



**Supplementary Manual to the WSAA  
Sewerage Pumping Station Code  
(WSA 04-2005:2.1)**

**Version 2.1**

## ACKNOWLEDGEMENTS

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Central Highlands Water acknowledges the following source documents in the preparation of this standard:

Sewerage Pumping Station Code of Australia WSA 04-2005:2.1

## DISCLAIMER

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“Central Highlands Water excludes all liability to all persons and all conditions and warranties, which are expressed or implied at law (including under statute).

Where liability and conditions and warranties cannot be excluded at law, the liability of Central Highlands Water is limited at their choice, to re-supplying the Supplementary Manual or paying the cost of re-supplying the Supplementary Manual.”

Please note that the Supplementary Manual or information contained within the Supplementary Manual must only be used in conjunction with the Sewerage Pumping Station Code of Australia WSA 04-2005, of the Water Services Association of Australia.

**Further, the Supplementary Manual may be periodically updated.**

## INFORMATION

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For information and advice and to advise of possible errors, omissions and changes required for future revisions, please contact [CHW](#) Land Development Team.

## INTENDED AUDIENCE

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This Central Highlands Water Supplementary Manual is intended for the use of CHW personnel, consultant engineers and contractors engaged in the design, construction and maintenance of CHW’s sewerage pumping stations.

## REVISION CONTROL

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Version	Approved by	Approval Date	Issue Date
Version 2			
Version 2.1	Paul Donald	Dec 2012	2/01/2013

## **PREFACE TO CHW SUPPLEMENT**

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This Supplement complements the Sewerage Pumping Station Code of Australia, WSA 04-2005 (the Code) and contains additional (supplementary) information to cover:

- ▶ Central Highlands Water's detailed requirements for specific matters, which the Code anticipates individual water agencies will address.
- ▶ Variations to the Code where its requirements are not compatible with Central Highlands Water's current requirement

## TABLE OF CONTENTS

<b>Part 0 - Glossary of Terms.....</b>	<b>5</b>
<b>Part 1 – Planning &amp; Design.....</b>	<b>6</b>
1 GENERAL.....	6
1.1 Scope .....	6
1.2.2 Pumping Alternatives.....	6
1.3.1 Pumping Philosophy.....	7
2 CONCEPT DESIGN .....	7
2.2 Functionality.....	7
2.5 Due Diligence Requirements .....	8
2.8.1 General .....	9
2.9 Odour Control.....	9
2.12 Access .....	9
2.13 Security.....	9
2.15 Supporting Systems .....	9
2.17.1 General .....	9
3 GENERAL DESIGN .....	10
3.1 General.....	10
3.7 Easements.....	10
5 PUMPING STATION DESIGN.....	10
5.2.1 Site Selection .....	10
5.2.4 Site Area .....	10
5.2.5 Site Layout and Access .....	10
5.4.2 Sizing.....	10
5.4.4 Control Levels .....	11
5.4.7 Washers.....	11
5.6.2 Emergency Storage – CHW to confirm .....	11
5.6.2.2 Configurations .....	11
5.6.2.3 Design.....	11
5.6.2.4 Access and Cover Arrangements.....	12
5.6.4 Emergency Relief System.....	12
5.7 Ladders and Platforms .....	12
5.8 Wet-Well Access Covers .....	13
5.9 Safety Systems .....	13
5.10 Grit Collection.....	13
5.11 Screens.....	13

