



# SHEPPARTON TERMINAL STATION

TRANSMISSION REVENUE RESET (TRR) PROJECT SCOPING

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## EXECUTIVE SUMMARY

AusNet Services engaged APD Engineering to prepare project scopes and estimates relating to options for replacement of poor condition primary equipment at Shepparton Terminal Station (SHTS) for inclusion in AusNet Services' 2022 – 2027 Transmission Revenue Reset.

APD Engineering has reviewed a functional scope prepared by AusNet Services and developed detailed scopes and estimates for each planning option required by AusNet Services.

The planning options considered, along with the associated costs, are included in Table 1 below. These costs exclude contingency but include an allowance for overheads and finance charges. The cost estimates have an accuracy of  $\pm 30\%$  and are based on the limitations outlined in Section 2 of this report.

Option	Option Title	Capital Cost (M)
1.	INTEGRATED PROJECT	\$23.99
2.	REPLACE SWITCHGEAR ONLY	\$11.02
3.	REPLACE SINGLE TRANSFORMER (B2 or B3)	\$6.95
4.	REPLACE B2 AND B3 TRANSFORMERS	\$13.23
5.	REPLACE SINGLE TRANSFORMER AND SWITCHGEAR	\$17.85

*Table 1- Capital Cost Estimates*

[C-I-C]  
DESIGN MANAGER

## 1. INTRODUCTION

AusNet Services engaged APD Engineering to prepare project scopes and estimates relating to options for replacement of poor condition primary equipment at Shepparton Terminal Station (SHTS) for inclusion in AusNet Services' 2022 – 2027 Transmission Revenue Reset.

The 66kV and 22kV primary and secondary equipment, along with planning options for consideration have been prepared as per reference Shepparton Terminal Station (SHTS) Transformer B2 and B3 Replacement Project TD-0007996 are considered in this report.

## 2. LIMITATIONS

In preparing this report, APD Engineering has relied on information provided by AusNet Services, including (but not limited to):

1. Site drawings and documentation outlining the existing equipment on site;
2. Condition assessments and functional scopes identifying poor condition primary and secondary assets for replacement prepared by AusNet Services, along with supporting information to allow the development of the scopes and estimates;
3. A top down estimating spreadsheet provided by AusNet Services to calculate the capital costs associated with each project;
4. Unit costs for major items of plant and equipment, labour costs and other costs assumptions provided by AusNet Services as part of the top down estimating spreadsheet.

## 3. ASSUMPTIONS

1. The replacement of 66kV CB primary equipment requires replacement of associated secondary equipment and includes the remote ends for both distance and line differential scheme protections.
2. No allowance has been made for telecommunications replacement.
3. It is assumed that, where required, the existing 415 VAC and 250VDC equipment can be modified as part of the project. Replacement of the full 415V AC/ 250VDC or 48VDC distribution boards and batteries has not been considered.

4. It is assumed that SCIMS hardware can be modified as part of the project. Only modification to existing SCIMS equipment has been included in the estimates. Full replacement of the RTU/SCIMS alarm modification or panel replacement has not been considered.
5. Allowance has been made to replace all Condition 4 and Condition 5 relays, including relays older than 9 years under Condition 2 and 3.

## 4. OPTION 1 – INTEGRATED PROJECT

### 4.1. OUTLINE OF PROJECT

This planning option delivers a single integrated project undertaking all works identified as required for the replacement of poor condition assets at Shepparton Terminal Station.

A single line diagram of Shepparton has been included as Figure 1 and an aerial view of the terminal station has been included as Figure 2.

### 4.2. B2 AND B3 TRANSFORMER WORKS

AusNet Services has identified the need to replace the B2 and B3 transformers due to condition.

APD Engineering has reviewed the functional scope provided by AusNet Services. In the proposed scope, to replace the B2 and B3 transformers, APD Engineering has recognised that a long duration outage of a single transformer is likely to be available.

APD Engineering therefore proposes the sequential in-situ replacement of the B2 and B3 transformers as part of this integrated project.

A detailed scope of works has been prepared for the replacement of the B2 and the B3 transformers to allow capital cost estimation. This scope has been included in scope in Appendix B.

