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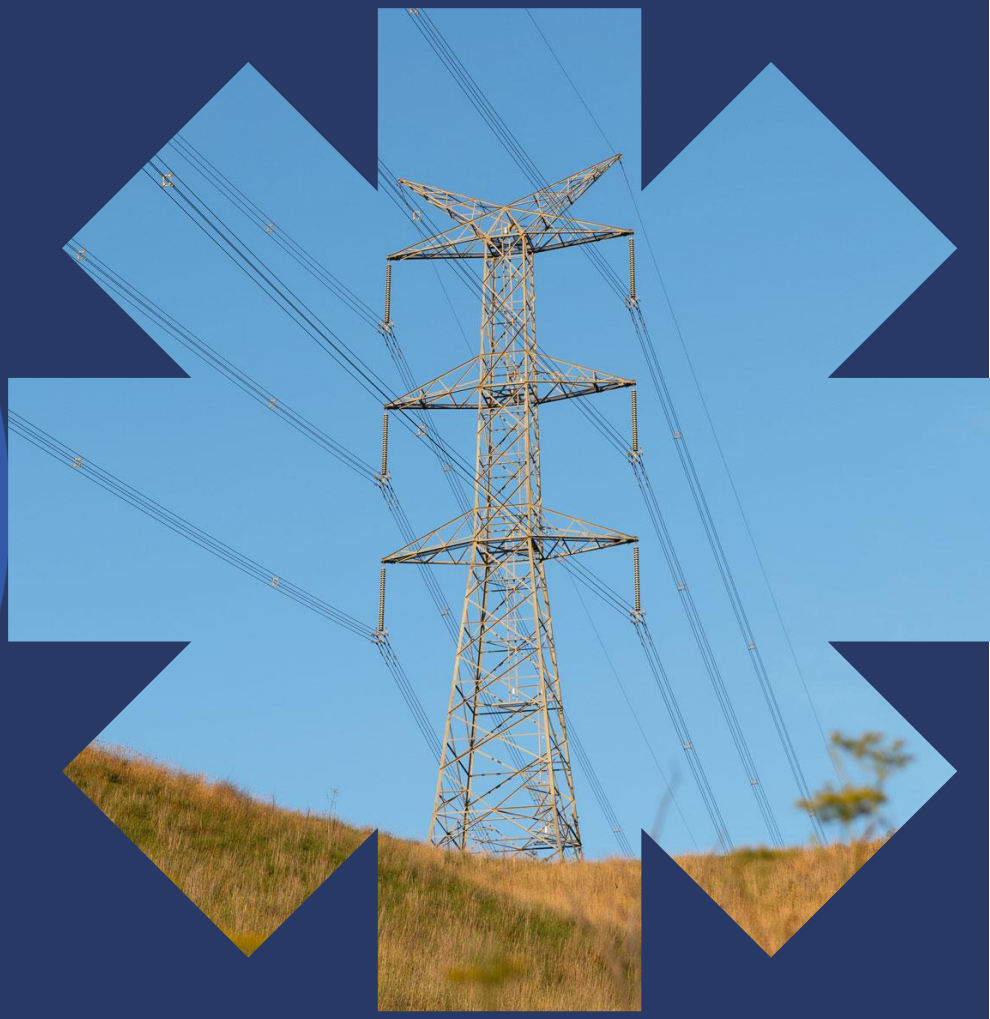

Project Cost Estimating Methodology

AusNet Transmission Revenue Reset 2027-32

Thursday, 25 September 2025

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ISSUE/AMENDMENT STATUS

Issue	Date	Description	Author	Approved
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1. Introduction

The purpose of this document is to outline the principles, methodologies and procedures that AusNet Services applies in preparing cost estimates for major capital projects included in the Transmission Revenue Reset (TRR) submission for the regulatory period 2027-2032.

1.1. Acronyms

AER	Australian Energy Regulator
AM	Asset Management Group
CDP	Construction Delivery Partner
DDP	Design Delivery Partner
IDC	Interest During Construction
NPV	Net Present Value
PM	Project Manager
SLD	Single Line Diagram
WBS	Work Breakdown Structure
@RISK®	Excel Based Simulation Software
SDM	Substation Design Manual
TRR	Transmission Revenue Reset

1.2. Definitions

Activity: An element of work performed during the course of a project. Each activity typically has a defined duration, associated cost and required resource requirement. Activities may be further broken down into smaller components known as task.

Actual Cost: The final out-turn dollar expenditure of a project.

Assumptions: Factors accepted as true, real or certain for planning purposes, without requiring proof or demonstration.

