

# Jemena Limited

## Jemena Infrastructure Cost Estimation Methodology

JEM PMM-PR-2542

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# 1. INTRODUCTION

## 1.1 SCOPE

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This document provides the process followed for Jemena Project Cost Estimation for all non-routine projects and programs of work for Jemena Network Infrastructure Projects. It details the methodology to be applied when developing a project estimate. Documenting the project estimation process reinforces the importance of applying the framework consistently to achieve the objective of developing accurate project estimates.

This document must be read in conjunction with the Jemena Project Management Methodology (PMM) and will be updated on a periodic basis as the maturity of estimation methodologies and estimation metrics evolve.

The following items listed below are excluded (for the time being) though estimating principles and tools referred to within can still be applied:

- IT;
- JEN Metering;
- JEN Quoted services;
- JEN Negotiated services;
- JEN Public lighting;
- CIC Customer contribution;
- JGN Routine Projects; and
- JGN Routine Programs.

For clarity, for commercial projects, the project cost estimate will be taken by the commercial team to develop the project price taking into account the appropriate commercial terms and conditions. This document does not cover off aspects required to determine the project price estimate from the project cost estimate.

## 1.2 PURPOSE AND PRINCIPLES

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The purpose of this methodology is to:

- Provide a common understanding of the concepts involved with classifying cost estimates
- Define and correlate the major characteristics of project cost estimates
- Use the maturity level of project deliverables as the primary characteristic to categorise cost estimates
- Reflect accepted practices in the cost engineering profession

Jemena's project cost estimates are to be developed to meet the following principles:

1. *Fit-for-purpose* – Estimates are developed to be efficient and to a level of accuracy that ensures they are appropriate for the purpose for which they are to be used. It is acknowledged that the level of accuracy required will vary subject to the purpose for which the estimate is created;
2. *Credible* – the assumptions used in the development of the estimate are to be realistic. They have been cross-checked and reconciled. They are to match the level of confidence associated with the estimate;
3. *Documented* – supporting documentation shall include a narrative explaining the process, sources, and methods used to create the estimate and identifies the underlying data and assumptions used to develop the estimate; and
4. *Reviewed and Approved* – estimates are subject to a review and approval process to ensure accountability, responsibility, costing standards and control applied prior to release.

## 1.3 BACKGROUND

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Jemena undertakes construction, operations and maintenance work on a variety of electrical, gas and water infrastructure assets around Australia. Many of these activities are delivered as a project or as a program of works through an annual program of work detailed from the rolling two year Capital and Operating Works Plans (COWP). Jemena's Project Management Methodology (PMM) mandates the requirement for a Financial Investment Decision (FID) to enable Projects and Programs of works to transition through the lifecycle gating process. At the time of FID, the level of uncertainty in the project estimate needs to be commensurate with the business/commercial risk of the project.

Accurate budgeting is dependent on the consistent application of a robust cost and schedule estimating methodology. The Project Cost Estimation process described in this document aims to provide Service Delivery and Asset Management with consistently accurate project and program estimates by ensuring that:

- all relevant inputs are considered – encompassing scope definition, asset management standards requirements; HSE requirements, site information; standard rates; and Vendor pricing;
- project cost estimates reflect the detailed design and delivery strategy, including construction, procurement and resourcing; and
- risk is treated appropriately, recognising that Jemena undertakes a portfolio of projects and programs of work, and that an element of risk should be applied at the portfolio level.

Estimating the budget required is completed using a risk based approach once projects progress through the PMM gating process. Under-estimating a project will result in increased effort and change to the program of works in order to release more funds from Jemena's portfolio and over-estimating will tie up unnecessary funds and impact an optimal program delivery.

Risk-based estimates provide sound appraisals of project value by combining the two (2) components of the estimate: the estimated cost and the event risks. The first component, the base cost estimate, is determined using traditional cost estimating techniques, except no contingencies or allowance are applied for the unknowns. The second component comprises the contribution of event risks causing a project's outcome to change from the initial plan.

## 1.4 OVERARCHING GOVERNANCE PROCESS

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The cost estimation framework is part of Jemena's broader governance process for Asset Management and Service Delivery, and targets the realisation of 'value for money' for all stakeholders by trying to determine the efficient project cost to deliver the scope of works. This process includes a number of tools that help us ensure that we achieve efficient investments. The key elements in our governance process are briefly summarised below:

- Asset Business Strategy (ABS) covers a 20 year time horizon and ensures Jemena adapts over time to maintain the relevance of our services to our customers.
- Asset Investment Plan (AIP) covers a seven year time horizon and summarises Jemena's rolling five-year forecast of the capital work we need to undertake to maintain a safe, reliable network, and is updated annually.
- Capital and Operating Works Plan (COWP) covers a two year time horizon and is derived from the Asset Investment Plan (AIP).
- Project Management Methodology (PMM) provides a framework which improves and standardises scoping, estimation and delivery management of network infrastructure programs. PMM details the project governance gating process for managing projects from inception through to completion; the framework also ensures alignment to Jemena's Delegation of Financial Authority (DFA) policy. Portfolio and Planning Governance Process governs the prioritisation of projects within the COWP and monitors issues, risks, variation and escalation across the portfolio. Portfolio and Planning gathers information from all projects (large and small) to sequence the projects (based on dependencies, resource constraints, and priorities) in a way that ensures an optimised portfolio at a given point in time.

Figure 1–1: PMM Lifecycle and Gating Process below illustrates the PMM project gating process.