6 PUMPING SYSTEM.....	13
6.2 Hydraulic Design.....	13
6.4 Pump Selection.....	14
6.6.5 Junction Boxes.....	14
6.6.6 Pump set Lifting Equipment.....	14
6.8.1 General.....	14
6.9 Harmonics and Radio Frequency Interference.....	14
7 POWER SYSTEM.....	14
7.1 General.....	14
7.2.2 Security of Supply.....	14
7.3.4 Lighting.....	14
8 CONTROL AND TELEMTRY SYSTEM.....	15
8.1 General.....	15
8.5.1 General Design Principles.....	15
8.5.3 Alarm Creation Function.....	15
8.7.3 Alarm Levels.....	16
8.8.2 Flow Measurement.....	16
9 WET-WELL PIPEWORK.....	16
9.1.1 General.....	16
9.1.3 Type.....	16
9.3.1 General.....	16
10 PRESSURE MAIN.....	17
10.2.1 General.....	17
10.6.2 Fatigue Design for Thermoplastics Pipes.....	17
10.9.3 Gas Release Valves.....	17
11 STRUCTURAL DESIGN.....	17
11.3.2 Products and Materials.....	17
11.3.6 Above Ground Crossings.....	17
<b>Part 2 – Products &amp; Materials.....</b>	<b>18</b>
<b>Part 3 - Construction.....</b>	<b>19</b>
22 TELEMTRY.....	19
22.1 Compliance with Authorities, Statutes, Regulations and Standard.....	19
<b>Part 4 – Standard Drawings.....</b>	<b>20</b>

## **Part 0 - Glossary of Terms**

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CHW has no supplementary requirements in this section.

# Part 1 – Planning & Design

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## 1 GENERAL

### 1.1 Scope

*Additional paragraphs:*

This Code does not apply to low pressure pumping systems including Pressure Sewer Systems.

Pressure sewer systems are required to be designed in accordance with WSAA Pressure Sewer Code of Australia (WSA 07-2007)

All pumping stations should conform to the WSAA Sewerage Pumping Code of Australia (WSA 04-2005).

This Code not only sets design standards but also a design process. Developers must seek CHW Approval for any design, or change to a design that does not meet the standards defined in the WSAA Code or this Supplementary Manual document.

This Code shall also be read in conjunction with the following CHW documents:

- ▶ 'Electrical Installation and Control Specification' (under review)
- ▶ 'SCADA System - Technical Specifications' (November 2009)

as revised from time to time.

Where any discrepancy occurs between these documents, the developer shall consult CHW for clarifications.

### 1.2.2 Pumping Alternatives

*Insert the following paragraphs after italicized text:*

Prior to the installation of a new sewage pumping station, or upgrade at a current pumping station, an assessment of alternative options should be undertaken. Where alternative options (such as a gravity sewer, or gravity sewer and pumping station hybrid design) are proven cost effective they should be adopted. The assessment should take into account the following costs for a pumping station:

- capital costs;
- operational and maintenance costs;
- cost of spill minimisation and containment; and
- a factor for the risk to the organisation of a pumping station solution, which should be based on the environmental and health impacts of a spill at the proposed location.

The WSAA Code provides a useful framework for a life cycle cost assessment. External development of a pumping station will require CHW approval of the life cycle cost assessment before detailed design is undertaken.

**A report outlining the assessment is required to be submitted to CHW, before detailed design is undertaken and the designer shall obtain CHW consent on the assessment report.**

Where a new development lacks the size to justify a gravity sewer solution, but future expansion is likely, a temporary pumping station may be built. The temporary pumping station is to comply with these guidelines, But a flow level should be set that triggers the reassessment of a gravity sewer solution. CHW prior consent is required to be obtained at the initial stage of temporary pump station design.

### **1.3.1 Pumping Philosophy**

*Additional paragraphs:*

CHW aims to prevent environmental spills from sewage pumping stations in order to meet its performance objectives. The approach to preventing environmental spills is made up of a hierarchy of strategies:

**Avoiding** the use of sewage pumping stations where practicable, for example utilising gravity sewers where cost effective.

**Minimising** the likelihood of failure of sewage pumping station equipment by providing cost effective redundancy and through preventative maintenance and operational procedures.

**Containing** sewage to prevent an environmental spill. It is proposed to achieve containment by using an effective SCADA system, incident response procedure and emergency storage. The storage is required to contain

- ▶ A minimum of 3 hours peak dry weather flows in to the pump station, and
- ▶ All flows from a 1 in 5 year rainfall event when the pumps at the pump station are operating at its design flow rate.

## **2 CONCEPT DESIGN**

### **2.2 Functionality**

*Replace item (f) with the following:*

f. Provide safe working conditions for operation and maintenance personnel **including a hard standing area adjacent to the pump station and fall protection facilities.**

*Additional paragraph:*

An assessment of each 'system' of pumping stations will be undertaken to highlight those stations where flows from upstream pumping stations will increase the spill risk during a failure.