Bottom-Up Estimation: A method of estimating a component of work by breaking it down into detailed elements. Estimates are prepared for each lower-level component based on its specific requirements and details. These estimates are then aggregated to form the total estimate for the overall work component.

Budget: The approved cost estimate for a project, awork breakdown structure component, or a schedule activity. See also: Estimate.

Business Case: A structured document that outlines the rationale and objectives for initiating a project. It provides the basis for approval to proceed with design and implementation.

Contract: A legally binding agreement that obligates the seller to deliver the specified product, service or result and obligates the buyer to provide payment.

Contractor Indirect: An allowance covering the contractor's corporate costs. These indirect costs cannot be directly traced to a specific project and are allocated across multiple using approved accounting method.

Control Estimate: A detailed budget estimate prepared for the project implementation phase, following completion of a detailed scope of works and detailed design documentation. It is developed using Bottom-up Estimation in Expert Estimation software and is used to monitor project status, update project budgets, and manage changes to the cost baseline.

Cost Budgeting: The process of allocating the cost estimate to individual project components or WBS elements.

Cost Codes: Numerical identifiers used to classify work characteristics or schedule activities(e.g. 1000 for Project Establishment, 2000 for Project Management). See also: Work Breakdown Structure (WBS).

Cost Control: The process of managing and controlling changes to the project budget.

Cost Estimating: The process of developing an approximation of the financial resources required to complete project activities.

Deliverable: A measurable, tangible, and verifiable output, result or item that must be produced to complete a project or part of a project or phase.

Direct Costs: Costs that can be directly attributed to specific project activities or services.. In construction, this includes costs for labour, materials, plant, and subcontracted work.

Estimate: A quantitative assessment of the likely cost or outcome of a project component. Estimates are typically preceded by a modifier (i.e. Indicative estimate, Planning estimate, and Control estimate).

Expert Estimation®: A resource-based estimating software provided by Pronamics, used by Project Engineering in AusNet Services to prepare cost estimates.

Indicative Estimate: A preliminary budget estimate developed from initial project concepts. It is based on limited information and used to assess feasibility, conduct options analysis, and support early decision-making..

Indirect Costs: Costs those are not directly attributable to specific work items. In construction, these costs include on-site and off-site overheads such as administration, site, facilities and general project support.

Material: Items used in the execution of a project, including equipment, tools, and consumables..

Management Reserve: A contingency fund allocated at the program level to cover unforeseen events or risks not accounted for in the project estimate. These may include but are not limited to the occurrence of an unplanned or unforeseen event such as a natural events, safety incidents, changes to planned assumptions, stakeholder issues (outage restrictions, community), site access delays, industrial relations issues external to the Project/Program, and contractual issues or claims.

It represents the difference between P(90) and P(50) cost outcomes.

Methodology: A structured system of practices, techniques, procedures and rules used by Project Engineering to develop project scope, design and cost estimate.

Monte Carlo Simulation: A quantitative analysis technique that generates hundreds or thousands of possible outcomes based on probability distributions for cost and schedule variables at the task level.. These outcomes are used to generate a probability distribution for the overall project.

Objective: A defined goal toward which work is directed. It may represent a strategic position to be attained, or a purpose to be achieved, a result to be obtained, a product to be produced, or service to be performed.

Planning (Business Case) Estimate: A budget estimate prepared during Planning Phase. The Planning Estimation builds on the preferred option identified during the Initiation Phase and supports project feasibility analysis and option selection. Once a final option has been selected, the Planning estimate is risk adjusted and used for financial and Business Case approval.

Project Components Uncertainty: An estimate of the variability inherent in project components, arising from uncertainties in pricing, quantities, or construction methods. These uncertainties contribute to the difference between the reference estimate and the actual outturn cost. Examples include scope changes, variations in quantities or unit rates, and changes in construction techniques..

Project Cost Management: A subset of project management that includes the processes required to ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting and cost control.

Project Direct Expenditure: Expenses directly attributed to the execution of a project. These typically include labor, materials, equipment, and subcontractor services essential for delivering the scope of work.

Project Estimate: The total estimated costs of a project in outturn dollars, covering all components from project initiation through to project close-out.

Project Execution Manual: AusNet Services' framework that provides the direction and guidance for effective management and delivery of projects.

Project External Uncertainty: n estimate of the variability arising from external factors that may effect the project during the life of the Project. The uncertainty is a portion of the difference between the outturn and what has been assumed in the reference estimate.

The occurrence of an unplanned or unforeseen event such as a natural events, safety incidents, the change to planned assumptions, stakeholder issues (outage restrictions, community), the availability of resources or materials, delayed access to site, industrial relations issues external to the Project / Program, and contractual issues or claims.

