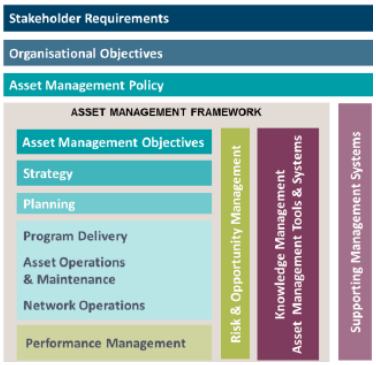
Automation Project Execution

Procedure

DOCUMENT HIERARCHY

This document resides within the Planning component of Western Power's Asset Management System (AMS).



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Record of endorsement, approval, stakeholders, and notification list is provided in EDM# 43735597 appendix

RESPONSIBILITIES

Western Power's Engineering & Design Function is responsible for this document

CONTACT

Western Power welcomes your comments, questions, and feedback on this document, which can be emailed to standards.excellence@westernpower.com.au

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Revision Details

Version	Date	Summary of change	Section
0	Oct-2017	Initial release	
1	May-2020	Expanded to Cover Project Execution	
2	April-2022	Added Project Guide and Checklist	
3	May-2023	Refresh document to current practices and references	
4	08/09/2023	Updated formatting and added Project Checkpoints	Appendix D
5	28/03/2024	Updated copyright information. Added reference to Customer Interface Guideline in section 5 and Customer Interface List in Appendix G. Updated Commissioning deliverable text in Appendix D.	All sections

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1. Introduction

1.1 Purpose and scope

The purpose of this document is to provide an overview of the process for the execution of projects within the Automation team. This document is intended a guide for personnel working on the delivery of automation projects and covers the following activities for project delivery.

a) Design
b) Materials
c) Construction
d) Configuration
e) Commissioning
f) Project Finalization

Refer to Appendix A[1] for the document structure providing an overview of the key documents for Automation project delivery.

Refer to Appendix B & C for the typical Project Execution Process. Refer to Appendix D for the Project checkpoints. These checkpoints provide an opportunity to evaluate the quality and completeness of each section before progressing to subsequent stages.

1.2 Definitions

Terms and definitions used in this document:

Term	Definition
AMS	Asset Management System
AP A&C	Asset Performance – Automation and Control Team
E&D	Engineering and Design – Operational Technology
eNAR	Electronic Network Access Request
FPT	Field Protection and Telecommunications
NMPD	Network Maintenance Planning and Delivery
NO	Network Operations
PEA	Project Erection Authority
RACI	Responsibility Matrix
SCADA	Supervisory Control and Data Acquisition
USA	Upgrade Substation Automation

[1] Internal Western Power documentation is available to accredited vendors.

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1.3 References

Refer to Appendix G[2] for internal references.

2. Design

All Automation Designs shall be completed in accordance with Automation Design Guideline[2] and templates. Where a connection is required to a customer refer to the Automation Design Customer Interface Guideline[2]. The design process can be split into two stages detailed as follows.

2.1 Preliminary Design

During preliminary design main interfaces to the automation system and functional requirements should be determined. At this stage design inputs from other design teams are reviewed and high-level design is developed. Any Automation System requirements should be agreed with the other teams and customers at this stage.

Preliminary Design includes the following activities:

a) Determine Scope of Works
b) Review Automation System
c) Develop Preliminary Design including:
    i. Equipment Requirements
    ii. Interface Requirements
    iii. Power Supply Requirements
    iv. Cubicle layouts
    v. Building and Site layouts
    vi. Works schedule considerations
    vii. Safety in Design Considerations
d) Determine high level construction scope for resource planning

2.2 Final Design

The Automation Design can be completed in parallel with the secondary design. The Final Automation Design should include the following

a) All drawing completed
b) Installation construction PEA completed including any staging requirements
c) Asset List completed (without serial numbers)
d) Planned Changes notification to Maintenance

When the final design is completed the required project dates should be known to ensure the Installation scope of works reflects required works dates.

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3. Materials Management

Automation Design are responsible for the specification, procurement, and handover of automation field equipment. Materials management activities are detailed in Automation Design Guidelines Materials Management section[3].

Materials management includes the following activities:

a) Materials Specification
b) Standard Materials Introduction
c) Procurement and Material Handling
d) Asset Recording

4. Construction

Construction Works involve the physical installation of materials and equipment. Construction activities shall be completed in accordance with Automation Design Guidelines Construction section[3].