### 4.3. 66KV SWITCHGEAR REPLACEMENT

AusNet Services has identified that there are thirteen poor condition 66kV circuit breakers at Brooklyn Terminal Station requiring replacement. In addition, there are a number of isolators, instrumentation transformers and earth switches that have been identified by AusNet Services as in poor condition and require replacement.

Based on the information provided to APD Engineering, APD Engineering expects that in-situ replacement (with associated outages) will be viable for each of these replacements.

## 4.4. PLANNING ESTIMATE

The cost to implement the above project scope of work as an integrated project in Appendix A has been estimated using the AusNet Services estimating spreadsheet at a total capital cost of \$23.99M ( $\pm 30\%$ ).

These costs exclude contingency but include an allowance for overheads and finance charges.

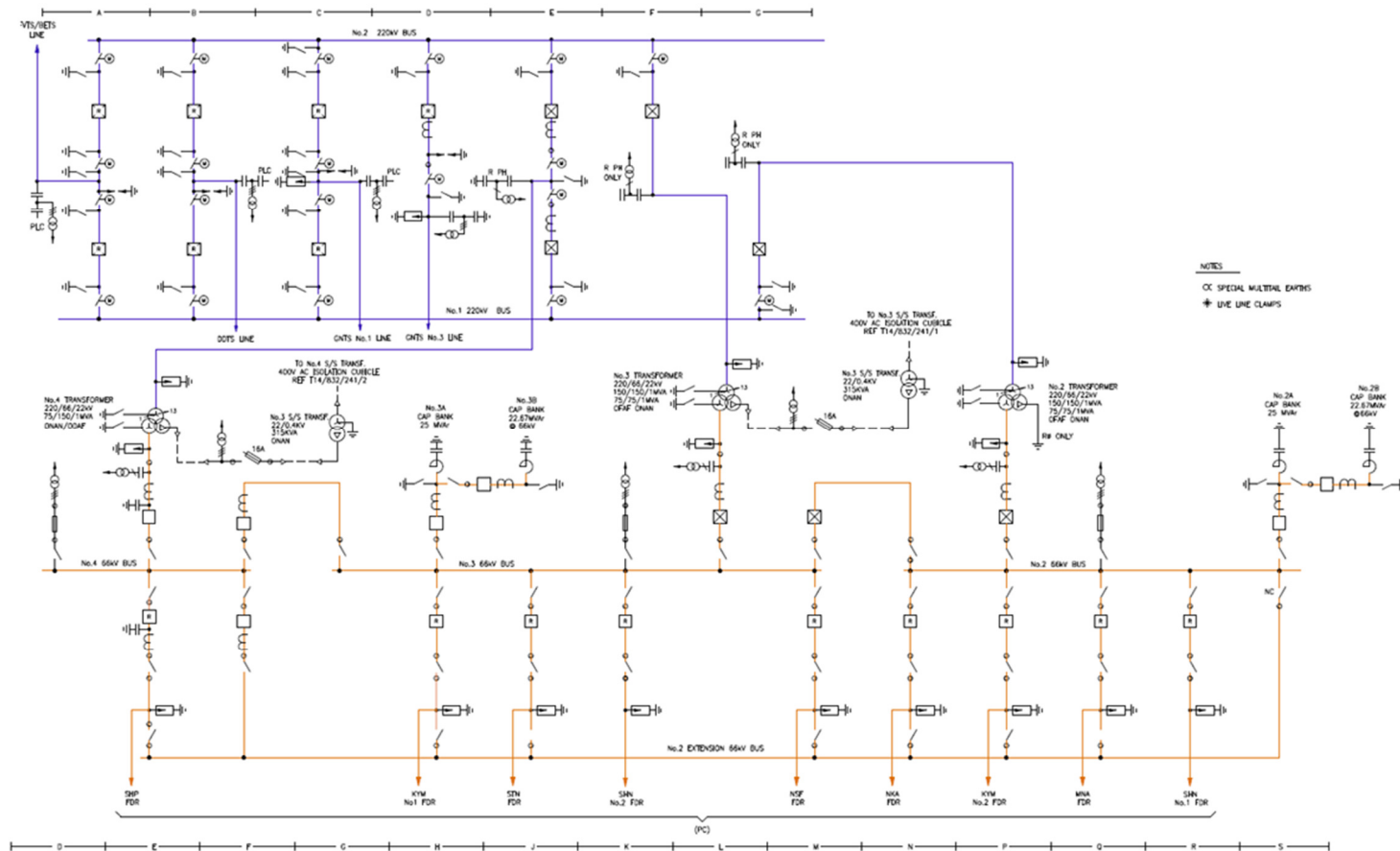
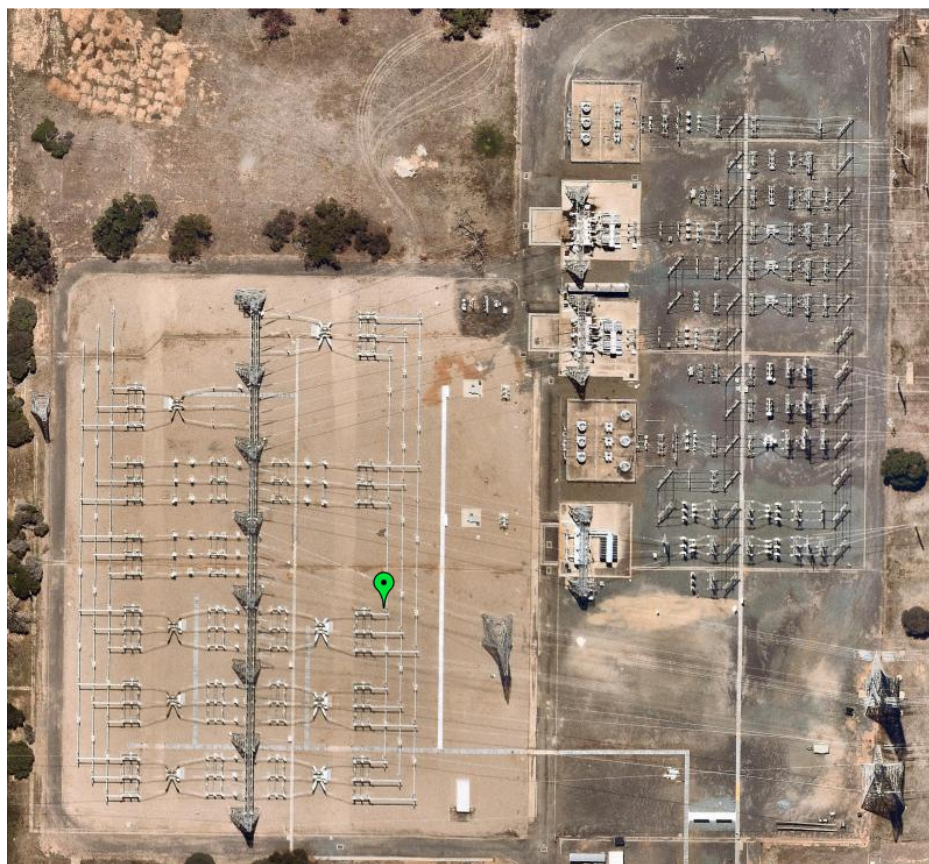


