



Hunter Water Corporation A.B.N. 46 228 513 446

Standard Technical Specification for:

OPERATION AND MAINTENANCE MANUAL REQUIREMENTS

STS 906

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Standard Technical Specification Preparation of Operation and Maintenance Manual – STS 906

1 Purpose

All assets, equipment and components that have operating or maintenance regimes that have regulatory, statutory or warranty impacts or require specialist training or tools must be supplied with an Operation and Maintenance (O&M) Manual. This Standard Technical Specification (STS) details the requirements for the provision of an O&M Manual for Hunter Water systems which comprise the construction or installation of several assets.

These systems include, but are not limited to:

- Wastewater pumping stations
- Water pumping stations
- Treatment facilities
- Chemical dosing facilities
- Actuated and remotely operated equipment

O&M manuals are required to detail the function of the asset and components, detail the equipment installed, equipment maintenance and servicing requirements and fault finding / troubleshooting references. The O&M Manual also contains contract and WAC information required as part of the commissioning process. It does not cover requirements for:

- Work as Constructed (WAC) Drawings specified in *STS 903*
- Electrical Drawings specified in *STS 904*
- Mechanical Structural and Civil Drawings specified in *STS 911*

The O&M Manual is prepared in two stages:

- The first stage is provided by the Designer as part of the detailed design deliverables.
- The final stage is provided by the Contractor as part of Work as Constructed (WAC) deliverables.

O&M Manuals are required for assets, equipment and components that meet one or more of the following criteria:

- The item has a specific maintenance or operating regime that must be applied if regulatory (e.g. flowmeter calibration), statutory (e.g. safety, environmental legislation) and/or warranty requirements are to be met.
- The item performs a critical functional role in the treatment or transport process (i.e. if the item were not appropriately maintained/operated the process would be compromised).
- The item requires specialist training for operators and/or maintainers.
- The item requires specialist tools or spares for operation and/or maintenance.

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2 Interpretation

For the purposes of the interpretation of *STS 906*, except where the context requires otherwise:

- 'Drawings' means the drawings detailing the work involved in a particular project.
- 'Include' means including but not limited to, and is used to provide clarification or examples of the type and nature of items intended.
- 'Specification' means a specification detailing the work involved in a particular project.
- 'Standards' means applicable industry standards including the Australian Standards (AS), Australian / New Zealand Standards (AS/NZS).
- 'Standard Drawings' means Hunter Water Corporation drawings.
- 'Standard Technical Specification' (STS) is a reference to any of Hunter Water's Standard Technical Specifications, as implied by the text.

Headings are for the convenience of the reader and shall not be used in the interpretation of this STS.

Unless the stated otherwise any expression such as "give notice", "submit", "approval", or "directed" means give notice to, submit to, approval by, or directed by the person nominated by the Hunter Water.

Approval does not imply acceptance of responsibility by Hunter Water for compliance with this STS. Unless approval has been issued in writing by Hunter Water, approval has not been granted.

2.1 Order of Precedence

The hierarchy of specifications unless states otherwise in project specific specifications are:

1. Specification, Drawings, Standard Drawings (project documents)
2. Facility related STS
3. Equipment related STS
4. *STS 906*

3 Roles and Responsibilities

3.1 Document Owner

The Document Owner of this STS is the Manager Asset Management.

3.2 Responsibilities

Any request for a variation to this STS shall be made in accordance with the change management process in *Hunter Water Asset Standards Management Plan*.

The Document Owner shall approve in writing the issue of any updates.

4 Definitions

Where the following term, abbreviation or expression occurs in this STS, it is defined as follows, unless the context implies otherwise:

Term / Abbreviation / Expression	Definition
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
Contractor	The organisation undertaking some or all of the manufacture, supply, installation, construction or commissioning of assets.
Ellipse	Hunter Water Enterprise Resource Planning System
FMEA	Failure Modes and Effects Analysis
Hunter Water	Hunter Water Corporation
OEM	Original Equipment Manufacturer
TRIM	Hunter Water Document Management System

The following additional terms are defined in the Work Health and Safety Act, NSW, 2011:

- o Designer
- o Manufacturer
- o Supplier
- o Installing, constructing or commissioning

5 Compliance Requirements

5.1 Standards

O&M Manuals shall comply with:

- This STS
- Other relevant Hunter Water Standards
- Relevant Australian Standards

Any deviation from *STS 906* shall be approved in writing on a case by case basis by an authorised Hunter Water representative.

5.1.1 Australian Standards

Where a Hunter Water Standard or other requirement has not been specified, drawings are to comply with the current relevant Australian Standards.