Construction Activities is as follows:

a) Resource allocation
b) Issue of scope and Construction Planning
c) Panel Construction
d) Field Construction
e) Construction finalisation

5. Configuration

The Automation configuration Works are completed by the Automation Team. Commissioning activities shall be completed in accordance with Automation Design Guidelines Configuration section[3].
The configuration process can be split into two stages detailed as follows.

5.1 Preliminary Configuration works

Preliminary configurations works are the works required to be completed to plan and schedule head end changes and outages and to determine functional and operations requirements for any schemes to be implemented.
The preliminary site configuration works for Automation Include the following activities:

a) Configuration Requirements Development
b) Determination of functional and operational scheme requirements
c) For customer connections agreed interface point list is developed as per the Customer Interface template[3].
d) Preparation of Commissioning Sheets and Plans
e) Head End Changes specification

5.2 Final Configuration Works

The preliminary site configuration works for Automation Include the following activities:

a) Preparation of Configuration
b) Pre-Commission checks of IEC61850 MMS settings
c) FAT bench testing for special schemes and new customer connections
d) Update of site Documentation including Scheme Work Instructions
e) Head End Configuration works

[3] Internal Western Power documentation is available to accredited vendors.

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6. Commissioning

The Automation commissioning works are completed by the Automation Team. Commissioning activities shall be completed in accordance with Automation Design Guideline Commissioning section[4].
The commissioning process can be split into two stages detailed as follows.

6.1 Commissioning Planning

Commissioning Planning involves the following activities;

a) Commissioning planning and coordination of works with other Commissioning Teams
b) Commissioning resource Allocation
c) Outage Notification and Approval as per Automation Design eNAR Application Process
d) Planned Commissioning Notification to Maintenance

6.2 Site Commissioning

Site commissioning involves the following activities

a) Finalisation of Automation Installation works
b) Coordination of Master Station Updates
c) Commissioning of Automation Equipment (including logging and remote management)
d) Commissioning of Telecommunication Channels
e) Commissioning of Automation settings files
f) In service Notification to Maintenance
g) Site Records Updates

7. Project Finalisation

Project finalisation involves updating design and config information and site records following commissioning. This includes the following works, these activities are detailed in the relevant guidelines.

a) Design and Documentation updates
b) Finalising site asset information
c) Commissioning Sheet Finalisation
d) Maintenance Handover

8. Project Handover

A staged handover to SCADA Field Maintenance is required as part of the Project execution. Refer to the Automation Quality Assurance process and Handover Guideline[4].

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Appendix A – Key Automation Project Documents[5]