Figure 1 – Shepparton Terminal Station SLD





*Figure 2 – Shepparton Terminal Station Aerial View*

## 5. OPTION 2 – REPLACE SWITCHGEAR ONLY

### 5.1. OUTLINE OF PROJECT

This planning option delivers the replacement of the poor condition switchgear only.

### 5.2. 66KV SWITCHGEAR REPLACEMENT

The 66kV works required as part of this option are identical to those in the integrated option.

### 5.3. PLANNING ESTIMATE

The cost to implement the above project scope of work as an integrated project in Appendix A has been estimated using the AusNet Services estimating spreadsheet at a total capital cost of \$11.02M ( $\pm 30\%$ ).

These costs exclude contingency but include an allowance for overheads and finance charges.

## 6. OPTION 3 – REPLACE SINGLE TRANSFORMER

### 6.1. OUTLINE OF PROJECT

This planning option delivers the replacement of a single transformer (either B2 or B3).

### 6.2. B2 AND B3 TRANSFORMER WORKS

This option would result in the replacement of either the B2 or B3 transformers due to condition.

APD Engineering has identified that the replacement of a single transformer can be done in-situ with associated outages.

### 6.3. PLANNING ESTIMATE

The cost to implement the above project scope of work as an integrated project in Appendix A has been estimated using the AusNet Services estimating spreadsheet at a total capital cost of \$6.95M ( $\pm 30\%$ ).

