Jemena Gas Networks (NSW) Ltd

Minor Capital Works

GAS-1499-PA-IN-006

Table of Contents

1. Executive Summary

To ensure we can continue to provide a safe, reliable and competitive pipeline service, we will incur capital expenditure to undertake minor capital works.

These minor works are initiated each year through the operational of our ISO55001 certified Asset Management System based on updated condition assessments and other factors affecting Jemena Gas Networks (**JGN**) assets.

Minor capital works are identified and then undertaken in a short timeframe, and thus these works cannot be forecast over a longer period at a project level.

The prudent forecast of these minor capital works is undertaken at a sub-program or allocations level based upon the average of historical costs. Using a 3-year average (Regulatory years RY21-RY23) smooths out the year-to-year variations in costs. Where we have additional information, or a new sub-program is required, we adjust the forecast requirements to reflect this information.

Table 1 shows the annual Allocation Forecast requirement for 2026-30 against 3 years average historical Capex.

For the 2026-30 period, we have based the forecast requirement on historic costs. The exceptions are increases to meet future requirements in :

- **Pipework** : to reflect new requirements for pipelines along water crossings. Post the APA's incident in November 2022, where flooding caused damage to APA's Lithgow to Young Gas Pipeline resulting in gas supply being cut to approximately 20,000 JGN customers in Bathurst and Lithgow, there has been a change requirement for remediation works to secure pipelines laid in river beds that has increased the risk profile, as outlined in Section 3.6.2.

- **District Regulator Sets (DRS)** : to reflect the water ingress modifications to address corrosion risk and extend life of assets, as outlined in Section 3.4.2.

- **Emissions Pressure Reduction** : We have added a new allocation to reduce emissions through pressure reduction of areas of our network to meet future requirements. The scope of this allocations category is to cater for small augmentation projects identified to support the reduction of network pressures and consequently support the business' strategic objective to reduce network emissions, with further details in Section 3.10.1.

Table 1: Allocation projects ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor Capital - Mains Interconnect	R-DAA	815,274	815,274
Minor Capital - Relocations	R-GAW	577,212	577,212
Minor Capital - Connections renewal	R-RAB	782,914	782,914
Minor Capital – Mains integrity renewals	R-RAC	746,810	746,810
Minor Capital works - TRS	R-RFT	659,159	659,159

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor Capital[1] – PRS	R-RFP	25,552	25,552
Minor Capital - DRS	R-RFS	842,603	1,100,000
Minor Capital - Boundary Regulator Upgrades	R-RFSB	62,899	62,899
Minor Capital - Pipework	R-RAKP	2,397,486	2,660,000
Minor Capital - Washaways	R-RAKW	416,878[2]	416,878
Allocation: Minor tools and equipment	AA_R-GEAT	967,827	967,827
Allocation: Property Program	PRTY - 1	865,211	865,211
Allocation: Emissions Pressure Reduction	R-RAKE	0	230,000
Total		**9,159,825**	**9,909,735**

1 Minor Capital -TRS project costs have been grouped due to SAP system automation with Minor Capital – PRS. No adjustment made from 3 year average historical because sum of both minor capital allocations meets current requirement for high pressure facilities (PRS & TRS). Details in Section 3.2 .

2 3 years average for washaways based on 1 Jan 2021- 31 Dec 2023.

2. Background

Jemena's Asset Management System (**AMS**) is certified to both ISO55001 (asset management) and ISO27001 (information security). These particular ISO Management System Standards (**MSS**) promote cyclical improvement as an endemic feature. The application of these ISO MSS within the Jemena AMS ascribe to Deming's Plan-Do-Check-Act (**PDCA**) cycle. The PDCA cycle within the AMS drives annual business planning, which justifies asset management decision making from an engineering/technical and financial/economic perspective. The hierarchical approach to objective setting, whereby asset objectives are distilled from corporate objectives, is a key feature of the AMS and evident throughout the suite of documents from high level strategies to operational plans.

- **Plan** – the Asset Business Strategy identifies the asset objectives and drivers that the suite of Asset Class Strategies will respond to in determining required activities.
- **Do** – Activities, from routine maintenance through to capital projects, are undertaken in accordance with the Capital & Operating Work Plan. Each activity generates data and information that is fed back into the AMS for monitoring purposes.
- **Check** – The Asset Class Strategies are reviewed annually in consideration of asset performance assessments (including condition and controls) and correlating risk registers, both of which are key inputs to decision making processes.
- **Act** – Decision making is justified in accordance with the optimised balancing of performance, cost and risk considerations. Whilst optimisation is often represented as the annual process, invariably day-to-day asset monitoring and correlating changes to the risk profile necessitates immediate review of required activities. The responsiveness of the AMS improvement cycle in identifying unplanned activities ensures Jemena's asset portfolio remains optimally balanced for performance (customers), cost (shareholders) and risk (public).

In order to 'Act', funds are required to undertake minor capital works. These funds are budgeted through capital allocations, and values are based on historic averages to support the timely development of solutions to address risks and issues identified via this ongoing review process.

JGN assets cover geographically large areas and their physical location means some minor capital projects are not identified prior to the commencement of the calendar year and therefore not included into the capital program of works. These projects are of a smaller scope, generally less than $300k, compared to the rest of the capital program of work, and cannot be forecast five years in advance. To provide an efficient and effective process to manage these minor capital works, and complete works in a timely manner, a set of allowances, grouped by common sub-programs is provided for within the capital program of works.

