission to the Pine Rivers Shire Council.

Drawings shall include details of all civil infrastructure works required under a Permit for Operation Works, or for projects or work commissioned by the Pine Rivers Shire Council.

5.2.0 SCALES

Drawings are to be produced based on the suite of accepted engineering scales, or multiples of these scales. These are:-

❖	Overall Plans	1:5000	
		1:2500	
		1:1000	
❖	Layout Plans	1:500	
		1:1000	
❖	Longitudinal Sections	1:500	Horizontal/1:50 Vertical
		1:1000	Horizontal/1:100 Vertical
❖	Cross-Sections	1:100	Horizontal/1:50 Vertical *
		1:100	Horizontal and Vertical *
❖	Details	1:200	
		1:250	
		1:100	
❖	Pipework and Pit Details etc.	1:100	
		1:50	
		1:20	

Although not preferred, 1:25 and 1:125 and 1:1250 may be used on occasion.

* the selection of distorted scales will depend on the cross slope of the ground and clarity required on the drawing.

5.3.0 MEDIA AND SHEET SIZES

All drawings for civil infrastructure shall be based on standard size sheets, the following sheet sizes being the only ones accepted:-

- ❖ A1 841 mm x 594 mm
- ❖ A2 594 mm x 420 mm
- ❖ A3 420 mm x 297 mm
- ❖ A4 297 mm x 210 mm - building site plans only

Where copies of drawings to be supplied, these may be provided on opaque paper. Where original versions of design drawings are required, these are to be produced as either:-

- ❖ black ink drawings on polyester film
- ❖ black ink drawings on tracing paper

The use of colour to differentiate or emphasize items should be avoided for engineering detail drawings.

5.4.0 SURVEY DATUM

5.4.1 Horizontal

Survey, design and construction control shall be based on the Geocentric Datum of Australia (GDA 94) and be projected to the Map Grid of Australia 1994 (MGA 94) Zone.

5.4.2 Vertical Datum

Survey, design and construction shall be leveled to Australian Height datum (AHD).

6.0.0 RELATIVITY TO AS CONSTRUCTED INFORMATION

6.1.0 DRAWINGS REQUIRED FOR AN OPERATIONAL WORKS PERMIT

Council may make the spatial allotment data set for a proposed development available on request. Contact Council's Information Management / GIS section for details.

The designer should evaluate any efficiency obtainable by considering the requirements for the collection and presentation of as constructed and asset information during the preparation of design drawings.

Refer to the Pine Rivers Shire Council Design Guideline DG-03: *Provision of As Constructed Drawings and Asset Information for Civil Infrastructure*.

6.2.0 DRAWINGS REQUIRED FOR COUNCIL PROJECTS

Drawings prepared for the Pine Rivers Shire Council projects are to be produced using AutoCAD so that as constructed information and modifications may be made to the drawings and asset information provided using the ADAC schema and modules.

Drawings are to be compatible with the electronic means for the supply and inclusion of as constructed and asset information discussed and required in the Pine Rivers Shire Council Design Guideline DG-03.

7.0.0 PLAN INFORMATION

7.1.0 QUALITY OF INFORMATION

The engineering drawings for civil infrastructure, together with specifications and standard drawings, will provide all information necessary to permit construction of the works in accordance with the Pine Rivers Shire Council requirements. The project drawings shall contain all information necessary to show the work required, provide setout information and allow the works to be constructed as they were designed, with minimum interpretation on behalf of the consulting engineer or superintendent.

The drawings and details described below will be required where they are applicable to the project.

The standard specifications and standard drawings contained in the Design Standards have been produced to promote a standard approach to the design, specification and construction of civil infrastructure within the Pine Rivers Shire. These are written for inclusion with contract documentation for both the Pine Rivers Shire Council, and development related projects.

