

# Supervisory Control and Data Acquisition (SCADA) Guideline

**WSA 302—2016-1.1**



**WATER SERVICES**  
ASSOCIATION OF AUSTRALIA

## ACKNOWLEDGMENTS

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The WSAA Board would like to express its appreciation to WSAA Members and staff for their contributions to the first edition of the Guideline. Contributions from other industry organisations and individuals are also gratefully acknowledged. In particular, the following contributors deserve special mention for their productive work and commitment to the revision of this Guideline:

Mark Abela	TasWater
Jim Baker	Water Corporation
Paul Baxter	Jacobs – Guideline Consultants
Matthew Grills	Barwon Water
Luke Hellowell	SEQ Water
Jaimie Hicks	WSAA
Scott Humphreys	Water NSW
Matthew Nicholson	East Gippsland Water
Ben O’Halloran	Coliban Water
Russell Reichstein	WSAA
Dan Smith	Coliban Water
Justin Sorbello	Jacobs – Guideline Consultants
Michael Wassell	Sydney Water – Project Manager

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## PUBLICATION DETAILS

Published by:

Water Services Association of Australia Limited  
Level 8, 401 Docklands Drive  
Docklands VIC 3008 Australia

ISBN 1 920760 69 5

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## FOREWORD

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It gives me great pleasure to present the first edition of the SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) GUIDELINE which is an initiative of the Water Services Association of Australia (WSAA) and our members.

In recent years Australia's water sector, both urban and rural, has faced the full impact of climate variability and change. Diminishing rainfall, reduced runoff and consequent lower yields have undercut water security and resulted in water shortages in many cities and towns. More recently, floods have caused major threat, loss of life, damage and disruption, and challenged water infrastructure. Dramatic climate shifts and the potential for more extreme weather events present big challenges to Australia's urban water utilities.

Uncertainty and the prospect of climate change require the water industry as a major utility sector, to adapt. In response to these challenges, the urban water industry has already implemented a series of adaptation initiatives. To address the primary threat of inadequate water supply, governments and water utilities have responded through major water saving and supply augmentation initiatives to improve reliability. SCADA Systems are currently utilised by water utilities to monitor, control and provide real time information on their assets. These systems are crucial to the management of assets and delivery of services to existing and future customers.

The Australian water industry has a diverse range of SCADA assets and differing approaches in how they operate, maintain and manage their SCADA Systems. With technology rapidly advancing SCADA Systems continue to evolve to meet the needs of end users. This document will provide guidance, to water utilities when considering and implementing improvements, upgrades or changes to their SCADA Systems, against requirements that the water industry has identified as appropriate to the successful management of SCADA systems.

This edition of the Guideline addresses the entire life cycle of SCADA infrastructure, and incorporates the combined experience of the water utilities that formed the project delivery team. It has been simplified into three parts Labelled: Guideline Use, SCADA Integration with Business Policies and Specific Guidelines for SCADA Systems.

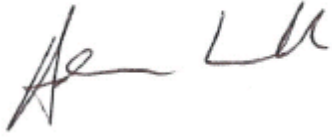
The adoption of industry standards (via codes or guidelines) will assist in the integration of a wider range of products and features whilst still achieving the needs and expectations of SCADA Administrators and Engineers.

In using WSAA Codes and Guidelines, it is important that designers and suppliers understand that it is their responsibility to provide the constructors with all the necessary information i.e. design drawings, project specification etc. to efficiently and safely build assets, to deliver water and sewerage services, sustainably for current and future generations.

The clear benefits of this Guideline extend beyond our members to the wider Australian community. The performance of network infrastructure is fundamental to achieving excellence in community health, commerce and industry, customer service, asset management and delivering sustainable water and sewerage services. This edition of the Guideline is the first step in providing guidance to the entire water industry in the implementation of SCADA systems; this will make a practical contribution to better achieving these goals.

WSAA is ideally positioned to provide national leadership in actively prosecuting its National Codes Initiative that commenced in 1997. As an industry association of the urban water utilities in Australia, WSAA's members supply the majority of Australian residential, commercial and industrial consumers with water and sewerage services. In developing Codes and Guidelines that articulate appropriate planning, design and construction practices, WSAA is providing a valuable training resource that can assist in building asset

management capability and capacity necessary for the ongoing reliable and successful performance of our network infrastructure.

A handwritten signature in black ink, appearing to read 'Adam Lovell', with a stylized flourish at the end.