In terms of the project gating process illustrated above, this document describes the arrangements in place to ensure that project cost and unit rate estimates entering Gate 3 are robust and substantiated. In addition, the document also explains that works planned beyond a two-year time horizon are subject to "Top Down" estimates.

Figure 1–1: PMM Lifecycle and Gating Process

		HIGH LEVEL ACTIVITIES	PRODUCT	GOVERNANCE
<b>Pre-Project</b>	<b>OBJECTIVE</b> SAP IM Program Planning/ Pre Project Setup	Identify issue or opportunity. Analyse, assess, gather support.  Obtain permission to add to the Asset Management Plan, or Other Works Plan, and progress to a Project.	A supported infrastructure objective, as defined in the preliminary Project Mandate	Result: AMP/Works Plan updated to reflect Potential Project
<b>PROJECT PHASE</b>				
<b>Initiate</b>	<b>OPTION</b> SAP Initiate Phase	Establish requirements & agree preferred delivery option	An articulated asset scope with delivery concept and constraints	<b>GATE 1</b> Option Confirmed
	<b>SCOPE DEFINITION</b> SAP FEED	Conduct the functional design - confirm technical feasibilities of project scope & solution design	A refined & validated, technically feasible design	<b>GATE 2</b> Scope & Requirements Defined
<b>Plan &amp; Define</b>	<b>PLAN</b> SAP Detailed Design & RFT/ RFQ / Estimation	Develop designs, detailed estimates and project delivery plans to fully support the Scope.  Obtain stakeholder acceptance of designs and cost estimates.	Technical design, cost estimates and project delivery details sufficient to obtain approval	<b>GATE 3</b> Final FID & Delivery Approval
	<b>APPROVE</b> SAP Approvals	Business Case is approved and funding is released	An approved and funded project	<b>GATE 3</b> Final FID & Delivery Approval
	<b>PREPARE &amp; MOBILISE</b> SAP Mobilisation	As necessary, finalise designs, costings and project plans to align with Scope and Budget.  Project management, administration, purchasing, contracting, external approvals and logistics are fully established.	A finalised design and plan; ready for construction	<b>GATE 4</b> Ready for Construction
<b>Deliver</b>	<b>CONSTRUCT</b> SAP Execute & Monitor Work	Site works are conducted and completed.  Timelines, budget performance and build quality are actively managed using industry Best Practice.		
	<b>FINISH</b> SAP Finalise Work	Finish testing and site documentation. Commence demobilisation.	A functioning facility or equipment(s), ready for commissioning	<b>GATE 5</b> Construction Complete
	<b>COMMISSION</b> SAP Commission, Update Equipment & Trigger Maintenance	Asset (or equipment) is handed over to customer, and placed 'In Service'.  Engineering, operational and financial records reflect this fact.	A quality asset (or equipment) accepted by the customer as 'fit for service'	<b>GATE 6</b> Project Delivered (Commission)
	<b>SETTLE</b> SAP Close Work & Settle to Assets	Complete recording of engineering and financial aspects of the asset.	A professionally documented asset, and a completed project	
<b>Close</b>	<b>CLOSE</b> SAP Close Project	Review and close out all activities	A fully capitalised asset. A closed project.	<b>GATE 7</b> Project Closed



## 1.5 NON-ROUTINE PROGRAMS

A non-routine program is focused on addressing a specific network issue across multiple sites, such as an asset failure, major augmentation or network constraint. A non-routine program is typically higher in complexity and as a result carries with it a greater risk of variance between “like” projects. In contrast, a routine network project is work in relation to a pre-defined set of tasks, which is subject to a scheduled timeframe and is highly repeatable with minor variances.

Productivity and cost efficiencies can be achieved by packaging non-routine projects into programs of work. In particular, treating multiple activities as a single program of work allows synergies to be realised in project management, resource allocation and field crew co-ordination. In addition, continuous improvement may be achieved as work crews gain expertise in delivering consistent activities. Structuring multiple non-routine projects into programs of work also present the opportunity to combine the activities with opportunistic maintenance and realise efficiencies.

The following examples highlight projects that can be delivered as a program of work:

Asset	Types of Projects
JEN	<ul style="list-style-type: none"> <li>• non-tension connector replacement;</li> <li>• surge diverter replacement;</li> <li>• service replacement;</li> <li>• cross arm replacement;</li> <li>• conductor replacement;</li> <li>• animal proofing installation;</li> <li>• vibration damper and armour rod installation;</li> <li>• Customer connections &amp; ACS activities; and</li> <li>• Pole to Pit installations.</li> </ul>
JGN	<ul style="list-style-type: none"> <li>• integrity digs;</li> <li>• cocon installation;</li> <li>• service laying;</li> <li>• plastic mains laying;</li> <li>• mains and services Renewals; and</li> <li>• metering renewals up to 500kPa inlet pressure and market expansion.</li> </ul>

## 2. ROLES AND RESPONSIBILITIES

The estimating process requires a number of stakeholders providing timely information to project estimators to enable them to develop an accurate estimate of the works, including labour, materials, equipment and contract service activities and costs.

In addition, each stakeholder is required to communicate issues/risks and assumptions to ensure that Project Managers and construction personnel understand how the estimate has been developed; what it covers and any risk items that have been considered.