When a High-High Level Alarm occurs at the downstream pumping station, the start level of the upstream pumping station will automatically be set to the station's High Level Alarm set point. This will allow a greater volume of sewage to be stored upstream, and help avoid a spill at the downstream pumping station.

## **2.5 Due Diligence Requirements**

### *Additional paragraph:*

A risk assessment of each station's spill path is required to be undertaken by the designer. Where high risk infrastructure such as housing or waterways used for aquaculture, recreation or potable water are located along the spill path, the designer shall notify CHW and based on the information provided CHW may deem the location of the pump station to be high risk.

Based on the risk analysis provided by the designer, CHW shall advise the designer to provide additional risk mitigation strategies for high risk pump stations, such as an onsite generator or additional storage.

## **2.8.1 General**

### *Additional paragraphs:*

If all possible design parameters have been addressed to minimize the septicity of the sewage in the pump station and pressure main and a problem of septicity still remains it may be necessary to chemically dose the pressure main, pump well and/or the reticulation lines leading to the pumping station. The designer shall consider that the chemical dosing shall be the last resort to consider.

Where chemical dosing is considered necessary to control septicity then the designer is to detail dosing options, impacts, advantages and disadvantages, capital and operating costs associated with the dosing.

## **2.9 Odour Control**

### *Additional paragraphs:*

The designer shall provide evidence that odour generation and control has been considered. This will include calculations that demonstrate odour generating potential and how any odours generated will be treated. The designer shall liaise with CHW on proposed ventilation and odour control measures.

## **2.12 Access**

### *Additional paragraph:*

Further to Clause 5.2.1 'Site Selection', where the area of land for the pumping station does not front a public road, then CHW shall make the appropriate arrangements to obtain unfettered legal access to the pumping station (ie. by means of fee simple ownership of land, carriageway easement or lease).

## **2.13 Security**

### *Additional paragraph:*

Where the station is located near a road, and is at risk of being damaged in a car accident, an Armco, bollards or similar type barriers should be used to protect the equipment.

Stations that are at risk of vandalism or sabotage should be secured with a security fence or other appropriate security. All control panels, pump well and valve pit lids and exposed valves should be key lockable.

## **2.15 Supporting Systems**

*Additional supporting systems:*

- (f) Kiosk substation
- (g) Alternative power sources (e.g. Generator)
- (h) Dosing and odour control services
- (i) Chemical / fuel storage bunded area

### **2.17.1 General**

*Additional requirements:*

CHW representatives must attend the commissioning.

Testing and commissioning requirements shall be read in conjunction with CHW's 'Electrical Installation and Control Specification' and as revised from time to time.

### **3 GENERAL DESIGN**

#### **3.1 General**

*Additional paragraph:*

#### **3.7 Easements**

Refer to the CHW Land Development Manual for detailed easement requirements.

### **5 PUMPING STATION DESIGN**

#### **5.2.1 Site Selection**

*Additional requirement:*

The designer shall consult with CHW if the proposed pump station site is not within CHW land or Council land.

If the proposed pump station is servicing to a new development, the developer is required to provide land for pump station and access. The land (together with any means of legal access to the land) required by CHW for the proposed pump station shall vest in fee simple in the name of 'Central Highlands Region Water Corporation' at no cost to CHW.

#### **5.2.4 Site Area**

*Additional requirement:*

(h) bunding complying with local regulations for all chemical and fuel storages including, as appropriate, allowances for bunding of fuel and chemical delivery trucks to contain potential spills.

#### **5.2.5 Site Layout and Access**

*Additional paragraph:*

24 hour, all weather access must be possible for repair vehicles, generator and eductor trucks. Access tracks must be constructed to carry the weight of a fully loaded Eductor truck, minimum weight 40 tonnes. Pipework and well design should allow for ease of setting up education equipment, access roads, manholes, safety and access equipment.

#### **5.4.2 Sizing**

*Replace criteria (b) with the following*

b. Where person-entry is required, there shall be sufficient room to work safely and effectively and evacuate / rescue personnel if necessary.