These costs exclude contingency but include an allowance for overheads and finance charges.

## 7. OPTION 4 – REPLACE B2 AND B3 TRANSFORMERS

### 7.1. OUTLINE OF PROJECT

This planning option delivers the replacement of both the B2 and B3 transformers at Shepparton Terminal Station as a single project.

### 7.2. B2 AND B3 TRANSFORMER WORKS

The works required would be identical to the transformer works associated with the integrated project.

APD Engineering therefore proposes the sequential in-situ replacement of the B2 and B3 transformer.

### 7.3. PLANNING ESTIMATE

The cost to implement the above project scope of work as an integrated project in Appendix A has been estimated using the AusNet Services estimating spreadsheet at a total capital cost of \$13.23M ( $\pm 30\%$ ).

These costs exclude contingency but include an allowance for overheads and finance charges.

## 8. OPTION 5 – REPLACE SINGLE TRANSFORMER AND SWITCHGEAR

### 8.1. OUTLINE OF PROJECT

This planning option delivers the replacement of a single transformer and all other works identified as required for the replacement of poor condition assets at Shepparton Terminal Station.

### 8.2. B2 AND B3 TRANSFORMER WORKS

This option would result in the replacement of either the B2 or B3 transformers due to condition.

APD Engineering has identified that the replacement of a single transformer can be done in-situ with associated outages.

### 8.3. 66KV SWITCHGEAR REPLACEMENT

The 66kV works required as part of this option are identical to those in the integrated option.

### 8.4. PLANNING ESTIMATE

The cost to implement the above project scope of work as an integrated project in Appendix A has been estimated using the AusNet Services estimating spreadsheet at a total capital cost of \$17.85M ( $\pm 30\%$ ).

These costs exclude contingency but include an allowance for overheads and finance charges.

## 9. REFERENCES

The following document were applied in preparation of this report.

TYPE	OWNER	TITLE
Document	AusNet	Shepparton Terminal Station (SHTS) – Transformer B2 and B3 Replacement Project TD-0007996
Document	AusNet	Top-down Transmission Estimate for Option Selection Rev 2.7
Document	AusNet	Relays Condition Score Status as of 07.05.2019
Drawing	AusNet	Shepparton Terminal Station 66kV and 220kV Single Line Diagram – T14/31/164

## APPENDIX A.

Transformer B2, B3 and 66kV switchyard replacement primary and secondary works within SHTS includes the following primary and secondary assets replacement.

### APPENDIX A.1.

The scope to replace B2 and B3 transformer equipment (primary equipment).

<b>TRANS</b>	<b>Activity</b>	<b>Description (Primary Equipment)</b>
Existing B2 TRANS	Remove	Decommissioning of existing three phase B2 Transformer and associated equipment in SHTS 220kV switchyard.
Existing B3 TRANS	Remove	Decommissioning of existing three phase B3 Transformer and associated equipment in SHTS 220kV switchyard.
B2 TRANSF & Station Service Trans	Install	New B2 Transformer & S/S Transformer Installation
		- Install one (1) Three Phase - 220/66/22kV 150 MVA Power Transformer (B)
		- Install one (1) Three Phase - 22kV/415V 315kVA Service Transformer
		- Install 3 220kV Surge Arresters
		- Install 3 66kV Surge Arresters
		- Install one (1) 220kV Neutral Isolator
		- Install one (1) 66kV Neutral Isolator
		- Install two (2) 220kV Neutral CTs
		- Install two (2) 66kV Neutral CTs
		- Install one (1) Three Phase B2 Trans 22kV VT