### 2.1 ESTIMATOR

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The Estimator:

- ensures that an appropriate and consistent framework is followed so that the estimating process, meets performance measures and quality assurance requirements of the business;
- ensures the Project Manager/ Planner registers the project in SAP and maintains records in relation to:
  - Requests for quotation (not necessary if the estimate is received as a project folder);
  - Clearly defined scope of works, including any departures from baseline;
  - Ensures version control is updated and current on all documents;
  - Design/drawings/plans as appropriate (these are required to detail structures and construction standards to be applied);
  - Dial-Before-You-Dig documents where applicable;
  - All project underground cable route quantities if drawings provided are not to scale;
  - SAP or PM project number;
  - Supply outage requirements;
  - Before and after / staging diagrams;
  - Photographs as applicable;
  - Traffic restriction times that will impact on the site working time availability; and
  - Applicable site allowances and associated costs.

In addition, the Estimator must ensure that this record specifies any additional project information that will influence the final estimate such as, temporary supply works, timing of the works, works completed by others and dependencies etc.

A Project Manager can take on the role of an Estimator for a non-routine project where the specific role does not exist and/or where the type of project being estimated is not supported by the estimating group based on skillset. In addition a project planner may assist a Program Manager or the Service Delivery Portfolio Team in estimating programs of work or minor projects.

## 2.2 PROJECT MANAGER

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The Project Manager is responsible for the following estimating activities:

- Managing the project's life-cycle in accordance with the PMM framework;
- Initiating the project and providing the estimating team with appropriate, clear, accurate project information (scope of works);
- Ensuring that all estimations are undertaken by a Project Estimator so that consistent and agreed processes and systems are implemented in a uniform and appropriate manner;
- Adherence to the documented processes within PMM to ensure that the governance framework is upheld;
- Visiting project work sites, clarifying scope of work, and preparing cost estimates and proposals where necessary;
- Developing and implementing delivery strategies as required to self-perform and to outsource various packages of work to achieve the projects objectives of cost, schedule and quality;
- Negotiating procurement activities including contracts and subcontracts to assure that all project goals are being addressed;
- Proactively identify issues that could lead to problems and facilitate their solutions;
- Assessing, documenting, quantifying and mitigating project risks in the Project Risk Register (including determining the risk controls to be adopted);
- Communicating with all customers and other stakeholder departments as appropriate;
- Reviewing the quotes used as inputs to project estimates to ensure costs are within project budget;
- Communicating appropriate cost or scope changes to the project estimator to undertake changes to the construction estimates; and
- Initiating a close out meeting with all relevant stakeholders when project is complete.

It is important to note that where a dedicated estimator does not exist and/or where the type of project being estimated is not supported by the estimating group based on skillset then the Project Manager assumes the role of project Estimator.

When the roles are separated, it is essential that the Estimator and the Project Manager communicate effectively with each other. The Project Manager has specific knowledge of the work required for the job and is, therefore, an important resource for the Estimator in producing an accurate estimate. The Estimator is laying the framework for the project. If the estimate is done completely and accurately, the Project Manager will experience fewer problems on the job.

## 2.3 PROJECT ESTIMATING TEAM

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The project estimating team (for large complex non-routine projects) is a virtual team that is formed as required, which:

- Performs the process steps to ensure that performance measures and quality requirements are achieved;

## 2 — ROLES AND RESPONSIBILITIES

- Assesses the project file and verifies its detail via consultation with the project group;
- Conducts site visits if required and seeks technical advice from Service Delivery wherever necessary;
- Identifies anomalies with SAP materials, labour and subcontractor costs as appropriate;
- Monitors the continual improvement of standard estimates within the nominated system by implementing Lessons Learnt and Post Implementation Reviews;
- Reviews planned estimates against project actual costs in order facilitate continual improvement; and
- Ensures that the final estimate is as accurate as possible.

### 2.4 ASSET INVESTMENT TEAM

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The Asset Investment team will provide DFA approval for funding between the Gates for Network Projects and also will be accountable for approving the Project Cost Estimate.

### 2.5 NETWORK COMMERCIAL TEAM

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The Network Commercial team will provide DFA approval for funding between the Gates for Commercial Projects and also will be accountable for determining and approving the Project Price.

### 2.6 FEED TEAM

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The FEED Team are accountable for managing projects from Project Mandate to Gate 2, after which it will be handed over to Service Delivery Projects Team to deliver.

The FEED Manager is responsible for undertaking a peer review of each project (including the cost estimate) as per Gate 3 Project Peer Review Procedure. This review is intended to be conducted in an open review model and promote healthy and robust discussions.

The purpose of the peer review is focused on reviewing the inputs to the project Business Case to:

- verify the work plan meets requirements;
- identify defects or problems early in the life-cycle;
- provide confidence to the DFA approver that the requirements of the project can be delivered on time and on budget;
- ensure adherence to relevant regulations, standards and codes of practice;
- ensure Lessons Learned have been reviewed and applied; and
- ensure appropriate management of risk.

Ultimately, the intent is to provide an additional level of robustness to support the Financial Investment Decision by the business.

The peer review is undertaken by the FEED Manager, or equivalent role with a minimum RegPM certification of CPPM issued by the Australian Institute of Project Management (or equivalent)

## 2.7 SERVICE DELIVERY

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Service Delivery Projects and Construction Team are accountable for managing non-routine projects from handover after Gate 2 through to Gate 7 and will also be accountable for providing the Project Cost Estimate at Gate 3.

The Non-routine Projects Manager or relevant Program Manager is to ensure they undertake a review of the cost estimate in conjunction with the Project Manager. The Projects or Program manager is to have a minimum RegPM certification of CPPM issued by the Australian Institute of Project Management (or equivalent)

### 3. ESTIMATING TECHNIQUES AND DEPENDENCIES

This section provides an overview of Jemena's approach to developing estimates for projects and programs of work.