The levels of expenditure by allocation may fluctuate by year, but overall the expectation is that annual requirements will continue as outlined below per allocation category and balance out to the recent historical average over time.

Additionally, we have identified new or augmentation to existing minor capital works initiatives that will be required to be addressed in the upcoming period. These are works that have been identified via our AMS as requiring expenditure and are activities over and above historical allocation activities previously performed.

Aligned with the National Energy objectives in promoting the efficient investment in and operation of gas network services, all allocations are required to meet the asset business objective to maintain asset safety, reliability and quality in service performance that complies with regulations and legislative instruments that determines the prudency of JGN's proposed expenditure.

2.1 Purpose

This document is to step out the proposed expenditure for Allocated Funds within the Asset Investment Plan.

2.2 Scope

This document contains the proposed allocation categorisation for the RY26-RY30 expenditure period. The Table below lists JGN's Capex allocation categories and provides a brief description of the associated expenditure (i.e. the type of capital works delivered).

Allocation Category	Allocation Name	Allocation ID	Description
Existing			
Augmentation	Minor capital works - Mains Interconnect	R-DAA	This is the augmentation minor capital allocation for small mains interconnect projects identified during the year (e.g.: through winter gauging / incidents, etc.). These include interconnections for reliability, back feeds, etc. found to be required at the time to ensure on-going supply reliability.
Asset Replacement	Minor Capital: Relocations	R-GAW	JGN funded relocations of its own assets, e.g. relocation of gas mains, which were laid within customer's property and without an easement. These projects are generally initiated when land is being re-purposed or developed.
Asset Replacement	Minor Capital-Connections Renewals	R-RAB	This activity involves renewals or upgrades of customer's service connections. This is a service order driven activity to renew services as identified by Jemena field staff required to mitigate the risk. Generally identified in response to, and investigation of, customer complaints.
Asset Replacement	Minor Capital-Mains Integrity Renewals	RAC	Localised renewal of sections of main and associated services that pose unacceptable risk or have reached their economic life. Generally identified from field investigations of high leakage or customer complaints and includes smaller areas (>12 m) of several streets.
Asset Replacement	Minor Capital: Trunk Receiving Station (**TRS**)	R-RFT	Aged component replacement due to end of life of individual components rather than entire or larger elements of Trunk Receiving Stations (**TRS**) or Packaged Off-take Stations (**POTS**). Triggered by field investigations, generally undertaken to correct an issue or risk concerning operability or safety.
Asset Replacement	Minor Capital: Primary Receiving Station (**PRS**)	R-RFP	This is an asset replacement allocation for the aged component replacement due to end of life of individual components rather than entire or larger elements of a Primary Receiving Station. Triggered by field investigations, generally undertaken to correct an issue or risk concerning operability or safety.
Asset Replacement	Minor Capital: District Regulator Set (**DRS**)	R-RFS	Aged replacement of district regulator sets, with an inlet pressure of secondary (1050kPa) and below, generally triggered by field investigations and undertaken to correct an issue or risk concerning operability or safety.
Asset Replacement	Minor Capital: Boundary Regulator Upgrades	R-RFSB	This is an asset replacement allocation of aged or non-conforming boundary regulators to ensure appropriate levels of pressure reduction and over pressure protection is provided to JGN's existing downstream medium and high density customers.

Allocation Category	Allocation Name	Allocation ID	Description
			This is a service order driven activity as identified by Jemena field staff required to mitigate the risk to correct an issue or risk concerning operability or safety. Boundary Regulator failure could result in over pressurisation of a downstream internal building pipework, leaks and or a potential fire or explosion.
Asset Replacement	Minor Capital-Pipework	R-RAKP	Minor capital allocation for asset classes of both pipelines and networks mains. This includes installation/replacement of Cathodic Protection (**CP**) and High Risk Valves (**HRV**). The CP work includes replacement of existing CP systems equipment that fails unexpectedly, and new CP equipment to continue to maintain compliance with technical regulations as a result of identified changes in the operating environment. High risk valves are installed in high risk areas, that is where there is a high presence of people (shopping mall/centres, public transport hubs, sport venues and business centres). When a new high risk area is identified, via the development or expanded public facilities, the network supply is assessed and valves fitted.
Asset Replacement	Washaways	R-RAKW	Works to rectify exposed pipeline assets to ensure the long term integrity of asset. Depth cover can be reduced by heavy rainfalls causing erosion or illegal 4WD activities. Once the depth of cover is reduced and/or removed the pipeline is exposed to various types of damage. Washaways projects are raised when and as identified and require an allocation provision to fund. Flooding and increase in erosion is a high probability following severe weather events which are becoming more frequent.
Non-Network	Allocation: Minor tools and equipment	R-GEAT	Minor tools and equipment with spend greater than $300 and a useful life greater than 1 year used to deliver JGN's program of works.
Non-Network	Allocation: Property Program	PRTY - 1	Minor capital allocation for property, which is any low value ad-hoc project identified during the year, such as minor property refurbishments and property make good provisions.
Augmentation	Allocation: Emissions Pressure Reduction	R-RAKE	The scope being minor capital for small augmentation projects identified to support the reduction of network pressure and consequently support the business' strategic objective to reduce network emissions.

3. Allocation and Relocation

3.1 Minor Capital Mains Interconnect

Minor capital works are required for small mains interconnect projects identified during the year through winter gauging or low pressure/loss of supply incidents. The scope includes interconnections for reliability and back feeds required at the time to ensure on-going supply. Most of this expenditure is incurred on our existing low and medium pressure networks.