		<ul style="list-style-type: none"> <li>- Install one (3) No.2 22kV/415V Service Trans 22kV Fused Isolator</li> </ul>
B3 TRANSF & Station Service Trans	Install	New B3 Transformer & S/S Transformer Installation
		<ul style="list-style-type: none"> <li>- Install one (1) Three Phase - 220/66/22kV 150 MVA Power Transformer (B)</li> </ul>
		<ul style="list-style-type: none"> <li>- Install one (1) Three Phase - 22kV/415V 315kVA Service Transformer</li> </ul>
		<ul style="list-style-type: none"> <li>- Install 3 220kV Surge Arresters</li> </ul>
		<ul style="list-style-type: none"> <li>- Install 3 66kV Surge Arresters</li> </ul>
		<ul style="list-style-type: none"> <li>- Install one (1) 220kV Neutral Isolator</li> </ul>
		<ul style="list-style-type: none"> <li>- Install one (1) 66kV Neutral Isolator</li> </ul>
		<ul style="list-style-type: none"> <li>- Install two (2) 220kV Neutral CTs</li> </ul>
		<ul style="list-style-type: none"> <li>- Install two (2) 66kV Neutral CTs</li> </ul>
		<ul style="list-style-type: none"> <li>- Install one (1) Three Phase B3 Trans 22kV VT</li> </ul>
<ul style="list-style-type: none"> <li>- Install one (3) No.3 22kV/415V Service Trans 22kV Fused Isolator</li> </ul>		

## APPENDIX A.2.

The scope to replace B2 and B3 transformer equipment (secondary equipment).

<b>TRANS</b>	<b>Activity</b>	<b>Description (Secondary Equipment)</b>
Existing B2 TRANS	Remove	B2 TR Y Differential Relay Duo Bias "R" Phase
		B2 TR Y Differential Relay Duo Bias "W" Phase
		B2 TR Y Differential Relay Duo Bias "B" Phase
		B2 TR 220 CB Control/ Monitor Relay
		B2 TR 66 CB Control/ Monitor Relay
Existing B3 TRANS	Remove	B3 TR X Differential Relay
		B3 TR X 66 CB Management Relay
		B3 TR 220 CB Control/ Monitor Relay
		B3 TR X 220 CB Fail & Control Relay
		B3 TR 66 CB Control/ Monitor Relay
New B2 TRANS	Install	- Install new B2 Transformer X Protection & Control Scheme.
		- Install new B2 Transformer Y Protection & Control Scheme.
		- Install new one B2 Transformer No.2 220/66kV Bus CB Management Scheme.
New B3 TRANS	Install	- Install new B3 Transformer X Protection & Control Scheme.
		- Install new B3 Transformer Y Protection & Control Scheme.
		- Install new one B3 Transformer No.3 220/66kV Bus CB Management Scheme.
		- Install new 220/66kV Transformer Voltage Control Scheme.

## APPENDIX A.3.

The scope to replace selected 66kV switchgear equipment (primary equipment).

<b>66kV Bay</b>	<b>Activity</b>	<b>Description (Primary Equipment)</b>
66kV Bay H	Remove	Existing KYM No.1 66kV FDR CB Bus Side Isolator Existing KYM No.1 66kV FDR CB FDR Side Isolator Existing KYM No.1 66kV FDR No.2 Bus Isolator
	Install	KYM No.1 66kV Feeder CB Bus Side Isolator - Install on the bus side of CB three 66kV disconnectors KYM No.1 66kV Feeder CB Feeder Side Isolator - Install on the feeder side of CB three 66kV disconnectors KYM No.1 66kV Feeder No.2 Bus Isolator - Install on the No.2 bus side three 66kV disconnectors
66kV Bay P	Remove	Existing KYM No.2 66kV FDR CB Bus Side Isolator Existing KYM No.2 66kV FDR CB FDR Side Isolator Existing KYM No.2 66kV FDR No.5 Bus Isolator
	Install	KYM No.2 66kV Feeder CB Bus Side Isolator - Install on the bus side of CB three 66kV disconnectors KYM No.2 66kV Feeder CB Feeder Side Isolator - Install on the feeder side of CB three 66kV disconnectors KYM No.2 66kV Feeder No.2 Bus Isolator - Install on the No.2 bus side three 66kV disconnectors
66kV Bay N	Remove	Existing NKA No.1 66kV FDR CB Bus Side Isolator Existing NKA No.1 66kV FDR CB FDR Side Isolator Existing NKA No.1 66kV FDR No.2 Bus Isolator
	Install	NKA No.1 66kV Feeder CB Bus Side Isolator - Install on the bus side of CB three 66kV disconnectors



