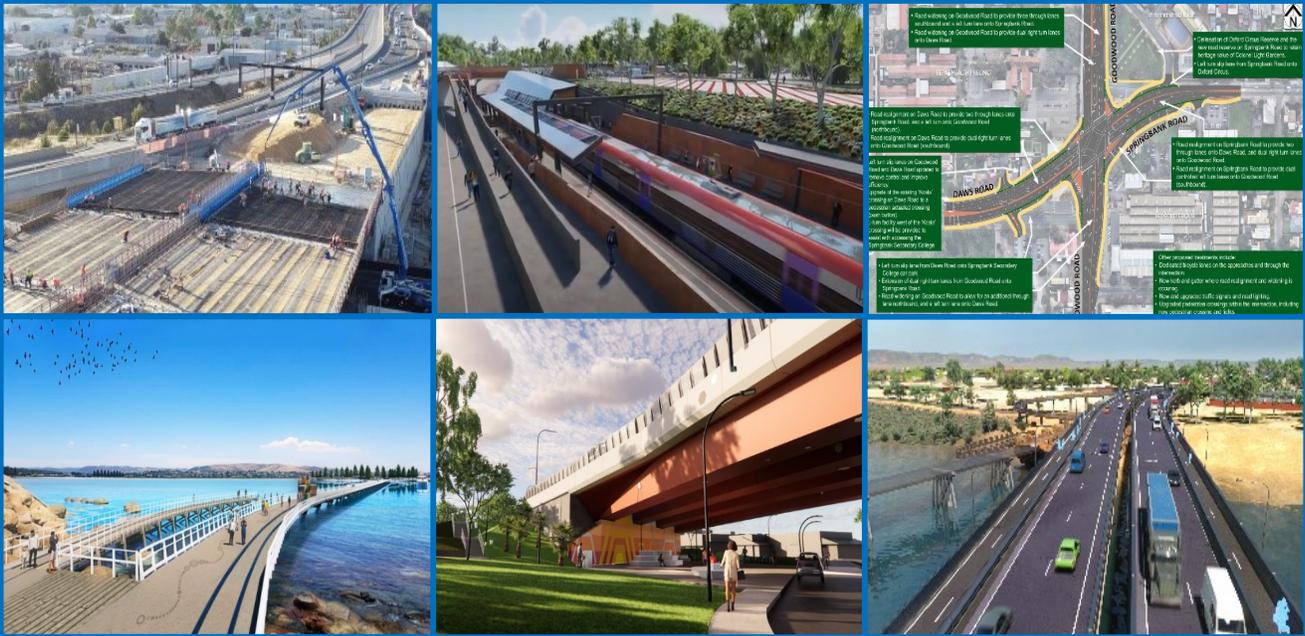


ESTIMATING MANUAL



Foreword

Accurate and reliable project cost estimates are fundamental to achieving successful project outcomes.

The release of the revised Estimating Manual – ‘Estimating Manual for Transport Infrastructure Projects’ builds on earlier versions and incorporates the latest Australian Government Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) Cost Estimation Guidance Notes to support estimate development, review and approval. It addresses issues relating to project scoping, contingencies and escalation – all of which have a major impact on project cost.

The manual provides the business context and instructions for estimating, covering the various stages from strategic estimates through to actual project costs. It links to and provides practical tools and information, including electronic spreadsheets.

The manual captures improvements from recent reviews, best practice studies and suggestions from practitioners. It demonstrates the Department’s commitment to the adoption of the aforementioned DITRDC Cost Estimation Guidance Notes.

Through the adoption of this manual it is expected that:

- Estimates will be realistic with reduced tendency for optimism bias
- The likelihood of cost overruns will be mitigated through the application of appropriate levels of contingency and risk allowance
- Estimate announcements will cover total project costs which are inclusive of appropriate contingency and escalation
- Projects seeking funding will have a formal estimate that is up-to-date and that accurately reflects an estimated total project cost relevant to the stage and scope of their development

All estimates prepared by and for the Department for Infrastructure and Transport (DIT) are required to conform to the requirements and practices set out in this manual. The use of this manual together with the professional expertise provided by estimating and other consultants is essential for effective project cost estimating.

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3	General review of document inclusive of updates for revised Department name and completed DITRDC Cost Estimation Guidance Notes.	March 2021	AJ

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Rev	Effective Date	Review Date	Responsible Officer	Contact Officer
2	12 July 2018	12 July 2019	Project Officer Estimating Services	Project Officer Estimating Services
3	23 March 2022	23 March 2022	Principal Cost Manager (Estimating & Programming)	Principal Cost Manager (Estimating & Programming)

TABLE OF CONTENTS

The Estimating Manual for Infrastructure Projects is structured into 3 sections:

Section 1 Estimating Approach

This section provides an overview of the estimating processes, general principles and the Cost Estimating Framework. It provides information for internal staff and external Estimators.

Section 2 Estimate Development & Presentation

This section provides more detailed information for Estimators and estimate reviewers/approvers.

Section 3 Appendices

The appendices provide detailed guidance and tools to support the estimating process, including details relating to work breakdown structure, contingencies and review checklists.

REFERENCES..... 8

INTRODUCTION..... 9

GLOSSARY OF TERMS..... 10

1 ESTIMATING APPROACH..... 16

1.1 Purpose and Intent16

1.2 Estimate Levels and Purpose.....17

1.3 Types of Estimates and Principles.....19

1.4 Cost Estimating Framework.....22

1.5 Generic Estimating Process.....24

1.6 Scope Definition.....25

1.7 Request for Estimating Services – Estimating Work Order28

1.8 Duplicate Estimate29

1.9 Concurrence Review29

1.10 Estimate Commencement Meeting30

1.11 Standard Estimate Spreadsheet.....30

1.12 Preparation of Base Estimates31

1.13 Goods and Services Tax (GST).....31

1.14 Risk and Contingency.....31

1.15 Inherent Risk.....32

1.16	Contingent Risk	32
1.17	Probabilistic Risk Cost Assessment Methods	32
1.18	Deterministic Risk Cost Assessment Methods	33
1.19	Construction Program, Staging Diagrams and Cash flow	33
1.20	Estimate Review Process	34
1.21	Formal Estimate.....	35
1.22	Price Escalation	35
1.23	Project Funding and Risk Exposure	37
1.24	Variance Reporting	37
1.25	Updating Old Estimates to Present Day Dollars	37
1.26	Senior Responsible Officer Approval and Responsibilities	38
2	ESTIMATE DEVELOPMENT AND PRESENTATION	40
2.1	General.....	40
2.2	Estimate Presentation.....	40
2.2.1	Estimates Level 1	40
2.2.2	Estimates Levels 2, 3, 4, 5 & 5B.....	41
2.2.2.1	By Estimating Consultants.....	41
2.2.2.2	By DIT Staff	41
2.2.3	Principals Tender Estimate	42
2.2.4	Actual Project Costs	42
2.3	Estimate Numbering Convention.....	42
2.4	Work Breakdown Structure	42
2.5	Estimating Methods	44
2.5.1	Global Estimate (benchmark rates).....	44
2.5.2	Composite Estimate	44
2.5.3	Unit Rate Estimate (based on historic rates)	44
2.5.4	Hybrid Estimate - Unit Rate/First Principles.....	45
2.5.5	First Principles Estimate.....	46
2.6	Required Estimating Methods	47
2.7	Estimate Build-up	47
2.7.1	Client Costs (1.1 to 1.10).....	48
2.7.2	Land Acquisition (2.1 to 2.4).....	48
2.7.3	Services (By DIT) (3.1 to 3.5).....	48
2.7.4	Construction Costs (4.1 to 4.18).....	48
2.7.5	Contractor's Design Cost, Overheads and Margin (5.1 to 5.4).....	48

2.7.6	Contingent Risks (6.1)	48
2.7.7	P50 & P90 Risk & Contingency (7.1 to 7.2)	48
2.8	Inherent and Contingent Risk	48
2.8.1	Inherent Risk	49
2.8.2	Contingent Risk	49
2.9	Calculation of Inherent and Contingent Risk Values	49
2.9.1	Estimate Level 1	49
2.9.2	Estimate Levels 2 to 5B (Estimating Consultants)	53
2.9.3	Estimate Levels 2 to 5B (where prepared by DIT Staff)	54
2.10	Program and Cash Flow	56
2.11	Estimate Review Process	56
2.12	General Considerations in the Development of Estimates	57
2.12.1.1	Road Projects	57
2.12.1.2	Rail Projects	57
2.12.1.3	Marine Projects	58
2.13	Retention of Estimate Input Information	58

2	APPENDICES	59
	Appendix 1 – Information Requirements for Estimate Levels	60
	Appendix 2 – Estimating Work Order	63
	Appendix 3 – Procedure for Duplicate Estimates	64
	Appendix 4 – Numbering Convention of DIT Estimates	66
	Appendix 5 – Completing the Standard Estimate Spreadsheet	68
	Appendix 6 – Standard Work Breakdown Structure Items and Content	75
	Appendix 7 – Estimate Review Process	98
	Appendix 8 – Completion of Formal Estimate	102
	Appendix 9 – Process for Updating Old Estimates to Present-day (Real) Dollars	105

LIST OF FIGURES

Figure 1	- Estimate Levels Relevant to Project Lifecycle Phases and Assurance Gates	19
Figure 2	- Components of Options and Formal Estimates	21
Figure 3	- Cost Estimating Framework	23
Figure 4	- Generic Estimating Process	24
Figure 5	- Formal Estimate Process	35

LIST OF TABLES

Table 1 – Estimate Levels and Purpose	17
Table 2 – Example of Price Escalation Calculation.....	36
Table 3 – Work Breakdown Structure by Estimate Level.....	43
Table 4 – Recommended Estimating Method by Estimate Level.....	47
Table 5 – Total Risk Considerations, Level 1 Estimates (Road Projects).....	50
Table 6 – Total Risk Considerations, Level 1 Estimates (Rail Projects).....	51
Table 7 – Total Risk Considerations, Level 1 Estimates (Marine Projects).....	52
Table 8 – Summary of Contingency Allowances for Level 1 Estimates	53

LIST OF SPREADSHEETS AND FORMS

- EST 600-1 Standard Estimate Spreadsheet, Estimate Level 1 – [KNet #5751720](#)
- EST 600-2 Standard Estimate Spreadsheet, Estimate Levels 2, 3, 4, 5 & 5B (*where prepared by estimating consultants*) – [KNet #5751722](#)
- EST 600-3 Standard Estimate Spreadsheet, Estimate Levels 2, 3, 4, 5 & 5B (*where prepared by DIT Staff*) – [KNet #5751723](#)
- EST 600-4 Estimating Work Order – [KNet #4479522](#)
- EST 600-5 First Principles Client Costs Estimate – [KNet #5729453](#)
- EST 600-7 Cash Flow Template – [#12245240](#)
- EST 600-8 Actual Project Costs, Level 6 – [KNet #9683206](#)

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Department of Infrastructure, Transport, Regional Development and Communications (2018). Cost Estimation Guidance Notes:

- Guidance Note 1 – Project Scope
- Guidance Note 2 – Base Cost Estimation
- Guidance Note 3A – Probabilistic Cost Estimation
- Guidance Note 3B – Deterministic Contingency Estimation

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Queensland Government, Department of Transport and Main Roads, Project Cost Estimating Manual – Seventh Edition, Transport and Main Roads, July 2017.

INTRODUCTION

This manual sets out the approach, processes and standards for the preparation, review and acceptance of transport infrastructure project cost estimates. The manual provides standard processes, forms and a work breakdown structure to guide Estimators and Project Managers/Planners in the consistent production and review of road, rail and marine infrastructure estimates.

The overall Cost Estimating Framework for capital road and rail projects is supported by:

- DIT Estimating Manual (EST 600) – this manual ([KNet #12905558](#));
- Project Management Office Project Management intranet site https://cms.dit.sa.gov.au/portfolio_management_office/portfolio_management_office; and
- Cost Estimation Guidance Notes (Department of Infrastructure, Transport, Regional Development and Communications) http://investment.infrastructure.gov.au/about/funding_and_finance/cost_estimation_guidance.aspx.

These documents may also be used to guide the development of estimates for projects other than those which incorporate road, rail and marine infrastructure (with appropriate changes to detail as necessary).

The Departments' cost estimates are generally prepared by external estimating consultants who provide an industry perspective of factors such as the likely construction methodology; project duration and constraints; and in turn the anticipated project costs. Where utilised, these specialist estimating suppliers are required to have appropriate skills and experience relative to the projects for which they are engaged to provide estimating services for and in doing so are required to complete estimates in accordance with the requirements set out in this manual.

Cost estimating may be undertaken by experienced Departmental staff, however for all estimates the processes and principles contained in this manual are to be applied.

All projects are required to have a current estimate which has been prepared in accordance with the procedures and practices detailed within this document. While projects with an estimated total value (including risk) of less than \$150,000 do not require a registered estimate they are required to follow the practices set out in this manual.

