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| Assets Planning and Delivery Group Engineering |

DESIGN STANDARD DS 26-46

Type Specifications – Electrical

Design & Construction Specification

for

 Minor LV Switchboard Replacement

under

‘Technology Licence Agreement’

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|  |
| version 1revision 3 |
| April 2024 |

**Design & Construction Specification Template Guidance Notes**

**\*\**REMOVE COVER AND GUIDANCE NOTES AFTER SPECIFICATION COMPLETED AND READY FOR ISSUE*\*\***

* Please note this Specification Template is for the DESIGN & CONSTRUCTION for MINOR LV SWITCHBOARD REPLACEMENT & ASSOCIATED WORKS only - (maximum LV switchboard capacity 440A)
* The Preferred Supplier Agreements for the Manufacture and Supply of LV Switchboards with or without site installation with Western Controls and Leicon Notley include project engineering design (Primary Design Drawings), project detail design, switchboard design and manufacture, factory acceptance testing, installation, site acceptance testing, commissioning, SCADA integration and all related activities
* The Preferred Supplier Agreement for the Manufacture and Supply of LV Switchboards with Kounis Metal Industries excludes the engineering (Primary Design) and installation aspects for A1, A2 and B switchboards from the scope of work
* Minor LV Switchboard Replacement & Associated Works Process Summary:

1. The Design Manager, generally an electrical engineer, will prepare the Design & Construct documentation based on the standard Design & Construction Specification Template

2. Leicon Notley and/or Western Controls and/or Kounis will be invited to submit bids, via the Procurement and Property Business Unit, in accordance with the requirements of the Design & Construction documentation

3. The Design Manager and Project Manager will carry out a technical evaluation of the Design & Construction tender submissions

4. Once a tender submission for a project is accepted by the Design Manager, the Project Manager will initiate placement of a purchase order to award the job to the successful tenderer

5. The successful tenderer (Leicon Notley or Western Controls or Kounis) will complete the work in accordance with the requirements of the Design & Construction contract

* The Design Manager shall ensure that this Design & Construction Specification contains the information required from the Service Agreement and the Design Deliverables Checklist (as agreed with the Design Team Leader, Section Manager and Project Manager)
* Use of the word ‘shall’ makes the requirement mandatory. Use of the words ‘may’ and ‘should’ make the requirement optional as applicable to the design job
* Guidance notes (in blue) have been prepared to assist in document preparation. They are present throughout the template and must be deleted before printing/signing
* Standard text (in black) under main and sub-headings must remain unchanged in the issued specification
* When using the template document, text between arrows (e.g. <Date>) needs to be edited to reflect the specific design job
* Standard clauses and sub-clauses (in black) shall not be deleted

**Front Cover**

The design job title shall clearly reflect the asset location and type, e.g. *Wagin Union St PS2 switchboard Replacement.*

**Document Footer**

The date in the document footer shall be the same as the date of the latest revision as identified in the Table of Revisions.

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**Copyright Notice**: The copyright notice shall not be modified or deleted.

**Document Preparation and Endorsement**

The standard text above and below the endorsement signatures shall not be modified or deleted.

**Table of Revisions**

The table of revisions shall be updated to list each revision of the document.

The latest revision date as identified in the table of revisions shall be transferred into the document footer.

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Assets Planning and Delivery Group

Engineering

**Design & Construction Specification**

**for**

**Minor LV Switchboard Replacement & Associated Works for**

**< *insert project title*>**

**Project Number(s): < *insert* >**

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**Document Preparation and Approval**

Signing of this document by the Design Manager indicates that:

1. The Project Manager and Service Delivery Representative have been consulted.
2. Where the job involves more than one engineering discipline, the specification has been reviewed by people competent in each discipline.
3. Funding for the scope of this Specification is secured and availability confirmed by the Project Manager.

Prepared By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name:

Position: Design Manager

Approved By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name:

Position: Principal’s Representative

Contractors shall accept this specification only if the Principal’s Representative has approved it. Approval may be either by signature above on a hard copy or by issue of this specification as an email attachment from the Principal’s Representative.