*Additional requirement:*

d. The wet-well shall be large enough to accommodate future pumps sized for the ultimate development.

*Additional paragraph:*

A reasonable estimation on peak wet weather flow (PWWF) should be undertaken for all stations based on a 1 in 5 year rainfall event. Where there is no historical information available or when designing a

sewer pump station for a new catchment, the PWWF can be estimated at 6 times ADWF. The designer shall demonstrate the criteria adopted for deriving PWWF.

The minimum pump capacity shall be equivalent to peak wet weather flows. The designer shall consider the ultimate peak wet weather inflow to the pump station when sizing the pumps with the consultation with CHW.

#### 5.4.4 Control Levels

Replace table 5.1 with the following:

Parameter	Description
Cut-out level – Pump off level	The cut-in/cut-out volume height determines the cut-out level. The minimum submergence level of the pumps shall be set at this point.
Duty cut-in level – Pump on level	Set at least 150mm below the incoming sewer invert level.
Standby cut-in level	Set at least 600mm above the duty cut-in level.

#### 5.4.7 Washers

Additional requirement:

CHW does not require wet well washers.

#### 5.6.2 Emergency Storage – CHW to confirm

##### 5.6.2.2 Configurations

Insert after paragraph 3:

The size of the emergency storage is in accordance with Section 1.3.1 of this Supplementary Code.

##### 5.6.2.3 Design

Additional paragraphs:

The designer shall consider the following additional guidelines:

- ▶ the storage should be designed such that floatables will not enter the environment during an overflow;
- ▶ peak dry weather flow should be based on a calculation of two times average dry weather flow if no peak flow data is available; and
- ▶ a risk analysis should be undertaken for 'High Risk Location' pump stations, and the storage sized shall be in accordance with Section 1.3.1 of this Supplementary Code.

The emergency storage shall be constructed from a non-corrosive material.

For a separate storage system the designer will need to consider and discuss with CHW:

- ▶ the installation of a storage cleaning system;
- ▶ the installation of an odour control system;
- ▶ OHS requirement for personnel to enter in to storage systems when required;
- ▶ ventilation requirements; and
- ▶ level monitoring requirements refer to CHW's 'SCADA System - Technical Specifications' (November 2009)

#### **5.6.2.4 Access and Cover Arrangements**

CHW does not require ladders in emergency storages.

#### **5.6.4 Emergency Relief System**

*Additional requirements:*

Before CHW decides to approve the construction of any new ERS, the designer will investigate whether such a structure is required for occupational health and safety, public health and safety, or for the safety of the sewerage system to be maintained.

Whilst the minimum design requirement is for the storage is to retain three hours peak dry weather flow to provide an adequate response time, an assessment shall be made of the likely impact upon the environment of any spillage from the ERS.

The designer shall assess the capacity of the sewerage system in the catchment is sufficient to contain all sewage flows associated with a 1 in 5 year ARI storm event.

These assessments are required to be submitted to CHW.

The designer shall also investigate and report on any alternative means that might be available to avert or reduce the risk of emergency spillage from the sewerage system from a 1 in 5 year ARI event coinciding with a pump station failure.

The ERS shall be designed in accordance with the provisions of the Sewerage Code of Australia WSA 02-2002-2.3 Melbourne Retail Water Agencies Edition. CHW shall liaise with the EPA regarding the ERS design and provide any EPA commentary to the designer for incorporation into the design.

A flap gate shall be installed at the emergency relief overflow pipe to ensure that a positive and effective gas seal is achieved.

#### **5.7 Ladders and Platforms**

*Additional paragraphs:*

Ladders shall **not** be included in wet wells and separate emergency storages, unless otherwise specified by CHW.

Notwithstanding the above, entry to wet wells shall be in strict accordance with CHW's confined space entry procedures.

### **5.8 Wet-Well Access Covers**

*Additional requirements:*

CHW has developed a typical access cover arrangement for Sewage Pumping Stations which shall be adopted as the basis for design pump station covers for new installations. The typical arrangement shall be as per "McBerns Built-in 4-Sided Void Protection Safety Lid Design Registration No:336107" or equivalent.