GLOSSARY OF TERMS

Additional Reviewer – a further estimate reviewer who provides either specific knowledge relevant to the project type who can provide increased confidence in the estimate to the Department or in the case of an estimate procured for the Department by a third party, the reviewer who confirms the application of the correct project scope and all anticipated project aspects within the estimate along with ensuring all relevant sections of the estimate template have been completed.

Base Date – the date at which the selected options estimate has been prepared, prior to indexation to current dollars or escalation to future dollars being applied.

Base Estimate – represents the Estimator's best prediction in terms of the quantities and current rates which are likely to be associated with the delivery of a given scope of work prior to the addition of inherent and contingent risk values or escalation allowances.

Benchmarking – the analysis of historical project cost data used during the very early identification of potential future project costs where the scope is of a similar nature or alternatively for more detailed estimates, comparing estimated values with actual cost data from recent projects of a similar nature.

Budget – the approved cost estimate for the project or the approved funding allocated to a particular activity or project.

Business Case – a key document that is developed early in the lifecycle that describes the reasons and the justification for the development of a project or program, based on its estimated costs, the risks involved and the expected future business benefits and value. It provides the basis for selection and authorisation of future effort on a project's definition, planning and estimating of budget requirements and implementation considerations.

Cash Flow – represents the project base estimate plus contingency amount expenditure profile across the financial years the funds are expected to be spent.

Concurrence Review – an independent review of a previously completed project cost estimate which is undertaken by a third party to determine any areas of variance associated with the price which has been determined. At the discretion of the relevant SRO a concurrence review may be used in place of a Duplicate Estimate.

Contingency – a financial reserve included in the project estimate to offset unforeseen factors relating to the delivery of project objectives. This value represents both inherent and contingent risk.

Contingency Management – the Department's approach to Contingency Management in terms of the ownership and allocation of contingency funds associated with the delivery of a project is described within the PPMF, see Module 10 – Project Controls.

Contingent Risk – contingent (or unplanned) risks are those which have a less than 100% chance of occurring. They are evaluated separately from other project items due to their unknown nature.

Correlation – a parameter used within cost risk assessments to describe the degree to which one variable's probability distribution is related to another.

Cost Estimating Framework – the overarching framework which illustrates how project estimates progress from early strategic estimates to final actual project costs.

Cost to Complete (CTC) – forecast costs to complete the project in addition to actual cost already spent or accrued.

Deterministic Risk Analysis – a deterministic risk model, as opposed to a probabilistic risk model, contains no random elements and as such treats all risk input factors as being constant. This form of model also pertains to exactly predictable events, the outcome of which is assumed to be known with certainty if the inputs are known with certainty.

Direct Costs – are those which are directly attributed to work items. They include those items within section 4 of the Work Breakdown Structure such as environmental management, traffic management, services (by contractor), earthworks, drainage etc.

Duplicate Estimate – process where two separate estimates are prepared (and reconciled) to give increased confidence as to the total project costs involved. At the Senior Responsible Owners discretion, projects with an estimated P90 Project Estimate cost of greater than \$25m or which are considered to be either high risk or sensitive may be subject to the duplicate estimate process prior to seeking funding. At the discretion of the relevant SRO a concurrence review may be used in place of a Duplicate Estimate.

Estimate Review Process – the process which Estimators and those requesting estimates are required to follow in reviewing and accepting estimates

First Principles Estimate – the method of preparing a cost estimate which considers factors such as the anticipated items of plant, labour and materials that will be used along with their associated hourly rates, rates of productivity, purchase costs and the like as applicable to the completion of individual project tasks.

Formal Estimate – generated using the project estimate, the formal estimate recognises the effects of the project cash flow and subsequent price escalation. It is recognised as the current total project cost until a subsequent formal estimate value is prepared for a more detailed project estimate. It is expressed in out-turn dollars and rounded to the nearest 1000 dollars. The formal estimate is used for internal budgetary purposes, seeking project funding and is the only estimate value which is to be announced (by those authorised do so).

Gateway Approval – an approval at the completion of critical activities in a phase or phases, which must be in place before the project, program or component activities can progress.

Gateway Review – a governance activity which is a review performed at the end of a phase to arrive at a decision to either continue to the next phase, to continue with modification, or to end a project or program.

Indirect Costs – costs not directly attributable to work items such as on-site overheads (mobilisation/demobilisation, site supervision, site vehicles, establishment of site facilities etc.) and off-site overheads (contractors head office costs and associated administration). They do not include the contractor's corporate overhead, margin or risk.

Inherent Risk – applies to measured items, i.e. those specifically identified within the various components of the Base Estimate and which will definitely contribute to project cost

but where there remains uncertainty as to the accuracy or reliability of their amount and cost within the Base Estimate.

Margin – an allowance which is inclusive of the contractor's corporate overheads and profit.

Non-Recurring On-Site Overheads – indirect costs which generally are only incurred on a single occasion, these typically include items such as the mobilisation of plant, equipment and personnel; establishment of site facilities; and provision of insurances.

Objective – the planned goal, purpose or outcome of a project.

Optimism Bias – the tendency for those associated with the scoping and preparation of estimates to be overly optimistic and/or accurate in their assessment of project durations, quantities and costs.

Options Estimate – represents the total estimated cost for a given project option including the Estimators best prediction of all known project scope items and their associated costs to which risks values are added.

Outline Business Case – an Outline Business Case (OBC) sets out the preliminary thoughts regarding a proposed project. It should contain the information needed to help the institution make decisions regarding the adoption of the project and state envisaged outcomes, benefits and potential risks associated with the proposal.

Out-turn Dollars – the estimated dollar value for which the project will be completed assuming a given delivery period. Out-turn dollars are calculated by escalating the estimated project cash flow for each year of the project to represent the actual project cost in future year dollars.

P50 Value / P90 Value – P50 and P90 values are established to provide a level of confidence (50% confident / 90% confident) that the estimated cost at these respective levels will not be exceeded at project completion.

Peer Review – a review of the project estimate by one or more experienced people to ensure the quality of the estimate. Typically this will involve more senior/experienced Project Managers/Planners (including external specialists where deemed necessary) who have delivered similar types of projects, reviewing the estimate to provide an increased level of confidence in the estimated project cost.

Planned Risk – see Inherent Risk.

Present-day Dollars – (or real dollars) are those at the point in time which the estimate is prepared. Estimates are prepared as if the project were being undertaken today and escalated to represent Out-turn dollars based on the assumed delivery timeframe.

Price Escalation – the anticipated increase in project costs over time as a result of various factors such as inflation, market conditions, supply constraints and project complexity.

Principal Arranged Insurance – insurance provided by the Principal (DIT) to cover the agency, contractors, subcontractors and other service providers in respect to contracts let by the principal.

Principals Tender Estimate – the Principals Tender Estimate (Level 5A) is completed to provide a price for use in the comparison with actual tender prices received from contractors tendering to undertake the works. It is intended to represent a fair price to undertake all associated contract works and does not include any client costs or works undertaken by the client outside of the relevant tender. A formal estimate is not completed for Level 5A estimates.

Probabilistic Risk Analysis – the process by which cost components are identified along with the likely range of each component and the distribution of values within that range determined, prior to the use of a simulation process (e.g. Monte Carlo or similar analysis using computer software) to generate a probability distribution of project costs.

Program and Project Management Framework (PPMF) – the PPMF describes how the Department manages the development of programs and projects. It provides guidance on the key activities, minimum deliverables, and decisions and approvals within each project phase and is used to support and guide the Department's relevant divisions in taking programs and projects from the initialisation stage, through development and delivery, and on to handover and operations.

Project Estimate – the project estimate represents the highest valued realistic options estimate which is used as the basis of the formal estimate. Where the highest valued option is considered unrealistic due to factors such as its high cost, social impacts etc. the next highest valued option is carried forward as the project estimate. *Note: when seeking project delivery funding the project estimate must represent a defined option/scope of work, e.g. it is not acceptable to still be determining the best project solution such as roundabout versus signalised intersection.*

PSAESC – Preferred Supply Arrangement Estimating, Scheduling and Constructability, the means by which the Department typically procures estimating services.

Real Dollars – estimates are prepared in Real Dollars reflecting current day pricing, then cash flowed and converted to out-turn dollars using approved escalation rates to reflect their anticipated cost in future years.

Reality Check – the process where a more senior and/or experienced member of the team preparing the estimate reviews the estimate to ensure its reasonableness given the available project information.

Recurring Costs – indirect costs which occur on an ongoing basis, these include items such as project management, site supervision, site vehicles, site accommodation running costs.

Registered Estimate – an estimate which has been prepared in accordance with this manual and subsequently recorded within the Department's estimating database.

Risk Register – a formal document that outlines identified project risks.

Senior Responsible Owner (SRO) – the SRO is the Executive / Senior Manager who has the ultimate single point of accountability and responsibility for the project outcomes for the life of the project, including for benefits realisation after the project team has disbanded. The SRO is a member of the program/project governing body and ensures active and visible support of project governance in order to enable success of the project.

Sponsor – a senior member of the program/project governance structure with accountability for: setting outcomes and benefits, determining the business case, obtaining funding, setting performance requirements (in concert with the SRO); and, ensuring the program or project achieves its outcomes, including benefits realisation and outcome level reporting.

The Department – the Department for Infrastructure and Transport.

Unplanned Risk – see Contingent Risk.

Work Breakdown Structure (WBS) – provides a hierarchical structure that outlines the activities or work that needs to be done in order to complete the project scope. DIT uses a standard WBS for the development of options estimates.

SECTION 1

Estimating Approach

1 ESTIMATING APPROACH

1.1 Purpose and Intent

Cost estimates for transport infrastructure projects are produced for numerous purposes throughout the project lifecycle. Within the Department, cost estimates are typically used for:

- Initial assessment of transport initiatives;
- Assessing and comparing project options;
- Supporting project justification;
- Funding and investment decisions;
- Establishing project budgets;
- Comparison within tendered prices; and
- Validating costs associated with contractor variation claims.

The overall purpose of this manual is to direct and support the development of sound cost estimates relevant to the stages of a project's lifecycle, with appropriate levels of detail for the purpose for which they are intended. By utilising a standardised approach and structure to the development, presentation, review and approval of cost estimates it is expected that estimate accuracy and reliability will be improved and that decision-makers will have as high a level of confidence as possible in the estimates produced.

Accuracy is critical and it is expected that estimates contain costs for all scope items and are not qualified with “no allowance has been made for ...” statements where these items will or could reasonably be expected to form part of the project scope.

If works are expected to be in scope a reasonable assessment of the extent and value must be included in the estimate.

Similarly estimates are required to account for all costs associated with temporary works that would be necessary for the works to be implemented. For example, the construction of a replacement bridge or works which are undertaken to widen an existing bridge are required to account for any costs associated with upgrades to alternative routes, additional widening to facilitate construction and the like.

Considerations in the development of this manual include, but are not limited to:

- Reducing the tendency for ‘optimism bias (the tendency for people to be overly optimistic regarding project costs and planned durations);
- Mitigating cost overruns through the appropriate application of contingencies;
- Improving scope definition and documentation;
- Detailing the DIT standard work breakdown structure (WBS) with relevant levels of detail applicable to the project phase;
- Promoting an understanding of inherent and contingent risk within cost estimates;
- Improving estimate review and approval processes;
- Ensuring estimates are cash-flowed and reported in out-turn dollars;
- Implementing variance reporting to control and manage estimate changes; and
- Providing guidance and support in the calculation of price escalation.

1.2 Estimate Levels and Purpose

In a project's life cycle estimates are produced based upon varying amounts of planning and design information. These estimates will generally be required to provide information for a specific purpose relating to the stage or phase of the project's life. Further information regarding the specific project phases applicable to the Departments projects can be found within the Program and Project Management Framework (PPMF).

Estimates produced should reflect the purpose and intent of their final use and are defined by the levels and names in Table 1. While projects with an estimated total value (including risk) of less than \$150,000 do not require a registered estimate they are required to follow the templates and practices set out in this manual.