**TABLE OF CONTENT**

[<*Project Title*> 10](#_Toc84930743)

[1 Introduction 10](#_Toc84930744)

[1.1 Corporation Contact 10](#_Toc84930745)

[1.2 Bid 10](#_Toc84930746)

[2 Project Description 10](#_Toc84930747)

[2.1 Project Background 10](#_Toc84930749)

[2.2 Project Scope 11](#_Toc84930750)

[2.3 Project Risks 11](#_Toc84930751)

[3 Field Work - Occupational Safety and Health Risks 12](#_Toc84930752)

[4 Water Corporation Standards, Specifications and Documents 12](#_Toc84930753)

[5 Project Requirements 12](#_Toc84930754)

[5.1 General Design Requirements 12](#_Toc84930755)

[5.2 Electrical 13](#_Toc84930756)

[5.3 SCADA, Instrumentation & Control 13](#_Toc84930757)

[5.4 Other 13](#_Toc84930758)

[5.5 Project Schedule 14](#_Toc84930759)

[5.6 Operability Study 14](#_Toc84930760)

[5.7 Constructability Review 14](#_Toc84930761)

[5.8 Safety in Design 14](#_Toc84930762)

[5.9 Asbestos Management Process 15](#_Toc84930763)

[5.10 Others as required 15](#_Toc84930764)

[5.11 Design Deliverables 15](#_Toc84930765)

[5.12 Project Schedule and Hold Points 15](#_Toc84930766)

[6 Switchboard Manufacture *<and Delivery>* 16](#_Toc84930767)

[7 Construction (if required) 16](#_Toc84930768)

[8 Site Testing (if required) 17](#_Toc84930769)

[9 Commissioning (if required) 17](#_Toc84930770)

[10 Training 17](#_Toc84930771)

[11 As-Constructed Information 18](#_Toc84930772)

[12 Progress Meetings 18](#_Toc84930773)

[13 Third Party Review 18](#_Toc84930774)

[14 Drawing Deliverables 18](#_Toc84930775)

[15 Appendices 18](#_Toc84930776)

**TABLE OF REVISIONS**

| **REVISION STATUS** |
| --- |
| **VER./****REV.** | **DATE** | **PAGES REVISED** | **REVISION DESCRIPTION****(Section, Clause, Sub-Clause)** | **RVWD.** | **APRV.** |
| **1/0** | **Aug 2019** | **All** | **New Edition** | **EDG** | **NHJ** |
| **1/1** | **Oct 2021** | **All** | **Kounis manufacturer added** | **EDG** | **EDG** |
| **1/2** | **Aug 2022** | **All** | **Avid Resources replaced with Leicon Notley** | **SWG** | **TL** |
| **1/3** | **April 2024** | **All** | **Section 5.3, Appendix** | **TL** | **EDG** |

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# <*Project Title*>

# Introduction

This specification, together with the Contract documents, details the requirements for the work, manufacture, *<installation>*, programming, documenting, testing *<and commissioning>* of a switchboard, control cubicle and associated worksfor < *Project Title(s)* >.

This specification applies to the switchboard capacity not greater than 440A (switchboard types A1, A2 and B). The project scope is limited to switchboard replacement and the associated work only. No major works of other disciplines such as structural, mechanical, etc. is required.

The Contractor’s work comprises *<engineering design (Primary Design*),> switchboard design, control cubicle design, switchboard manufacture, *<supply of equipment, installation,>* programming, documenting, testing, *<commissioning and handover>*.

Note: Kounis Metal Industries agreement excludes the engineering (Primary Design) and installation aspects for A1, A2 and B switchboards from the scope of work.

The performance and output of the design and construction work described in this specification shall comply with all requirements of the specification, the Corporation’s *Engineering Design Manual* (EDM) and the Water Corporation Design Standards in particular DS20, DS22 and drawings MN01.

The design and construction of the switchboard shall comply strictly in accordance with the *Technology Licence Agreement*.

SCADA (including instrumentation, control, and communication) works shall be carried out by a PCS panel member.