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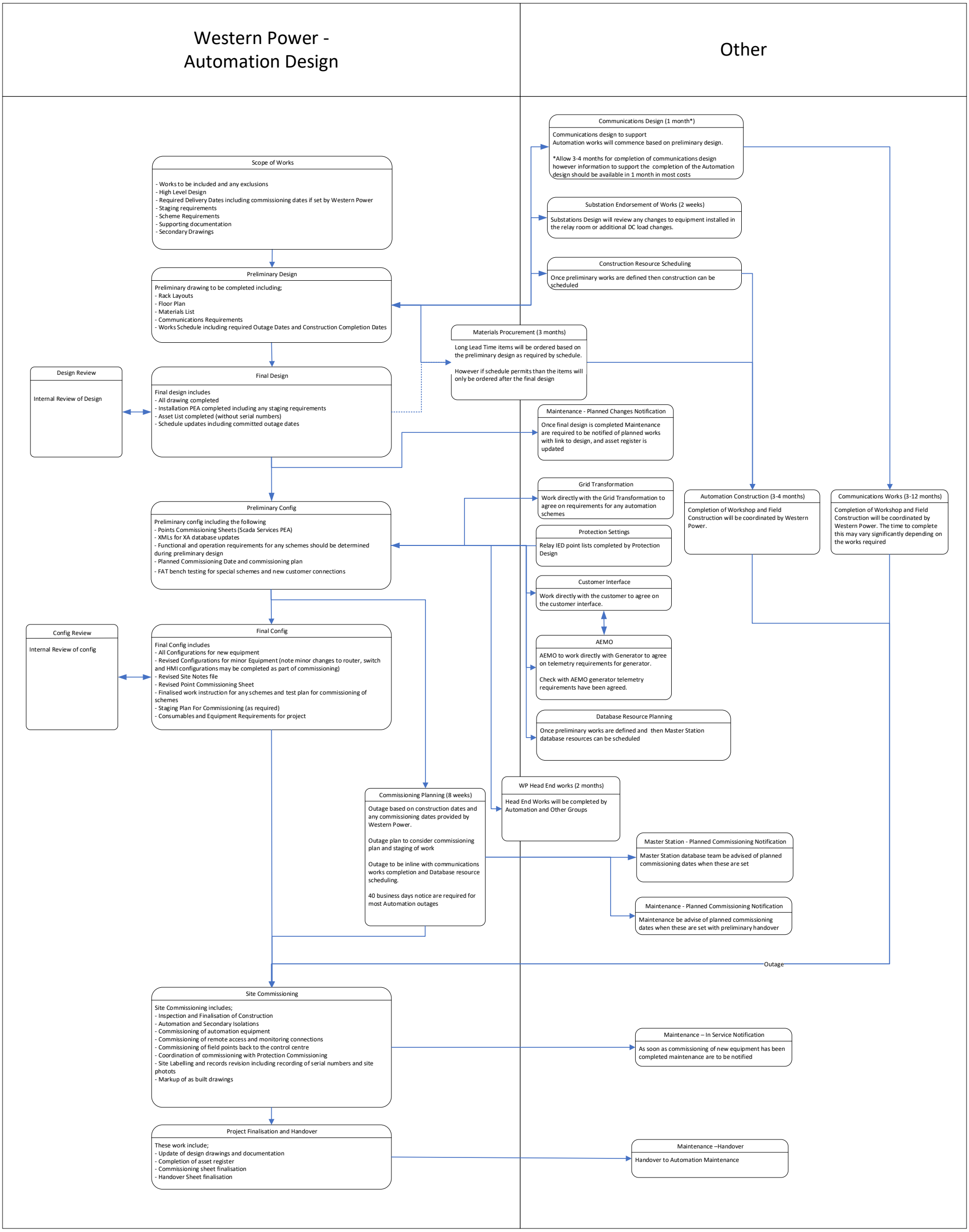
Appendix B – Automation Projects Procedure – Internal Delivery