5.1.2 Hunter Water Standards

Documentation is to be provided as per this STS and other Hunter Water documentation as referenced in Section 2.1.

Where the standards are referenced throughout this STS, they will refer to the number only.

5.2 Copyright

All electronic files supplied by Hunter Water are the property of Hunter Water. This includes, but is not limited to, the contents of the O&M Manual Information Package (“the Files”). Hunter Water retains all intellectual property and related rights in or relating to the Files including without limitation copyright (including future copyright); confidential information, and all other rights conferred by statute, common law or equity in relation to the Files.

The purpose of the Files is to assist the user in the production of O&M Manual information for Hunter Water in accordance with this Standard Technical Specification and to confirm whether the O&M Manuals produced for Hunter Water are compliant with this STS (Intended Use).

The Files are not to be used, copied, modified, manipulated, supplied, reproduced, provided or disclosed by or to any other person or for any purpose other than the Intended Use without the prior written consent of Hunter Water.

To the extent permitted by law, all conditions and warranties concerning the Files expressed or implied by statute, common law, equity, trade, custom or usage or otherwise are expressly excluded. Hunter Water makes no representation as to the stability of the Files and accepts no liability for any loss or damage arising from the instability of the Files.

Hunter Water is not required to provide maintenance support for the Files or detailed instructions on operational use.

The user must ensure that the Files are used:

- In accordance with any instructions provided by Hunter Water;
- Appropriately and only for such of the Intended Use for which the user is appropriately insured;

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- Not used, accessed, operated or copied by or provided to any persons, other than those officers, employees or agents of the user who are aware of and have agreed to be bound by these terms and conditions.

The user indemnifies and will keep indemnified Hunter Water against all actions, suits, claims, demands, costs, charges, damages, liabilities, loss and expenses to which Hunter Water may incur arising out of the provision to the user of, and any use, reproduction or disclosure of or change to, the Files by the user or any other person claiming through the user, which is in any way connected with or arises from the use of the Files.

Files submitted to Hunter Water shall become the copyright property of Hunter Water.

6 O&M Manual

6.1 Information Provided by Hunter Water

6.1.1 Operation and Maintenance Information Package

Hunter Water will provide an Operation and Maintenance Information Package of two file templates as follows within two weeks of request:

- OM_Manual_Template.doc
- Technical_Data_Sheet template.xls

The designer shall review the O&M Manual requirements and template and ensure that the documentation and drawing requirements from the relevant Hunter Water Design Code or Manual are fully addressed. Where required, the O&M Manual template is to be adjusted or expanded to meet the current Design Code specifications.

The original or the revised technical data sheet is attached as an appendix to the O&M Manual template.

The Designer and Contractor shall complete these documents and shall provide support documentation as additional Appendixes.

- Editable document formats shall be provided without data protection or passwords.

6.1.2 Asset Information

The Hunter Water Project Manager, Contract Officer or Accounts Executive shall also supply the following asset information within two weeks of request:

- Asset Name
- Equipment Reference Number
- Civil, Structural or Mechanical Drawing Number
- Electrical Drawing Number
- TRIM References

6.2 O&M Manual Document Configuration Requirements

6.2.1 Filenames

The generic files in the O&M Manual Information Package are to be renamed to become asset specific for the Information Package. Rename the two files in the package as follows

- The Equipment Reference Number will replace the word “template” in the O & M Manual Template file (e.g. O&M_Manual_SSBER018.Doc).
- The Equipment Reference Number will replace the characters “XXXX” in the filename of the Technical Data Sheet Template file (e.g. technical_data_sheet_SSBER018.xls).

Name each Appendix as a separate file (e.g. OM Manual SSBER018 Appendix 1-#.doc, where # is the number of Appendixes in the manual)

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The PDF file of the O&M Manual is to be labelled the same as the Template with the letters PDF at the end. (E.g. O&M_Manual_SSBER018_PDF.pdf)

6.2.2 Configuration Management

All documents supplied electronically, including appendices, shall include the revision number in filename, as follows:

- Initial Draft <filename as per Section 6.2.1> r 0.1<.xls or .doc or .pdf>
- Subsequent Draft <filename as per Section 6.2.1> r 0.2<.xls or .doc or .pdf>
- Final <filename as per Section 6.2.1> r 1.0<.xls or .doc or .pdf>

File revisions must be updated for each submission to Hunter Water.

The document templates supplied by Hunter Water also include a Configuration Management Section which shall be updated to reflect the revision status of the document.

Documents with incorrect configuration management will be rejected and will require resubmission.