Jemena's cost estimating approach draws on the best available information, given the nature and proposed timing of the expenditure. Both, 'Top Down' and/or 'Bottom Up' estimating methods are used to ensure that a project estimate is fit for purpose in the context of both the PMM project governance gating process and the two-year rolling program as defined by the COWP.

Wherever possible the project/program shall be estimated from a 'Bottom Up' build, as sufficient detail to enable an accurate overall project cost (i.e. within  $\pm 10\%$ ). Sufficient detail may include (but not limited to) detailed scope of works, preliminary design, detail design, site assessments, consultation, procurement and construction/delivery methodology.

As a rule of thumb, the typical cost to get from Project Mandate to Gate 3 (FID) is around 5% - 10% of the overall project value. Note for larger projects the percentage is closer to 5%. If there is a deviation then it is to be detailed within the Gate 3 Certificate.

Project estimates are completed in nominal dollars, without any consideration of potential future price changes (i.e. for the change in price of capital inputs, wages, CPI etc.).

#### 3.1 'TOP-DOWN' ESTIMATING TECHNIQUE

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The 'Top Down' estimating technique is used by approximating the size (duration and cost) and risk of a project/program (or phase) by looking at the project/program as a whole and comparing it to previously performed similar projects. The comparison may be made directly using 'Analogous estimating', through an algorithm as in 'Parametric estimating', or from 'Expert Judgment'.

For non-routine augmentation and replacement projects, this approach can be used for budgetary estimates for outer year estimates (beyond a two (2) year investment horizon). 'Top-Down' techniques are able to produce reasonable estimates with limited inputs, recognising that detailed scopes of work have not been developed at this point in time.

The 'Top-Down' estimates are created using 'modules' which are sourced from:

- historical data from past projects/programs (e.g. unit rates);
- recent tender prices (at the time of estimating e.g. within six (6) months);
- expected labour costs (consistent with Jemena's labour model); and
- period contract schedule of rate prices.

Once a project estimate is developed from the individual modules, a review is undertaken for any potential synergies and/or unique project conditions. These details are then documented in the project estimate.

### 3.1.1 ADVANTAGES OF TOP-DOWN ESTIMATING

An advantage of implementing a top-down estimation methodology is that it can result in a rapidly generated estimate. The development of top-down estimates can be done without the deep involvement of those responsible for end delivery. These estimates can be “sized” and socialised within the approving levels of Jemena to determine the acceptability of the top-down estimate to expectations for delivery of the project scope.

### 3.1.2 DISADVANTAGES OF TOP-DOWN ESTIMATING

A large dependency of top-down estimating is the high level scope and assumptions used to feed the estimating. If the scope and assumptions are not carefully thought through it can lead to unrealistic estimates, which create unachievable expectations. Additionally, there may be a disconnect between the top-down estimator’s knowledge of the effort required for delivery of the estimate element being estimated, which generally can lead to under-estimation.

Accordingly, top-down estimates and bottom-up estimates play a complimentary role and Jemena’s estimation framework seeks to utilise both estimating approaches. A good top-down estimate covers the project scope fairly well, thereby allowing realistic bottom-up estimates to be developed (by allocating them sufficient, meaning as close to the actuals, time and resource available), and good bottom-up estimates at task level help reinforce assumptions made in the top-down estimates of the overall project.

## 3.2 ‘BOTTOM UP’ ESTIMATING TECHNIQUE

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Bottom-up estimating uses the estimates of individual work packages or activities (as defined by the Work Breakdown Structure) which are then summarised or “rolled up” to determine an overall cost estimate for the project. This type of estimate is generally more accurate than other methods since it is looking at costs from a more granular perspective. Each line item in the Bottom-up build should be suitably justified including why it is efficient.

### 3.2.1 ADVANTAGES OF BOTTOM-UP ESTIMATING

One of the major advantages of bottom-up estimating is that the project estimate can be quite accurate for individual tasks. However, this is dependent upon all project task and cost elements being included within the estimating framework. Additionally, bottom-up estimating should involve many members of a particular project, which can be a benefit in terms of project/team morale and involvement.

### 3.2.2 DISADVANTAGES OF BOTTOM-UP ESTIMATING

One of the primary disadvantages of bottom-up estimating is that it can lead those who are in charge of tasks and also Project Managers to inflate project estimates. This can be driven by conservatism in individual estimates for task completion and/or padding of material estimates to ensure that the estimate is not “short” or “under-done”.

Another drawback to bottom-up estimating is that it is difficult to actually draw up a complete and thorough list of every step and task that will be necessary for the completion of a project. It is easy to overlook a task, requirement or resource for a project or a task, a problem that will lead to major issues in the overall budget.

### 3.3

#### 3.3 ESTIMATING TOOLS

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##### 3.3.1 PROJECT ESTIMATING MODEL (PEM)

Jemena currently utilises a project estimating template for estimating non-routine projects and programs of works. This spreadsheet is known as the PEM, and is a template available within Jemena's PMM library (refer document number JEM PMM PR 2542 TP 01)

The PEM template allows for direct costs, risk, and overheads to be built up as a project estimate with costs phased over the project lifecycle.

This tool may be reviewed and updated or withdrawn from use as other tools are developed or as the estimation process matures within the business

##### 3.3.2 EASY COST PLANNER (SAP)

Easy Cost Planner (ECP) is a module of SAP which is used to input project costs against project Work Breakdown Structures (WBS).

ECP also ensures that the correct labour rates and material costs are sourced from within Jemena's SAP system.

If estimates are developed using the PEM or other tools, it is still a requirement to input the project estimate into ECP in SAP after Gate 3 approval.