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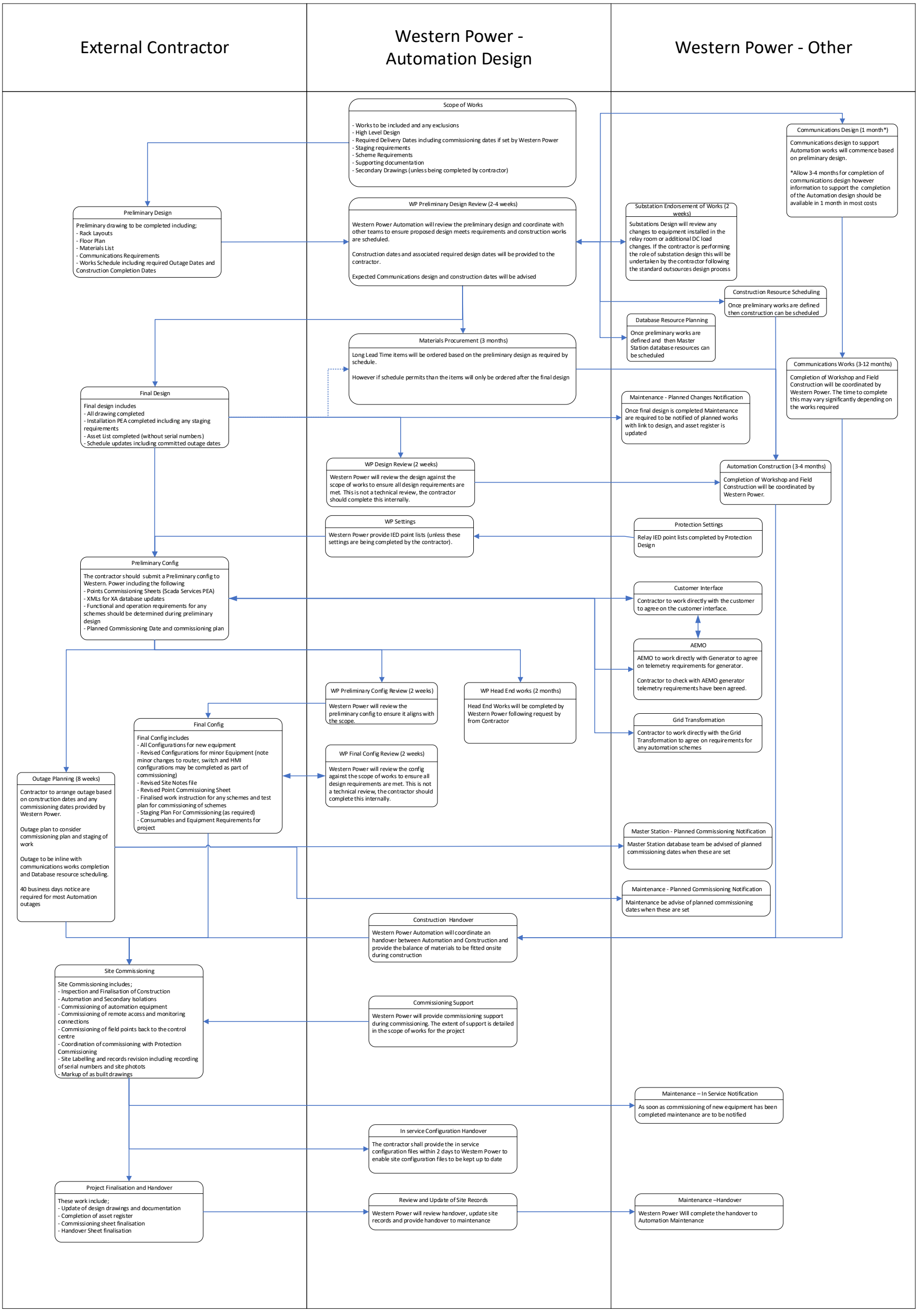
Appendix C – Automation Projects Procedure – External Delivery



