ASSET CLASS OVERVIEW

POLES

PAL BUS 4.01 – PUBLIC
2026–31 REGULATORY PROPOSAL

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1. Overview

Our network comprises over 490,000 poles, with the majority of these being wood poles. Our pole intervention program, therefore, is critical to our ability to maintain network reliability and minimise safety risk as far as practicable.

In the current regulatory period, we are required to intervene on a specified volume of wood poles, as directed by Energy Safe Victoria (ESV) under section 109 of the Electricity Safety Act 1998 (Vic) (Electricity Safety Act). This direction from ESV followed two separate reviews into the sustainability of our wood pole replacement practices.

A key consideration in ESV's reviews was that the underlying characteristics of our wood pole population mean that elevated intervention volumes will be required over multiple regulatory periods to ensure long-term sustainable outcomes. This is further evidenced by the decay rate assessment presented in this business case, which is based on independent statistical analysis.

Accordingly, we propose to maintain existing wood pole intervention volumes at current levels for the 2026–31 regulatory period. A proportion of these wood poles will be staked, consistent with our historical staking ratio.

This forecast is also supported by modelling of measured condition, noting that in practice, we are observing an increasing proportion of wood poles being identified as 'added control serviceable' or 'unserviceable' due to deterioration. For example, through cyclical inspections, ‘sound wood’ is measured to assess the level of internal rot (which is the main deterioration cause leading to wood pole failures). This inspection data has been converted into annual decay rates which have been used to predict future measured condition and subsequent serviceability as a counterfactual.

These forecasts of future sound wood thickness reiterate previous ESV expectations that the volume of unserviceable and added control serviceable poles will continue to grow, with volumes from 2036 onwards that will exceed our deliverability capacity. It is therefore prudent to manage these high volumes across multiple regulatory periods, recognising as well that the underlying age profile of our population suggests these interventions are least-regrets investments.

A summary of our pole intervention volumes is set out in table 1, with expenditure (applying unit rates based on audited Regulatory Information Notices (RIN) data) in table 2.

TABLE 1 FORECAST POLE INTERVENTIONS: VOLUMES

VOLUMES	FY27	FY28	FY29	FY30	FY31	TOTAL
LV pole replacements	797	797	797	797	797	3,983
HV pole replacements	3,708	3,708	3,708	3,708	3,708	18,538
Other pole replacements	4	4	4	4	4	18
Wood pole reinforcements	2,777	2,777	2,777	2,777	2,777	13,885
TOTAL	**7,285**	**7,285**	**7,285**	**7,285**	**7,285**	**36,424**

TABLE 2 FORECAST POLE INTERVENTIONS: EXPENDITURE ($M, 2026)

EXPENDITURE	FY27	FY28	FY29	FY30	FY31	TOTAL
LV pole replacements	16.7	16.7	16.7	16.7	16.7	83.6
HV pole replacements	80.0	80.0	80.0	80.0	80.0	400.1
Other pole replacements	0.1	0.1	0.1	0.1	0.1	0.6
Wood pole reinforcements	8.1	8.1	8.1	8.1	8.1	40.4
TOTAL	**104.9**	**104.9**	**104.9**	**104.9**	**104.9**	**524.7**

2. Background

Poles are essential to an overhead electricity distribution network. Their basic function is to support overhead electrical conductors and other pole mounted assets, and to provide safe clearance from the ground and other adjacent objects (including vegetation).

This section provides an overview of our pole asset class, including a high-level summary of our compliance obligations, pole population and age profile.

2.1 Compliance obligations

We operate under a combination of national and state legislation which establish our obligations and the regulatory framework under which we operate.

The National Electricity Rules sets out reliability and safety obligations and the Electricity Distribution Code of Practice include performance requirements. We must also manage our network assets in accordance with the Electricity Safety Act 1998, the Electricity Safety (Management) Regulations 2019, the Electricity Safety (Bushfire Mitigation) Regulations 2023 and the Victorian Environment Protection Act 2017.

These obligations can be summarised as follows:

- Electricity Safety Act 1998 – requires us to minimise safety risk 'as far as practicable' including bushfire danger
- Electricity Distribution Code of Practice – requires us to manage our assets in accordance with principles of good asset management and to minimise the risks associated with the failure or reduced performance of assets
- National Electricity Rules – requires us to forecast expenditure to maintain the quality, reliability and security of supply of our networks and maintain the safety of the distribution system
- Victorian Environment Protection Act (2017) – requires us to reduce the risk of harm from our activities to human health and the environment and from pollution or waste.