		<p>NKA No.1 66kV Feeder CB Feeder Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the feeder side of CB three 66kV disconnectors</li> </ul>
		<p>NKA No.1 66kV Feeder No.2 Bus Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.2 bus side three 66kV disconnectors</li> </ul>
66kV Bay M	Remove	<p>Existing NKA No.2 66kV FDR CB Bus Side Isolator</p> <p>Existing NKA No.2 66kV FDR CB FDR Side Isolator</p> <p>Existing NKA No.2 66kV FDR No.2 Bus Isolator</p>
	Install	<p>NKA No.2 66kV Feeder CB Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the bus side of CB three 66kV disconnectors</li> </ul> <p>NKA No.2 66kV Feeder CB Feeder Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the feeder side of CB three 66kV disconnectors</li> </ul> <p>NKA No.2 66kV Feeder No.2 Bus Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.2 bus side three 66kV disconnectors</li> </ul>
66kV Bay Q	Remove	<p>Existing MNA 66kV FDR CB</p> <p>Existing MNA 66kV FDR CB Bus Side Isolator</p> <p>Existing MNA 66kV FDR CB FDR Side Isolator</p> <p>Existing MNA 66kV FDR No.2 Bus Isolator</p>
	Install	<p>MNA 66kV Feeder Circuit Breaker</p> <ul style="list-style-type: none"> <li>- Install one 66kV Dead Tank Circuit Breaker</li> </ul> <p>MNA 66kV Feeder CB Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the bus side of CB three 66kV disconnectors</li> </ul> <p>MNA 66kV Feeder CB Feeder Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the feeder side of CB three 66kV disconnectors</li> </ul> <p>MNA 66kV Feeder No.2 Bus Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.2 bus side three 66kV disconnectors</li> </ul>
66kV Bay J	Remove	<p>Existing STN 66kV FDR CB</p> <p>Existing STN 66kV FDR CB Bus Side Isolator</p> <p>Existing STN 66kV FDR CB FDR Side Isolator</p> <p>Existing STN 66kV FDR No.2 Bus Isolator</p>

	Install	<p>STN 66kV Feeder Circuit Breaker</p> <ul style="list-style-type: none"> <li>- Install one 66kV Dead Tank Circuit Breaker</li> </ul> <p>STN 66kV Feeder CB Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the bus side of CB three 66kV disconnectors</li> </ul> <p>STN 66kV Feeder CB Feeder Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the feeder side of CB three 66kV disconnectors</li> </ul> <p>STN 66kV Feeder No.2 Bus Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.2 bus side three 66kV disconnectors</li> </ul>
66kV Bay R	Remove	Existing SHN No.1 66kV FDR CB
	Install	<p>SHN No.1 66kV Feeder Circuit Breaker</p> <ul style="list-style-type: none"> <li>- Install one 66kV Dead Tank Circuit Breaker</li> </ul>
66kV Bay J	Remove	<p>Existing SHN No.2 66kV FDR CB</p> <p>Existing SHN No.2 66kV FDR CB Bus Side Isolator</p> <p>Existing SHN No.2 66kV FDR CB FDR Side Isolator</p>
		<p>SHN No.2 66kV Feeder CB Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the bus side of CB three 66kV disconnectors</li> </ul> <p>SHN No.2 66kV Feeder CB Feeder Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the feeder side of CB three 66kV disconnectors</li> </ul>
66kV Bay M	Remove	<p>Existing 2-3 66kV Bus-Tie CB No.2 Bus Side Isolator</p> <p>Existing 2-3 66kV Bus-Tie CB</p> <p>Existing 2-3 66kV Bus-Tie CB No.3 Bus Side Isolator</p>
	Install	<p>2-3 66kV Bus-Tie No.2 Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.2 bus side of CB three 66kV disconnectors</li> </ul> <p>2-3 66kV Bus-Tie No.3 Bus Side Isolator</p> <ul style="list-style-type: none"> <li>- Install on the No.3 bus side of CB three 66kV disconnectors</li> </ul>
	Remove	Existing No.2 66kV Bus VT Isolator Switch

