



AusNet Electricity Services Pty Ltd

Electricity Distribution Price Review 2022-26

Appendix 9B: Unit Rates

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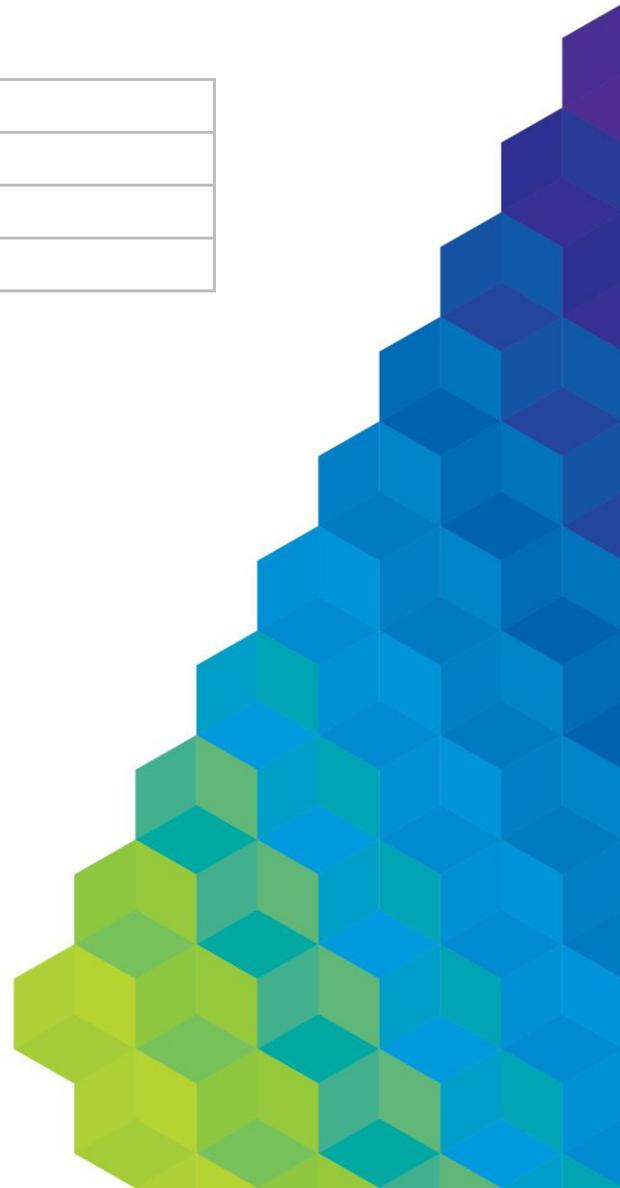


Unit Rates

EDPR

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1 Introduction

The purpose of this document is to provide the unit rates that been applied to forecast capital expenditure for the 2021-2025 EDPR and to explain the basis of each of the rates.

All rates are P50 and are presented in \$2018. A P50 estimate is an estimate prepared at any stage of a project that has a 50% confidence factor of the cost not being exceeded at completion.

2 Basis of Rates

The basis of the unit rates used to develop the capital expenditure forecast is described in the following sections.

2.1 Methodology

2.1.1 Lines & Enhanced Safety Programs

The unit rates used to forecast costs of most lines related works, including the majority of the safety related expenditure, are based on the historical rates. Data has been captured from since the introduction of SAP in the business to around the end of 2018 in order to determine average actual historical costs for each item.

The unit rates have been provided based on taking the average (calendar) yearly actual costs divided by the average yearly installation volumes. Prior year costs have been related to \$2018 for the purposes of calculating the average yearly cost.

Where a unit rate has not been developed on this basis, the alternative methodology is noted in the rates tables shown in Section 3.

All rates are the direct cost of undertaking the activity and do not include overheads or finance charges.

2.1.2 Substations

The approach to forecasting capital expenditure categories is explained in the *Project Cost Estimating Methodology*. This document details the unit rates used in each category of capital expenditure.

The unit rates are compiled based on the project cost estimating spreadsheet (Top-down distribution estimate for option selection only). This spreadsheet is built up using a bottom up approach, with labour and materials itemised individually.

The following have been adopted in the preparation of the unit rates for works within the substation:

- Material costs are based on period contract pricing from suppliers as of April 2018
- Design Service Provider (DSP) panel rates have been used to estimate design costs
- Installation Service Provider (ISP) services agreement rates for labour and plant rates have been used to estimate construction costs
- AusNet Services internal cost i.e. Project Management, Quality Assurance, Site Supervision and Engineering support rates are based on DSP panel rates
- Project Components Uncertainty¹ (value applied to reference estimate to arrive at P50 outcome)

¹ Project Components Uncertainty is a calculation (or estimate) of the variability that occurs in all projects. This variability arises from uncertainty in pricing or volumes of component activities. The uncertainties are a portion of the difference between the outturn and assumptions in the reference estimate.