Project Initiator: At AusNet, the individual or business unit responsible for identifying a business or operational need and initiating the formal evaluation process for a potential capital investment projects.

Project Life Cycle: The total duration of a project, typically divided into sequential phases (Idea, Plan, Build and Close).

Project Uncertainty: The combined effect of Project Components Uncertainty and Project External Uncertainty.

Provisional Items or Provisional Sums: Items or allowances included in an estimate where work is known to be required but cannot yet be quantified. Examples include. planning permit application, rock excavation and soil disposal, exact number of existing drawings to be cancelled without performing a detailed design.

Quantitative Assessment of Project Uncertainty: A process aimed at identifying and quantifying both the Project Components and Project Specific External Uncertainties.

Reference Estimate: A direct cost build-up based on known scope items, including provisional items or provisional sums, used as the baseline for comparison and risk analysis.

Scope: The sum of the products, services, and results to be delivered by the project.

Substation Design Manual (SDM): A comprehensive set of technical guidelines used within the AusNet Transmission Network to standardise the design, construction, and operation of substations.

Simulation: A technique that uses a project model to translate the detailed uncertainties into their potential impact on overall project objectives. Project simulations typically use computer models and estimate of uncertainty, usually expressed as a probability distribution to assess cost and schedule risks, often employing Monte Carlo analysis..

Uncertainty-Adjusted Planning Estimate: An estimate prepared at the end of the Initiation Phase, based on the preferred functional scope option. It is risk-adjusted and expressed in present-day dollars, forming the basis for Business Case evaluation and funding approval..

Unit Rate: The cost associated with an installed asset assembly and / or functional element.

Work Breakdown Structure: A hierarchical, deliverable-oriented decomposition of project work. It organises and defines the total scope of the project by grouping discrete work elements. See also: Cost Code

2. Background

AusNet Services follows a standardised approach to the development, management and reporting of projects and programs of works. The Portfolio Framework shown in Figure 1, outlines the four key phases: Idea, Plan, Build, Close.

- **Idea Phase:** Captures high-level information about a proposed project, including its strategic alignment, initial scope, and business need.
- **Plan Phase**: Commences once a project or program is endorsed and selected into the pipeline. This phase includes Business Case development and approval, completion of detailed designs, and preparation of control estimates.
- **Build Phase**: Encompasses all activities required to construct, implement, and deliver the project in accordance with the approved scope and design.
- **Close Phase**: Involves finalising all project activities, including commissioning, handover to operations, financial reconciliation, documentation, and capturing lessons learned. This phase ensures that all contractual, technical, and administrative aspects are completed and formally closed.