Table 1 – Estimate Levels and Purpose

ESTIMATE LEVEL	ESTIMATE DESCRIPTION AND PURPOSE
Level 0	<p>The Level 0 estimate designation is reserved for other estimating services which do not fit within the phases described below. The use of the Level 0 estimates is generally limited to:</p> <ul style="list-style-type: none"> • Value for money assessments • Concurrence reviews • Other estimating services procured from the Departments estimating, scheduling or constructability assessment suppliers
Level 1 Strategic Options Estimate	<ul style="list-style-type: none"> • Undertaken during the Initialisation Phase • Provides initial strategic level total project cost advice for specific options of an initiative being considered • Based on very broad and minimal assumed project scope and design solution details relative to each option • Prepared using benchmark project costs of recent similar projects (adjusted to suit the current project and market conditions) • Include relatively large risk values due to limited design information and estimating effort • Expressed as mid to high range costs, inclusive of escalation based on the assumed delivery dates • Used to inform the Outline Business Case • Not to be used to seek project funding, rather to allow the initial comparison of potential initiatives
Level 2 Preliminary Options Estimate	<ul style="list-style-type: none"> • Undertaken during the Proving Phase • Provides initial total project cost analysis for each of the specific options of an initiative being considered • Based on minimal assumed project scope and assumed design solutions relative to each option • Prepared using the Hybrid Estimating method, utilising a combination of unit rates (nominally 90% of estimate value) and first principles (nominally 100% of estimate value) methods • Typically include large risk values due to limited design information and estimating effort • Expressed as P50 and P90 values, inclusive of escalation based on the assumed delivery dates • Typically used to assess costs for a long list of project options • Not typically used to seek project funding
Level 3 Preliminary Concept Estimate	<ul style="list-style-type: none"> • Undertaken during the Proving Phase • Provides a total project cost analysis for each of the specific options of an initiative being considered • Based on minimal assumed project scope and initial design details relative to each option • Prepared using the Hybrid Estimating method, utilising a combination of unit rates (nominally 40% of estimate value) and first principles (nominally 60% of estimate value) methods • Includes risk values which are commensurate to the nature, scale, requirements etc. of the project and the level of design upon which it is based • Expressed as P50 and P90 values, inclusive of escalation based on the assumed delivery dates • Used to provide a more detailed cost assessment of options short listed from the previous estimate level • May be used to seek project funding

Table 1 – Estimate Levels and Purpose (continued)

<p>Level 4 Concept Estimate</p>	<ul style="list-style-type: none"> • Undertaken during the Proving Phase • Provides a refined total project cost analysis for a single specific project option of an initiative being considered • Based on the anticipated project scope and early design details relative to a single specific option • Prepared using the Hybrid Estimating method, utilising a combination of unit rates (nominally 20% of estimate value) and first principles (nominally 80% of estimate value) methods • Includes risk values which are commensurate to the nature, scale, requirements etc. of the project and the level of design upon which it is based • Expressed as P50 and P90 values, inclusive of escalation based on the assumed delivery dates • Used to provide a more detailed cost assessment of the project option selected to seek delivery funding for as an outcome from the previous estimate level • Used to seek project funding
<p>Level 5 Detailed Estimate</p>	<ul style="list-style-type: none"> • Undertaken during the Pre-Delivery Phase with revisions undertaken as required/the design progresses • Provides an estimated total project cost of the specific option to be delivered, including any costs to date which are to be or have been attributed to the project • Based on the detailed project scope and design details specific to option to be delivered • Prepared using primarily first principles methods • Includes risk values which are commensurate to the nature, scale, requirements etc. of the project and the level of design upon which it is based • Expressed as P50 and P90 values, inclusive of escalation based on the anticipated delivery dates <p>Used to confirm that the project budget is adequate prior to calling construction/implementation tenderer (Construct Only contracts) OR to provide DIT's view of the anticipated project cost during the tendering phase (D&C type contracts)</p>
<p>Level 5A Principals Tender Estimate</p>	<ul style="list-style-type: none"> • Undertaken during the Procurement Phase • Provides an estimated total contract cost of the works requested within the tender • Based on the detailed project scope and design details issued with the tender • Prepared using primarily first principles methods • Includes risk values which are commensurate to the nature, scale, requirements etc. of the tender and the design upon which it is based • Expressed as real \$ values, inclusive of escalation as applicable to the tender • Used to provide a check price with those submitted by tenderers and aid in the analysis of tenders
<p>Level 5B Implementation Estimate</p>	<ul style="list-style-type: none"> • Undertaken during the Procurement Phase • Provides an estimated total project cost of the specific option to be delivered inclusive of the tender price to be accepted which is substituted in place of the previously estimated costs for these components. Other components (e.g. client costs, land acquisition, service relocation costs not included in the tender etc.) are based on previously estimated costs and any previously incurred costs only (as per the Level 5 estimate) • Include risk values using the percentages applied in either the Level 5 or 5A estimate, a combination of both OR a further risk assessment • Expressed as P50 and P90 values, inclusive of escalation based on planned delivery dates • Used to confirm that the project budget is adequate prior to contract award
<p>Level 6 Actual Project Costs</p>	<ul style="list-style-type: none"> • Undertaken during the Realisation Phase • Provides actual project cost and scope details of the final project • Compares cost estimates and associated scope at each estimate level relative to the completed project • Compares the accepted tender price to the final contract values, noting reasons for any variances • Used to inform future project cost estimates • All values are expressed as real dollars

The following figure provides a visual representation of estimate levels relative to each of the project lifecycle phases and relevant assurance gates as described in the Department's PPMF.

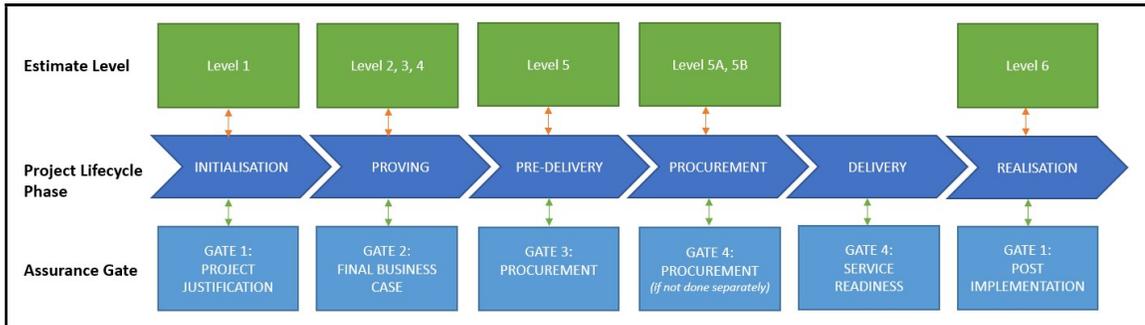


Figure 1 - Estimate Levels Relevant to Project Lifecycle Phases and Assurance Gates

Depending on various factors including project complexity, timing and commitments, it may not be practical nor warranted for estimates to be produced for each level as described above. It is essential however that each project has a Formal Estimate (excluding those at Levels 1, 5A and 6) that accurately reflects the estimated total project cost (in out-turn dollars) relevant to the intended year(s) of implementation.

1.3 Types of Estimates and Principles

In the context of this manual and the Cost Estimating Framework (illustrated in Figure 3), estimates are defined in three ways; Options Estimates, Project Estimates and Formal Estimates.

Options Estimates are produced for each alternative project option being considered. There may be numerous possible options for any given project. Estimates are prepared for each project option in order to provide the information necessary to assess project costs against the perceived benefits.

Options Estimates are produced at various stages throughout the project life cycle as a project proceeds toward delivery and additional information becomes available to better define total project costs.

Following completion of the Options Estimate(s) for a given level in the Cost Estimating Framework, the highest costed realistic Options Estimate is to be selected as the Project Estimate and in turn used to generate the Formal Estimate – see Figure 1. *Note: when seeking project delivery funding the project estimate must represent a defined option/scope of work, e.g. it is not acceptable to still be determining the best project solution such as roundabout versus signalised intersection.*

Key attributes of Options Estimates are that they:

- Are prepared for each 'realistic' option under consideration;
- Relate to the cost of a single option that has a fixed scope at a particular point in time;
- Are expressed in present-day (real) dollars; and
- Have no Formal Estimate status and as such are for internal use only.

Options Estimates are expressed as follows:

Estimate Level	Level 1	Level 2	Level 3	Level 4	Level 5	Level 5A	Level 5B	Level 6
Expressed As:	Cost Range (Mid to High)	P50/P90 (or equivalent P50/P90)				Out-turn \$ (tendered values typically include escalation to completion)	P50/P90 (or equivalent P50/P90)	Actual \$

- Are inclusive of the following risks which are assessed together:
 - Inherent risks – those which have a 100% chance of occurring
 - Contingent risks – those which have less than a 100% chance of occurring

Estimate Level	Level 1	Level 2	Level 3	Level 4	Level 5	Level 5A	Level 5B	Level 6
Where Prepared by Estimating Consultants	Factor Based Deterministic Analysis	Probabilistic Risk Analysis						Not applicable
Where Prepared by DIT Staff		Range Based Deterministic Analysis						

- Are subject to peer review and Project Manager/Planner acceptance of quality assurance signoffs.

Project Estimates generally have the same characteristics as Options Estimates except that they represent the highest most realistic Options Estimate prior to the addition of cost escalation and Senior Responsible Owner approval (the Formal Estimate).

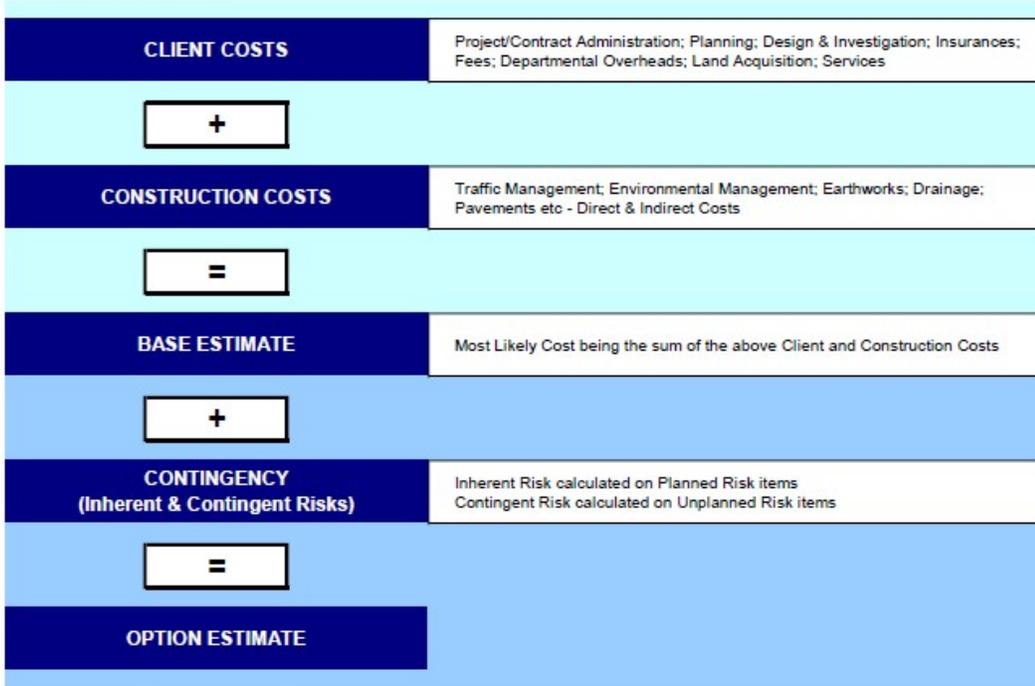
Formal Estimates are required at defined times in the project life cycle and are based on the highest most realistic Options Estimate (the Project Estimate) at that point in time. *Note: when seeking delivery funding the project estimate must represent the defined option/scope of work which is to be implemented.*

Key attributes of Formal Estimates are that they:

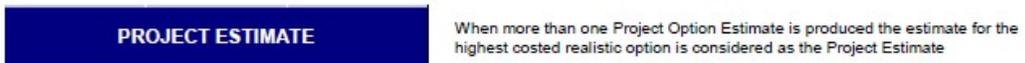
- Are completed only for estimates at Levels 2, 3, 4, 5 and 5B. *Note: Level 1 estimates are not 'formalised' as they are not used to seek project funding, with values quoted only as a cost range. Level 5A estimates are used for comparison with tendered rates only and as such represented as most likely project costs for work to be performed by the contractor, they do not represent a total project cost, Level 6 estimates represent actual costs only;*
- Are based on the P50 and P90 cost of the highest realistic Options Estimate (known as the Project Estimate) which has been developed in present-day (real) dollars;
- Are based on the relevant cash flow, upon which price escalation values are calculated, resulting in them being expressed in out-turn (nominal) dollars;
- Are rounded to the nearest 1000 dollars;

- Remain the current approved estimate for a given scope of work unless replaced by another updated and approved Formal Estimate;
- Are used for internal budgetary purposes, seeking project funding (at appropriate times) and public release (only where approved); and
- Are only required to be signed off at the point in time in which they are to be used to seek project funding (estimates at Levels 2, 3, or 4),proceeding to delivery (estimates at Level 5) or prior to contract award (estimates at Level 5B). Prior to this Formal estimates are used primarily as a means of recording project details and calculating price escalation relative to the anticipated year(s) of implementation.