In short, we must maintain reliability, minimise safety risk 'as far as practicable' including bushfire danger arising from our network, and reduce the risk of harm to the environment.

For our wood pole population, we also have specified minimum intervention volumes set out in our bushfire mitigation plan following a direction from ESV under section 109 of the Electricity Safety Act. Further detail on this obligation is outlined in section 3.2 of this document.

2.2 Asset population

Our poles asset class includes low voltage (LV), high voltage (HV), sub-transmission and public lighting poles.[1] The corresponding material types used are wood, concrete and steel.

As shown in table 3, the majority of this asset class are HV wood poles.

[1] As public lighting poles are not part of our standard control services, we have excluded them in this document.

TABLE 3 EXISTING POLE POPULATION: TYPE

POLE TYPE	WOOD	CONCRETE	STEEL	TOTAL
LV	93,202	25,810	431	**119,443**
HV	231,815	104,403	405	**336,623**
Sub-transmission	18,328	10,825	89	**29,242**
Other	3,513	1,140	1,148	**5,801**
Total	**346,858**	**142,178**	**2,073**	**491,109**

Our wood pole population also includes staked poles (i.e. additional supports to reinforce the pole and extend its life).

Our wood pole population can be further disaggregated by durability class, which refers to the natural ability of a wood pole to resist attack by fungi and insects. Australian Standards divide timbers into four durability classes, which relate to only the non-preservative treated heartwood or 'true-wood'.

Durability class one represents our strongest poles, with poles of unknown durability class treated as class three by default. Class three poles have generally been pressure treated with creosote, which is used to protect timber from white ants and decay.

2.3 Asset age profile

Table 4 sets out the expected service life for our different pole assets. This service life is the expected period of time after which the asset is unlikely to be fit for purpose, typically determined by safety, technology and/or obsolescence.

The expected service life is consistent with the average replacement age. For example, for wood poles with durability class three, the average replacement age over the past five years has been 55 years.

TABLE 4 EXPECTED SERVICE LIFE: POLES (YEARS)

POLE TYPE	EXPECTED SERVICE LIFE
Wood (durability class one)	70
Wood (durability class two)	60
Wood (durability class three and four)	50
Concrete	80
Steel	60

Figure 1 also shows the age profile of our pole population by material type, and figure 2 shows the corresponding wood pole population based on durability class. Collectively, these charts show that our existing wood pole population comprises a large cohort of aged, lower durability poles, including a significant volume of wood poles—42 per cent of the population—that are beyond their expected service life.

FIGURE 1 NUMBER OF POLES BY MATERIAL AND AGE (YEARS)