6.2.3 Document Quality

All scanned documents must be 150dpi or greater and easily read online or when printed.

Supply all information in English.

6.2.4 Appendices

After scanning original signed sheets or certificates (checklist warranties etc.) are to be attached in the appropriate appendices in the hard copy.

Relevant information to Hunter Water is that which relates to maintaining or repairing the equipment and identifying replacement parts.

List the appendices in the table of contents and add a cross reference in the relevant section of the document.

If information is from a third party, only relevant pages are to be included.

If a page contains relevant and none relevant information, clearly identify the relevant information.

Information that does not directly relate to the installed equipment is to be removed or shown in strikethrough.

6.2.5 Hardcopy layout

The document shall be neatly bound in loose leaf hardback (4 ring “D” type) binders at A4 Size. The front and side labels shall be securely attached to the folder.

Each section of the O&M manual is to be separated by a labelled divider. A3 print outs shall be folded so they can be suitably opened.

6.2.6 Submission

6.2.6.1 Electronic

Submit the Operation & Maintenance Information Package electronically as follows:

- One editable file of the O&M Manual in the same format as the Hunter Water template.
- A separate file for each appendices, in the same format as the O&M Manual template.
- One copy of the O&M Manual completed as a single PDF document, including appendices.
- The updated Technical Data Sheet Template File.
- Suitably labelled CD, USB Key or other suitable device.

6.2.6.2 Hard Copy

Provide one hardcopy printed from the draft/final editable file of the O&M Manual, all appendices and the printout of the exported data sheet file from the Technical Data Sheets.

6.3 O&M Information to be provided

6.3.1 Submitting and Acceptances of Documentation

The Designer and Constructor shall submit the required documentation in electronic and hardcopy.

6.3.2 Safety and Risk Information

Hunter Water and Hunter Water stakeholders, including designers, manufacturers, suppliers, and organisations involved in installing, constructing and commissioning, have obligations defined within:

- The WHS Act, NSW, 2011
- The WHS Regulations NSW, 2011
- WHS Codes of Practice
- Relevant Australian Standards

In order to meet those obligations, Hunter Water requires appropriate risk and safety information to be provided as part of the O&M Manual package. This information will be confirmed by Hunter Water on a project by project basis and will include, but not necessarily be limited to, the following table.

Table 1: Safety and Risk Information

Area	Designer	Contractor (Installing, Commissioning, Supplying)
Mandatory Information to Identify Risks, Controls and Residual Risk		
Overall	Safety in Design Report	Pre and Post Commissioning Risk Assessments All risk information from sub consultants and suppliers of equipment installed or commissioned.
Project Based Information		
Mechanical or Electrical guarding Equipment with E-Stops	Design Risk Assessments to AS 4024.1-2006 Series Safety of Machinery FMEA	Final Risk Assessments to AS 4024.1-2006 Series Safety of Machinery
Installation of Plant and Equipment		Equipment Risk Assessments for manufactured plant and products Commissioning and Operational SOP's and SWM
Commissioning and Operations		Safe Operating Procedures Safe Work Method Statements
Processes and Integrated Systems	HAZOP	HAZOP Systems Integration Risk Assessment

Risk assessments are to be conducted based on:

- Hunter Water Risk Management Framework Version 3.0
- AS/NZS ISO 31000:2009 Risk management – Principles and guidelines

Regardless of the information requested by Hunter Water, stakeholders must ensure they meet their obligations within the WHS Act, WHS Regulation, and associated legislation and standards.

6.3.3 O&M Manual Information

Submit O&M manual information in the following format.

Table 2: O&M Manual Information

Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
Contact Information			
Contact Details	Name Address Phone Fax Email	Name Address Phone Fax Email	Word
Reference Number	The Designer Project or Job number	The Contractor Project or Job number	Word
Hunter Water Contract Number	The Hunter Water reference number	The Hunter Water reference number	Word
Description of work	Design brief: Scope of work to be completed	Scope of work to be completed under the contract	Word
Defect Liability			
Equipment covered by warranties	NA	All equipment covered by warranty and warranty period. Warranty certificates attached as Appendix 1	PDF
Spare Parts and Special Tools	NA	List of any spare parts supplied under the contract: <ul style="list-style-type: none"> • Critical Spares • Operational Spares • Special Tools 	Spreadsheet
WAC Information			
WAC Drawings	NA	Supplied in accordance with STS 903	AutoCAD
WAC and Construction Drawings Location	NA	List the location of the WAC Drawings and the Trim References of the Construction Drawings files with in	Word