## Corporation Contact

The Corporation contact for all technical issues relating to the work shall be the Design Manager.

|  |  |
| --- | --- |
| Name: | <*insert*> |
| Position: | Design Manager |
| Address: | <*insert*> |
| Phone Number:  | (08) |
| email: | <*insert*>@watercorporation.com.au |

## Bid

Please complete all details required within the attached *Bid Invitation* document.

*Note: The Bidder shall prepare the Schedule of Prices based on the critical requirements of the project, such as the number of cubicles, starter type and capacity, operational requirements, <number of earth electrodes>, etc. and this base clearly stated in their bid.*

# Project Description

1.

## Project Background

Define the project background & reasons for the project.

Site location and access

Reference to attached documents.

## Project Scope

Design and Construction work by the Contractor

* *<The Contractor shall prepare Engineering Design (Primary Design) drawings to a level of detail sufficient to cover the scope of the work and the development of the detail design drawings in accordance with DS20, DS22 and MN01>*
* The Contractor shall prepare Engineering Design and Detail Design for SCADA, Instrumentation, Control and Communications in sufficient detail to cover the scope of work in accordance with DS40 series of standards
* The Detail Design shall be carried out by the Contractor, in accordance with the *Technology Licence Agreement*, following the review and approval of the Engineering Design by the Principal. The workshop/factory drawings shall be developed ready for switchboard manufacture. The Primary Design drawings shall be updated as per the detail design as appropriate in accordance with DS20
* The Contractor shall manufacture the switchboard following the review and approval of the Detail Design by the Principal
* The Contractor shall manufacture the control cubicle following the review and approval of the Detail Design by the Principal
* The Contractor shall carry out factory acceptance testing and complete all *As Constructed* drawings
* The Contractor shall implement the *Safety in Design* process documentation
* *<The Contractor shall deliver the switchboard to the site and conduct installation of the switchboard. The switchboard shall be fully tested after the installation and ready for operation>*
* *<The Contractor shall deliver the control cubicle to the site and install it on site. The cubicle shall be fully tested after the installation and ready for operation>*
* *<The Contractor shall commission the switchboard and hand it over to the Principal. If required, training shall be provided to the operations personnel>*
* *<The Contractor shall commission the control cubicle complete with control, instrumentation, SCADA and communication equipment and had it over to the Principal. If required, training shall be provided to the operations personnel>*
* *<The Contractor shall submit the As Constructed drawings and relevant documents to the Principal following successful commissioning, and>*
* *<The handover process (handover means: the date in the Project Schedule for the completion and handover of the Works, including as built documentation) shall be completed by the Contractor in accordance with Water Corporation requirements>*

Define the project scope further as required.

Work by Others

Insert as required or leave blank.

Some aged assets may contain hazardous substance, like asbestos. Works such as decommissioning, removal, and disposal of the asset shall be discussed between the Contractor and asset owner. If required, this part of work shall be included in the project scope and detailed in the Installation Specification.

## Project Risks

Define the key project risks that impact on this job. Otherwise leave blank.

# Field Work - Occupational Safety and Health Risks

Since field work is necessary as a part of the work required by this specification the Contractor shall describe how the associated OSH risks will be managed. Particular attention shall be paid to the identification and management of potential hazards including but not limited to asbestos, dangerous goods, unexploded ordinances, contaminated sites, electrical and gas services.

# Water Corporation Standards, Specifications and Documents

DS20 Design Process for Electrical Works

DS22 Ancillary Plant and Small Pump Stations – Electrical

MN01 Electrical Standard Drawing – Small Pump Station

DS26-09 Type Specification for Low Voltage Switchboards - General Requirements

DS26-10 Type Specification for Minor Low Voltage Switchboards > 100 Amps ≤ 220 Amps

DS26-11 Type Specification for Extended Range Minor Low Voltage Switchboards > 220 Amps ≤ 440 Amps

DS26-36 Type Specification for Minor Low Voltage Switchboards ≤ 100 Amps

DS26-44 Type Specification for Minor Electrical Installations

DS40 Series of standards for Instrumentation, Control and SCADA systems

WWPS01 Standard software

# Project Requirements

Define the project requirements including not limited to the following:

* Electrical
* Instrumentation, control and SCADA
* Minor mechanical and civil work

## General Design Requirements

An *Engineering Summary Report* is not required. The Contractor shall develop a design encompassing the basic requirement for Engineering and Detail Design of the required switchboard in accordance with the requirements of Design Standards DS20, DS22, MN01 *Technology Licence Agreement* and DS40 series of standards.