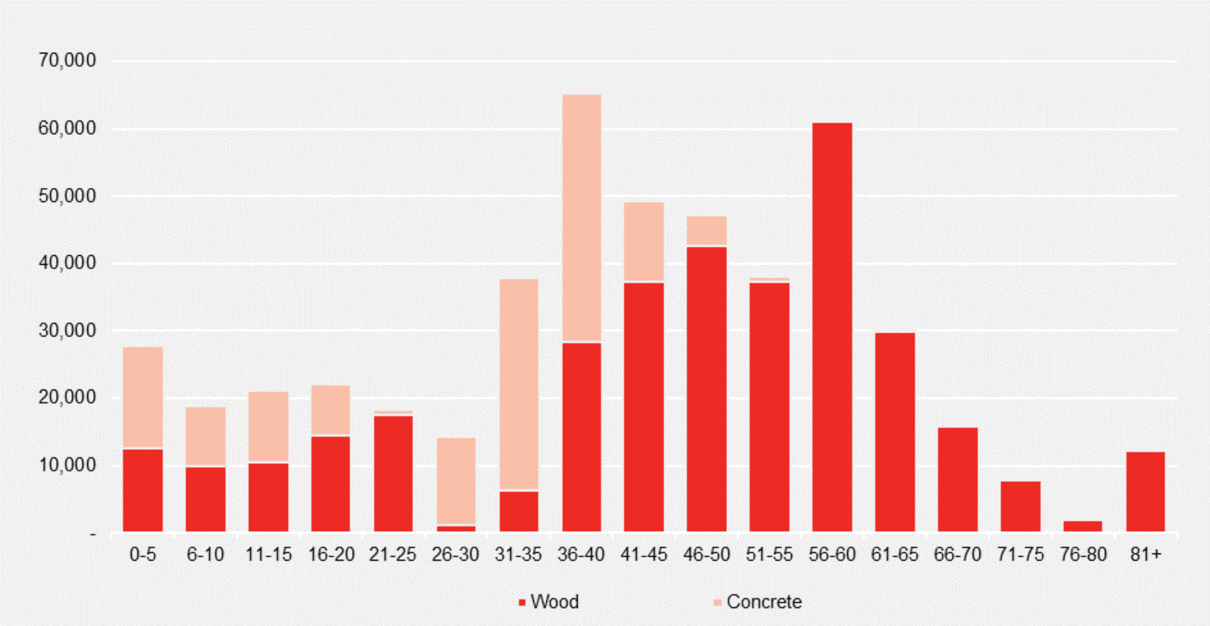
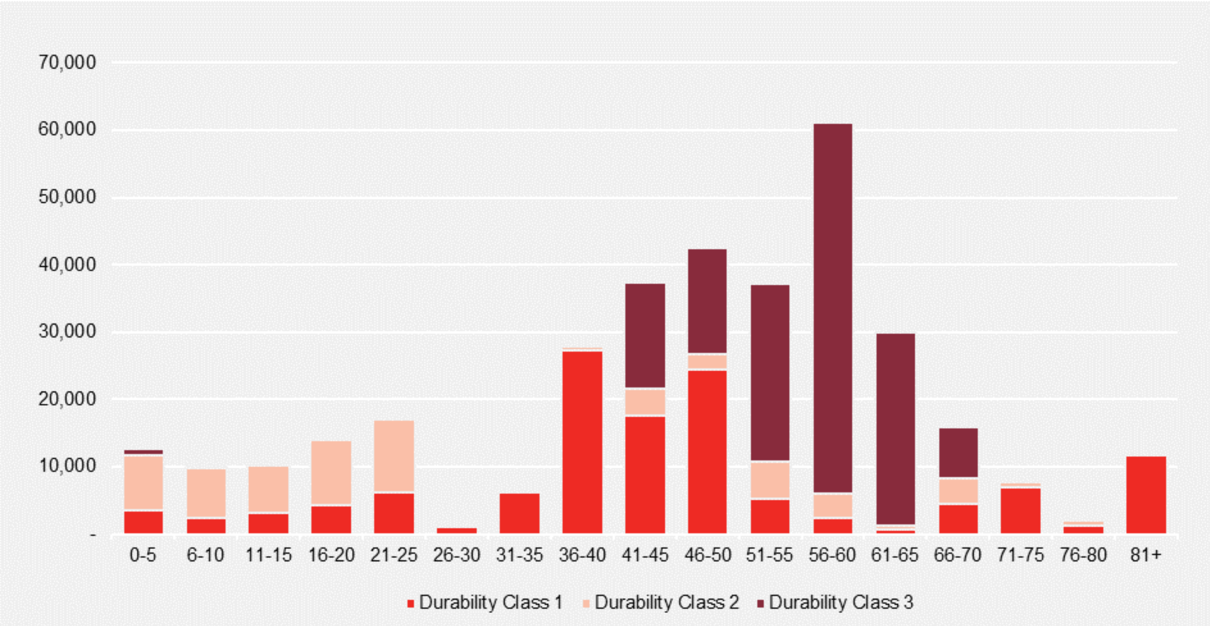


FIGURE 2 NUMBER OF WOOD POLES BY DURABAILITY CLASS AND AGE (YEARS)



3. Identified need

The performance of our pole asset class can impact our network service levels, as pole failures may lead to a loss of supply for customers, pose safety risks to our personnel and the public, and potentially start fires, including in hazardous bushfire risk areas (HBRA).

The identified need, therefore, includes managing our pole asset class to maintain reliability and minimise safety risks as far as practicable, consistent with our regulatory and legislative obligations.

The large volume of our wood pole population, and its underlying condition and age profile, is also driving the need to maintain sustainable intervention volumes to prudently manage deliverability and safety factors. This need was identified by ESV in its review of our wood pole management practices, and its subsequent direction under the Electricity Safety Act.

This section outlines the historical performance of our poles, which has informed how we assess (and respond, as required) to these identified needs.

3.1 Historical performance

In considering any pole intervention needs, we monitor several asset performance indicators, including asset failures, high priority defects, and asset condition. These indicators inform our underlying asset management response—for example:

- increasing unassisted asset failures indicates a likely need to act immediately and review asset management practices (noting that robust inspection practices and governance over the application of these methods may drive low failure rates, but if the underlying condition of the relevant asset population is poor and/or deteriorating, high and/or increasing intervention volumes may still be prudent and efficient)
- increasing high-priority defects or deteriorating condition (relative to asset management thresholds) indicates a likely need to act soon to increase interventions over time, and/or undertake risk-based assessments.