This expenditure is largely driven by changes in granular, local changes in existing customer usage patterns. This expenditure is not focussed on supporting new customer connections, which have been historically supported through specific augmentation projects, typically through the extension of our secondary (steel network). Table 2 shows the historical spend, and the recommendation that the forecast expenditure should be maintained at a three year average. ***Note** : RY20 was ~$940K, hence RY21 can be contributed to minimum activities and capital work due to COVID, higher pressures and no significant issues found during the winter gauging program*.

Table 2: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – Mains Interconnect	R-DAA	269,719	1,274,072	902,031	815,274

3.1.1 Historic Requirement

Three years of historic minor capital mains interconnection projects have provided capacity and supply reliability. These low pressure areas risking loss of supply were on existing networks. These mains interconnections augment the network to meet pressure standards to provide customers supply reliability. Some of the projects in this category included :

- Greenacre 7kpa – to address risk of loss of supply to 60 customers due to low network pressures.
- Burwood Low Pressure – to address risk of loss of supply to 1000 customers due to low pressures.
- Bathurst Eglington Low Pressure – to address risk of loss of supply to 250 customers due to low pressure.
- Largs Stage 1 - to address risk of loss of supply to 570 customers including domestic and I&C customers.
- Lilli Pilli - to address risk of loss of supply to 700 customers.
- Mt Lewis – to address risk of loss of supply to 150 customers.
- Strathfield South Supply Issue – to address poor supply incident impacting 6 commercial customers.
- Faulconbridge reinforcement - to address risk of loss of supply to 250 customers due to low pressures.
- Burwood reinforcement – to address 2000 customers at risk of poor supply and approx. 500 customers at risk of loss of supply.

3.1.2 Future Requirement

There is an ongoing requirement to make small mains interconnections, as identified through winter gauging & incidents, to continue to provide capacity and supply reliability in the existing networks to meet pressure standards to provide customers continued supply reliability. The forecast minor capital works is based on average of historic costs, as per Table 3.

Table 3: Minor Capital works Mains Upgrade Interconnect Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – Mains Interconnect	R-DAA	815,274	815,274

3.2 Minor Capital - Relocations

The requirement for JGN funded mains relocation and/or application for easements is driven by mains constructed in error laid on private property. The accuracy of boundary data and records have improved significantly over time and those current in error were referenced most likely from 30-40 years ago. The identification by customers that mains have been incorrectly laid within their property, has continued to increase over the last three years and is expected to remain at approximately the same levels due to the increasing development and knock-down rebuilds in older suburbs. Although there is an increasing trend over the past three years, an average has been used consistent with other allocations.

Table 4: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – Relocations	R-GAW	490,741	579,659	661,236	577,212

3.2.1 Historic Requirement

Recent examples of Minor Capital Relocations include:

- Purvis Lane Secondary Main – Purchase of an easement for a secondary main located along the length of Purvis Lane which is on Dubbo Council Property. The easement mitigates the risk of initiated council litigation and ensure JGN does no lose access to the main.
- Ellalong Road, Cremorne - Transfer of independent services from 4 inch cast iron main located in private property without an easement to an existing plastic main. The solution also delivers customers 2.75kPa standard metering pressure and the relocation of meters provides customers the benefit of reducing the likelihood of estimated reads.
- Wiseman Ferry - Relocation of a section of main supplying 40 industrial customers crossing through private property to a new alignment. There was no existing easement in place prior.
- Old Glenfield Road Main – Relocation of a medium pressure main, supplying downstream customers from private property to road reserve. No existing easement in place prior.
- Gindurra Street, Somersby Main – Secondary main on private property. JGN negotiated with the developer to install the main to a lower depth of cover to protect this previous shallow main before being covered with an industrial driveway with load bearing design. Property owner satisfied with proposed solution to meet the developers timeline.
- Heathcote Road, Voyager Point - Relocation of a section of main to new alignment along Heathcote Road/The Avenue, Voyager Point and then cut and cap the 80mm steel main that is running through private property and underneath the Macarthur Railway Line/Corridor, supplying downstream customers.

3.2.2 Future Requirement

There is an ongoing requirement for JGN funded relocations of its own assets laid within a customer's property and/or without an easement, and this is anticipated to continue to increase or remain at current levels as described above. As shown in Table 5, the forecast requirement remains in line with the 3 years average historical.

Table 5: Minor Capital works Mains Relocations Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – Relocations	R-GAW	577,212	577,212

3.3 Minor Capital – Connections renewal

3.3.1 Historic Requirement

This is a service order driven activity to renew services as verified by JGN field staff required to mitigate integrity related risks to over 1.1 million JGN service connection pipes. Renewals are generally identified in response to, and investigation of, customer complaints.

Table 6: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – Connections renewal	R-RAB	750,042	604,278	994,422	782,914

3.3.2 Future Requirement

There is on ongoing activity for connection renewals or upgrades of customer's service connections and this is anticipated to continue at a constant level due to the size and age of the asset.

Table 7: Minor Capital works Mains Connections Renewal Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – Connections renewal	R-RAB	782,914	782,914

3.1 Minor Capital – Mains integrity renewals

Localised renewal of sections of main and associated services that pose an unacceptable risk. Generally identified from field investigations of high leakage or customer complaints and includes smaller areas (>12m) of several streets.