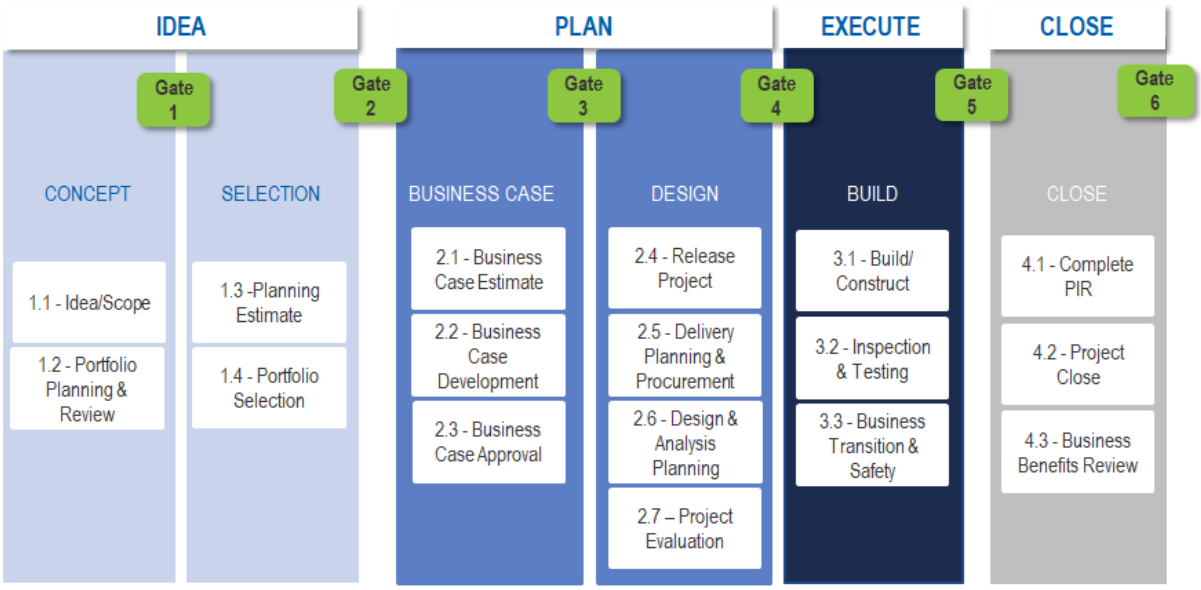

Figure 1 Overview of project framework

3. AusNet Cost Estimate Classification

Different cost classifications are required throughout a project's lifecycle to support effective decision-making, financial control, and regulatory compliance. As the project progresses from initiation to closure, the nature and purpose of costs evolve, necessitating tailored classifications that reflect the specific needs of each phase.

These distinctions support project initiators and stakeholders to make informed decisions both at the individual project level and across the broader portfolio.

The Project Development Team within the Transmission Line group is responsible for supporting project delivery through the following key activities:

- Idea Phase Estimates: Preparing initial project estimates to support early-stage cost-benefit analysis, optimisation, and prioritisation of projects.
- Planning Phase Estimates: Developing planning estimates to inform and support the creation and approval of Business Cases.
- Control Estimates (Class 2 Equivalent): Producing detailed control estimates during the Plan phase, prior to the Build phase. These estimates are used in conjunction with design release to validate Business Cases and support cost control.
- Continuous Improvement: Conducting regular reviews of estimation systems and the estimation database to ensure accuracy, consistency, and ongoing improvement in estimating practices.

Estimate Class	Maturity of Project Definition (%)	End Usage	Accuracy Range	Remarks	Equivalent to AACE[1] Classification
P(50) Idea	0–5%	Screening/Feasibility	-50% to +50%	Used for pre-project Network Planning Option Analysis, Revenue Reset, AER Submissions,	Class 5
P(75) Planning	10% to 30%	Budget / Returnable pricing schedule / Evaluation of Contractor Bids /Business Case Estimate	-30% to +30%	Business case Estimate developed when sufficient scope detail is available to support accurate cost forecasting and Business Case approval	Class 3
P(90) Control	30% to 75%	Budget / Board Authorisation/Control Estimate	-10% to +10%	Preferred contractor bids, materials on order, forecast for execution phase, actuals to date; required for gate at end of Definition phase	Class 2

Exclusion:

The project development team scope excludes discussion of other tools currently used to support the project creation, development, execution, monitoring and reporting, such as EPPM (Enterprise Program Project Management), NPV (Net Present Value) Model, Business Case Documentation and Templates, Corporate Risk Framework, and the Project Execution Manual.

For a detailed information on the estimating tools and methodologies used by the team, refer to the Project Estimating Manual.

[1] *AACE International Recommended Practics No 18R-97 , Source: AACE website 18R-97: Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries*

4. Basis of Estimation

4.1. Estimating Rationale

AusNet Services recognises that cost management, including cost estimating, must be exercised in the broader context of project management. Estimating is a core input alongside scope, time, cost, quality, and uncertainty, forming an interdependent system that supports effective project delivery. The project budget is established through the approval of the Business Case estimate at the beginning of the Plan Phase. The Project estimate (Uncertainty Adjusted Planning Estimate) is based on a well-defined scope for the preferred option identified during the options analysis, and plays acritical role in the economic justification (cost/benefit evaluation) of the project.

The projects developed for, and information provided in the TRR submission are driven by AusNet Services' need to address asset condition, safety, and regulatory obligations within the transmission network. Identification and funding of the highest priority work to meet these needs, and delivering them through an efficient program, is underpinned by robust project cost estimation.

Estimating in the current market environment requires a conservative but realistic view of the project scope together with the associated Project Components and Project External Uncertainties, particularly in the early project stages when detailed design is not yet available. Estimators must account for both Project Components Uncertainty and Project External Uncertainty, making provision for items that are considered likely to be required, based on environmental determinants, stakeholder input and community feedback as part of the final project scope. Such items are included as Provisional Items and not through an increase in Management Reserve.

The challenge for the estimator is to arrive at a realistic (that is, not overly conservative) view of the project scope and associated Project Uncertainties, and to assign appropriate quantities for Project Uncertainties and Management Reserve in order to produce a meaningful estimate within the expected accuracy. All estimates must include a detailed assessment of project costs, including project definition, engineering and management. These costs may be estimated using typical values or estimated on a first principles basis, considering the expected personnel and resource requirement.

Estimates are specific to a defined project scope, range of scopes or program of works, as determined during the estimating process. Each estimate is documented in a report that clearly defines the scope, uncertainty and assumptions on which the estimate has been based.