3.1.1 Unassisted pole failures

We report unassisted pole failures to ESV annually, with no observed concrete or steel pole failures in the last five years.

Our unassisted wood pole failures have remained relatively stable since 2018, however, at around 0.7 to 0.8 failures per 10,000 poles, are the highest amongst Victorian distributors.[2]

3.1.2 Observed and measured defects[3]

Consistent with our regulatory obligations, we inspect our poles located in HBRA every 2.5 years, and every five years for poles in low bushfire risk areas (LBRA). These cyclic pole inspections provide point-in-time assessments of the pole condition and identify any pole defects.

The main deterioration cause for wood poles is timber rot, which reduces the strength of the wood pole and may eventually lead to failure. Internal timber rot primarily affects the centre 'heart' wood at the base of the pole and results in the pole being hollowed out.

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2 See, for example, data included in ESV's review of Victorian wood pole management practices: ESV, United Energy wood pole management: a review of sustainable wood pole safety outcomes, Public report, June 2023

3 This section focuses on our wood pole population, as we currently have no condition measurements available for concrete and steel poles

Our long-standing approach to determining internal rot is to measure the sound wood thickness of a pole. Sound wood thickness (SWT) is measured regularly via our cyclic inspections, and is a key input into determining the serviceability of the pole.

In addition to measured defects, observable factors—such as splitting wood, fire and lightning damage—will also inform serviceability assessments.

Based on these inspection outcomes, we categorise poles into the following three serviceability categories:

- serviceable – pole can remain in service
- added control serviceable – pole capacity has been reduced and requires additional controls to remain serviceable
- unserviceable – pole is unsuitable to remain in service and requires timely intervention.

Defects are recorded where a pole is deemed either added control serviceable, or unserviceable. Our response to identified defects depends on the nature and severity of the defect, and may include more frequent re-inspections.

High-priority defects that result in intervention are shown in table 5.

TABLE 5 RESPONSE TIMEFRAMES FOR HIGH PRIORITY DEFECTS

PRIORITY	TIMEFRAME FOR INTERVENTION
P1	Make safe within 24 hours of identification (replacements or repairs can occur beyond the initial 24 hours)
P42	Addressed within 42 days of identification
P2	Addressed within 32 weeks of identification

As shown in figure 3, the number of high priority defects has been increasing since 2019, driven by P2 defects. This is consistent with an ageing and deteriorating population of lower durability wood poles, and as set out in the following section, we expect this elevated trend to remain over multiple regulatory periods.

Figure 4 shows the same number of high priority defects by pole material type.[4]

[4] Steel poles are not shown as we have averaged less than five steel pole defects per annum in this timeframe.