While Table 8 shows the historical minor capital costs appear to be declining, this relates to phasing of identified minor capital. There is an ongoing requirement for minor capital mains integrity renewals allocation to manage the risk on JGN's 24,000kms of medium & low pressure network to address investigations of high leakage or

customer complaints in a timely and efficient manner. Section 3.1.2 outlines upcoming localised upgrade renewal projects already identified, and the need to investigate localised high leakage areas from newly introduced (post RY23) Picarro leakage detecting vehicles, likely to result in small targeted (risk based) street level minor capital renewal projects.

Table 8: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – Mains integrity renewals	R-RAC	1,512,037	433,447	294,946	746,810

3.1.1 Historic Requirement

The historic actual projects included:

- Replacement of Entrance Road Erina Steel Main was required to mitigate safety risk of an unprotected and corroded steel main which was located in a highly corrosive environment (Note : delivered in RY21).
- Insertion of Carley Road (50 years) old leaking cast iron main, driven by customer expectations with numerous gas smell complaints and safety.
- Mains rehabilitation in Thames Street West Wollongong to mitigate leaks on badly corroded leaking section of main which had ongoing call outs and isolation and repair access issues.
- Mains Insertion of 4” Cast in Graham Street in Glendale to mitigation leaks which has had ongoing call outs from the public to the response centre.
- Multiple projects to lower shallow mains in networks in Emu Plains, Maitland, Randwick and Thornleigh areas, where depth of cover was less than standard and to protect from 3rd party hits to ensure safety and integrity of assets.
- Multiple other smaller mains upgrade renewal sections.

3.1.2 Future Requirement

There is an ongoing requirement for localised renewal of mains to manage risk of leakage, water ingress and integrity issues. These continue to be identified via the annual APAIR review, field investigations of high leakage, or customer complaints, and likely to be compounded by projects identified via the newly introduced Picarro vehicles detecting localised high leakage sections. It is expected that with the implementation of the Picarro vehicles that localised sections of mains with high emissions that are not already identified in the proposed AA25-30 mains rehabilitation projects, will be prioritised for replacement. To be clear, our forecast for these costs is based on the historical average. We have not adjusted the forecast to reflect the increase in expenditure likely required once we move to direct measurement using Picarro technology given the uncertainty around these costs.

As shown in Table 9, the forecast requirement is maintained at the 3 years average historical.

Upcoming localised renewal projects already identified through this process and planned into the RY24-RY25 program are:

- Cutcliffe Street 7kPa Water Ingress Mains
- Stage 3 - Richmond Road Interconnection/Insertion
- Dubbo Wellington Unaccounted for Gas (**UAG**) Mains renewal

Table 9: Minor Capital works Mains Upgrading Renewals Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – Mains upgrading renewals	R-RAC	746,810	746,810

3.2 Minor Capital TRS

Minor capital works are required to address replacement of obsolete or not 'fit-for-purpose' individual components rather than entire or major elements of TRS or POTS. The requirement for these component replacements is triggered by field investigations, undertaken to correct an issue or risk, concerning operability or safety.

There are 55 TRS/POTS stations within JGN's network. These are major supply points to the downstream networks/townships. These stations filter gas and reduce trunk pressure supplied for the downstream network. The asset management of the stations includes managing the concrete pits and the buildings that house the stations.

Forecast minor capital works is based on average historical costs as shown below in Table 10.

Table 10: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – TRS	R-RFT	418,237	759,392	799,849	659,159

3.2.1 Historic Requirement

Examples of historic minor capital works to address issues include:

- Undersized duty valve at Yass POTS could not supply required downstream pressure at peak times requiring retrofit of the station by modifying piping and providing additional valves for the duty run to mitigate the risk of loss of supply to downstream customers. Yass POTS is the sole feed to 3,000 downstream customers.
- Station component corrosion requiring replacement. Windsor TRS spool replacement had corrosion up to 65% wall thickness and operates with a Maximum Allowable Operating Pressure (**MAOP**) of 6.895MPa. The spool is part of a bypass for the Station Inlet Valve (**SIV**).
- Station access driveway renewals required to safely enter and exit the station site, and to address driveway condition no longer fit for purpose with cracking, water ingress and subsidence, a significant safety hazard. Examples include Horsley Park TRS which had been in constant use since the commissioning of the TRS in 1974 and used to access all plant & equipment on site using heavy equipment (trucks and cranes), and Wallerawang POTS driveway to safely enter and exit the site.

- Station high pressure meter replacements at Appin POTS to enable remote reading/monitoring to ensure reliability of supply to downstream single feed network and Albion TRS to ensure current redundancy is maintained on this station critical to reconcile network receipts and unaccounted for gas (**UAG**) calculations.
- Operability and safety concerns regarding station valves requiring replacements or renewals at stations. Examples include Goulburn TRS valve replacement & West Hoxton automatic line break valve electrical upgrade.
- Roof repair at the Wilton TRS Control Room.
- Replace Remote Terminal Unit (**RTU**) at West Wyalong POTS to ensure accurate odorant dosing for downstream customers in township.
- Replacement of mesh silencers at Cootamundra POTS, Sally's Corner POTS, Bowral TRS, Marulan TRS, and Bingara Gorge TRS to provide protection of facilities to ensure reliability of supply to downstream customers.

3.2.2 Future Requirement

There is an ongoing requirement to replace obsolete or not 'fit-for-purpose' individual components at POTS and TRS. This can include:

- asset failure;
- operational risks;
- vandalism;
- mechanical failure, particularly caused by excessive noise and vibration;
- external environments (e.g. bushfire or flooding);
- regulatory (standards) or reputational risks; and
- asset lifecycle risks (obsolescence of equipment).