Adam Lovell

Executive Director, Water Services Association of Australia

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## **PREFACE**

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### **THE NEED FOR TECHNICAL DOCUMENTATION**

Over recent years, a number of significant technological improvements have been undertaken by public Water Agencies in Australia and overseas. Data storage, information security, works management integration and enhanced water network performance are considerations for many Water Agencies looking for efficiency improvements and preparedness for potential changes in regulations.

SCADA Systems are currently utilised in Water Agencies to monitor, control and provide near real-time information on their assets. These SCADA systems are critical in achieving business objectives and it is imperative that Water Agencies apply a whole of life cycle approach to the design, procurement, operations and maintenance of their SCADA assets.

SCADA Systems in the Australian water industry consist of a wide range of equipment and networks that can vary considerably in their age, feature-set, connectivity, and vendor support. Furthermore, most systems have been built piecemeal over the years by a wide variety of contractors, vendors, and consultants, each with their own approaches. The result is that many Australian Water Agencies now find themselves with complex, varied, and mixed systems that are often difficult to manage and maintain in order to remain dependable.

Previous to this Guideline there has been little formal guidance on accepted industry practice in the application of SCADA systems to Water Agencies. There have been moves by regional water industries to define specific standards such as the Water Industry Technical Standard UK (WITS®), however, there is no SCADA standard specifically tailored for the water industry.

Individual Water Agencies have developed a range of in-house standards and specifications for their SCADA systems. These standards have typically been prepared in isolation for individual needs and have generally not been intended for use across different Water Agencies or to the wider market place in providing SCADA solutions.

A common set of Guidelines for Australian Water Agencies that addresses all aspects of the SCADA life-cycle was deemed highly beneficial to the WSAA membership and the Australian water industry. This publication is intended to define such a common set of Guidelines.

### **THE BENEFITS OF NATIONAL CODES**

Historically, Australia's urban water authorities developed and enforced their own parochial standards for design, construction, materials and products. The wide variety of requirements for pipeline systems created small, fragmented markets and hindered the mobility of suppliers, leading to higher costs than necessary.

National Codes, first published in 1999:

- facilitate consistent national reform and regulation of the water industry;
- provide a transitional mechanism for sharing water-industry specialist expertise as internal Water Agency resources diminish;
- provide a common technical reference for the development of industry training and skills accreditation programs for private sector suppliers;
- 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 water companies.

WSAA members have adopted the first editions of these codes with supplementary requirements and technical variations. These codes have been updated, over time, with the current version of the majority of the codes being the third edition. The codes are presented



in “performance based” terms together with ‘deemed to comply’ solutions. Alternative solutions may be accepted provided it can be demonstrated that they meet the performance requirements.

The SCADA Guideline, in conjunction with each Water Agency’s specific supplementary documentation may form a utility requirement. In the future, the Guideline may become a WSAA national code subject to the needs of WSAA members.

### **INNOVATION**

This Guideline has been developed to consolidate current industry practice. It is not intended to inhibit innovation. It does not purport to address all SCADA system related situations and options.

The clear benefits of this Guideline and other WSAA Codes, Standards, Specifications and Tools extend beyond WSAA members to the wider Australian community. The performance of network infrastructure is fundamental to achieving excellence in community health, commerce and industry, customer service, asset management and delivering sustainable water and sewerage services. The Guideline makes a practical contribution to better achieving these goals.

### **THE WSAA WEBSITE**

The following information is available from the WSAA website [www.wsaa.asn.au](http://www.wsaa.asn.au). More information may be added over the life of this edition:

- Guideline Appendices
- Product Specifications
- Product and Material Information and Guidance
- Water Industry Product Standards
- Technical Notes
- Product Appraisal Reports

## INTRODUCTION

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### SCOPE OF GUIDELINE

The WSAA SCADA Guideline, together with a Water Agency supplement and other referenced documents, sets an Agency's requirements for:

- Minimum acceptable, good and best practices for SCADA systems in the Australian Water industry;
- Application of existing relevant industry standards for SCADA subsystems or related processes to the Australian Water industry;
- SCADA systems for treatment, distribution and source management; and
- SCADA system integration and interaction with broader business policies and systems.

This Guideline also covers SCADA systems interconnections with field instruments, business applications, process and policies. This Guideline does not cover the specific requirements for these items, only the interface between the item and the SCADA system unless explicitly stated.

This Guideline is vendor neutral and does not identify specific manufacturers or vendors throughout the document.