FIGURE 3 HIGH PRIORITY POLE DEFECTS

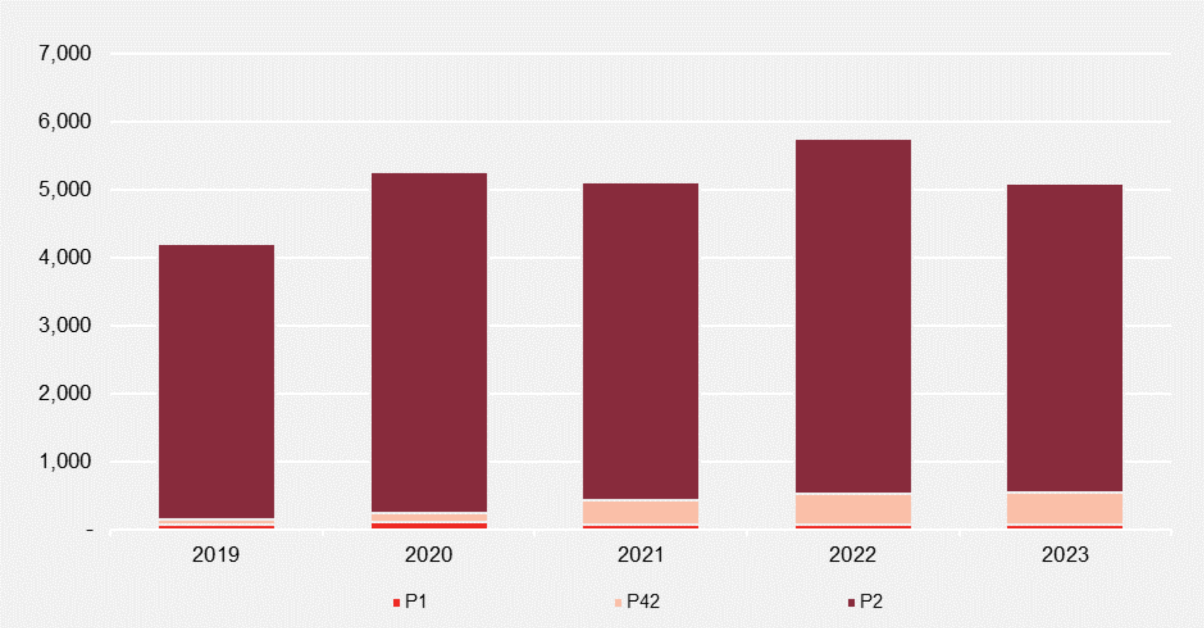
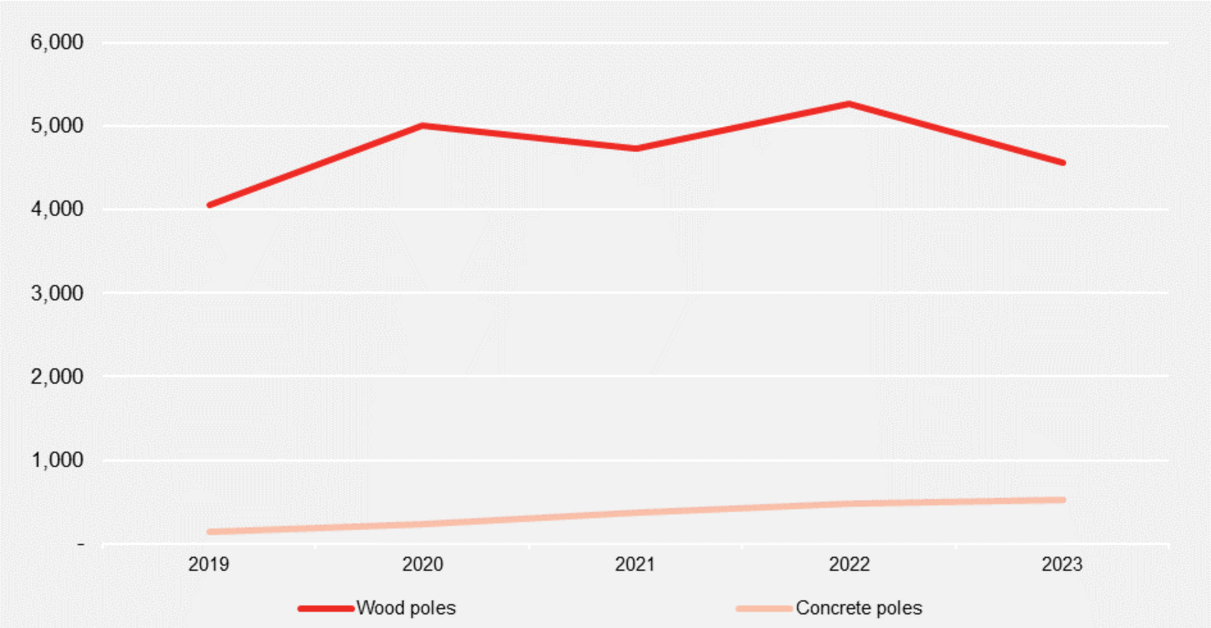


FIGURE 4 HIGH PRIORITY POLE DEFECTS BY POLE MATERIAL TYPE



3.2 Sustainable pole interventions

In 2019, ESV completed a technical review of our wood pole management practices and found they would not deliver sustainable outcomes for the future.

Subsequent to this review, and the AER's final determination for the 2021–26 regulatory period, ESV issued a notification under section 109 of the Electricity Safety Act that required amendments to our bushfire mitigation plan to specify a minimum volume of wood pole interventions. These minimum intervention volumes—shown in table 6—represented more than a 50 per cent uplift on the volumes allowed for in the AER's final determination (and accordingly, were the subject of a pass-through application that was accepted in full by the AER).

TABLE 6 WOOD POLE INTERVENTIONS: 2021–26 REGULATORY PERIOD

DESCRIPTION	TOTAL INTERVENTIONS
AER: final determination	22,361
ESV minimum: revised BMP (in response to section 109 notification)	34,650

ESV's review and direction regarding minimum intervention volumes reflected the large volume of our wood pole population and its underlying condition and age profile, and potential safety risks. In particular, ESV's direction notice stated that there are measures that are practicable and within our control to mitigate known hazards and risks associated with pole failures, including an increase to the level of interventions being undertaken to reduce the average age of our wood pole population.