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Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
		the Hunter Waters electronic system.	
Commissioning	NA	The commissioning and any re-commissioning original signed sheets are to be included as Appendix 2	PDF
Asset Operational and Maintenance Details			
Asset Function	A description of <ul style="list-style-type: none"> The asset function (what does it do?) Asset operation (how does it do it?) Interactions with other assets 	NA	Word
System hydraulic overview	A graphical representation of where the asset fits in the Hunter Water system and how it interacts with the other assets in the system, for more details See Appendix 2.	NA	PDF
Operation Procedures			
Assets Operation	A description of asset general operation. Include relevant information such as: <ul style="list-style-type: none"> Level settings Overflow points The way the Asset control works Interactions with other assets in the system 	An overview of the function and intended operation of equipment and installed components within each functional unit. Include relevant process flow diagrams and P&ID drawings.	Word
Restriction on Asset Operation	List any limitation on the asset or any individual part of the asset caused by factors within the network or the asset.	List any limitation on the asset or any individual part of the asset caused by factors within the network or the asset.	Word
Start Up/Shut Down	Step by step procedures for start-up & shut down for the asset and other associated equipment	Step by step procedures for start-up & shut down for the asset and other associated equipment	Word
Isolation	Safe isolation procedures for the asset for shut down and maintenance, including: <ul style="list-style-type: none"> Safe isolation isolate the asset from the whole system Safe operation of the system without the asset 	Safe isolation procedures for the asset for shut down and maintenance, including: <ul style="list-style-type: none"> Safe isolation isolate the asset from the whole system Safe operation of the system without the asset 	Word

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Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
Fault Conditions	NA	A full list of fault conditions, including: <ul style="list-style-type: none"> • How the fault is generated, • Consequence of each fault • How to reset or overcome the fault 	Word
Emergency Procedures	List of possible emergency scenarios and procedures.	List of possible Emergency scenario and procedures.	Word
Surcharge Details	For wastewater collection system only, such as: <ul style="list-style-type: none"> • Wastewater Pump Station, • Storm flow bypass pumping system or • Offline storage Details as per the Technical Data Sheet See Appendix 2	For wastewater collection system only, such as: <ul style="list-style-type: none"> • Wastewater Pump Station, • Storm flow bypass pumping system or • Offline storage Details as per the Technical Data Sheet See Appendix 2	Template
Generator Connection Details	Only if portable generator connections are required See Appendix 2 Details as per the Technical Data Sheet	Only if portable generator connections are required. See Appendix 2 Details as per the Technical Data Sheet	Template
Process systems SOPs / SWMSs	NA	Include copies of Standard Operating Procedures (SOPs) / Safe Work Method Statements (SWMSs) for all equipment.	Word
Safety Data Sheets (SDS) Register	NA	A register of all chemicals required for use in the day to day operation and routine and periodic maintenance of the equipment.	
Asset Equipment			
Equipment Technical details Tables			
Pump and Motor	NA	Details as per Pump Details section in Technical Data Sheet	Template
Level Monitors	NA	Details as per this section in Technical Data Sheet	Template
PLC & Telemetry	NA	Details as per this section in Technical Data Sheet	Template
Valves	NA	Details as per this section in Technical Data Sheet	Template

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Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
Pump Details (Remove if not a pump station)			
Pump certified test curves	NA	Provided by the pump manufacturer.	PDF
Pump Published Curves	Provided by the pump manufacturer	Provided by the pump manufacturer	PDF
Motor test curves	NA	Provided by the pump manufacturer	PDF
Motor published curves	Provided by the pump manufacturer	Provided by the pump manufacturer	PDF
Test result log sheet	Provided by the pump manufacturer	Provided by the pump manufacturer	PDF
Motor torque/speed/efficiency characteristic curves	NA	Provided by the pump manufacturer	PDF
Drawings:	NA	General Arrangements including pump & discharge bend assembly (dimensioned). Sectional Arrangement with parts and material lists Dimensioned Motor Arrangement Sectional Arrangement with parts list and material lists Gland Sealing Arrangement including submersible power cables	PDF
PLC and Telemetry (if installed)			
Operation of the PLC & telemetry	Summary description of the PLC Operation & telemetry, including interaction with the PLC / Telemetry and other assets.	Functional Specification of the PLC & telemetry	Word
Peripheral Equipment (If installed)			
Includes: <ul style="list-style-type: none"> • Compressor • Generators • Odour & Sterilising units • Overhead Cranes • Pressure Vessels 	NA	Refer to Section Error! Reference source not found. Details as per Peripheral Equipment section in Technical Data Sheet	Template