4.2. Cost Definition and Inputs

Major Material:

Ausnet Services has established periodic order contracts that define the fixed material price over the period of the contract. This provided certainty on the major material cost such as Circuit Breakers, Disconnectors, Cables, Protection relays.

For other major/high-value materials, such as Power Transformer and Reactors, a dedicated Manufacturer engagement process was developed during the TRR preparation to ensure certainty on the budget for these components.

Design:

Ausnet Services has established an outsource model for delivery of design services.. Through this process a panel of approved design service providers has been established, with pre-defined design rates used in bottom-up estimation. These rates are reviewed annually to reflect market conditions and service scope.

Construction:

Ausnet Services has established an outsource model for construction delivery. Through this process a panel of construction delivery partners has been established, with pre-defined construction rates for different labour and plant rates used in bottom-up estimating. These rates are subject to annual review.

Internal Labour:

Internal labour cost is defined by labour category based on current AusNet Services cost structures. These rates are reviewed annually to ensure alignment with internal workforce planning and budgeting.

Project Benchmark:

A continuous review conducted for the market prices received for design and construction for projects in delivery. This data informs **benchmarking activities**, helping validate estimates and improve future cost forecasting.

4.3. Estimating Principles

Project estimates are developed using a first principles bottom-up estimation approach. This technique builds an accurate overall cost by breaking down a project into its smallest, most fundamental components and estimating each one individually. This process is aligning with the Substation Design Manual (SDM) and the Estimating libraries predefined in Expert Estimation software. The SDM is a comprehensive set of technical guidelines used within the AusNet Transmission Network to standardise the design, construction, and operation of substations.

The Expert Estimation Library comprises multiple Cost Build-ups. The individual build-ups can be used either as standalone element or integrated into broader project estimate. The Expert Estimation Library has been setup with the provision of "standard assets" and associated equipment units, generally in use across AusNet Services as per the SDM, including all typical costs associated with the installation of an asset. Alternatively, where a non-standard solutions are proposed, an estimate can be built up from individual components to reflect the specific scope of works. Cost inputs used in the library build-up are defined in Section 4.2.

5. Estimating process overview

5.1. Asset Replacement Programs Estimates – Unit Rates

Asset Replacement Programs are calculated by multiplying a nominated volume of replacement by a bottom-up built unit rate. Unit rates are calculated based on first-principles methodology. This calculation, based on the current actual cost of replacing a unit, forms a P(50)/Class 5 estimate.

Estimating Inputs:

Conceptual scope includes asset type and associated works for replacement.

Outputs:

High Level Scope of Works and an Indicative Estimate based on a Microsoft Excel, with inputs drawn from the Standard Libraries within Expert Estimation.

5.2. Options Analysis and Indicative Estimate

An Options Analysis and Indicative Estimate are prepared to support the development of a project from the conceptual scope provided by the Project Initiator. Typically, the information in the conceptual scope is preliminary and high-level, with broad functional requirements. The indicative estimating process provides approximate costs to assess project feasibility, options analysis and selection. This type of estimate is used to support economic evaluations.

This estimation process involves consultation with various stakeholders to determine the best approach to achieving the functional requirements in the most effective manner. Indicative Estimates are often developed as a desktop assessment, with allowances allocated to loosely defined scope items and appropriate provisions made for Project Uncertainties.

Estimating Inputs:

- Conceptual scope
- Simple Single Line Diagram (SLD)
- High-level implementation methodology (For non-standard solutions)
- High-level project schedule

Outputs:

High Level Scope of Works and Indicative Estimate, based on a standard Expert Estimation template and typically incorporating multiple options with approximate costs to evaluate project feasibility and enable option selection.

Process:

1. **Initiation:** Requests are initiated by internal or external stakeholders. Internal Project Initiators define the need for an estimate. Minimum requirements are agreed upon, and an initial risk assessment is conducted.
2. **Project Allocation:** Project Development Engineer/s is/are assigned to the project.
3. **Preliminary Design:** High-level SLDs and layouts are developed to present potential options and outcomes to the Project Initiator.

4. **Stakeholder Consultation:** Consultation with the Project Engineer and relevant stakeholders are conducted. The Project Initiator selects options for further development based on preliminary designs.
5. **Estimate Development:** The estimate for the preferred option is developed using staging SLDs and layouts as required. The Expert Estimation Library for transmission projects is used to develop the estimate. Project indirect labour costs for the lifecycle of the project and design costs are determined as a percentage of the total direct costs of the project based on historical quotations or out-turn costs of similar projects. A nominal project uncertainties value in percentage of the total direct is generally added at the options analysis stage of the process.
6. **Reporting:** A standard report template is used to present the Indicative Estimate. It includes - input documentation list, general description, outline of options, scope of work, scope clarifications and exceptions, scope exclusions, third-party scope, project cost summary and timeframe. Additional sections may be included, such as project staging and sequencing, outage plans, detailed project timeline and detailed cost breakdowns
7. **Review:** Two staged review is conducted – first internally within the Project Development team and then with the wider relevant specialists, to determine the best, efficient and preferred solution. This may result in scope or estimate revisions.
8. **Handover:** Expected output is handed over to the Project initiator as part of the formal report issued.