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Further explanation of the project cost estimating database and methodology is contained in the *Project Cost Estimating Methodology*.

All rates are the direct cost of undertaking the activity and do not include overheads or finance charges.

3 Unit Rates

3.1 Lines

The rates in this section have been used to estimate programs of expenditure associated with replacement of lines assets.

3.1.1 Assumptions

Lines asset replacement works are delivered by a combination of internal and external resources depending upon the region and work delivery volumes. The unit rates are the average across the network and are not reflective of highest or lowest rates.

3.1.2 Limitations

Financial information is not captured at the works specification level. This limits the ability to calculate a historic unit rate specific to some of the asset categories.

- It was not possible to split the historic rates between the 3 different pole types, Wood, Concrete or Steel.
- Distribution substation replacement costs have been calculated as an average across all types. The cost of replacing a distribution substation varies greatly. A 25 kVA pole type transformer is an order of magnitude less expensive than a 500 kVA kiosk. A change in the mix of substations replaced could result in a materially different replacement cost.

3.1.3 Contractor overheads

A delivery partner is engaged to deliver a significant proportion of lines related capital work in one of the three delivery regions. The contract with this supplier specifies that AusNet Services will pay a component of the supplier's overhead. The overhead is not included in the unit rates paid to the contractor and is not incorporated into the historical direct costs used to develop the unit rates.

The rates shown in the table do not incorporate contractor overheads. The overheads have been incorporated into the total costs in the Capex model.

3.1.4 Rates

Table 1- Lines Unit Rates

Category	Description	Rate	Basis and Unit of Measure
Poles - Sub transmission (66kV)	Complex Structure HV/LV structures including Substation Poles, Switch Poles, Cable Head Poles, Regulator & ACR Poles – Open Wire and ABC conductor		Per pole Includes pole top hardware
	Simple Structure Single Circuit Intermediate or angle structure - Open Wire and ABC conductor		Per Pole Includes pole top hardware

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Category	Description	Rate	Basis and Unit of Measure
Poles Distribution (22/11/6.6kV)	Complex Structure HV/LV structures including Substation Poles, Switch Poles, Cable Head Poles, Regulator & ACR Poles – Open Wire and ABC conductor	C.I.C	Per Pole Includes pole top hardware
	Simple Structure HV/LV Structures – Intermediate/Angles, Strains, Terminations, and small substation poles (Single Phase & SWER Distribution) – Open Wire and ABC conductor		Per Pole Includes pole top hardware
	Low Voltage (<1kV) Intermediate, Strain, Termination, Anchor, Tee-off – LV Open Wire or LVABC		Per Pole Includes pole top hardware
	Aerial Guy Pole/Public Lighting Pole/Column/Service Pole		Per Pole
Pole – Staking or Reinforcement	Installation of RFD Pole Stakes to reinstate an Unserviceable or Limited Life pole – Sub- transmission, HV and LV poles		Per Pole
	Re-butting of an Unserviceable or Limited Life pole – Sub-transmission, HV and LV poles		
Crossarms	Sub transmission (66kV) Intermediate, Strain, Termination, Anchor		Per Crossarm Includes associated hardware
	High Voltage (22/11/6.6kV) Intermediate, Strain, Termination, Anchor, Angle, Tee-off, Dressing-Down Crossarm		Per Crossarm Includes associated hardware
	Low Voltage (<1kV)		Per Crossarm Includes associated hardware
Conductor ²	Span OF Defective Conductor (1 Phase or 3 Phase)		Per span (based on reactive replacements – eg. emergency)
	Replacement Of HVABC Conductor (Per Span > 3 Metres In Length)		
	Replacement Of LVABC Conductor - Per Span		
Distribution Substation Transformers	Replace Defective or Faulted Transformer on Pole Type Substation, or Ground Type Substation	Per Substation	
Switches and ACR (Auto Circuit Recloser)	High Voltage	Per Switch	
Low Voltage Services	Overhead Service Line From Pole To Installation	Per Service Average of proactive (planned) and reactive (replace on failure)	
Surge Arresters	Line Class	Per Surge Arrester	
Voltage Regulators	All	Per Regulator (3 phases)	

² For programmed conductor replacement, refer to section 3.4.2.

3.2 Stations

The rates in this section have been used to estimate programs of expenditure associated with replacement of stations assets. These assets are located within the zone substations used to transform sub-transmission voltages to distribution voltages. Rates in this section are inclusive of civil, primary equipment and associated secondary works, unless otherwise specified.