In summary, Engineering/Detail Design shall provide, but not be limited to, the following key items:

1. *<Development of Engineering (Primary) Design drawings for switchboards ≤ 440A, ≤ 150kW Drive Modules and ≤10kA bus fault level based on the relevant DS20 suite of standards>*
2. *Development of an installation specification covering electrical installation work utilising the Type Specification for Minor Electrical Installations, DS26-44*
3. Development of the Detail Design drawings in accordance with the *Technology Licence Agreement* and Primary Design drawings
4. *<Development of the construction staging plan and changeover plan to minimise the disruption of the plant operation and overall construction time>*
5. *<Liaise with the Supply Authority, on behalf of the Corporation, with respect to quality of supply, technical, commercial and connection requirements>*
6. Working closely with the Water Corporation’s Design Manager and Regional Asset team to identify specific risks associated with the installation and cross over to the new switchboard (if applicable), identify specific contingency works required to either maintain or bypass the plant being replaced as appropriate. The output of such discussions shall form the basis of an installation specification with a matrix of risks (in place of a full SiD Report which is not required) and all other specific site risks and material handling that may be required as part of this scope
7. A protection grading study and an arc flash hazard assessment coordinated for optimal selection of settings in accordance with the requirements of DS29 – *Arc Flash Hazard Assessment of Switchgear Assemblies*
8. All Engineering (Primary) Design and Detail Design drawings as per the requirements of DS20 section 2 (including if there is a requirement to bring the existing earthing up to present and currents standards)
9. Interlocking drawings as required (if any current interlocking drawings are no longer fit for purpose)
10. *<Carry out a site visit and perform soil resistivity testing>*
11. An analysis of the SCADA communications requirements including desktop and site surveys where required. These are to be conducted by Water Corporation approved consultants
12. Provide design of modification or upgrade of the control, instrumentation, SCADA and communication system if required by scope, and
13. Development and production of a relevant Specification and detail design drawings for the instrumentation, control, SCADA and communication installation based on DS40 suite of standards.

## Electrical

Detailed electrical requirements

## SCADA, Instrumentation & Control

SCADA, instrumentation, control and communication design shall be in accordance with the requirements of the Water Corporation’s DS40 series SCADA standards. The design shall meet all the requirements specified in this section and Modular Specification - Instrumentation and Control, Appendix 5.

The Contractor shall engage qualified communications consultants to conduct communications surveys. The approval shall be sought from the Water Corporation SCADA advisor before commencing the surveys. All SCADA and Control Works shall be performed by a Water Corporation PCS Panel Member.

The Communications modems and router will be Principal supplied. The Contractor shall use the LTM/PTM Request/Requirements form (F41-01) to request the communications equipment. LTM/PTM request shall be submitted by contractor via online service from the link: [ITG Design Request - Water Corporation (service-now.com)](https://watercorporation.service-now.com/sp?id=wco_sc_cat_item&sys_id=197679394f42cb409aee46501310c7c6&sysparm_category=30e1bcbd4fce8b409aee46501310c7f3).

The Contractor shall use the SCADA Approved Equipment List, Appendix 6, for design and equipment procurement. Dispensation shall be sought from the Principal Engineer Operational Technology if any equipment outside this list is proposed.

Note:

SCADA advisor shall specify all SCADA, instrumentation, and control requirements detailed in the [Modular Specification, Appendix 5](Modular%20Specification%20-%20IC%20-%20Instrumentation%20and%20Control%20-%20Content%20Suite%20Platform%20CE%2022.2%20%28watercorporation.com.au%29).