5.3. Planning Estimate (Business Case Estimate)

A Planning Estimate (Business Case Estimate) is developed once the Project Initiator has selected a preferred solution or option and further scoping and costing are required. At this stage, the information is more specific, and a conceptual scope may have already been defined. The Planning Estimate process builds upon this scope using a bottom-up estimation model, providing a more detailed and accurate cost assessment.

The key differences between an Indicative Estimate and a Planning Estimate lie in the level of scope certainty, the detail available, and the use of built-up and standard pricing rather than broad allowances. Once the final option is confirmed, the Planning Estimate is adjusted to include Project Uncertainty, ensuring the estimate reflects both known risks and potential variability.

This estimate forms the basis for Business Case development and financial approval. The estimation process involves consultation and collaboration with various stakeholders to determine the most effective approach to meeting the project's functional requirements.

Inputs:

- Detailed Business Case scope
- Concept design of network replacement or augmentation works.
- Assessment of the Land Planning, Cultural Heritage Management Plan (CHMP) and Environmental requirements.
- Assessment of the Community Engagement requirements.
- Assessment of physical security requirements
- Assessment of the OT and cybersecurity requirements.
- Technical Risk assessment
- SLD and Concept Layout.
- Construction methodology
- Project schedule.

Outputs:

- Scope and Uncertainly Adjusted Business Case Estimate based on the standard template for the preferred option only with project uncertainty adjusted bottom-up costs model to provide information for financial approval of the project.
- Estimate Summary and Interest During Construction IDC work sheets.
- Risk Results

Process:

1. **Initiation**: Estimate requests are initiated by internal or external stakeholders. The Project Initiator defines the requirement for an estimate. Initial discussions are held to confirm the minimum requirements, and a preliminary risk assessment is conducted.
2. **Project Allocation:** Project Development Engineer/s is/are assigned to the project.
3. **Preliminary Design Development**: Basic Single Line Diagrams (SLDs) and layout sketches are prepared to provide greater detail and assess constructability of the proposed scope.
4. **Estimate Development:** The estimate for the preferred option is developed using detailed scope of works, including staging SLDs, relevant layouts and protection and control schematics. The Expert Estimation Library for transmission projects is used to develop the estimate.

The Project Estimator compiles the estimate by entering quantities for relevant group work resources into the estimating database. Project labour costs are developed using a bottom-up approach, based on the roles required within the project team and the expected duration of the project. Design costs are calculated in a similar manner, reflecting the scope and complexity of the design effort.

Contractor Indirect Costs are also determined using first-principles estimation. These costs are entered into the database based on quantities for relevant group work resources and include non-direct labour and material costs incurred by Construction Delivery Partners (CDPs). Typical inclusions are:

a. Inductions
b. Site and shift allowances
c. Living Away from Home costs
d. Contractor project management and supervision costs
e. Contractor Occupation Health & Safety and quality costs
f. Contractor procurement and administration costs
g. Contractor, support equipment including computers, faxes, phones, refrigerators, portable water, etc. for the contractor to perform their work on site
h. Contractor vehicles.
i. Contractor site establishment and maintenance costs including huts, site clean-up etc.
j. Contractor provision of huts and Amenities for AusNet Services personnel
k. Contractor overheads and off-site support costs.

A quantified risk assessment is performed in accordance with AusNet Services' Risk Management Process, and the Planning Estimate is updated to reflect the outcomes of the risk assessment and is formally approved as part of the review process. Also, refer to Section 6 for the process to estimate project uncertainties and associated contingency allocations,

Once the estimate is completed, individual work group items are exported into a Microsoft Excel-based template. This enables the data to be presented in a format suitable for Business Case approval, ensuring transparency and alignment with financial governance requirements.

5. **Reporting**: A standard report template is used to present the estimate. It includes - input documentation list, general description, outline of options, scope of work, scope clarifications and exceptions, scope exclusions, third-party scope, project cost summary and timeframe. Additional sections may be included, such as project staging and sequencing, outage plans, detailed project timeline and detailed cost breakdowns.
6. **Review:** Two staged review is conducted – first internally within the Project Development team and then with the wider relevant specialists, to determine the best, efficient and preferred solution. This may result in scope or estimate revisions.
7. **Handover:** Expected output is handed over to the Project initiator as part of the formal report issued.