OPTION ESTIMATES



PROJECT ESTIMATE



FORMAL ESTIMATE

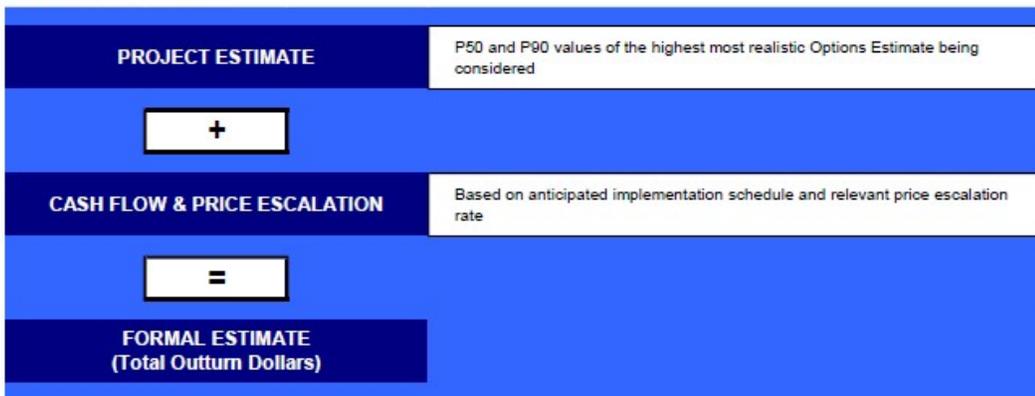


Figure 2 - Components of Options and Formal Estimates

1.4 Cost Estimating Framework

Estimating is an integral part of a system of interdependent core inputs of scope, time, cost and quality. The Cost Estimating Framework illustrated in Figure 3 sets out the various estimates as they relate to different stages of a project. The degree of detail of the project description along with the associated level of effort and accuracy of cost estimation should increase gradually from Level 1 through to Level 6. At one end of the spectrum, Level 1 involves a very preliminary idea about the nature of the project, with minimum detail and a high degree of uncertainty as to the scope and costs. At the other end of the spectrum, Level 6 details the actual costs which were incurred in the delivery of the project.

As explained further in this manual, as a project advances through the various project phases the intention is to ensure that sufficient recognition of all possible costs are incorporated with the intention of ensuring that project cost overruns are avoided.

The model summarises the development of Options Estimates, Project Estimates and Formal Estimates over the life of a project.

EST 600-8 Actual Project Costs, Level 6 ([KNet #9683206](#)) provides a template to aid in recording projects costs across all estimate levels.

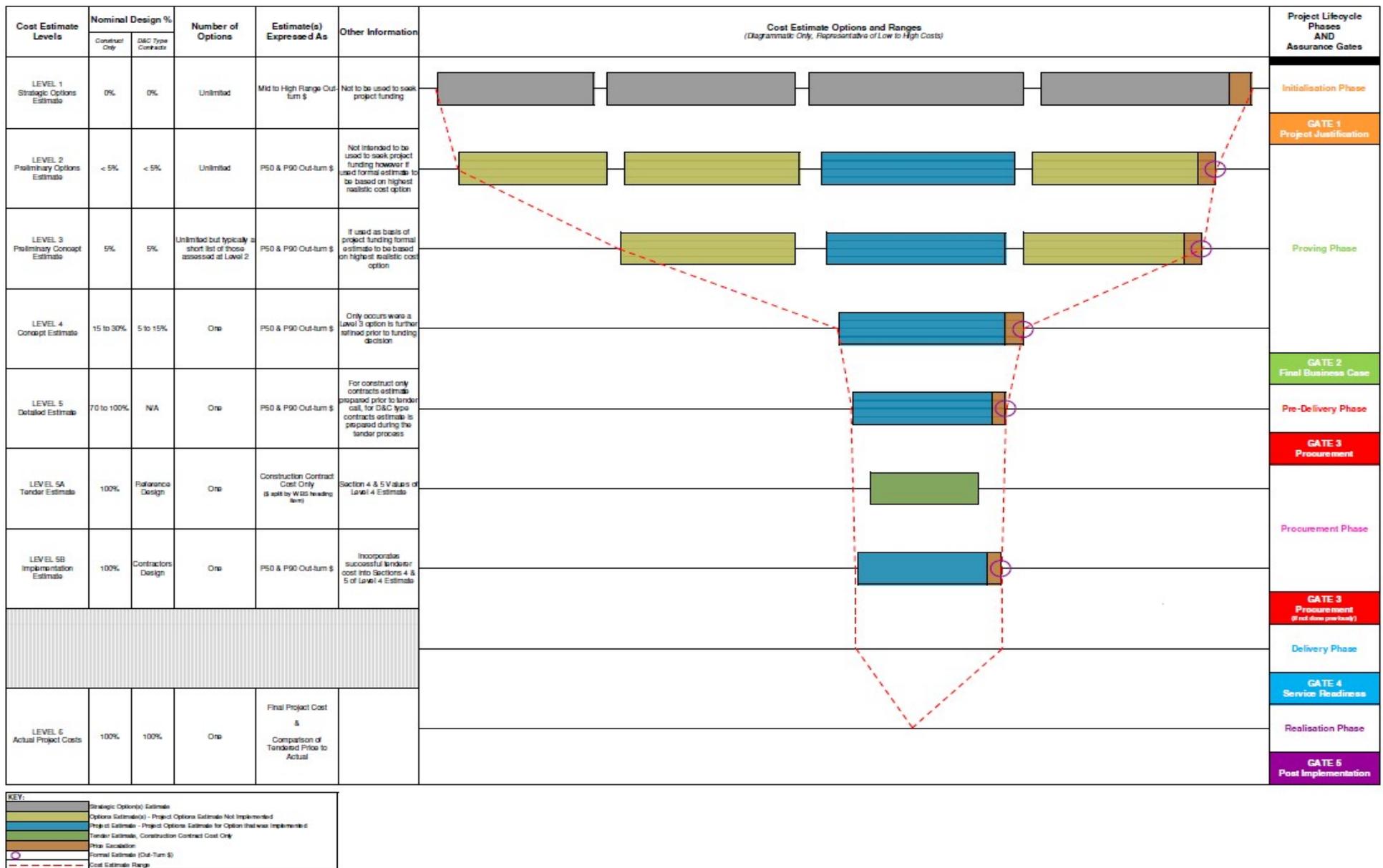


Figure 3 - Cost Estimating Framework

1.5 Generic Estimating Process

The following flowchart outlines the typical steps involved for initiating, completing, reviewing and formalising project estimates from Level 2 onwards

Note: Level 1 estimates are completed based on very limited information using EST600-1, are used to undertake the initial cost assessment of strategic initiatives and are not used to seek project funding or for proceeding to delivery, hence the following process is not applicable.

For Estimators, more detailed information relating to estimate preparation, structure and presentation is provided in Section 2.

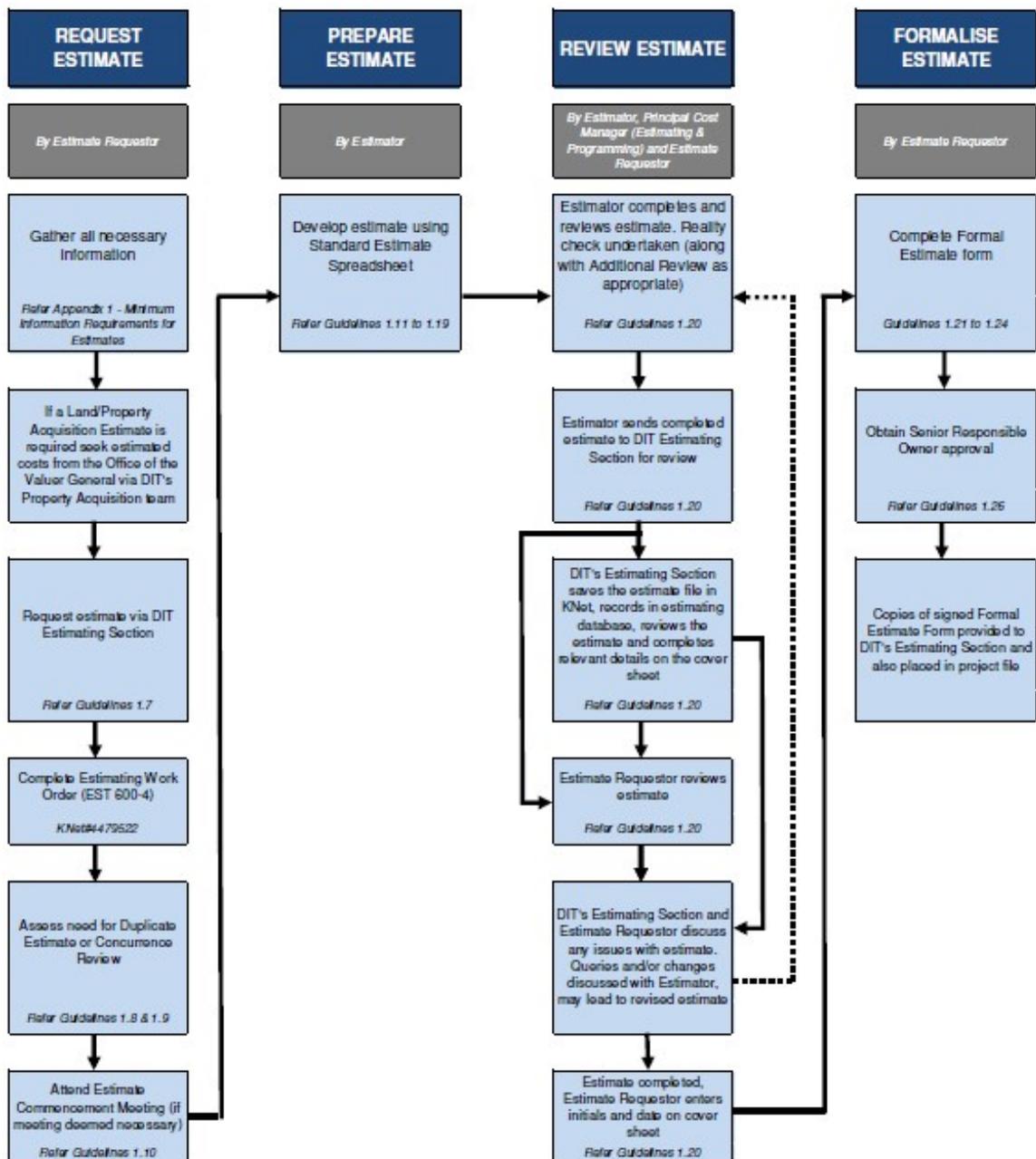


Figure 4 - Generic Estimating Process

1.6 Scope Definition

One of the main issues affecting the reliability of any cost estimate is the ability to accurately define what is and what is not included within the scope of the project.

The starting point for any estimate is a well defined scope. Vague scope definition is likely to result in decreased accuracy of the estimate due to the large number of assumptions that need to be made and the increased potential for variance between what has been estimated in comparison to what is ultimately required to be delivered.

The definition of project objectives, performance criteria and scope are critical to the preparation of reliable estimates.

Project Managers/Planners should be aware that the cost estimate will only represent the defined scope of work. Where changes are made to the scope of work associated with the project this will require the project to be re-estimated/updated based on the revised scope of work.

Those requesting estimates (or internal staff preparing their own estimates) need to ensure that a clear physical and functional description of the project and its scope is prepared and recorded to allow future changes and their subsequent impacts to be monitored and controlled.

The Project Manager/Planner is responsible for determining the physical scope and requirements of the project and clearly describing and articulating this to the Estimator. The completion of an Estimating Work Order will assist with this requirement. This form provides a means for the Project Manager/Planner to provide a detailed description of the objectives, performance criteria and option specific details to the Estimator, with these details transferred directly to the estimate file to provide a future record of the basis of the estimate. Additional information regarding the importance of scope definition and the factors to be considered is detailed within the Department of Infrastructure, Regional Development and Cities (DITRDC) Cost Estimation Guidance Note 1 – Project Scope.

While the level of scope information will increase as the project develops, in order for estimates to be prepared with a consistent level of information and their anticipated costs and benefits compared equally, Project Managers/Planners need to ensure minimum levels of information are available prior to requesting estimates.

A guide to the minimum information that should be made available to Estimators for each level of estimate is included in Appendix 1. To support the accuracy of estimates, in addition to the development of project scope, site constraints and the like, Project Managers/Planners should assist Estimators to accurately determine relevant items and costs associated with each of the following items:

- **Client Costs:** To account for client costs in early estimates, Estimators will typically apply rates and durations for project management staff and/or contractors, consultants and the like based on their perception of the likely costs associated with this aspect of the project. As projects are further

developed and clearer information becomes available it is anticipated that both Estimators and Project Managers/Planners will work towards more accurately determining those costs which have been incurred to date along with those which are likely to be required to complete the project, resulting in an increasingly accurate first principles breakdown of these items within the estimated total project cost.

Project Managers/Planners should seek to identify and provide Estimators with anticipated staff and consultant cost details including their applicable hourly rates and duration of employment for each phase of the project via the Estimating Work Order or EST 600-5 First Principles Client Costs Estimate template ([KNet #5729453](#)).

The DIT Overhead Charge (work breakdown structure item 1.10) will account for many of the client costs tasks. Details of the costs covered by this charge are included within Appendix 6.

- **Environmental:** Project Managers/Planners should seek input from DIT Technical Services for the engagement of an Environment Officer to undertake an assessment of all environmental aspects relevant to the scope of a given project along with the process to be followed to procure these assessments and environmental advice. In particular this will relate to cost and time implications which may be applicable for specific approvals and the like along with the implementation of any mitigation measures which may be required.