3.2.1 Allowances

The following items have been allowed for within the stations unit rates:

- Decommissioning and removal of existing equipment
- Supply, installation, testing and commissioning of equipment
- Earthworks, foundations and structures (where applicable)
- Cabling (secondary and power) (where applicable)
- Protection and control associated with the equipment including interfacing works (where applicable)
- Interplant connections
- Earthing modifications
- Operational outage costs (i.e. planning preparation of outages & network switching)
- Design
- AusNet Services internal labour costs (i.e. Project Management, Quality Assurance, Site Supervision and Engineering support)
- Contractor indirect costs.

3.2.2 Exclusions

The following items have been excluded from the stations unit rates:

- Planning and building permit applications
- Land acquisitions and easement creation
- Site surveys, geotechnical investigations and reports
- Additional cable ducts or cable trenches - assume existing is suitable and sufficient capacity
- Removal of contaminants such as asbestos, PCBs and contaminated soil
- Costs associated with any environmental works
- Communication systems and schemes
- Management reserve³
- Cost escalations
- Financing cost and corporate overheads
- Written-down values
- Spares
- Operations and maintenance costs.

³ An amount of funds, budget, or time needed above the estimate to cover the costs of unforeseen factors related to the delivery of the project objectives, which are not provided for elsewhere in the total job costs. Management Reserve is to be administered at program level. These can include but are not limited to the occurrence of an unplanned or unforeseen event such as a natural event or a major safety incident and the change to planned assumptions, stakeholder issues (outage restrictions, community) and delayed access to site, industrial relations issues external to the Project / Program, and contractual issues or claims.

Management Reserve is the difference between P(90) (An estimate prepared at any stage of a project which has a 90% confidence factor of not being exceeded by cost at completion) and P(50) outcomes.

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3.2.3 Primary Rates

Table 2 provides the unit rates for 22 kV stations primary equipment.

Table 2 - 22kV Primary Equipment Unit Rates

Unit	Rate	Basis
Capacitor Bank - 6MVAR with 7% (19.3mH) current limiting series reactor	C.I.C	<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ Power cable and conduit (30m) ○ New capacitor bank protection scheme and integration ○ Safety fencing
Reactor (For Capacitor Bank) - 7% (19.3mH) current limiting series reactor		
Circuit Breaker: Dead Tank – Outdoor, 22kV 2000A 31.5kA, 4 5A bushing current transformer cores per phase: 0.2PX160, R0.55 on 1600/5		<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ Duplicated secondary cabling to Interface Termination Cubicle (ITC)
Neutral Earthing Resistor – 22/12.7kV, 1600A/10sec, Outdoor, single phase 8 Ωneutral earthing resistor with bypass Circuit Breaker and series Current Transformers and Voltage Transformers		<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ Neutral Current Transformers and isolator ○ New earth fault back up protection scheme and integration ○ Provision for SCADA RTU modifications ○ Provision for Digital Interface Cubicle modifications ○ Duplicated secondary cabling to ITC ○ Monitoring accessories ○ Power cable and conduit (40m)
Neutral Earthing Compensator		<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ Power cabling (30m) ○ Termination frame ○ NEC protection and control scheme
Isolator: Underslung – 1600A, 31.5kA		<ul style="list-style-type: none"> • 3 phase, Hook stick operated • Includes: <ul style="list-style-type: none"> ○ 8.9kN station post insulators ○ Earthing receptacles (two sets)
Isolator: Rotary Double Break – 1600A, 31.5kA		<ul style="list-style-type: none"> • 3 phase, ganged manual operation • Includes: <ul style="list-style-type: none"> ○ Manually operated earth switch ○ Earthing receptacles (one sets)
Current Transformer – 2000A, 31.5kA		<ul style="list-style-type: none"> • 3 phase set • Includes:

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Unit	Rate	Basis
		<ul style="list-style-type: none"> ○ Marshalling box and secondary cabling to ITC
Voltage Transformer - 24mS, 0.5M/1P		<ul style="list-style-type: none"> ● 3 phase set ● Includes: <ul style="list-style-type: none"> ○ Marshalling box and secondary cabling to ITC
Surge Arrester – 31.5kA short circuit withstand current, 10kA peak nominal discharge current		<ul style="list-style-type: none"> ● 3 phase set
Modular Switchroom – Including switchgear		<ul style="list-style-type: none"> ● Approx. 4.5m x 12.5m steel framed building ● Excludes: <ul style="list-style-type: none"> ○ Demolition of existing switchroom ○ 22kV power cabling ○ DC supply and batteries ● Building includes: <ul style="list-style-type: none"> ○ Air conditioning system ○ Fire detection system ○ Control room complete with ITC ● Protection panels included: <ul style="list-style-type: none"> ○ (4) 22kV feeder protection ○ (2) Capacitor bank protection ○ X & Y Bus protection ○ CB failure protection ○ Bus Tie protection ○ Provision for REFCL protections, where required ● Switchgear includes: <ul style="list-style-type: none"> ○ One (1) 2000A, 20kA transformer panel including 5, 5A current transformer cores ○ Four (4) 1250A, 20kA feeder panels including 2, 5A current transformer cores ○ Two (2) 1250A, 20kA capacitor panels including 2, 5A current transformer cores ○ One (1) 2000A, 20kA bus tie panel including 5, 5A current transformer cores ○ Single bus with a 50VA voltage transformer 0.5M/1P

Table 3 provides the unit rates for 66 kV stations primary equipment.

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Table 3 - 66 kV Primary Equipment Unit Rates

Unit	Rate	Basis
Power Transformer – Yyn0(d11), 66/22kV, 15/20MVA with 4hr 30MVA emergency rating, 10% nominal impedance, tapping range -26 to +5 %	C.I.C	<ul style="list-style-type: none"> • Reuse footings and firewall • Excludes protection upgrades • Includes: <ul style="list-style-type: none"> ○ Removal of existing transformer ○ Neutral isolator, neutral current transformers and associated isolation structure ○ 66kV surge arresters ○ Secondary cabling to ITC
Circuit Breaker: Dead Tank – 3150A, 40kA, 4 5A bushing current transformer cores per phase: 0.1PX1000, R1.6 on 3000/5		<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ Duplicated protection and control schemes, integrated into existing station ○ Secondary cabling to ITC
Isolator: Underslung – 2000A, 31.5kA		<ul style="list-style-type: none"> • 3 phase, Hook stick operated • Includes: <ul style="list-style-type: none"> ○ 12.5kN station post insulators ○ Earthing receptacles (two sets)
Isolator: Rotary Double Break – 800A, 25kA		<ul style="list-style-type: none"> • 3 phase, ganged manual operation • Includes: <ul style="list-style-type: none"> ○ Manually operated earth switch ○ Earthing receptacles (one set)
Current Transformer – 2000A, 31.5kA, 5 5A cores per phase, 0.14PX700, R1.1 on 2100/5		<ul style="list-style-type: none"> • 3 phase set • Includes: <ul style="list-style-type: none"> ○ Marshalling box and secondary cabling to ITC
Voltage Transformer - 24mS, 0.5M/1P		<ul style="list-style-type: none"> • 3 phase set • Includes: <ul style="list-style-type: none"> ○ Marshalling box and secondary cabling to ITC
Surge Arresters – 31.5kA short circuit withstand current, 10kA peak nominal discharge current		<ul style="list-style-type: none"> • 3 phase set
Bus section – 100mm OD, 6mm WT welded aluminium tube, 2500A rating.		<ul style="list-style-type: none"> • Includes: <ul style="list-style-type: none"> ○ 8 metre section of 3 phase rigid bus ○ 12.5kN station post insulators ○ Support structure and associated footings.

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3.3 Secondary

The rates in this section have been used to estimate programs of expenditure associated with secondary assets. These assets are located within zone substations and include items such as line protection, transformer protection and capacitor bank protection.

3.3.1 Allowances

The following items have been allowed for in the secondary unit rates:

- Decommissioning and removal of existing equipment
- Supply, installation, testing and commissioning
- Control cabling from cubicle to ITC
- Intercubicle wiring
- Cubicle earthing and cable tray
- Modification and interfacing works
- Design
- AusNet Services internal labour costs (i.e. Project Management, Quality Assurance, Site Supervision and Engineering support)
- Contractor indirect costs

3.3.2 Exclusions

The following items have been excluded from the secondary unit rates:

- Building modification works
- Removal of asbestos
- Communication systems and schemes
- Non-standard / site specific installations
- Management reserve
- Cost escalations
- Financing costs and corporate overheads
- Written-down values
- Operation and maintenance costs
- Spares.

3.3.3 Secondary Rates

Table 4 provides the unit rates for stations secondary equipment.