## Other

Detailed requirements of other disciplines, such as mechanical and civil if there is any. Otherwise leave blank.

## Project Schedule

The Bidder shall provide a project schedule (in the form of a Gantt chart) to include design, switchboard manufacture, factory testing, delivery to site, installation work, testing, commissioning and handover. It shall also include a detailed site construction program, methodology and staging plan.

## Operability Study

*<An Operability Study shall be carried out. The outcomes should be recorded within a spreadsheet noting the simplicity of this project. However, if the switchboard operability is based on the existing switchboard strategy, then an Operability Study is not required unless the project specifically requires any specific changes which shall be identified in the specification or by consultation post contract award with the Asset Owner. >*

## Constructability Review

*<This will be done by consultation with the Asset Owner and the Design Manager. The review is to develop the Installation Specification. Outputs captured in the Specification by the Contractor following a meeting with impacted Stakeholders organised by the Contractor.*

*The objective of the review is to:*

1. *Ensure that the switchgear and cable alignment/interconnection design can be constructed in a safe and effective manner and impacts are minimised to the overall performance of the plant being replaced;*
2. *Ensure that the construction process is duly considered to minimise project risk and costly design changes during construction;*
3. *Ensure that the installation strategy can be facilitated and scheduled in line with long lead delivery schedules to minimise construction time for the installation work and minimise any disruption to the operation and maintenance of the Plant and serviced customers.*

*The outcomes should be recorded within a spreadsheet noting the simplicity of this project. The final outcomes shall be clearly covered in the installation specification for the project.>*

## Safety in Design

Regulations relating to the National Standard for Construction Work (2005) were introduced for designers, clients and key Contractors within the construction industry. In accordance with these new regulations, designers must provide their clients with a written report on the OSH aspects of their designs.

The Safety in Design (SiD) process is the integration of hazard identification and risk assessment methods as early as possible in the planning and design process to eliminate or minimise the risks of injury throughout the life of the product. A safe design approach considers the safety of those who construct, maintain, clean, repair and demolish an asset as well as those who work in or on it.

The main purpose of the SiD is to maximise the likelihood of project safety and health objectives being achieved and to record findings from the design process to allow steps to be implemented which will benefit other parties involved with the project.

Produce the SiD based on a systematic risk assessment that includes identification of alternative mitigations to be incorporated into the design, or if appropriate, incorporated during construction, operations/maintenance, and demolition phases. Incorporate relevant items operability and constructability.

Carry out the SiD work in accordance with the Engineering SiD Work Instruction (refer Appendix), noting the below.

In this simplistic case, the SiD outcomes shall be recorded in a spreadsheet developed during the installation and cross over review for the switchboard with the Asset Owner and the Corporation’s Design Manager. A full SiD report is not required; however, the specific project risks shall be tabulated in the final installation specification for the project.

## Asbestos Management Process

*<The Contractor shall have an asbestos management plan to mitigate the risk of asbestos exposure. The type of investigations required shall be determined in accordance with Asbestos Management attached in Section 15 as an appendix. Asbestos survey shall only be conducted by the approved consultants. A list of the approved asbestos survey consultants is attached in Section 15.>*

## Others as required

Complete or leave blank.

## Design Deliverables

The following design deliverables shall be provided in order to define the works in sufficient detail to enable award of contracts for switchboard, instrumentation, control, SCADA and communication supply, installation and commissioning:

1. *<Engineering (Primary) Design drawings*
2. *Combined SiD, Operability and Constructability spreadsheet>*
3. Detail design drawings (workshop drawings)
4. Project Schedule
5. FAT *<and SAT>* test plans, inspection & test documentation *<and commissioning report>* that demonstrates full as-built compliance with the project requirements, scope and design
6. Operation and/or maintenance Manual (if required)

## Project Schedule and Hold Points

Milestones are expected for delivery of significant components of the design and construct process. Project hold points are stages or points in time beyond which no further work shall proceed until the Project Manager has accepted the milestone deliverables following review of the work in consultation with project stakeholders.