Table 11: Minor Capital works TRS Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – TRS	R-RFT	659,159	659,159

3.3 Minor Capital PRS

Minor capital works is required to replace individual components at PRSs. These works are usually trigged by field investigations and are generally undertaken to correct an obsolescence or fitness-for-purpose issue or risk, concerning operability or safety.

There are 16 PRSs within JGN network, whose purpose is to filter gas and reduce gas pressure at each off-take on the primary main. They reduce the pressure from 3,500kPa to 1,050kPa to supply the downstream secondary network.

Individual components within the stations are replaced at various times during the life of the facility and the age of components may therefore be less than the age of the station.

Table 12: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – PRS	R-RFP	0	3,978	72,678	25,552

3.3.1 Historic Requirement

It has been identified that, due to system automation of SAP, the costs for PRSs have been grouped together with Minor Capital TRS Allocations. Therefore the historical average for PRS booked to Allocation R-RFP looks 'low' and not representative of the PRS Minor capital projects delivered and captured together with Minor capital works - TRS.

The historic minor capital PRS upgrade work delivered within RY21-RY23 (with costs captured under TRS allocation) included:

- PRS Underground lighting upgrades.
- PRS Fire & gas detection system upgrades.
- Instrument Air Compressor obsolescence replacements.

3.3.2 Future Requirement

There is an ongoing requirement to address aged component replacement due to end of life of individual components.

JGN has an ongoing obligation to address mitigate risk that impact facilities assets which include:

- asset failure;
- operational risks;
- vandalism;
- mechanical failure, particularly caused by excessive noise and vibration;
- external environments (e.g. bushfire or flooding);
- regulatory (standards) or reputational risks; and
- asset lifecycle risks (obsolescence of equipment).

While the split of costs is not representative, the combined PRS & TRS forecast minor capital works allocations three years average Capex would be representative and therefore the PRS minor capital works has been maintained at three years historic average and future SAP activities will be reviewed to gain a better representative understanding of the costs.

Table 13: Minor Capital works PRS Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – PRS	R-RFP	25,552	25,552

3.4 Minor Capital DRS

Minor capital works is required to address obsolescent or non 'fit-for-purpose' district regulating stations (**DRS**) with an inlet pressure of secondary (1050kPa) and below, via replacement and or refurbishment of DRSs. The minor capital works are generally triggered by field investigations and undertaken to correct an issue or risk, concerning operability, safety or integrity.

There are 647 DRSs in the network. Based on age estimates, almost 20% of DRS will reach the end of their nominal design life within the next 10 years.

The drivers of minor capital can include HSE issues (ergonomic, traffic, trips, etc.); third party development activities, and water ingress creating corrosion adversely impacting DRS operations or integrity.

JGN does not have a planned DRS replacement program as it is more cost effective to do condition based component replacement. Where individual DRS replacement/relocation projects are identified, via the APAIR review process, these are prioritised based on asset performance, location and risk. Both component and full DRS replacements draw on this allocation budget.

Historical three years average actuals for this minor capital allocation is $842,603, however an uplift forecast to $1,100,000 is required to accommodate recent asset inspections and changes to the asset management approach of water ingress and regulator obsolescence of the DRS. The uplift in forecast is representative of the last two years average, where the change in approach has been adopted highlighting a 2 year average of $1,090,632.

Table 14: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor capital works – DRS	R-RFS	346,547	766,649	1,414,615	842,603

3.4.1 Historic Requirement

Historic minor capital projects to address issues identified such as:

- Red Corrosion Dust from a corroded main in Caringbah network impacting a significant number of downstream customers by damaging their gas appliances resulting in customer complaints, resulted in customers contacting the NSW Ombudsman. The cause of the red dust was a 150 mm steel main installed over 60 years ago at the time of town gas reticulation. The main has been operated at medium pressure and the corrosion flaking off from the internal wall of the pipe, creating fine red dust less than 50 microns which can pass into customers gas appliances causing internal damage. The most prudent works included fabrication and installation of two filter boxes at two key locations (referred to as the 'Caringbah Filter box') to capture any red dust coming from upstream, along with the insertion of a steel main with medium pressure plastic mains.
- Modification of existing DRSs components include :
    - DRS Meter set renewals and modifications to address leakage, integrity and HSE requirements.
    - DRS telemetry replacement & DRS lid replacements due to condition caused by water ingress.
    - Raising DRS boxes due to changed foot path heights causing trip hazards, water ingress pooling and to ensure unrestricted access.
    - Replace aged regulator models that are not serviceable due to spare parts being no longer available.
    - Replacement of Concrete Aprons at DRS in poor condition and removal of trip hazards.
    - Re-erect fence around Jemena's easement at DRS on boundary.
    - Upgrade aged DRS outlet valves and by-pass so that the DRS can continue to be maintained.

3.4.2 Future Requirement

As per the Distribution Asset Class Strategy, there is an ongoing DRS replacement and modification to manage asset risks which include:

- Age related degradation of the condition of the DRS (e.g. corrosion, gas leaks, water ingress);
- Obsolescence of the regulators inside older model DRSs that are no longer produced and spare parts are no longer available;
- Environmental changes, including the surrounding area has been developed over time (e.g. changes to roads, reduced width of road reserve, no parking), making it increasingly difficult to access and maintain the DRS;
- Development changes to the surrounding area leading to reclassification to a high consequence area, making the current location of the DRS not sustainable.