Table 4 - Secondary Equipment Unit Rates

Unit	Rate	Basis
66kV Line Protection		<ul style="list-style-type: none"> • X&Y modular scheme includes <ul style="list-style-type: none"> ○ Current differential protection ○ Back up distance protection ○ Auto reclose ○ Circuit breaker failure ○ Circuit breaker management ○ Circuit breaker control ○ Line instrumentation quantities

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Unit	Rate	Basis
66kV Autoclose	C.I.C	<ul style="list-style-type: none"> • Four (4) bus arrangement • Tap matching scheme • Autoclose panel includes: <ul style="list-style-type: none"> ○ Autoclose relay ○ Interface/tap matching relay
22kV Feeder Protection		<ul style="list-style-type: none"> • Modular scheme includes <ul style="list-style-type: none"> ○ Two (2) feeders on panel ○ Overload protection ○ Sensitive earth fault protection ○ Auto reclose ○ Circuit breaker management ○ Circuit breaker control ○ Feeder instrumentation quantities
66/22kV Transformer Protection		<ul style="list-style-type: none"> • X&Y modular scheme includes <ul style="list-style-type: none"> ○ Differential Protection ○ Overload ○ Circuit breaker failure ○ 66kV circuit breaker management ○ 66kV circuit breaker control ○ Transformer instrumentation quantities
22kV Bus Protection		<ul style="list-style-type: none"> • X&Y modular scheme includes <ul style="list-style-type: none"> ○ Differential protection ○ Bus Overload ○ 22kV Transformer and bus tie: <ul style="list-style-type: none"> ▪ Circuit breaker failure ▪ Circuit breaker management ▪ Circuit breaker control
22kV Earth Fault Backup Protection		<ul style="list-style-type: none"> • Earth Fault Backup Protection
22kV Cap Bank Protection		<ul style="list-style-type: none"> • X&Y modular scheme <ul style="list-style-type: none"> ○ Overload protection ○ Circuit breaker management ○ Circuit breaker control ○ Instrumentation quantities
Zone Substation RTU		<ul style="list-style-type: none"> • SCIMS System – Large (3 rack RTU) • Includes: <ul style="list-style-type: none"> ○ SCIMS Panel ○ HMI ○ GPS clock ○ DSP Mapping & Design ○ Testing ○ NOC Review & Display Implementation

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3.4 Enhanced Safety Programs

The rates in this section have been used to estimate programs of expenditure associated with the Enhanced Safety Program.

3.4.1 Assumptions

Safety program works are delivered by a combination of internal and external resources depending upon the region, the program and work delivery volumes. The unit rates selected are the average across the network and are not reflective of highest or lowest rates.

3.4.2 Rates

Table 5 provides unit rates for enhanced safety program activities.

Table 5 - Enhanced Safety Programs Unit Rates

Category	Description	Rate	Unit of Measure	Basis of Rates
Installation of Armour Rods and Vibration Dampers	Install or replace armour rods and vibration damper on the following structures <ul style="list-style-type: none"> • SWER Intermediate • SWER Angle • Intermediate Single Phase • Intermediate Three Phase • Angle Single Phase • Angle Three Phase 	C.I.C	Per Structure	<ul style="list-style-type: none"> • Based on the historical average rate and mix of activities.
Conductor Replacement	Proactive program to replace conductor: <ul style="list-style-type: none"> - Steel - Copper 		Per km	<ul style="list-style-type: none"> • Average unit rate based on historic average cost
EDO Fuse Unit Replacement	Replacement of EDO to Boric Acid unit on the following structures <ul style="list-style-type: none"> • SWER • Single Phase • Three Phase 		Per Unit	<ul style="list-style-type: none"> • Based on reported volumes and costs in annual RINs 2011 to 2013
Animal Proofing	Animal Proofing of the following <ul style="list-style-type: none"> • The retrofitting of an existing concrete pole substation structure with Animal Proofing materials • The retrofitting of an existing complex (termination, strain, anchor) High Voltage or wood pole substation structure with Animal Proofing material • The retrofitting of an existing pole or ground type substation or Cable Head Pole structure with minor Animal Proofing materials. 		Per Structure	<ul style="list-style-type: none"> • Average rate based on a mix of structure types and both full and minor animal proofing.
Overhang	Replacement of bare overhead wire		Per 56M	<ul style="list-style-type: none"> • Based on historical rate of

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Category	Description	Rate	Unit of Measure	Basis of Rates
Removals	classified as a 56M with High Voltage Aerial Bundled Cable		span	undertaking similar activity.
Line Clearance	Rectification of Line Clearance issues		Per Span	<ul style="list-style-type: none"> Based on historical cost of rectifying line clearance issues.
High Voltage Underground Cable Installation Program	Replacement of High Voltage Aerial Bundled Cable with High Voltage Underground cable		Per km	<ul style="list-style-type: none"> Based on forecast expenditure from the current High Voltage Underground Cable Installation Program