|  |  |  |
| --- | --- | --- |
| **Job Milestone** | **Task Owner** | **Due Date** |
| Bid period for *<switchboard supply and>* construction contract | Principal/ Contractor |  |
| Bid evaluation and job award | Principal |  |
| *<Issue Engineering (Primary) Design drawings (Hold point)>* | Contractor |  |
| *<SiD / Operability / Constructability review combined meeting & spreadsheet>* | Principal/Contractor |  |
| Pre-Construction Site Condition Assessment | Principal/Contractor |  |
| Engineering review and approval | Principal |  |
| Issue Detail Design drawings (workshop drawings) and installation specification (Hold point) | Contractor |  |
| Detail design review and approval | Principal |  |
| Issue for Construction Engineering and Detail Design drawings | Contractor |  |
| Switchboard and Control Cubicle manufacture, FAT and delivery | Contractor |  |
| *<Submission of an integration / tie-in / cut-over procedure >* | Contractor |  |
| *<Approval of the integration / tie-in / cut-over plan>* | Principal |  |
| *<Installation and SAT>* | Contractor |  |
| *<Receipt of electrical compliance certificate (where network supplier inspection is required)>* | Contractor |  |
| *<Commissioning>* | Contractor |  |
| *<Handover, documentation and>* job closure | Contractor |  |

The Contractor shall allow 10 working days for the Principal to review and comment on design drawings. This review period is deemed to be included within the Contractor’s program.

# Switchboard Manufacture *<and Delivery>*

The switchboard shall be constructed strictly in accordance with the drawings, this specification, the relevant DS26 standard and the *Technology Licence Agreement*. Type or rating of equipment shall be as shown on the drawings and shall not be modified unless by written variation from the Principal. The Contractor shall perform all required factory routine tests as specified in the relevant DS26 standard. The Principal Representative will witness the FAT tests at the Contractor’s premise and/or review the test certificates submitted by the Contractor.

*<After successfully conducting all factory tests, the Contractor shall organise the transportation to deliver the switchboard to the nominated address. The switchboard shall be unloaded, unpacked, assembled and positioned at the nominated position ready for construction. The Contractor shall undertake a visual inspection to verify that the switchboard is undamaged and properly placed as required.>*

# Construction (if required)

The Contractor shall carry out all construction activities in accordance with Water Corporation Standard DS26-44 applying to the electrical installation not more than 315kVA.

The construction methodology shall comply with the requirements specified in this document, design drawings, Water Corporation Standards and Specifications, all relevant Australian Standards, OSH requirements and regulatory requirements. The construction methodology shall include a detailed construction process description and the document should detail materials, plant, labour and any temporary works required. The methodology shall be prepared taking account of the construction staging plan and changeover plan to minimise the disruption to plant operation.

The Contractor shall complete all preconstruction activities prior to commencement of construction works on site. The Clearance to Work (CTW) Procedure applies to Contractors working on or near Water Corporation assets. The Contractor shall submit a CTW application at least 5 days prior to commencing work on site. A Clearance to Work Permit has to be presented to the Principal before carrying out any work.

The Contractor shall provide a provisional price in the Schedule of Prices for Tie-ins and cut-overs as specified hereunder. The Contractor shall provide all temporary power and equipment required to enable safe and efficient tie-in of the new works and cut-over to the new switchboard (this may need to include, staff to manually operate equipment and / or tankering or temporary bypass operations). In each switchboard replacement instance, a plan will be required to describe how this will be achieved. The tie-in and cut-over activity may only occur following review of the plan and approval by the Principal. The exercise of cut-over will need to schedule to minimise impact on / risk to the ongoing operation of the assets associated with the new switchboard. Cut-overs may need to occur outside of normal business hours to minimise interruptions. It is expected the Contractor will liaise closely with the Principal’s commissioning, operations and maintenance staff regarding planning for and during the execution of cut-overs. The Principal’s commissioning, operations and maintenance staff may need to assist the Contractor to achieve the execution of cut-overs.

# Site Testing (if required)

The Contractor shall carry out the site tests specified by DS26-44 on the electrical installation witnessed by the representative of the Principal. All the test results and certificates shall be submitted to the Principal for review and approval.