4. Forecast interventions

Our asset management practices mean we intervene on our poles in response to asset failures, or based on observed defects and measured condition following inspection. In the current regulatory period, we have also identified risk-based interventions to prioritise the replacement of wood poles in higher bushfire risk areas.

When intervening, we either stake or replace wood poles, and replace concrete and steel poles.

The derivation of our forecast interventions for the 2026–31 regulatory period is set out below.

4.1 Forecast volumes

For the 2026–31 regulatory period, our starting consideration for forecasting pole intervention was to maintain the same volume of interventions that will be completed in the 2021–26 regulatory period under our commitment with ESV. This is consistent with ESV's assessment and expectations regarding the breadth and longevity of the sustainability challenge regarding our wood pole population, that will endure over multiple regulatory periods—in effect, maintaining current intervention volumes is likely to represent no-regrets investment.

This is further the case when considering the central theme through our stakeholder engagement program was reliability, safety, and resilience. Broadly, our customers want to stay connected with a safe and uninterrupted electricity supply that can withstand both normal and extreme weather.

In the context of the electricity transition, our replacement program is critical to ensure customers have trust in their energy system to have confidence to fully electrify their homes and lifestyle.

Our preferred intervention volumes over the 2026–31 regulatory period, therefore, are set out below in table 7. This forecast includes maintaining our existing proportions of reinforced poles (i.e. staked poles) relative to replacements.[5]

TABLE 7 FORECAST POLE INTERVENTION VOLUMES: BASE-CASE

VOLUMES	FY27	FY28	FY29	FY30	FY31	TOTAL
LV pole replacements	797	797	797	797	797	3,983
HV pole replacements	3,708	3,708	3,708	3,708	3,708	18,538
Other pole replacements	4	4	4	4	4	18
Wood pole reinforcements	2,777	2,777	2,777	2,777	2,777	13,885
TOTAL	**7,285**	**7,285**	**7,285**	**7,285**	**7,285**	**36,424**

Note: The volumes above differ from ESV's wood pole mandate as these include concrete pole replacements that were not part of ESV's wood pole mandate. and fault-driven replacementsare based on history.

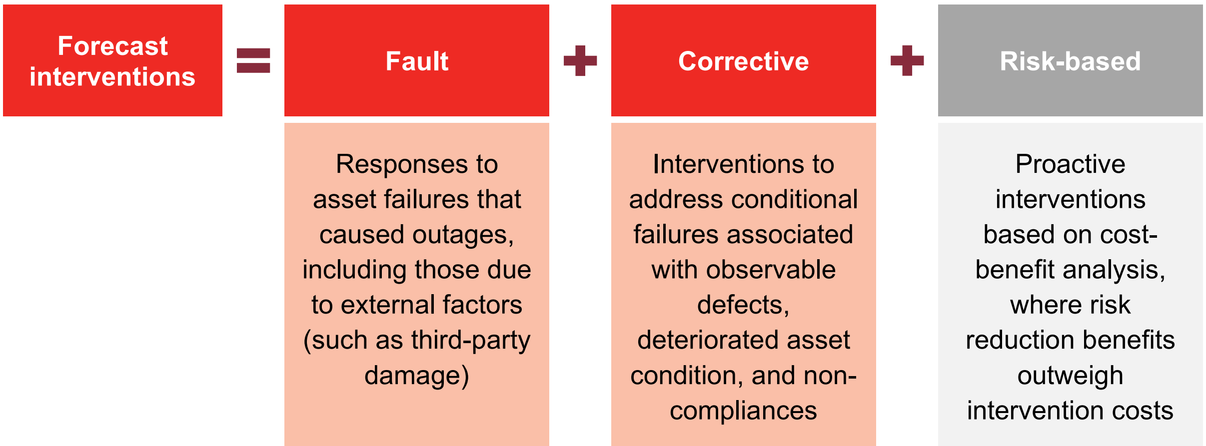
[5] Pole staking is a suitable and cost-efficient method to extend the life of our wood poles to maintain affordability for our customers.

Notwithstanding the above, to test the validity of maintaining current volumes, we challenged our approach by developing an alternative counter-factual based on our standard forecasting methodology for high-volume assets.