7.2.0 GENERAL

The project drawings should include the following general information:-

- ❖ estate or development name and stage
- ❖ developer's name
- ❖ consultant's name, address and contact details
- ❖ scale and scale bar
- ❖ drawing title and number
- ❖ drawing revision schedule and description of amendments
- ❖ locality plan (may be included on a title sheet covering a multi-faceted project)
- ❖ legend
- ❖ area for indicating approval of the drawing (including amendments)

The nature and complexity of the works will often determine the amount of detail provided on drawings, however the following would be expected to be shown on the project drawings:-

- ❖ locality plan
- ❖ layout plan including, locations and details of existing ground features
- ❖ layout, locations and details of existing services
- ❖ existing and proposed allotment layouts
- ❖ details of any "future works" designed to enable detailing of proposed work
- ❖ stage boundaries where applicable, or limit of work
- ❖ list of appropriate Pine Rivers Shire Council standard drawings to be used in construction
- ❖ origin of levels and setout information

7.3.0 PROJECT DRAWINGS

In multi-disciplined projects, drawings for certain aspects of the works should be separated onto their own group of drawings for each discipline. These may include separated drawings for: -

- ❖ water supply works
- ❖ sewerage works
- ❖ structural works
- ❖ major stormwater drainage or stormwater quality infrastructure (wetlands etc.)
- ❖ erosion and sedimentation control plans and details of devices

7.4.0 DRAWINGS FOR ALLOTMENT WORKS

Engineering drawings for allotment works are to include the following information:-

- ❖ clearing plans
- ❖ retaining walls and similar
- ❖ allotment earthworks – extent of cut and fill
- ❖ drawings showing designated building site locations

7.5.0 DRAWINGS FOR ROADWORKS

Engineering drawings for roadworks are to include the following information:-

- ❖ plan of each new road
- ❖ detailed plan of each intersection, cul-de-sac or speed control device
- ❖ longitudinal section of each road
- ❖ cross-sections of each road
- ❖ standard (typical) cross-section for each road
- ❖ access cross-sections (where necessary)
- ❖ noise attenuation barriers
- ❖ speed control devices
- ❖ signs and linemarking
- ❖ other details as apply to the project

7.6.0 DRAWINGS FOR STORMWATER DRAINAGE WORKS

Engineering drawings for stormwater drainage works are to include the following information:-

- ❖ longitudinal sections of each drain line, showing pipeline, natural surface, and pipeline details at regular spacing (nominal 20 m)
- ❖ plan, longitudinal and cross-sections of open drain systems
- ❖ layout plan including the stormwater drainage system with numbered manholes and catchpits and culverts etc.
- ❖ roofwater drainage layout plan
- ❖ drainage detail plan
- ❖ catchment plan
- ❖ drainage calculations sheet
- ❖ detention basin details
- ❖ gross pollutant traps
- ❖ wetlands systems

7.7.0 DRAWINGS FOR WATER SUPPLY WORKS

7.7.1 Reticulation Mains (250 mm diameter and less)

A drawing set may be limited to a layout plan, accompanying details and notes. Information must contain:-

- ❖ plan layout of proposed water mains, including legend for pipe sizes
- ❖ proposed offset for mains from property boundaries, or other setout information as may be appropriate
- ❖ positions for valves and hydrants
- ❖ positions for pre-tapped property service fittings (where pipe diameters suit)
- ❖ diagrams/details of proposed bends, fittings etc. (may be provided as line diagrams or a table)
- ❖ class and material for pipes and fittings
- ❖ detail of proposed interconnections to existing mains
- ❖ location of service conduits
- ❖ project specific details as required

The extent and detail of the above will depend on the location of the works; be it through existing areas or on an undeveloped site.

7.7.2 Trunk Mains (300 mm diameter and greater)

Designs for water supply infrastructure of this size are dependent on many facets, and demand greater depth of investigation, design and drawing content, as they are not as readily altered during construction.

A drawing set would typically require the following information:-

- ❖ plan layout of proposed water mains, including legend for pipe sizes
- ❖ proposed offset for mains from property boundaries, and/or other setout information as may be appropriate
- ❖ positions for valves, hydrants and other key fittings and installations
- ❖ longitudinal section showing pipeline, natural surface, and pipeline details at regular spacing (nominal 20 m)
- ❖ diagrams/details for proposed bends, fittings etc. (line diagrams and/or scale details)
- ❖ design of proposed pits or chambers and included pipework
- ❖ detailed sections of the main (plan and longitudinal sections etc.) for creek crossings, aerial mains or other areas requiring a high order of detail
- ❖ class and material for pipes and fittings
- ❖ detail of proposed interconnections to existing mains
- ❖ project specific details as required

The amount of information and detail of the above will depend on the location and complexity of the project.