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Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
Other Installed Equipment (equipment which is not detailed in another section of the O&M Manual)			
List of Other Installed Equipment	NA	List of components installed: <ul style="list-style-type: none"> • Of the class listed in the Approved Product list; or • Valued at more than \$5,000; and • Components not on an Approved Product List that has been approved for this project. 	Word
Technical and Replacement Details	NA	Technical specifications for components listed above	Word
Maintenance Information			
Trouble shooting instructions for large components (e.g. pump and motors etc.).	NA	Step by step procedures for: <ul style="list-style-type: none"> • Dismantling and reassembly of the unit (pumps, motors etc.) • the use of special tools • Replacement of wearing parts such as bearings, seals, wear rings, etc. 	Word
Maintenance scheduling	NA	Sufficient information from the OEM Manual to allow maintenance to be determined including routine overhauls required to achieve operational design life. (Not the whole manual)	Word
Drawings and schedules	NA	As required for asset installation, operation and maintenance	PDF
Performance Testing	NA	Metrics and procedures to measure equipment performance to ensure it is operating at required function and capacity.	Word
OEM Manuals	NA	A summary of the OEM manuals for the major components to be attached as Appendix 4..	PDF
Risk Information			
	A summary of Safety and Risk information as per	As per Section 6.3.2	PDF

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Item	Stage		Format
	Design Stage - Designer to Provide	WAC Stage - Contractor to Provide	
	Section 6.3.2 Risk Assessments and supporting information to be provided within Appendix 5 Safety and Risk		

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6.3.4 Design Stage Information

The Designer shall provide draft documentation and summarise the information specified in Table 2 within the O&M Manual Template and Technical Data Sheets.

6.3.5 Design Stage Information

The Designer shall provide the Operation and Maintenance Information Package. The package contains:

- If required (refer 6.1.1) use the revised Table 2 (O&M Manual Information), attached as an appendix to the O&M Manual.
- The Designers part of the O&M Manual completed as specified in approved table 2 (Originator or Revised) and it file relabelled.
- The Technical Data sheet with its file relabelled.
- A PDF and hardcopy version of the O&M Manual.

6.3.6 Work as Constructed Stage Information

Prior to the commissioning stage, the contractor shall:

- Use the Table 1 in STS 906 unless a revised Table 2 has been included as an appendix to the O&M Manual in the Operation and Maintenance Information Package.
- Complete the O&M Manual by providing the information required as specified in Table 2.
- Complete the Technical Data Sheets in the Excel spreadsheet supplied.
- Review any information provided in the Design Stage and revise any which has changed during Construction.
- Provide all associated documentation as outlined in Section 6.2.6

7 Related Documents

Other Hunter Water drawing standards include:

- STS 904 – Standard Technical Specification – Preparation of Electrical Drawings
- STS 903 – Standard Technical Specification – Preparation of Work as Constructed Drawings
- STS 911 – Standard Technical Specification – Mechanical Civil and Structural Drawings

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8 Document Control

Version	Date	Author	Details of Change	Approval Date	Approved by	Next Scheduled Review
1.0	Jan 2014	R Payne	New Standard	Jan 2015	S Horvath	Dec 2016
1.1	July 2016	R Payne	Table 2 – Add Pump Published Curves	July 2016	S Horvath	Dec 2016

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Appendix 1. Australian Standards

Name	Number
AS 4024.1-2006	Series Safety of Machinery
AS/NZS ISO 31000:2009	Risk management – Principles and guidelines

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Appendix 2. O&M Manual Instructions

A.1 Introduction

These instructions are for the purpose of creating an O&M Manual using the template O&M Manual Template.Doc.

A.2 Documents Required to Create an O&M Manual are

1. O&M Manual Template.doc
2. Technical Data Sheet Template.xls

A.3 Additional Information for Table 1

A.3.1 System Hydraulic Overview

Sewer Station

- For most sewer stations, show all upstream stations and the next downstream also the treatment works joined with a dotted line to the downstream station. For any station that has too many upstream stations to show on one page, show as much of the network as can be fitted on the page working from the station in this contract. Above the last station on each branch that can fit on the page list the rest of the contributing stations, in their location order.

Water Stations

- Show as much of primary configuration of the upstream water system and the next downstream pump station or reservoirs that can fit on one page, starting from the station in this contract

A.3.2 Generator Connection Details

If no generator connection is available at the asset enter the following text:

- “Not set up to be connected to a portable generator”

If a generator is permanently installed enter the following text:

- “Permanent Generator Installed, Refer to Peripheral Section for details”

A.3.3 Peripheral Equipment

If peripheral equipment is not installed, enter the following text:

- “Permanent No Peripheral Equipment Installed”

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