# Commissioning (if required)

The Project Quality Register (PQR) is a spreadsheet designed to assist with tracking and managing commissioning tasks during the project delivery phase. A generic/ preliminary PQR shall be developed by the Principal in conjunction with the Preliminary Commissioning Plan once the engineering Design has been completed.

The Principal will appoint a Commissioning Manager/ Specialist to produce the generic/ preliminary commissioning plan. The Contractor shall allow at least 28 days from the time of submitting the engineering design drawings for the Principal to prepare the preliminary commissioning plan and PQR template. At the completion of detailed design, the Contractor shall develop the Construction Commissioning Plan and PQR from the Preliminary Commissioning Plan and PQR to incorporate asset commissioning requirements of the detailed design.

The Contractor shall satisfy the commissioning requirements as detailed in the Preliminary Commissioning Plan. The Principal appointed Commissioning Manager shall represent the Principal’s interest in commissioning related activities and will be responsible for review of the contractor commission results, reports and documentation to determine if these are compliant with requirements – demonstration of compliance is a pre-requisite to project practical completion.

The electrical installation shall be commissioned under operating condition in accordance with the Commissioning Plan. The Contractor shall carry out all the commissioning activities attended by the Commissioning Manager.

The instrumentation, control, SCADA & communications installation shall be commissioned under operating conditions in accordance with the Commissioning Plan. The Contractor shall carry out all the commissioning activities attached by the Commissioning Manager.

Commissioning planning documents shall be submitted to the Principal for review at least 28 days prior to the commencement of the commissioning activity.

# Training

The Contractor shall provide training to Principal’s personnel, including specialist training by equipment suppliers. The training programme shall be appropriate for all levels of personnel and shall cover supervisory, engineering, maintenance, and operations staff.

Preliminary O&M Manuals shall be available for commencement of the training activities.

# As-Constructed Information

The Contractor shall provide as-constructed information on all drawings detailing all changes and modifications made during the construction and installation phases of the project.

The contractor shall submit drawings in both AutoCAD and PDF formats in accordance with the Drawing Submission Process. Adequate contrast within the PDF image shall be maintained between drawing content and background to ensure the clarity and quality of the drawings.

Before the completion of the drafting, a full copy of drawings marked as *As Commissioned* shall be left on site for operator to reference.

# Progress Meetings

Progress meetings will be held every 2 weeks. The venue will be advised by the Project Manager as either the Water Corporation’s office or the Contractor’s office. The Project Manager will take the minutes of the meeting.

# Third Party Review

A third-party review is not required however the Main Contractor shall ensure an independent in-house review is carried out and each drawing signed accordingly as per the requirements of DS20, Section 2.

# Drawing Deliverables

1. All drawings provided by the Contractor shall be in accordance with the latest issue of the Water Corporation Design Standard DS24 – Electrical Drafting
2. All drawings shall be prepared in AutoCAD format, Release 2018 or later software
3. Drawings shall be prepared on the “Electrical” A1 metric drawing sheet and title block provided in the Water Corporation eXternal (WCX) package (available for download) in accordance with the Water Corporations Design Standard DS80
4. The drawings shall provide within the title block, the details to identify the drawing, including but not limited to its title, plan number, revision status, date of issue, Corporate project number, contractor’s name and reference number (if applicable)
5. Drawings detail shall include, but not limited to, the general arrangement, panel layout, power and control circuit diagrams and equipment specifications, as required
6. The contractor shall submit drawings in both AutoCAD and PDF formats in accordance with the Drawing Submission Process. Adequate contrast within the PDF image shall be maintained between drawing content and background to ensure the clarity and quality of the drawings

#

# Appendices

Only if required

* Appendix 1 Drawing List
* Appendix 2 Safety in Design Work Instruction, NEXUS #58574982
* Appendix 3 Asbestos Procedure, NEXUS #58731532
* Appendix 4 Environmental Consultants Panel NEXUS #58651467
* Appendix 5 Modular Specification - Instrumentation and Control
* Appendix 6 SCADA Approved Equipment List