DIT projects are assessed in accordance with Environmental Approval Procedures, Environmental Instruction 21.1 ([KNet #1645388](#)). While the level of detail associated with this assessment will vary depending on location, scale and activities associated with the project, it will typically include the consideration of factors such as contamination, water quality, noise, air, cultural heritage, sustainability, flora and fauna assessment and offsets. In addition to this, risks associated with these items can be minimised through considering alternatives or implementing management strategies to minimise and/or offset the impacts associated with the project. Considerations regarding the ongoing maintenance costs associated with proposed environmental measures can also be assessed.

- **Land/Property Cost Information:** Project Managers/Planners are to source estimates for land/property acquisition from the Office of the Valuer General via DIT's Property Acquisition team.

It should be noted that these costs may be subject to significant variation, in particular where commercial property is to be acquired and compensation is to be paid and/or tenants relocated. It is expected that by the time a detailed estimate is requested that discussions with property owners have commenced, more detailed acquisition estimates have been prepared and as such more accurate property estimates can be provided for inclusion in the estimate.

Project Managers/Planners should ensure that any available breakdown of land acquisition costs (inclusive of estimated values for land/property acquisition, disturbance, stamp duty and other statutory charges, injurious

affection/severance, professional fees, DIT costs, compensation, solatium, business losses, accommodation works, contingencies and the like) is provided to the Estimator for consideration/inclusion within their work. The provision of such information is important to ensure that any items included within the valuation are not duplicated by the Estimator in other sections of the estimate and to assist in the ranging of risk values that may be associated with these items.

Unless noted otherwise land acquisition values provided are to be considered as 'most likely' values.

For estimates at earlier levels it may be possible for estimating consultants to provide indicative costs by benchmarking against those which have been provided for similar previous projects. An exception to this is where commercial properties are to be acquired and compensation payments may be applicable.

Importantly Estimators should note that for acquired properties ongoing operating costs associated with items such as Council rates, Government levies and utility services fees will continue to apply. As such estimates are required to make reasonable allowances to account for these costs.

- **Services:** Where considered appropriate and/or time permits, Project Managers/Planners should endeavour to commence discussions with service authorities that may be impacted as a result of the proposed project. The benefit of this approach is that it may allow relevant authorities to better define their services and potentially provide additional information regarding how the service could be relocated, programming issues, specific requirements that may need to be met if a service is to be relocated and an indication of the costs that may be associated with the proposed works.

It is anticipated that by the time projects progress to the detailed estimate stage (Level 5) that all relevant services will have been identified and that where impacted, quotes from relevant authorities for the required relocation works will also be available.

For early level estimates it may not always be possible or realistic to involve the relevant service authority given that some estimates are produced purely to assess the costs associated with potential alignments or options. Therefore, benchmarking of such costs for previous projects of a similar nature may be a reasonable means of determining the potential cost of such works. It is however critical that major services are identified either by way of a site inspection, 'Dial Before You Dig' survey or some other means that can effectively identify the extent and complexity of service relocations that may be associated with the project.

Project Managers/Planners should note that service relocations are typically subject to a wide range of cost variability given the often limited detail available. Hence this is seen as a key area where the ability to identify impacted services early and obtain applicable costing information can be critical in accurately determining the estimated project cost.

- **Earthworks/Pavements:** To assist Estimators with the accurate and cost effective measurement of earthworks volumes and pavement areas, Project Managers/Planners should ensure that designs incorporate the requirements detailed in the Departments 'Requirements for the Measurement of Earthwork Volumes – EST – 03 ([KNet #5976121](#)). This document provides details regarding the provision of proposed and existing contours; and pavement area boundaries, enabling the use of specialist software to quantify these items more rapidly and accurately.
- **Urban Design/Landscape Scope:** In order to adequately account for costs associated with urban design treatments applied to projects consideration is to be given to the likely types of treatments which may apply and the costs associated with these. General considerations include public safety, access and movement, wayfinding, water sensitive urban design, public art, landscaping and public realm elements. Project Managers/Planners may be able to obtain advice on the potential treatments and requirements which may be applicable for a given project type and location by contacting the Office for Design and Architecture South Australia (ODASA).

In addition to the development of clear scope for the above items, when identifying project solutions Project Managers/Planners should give due consideration to the ongoing operational and maintenance costs that will result. For example, while the provision of passenger lifts at a railway station may provide operational benefits, significantly higher ongoing costs may be realised than will be the case for a ramp used to provide the same access. Similarly the use of a tunnel on a road project would attract significantly higher ongoing operational costs in comparison as to a bridge that may serve the same purpose.

1.7 Request for Estimating Services – Estimating Work Order

The majority of estimates are produced by Estimators who are members of the Departments' Preferred Supply Arrangement for Estimating, Scheduling and Constructability (PSAESC). Members of this arrangement who are nominated for the provision of civil estimating services comprise of contractors assessed as having relevant experience and ability in developing cost estimates for the Departments' transport infrastructure projects.

All requests for the provision of civil estimating services to be procured using the PSAESC must be directed to the Principal Cost Manager (Estimating & Programming) by emailing them to: DIT.PSAESC@sa.gov.au. The Principal Cost Manager (or their delegate) will assign a member of the PSAESC to complete the work based on factors such as, but not limited to the type of skills that are required, the specific requests of the Project Manager/Planner, the availability of Estimators, the required completion date and the likely costs to be incurred.

*Requests for estimates to be procured through the Estimating Panel Contract must be directed to the Principal Cost Manager by emailing to:
DIT.PSAESC.sa.gov.au*

On receipt of request to engage an Estimator using the PSAESC, the project title will be registered in the Department's estimating database and if not provided as part of the original request the Project Manager/Planner will be asked to complete an Estimating Work Order (EST 600-4 Estimating Work Order, [KNet #4479522](#)). This standard work order document aims to provide the Estimator with a clear definition of the scope and extent of work associated with the estimate. The details provided will be transposed to the Standard Estimate Spreadsheet by the Estimator, maintaining a history of the original request including the associated project objectives, scope, extent of work and various other project specific details.

Where estimating services are to be procured separately to the PSAESC, either as deliverables associated with a planning study or for some other requirement, the alternative Estimating Work Order (EST 600-4.1 Estimating Work Order, Estimates Procured via Designers, [KNet #17537788](#)) is to be used in place of EST 600-4. In this occurrence the Departmental representative requesting the estimate is required to work with the relevant Planning/Design Consultant or the like to develop the Estimating Work Order, including seeking the applicable estimate number from the Principal Cost Manager (Estimating & Programming) or their delegate. Upon completion of this work order the Planning/Design Consultant is required to provide the document to Estimator for them to use in the same manner as the standard work order previously detailed above.

1.8 Duplicate Estimate

Where the project is anticipated to have a P90 Project Estimate value exceeding \$25 million (real \$) it is recommended that a duplicate estimate is sought prior to seeking funds for the delivery of the project.

In determining the need for a duplicate estimate, Project Managers/Planners should discuss with the Senior Responsible Officer factors such as the perceived risks relevant to the project, their required level of confidence with the estimate, the end use of the estimate and the like. The process for arranging and preparing a duplicate estimate is described in Appendix 3.

It is recommended that projects with a P90 Project Value which is estimated to exceed \$25 million (real \$) be subject to the duplicate estimate process prior to seeking project funding

Where duplicate estimates are to be undertaken, these should occur at the same time to ensure consistent information is provided to both Estimators.

A concurrence review may be undertaken as an alternative means of gaining confidence in the estimated cost of a specific project/scope of work.

1.9 Concurrence Review

At the discretion of the Senior Responsible Officer, a concurrence review may be undertaken in place of a Duplicate Estimate.

A concurrence review is undertaken on a previously completed project cost estimate by a third party/alternate PSAESC Estimator who is tasked with determining any areas of variance associated with the estimated price, considerate of the proposed

methodology, staging, durations, cash flow and the like which has been determined/is applicable to the estimate.

These reviews will typically result in written reports and spreadsheets which provide direct comparisons of the quantities, rates and any other aspects of the original estimate with those anticipated by the reviewer, including the identification of areas of variance and commentary as to the anticipated reasons and resulting recommendations for items to be revisited/reviewed by the original Estimator within the applicable estimate.

Concurrence reviews and their associated reports are recorded as Level 0 estimates.

1.10 Estimate Commencement Meeting

Where estimating services are sought using the PSAESC, following completion of an Estimating Work Order (EST 600-4 Estimating Work Order [KNet #4479522](#)) an estimate commencement meeting may be scheduled where the Project Manager/Planner (along with other staff and/or specialists where applicable) can talk through the details of the project with the Estimator. Where held, this meeting aims to facilitate discussion regarding the clients' requirements, the scope of the project and any other specific requirements associated with the preparation of the estimate, whilst also enabling the Estimators to raise and discuss any initial queries and clarifications.

1.11 Standard Estimate Spreadsheet

The Estimator will develop the estimate using the drawings, documentation and other information available for the project. Where necessary, further discussions may occur and/or additional information be sought to better define any details associated with the project.

The Estimator will prepare and present the estimate using one of the Standard Estimate Spreadsheets. These Microsoft Excel spreadsheets, as detailed below, are available electronically from the Principal Cost Manager (Estimating & Programming):

- EST 600-1 [KNet #5751720](#). For estimates at Level 1.
- EST 600-2 [KNet #5751722](#). For estimates at Levels 2, 3, 4, 5 & 5B where prepared by estimating consultants. *Note: typically these estimates will be prepared using proprietary estimating software and transferred to the template. A complete copy of the first principles estimate including all labour, plant, materials, rates of production etc. along with the files used as the basis of risk calculations and any other aspects of the estimate are to be retained by the Estimator and made available to the Department upon request.*
- EST 600-3 [KNet #5751723](#). For estimates at Levels 2, 3, 4, 5 & 5B where prepared by DIT staff.
- EST 600-8 [KNet #9683206](#). Used for recording actual project costs (Level 6) and comparing these with the applicable estimates, further details regarding the use of this template can be found in section 2.2.4.

Level 5A Principals Tender Estimates are used for comparison with tendered rates and to assist with the evaluation of tenders. These estimates are required to be presented in accordance with the tender schedule provided within the tender documents. Estimators will be required to download relevant documents as directed by the Departments representative and submit their estimated tender price (or

Principals Tender Estimate) by the same time and in the same manner applicable to tenderers.

Completed examples of each of the Standard Estimate Spreadsheets can be found using the following links:

- Example – EST600-1: [KNet #5939749](#).
- Example – EST600-2: [KNet #5939751](#).
- Example – EST600-3: [KNet #5939752](#).
- Example – EST600-8: [KNet #12845474](#).

Departure from the use of these spreadsheets is only permitted with the prior approval of the Principal Cost Manager (Estimating & Programming).

1.12 Preparation of Base Estimates

Base Estimates are initially prepared using the Estimator's assessment of the quantities and rates that will apply (inclusive of the assumed construction methodology, staging and the like) to a given scope of work, based on the available documentation, resulting in a most likely estimate total (the Base Estimate). Inherent and contingent risks (discussed in the following sections) are then assessed to result in the Options Estimate total.

Section 2 of this manual, Estimate Development and Presentation, provides further details regarding the preparation of base estimates. Additional information is also available from DITRDC Cost Estimation Guidance Note 2 – Base Cost Estimation.

1.13 Goods and Services Tax (GST)

All estimates are to be prepared exclusive of GST.

1.14 Risk and Contingency

Contingencies for risk are an aggregate value made up of threats (which may add cost) and opportunities (which may reduce cost). In preparing Options Estimates there are also many situations where the inputs may be less than or greater than that anticipated due to factors such as:

- Missing or as yet unidentified project scope/elements, requiring the Estimator to identify and make appropriate inclusions for such items;
- Limited design information being available reducing the Estimators ability to accurately measure the applicable quantities;
- The time and effort available to prepare the estimate; and
- Varied market and procurement factors which can influence the estimated rates.

A contingency allowance is the measure of the residual risk that exists within the project relative to achieving the project objectives and is expressed as a level of uncertainty or confidence.

Whilst their outcome is calculated together, within DIT estimates risks are considered to be either inherent or contingent. Additional information regarding these types of risk is provided in sections 1.14 and 1.15.

Contingency allowances are estimated using either probabilistic or deterministic risk cost assessment methods, versions of these methods as applicable to DIT estimates are described in the sections 1.16 and 1.17.

1.15 Inherent Risk

The assessment of inherent (or planned) risk is relates to the ranging of quantities and rates for each of the items within the estimate. Project cost estimates cannot be confidently prepared using whole number quantity and rates values as in reality there are likely to be a range of quantities and rates which are possible for each line item due to their exact nature along with variability in construction methodology and pricing between construction contractors. This is modelled as a +/- risk range on both the quantities and rates of all estimate line items with these ranges used to spread risk appropriately across each line item to allow for statistical modelling (i.e. P50 and P90 calculations).

1.16 Contingent Risk

The assessment of contingent (or unplanned) risk involves the evaluation of risk associated with unmeasured items, e.g. those not included within the Base Estimate due to their unknown nature or them being only loosely identified resulting in them having a less than 100% chance of occurring. Where available, as indicated on the Estimating Work Order, the project specific risk register should also be provided to the Estimator to assist in the identification, categorisation etc of those risks which have been identified by the relevant project team.