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Appendix D – Project Checkpoints

Discipline	Deliverables
Project	WIR, DDA for Drawings
	Schedule
	Weekly Updates (every Friday)
	Progress meeting minutes (Fortnightly and where required)
	Safety in Design - Hazard Spreadsheet
	Request for Information (RFI) register
Design	Automation Drawings
	Installation Scope of Works
	Site Visit
	Asset Register List
Config	SCADA Services Commissioning Sheet
	Equipment Configurations
	Revised Site Work Instruction
	Master Station XML File
	Scheme Work Instructions
	Revised Site Notes File
	Preliminary completion of Handover
Materials	Order of Materials
	Issue of Materials to Construction
Commissioning	Construction Finalisation
	Commissioning of All Equipment and Points
	Completed Isolation Schedules
	Site Photographs
	Completed Equipment & Point Commissioning Sheets - Handover
	Site USB Revised – Notes file and equipment setting backups
	As Commissioned configurations
Project Finalisation	Revised Asset Register with Serial Numbers
	As-Built Drawings
	Removal and hand over of old equipment

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Appendix E – USA Project Checklist and Guide

Stage	Task	Overview	References
Design	1. Review Site Drawings and Configuration	Check Drawings for site to see what Automation Equipment is on site, and how equipment has been installed. Review configuration to see what the interfaces are on the equipment and what logic is implemented. New design should be implemented based on design guide.	Automation Design - USA Design Guide
	2. Obtain External Inputs	Discuss with telecommunications any proposed changes to circuits and with substations any proposed changes to station DC connections or new cubicles being installed	
	3. Determine Staging	Based on high level design develop high level plan for staging of implementation. Where possible the site needs to be returned completely to service at the end of every day. Where complex schemes exist, it may not be possible to put scheme into service until all inputs are cutover, in these cases an extended outage may be required for the scheme. Contact network operations engineering to discuss any extended outages that may be required	
	4. Complete Markups	Markup drawings based on templates and complete drafting request to have drafting completed. At this stage long lead time equipment is identified and orders can be placed. If construction works are minor (<15 hours effort, simple indoor cable runs and retrofit of existing cubicle) these can be completed by Automation as part of commissioning. Otherwise, it is recommended construction complete these works. An installation PEA is required to be completed. Confirm with the project manager if construction works are internal or external, this will determine who drawings are issued to.	Automation Design - Register - Template Drawings
	5. Drafting Completed	Request drafting to be completed by handing markups to drafting team. When drawings are issued you will review and electronically sign.	
	6. Complete Installation PEA	Complete installation PEA clearly identifying which work are to be completed by construction and what works will be completed by automation as part of the cutover. Once PEA is issued confirm through PM when works are scheduled to be completed and ensure any materials required will be available in time.	Automation - Template - Installation Scope of Works
Materials	7. Order long lead time equipment	Ideally long lead time equipment is ordered by construction. However, if there is not sufficient time from issue of drawings to planned construction date then these should be ordered as early as possible once equipment requirements are firm. Most long lead time equipment is stock coded order these using a purchase requisition other equipment can be ordered with a purchase order or a credit card Note for USA some equipment has been ordered in advance check the order register in the project workbook before ordering equipment	Automation Design Guideline Materials section
	8. Order other equipment	Other equipment and consumables such as terminals, cable, patch leads, MCBs, boot laces, surge arrestors and should be ordered via purchase order and credit card Note etched labels can be ordered from Kewdale Depot to allow fixture on site by Automation	
Construction	9. Construction	Construction will schedule the cubicle builds and field construction based the request from the PM, ensure this has been arranged by the PM. Any equipment which has been ordered by Automation and needs to be installed into the rack needs to be delivered to Kewdale Depot to allow construction to be completed The field construction schedule can be referred to see who is completing construction and when it is scheduled. Construction do not always provide feedback on when works are completed and should be contacted to ensure works are on track or completed.	
Config	10. Extract Existing RTU Configuration	The existing D20/200 configuration will need to be migrated to the new gateway. The OCA toolset can be used to create the new configuration.	Automation - OCA - Point Config Tool

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Stage	Task	Overview	References
	11. Review requirements for Schemes	If any schemes are required a specification should be provided by the requestor. Network Operations Engineering need to be contracted to determine the operational requirements for schemes including any alarms and additional control required.	
	12. Create new Commissioning sheet	Once the existing configuration is extracted and the scheme requirements are understood a full points list for the works can be created. The commoning of the points is to be updated as per current standards.	Automation Design - Register - Standard Points SCADA SERVICES PEA AND COMMISSIONING SHEET
	13. Create Commissioning plan	A Commissioning plan must be developed for the migration of the points. Typically, the order of cutover is IEDs followed by K and C Cards with S and A modules last. The commissioning plan should consider • Staging of Equipment installation • Impacts on Schemes • Sequence for cutover of points • Temporary commoning of points between RTU and Gateway	
	14. Request Outage and Master Station Updates	Once points list has been created and commissioning plan is determined an outage can be requested for the RTU. The following inputs are needed to request an outage. • SCADA Points Commissioning Sheet • Outage plan and anticipated duration • Impacts on schemes • Confirmation of when construction will be completed • Confirmation of Network Ops and Automation resource availability • Confirmation of when telecommunication services will be implemented	
	15. Request Head End Configuration Works	The Remote Access and DNP-IP firewall changes need to be requested, the process for these is detailed in configuration Guideline.	Automation Design Guideline Configuration section
	16. Finalise Configuration	The configuration should be completed as per Automation Design - Guideline – Configuration. Standard Logic routines are detailed in	Automation - Equipment Guideline - Gateway Logic Reference
	17. Complete work instructions	Any schemes installed should be detailed in the site work instruction.	SCADA WORK INSTRUCTION -TEMPLATE DOCUMENT
Commissioning Handover	18. Review Construction	Construction works should be reviewed against the design prior to the outage to ensure outstanding works will not impact the outage	
	19. Confirm Resources and External Works	The resources internal to automation and external should be confirmed. Also, at this stage the status of the Head End works, and Telecommunications works should be confirmed.	
	20. Revise Commissioning Plan	Commissioning plan should be reviewed and revised based on the final configuration, any outstanding construction works and resources allocated	
	21. Complete Commissioning	Commissioning, should be completed as per Automation Design - Guideline – Commissioning.	Automation Design Guideline Commissioning section
	22. Finalise External Works	Once cutover is complete then advise Telecommunication of any circuits which are redundant and request final head end changes for decommissioned equipment. Also arrange for construction to complete any final construction works which may be required.	
	23. Complete Handover	Complete Handover to Maintenance as per Automation Design - Guideline – Commissioning. A preliminary handover should be sent at the start of commissioning.	
	24. Complete as Built drawings and Update Site Records	Redline drawings and leave a copy of markups on site. Update site configuration records and Site Records in EDM.	