5.4. Control Estimate

A Control Estimate is developed following the approval of the Business Case, using a standard bottom-up template within the Expert Estimation. It is based on the outputs of the Detailed Design phase and provides a comprehensive breakdown of all project costs. The Control Estimate serves as a key input for the Project Delivery Team, offering detailed cost visibility and supporting financial oversight.

This estimate may also be used to revise the Project Budget, ensuring alignment with the final scope and design. In accordance with AusNet Services' Risk Management Process, the Control Estimate is risk-adjusted to account for both Project Components Uncertainty and Project External Uncertainty, ensuring the estimate reflects a realistic and resilient cost position.

Inputs:

- Planning Estimate
- Approved Business Case.
- Detailed Construction (CDP) Scope
- Delta Analysis between Concept Design and Detailed design.
- Procurement Data (Material and service invoices summary)
- Project costs and variations
- Current Actual Internal labour hours
- CDP Quotes (If available)
- IDC Work sheets updated by PMs to reflect their spending plan

Outputs:

- P90 Estimate Summary Report,
- Detailed Cost Estimate Report,
- IDC Build-ups

Process:

- A Project Manager (PM) is assigned during the Idea Phase and remains a key stakeholder throughout the project lifecycle until the Close Phase.
- The PM engages a Design Delivery Partner (DDP) to develop the Detailed Design required for the Control Estimate.
- The PM determines whether a Constructability Review is necessary. If required, the review is conducted with relevant stakeholders to assess feasibility and identify potential design or delivery risks.
- If the design information is deemed suitable and no modifications are needed, the project is assigned to the nominated Estimator to develop the Control Estimate.
- The Estimator compiles the Control Estimate using the Expert Estimation and provides a summary of major cost variations to the PM for initial review.
- The PM initiates a formal review of the estimate with relevant stakeholders.
- The Estimator prepares the necessary documentation for approval, ensuring all assumptions, scope details, and cost breakdowns are clearly presented.

6. Risk Allowance

6.1. General

AusNet Services applies a risk-based approach to estimating through the implementation of both a Qualitative and Quantitative risk assessment framework. This framework involves collaboration with stakeholders from Initiation to Finalisation to identify and assess risks. The Estimating Team facilitate the process during the Initiation Phase and administers the quantitative risk assessment, typically using simulation tools to inform contingency and management reserve allocations.

6.2. Qualitative Risk Assessment

The first step in quantifying cost impact is conducting a Qualitative Risk Assessment, performed by the Project Engineers and Project Manager after the scope of works is developed. This assessment is documented using the Risk Register Template and the Risk Assessment Tables from the Risk Management Framework.

The process involves identifying risks, their causes, and potential impacts, followed by evaluating existing controls and treatments. Using the standard Risk Matrix (Consequence × Likelihood), a Residual Risk Rating is determined, and a cost is applied to reflect the Project Financial Exposure.

The outputs of the Qualitative Risk Assessment serve as inputs into the Quantitative Risk Assessment process.

6.3. Quantitative Risk Assessment

The primary objective of the Quantitative Risk Assessment (QRA) is to identify and evaluate both Inherent and Contingent Risks associated with a project. These risks represent uncertainties that may impact the accuracy of the reference estimate and overall project outcomes. Inherent Risks are planned or known uncertainties that exist within the defined scope of work. These typically arise from assumptions made during the estimating process and reflect variability in pricing and execution. Examples include:

- Uncertainty in the scope of work.
- Unknown or variable site conditions.
- Variations in quantities and unit rates within the reference estimate.
- Changes in construction methods or techniques.

These risks are embedded in the estimate and are addressed by applying probability distributions to individual line items based on historical data, expert judgment, and project-specific knowledge.

Contingent Risks are potential events that may occur during the project lifecycle and deviate from the assumptions made in the reference estimate. These risks are external to the base scope and typically result in additional costs or delays. Examples include:

- Unplanned events (e.g., natural disasters, major safety incidents).
- Changes to planned assumptions.
- Stakeholder-related issues (e.g., outage restrictions, community concerns).
- Resource or material availability.
- Delayed site access.
- Industrial relations issues external to the project.
- Contractual disputes or claims.

Each contingent risk is documented using the standard risk template, including:

- Risk description and potential consequences.
- Estimated cost impact if the event occurs.

- Justification for the cost estimate.
- Likelihood of occurrence.
- Distribution of cost impact (Minimum, Most Likely, Maximum).