The project estimate inputted into ECP is also utilised to form the baseline variant within Jemena's SAP system to aid in the real time management of variance against baseline

#### 3.4 ESTIMATING DEPENDENCIES

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Estimating for non-routine projects and programs is subject to a number of dependencies, which are used to inform current, accurate and efficient project estimates. Some of these dependencies include:

- Current spatial network load growth;
  - Actual plant performance/life;
  - Applicable technical/design standards;
  - Customer expectations/requirements;
  - Regulatory requirements;
  - Current strategic material and services contracts;
  - Resource availability;
  - Timeline;
  - Completion of detailed design;
-



- Vendor availability and responsiveness;
- Environmental considerations; and
- Workplace health and safety regulations.

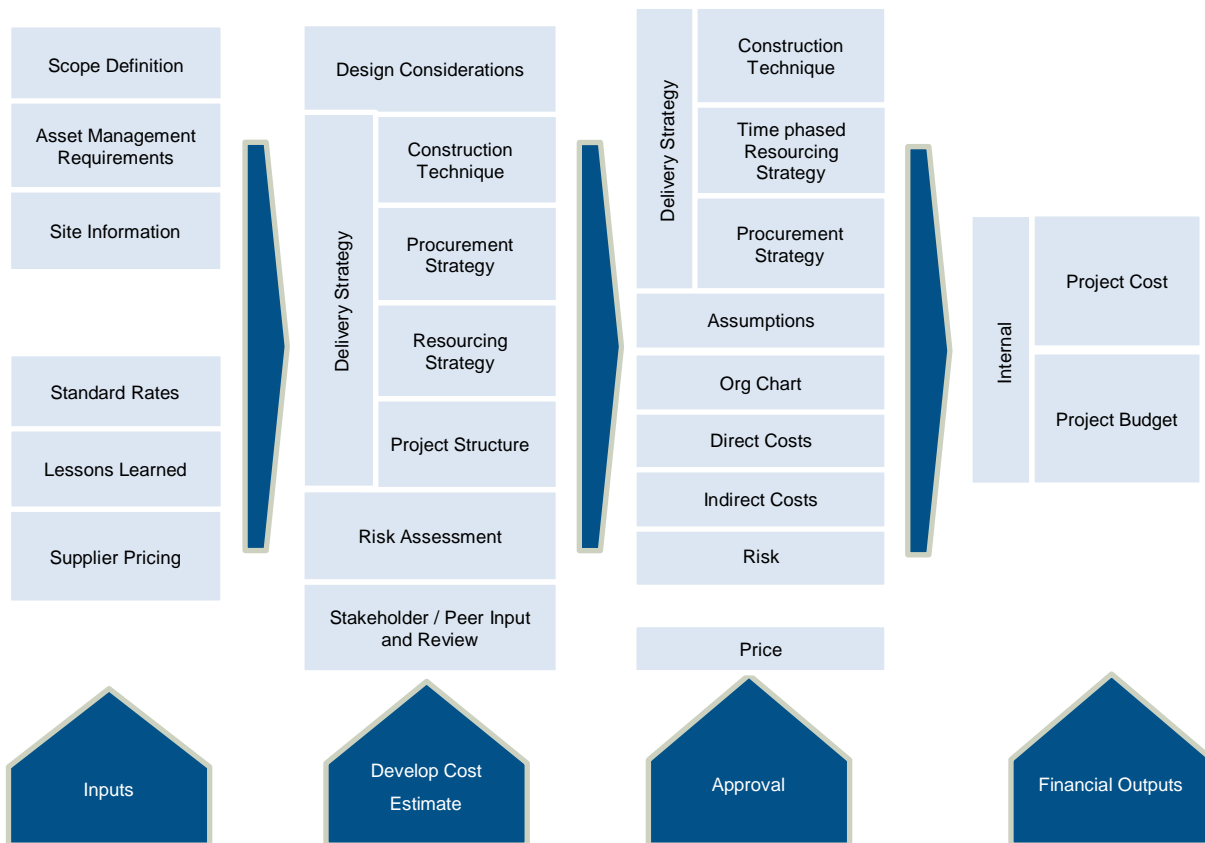
## 4. ESTIMATING PROCESS

### 4.1 ESTIMATING FRAMEWORK

Figure 4–1: Estimating Process below outlines the process for estimating a project or a program of works in line with the Jemena PMM.

Estimates are developed to align with PMM gate reviews within the project lifecycle. This is further defined in Appendix A.

**Figure 4–1: Estimating Process**



The objective of estimating is to determine the efficient project cost to deliver the scope of works. There is an inherent need for accurate forecasting of costs in all Jemena business program activities to ensure successful delivery of the Program of Works (POW). Cost estimates are utilised within the business in a variety of ways. Jemena considers the following uses of a cost estimate:

- From Asset Management perspective, the cost estimate determines whether a particular project or activity is to be funded for delivery.

- From a Service Delivery viewpoint the cost estimate represents an estimate of required expenditure for the project/activity under consideration, based on the agreed upon scope of work. Also represents a performance target.

## 4.2 ESTIMATE INPUTS

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### 4.2.1 SCOPE DEFINITION

The Scope Definition is developed from the Project Mandate and captures the activities and actions required to complete a defined Project or Program of Works. In addition to the Scope of Work, it includes project objectives, specifications for the products or services being procured, project milestones and any other detail required to define the products or services to be delivered. The Scope of Works will also cover additional items like the performance reporting and mandatory requirements. The Scope of Work needs to be clearly understood throughout the estimating process, and in order to do so will generally involve:

- Customer Input;
- Jemena Technical and/or Engineering Input;
- Operational Input (Project Manager / Construction Manager); and
- Site visits.