Additional to historic requirements, JGN has modified its strategy for water ingress into DRS.

Jemena District Regulator Sets (DRS's) installed, greater than 20 years ago, within the Network are currently affected by significant water ingress during rain events. This is attributed to the earlier iteration of DRSs not having adequate water seals installed on the lids. This leads to poor drainage from the internal rain channel on the top of the DRS away from the box, such as to the street gutter. The water ingress into the DRS leads to water pooling inside the asset and subsequent corrosion of structure and pressure control equipment.

The historic "do nothing" approach is to respond through pumping out of the water from the DRS, as required, during or after heavy rainfall events. This does not address the accelerated corrosion driving early full DRS replacement.

Asset Management have reviewed the approach of DRS Water Ingress. The outcome is to make modifications to existing DRS lids and drainage systems to extend the life of these DRSs. The review determined that extending the height of the DRS lids and providing a design for drainage through to the street gutters will address the integrity issues related to the accelerated corrosion. This leads to the modification of six to eight existing DRSs per annum with raised lid and gutter system including drainage to kerbside at approximately $40K per DRS.

Note, all new DRSs introduced into the network have water ingress prevention built in to the design.

To reflect the changed requirements, the forecast for minor capital DRS allocation has used a two year average of $1,100,000, an incremental $257k per annum over a three year average as per Table 15 below.

Table 15: Minor Capital works DRS Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	2 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – DRS	R-RFS	1,090,632	1,100,000

3.5 Minor Capital Boundary Regulators

Minor capital works are required to replace obsolete or non-conforming boundary regulators to ensure appropriate levels of pressure reduction and over pressure protection is provided to JGN's existing medium and high density customers.

This is a service order driven activity identified by Jemena field staff to mitigate a risk or correct an issue concerning operability or safety.

Boundary Regulator failure could result in over pressurisation of a customer's internal pipework resulting in leaks and a potential fire or explosion.

Table 16: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor Capital - Boundary Regulator Upgrades	R-RFSB	12,365	109,597	66,735	62,899

3.5.1 Historic Requirement

Jemena field staff on inspection of boundary regulators, raise an order to replace boundary regulators which are aged and non-conforming.

3.5.2 Future Requirement

As per the Distribution Asset Class Strategy, there is an ongoing Boundary Regulator replacement program to manage asset risks in line with historic requirement on existing boundary regulators.

The forecast expenditure has been maintained at a three year average.

Table 17: Minor Capital works DRS Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor capital works – Boundary Regulator Upgrades	R-RFSB	62,899	62,899

3.6 Minor Capital Pipework

Minor capital works for pipework includes installation/replacement of Cathodic Protection (**CP**) and High Risk Valves (**HRV**) and other rectification to mains and pipelines to ensure safety and integrity, including protective works for exposed mains, coating remediation and remediation of short lengths of secondary mains.

The CP work relates to the replacement of existing cathodic protection systems or CP components that fail unexpectedly, and installation of new CP equipment to maintain compliance with technical regulations as a result of identified changes in the operating environment.

High risk valves are installed in high risk areas, that is where there is a high presence of people (shopping mall/centres, public transport hubs, sport venues and business centres). When a new high risk area is identified

or the boundaries of an existing high risk area change, via the development or expansion of public facilities, the network is assessed and valves are fitted.

Table 18: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor Capital- Pipework	R-RAKP	2,029,460	1,104,309	4,058,690	2,397,486

3.6.1 Historic Requirement

Historical minor capital works related to:

- CP remote monitoring data logger replacement for the purchase of Cathodic protection equipment to provide integrity assurance to JGN's steel network pipes and to ensure compliance as mandated by regulatory compliance. This project upgraded JGN's cathodic protection equipment at approximately 3,000 test points and telemetry CP sites.
- Rectification of a bridge by applying new protective coating ensures the bridge structure remains fit for purpose and the attached Sydney Primary Main pipeline can operate in a safe and reliable manner without compromising public safety, integrity and security of supply of 10,000 customers.
- Replacement of Non-standard Secondary Main due to cracks identified via an integrity dig. The driver was safety and integrity.
- High risk valves installed to isolate, in the event of an emergency, areas classified as High Risk Areas. New or amended High Risk Areas are defined as areas develop with new shops, increased concentration of buildings, train/bus stations and shopping centres and awning coverage over a gas main. On network configuration and isolation review, additional High Risk Valves are recommended to reduce the consequence if a large leak/fire or explosion occurred in the area.
- Bushfire valves are installed to enable the safe isolation of the gas network in areas that are liable to bush fire exposure. Isolation of the gas network in these sections removes natural gas as a fuel source from the bush fire. Bush fire valves may be installed as part of planned process or as a response to a live bush fire situation.
- Remediation works to bridge crossings to maintain the integrity of the main and pipeline.
- Other CP installations as identified to manage the integrity of steel assets.

3.6.2 Future Requirement

There is an ongoing requirement for the allocation based on annual performance assessments:

- New/upgrade of CP systems or components to ensure the integrity of the steel pipelines/mains.
- Install new High Risk values are identified to maintain and the ability to isolate new High Risk Areas.
- Work with Emergency Services and planning authorities to identify areas at risk from bushfires valves to shut off/isolate pockets of the gas network where there is an elevated risk.
- Remediation works to bridge crossings to maintain the integrity of the main and pipeline.
- Based on recent flooding that has raised the risk profile, JGN is reviewing Secondary Mains water crossings. Remediation of these sites to ensure the integrity of the secondary mains will at some locations be required.