### **5.9 Safety Systems**

*Additional requirements:*

No tripping hazards shall be within the immediate vicinity of well or pit openings.

Safety Bollards shall be erected around electrical cabinets and other above ground installations refer to CHW Land Development Team during design phase for requirements.

### **5.10 Grit Collection**

*Additional paragraph:*

CHW does not normally require grit collection chambers.

### **5.11 Screens**

*Additional paragraph:*

CHW does not normally require pump station pre-treatment by screening.

## **6 PUMPING SYSTEM**

### **6.2 Hydraulic Design**

*Additional requirements:*

Estimation of peak wet weather flow (PWWF) should be undertaken for all stations based on a 1 in 5 year rainfall event. Where there is no historical information available or when designing a sewer pump station for a new catchment, the PWWF can be estimated at 6 times ADWF. The designer shall demonstrate the criteria adopted for deriving PWWF.

Provision of emergency storage will be made in accordance with Section 1.3.1 of this Supplementary Code.

Emergency relief shall comply with any sewer system overflow license requirements established by the environmental regulator.

**The designer shall plot the system curve and the proposed pump curve using the pressure main parameters and shall provide the plot details to CHW for review.**

The minimum pump capacity shall be equivalent to peak wet weather flows. The designer shall consider the ultimate peak wet weather inflow to the pump station when sizing the pumps with the consultation with CHW.

## **6.4 Pump Selection**

### **Additional Requirements**

CHW's preferred pumps are Flygt or KSB-Ajax, however, other pumps may be considered on a case by case basis.

Final selection of the pump model and size is subject to approval from CHW.

### **6.6.5 Junction Boxes**

#### *Additional requirements:*

CHW does not accept the use of junction boxes. Refer to the CHW 'Electrical Installation and Control Specifications' for standard requirements.

### **6.6.6 Pumpset Lifting Equipment**

#### *Additional requirements:*

Pump set lifting equipment shall be a minimum 316 Grade Stainless Steel.

### **6.8.1 General**

#### *Additional Requirements:*

This Code shall be read in conjunction with CHW's 'Electrical Installation and Control Specifications'.

## **6.9 Harmonics and Radio Frequency Interference**

#### *Additional Requirements:*

This Code shall be read in conjunction with CHW's 'Electrical Installation and Control Specifications'. Where a discrepancy exists between the documents in relation to these requirements the CHW specification shall take precedence.

## **7 POWER SYSTEM**

### **7.1 General**

#### *Additional Requirements:*

Sections 7.1 to 7.3 inclusive of this Code shall be read in conjunction with CHW's 'Electrical Installation and Control Specifications'.

### **7.2.2 Security of Supply**

#### *Additional paragraph:*

A generator or dual power supply will be installed at all sewage pumping stations in high risk locations.

High Risk locations shall be assessed in accordance with Section 2.5 of this code.

All sites must have a standard generator connection point fitted with a decontactor.

### **7.3.4 Lighting**

#### *Replace the first sentence in paragraph one with:*

External electrical control cabinets shall have separate fluorescent lighting tubes inside each compartment.

## 8 CONTROL AND TELEMETRY SYSTEM

### 8.1 General

*Insert after paragraph 1:*

Sections 8.1 to 8.12 inclusive of this Code shall be read in conjunction with CHW's 'Electrical Installation and Control Specifications' and SCADA System - Technical Specifications' (November 2009) current at the time of installation.

### 8.5.1 General Design Principles

*Additional paragraphs:*

A 'critical incident' alarm should be sent through to the operations room in the event of:

- a High High Level Alarm;
- no pumps are operational; or
- the power supply fails.