### 4.2.2 ASSET STRATEGY REQUIREMENTS

As a part of defining the scope, obtaining technical and operational input will generate clarity of capability requirements required to achieve the desired outcome of the Project or Program. This will also identify any constraints and any requirements for temporary works or staging. Engineering input is sought from Asset Strategy.

### 4.2.3 SITE INFORMATION

Typically for non-routine projects, site visits are undertaken to assist project estimators to consider as much local, current information relevant to the project estimate. Ensuring that site-information is gathered, documented, and clearly understood will aid in minimising any unforeseen site conditions that may adversely impact on the proposed delivery strategy and subsequently the cost of the project.

Typically a site inspection is required to assess:

- Site access and layout including delivery points, parking, lay-down areas and storage, spoil areas;
- Circulation throughout the site;
- Delivery routes;
- Existing utility locations;
- 3rd party crossings;
- Special site conditions (terrain, weather implications, staging requirements);
- Traffic management requirements;
- Environmental considerations;

- Construction methodology;
- Safety issues – workers, pedestrians, general public;
- Community consultations;
- Land owner issues; and
- Scoping of work.

Any remaining uncertainty is included within the project risk assessment, and the assumptions applied within the project estimate are to be clear throughout the review and approval process. Any departures from the Baseline Scope of Works are to be quantified and detailed as part of the project governance review process.

### 4.2.4 SCOPE DEFINITION ACTIVITIES

Scope Definition activities are undertaken to reduce the uncertainty in scope and provide more accuracy in the cost estimate. Typical Scope Definition activities, which are dependent on the stage of estimate, are (but not limited to):

- Site assessments;
- Concept/preliminary drawings;
- Functional Design/Design Basis Manual;
- Detailed equipment lists;
- Project management artefacts – schedule and identify risks;
- Budgetary pricing;
- 3rd party approval; and
- Ordering of long lead Items (if impacts overall schedule).

### 4.2.5 STANDARD RATES

Jemena uses standard labour and plant rates for estimating and costing both internal labour and plant on projects. Also for some external activities, there are negotiated contractor standard rates. Project estimators need to be aware of both the composition of these rates and the underpinning assumptions so as to avoid duplication of costs, and to ensure additional items are not overlooked.

### 4.2.6 LESSONS LEARNED

Jemena has a diverse portfolio of capability and experience with similar projects likely to have been previously undertaken. The estimating process calls on relevant experience from the wider business where required, and incorporates the lessons learned from past successes and failures into the planning and risk management processes. Lessons learned registers and Post Implementation Reviews are implemented with the intent of targeting the continual development and improvement lifecycle of base estimates.

#### 4.2.7 VENDOR PRICING

Vendor pricing is subject to regular change and is dependent on variables such as volume, location and market depth. The estimating process ensures that prices used within the estimate are sourced from Vendors that are current and applicable to the volumes required.

Where there is significant procurement required for the project, the procurement manager is engaged early in the process to assist in the development of an appropriate procurement strategy.

#### 4.2.8 OVERHEAD ALLOCATIONS

In accordance with Jemena's Cost Allocation Methodology (CAM) Policy and other Finance Policies, the direct, indirect and Enterprise Support Functions (ESF) costs are charged to projects.

Information on overhead allocations in project estimates should be obtained from Asset Investment.

### 4.3 DEVELOP PROJECT ESTIMATE

#### 4.3.1 PROJECT ESTIMATE BUILDUP

A non-routine project estimate typically consists of the following elements:



**Figure 4–2: Typical project estimate elements (graphical representation only)**

#### 4.3.2 DESIGN CONSIDERATIONS

In developing an estimate, project estimators make an initial assessment of the Scope of Works contained in the request for estimate to establish the nature and complexity of the project (through requirements determination). Factors influencing the complexity of the project include detail of the design drawings, volume of work, type of structure presented in the drawings, location and accessibility. The complexity is determined by the project estimator's experience, information provided by the Project Manager and knowledge of the location of the proposed works.

#### 4.3.3 DELIVERY STRATEGY

Developing a robust project delivery strategy can significantly affect the success of a large construction project. The appropriate delivery strategy typically drives project cost, quality of design, constructability, maintenance strategy, and project completion date. Project Managers planning large projects can augment the likelihood of a successful outcome by performing a thorough assessment of the key objectives for the project and the delivery strategies available to execute it.

Upon collection of all information pertaining to the project, the project estimator will assess the construction technique, procurement strategy, resource strategy and organisational structure for the project.

### 4.3.4 CONSTRUCTION TECHNIQUE

The construction technique is developed in close consultation with the Project Manager and Construction Manager to identify any key constraints on the delivery of the project. Examples of site access restrictions are busy roads or inaccessible terrain. This ensures the project estimator can allow for the required plant and construction hours to complete the required activities.

### 4.3.5 PROCUREMENT STRATEGY

Procurement strategy is aimed at mapping the optimum route to achieving the project objectives. This involves identifying what is required and investigating the market's capacity to deliver, while accounting for the associated risks, opportunities and constraints.

The procurement strategy needs to establish:

- what is to be procured;
- timelines to be achieved;
- budget constraints and cost management;
- an analysis of the market capability;
- the approach for engaging the market; and
- implications associated with each potential option.

To meet the requirements of the project procurement strategy, the project estimator requests pricing for any non-stock materials and sub-contractor costs through the procurement manager via the Project Manager. Stock material pricing is maintained within SAP ECP.