Additionally, Jemena are reviewing the asset risk profile of JGN's pipelines (>1050kPa) that are laid across rivers. Jemena operates a number of natural gas pipelines which traverse various rivers and waterways via buried,

submerged crossings. The changed requirement for remediation works to secure pipelines laid in river beds driven by a recent review post the APA's incident in November 2022, where flooding caused damage to APA's Lithgow to Young Gas Pipeline resulted gas supply being cut to 20,000 JGN customers in Bathurst and Lithgow. As a result, JGN's Pipeline (>1050Pa) River crossings risk profile has been raised.

The plan is to:

- Review JGN's 7 river crossings on JGN's Northern Trunk (Lic 7 and 8) and 3 river crossings on Sydney Primary Main (**SPM**) where the pipelines are laid on the riverbed, not underground bored.
- Inspect all riverbed crossing locations. A key part of the integrity management process for river crossings is to determine if there has been any change to the state of the pipeline with respect to the river bed. Once this study is done, Jemena will be in a position to determine the river crossing remediation works required.
- Justification for this increase in the capital allocation for remediation works to secure pipeline water crossings to meet compliance as per AS2885 standard, which is required to prove the condition of the river crossing as part of Safety Management Study (**SMS**). Exposed pipelines are susceptible to overstressing (buckling or vortex induced vibration) or damage from vessel anchors and debris in storm/flooding events, leading to loss of supply.

To continue with the above mentioned minor capital requirement, and also to provide a provision for forecasted remediation works to secure pipeline water crossings, the forecast minor capital works has been increased from the historic 3 years average costs of $2,397,486 to $2,660,00 per annum, an increase of approximately $260,000 per annum.

Table 19: Minor Capital Pipeworks Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor Capital - Pipework	R-RAKP	2,397,486	2 ,660,000

3.7 Washaways

Minor capital works for 'washaways' is required to rectify pipeline or mains assets to ensure the long term integrity of land based 'buried' assets. Washaways are generally due to erosion post heavy rainfall or flooding that result in reducing the depth of soil coverage of buried pipelines, risking 3rd party damage or failure of the asset due to over-stressing.

Some of the circumstances that can lead to reduced depth of cover include:

- Flooding;
- Uncontrolled or unmanaged erosion – due to normal or above normal rainfall events;
- Changes in watercourse routes – due to development or other factors;
- 4WD or trail bike activities;
- Storm tides;
- Changes in vegetation; and
- Inefficient drainage systems.

JGN undertakes both routine inspections and special inspections (for example, after a high rainfall or flood events) that are prone to erosion. When these inspections confirm that works are required to protect the assets, JGN will undertake a minor works design and construction project to engineer a permanent solution to minimise future asset risks. Solutions to prevent future erosion along the pipelines' easement and associated access tracks, could include remediation of coating defects and civil works to reinstate or enhance the pipeline's depth of cover, or install cross-banks, and implement drainage control measures.

Table 20: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Minor Capital - Washaways	R-RAKW	93,559	532,102	624,971	416,878

3.7.1 Historic Requirement

Table 20 The historical washaway expenditure was for the following projects:

- Lic 7 Rhyope Washaway;
- Wakefield Washaway;
- Lic 7 Scaddens Ridge Washaway; and
- Some preliminary Front End Engineering Design (**FEED**) work for Fern Bay, Northern Trunk and Southern Trunk Lic 2 Picton Washaways.

3.7.2 Future Requirement

The annual allocation is required to mitigate pipeline integrity and security of supply risks and meet all regulatory compliance and safety standards. The capital solutions will mitigate sites where there is a reduction in depth of cover.

Current identified washaway projects with forecast capital in RY24-RY25 are :

- Fern Bay Washaway Secondary main laid beside the Hunter River with reduced cover post heavy rains.
- Southern Trunk License 2a at Picton Rd Washaway Remediation work as a results of heavy rains and continuous flooding events having a significantly affected a section of Lic2a between Wilton and Mount Kiera, in way of erosion (reduced cover) along the easement and access track deterioration. The project aims to reinstate and enhance the pipeline's depth of cover, remediate coating defects, and implement drainage control measures to prevent future erosion along the easement tracks. This ensures the maintenance of adequate pipeline cover, intact structural integrity, safe continuation of routine maintenance, and effective mitigation of any additional external stresses on the pipeline
- Northern Trunk Washaway Remediation at three different locations along the pipeline easement, The project aims to remediate damaged access tracks running parallel to the pipelines, enhance pipeline's depth of cover, and implement drainage control measures to prevent future erosion along the pipeline's easement. This ensures the maintenance of adequate pipeline cover, intact structural 2 integrity, safe continuation of routine maintenance, and effective mitigation of any additional external stresses on the two pipelines.

APAIRs (Asset Performance and Integrity Reviews) are completed annually. Exposed mains sites are reported in the easement management sections which lists any erosion issues or have the potential for water course risk and have limited access. And as such the forecast requirement in RY26-RY30 is based on the historic 3 years average, as shown in Table 21.

Table 21: Minor Capital works Washaways Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Minor Capital - Washaway	R-RAKW	416,878	416,878

3.8 Allocation Minor Tools & Equipment

3.8.1 Historic Requirement

Historical capital expenditure for the procurement of plant and equipment, with a useful life greater than 1 year, used as tools for works delivered on JGN's network is shown below in Table 22. High volume specialised tools that are required to maintain and construct the network, assets include but not limited to, multi-meters, gas detectors, drills, portable tester, pipe benders etc.