66kV Bay Q	Install	No.2 66kV Bus VT Isolator Switch - Install three (3) Single Phase Isolator Switch
66kV Bay F	Remove	Existing 2-4 66kV Bus-Tie CB
66kV Bay K	Remove	Existing No.3 66kV Bus VT Isolator Switch
	Install	No.3 66kV Bus VT Isolator Switch - Install three (3) Single Phase Isolator Switch
66kV Bay F	Remove	Existing 3-4 66kV Bus-Tie CB
66kV Bay S	Remove	Existing No.2 66kV Capacitor Bank CB Existing No.2 66kV Capacitor Bank CB Isolator Existing No.2B 66kV Capacitor Bank CB
	Install	No.2 66kV Capacitor Bank Circuit Breaker - Install one 66kV Dead Tank Circuit Breaker No.2 66kV Capacitor Bank CB Isolator - Install on the No.1 Capacitor side three 66kV disconnecter No.2B 66kV Capacitor Bank Circuit Breaker - Install one 66kV Dead Tank Circuit Breaker
66kV Bay H	Remove	Existing No.3 66kV Capacitor Bank CB Existing No.3 66kV Capacitor Bank CB Isolator Existing No.3B 66kV Capacitor Bank CB
	Install	No.3 66kV Capacitor Bank Circuit Breaker - Install one 66kV Dead Tank Circuit Breaker No.3 66kV Capacitor Bank CB Isolator - Install on the No.1 Capacitor side three 66kV disconnecter No.3B 66kV Capacitor Bank Circuit Breaker - Install one 66kV Dead Tank Circuit Breaker
	Remove	Existing B2 220/66KV TRANS 220KV Neutral Isolator

B2 TRANS		Existing B2 220/66KV TRANS 66KV Neutral Isolator Existing B2 220/66KV TRANS 22KV VT "R" Phase Existing B2 220/66KV TRANS 22KV VT "W" Phase Existing B2 220/66KV TRANS 22KV VT "B" Phase Existing B2 Transformer CT (R, W, B) Phase
	Install	<ul style="list-style-type: none"> <li>- Install one (1) 220kV Neutral Isolator</li> <li>- Install one (1) 66kV Neutral Isolator</li> </ul> B2 Trans 66kV Voltage Transformer <ul style="list-style-type: none"> <li>- Install one (1) Single Phase Post Type 66kV VT</li> <li>- Install three (3) Single Phase Post Type 66kV CT</li> </ul>
B3 TRANS	Remove	B3 220/66KV TRANS 220KV Neutral Isolator B3 220/66KV TRANS 66KV Neutral Isolator Existing B3 Transformer CT (R, W, B) Phase
	Install	<ul style="list-style-type: none"> <li>- Install one (1) 220kV Neutral Isolator</li> <li>- Install one (1) 66kV Neutral Isolator</li> <li>- Install three (3) Single Phase Post Type 66kV CT</li> </ul>
66kV Bay E	Remove	Existing B4 TRANS 66kV CB

## APPENDIX A.4.

The scope to replace selected 66kV switchgear equipment (secondary equipment).

66kV Bay	Activity	Description (Secondary Equipment)
66kV Bay J	Remove	STN 1 Auto-Reclose Relay
	Install	- Install new STN No.1 Auto-Reclose Relay Scheme.
66kV Bay R	Remove	SHN 1 X Remote Trip VF AUX Relay
		SHN 1 X High Speed Biased Two Pilot Wire
		SHN 1 X VF Signal Loss AUX Relay
		SHN 1 X Trip Relay
		SHN 1 Y Sensitive Earth Leakage Relay
		SHN 1 Auto-Reclose Relay
	Install	- Install new SHN No.1 Feeder X & Y Protection & Control Scheme.
		- Install new SHN No.1 Feeder X & Y Protection & Control Scheme to remote end.
66kV Bay K	Remove	SHN 2 X Remote Trip VF AUX Relay
		SHN 2 X High Speed Biased Two Pilot Wire
		SHN 2 X VF Signal Loss AUX Relay
		SHN 2 X Trip Relay
		SHN 2 Y CB Current Check Relay
		SHN 2 Y Sensitive Earth Leakage Relay
		SHN 2 Y Trip Relay
		SHN 2 Auto-Reclose Relay
	Install	- Install new SHN No.2 Feeder X & Y Protection & Control Scheme.
		- Install new SHN No.2 Feeder X & Y Protection & Control Scheme to remote end.