### 4.3.6 RESOURCING STRATEGY & ORGANISATION STRUCTURE

The Project Estimator makes an assessment of the resourcing requirements of the project in consultation with the Project Manager, Construction Manager and Resource Planner. A decision is made on the required mix of skill sets, including civil, which will form the basis of the estimate. When internal labour is utilised on projects, effort is made to schedule the resources in such a way to efficiently optimises costs.

### 4.3.7 RISK ASSESSMENT

Risk is allocated based on a quantitative and qualitative risk assessment of plausible risks that could affect the project. These risks are captured as an element of the estimating process.

Given that risks may or may not materialise, the extent to which the total amount required to respond to each risk is considered. Where a defined scope exists, Project Estimators can allocate 'risk control' cost to mitigate risk and allocate this risk control cost within the direct cost of a project estimate. Residual Risk costs are allocated to the risk portion of the project estimate as defined by the project Risk Assessment.

From Gate 1 onwards, as a part of the Project Estimate a Project Risk Register containing all risks identified for the Project, their current assessment and the identified risk mitigation strategies to reduce the likelihood and

consequence of each risk must be completed. Project Risks and any associated controls must be costed within the Risk Register.

As risk management is an ongoing process over the life of a project, the Risk Register must be considered as a 'snap shot' of relevant risks at one point in time.

It is also important to recognise the uncertainty associated with projects, as not all scope items or risks can be known or estimated especially in the early stages of a project. Cost uncertainty (sometimes called Scope Factor Allowance (SFA)) can be allocated within the Risk Budget of a project. Typically uncertainty is included in project estimates prior to Gate 1. By the time a cost estimate has been developed at Gate 1 and beyond, the scope and risks can be better defined and quantified, and uncertainty factors are no longer required. Refer to Appendix A for guidance on the application of uncertainty factors.

The sum of the unmitigated costs and uncertainty from the projects/program is to be collated to be managed at a portfolio level and controlled by Investment Management (IM) in SAP. Risk budget cannot be committed to the project by the Program or Project Manager without Investment Management approval, as established in the PMM Project Variation Procedure (JEM PMM PR 2519).

#### 4.3.8 CONTINGENCY

Contingency is an amount that can be applied in addition to the risk budget and provides for unforeseen issues that arise during a project. Contingency provides access to additional funds that, if required, still keep the project within its Business Case approved DFA limit.

Contingency is not to be included with the project direct cost or risk estimate. Typically contingency (where required) will be included within the Business Case for a project, and not itemised within the project estimate.

The amount of contingency (for unknown-unknown risks) will be allocated and controlled at an IM level in SAP by the Investment Management department.

In determining the amount of contingency that should be included in the total approved costs of the project, the prevailing methodology would likely be to apply a percentage of the total estimate as a contingency fund based on experience with previous projects – recognising that contingency is an amount over and above (and needs to be justified in aggregate with) the risk budget. However, other methods may be used depending on the nature of the project, and they will need to be selected with regard to the commercial viability or prudence of the project.

Contingency, by its very nature, may or may not be required and, even if it is required, there may be time, scope and quality levers that can be pulled to enable a project to be delivered without incurring additional cost. Furthermore, over-allocation of (or underspend against) contingency may affect the total performance of the capital program against its budget. Therefore, whilst contingency is determined for each project, only a portion of each project's approved contingency may be aggregated at a program level. In doing so, the total budgeted contingency may be less than the total approved contingency for each of the projects within the program.

Determining the amount of contingency as a proportion of the approved amount for that project that will be allocated to the program contingency budget will depend on the nature of the project, the extent to which there are tolerances in relation to time, scope and quality as well as experience or gut instinct. It is important to note, however, that any project is able to dip into the broader pool of contingency beyond its actual contribution to that pool (budgeted amount) – just that every project will not be able to do this or else the program contingency fund will run out.

As a consequence of pooling the program contingency, incurring any costs against the contingency fund will be controlled by the change management process and approved by the relevant governance/steering committee.

This is necessary to manage the overall program contingency budget and to ensure that appropriate alternatives are considered before costs are approved.

### 4.3.9 ESTIMATE FORMAT

On completion of the estimate, a completed PEM Template (JEM PMM PR 2542 TP 01) is provided to the Project Manager which contains all of the assumptions, risks, and supporting documentation to provide sufficient information to assess the estimate and progress the project to the approval stage. The template ensures that all estimates are provided in a format such that following information can be clearly extracted:

- Project Cost;
  - Internal Labour
  - Materials
  - Subcontractors (including Restorations where applicable)
- Jemena Overheads;
- Risk;
- Seasonalised Cash flow – This shall align directly to the project/program schedule. Adequate allowance shall be made in the estimate to adequately make provision for suitable escalation in future years.

During early stages of the PMM up to FID at Gate 3, the estimating accuracy of project stages can be variable within the various project stages. The overall project cost estimating accuracy over the life of a project will be refined as the project progresses through the gating stages. On the other hand a detailed estimate (i.e. within  $\pm 10\%$ ) of the funds required to get to the next gate is a pre-requisite to establish an agreed scope (deliverables and schedule) with stakeholders to get to next stage. Refer to Appendix A for guidance on expected project accuracy ranges.

### 4.3.10 STAKEHOLDER / PEER REVIEW AND REVIEW

A review is undertaken to ratify the estimate and specifically review the resources allocated to the project to confirm the resource allocation is reasonable. This review is based on lessons learned, the complexity of the project and identified risks. The review will determine whether too many or too little resources are allocated.