4.1.1 Alternative counter-factual

Generally, our high-volume asset forecasts are based on three broad categories—faults, corrective and risk-based forecasts. This approach is summarised in figure 5, with further detail on each category provided below (except for risk-based, which we have not forecast under this counter-factual).

FIGURE 5 FORECAST CATEGORIES



Fault forecasts

Faults, including from third-party damage, occur somewhat randomly across our network. Accordingly, our alternative fault-based pole intervention forecast is based on a simple average over the previous four-year period.

Corrective forecasts

Our alternative corrective forecasts comprise two separate sub-categories—observable visual defects, and measurable pole condition.

Observable visual defects, such as splitting wood, fire and lightning damage, are again somewhat random in occurrence across our network. Similar to faults, therefore, our alternative observable defects forecast is based on a simple average over the previous four-year period.

Measurable pole condition

Our alternative wood pole measurable condition-based intervention forecast is based on the predicted condition and serviceability of wood poles over time against our ESV accepted pole intervention criteria. This forecast is modelled through our enhanced pole calculator, which uses the following key inputs:[6]

- measurements from the last pole inspection (current condition)
- annual internal decay rate of sound wood thickness.

To determine the annual internal decay rate, three predictive models were considered, based on independent statistical analysis.[7] These models included the following:

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6 External decay rate of pole diameter is an insignificant driver of pole condition and serviceability.

7 PAL ATT 4.02 – Simon Holcombe (Melbourne University) - EDPR defect forecasting methodology – Aug2024 – Public, p 14

- linear regression: analysis included testing both simple (with a single independent variable) and multiple linear regressions (examining the influence of multiple variables) to model the relationships between variables, assuming normally distributed data residuals
- gradient boosting: the model constructs multiple decisions trees one after the other, with each tree correcting the errors of the one before it. This method allowed for the consideration of various influential factors, enhancing our understanding and predictivity regarding asset decay rates
- random forest: the model operates by constructing multiple decision trees during training and outputs the model of the classes (classification) or mean prediction (regression) of the individual trees for unseen data.

In selecting the most effective model for each measurement, consideration was made to the average root mean squared error (RMSE) and the confidence range. RMSE quantifies the average differences between the model's predicted values and the actual outcomes, providing a reliable indicator of the model's predictive performance. A lower RMSE signifies a higher accuracy in the model's predictions, reflecting a closer alignment between predicted values and actual result.

A summary of the outcomes of each model is shown below in table 8.

TABLE 8 PREDICTIVE MODELS FOR INTERNAL DECAY RATE (MM PER ANNUM)

MODEL	ACCURACY (RMSE)	AVERAGE DECAY RATE (CLASS 1)	AVERAGE DECAY RATE (CLASS 2)	AVERAGE DECAY RATE (CLASS 3)
Linear regression	6.112 ± 1.708	1.66	1.70	2.55
Random forest	6.111 ± 1.713	1.55	1.67	2.58
Gradient boosting	6.104 ± 1.710	1.65	1.34	2.53

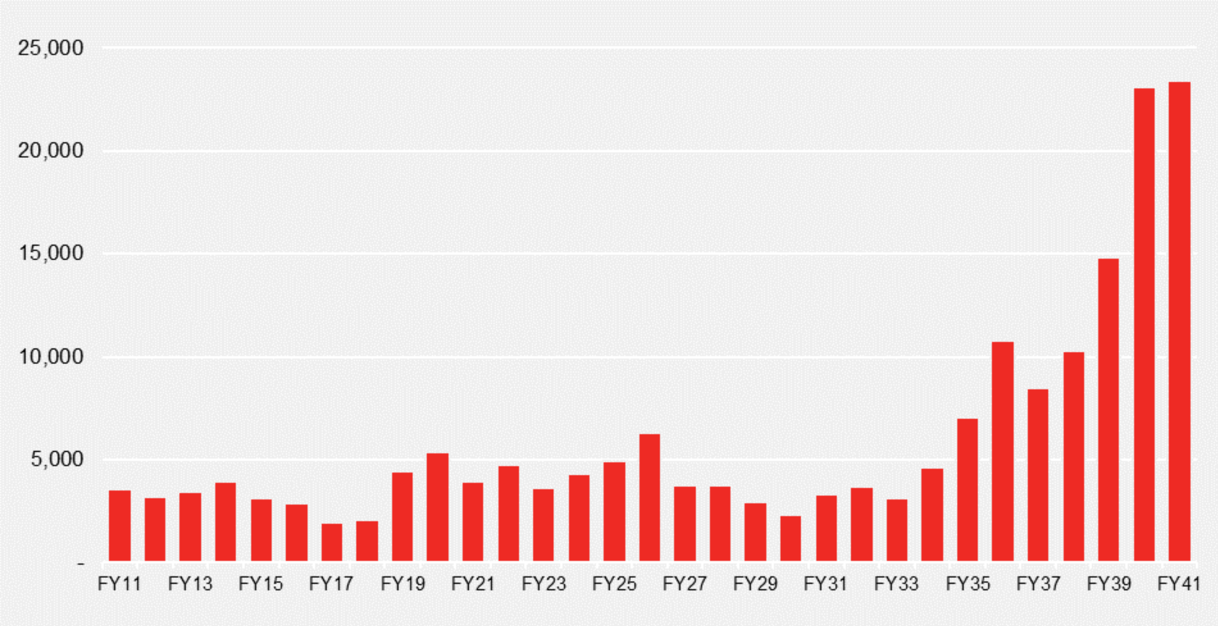
As shown in table 8, the most accurate model for predicting robust estimates of internal decay was the 'gradient boosting' model with the lowest RMSE value. This model also yielded a lower decay rate than the other models for durability class two and three poles. A lower decay rate will result in a lower intervention volume.