Items with no information, but which are known to form part of the project scope (e.g. they have a 100% chance of occurring) are to be included as line items within the Base Estimate and not rely on contingent risk items to make provision for them.

1.17 Probabilistic Risk Cost Assessment Methods

Probabilistic risk methods are a form of quantitative risk analysis which use computer software programs to apply Monte Carlo simulation techniques to estimate contingency values.

Within cost estimation Monte Carlo simulation is applied as a statistical sampling technique which generates a sample of a large number of possible project outcomes based on the input data (e.g. the estimate items and subsequent potential high/pessimistic and low/optimistic ranging of quantities and rates from most likely predictions). This input data and the likelihood of occurrence for outcomes reflecting the potential variances within a given range (determined by the probability density function of the input data) is taken to reflect the likelihood of an outcome arising in reality. By producing the potential outcome on numerous occasions (or iterations) Monte Carlo simulation provides a table of the estimated percentile costs, with those at the 50th and 90th percentile adopted as the respective P50 and P90 values.

When assessing inherent and contingent risks probabilistically, P50 and P90 values are calculated using risk analysis software such as @Risk, or some other form of proprietary software recognised by industry as being suitable for the calculation of such values. DIT's preference for consultants preparing estimates is for them to use @Risk software.

Probabilistic risk assessment methods are utilised within DIT estimates as follows:

- Level 2 to 5B Estimates (where prepared by Estimating Consultants) Further information on this approach is contained in section 2.9.2.

More detailed information regarding probabilistic contingency estimation and methods can be found within DITRDC Cost Estimation Guidance Note 3A.

1.18 Deterministic Risk Cost Assessment Methods

Considered to be less accurate than probabilistic methods, deterministic risk methods treat all input values as being constant due to the fixed quantity and cost outcomes which result from the application of ranging to relevant estimate items.

Deterministic risk assessment methods are utilised within DIT estimates as follows:

- Level 1 Estimates: Factor based – applied at the earliest stages of projects, this most basic method acknowledges that there may be insufficient information, resources or time available to allow more detailed assessments to be undertaken and aims to apply an appropriate level of contingency via a strategic review of the factors that will influence the cost outcome of the project. This approach calculates a single overall contingency range which is inclusive of inherent and contingent risk by identifying items which will have a critical effect on the project outcome and applying ranging to them. Further information on this approach is contained in section 2.9.1.
- Level 2 to 5B Estimates (where prepared by DIT staff): Range based – this approach requires the Estimator to determine a range comprising low (L), most likely (ML) and high (H) values for each cost element and contingent risk item which are in turn used to derive equivalent P50 and P90 values. Further information on this approach is contained in section 2.9.3

More detailed information regarding deterministic contingency estimation and methods can be found within DITRDC Cost Estimation Guidance Note 3B.

1.19 Construction Program, Staging Diagrams and Cash flow

In order to accurately determine the overall duration of the project and subsequent to this the costs associated with time dependent activities (e.g. project/contract management, traffic management etc) a construction program, staging diagrams and a cash flow should be developed by the Estimator. Whilst it is recommended that these are prepared for the majority of estimates, the Estimating Work Order provides sections where Project Managers/Planners are able to indicate their requirement for these items to be undertaken by the Estimator.

Where sought, these programs are required to consider each of the tasks applicable to the project and their dependences on each other along with the staging that will be necessary to perform the work, in-turn informing the development of a project cash flow which recognises expenditure associated with each of the applicable tasks. EST 600-7 Cash Flow Template ([KNet #12245240](#)) can be used to assist with the presentation of cash flow values within the estimate file.

The adopted project cash flow is to be based on the Project Estimate (the highest valued realistic Project Option Estimate, inclusive of inherent and contingent risk). Optimism bias should be avoided by being conservative as to when the project will

commence construction and the likely expenditure draw-down rate through the construction period.

Projects often experience cash flows (particularly construction expenditure profiles) much slower than expected due to delays in obtaining project approvals or funding, rescheduling of works, labour or material shortages, delays in the negotiation and completion of service relocations or land acquisition processes. As such most of the contingency amount should be skewed towards the later years of the project/during the construction period, with some in the year following practical completion.

1.20 Estimate Review Process

All estimates are to be reviewed in accordance with the Estimate Review Process described in Appendix 7.

Prior to the submission of an estimate, Estimators are required to review their/the work undertaken by their company. Any errors and/or omissions identified through the review are to be corrected prior to forwarding an electronic copy of the completed estimate to the Departments Estimating Section.

The Departments Estimating Section will save the estimate document to KNet, record the estimate within the estimating database and review the estimate prior to forwarding a KNet link to the estimate file to the Project Manager/Planner for their review.

Project Managers/Planners are also required to review the estimate. Any required changes or issues requiring further clarification will be discussed with the Departments Estimating Section who will request any necessary queries and/or updates from the relevant Estimator.

As individual reviews are completed, pending their acceptance of the estimate each relevant person involved in the preparation and/or review of the estimate is to enter their details and the date which they reviewed the estimate in the 'Review Information' cells included at the base of the estimate Cover Sheet.

Where estimating services have been procured separately from the PSAESC, either as deliverables associated with a planning study or for some other requirement, the review process described above is still applicable. The only variance to the process described above is that an 'Additional Reviewer' from the Planning/Design Consultants organisation is required to review the estimating deliverables from their Estimator prior to these being provided to the Departments Project Manager/Planner. The Project Manager/Planner is then required to provide the relevant estimating deliverables (e.g. the estimate file, staging diagrams, programs, cash flow etc) including copies of the drawings and other information on which the estimate is based to the Departments Estimating Section to record and review. Any resulting review comments requiring the estimating deliverables to be reviewed/updated will ultimately need to be returned to the Planning/Design Consultant by the Project Manager/Planner.

1.21 Formal Estimate

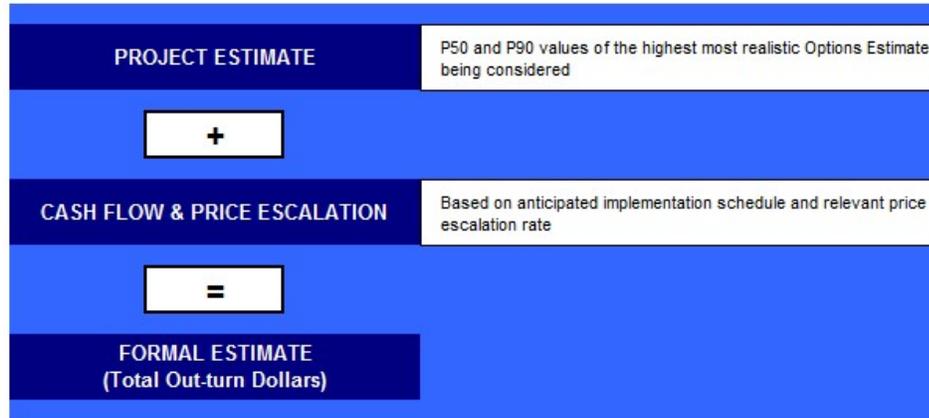


Figure 5 - Formal Estimate Process

Following completion of the Options Estimate (including reviews as detailed in Section 1.18) estimates are required to be formalised. A Formal Estimate represents the total project cost as approved by the Senior Responsible Officer at any given point in time during the project's development.

The Formal Estimate is generated by taking the estimated P50 and P90 values of the highest realistic Options Estimate, (the Project Estimate) and cash-flowing these amounts (as described in section 1.20) in order to allow for the escalation of the estimate (as described in section 1.21), thus producing the Formal Estimate cost in total out-turn dollars.

The Standard Estimate Spreadsheet (estimate Levels 2, 3, 4, 5 & 5B) contains a worksheet titled 'Formal Estimate' which is used to calculate and record Formal Estimate values. Project Managers/Planners are required to complete these forms and obtain Senior Responsible Officer approval/sign-off of the Formal Estimate prior to using the estimate in the process of seeking project funding and/or proceeding to deliver the project.

Instructions for completing the Formal Estimate form are provided in Appendix 8.

Project Managers/Planners should note that when seeking project delivery funding that the project estimate must represent a defined option/scope of work.

1.22 Price Escalation

Formal Estimates are expressed in out-turn dollars (\$OT) and include price escalation to reflect the anticipated actual project cost at completion.

As described in the previous section, a cash flow is to be determined to suit project delivery timeframe. Out-turn costs are calculated by adding price escalation to the Project Estimate which is developed in present day (real) dollars and is inclusive of both inherent and contingent risk considerations.

The Price Escalation Calculation Spreadsheet ([KNet #4624055](#)) is to be used to calculate out-turn dollars across the anticipated delivery years. This spreadsheet includes the annual rates of escalation rates to be used for projects, with varying rates provided for State and/or Federally funded projects.

The basis of the price escalation percentages to be applied are described as follows:

- State based projects with no Federal funding utilise established price escalation forecasting endorsed by senior DIT staff.
- Projects with any degree of Federal funding utilise mandated price escalation forecasting with varying percentages applied dependent on the proposed procurement method and project nature (road OR rail project).

Table 2 – Example of Price Escalation Calculation

Description	Pre-2021/22 \$m	Current year 2022/23 \$m	2023/24 \$m	2024/25 \$m	2025/26 \$m	Total Project Cost \$OT \$m
Expenditure (present day - real \$'s)	0.5	1.5	25.0	40.0	15.0	82.0
Price Escalation @ 5% rate	1.00	1.05	1.05 ²	1.05 ³	1.05 ⁴	
Project Cash flow (Nominal - \$OT)	0.5	1.58	27.56	46.31	18.23	94.18

The above example is a simple approach to reviewing how price escalation is calculated. Reference to the approved rates contained in the above referenced spreadsheet should be made (which may differ from the above rates) noting ‘current year’ rates often reflect a part year rate where the estimate has been prepared part way through the financial year.

Regardless of the funding source, the price escalation percentages and approach set out with the Price Escalation Calculation Spreadsheet must not be varied or escalation values randomly developed. It is however noted that there may be special circumstances where variances can be warranted such as where tenderers have been required to include price escalation of relevant items within their tender bids. In this instance escalation may only be required to be calculated on items which do not form part of the tendered/construction cost (e.g. client costs, land acquisition, service relocation undertaken by the Department)..

The deemed rate of price escalation (including the approach to ‘current year escalation’ which changes throughout the year) is reviewed annually by the Team Leader, Financial Analysis (Finance) and updated in the Price Escalation Calculation Spreadsheet as necessary.

The cumulative amount of price escalation can be a significant percentage of the total project cost, particularly for projects that are planned to commence several years in the future and/or which may have a considerable construction period. As such assistance and advice from the Team Leader, Financial Analysis (Finance), is recommended when developing cost escalation values.

It should be noted that price escalation is included to provide adequate capital funding to compensate the project for forecast cost increases due to inflationary imposts in the construction sector. It is not a secondary contingency figure.

1.23 Project Funding and Risk Exposure

Funding is to be sought based on the Formal Estimate P90 value, the estimated project cost of which there is a 90% chance will not be exceeded in the delivery of the applicable scope of works. Although not typically presented within estimates, the probabilistic value in excess of the P90 (e.g. the 'maximum' project cost) is usually not funded and therefore considered as the level of risk exposure to the Department.

Those responsible for the delivery of projects should aim to deliver the project for the Formal Estimate P50 cost return unspent contingency funds once the identified contingent risks have passed. Conversely, where it is identified that the final project cost is likely to exceed the estimated project cost (including contingencies), Project Managers/Planners are required to determine the value of this increase and pursue a course of action such as reducing the project scope or seeking additional funding to account for the increased project cost. Project Managers/Planners should be aware of the risks identified by the Estimator which form the basis of the contingency values and where appropriate attempt to mitigate/reduce the potential likelihood and/or impact of them eventuating. Further information regarding the ownership and allocation of contingency funds associated with the delivery a project can be found within the PPMF, see Module 10 – Project Controls.

Estimates at Level 1 are used to undertake the initial cost assessment of strategic initiatives, they are not used to seek project funding or to proceed with project delivery. As such these estimates present only mid to high range estimated project cost values.

1.24 Variance Reporting

The Formal Estimate Sign-off and Approval Form (included within estimate templates EST600-2 and EST600-3) provides an avenue for tracking variances against key headings through subsequent estimate levels. In addition to this, EST600-8 Actual Project Costs provides a template for recording estimates at each level along with final project costs, thereby providing a means of tracking estimated and actual costs at individual heading levels throughout the life of the project. This analysis aims to better inform future early project estimates by identifying common areas of over or under-estimating project costs and to assist with the benefits realisation process.

1.25 Updating Old Estimates to Present Day Dollars

There are many circumstances in DIT where estimates are prepared in earlier years and 'shelved' for a period of time prior to being re-considered for a funding bid in the present day.