66kV Bay S	Remove	No.2 66kV Capacitor Bank X Overcurrent, Earth Fault, CB Fail
		No.2 66kV Capacitor Bank X Current Balance Relay
		No.2 66kV Capacitor Bank X Current Balance Relay
		No.2 66kV Capacitor Bank X Current Balance Relay
		No.2 66kV Capacitor Bank Y Overcurrent, Earth Fault, CB Fail
		No.2 66kV Capacitor Bank Y Overload & Current
		No.2 66kV Capacitor Bank Y Overload & Current
		No.2 66kV Capacitor Bank Y Overload & Current
		No.2 66kV Capacitor Bank Y O/L Block Timer Relay
		No.2 66kV Capacitor Bank Y Trip Relay
	Install	- Install new No.2 Capacitor X & Y Protection & Control Scheme.
	Remove	No.2B 66kV Capacitor Bank Y Trip Relay
		No.2B 66kV Capacitor Bank X Trip Relay
Install	- Install new No.2B Capacitor X & Y Protection & Control Scheme.	
66kV Bay H	Remove	No.3 66kV Capacitor Bank X Overcurrent, Earth Fault, CB Fail
		No.3 66kV Capacitor Bank X Current Unbalance Relay
		No.3 66kV Capacitor Bank X Current Unbalance Relay
		No.3 66kV Capacitor Bank X Current Unbalance Relay
		No.3 66kV Capacitor Bank Y Overcurrent, Earth Fault, CB Fail
		No.3 66kV Capacitor Bank Y Overload & 3B Current
	Install	- Install new No.3 Capacitor X & Y Protection & Control Scheme.
	Remove	No.3A 66kV Capacitor Bank Y Overload & 3B Current
		No.3B 66kV Capacitor Bank Y Current Unbalance Relay

		No.3B 66kV Capacitor Bank Y Trip Relay
		No.3A-3B 66kV Capacitor Bank X Trip Relay
		No.3A-3B 66kV Capacitor Bank Y Trip Relay
	Install	<ul style="list-style-type: none"> <li>- Install new No.3A Capacitor X &amp; Y Protection &amp; Control Scheme.</li> <li>- Install new No.3B Capacitor X &amp; Y Protection &amp; Control Scheme.</li> </ul>
66kV Bus Protection	Remove	No.2 66kV X High Impedance Bus Protection Relay
		No.2 66kV X Bus Protection Trip Relay
		No.2 66kV X Bus Protection & Backup Trip Relay
		No.2 66kV Y High Impedance Bus Protection Relay
		No.2 66kV Y Trip Relay
		No.2 66kV Y Bus Protection Trip Relay
	Install	<ul style="list-style-type: none"> <li>- Install new No.2 66kV Bus X &amp; Y Busbar Protection Scheme.</li> </ul>
66kV Bay F	Remove	No.2-4 66kV Bus-Tie CB Fail Relay
		No.2 66kV Bus Fault CB Fail & Dead Zone
		No.2 66kV Bus BU CB Fail Timer Relay
		No.2 66kV Bus Fault CB Fail & Dead Zone
		No.2 66kV Bus BU CB Fail Timer Relay
	Install	<ul style="list-style-type: none"> <li>- Install new No.2 66kV Bus-Tie (Bay F) CB Management Scheme.</li> </ul>
66kV Bus Protection	Remove	No.3 66kV X High Impedance Bus Protection Relay
		No.3 66kV X Bus Protection Trip Relay
		No.3 66kV X Bus Protection & Backup Trip Relay
		No.3 66kV Y High Impedance Bus Protection Relay
		No.3 66kV Y Bus Protection Trip Relay
		No.3 66kV Y Bus Protection Trip Relay

	Install	- Install new No.3 66kV Bus X & Y Busbar Protection Scheme.
66kV Bay F	Remove	No.3-4 66kV Bus-Tie CB Fail Relay
		No.3 66kV Bus Fault CB Fail & Dead Zone
		No.3 66kV Bus BU CB Fail Timer Relay
		No.3 66kV Bus Fault CB Fail & Dead Zone
		No.3 66kV Bus BU CB Fail Timer Relay
	Install	- Install new No.3 66kV Bus-Tie (Bay F) CB Management Scheme.
66kV Bus Protection	Remove	No.4 66kV X High Impedance Relay
		No.4 66kV X Bus Protection & Backup Trip Relay
		No.4 66kV Y High Impedance Relay
		No.4 66kV Y Trip Relay
		No.4 66kV Y Bus Protection Trip Relay
	Install	- Install new No.4 66kV Bus X & Y Busbar Protection Scheme.