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Stage	Task	Overview	References
	25. Complete Review	Review project execution and identify any areas for improvement with processes and templated.	

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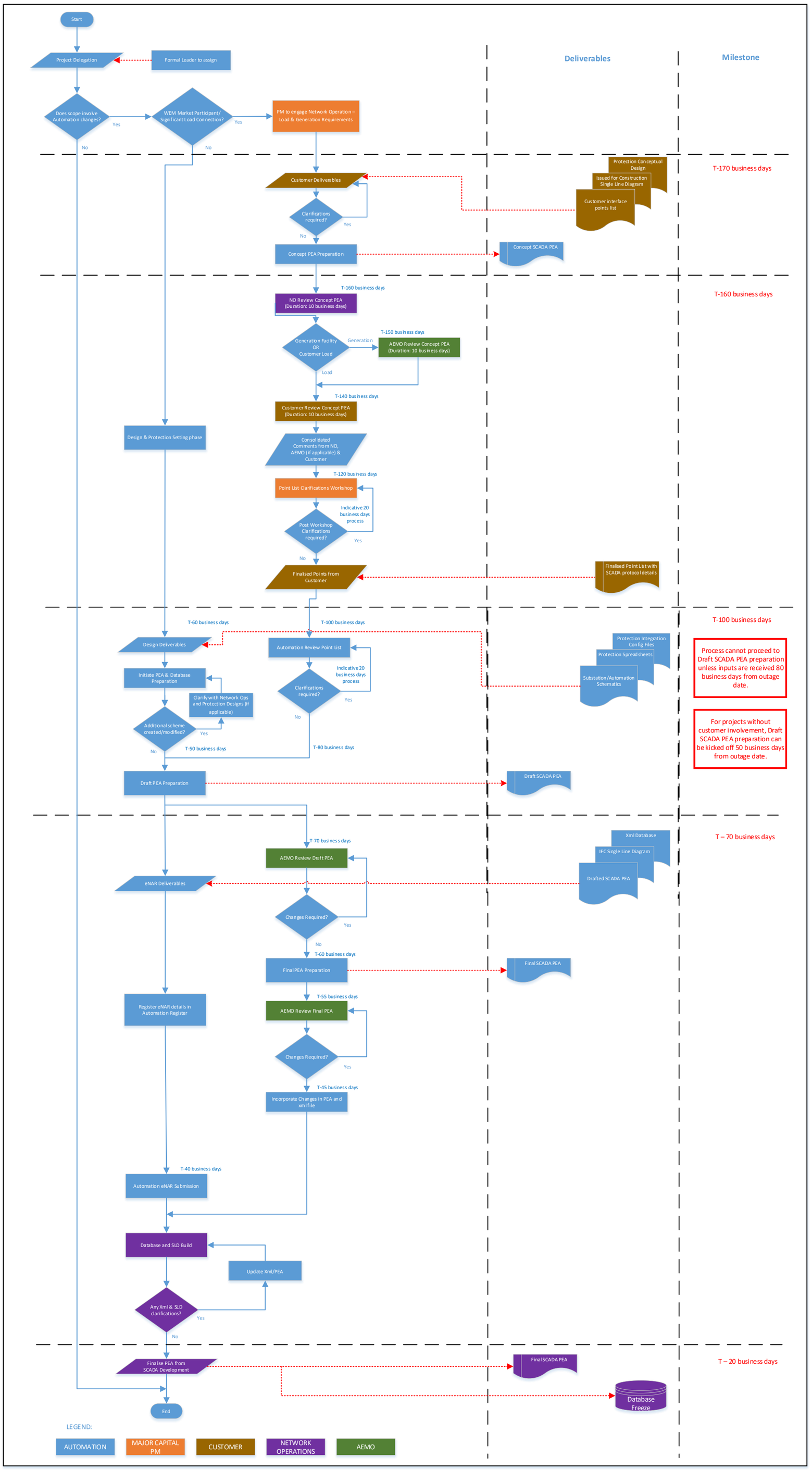
Appendix F – AUTOMATION DESIGN - eNAR APPLICATION PROCESS

OPERATIONAL TECHNOLOGY – AUTOMATION DESIGN - eNAR APPLICATION PROCESS



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