The inputs to the Quantitative Risk Assessment are determined through an estimate review / interrogation performed by the appropriate parties. These parties will include the Project Initiator and relevant stakeholders from Asset Engineering, Project Engineering, Program Delivery, Operations & field personnel.

The inherent risk analysis is applied to the reference estimate addressing issues relevant to each individual project. The individual items or lines of the reference estimate are interrogated, and a distribution applied based on individual experience and knowledge gained from previous projects. From the analysis, a percentage value is applied to the reference estimate item or line based on a spread of Minimum, Most Likely and Maximum value of that item/line.

The contingent risk analysis is also applied to the reference estimate and involves the thorough review of the project to identify site specific and generic issues which potentially could impact on the overall project costs and timings. The potential risk can be associated to but are not limited to – Scope, Inadequate Planning, Project Delays, Project Cost Over-runs, Health and Safety Events etc. and as defined in the Qualitative Risk assessment. Using the standard contingent risk template, the risk, its description and the consequences applicable to the risk are entered. For each individual risk identified the cost associated with the event should it actually occur is determined. The consequences not only detail the outcomes but also it is the basis for how the cost was arrived at. For future project review and as a learning function it is critical that the consequences clearly detail the reasoning as to why the cost was applied. After the cost estimate for each occurrence is determined, a percentage for the likelihood of it occurring is reviewed and entered. From this, a distribution percentage for the Minimum, Most Likely and Maximum cost impact of this particular event occurring is added.

The distributions determined in the Inherent and Contingent Risk assessment then become the basis for the @Risk simulation. The @Risk simulation performs a Monte Carlo probability calculation on the Reference Estimate to determine the total Inherent and Contingent risk costs. The Monte Carlo method is a technique that involves using random numbers and probability to iteratively evaluate complex, nonlinear problems. In general, 5,000 iterations will be used when running the @Risk simulation.

The results of the @Risk simulation determine the 50th and 90th percentile values inclusive of Inherent and Contingent risk costs. These values reflect a 50% and 90% confidence level respectively that the estimate will not be exceeded at the completion of the project. These values are used as the basis of the following:

- Project Direct Expenditure: This is the difference between the Reference Estimate and the 50th percentile value which is inclusive of Inherent and Contingent Risks.
- Project Direct Expenditure Plus Management Reserve (Risk): This is Project Direct Expenditure plus the difference with the 90th percentile budget.

7. Review and Update of Estimates

7.1. Documentation

The documentation used in the review of each type of scope of works and estimate produced is detailed below.

Indicative Estimate

- Single document detailing bases of estimate, scope of estimate, scope clarifications/assumptions, options and indicative costs
- Estimate Direct Cost Summary

Uncertainty Adjusted Planning Estimate

- Single document detailing basis of estimate, scope of estimate, scope clarifications, and the cost to implement the preferred option. Two figures are supplied, the Project Direct Expenditure and Project Direct Expenditure plus Management Reserve.
- Project Risk Results (RR)
- Business Case Direct Cost Summary (DCS)
- Estimate Summary (ES)
- The internal finance charge and Interest During Construction worksheet (IDC)

7.2. Scope of Works and Estimate Review

Upon completion of the scope of works and estimate, a review is performed by the Project Development team members and other relevant parties if required. Depending on the type of project these can include the Delivery leadership team, the nominated PM and members of the various Engineering team.

Depending on the type of Scope of works and estimate, the associated documentation and content/integrity of each estimate is reviewed. Any issues identified during the review that require further action are documented and assigned to the relevant person. Upon completion of the technical review and if required comments and/or actions, an Estimate Challenge Session and sign-off is completed by the manager of the Project Development Team.

7.3. WBS Structure

The Work Breakdown Structure (WBS) is used to define the separate areas or groups within the project. The structure is required to allow the allocation of funds, materials, labour and to facilitate the accurate reporting of project costs. As defined in the Business Case, the groups include but are not limited to:

- Design
- Labour
- Materials
- Plant & equipment
- Contracts

7.4. Presentation and Handover

Following the scope and estimate review and sign-off by Project Development, the scope and estimate is ready for handover to the Project Initiator.

The Uncertainty Adjusted Planning Scope and Estimate handover checklist is completed by the Project Lead Engineer prior to the handover. At the handover, project costs are reviewed, and all elements of the scope are confirmed. Any amendments or additional works required are documented as action points to be addressed. If there are no further issues or after any other issues have been resolved, the Uncertainty Adjusted Planning Scope and Estimate handover signed, scanned and attached into SAP. Following the handover and sign-off all relevant documentation is attached into SAP.

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