### GUIDELINE PURPOSE

The purpose of the Guideline is to provide guidance to water agencies in applying best practice in all stages of the SCADA lifecycle. Since the design, development, implementation, operations, maintenance and replacement of SCADA systems are all distinct life-cycle stages of the system, this Guideline also outlines which of the hierarchy of sub-sections apply at each stage. This will assist Water Agencies to apply the guidelines to their position appropriately.

The structure of this Guideline is outlined below:

- “Part 1” focuses on how to use and apply the Guideline. This is a critical piece of documentation outlining the approach to achieving best practice and depends on the capability maturity level and aims of the Water Agency.
- “Part 2” focuses on high level existing management policies and procedures to integrate these policies with the requirements of SCADA systems. Each subsection outlines how to integrate this set of documentation within the Water Agency's broader policy areas.
- “Part 3” focuses on specific guidelines that apply to the various stages of the SCADA system life-cycle. This includes:
  - Plan, Design and Procure;
  - Construct and Commission; and
  - Operate, Maintain and Dispose.

### NORMATIVE AND INFORMATIVE

This Guideline provides a mixture of normative and informative statements.

The normative requirements are a mixture of prescriptive and performance statements. Where the statement is normative this document uses the term “shall”. It should be understood however that this is a Guideline and it is up to each individual Agency as to how this Guideline is utilised within their business

The informative statements provided in this Guideline have been interspersed throughout the normative requirements to provide some context and enable better understanding of the normative requirements. All “Rationale/Overview” sections contain only informative text. Informative text has been italicised to enable clearer differentiation.

It is emphasised that the exact approach taken to all aspects of a SCADA system project is the decision of the Water Agency and its authorised planners, designers and constructors. This Guideline provides technical information to aid in that process.

## **APPLICATION OF THIS GUIDELINE**

The three parts of this Guideline are designed to be used by a Water Agency at the appropriate stage of the SCADA lifecycle. To facilitate this, each part of this Guideline provides a standalone explanation of the scope, use and application of the lifecycle approach to this Guideline. The requirements can be used to offer guidance or text for new documentation, processes or procedures being developed by a Water Agency. Requirements and best practices can provide targets or aspirational development goals for Water Agencies to guide the design or specification of new equipment, systems or processes.

To assist with the appreciation on how to interpret the requirements in a manner suitable for Water Agencies of different scale and size, examples have been provided from existing Water Agency standards.

## **APPENDICES**

The Appendices provided are detailed examples taken from Water Agencies on how to implement elements of this Guideline and are referenced in relevant Sections from Parts 2 and 3. These are referential examples only. If they are used for a particular application, the person using them must satisfy themselves as to their accuracy, relevancy and currency (by contacting the owner of the document). WSA takes no responsibility for currency, relevancy or suitability for their use as they are provided as examples only.

As necessary, documents referenced and abbreviations used are listed in each Appendix.

Unless otherwise stated, all clause and table references refer to this Guideline.

## **WORK HEALTH AND SAFETY (WHS) LAWS**

The model work health and safety laws consist of the Model Work Health and Safety (WHS) Act; supported by model WHS regulations, model Codes of Practice and a National Compliance and Enforcement Policy.

Safe Work Australia is the national policy body responsible for the development and evaluation of the model work health and safety laws. The Commonwealth, states and territories are responsible for regulating and enforcing the laws in their jurisdictions.

The model work health and safety laws are the basis for harmonised laws across Australia. For the model work health and safety laws to become legally binding, they need to be enacted or passed by Parliament in each jurisdiction. At the time of writing, Western Australia and Victoria have yet to enact these standards. This is forecast for 2017.

Information on each jurisdiction’s progress in implementing the new laws can be found using the following link: <http://www.safeworkaustralia.gov.au/sites/swa/model-whs-laws/pages/jurisdictional-progress-whs-laws> .

The application and consideration of WHS requirements for each stage of the lifecycle are provided in Sections 1 and 3.

## PROPOSED AMENDMENTS

WSAA invites users of this Guideline and its supporting documentation to propose amendments. An amendment proforma can be downloaded from [www.wsaa.asn.au](http://www.wsaa.asn.au).

To increase the likelihood of suggested amendments being adopted, it is recommended that users of the Guideline seek preliminary review by and support of a WSAA Member or other relevant organisation, for example, CSIRO, Civil Contractors Federation or PIPA for inclusion with the submission.

Amendments will be published from time to time on the WSAA website. Users may register their interest so that published amendments can be emailed directly. To register, please submit your name, position, company and contact details, together with the WSAA Code titles in which you have an interest, to [codes@wsaa.asn.au](mailto:codes@wsaa.asn.au).