Table 22: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Allocation: Minor tools and equipment	R-GEAT	731,403	1,316,921	855,157	967,827

3.8.2 Future Requirement

There is an ongoing requirement forecasted at historic 3 years average capex for plant & equipment of $967,827 per annum.

3.9 Allocation Property

3.9.1 Historic Requirement

Historical capital expenditure for low value ad-hoc minor property refurbishments and property make good provisions is shown in Table 23. RY23 costs included JGN's allocation of the head office's property refit.

Table 23: Minor capital historic expenditure ($, Real 2023)

Allocation	Allocation ID	RY21	RY22	RY23	3 Years average Capex
Allocation: Property Program	PRTY - 1	487,822	458,713	1,649,097	865,211

3.9.2 Future Requirement

There is an ongoing requirement forecasted at historic 3 years average capex for property of $865,211 per annum.

3.10 Allocation Emissions Pressure Management

JGN is developing a program in areas where the pressure in that part of the network can be optimised in order to reduce emissions. The rate of leakage is proportional to the pressure in the mains, and thus a reduction in pressure will lead to a reduction in gas lost through leakage. Some areas have been deemed to have higher than average integrity issues where publicly reported leaks and levels of mains repairs are higher than other parts of JGN (i.e. leading to higher emissions). The initial phase has been a review of those systems with pressures higher than 210kPa, future phases will review the potential to reduce emissions through pressure management in those network segments with pressures of 210kPa or lower.

JGN is expanding this program, with the next phases to include:

- Implementation of minor mains interconnections that will enable seasonal pressure reduction for 300kPa areas (down to 210kPa) i.e. apply seasonal reduction during the summer months with pressure reinstated to normal operating pressures in autumn required to maintain capacity during the winter period.

- Review of 210kPa areas where pressure could be reduced further (ie: 150kPa) to manage the level of fugitive emissions. During the upcoming AA period, these networks will be identified that can be reconfigured with minor interconnection to be able to support the existing network supply with reduced pressure as part of the emission reduction strategy

The Picarro Emissions Program will support this initiative through:

- An initial survey, identifying those areas where the greatest benefit could be achieved; and
- Validation surveys quantifying the benefits of the pressure reductions.

Note : The Mains Interconnect allocation will be required in order to ensure JGN can maintain existing levels of network supply and reliability to existing customers/network.

An example of a recently identified project is the pressure reduction of the Glenbrook-Springwood network where it has been demonstrated that the pressure can be reduced from 300kPa to 210kPa through a series of works costing approximately $540,000, which included the installation of a secondary regulator and mains interconnection.

The future requirement has assumed $230,000 per annum, based on a similar project scope without a secondary regulator installation requirement.

3.10.1 Future Requirement

Table 24: Allocation Emission Pressure Management Forecast Requirement ($, Real 2023)

Allocation projects	Allocation ID	3 Years Average Annual Capex	Forecast Annual Requirement
Allocation Emissions Pressure Management	R-RAKE	0	230,000

4. Allocations - Regulatory Mapping

Allocation	AA ID	RIN (Level One)	Regulatory Narrative
Minor Capital – Mains Interconnect	R-DAA	Mains Augmentation	Mains augmentation
Minor Capital - Relocations	R-GAW	Other Capex	SIB - Allocation and tools and equipment
Minor Capital - Connections renewal	R-RAB	Mains replacement	SIB - Allocation and tools and equipment
Minor Capital – Mains integrity renewals	R-RAC	Mains replacement	SIB - Allocation and tools and equipment
Minor Capital - TRS	R-RFT	Other Capex	SIB - Allocation and tools and equipment
Minor Capital – PRS	R-RFP	Other Capex	SIB - Allocation and tools and equipment
Minor Capital - DRS	R-RFS	Other Capex	SIB - Allocation and tools and equipment
Minor Capita - Boundary Regulator Upgrades	R-RFSB	Other Capex	SIB - Allocation and tools and equipment
Minor Capital - Pipework	R-RAKP	Other Capex	SIB - Allocation and tools and equipment
Minor Capital - Washaways	R-RAKW	Other Capex	SIB - Allocation and tools and equipment
Allocation: Minor tools and equipment	AA_R-GEAT	Other Capex	SIB - Allocation and tools and equipment
Allocation: Property Program	PRTY - 1	Other Capex	Non-network - Property
Allocation: Emissions Pressure Reduction	R-RAKE	-	Emissions

5. Terms & Definitions

Term	Definition
AA	Access Arrangement
AMS	Asset Management System
APA	Australian Pipeline Association
BC	A document that justifies a project for the purposes of capex DFA approval.
Capex	Represents expenditure that is capital in nature. This expenditure is capitalised in Jemena's Fixed Asset Base.
CP	Cathodic Protection
DRS	District Regulator Set
FEED	Front End Engineering Design
HRV	High Risk Valve
HSE	Health Safety & Environment
JGN	Jemena Gas Networks
kPa	kilopascal
MAOP	Maximum Allowable Operating Pressure
MPa	Megapascal
MSS	Management System Standards
NSW	New South Wales
PDCA	Plan-Do-Check-Act
POTS	Packaged Offtake Station
PRS	Primary Receiving Station
RTU	Remote Terminal Unit
RY	Regulatory Year
SIV	Station Inlet Valve
SMS	Safety Management Study
SPM	Sydney Primary Main
TRS	Trunk Receiving Station
UAG	Unaccounted For Gas