Where these older estimates are to be used there is a requirement to adjust the historical price estimated in a previous year (real dollar figure) to the current year before escalating the project cost again to a future dollar figure (out-turn \$) that reflects the year/period in time for which the project is to be delivered. Care should be taken to determine if the historical estimate value was inclusive or exclusive of price escalation, with the available values are treated accordingly during the process of any updates.

Project Managers/Planners should also assess the potential for cost increases beyond those associated with cost escalation, recognising that some project scope changes are likely to occur due to factors such as changes to design standards, existing site conditions and the like from when the estimate was originally prepared.

The process of escalating an old estimate to current day dollars using the Road and Bridge Construction Cost Index is recommended to only occur where the original estimate has been prepared within the last two years. This is due to engineering construction market pricing dynamics changing over time, leading to market pricing of elements like profit margins and the treatment of risk changing over time. In instances where estimates are more than two years old, it is recommended that the original Estimator is requested to review all quantities and rates within the original estimate to produce a revised/current estimate OR that a new estimate is prepared.

Details of the process to be used to update old estimates to present day dollars is provided in Appendix 9.

1.26 Senior Responsible Officer Approval and Responsibilities

Senior Responsible Officers are responsible for:

- Ensuring Project Managers/Planners seek the timely preparation of estimates for projects including the provision of new or updated estimates to reflect changes to project scope;
- Where considered necessary that a duplicate estimate or concurrence review has been undertaken;
- Ensuring estimate review processes have been undertaken;
- Approving each Formal Estimate prior to its use in seeking project funds or proceeding to delivery, including an assessment of the accuracy of the scope of works upon which the estimate has been based and conveying values in out-turn (nominal) dollars;
- Ensuring any estimate cost data that is released relates to the latest approved Formal Estimate only;
- Ensuring that any announcement of estimate details is appropriately endorsed or approved;
- Ensuring the project is 'managed' to the Formal Estimate P50 value, with funding sought at the Formal Estimate P90 value;
- Ensure that Project Managers/Planners apply reasonable measures to mitigate identified project risks; and
- Ensuring that excess project funds associated with project contingencies are returned as risks associated with these values pass.

SECTION 2

Estimate Development & Presentation

2 ESTIMATE DEVELOPMENT AND PRESENTATION

2.1 General

The format and structure of the Departments transport infrastructure estimates are standardised to ensure consistency in estimate presentation at all levels of the estimating framework. End-users (Project Managers/Planners, Project Directors, Senior Responsible Officers, project teams etc) are better able to analyse, review and approve estimates, when referring to standardised estimate format which is inclusive of clearly described scope, risk and methodology information, a standardised work breakdown structure detailed risk registers which are linked to the resulting risk and contingency values and the supporting information (e.g. references to the drawings etc used as the basis of the estimate) presented in a single estimate package.

DIT cost estimates are generally prepared by external estimating consultants. The Department has an established list of suppliers in place to facilitate the engagement of specialist Estimators, who are familiar with the guidelines established in this manual and have the appropriate skills and experience to provide infrastructure estimates. Alternatively, cost estimating may be undertaken internally by experienced staff. For all estimates the processes and principles contained in this manual are also to be applied.

2.2 Estimate Presentation

The Standard Estimate Spreadsheets are used to record in a single package, details of the applicable scope, sources of information, risks, assumptions, costs, quantities and risks associated with the build-up of the estimate, including the presentation of estimated costs one or more project options/solutions.

Instructions for using and completing the Standard Estimate Spreadsheets are included in Appendix 5.

All estimates are to be prepared exclusive of GST.

There are a number of separate versions of the Standard Estimate Spreadsheet, the purpose of each is as follows:

2.2.1 Estimates Level 1

EST 600-1 – [KNet #5751720](#)

This template is to be used for estimates of road, rail and marine projects at Level 1 (Strategic Options Estimate). Estimates at this early level are typically the result of benchmarking a proposed project against recent ones of a similar nature with adjustments made to account for variations in scope, local/site conditions, cost escalation and the like.

The following worksheets are included in the spreadsheet (road worksheets are to be substituted with copies of the rail or marine worksheet where the applicable project option is predominately rail or marine based):

- Cover Sheet;
- Scope, Risk and Calculation Sheet – All Options;
- Inherent - Contingent Risk (Road) Option 1;

- Inherent - Contingent Risk (Road) Option 2;
- Inherent - Contingent Risk (Road) Option 3;
- Inherent - Contingent Risk (Rail) Option(s); and
- Inherent - Contingent Risk (Marine) Option(s).

Risk values for these estimates may be determined using the worksheet provided within this spreadsheet – copies of these tables are also provided within Tables 5, 6 and 7 of this manual.

2.2.2 Estimates Levels 2, 3, 4, 5 & 5B

For estimates prepared at Levels 2 (Preliminary Options), 3 (Preliminary Concept), 4 (Concept), 5 (Detailed) and 5B (Implementation) the following templates are to be used.

Whilst the majority of the Department's estimates are prepared by estimating consultants, it is specifically recommended that these specialists are utilised for the preparation of high risk and/or high valued projects at these levels.

2.2.2.1 By Estimating Consultants

EST 600-2 – [KNet #5751722](#)

This template is to be used for estimates prepared by estimating consultants.

This format includes sections on the calculation sheet(s) for the probabilistic calculation of combined inherent and contingent risk (P50 and P90) values.

The following worksheets are included in the spreadsheet:

- Formal Estimate *(to be completed by the Project Manager/Planner)*;
- Cover Sheet;
- Scope, Risk and Methodology;
- Summary Option(s);
- Calculation Option(s); and
- Inherent & Contingent Risk Option(s).

Note: typically these estimates will be prepared using proprietary estimating software and transferred to the template. A complete copy of the first principles estimate including all labour, plant, materials, rates of production etc. along with the files used as the basis of risk calculations and any other aspects of the estimate are to be retained by the Estimator and made available to the Department upon request.

2.2.2.2 By DIT Staff

EST 600-3 – [KNet #5751723](#)

This template is to be used for estimates prepared by DIT staff.

This format includes a section on the calculation sheet(s) which uses the range based deterministic method to calculate the combined value of inherent and contingent risk.

The following worksheets are included in the spreadsheet:

- Formal Estimate *(to be completed by the Project Manager/Planner)*;
- Cover Sheet;
- Scope, Risk and Methodology;
- Summary Option(s); and
- Calculation Option(s).

2.2.3 Principals Tender Estimate

Level 5A estimates are used for the provision of the Principals Tender Estimate and in-turn comparison with tendered rates/to assist with the evaluation of tenders. These estimates are required to be presented in accordance with the tender schedules provided within the relevant tender documents. Estimators are required to download relevant documents as directed by the Project Manager/Planner and submit their estimated tender price (or Principals Tender Estimate) by the same time and in the manner applicable to tenderers.

2.2.4 Actual Project Costs

EST 600-8 – [KNet #9683206](#)

This template is to be completed by DIT staff.

This format includes a 'Data' worksheet where the majority of information is entered, this information carried forward to other pages of the spreadsheet. This spreadsheet contains a number of worksheets which aim to provide a comparison of the estimated total project cost at various estimate levels and tendered sums to the final values which were realised.

Values to be entered for each estimate level and option are generally able to be copied directly from the summary sheet of the corresponding estimate file.

The following worksheets are included in the spreadsheet, these are to be completed by the Project Manager/Planner:

- Project Cost by Level, Data;
- Project Cost by Level, Summary;
- Project Cost by Level, Detailed; and
- Estimate, Tender, Actuals Comparison.

2.3 Estimate Numbering Convention

All DIT registered estimates are allocated an estimate number to assist with their recording and future referencing. This numbering convention is explained in Appendix 4.

2.4 Work Breakdown Structure

Estimates are to be completed following the Work Breakdown Structure (WBS) as defined in Appendix 6 and as set out within the Summary sheet(s) and Calculation sheet(s) of each of the Standard Estimate Spreadsheets. All DIT estimates are to be developed using this structure to assist in the consistent preparation, review and comparison of estimates.

While DIT standard estimate templates present items and costs to WBS Level C, the preparation of unit rate build-ups (effectively WBS Level D) are to be completed within specialist estimating software systems (or the like) and are not required to be

detailed within the estimate file presented. Estimators are however required to retain these Level D work ups to allow for any necessary detailed reviews, future estimate updates and the like. At the request of the Department estimating consultants are required to provide a complete copy of the first principles estimate including all labour, plant, materials, rates of production and the like, along with information used as the basis of risk calculations and any other aspect of the estimate.

Table 3 – Work Breakdown Structure by Estimate Level

WBS Level A (Key Sections)	WBS Level B (Estimate Elements)	WBS Level C (Indicative Items/Sub-Items)
(1) Client Costs	(1.1) Scoping Phase – Project Management (1.2) Scoping Phase – Design and Investigation (1.3) Development Phase – Project Management (1.4) Development Phase – Design and Investigation (1.5) Delivery Phase – Project Management (1.6) Delivery Phase – Design and Investigation (1.7) Principal Arranged Insurance and Levies (1.8) Environmental Assessment (1.9) Other Client Costs (1.10) DIT Overhead Charge	(1.1.1) Project Administration (1.1.2) Contract Administration/Planning (1.1.3) Community Liaison (1.1.4) Cost Estimation and Constructability (1.1.5) etc.
(2) Property Acquisition	(2.1) Property Purchase Costs (2.2) Transaction, Legal and Other Costs (2.3) Business Compensation (2.4) Property Modification	(2.1.1) Property Purchase Costs Item 1 (2.1.2) Property Purchase Costs Item 2 (2.2.1) Transaction, Legal and Other Costs Item 1 (2.2.2) etc.
(3) Services (By DIT)	(3.1) Electricity (3.2) Communications (3.3) Gas (3.4) Water and Sewer (3.5) Other Services	(3.1.1) Electricity Item 1 (3.1.2) Electricity Item 2 (3.2.1) Communications Item 1 (3.2.2) etc.
(4) Construction Costs (Direct Costs)	(4.1) Environmental Works (4.2) Traffic Management (4.3) Services (if by Contractor) (4.4) Earthworks and Demolition (4.5) Retaining Walls (4.6) Drainage (4.7) Bridges (4.8) Tunnels (4.9) Pavement (4.10) Bituminous Surfacing / Asphalt (4.11) Secondary Pavements (4.12) Pavement Marking (4.13) Road Furniture (4.14) Lighting (4.15) Landscaping and Urban Design (4.16) Traffic Signage, Signals and Controls (4.17) Rail (4.18) Other	(4.1.1) Environmental Works Item 1 (4.1.2) Environmental Works Item 2 (4.2.1) Traffic Management Item 1 (4.2.2) etc.
(5) Contractor's Preliminaries (Indirect Costs)	(5.1) Design (by Contractor) (5.2) Onsite Overheads (5.3) Offsite Overheads (5.4) Contractor's Margin	(5.1.1) Design (by Contractor) (5.2.1) Onsite Overheads (5.3.1) Offsite Overheads (5.4.1) Contractor's Margin
(6) Contingent Risks	(6.1) Contingent Risks	
(7) P50 & P90 Risk and Contingency	(7.1) P50 Inherent & Contingent Risk (7.2) P90 Inherent & Contingent Risk	

Appendix 6 provides further details of the items and sub-items that are included within each element of the estimate.

The amount of detail that is able to be presented within an estimate will depend largely on the amount of design and documentation that is available as a basis for the estimate. Project Managers/Planners should endeavour to provide project information as described in Appendix 1.

2.5 Estimating Methods

DIT utilises a number of estimating methods with these varying depending on the end use and who is preparing the estimate. The basic difference between these methods is the degree to which a project is divided into elements and the way in which applicable quantities and rates are determined. The more rigorous the process used, the greater will be the certainty of the outcomes (the accuracy) of the estimate.

Whilst Table 4 (Estimating Method by Estimate Level), sets out the required estimating methods to be used within the Department's estimates, Estimators should ensure that regardless of the method used, most of the effort should be directed to ensuring the accuracy of the 20% of items that often make up 80% of the costs.

The following list details the methods utilised within DIT estimates in a generally increasing confidence level:

2.5.1 Global Estimate (benchmark rates)

Global estimating (or "Order of Magnitude" estimating) describes an approximate or low order method of estimating involving the use of 'all in' or 'global' composite rates. The project could be considered as consisting of one or two estimating elements only and the estimate prepared on this basis. Examples are road cost per km and bridge costs per square metre of deck area.

Note: both global and composite estimating methods (as described in the following section) have been found to be unreliable in achieving the required levels of estimating accuracy. Consequently, these methods are used by the Department only for early strategic/Level 1 estimates. They are not to be used for estimates which are to be used for budgeting, delivery or media release purposes.

2.5.2 Composite Estimate

Composite estimating is a more refined version of global estimating, utilising rates which are inclusive of a combination of a number of work items to construct a single element of the project. The estimate is generally considered as having a small number of estimating elements only such as drainage, environmental works, or traffic management costs per kilometre or bridge costs per square metre of deck area.