7.8.0 DRAWINGS FOR SEWERAGE WORKS

7.8.1 Gravity Sewers

A drawing set would typically require the following information:-

- ❖ plan layout of new sewer mains, including legend for pipe sizes
- ❖ offset of mains from property boundaries, and/or other setout information as may be appropriate
- ❖ longitudinal section showing pipeline, natural surface, and pipeline details
- ❖ positions of manholes
- ❖ positions of house connection points
- ❖ type and class of materials
- ❖ interconnections to existing mains
- ❖ details of pipe connections and pipeline alignments into manholes (diameter > 300)
- ❖ project specific details as required

7.8.2 Pressure Sewers

A drawing set for pressure sewer mains would typically require the following information:-

- ❖ plan layout of new sewer mains, original sewer mains, locations/details of existing features etc. including legend for pipe sizes
- ❖ offset for mains from property boundaries, and/or other setout information as may be appropriate
- ❖ positions of manholes
- ❖ longitudinal section showing pipeline, natural surface, pipeline details, and hydraulic grade line at regular spacing (nominal 20 m)
- ❖ detailed sections of the main (plan and long. sections etc.) for creek crossings, aerial mains or other areas requiring a high order of detail
- ❖ details of interconnections to the existing sewerage system
- ❖ positions and details of non-standards items including discharge manholes, venting and scour arrangements etc.
- ❖ class and material for pipes and fittings
- ❖ project specific details as required

The amount of information and detail of the above will depend on the location and complexity of the project.

7.8.3 Pumping Stations

Structural arrangements of sewer pump stations, electrical and mechanical fit-out are to be completed in accordance with the Pine Rivers Shire Council standards - refer also to sections in this guideline relating to structural works and electrical/mechanical works etc.

There are a number of standard drawings for sewer pump stations to be completed with design information and details.

Non-standard installations are to be fully detailed.

7.9.0 DRAWINGS FOR STRUCTURAL WORKS

Where structures and structural works form part of the project, complete working drawings detailing all structures, (above and below ground) and structural elements are to be provided as part of the drawing set to be submitted.

For example, structures may include gross pollutant traps, concrete pits for water supply valves, pipe galleries, pump stations, buildings, and similar installations.

7.10.0 DRAWINGS FOR ELECTRICAL, MECHANICAL AND TELEMETRY WORKS

Where the works include items of electrical, mechanical or telemetry infrastructure, the following information and drawings are to be provided:-

- ❖ electrical circuit diagrams
- ❖ details of switchboard cabinets and layouts
- ❖ equipment lists
- ❖ pump curves including design point
- ❖ pipe resistance curves
- ❖ any other relevant project specific information required to assess the proposal

7.11.0 SUBMISSION OF DRAWINGS

The requirements for submitting drawings to the Pine Rivers Shire Council will depend on whether the project is part of an operation works application under a Transitional Planning Scheme, or a project commissioned by the Pine Rivers Shire Council.

8.0.0 INFORMATION REQUIRED FOR AN OPERATIONAL WORKS PERMIT

Information submitted accompanying an operation works application shall include:-

- ❖ a certification by the consulting engineer that the project has been designed in accordance with the Pine Rivers Shire Council standards
- ❖ three sets of A3 size copies of all drawings (except the Pine Rivers Shire Council standard drawings)
- ❖ one copy of all supporting specifications (except the Pine Rivers Shire Council standard specifications)
- ❖ a set of electronic drawings (AutoCAD DWG files) may be required. This includes all associated files used in drawing creation and printing.

On the occasion that the Pine Rivers Shire Council will permit the electronic lodgment of applications, drawings and information, the following are required:-

- ❖ a PDF copy of the consulting engineer's certification that the project has been designed in accordance with the Pine Rivers Shire Council standards
- ❖ a set of electronic drawings (AutoCAD DWG files). This includes all associated files used in drawing creation and printing.
- ❖ PDF copies of the drawings. PDF files may be secured to prevent changes, however may not be password protected against opening or printing.

9.0.0 DRAWINGS REQUIRED FOR COUNCIL COMMISSIONED PROJECTS

Project “final” drawings submitted by consultants for the Pine Rivers Shire Council projects shall include:-

- ❖ information and drawings required under the terms of the project commission
- ❖ a set of electronic drawings on CD (AutoCAD DWG assembled by E-transmit). This includes all associated files used in drawing creation and printing.

Design drawings must be submitted at full original size.