Other 'maintenance alarms' are required for a single pump failure, high level, low pump RPM etc. This alarm system must have a high level of reliability and redundancy. A heartbeat is used at an appropriate interval to provide notification and avoid dry weather spills. System equipment specifications and protocols can be found in the 'SCADA System - Technical Specifications' (November 2009)

### 8.5.3 Alarm Creation Function

*Replace Table 8.1 with the following:*

Parameter	Description
low level alarm	set at the snort level of the pumps
high level alarm	set at least 300 mm above stand-by cut-in level but never above the inflow emergency alarm level.
high-high level alarm	set at least 600 mm below the overflow alarm I but never above the inflow emergency alarm level.
overflow alarm	set at the ERS weir spill level
inflow emergency alarm*	set at the obvert (soffit) of the outlet to the wet well in the collecting chamber

NOTE: \*Required where emergency storage is not provide

### **8.7.3 Alarm Levels**

*Delete paragraph 3 and replace with:*

The station shall incorporate an overflow/spill alarm. The overflow/spill alarm shall be a float style alarm, which will be located as close as practicable to the overflow/spill level of the well to indicate when a spill commences and ceases.

### **8.8.2 Flow Measurement**

*Additional requirements:*

A magnetic flow meter is required on the pressure main, following the valve chamber.

CHW require an ABB - Water master flow meter or equivalent.

A dismantling joint shall be installed in the flow meter pit for maintenance purposes.

The flow meter shall be located within the prescribed upstream and downstream distances as per ABB flow meter installation manual.

The flow meter pit shall have natural drainage or if not possible have a suitable sump pump installed.

The flow meter shall have a high level float connected to the telemetry.

After successful commissioning of the sewerage pump station the flow meter shall be fully coated using the DENSO system or equivalent.

## **9 WET-WELL PIPEWORK**

### **9.1.1 General**

*Additional requirements:*

Vertical pipework shall be supported at maximum 3m intervals.

The discharge pipe work shall include a scour line to enable the pressure main to be drained back to the wet-well or into an adjoining sewer reticulation system. This shall include a Tee and valve pipe work

### **9.1.3 Type**

*Additional requirements:*

Grouting of penetrations through block outs shall be carried out using high quality non-shrink grout with at least the same strength as the parent concrete.

### **9.3.1 General**

*Replace paragraph 1 with:*

CHW does not permit buried valves, flow meters and other appurtenances for pipework and pressure mains <DN200.

## **10 PRESSURE MAIN**

### **10.2.1 General**

*Additional paragraph:*

Pressure main location is to be identified with relevant posted signs. Signs are to be erected at:

- • change of direction;
- • at fittings along the pipeline; and
- • maximum 500 m spacing

### **10.6.2 Fatigue Design for Thermoplastics Pipes**

*Additional requirement:*

The designer shall provide the results of the fatigue analysis supporting pipe selection.

### **10.9.3 Gas Release Valves**

*Additional requirements:*

The designer shall submit plans of proposed air release valve locations for CHW's approval prior to completing design plans. In determining the location of the air release valve the following factors are to be considered:

- • proximity to properties;
- • venting requirements and subsequent odour issues; and
- • aesthetics of vent.
- • lockable powder-coated vent cage.

## **11 STRUCTURAL DESIGN**

### **11.3.2 Products and Materials**

*Additional requirement:*

Only approved pipes and fittings shall be used. Pressure mains must comply with colour and marking requirements to differentiate pressure sewerage mains from potable water and recycled water pressure mains (sewerage pressure main colours are currently PVC pipe coloured cream; PE pipe coloured black). Pipe type, size, class and series (PVC pipe) shall be clearly notated on design and as-constructed drawings.

### **11.3.6 Above Ground Crossings**

*Additional requirement:*

The design shall ensure that any above ground pressure main does not interfere with the natural flow of water at any waterway crossings.

## **Part 2 – Products & Materials**

*Additional Requirement:*

Refer to products referred to in Part 1 of this Supplement.

# Part 3 - Construction

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## **22 TELEMETRY**

### ***22.1 Compliance with Authorities, Statutes, Regulations and Standard***

#### *Additional requirement:*

The design and installation of the SCADA system shall comply with CHW's 'SCADA System - Technical Specifications' (November 2009) requirements current at the time of tendering; a copy of which will be provided upon request.

# Part 4 – Standard Drawings

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## **Typical Arrangement - Sewage Pumping Station Access Covers**

'McBerns' custom made Built-in 4-Sided Void Protection Safety Lid  
System Design Registration No:336107 refer to Internet site for details.