Further to the review for approval the Project Manager is responsible for the post implementation review, as a part of Gate 7, in order to give appropriate feedback to the project estimators and other stakeholders for future projects. This will entail comparing the actual project costs to planned costs to identify discrepancies between assumed requirements and actuals completed in the field. This will drive continuous improvement.

### 4.3.11 VARIATION AND CHANGE MANAGEMENT

'Change' refers to a governance process for dealing with permanent adjustments to time, cost, scope or quality that are and can be managed within approved Business Case tolerances for that project.

A 'Variation', in contrast, is required for a change to time, cost, scope or quality that exceed approved Business Case tolerances or where there is any doubt as to whether the project would have been approved had the consequences of that change been known at the point of initial approval.



All approved estimates shall form the baseline for any future variation/change management. Future variation/change documentation shall clearly articulate any variances from the approved baseline by documenting the facts.

Change management should be concerned with more than just controlling expenditure against the contingency budget. It is an important governance function that closely tracks the project and leaves a documentary trail that describes the challenges that the project faced and the decisions that were made. The change register is an important record for any audit, post-implementation review and for identifying improvements required in business and project management processes.

It is important for the integrity of the process that neither the risk budget nor the contingency fund is used to pay for changes to time, scope or quality that are outside the tolerances of the business case; these need to be dealt with through the Variation process. However, for this to be a reasonable standard, there needs to be an appropriate degree of rigour in the determination of time, scope and quality.

### 5. REFERENCE DOCUMENTS

1. Project Estimating Model (PEM) (JEM PMM PR 2542 TP 01)
2. Risk Management Guidelines for Jemena Electricity Networks (ELE GU 0902)
3. Jemena Electricity Networks Network Projects Business Cases Risks Budgeting and Assessment Guidelines (JEN GU 2502)
4. Electricity Estimating Governance (JEN GU 0106)
5. Jemena Procurement Policy (JEM PO 0026)
6. Jemena's Project Management Methodology (JEM GU 2500)
7. Property, Plant And Equipment (FIN-REP-012)
8. Capex, Opex And Project Accounting (FIN-REP-024)
9. Cost Allocation (FIN-REP-028)
10. Jemena Cost Allocation Methodology
11. Variation Register and Variation Request – Work Instruction (JEM PR 2519 WI 01)
12. Gate 3 Project Peer Review Procedure

## 6. APPENDIX A

## PROJECT ESTIMATION MILESTONES

Milestone	Expected Project Accuracy Range	Uncertainty factors / SFA	Scope	Next Stage Requirements	Basis of Project Estimate – Non - Routine	Level of Work Required
Project Mandate or prior	± 50% or better	Internal Labour ≤ 10% Other ≤ 30%	High Level or Better	<ul style="list-style-type: none"> <li>• Deliverables</li> <li>• Schedule for deliverables</li> <li>• Detailed Bottom-Up Estimate ±10%</li> </ul>	<ul style="list-style-type: none"> <li>• Utilises a Top-Down or Bottom-Up approach.</li> <li>• Utilise information from similar projects.</li> <li>• Initial Budget values.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal Scope</li> <li>• Identify similar projects to validate figures</li> </ul>
Gate 1	± 50% or better	Defined via risk assessment	High Level or Better	<ul style="list-style-type: none"> <li>• Deliverables</li> <li>• Schedule for deliverables</li> <li>• Detailed Bottom-Up Estimate ±10%</li> </ul>	<ul style="list-style-type: none"> <li>• Utilises a Top-Down or Bottom-Up approach.</li> <li>• Utilise information from similar projects.</li> <li>• Initial Budget values.</li> </ul>	<ul style="list-style-type: none"> <li>• On completed Project Mandate:</li> <li>• Prelim Schedule &amp; Risk</li> <li>• Identification of Long Lead Items</li> </ul>
Gate 2	± 30% or better	Defined via risk assessment	Confirmed Scope of Works	<ul style="list-style-type: none"> <li>• Deliverables</li> <li>• Schedule for deliverables</li> <li>• Detailed Bottom-Up Estimate ±10%</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly uses a Bottom-Up approach.</li> <li>• Budget hours from internal labour</li> <li>• Recent quotes/tender prices or budget estimates</li> </ul>	<ul style="list-style-type: none"> <li>• Scope Finalised</li> <li>• Preliminary Drawings</li> <li>• Preliminary Delivery Methodology</li> <li>• Refined Schedule and Risk Assessment</li> <li>• Site Walk Through</li> <li>• Budget prices</li> <li>• Site Survey (as required)</li> <li>• Major Equipment List Identified</li> <li>• Stakeholder Consultation/Approvals (as required)</li> </ul>

Milestone	Expected Project Accuracy Range	Uncertainty factors / SFA	Scope	Next Stage Requirements	Basis of Project Estimate – Non - Routine	Level of Work Required
Gate 3	± 10% or better	Defined via risk assessment	Detailed Scope of Works		<ul style="list-style-type: none"> <li>Fully uses a Bottom-Up approach</li> <li>Hours from Internal Labour using CATS Time-writing rates for resources</li> <li>Quoted/Tender price from contractor</li> <li>Approved delivery strategy</li> <li>Current Overhead</li> <li>Itemised Risks</li> </ul>	<ul style="list-style-type: none"> <li>Further Site Visits</li> <li>Additional testing (as required)</li> <li>Ordering of Long Lead Items (if impacts overall schedule).</li> <li>Sufficient design to enable estimate</li> <li>Equipment List Identified</li> <li>Detailed Schedule</li> <li>Detailed Risk Assessment</li> <li>Validate using Subject Matter Experts</li> </ul>