We selected the gradient boosting model to determine the annual internal decay rate. Based on the gradient boosting model, a set of sound wood thickness decay rates, by wood durability class and age group, was produced. These decay rates were applied to the most recent measurements of each wood pole, which was then used to determine the future serviceability of the wood pole.

As set out in figure 6, applying this forecast of future sound wood thickness shows an increasing volume of unserviceable and added-control serviceable poles across multiple future regulatory periods, including high volumes from 2036 onwards that will materially exceed our deliverability capacity. In this context, we consider this alternative counter-factual based only on unserviceable and added-control serviceable poles would not meet the long-term component of our identified need.

To manage this long-term risk in the current period, our asset management practices also include targeted interventions on aged and deteriorated poles in HBRA (specifically, poles aged more than 50 years and with less than 75mm of sound wood). In the period from 2022–2024, we have intervened on 47 per cent of this sub-population.

FIGURE 6 PROJECTED VOLUME OF UNSERVICEABLE AND ACS POLES BASED ONLY ON SOUND WOOD THICKNESS



Counter-factual forecast interventions

Based on the above, a summary of our alternative counter-factual interventions is set out in table 9.[8] This counter-factual is higher than our base-case forecast.

TABLE 9 WOOD POLE INTERVENTION VOLUMES: ALTERNATIVE COUNTER-FACTUAL

VOLUMES	TOTAL
Fault	1,104
Corrective: observable	4,150
Corrective: measured	36,902
TOTAL	**42,156**

Note: Our corrective measured forecast maintains our existing practice of targeted interventions on aged and deteriorated poles in HBRA, at the same rate as observed above.

4.1.2 Top-down portfolio review

In addition to challenging our base-case intervention volumes, we also reviewed our 2026–31 pole intervention forecasts against other capital investment programs to identify and remove any overlaps. For example, pole replacements have the potential to overlap with the following proposed resilience programs:

- bushfire resilience program, which proposes the targeted replacement of wood poles with concrete poles

[8] PAL MOD 4.11 - Wood pole condition counterfactual - Jan2025 - Public

- flood resilience program, which proposes the targeted replacement of existing poles with taller poles.

Our assessment of our resilience program found limited overlaps. These overlaps have been removed from the bushfire and flood resilience programs as detailed in our network resilience overview.[9]

4.2 Forecast expenditure

To develop expenditure forecasts for our poles asset class, we have multiplied the forecast intervention volumes by a volume-weighted average of the most recent unit rates derived from our audited RIN data.

Table 10 summarises this expenditure forecast for the 2026–31 regulatory period.

TABLE 10 FORECAST POLE INTERVENTIONS: EXPENDITURE ($M, 2026)

EXPENDITURE	FY27	FY28	FY29	FY30	FY31	TOTAL
LV pole replacements	16.7	16.7	16.7	16.7	16.7	83.6
HV pole replacements	80.0	80.0	80.0	80.0	80.0	400.1
Other pole replacements	0.1	0.1	0.1	0.1	0.1	0.6
Wood pole reinforcements	8.1	8.1	8.1	8.1	8.1	40.4
TOTAL	**104.9**	**104.9**	**104.9**	**104.9**	**104.9**	**524.7**

9 PAL BUS 5.01 – Resilience attachment – Jan2025 – Public

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