2.5.3 Unit Rate Estimate (based on historic rates)

Unit rate estimating calculates the cost of each element of the project by multiplying the quantity of work by historical unit rates. The project cost is then determined by the sum of the elemental costs. The unit rate is normally determined from a careful analysis of unit costs of a number of recently completed projects of the same type, allowances being made for project differences. It is important that the project analysis recognises that the rates may include indirect costs such as contractor's

management, risk, overheads and margins, which must be adjusted when converting a unit rate to the direct cost rate.

Adjustments to be considered include, but are not limited to:

- Inflation;
- Site conditions (mountainous or flat terrain);
- Market conditions;
- On-site and off-site overheads and profit;
- Scale of works (large or small quantities);
- Site location (urban or remote);
- Design complexity (unique or routine);
- Risk profile of the ground type;
- Construction methods (specialised or conventional); and
- Specification of materials and finishes (architectural or plain finish).

Unit rate estimating is a relatively quick method of estimating but lacks precision, especially in the interpretation of what exactly is provided for in the unit rate. Accuracy of an estimate requires emphasis on scope, reflected in a comprehensive schedule of work items that is unique to the project. Unit rates can vary from project to project, but the use of the historical unit rate, adjusted by an experienced Estimator and applied to a detailed schedule, produces a more accurate estimate than a global estimate.

With a sufficient level of information in terms of the scope of the project, the work breakdown, quantities and careful selection of appropriate historical rates, the unit rate method of estimating is capable of producing a portion of the estimated costs within estimates prepared at Levels 2, 3 and 4.

2.5.4 Hybrid Estimate - Unit Rate/First Principles

The hybrid method uses some features of the unit rate method and some of first principles method, thereby increasing estimating accuracy above that of the unit rate method.

The estimate is completed in a similar manner to the first principles estimate, by the application of typical percentages for on-site and off-site overheads and profit to a direct job cost estimate compiled using a direct cost unit rate method.

A weakness of the method is that it relies on the availability of direct cost unit rates (that is rates which are equivalent to the direct job costs component of the first principles method before the distribution of indirect costs). These are often not available from industry unless the organisation itself carries out first principles estimating. Given the correct information, experienced Estimators can make an adequate analysis of a contractor's tender schedule and bring the costs back to a direct cost level. For example, a business case with limited project development detail uses first principles for high value, high risk items and unit rates for low risk items.

Hybrid estimating methods are utilised for the Departments estimates prepared at Levels 2, 3 and 4.

2.5.5 First Principles Estimate

The foundation of “first principles” estimating is the calculation of project-specific costs based on a detailed study of the resources required to accomplish each activity of work determined necessary in completion of the project and subsequently recorded within the project’s work breakdown structure.

Consideration needs to be taken of such things as, but not limited to:

- The physical site conditions likely to be encountered;
- The program of work;
- Site and project constraints;
- Work methods to be employed (including alternatives);
- Resource availability;
- Productivity of labour and plant;
- Wastage factors;
- Procurement of materials and subcontractors; and
- The risks likely to be encountered during the course of the project.

First principles estimating methods are utilised to an increasing degree within the Department’s estimates as projects/initiatives progress from Level 2 Preliminary Options Estimates through to Level 5B Implementation Estimates.

2.6 Required Estimating Methods

Table 4 provides details of the estimating methods and expected level of detail as per the work breakdown structure to be used for each estimate level (for definition of WBS levels see Table 3):

Table 4 – Estimating Method by Estimate Level

Estimate Level	Estimating Method	Work Breakdown Structure Level Presented in DIT Estimate Format
Level 1 Strategic Options Estimate	Global Estimate (benchmarks rates) / Composite Estimate / Unit Rates	WBS - A
Level 2 Preliminary Options Estimate	Hybrid Estimate: Unit Rates (nominally 90% of estimate value) AND First Principles (nominally 10% of estimate value)	WBS – A, B & C
Level 3 Preliminary Concept Estimate	Hybrid Estimate: Unit Rates (nominally 40% of estimate value) AND First Principles (nominally 60% of estimate value)	WBS – A, B & C
Level 4 Concept Estimate	Hybrid Estimate: Unit Rates (nominally 20% of estimate value) AND First Principles (nominally 80% of estimate value)	WBS – A, B & C
Level 5 Detailed Estimate	First Principles	WBS – A, B & C
Level 5A Principals Tender Estimate	First Principles	WBS – A, B & C
Level 5B Implementation Estimate	First Principles	WBS – A, B & C
Level 6 Actual Costs	N/A – Record / Comparison of Actual Costs only	WBS – A, B & C

Note: Where WBS Level C applies it is expected that the approximate percentage of first principles methods nominated above are used to prepare costs at WBS Level D. While a breakdown of items and costs at WBS Level D are not typically provided to DIT, Estimators are required to retain a complete copy of their first principles estimate including all labour, plant, materials, rates of production etc. along with the files used as the basis of risk calculations and any other aspects of the estimate, with these to be made available to the Department upon request

2.7 Estimate Build-up

The estimate is built-up by identifying rates and quantities for items associated with each of the following sections of the estimate. A comprehensive listing and further details of items to be considered in each section of the estimate is included in Appendix 6.

2.7.1 Client Costs (1.1 to 1.10)

Client costs are those costs incurred by the Department to conceptualise, develop, deliver and finalise a project. Costs include staff costs (project management, planning, design, estimating, environmental planning etc.), engaged consultancy costs, community consultation costs, Principal arranged insurances, levies, environmental assessment costs, other client costs, general DIT staff overheads and the like.

2.7.2 Land Acquisition (2.1 to 2.4)

Land acquisition costs associated with the procurement and/or modification of land and property that are to be paid for by the Department.

2.7.3 Services (By DIT) (3.1 to 3.5)

Services (by DIT) costs include any identification, protection, relocation or alteration, including any associated design costs, of infrastructure owned by public utilities which are to be paid by the Department outside of the head construction contract. Any costs relevant to services which are to be completed by or on behalf of the head contractor as part of the construction works are to be included within section 4.3 of the construction costs in order for applicable overheads and margins to be realised.

2.7.4 Construction Costs (4.1 to 4.18)

Construction costs include the direct cost of labour, plant and materials required to complete each activity, sub-activity or task associated with the construction component of the project.

2.7.5 Contractor's Design Cost, Overheads and Margin (5.1 to 5.4)

Includes the design costs, on site overheads (inclusive of recurring and non-recurring costs), off site overheads and margin associated with the construction contractor's management of the implementation of the project.

2.7.6 Contingent Risks (6.1)

Contingent risk items are identified and priced by the Estimator with ranging applied to derive low and high pricing in the same way as applicable for all line items within the base estimate.

For Level 1 estimates specific contingent risk items are not identified, these are instead assessed in conjunction with inherent risks using the relevant table as provided within section 2.9.

2.7.7 P50 & P90 Risk & Contingency (7.1 to 7.2)

This section includes calculated values for both inherent and contingent risk. Details regarding the assessment and calculation of these values are included in the following sections of this manual.

2.8 Inherent and Contingent Risk

For all estimates inherent and contingent risk are assessed together when determining P50 and P90 values using probabilistic methods (or equivalent P50 and P90 values where deterministic methods are used).

2.8.1 Inherent Risk

Inherent (or planned) risk is associated with the potential for variations in the assigned quantities and rates of each of the line items within the estimate. Project cost estimates cannot be confidently prepared using whole number quantity and rates values as in reality there are likely to be a range of quantities and rates which are possible for each line item due to the exact nature of the associated task along with variability in construction methodology and pricing between contractors. This is modelled as a +/- risk range on both quantities and rates of all items, with these ranges used to spread risk appropriately across each item to allow for statistical modelling (i.e. P50 and P90 calculations) to occur.

2.8.2 Contingent Risk

Contingent (or unplanned) risk relates to the risk associated with unmeasured items, i.e. those not included within the Base Estimate due to them being unknown in nature and having a less than 100% chance of occurring.

Items with no information, but which are known to form part of the project scope (e.g. they have a 100% chance of occurring) are to be included as line items within the Base Estimate and not rely on contingent risk items to make provision for them.

2.9 Calculation of Inherent and Contingent Risk Values

2.9.1 Estimate Level 1

Estimates at this very early stage are considered highly variable due to the large degree of uncertainty associated with the scope and timing of the works. As such they are intended to be used for the assessment and comparison of possible initiatives, they are not to be used to seek project funding.

For these estimates inherent and contingent risks are assessed by adjusting percentage values based on broad questions relating to the project as detailed within the following tables. Tables 5, 6 and 7 are applicable to road, rail and marine projects respectively. An electronic copy of this tool is included within EST 600-1 ([KNet #5751720](#)).

Table 5 – Total Risk Considerations, Level 1 Estimates (Road Projects)

Element	Factors		Highly Confident & Reliable	Reasonably Confident & Reliable	Not confident & Not Reliable	Selected Percentage (example only)
Project Scope	Are project objectives and performance criteria defined?	Yes V No Λ	2%	4%	6%	5%
	Are project scope assumptions and exclusions defined?	Yes V No Λ	2%	4%	6%	5%
	Are concept drawings available?	Yes V No Λ	3%	4%	6%	5%
Risks	Are significant risks (political, community, technical, financial) anticipated?	No V Yes Λ	2%	3%	4%	4%
	Has a detailed risk analysis been undertaken?	Yes V No Λ	3%	4%	6%	5%
	Has the project delivery / procurement method been determined?	Yes V No Λ	3%	4%	6%	5%
Constructability	Has a constructability review been undertaken?	Yes V No Λ	1%	2%	3%	3%
	Does the project involve complex staging of works?	No V Yes Λ	1%	2%	3%	3%
Key Dates	Have key dates been determined to enable the assessment of escalation / out-turn costs?	Yes V No Λ	1%	2%	3%	3%
	Is the project planned to occur in the short term?	Yes V No Λ	1%	2%	3%	3%
Site Specific Information	Have geotechnical, heritage, environmental, technical etc. specialists provided estimate input?	Yes V No Λ	1%	2%	3%	3%
	Have enabling works been identified and adequately allowed for in the estimate?	Yes V No Λ	2%	3%	4%	4%
Project Interfaces	Have external interfaces been defined and adequate costs allowed for within the estimate?	Yes V No Λ	1%	2%	3%	3%
	Is the project short? (<2km Short >5km Long)	Yes V No Λ	2%	3%	4%	4%
Total contingency percentage to be adopted for an estimate with a 90% confidence of not being exceeded			25%	41%	60%	55%
Total contingency percentage to be adopted for an estimate with a 50% confidence of not being exceeded <i>(assessed to be 40% of the Contingency percentage for a 90% confidence level of not being exceeded)</i>						22%
Notes:						
<ul style="list-style-type: none"> • No V denotes that if answer is No, decrease the contingency. • No Λ denotes that if answer is No, increase the contingency. • Yes Λ denotes that if answer is Yes, increase the contingency. • Yes V denotes that if answer is Yes, decrease the contingency. 						

Table 6 – Total Risk Considerations, Level 1 Estimates (Rail Projects)

Element	Factors		Highly Confident & Reliable	Reasonably Confident & Reliable	Not confident & Not Reliable	Selected Percentage (example only)
Project Scope	Are project objectives and performance criteria well defined?	Yes V No Λ	4%	5%	7%	6%
	Are project scope assumptions and exclusions defined?	Yes V No Λ	4%	5%	7%	6%
	Are concept drawings available?	Yes V No Λ	4%	5%	8%	7%
Risks	Are significant risks (political, community, technical, financial) anticipated?	No V Yes Λ	2%	3%	4%	4%
	Has a detailed risk analysis been undertaken?	Yes V No Λ	4%	5%	7%	6%
	Has the project delivery / procurement method been determined?	Yes V No Λ	4%	5%	7%	6%
Constructability	Has a constructability review been undertaken?	Yes V No Λ	1%	2%	3%	3%
	Does the project involve complex staging of works?	No V Yes Λ	1%	2%	3%	3%
Key Dates	Have key dates been determined to enable the assessment of escalation / out-turn costs?	Yes V No Λ	1%	2%	3%	3%
	Is the project planned to occur in the short term?	Yes V No Λ	1%	2%	3%	3%
Site Specific Information	Have geotechnical, heritage, environmental, technical etc. specialists provided estimate input?	Yes V No Λ	1%	2%	3%	3%
	Have enabling works been identified and adequately allowed for in the estimate?	Yes V No Λ	4%	5%	8%	7%
Project Interfaces	Have external interfaces been defined and adequate costs allowed for within the estimate?	Yes V No Λ	1%	2%	3%	3%
	Is the project short? (<2km Short >5km Long)	Yes V No Λ	2%	3%	4%	4%
Total contingency percentage to be adopted for an estimate with a 90% confidence of not being exceeded			34%	48%	70%	64%
Total contingency percentage to be adopted for an estimate with a 50% confidence of not being exceeded <i>(assessed to be 40% of the Contingency percentage for a 90% confidence level of not being exceeded)</i>						38%
Notes:						
<ul style="list-style-type: none"> • No V denotes that if answer is No, decrease the contingency. • No Λ denotes that if answer is No, increase the contingency. • Yes Λ denotes that if answer is Yes, increase the contingency. • Yes V denotes that if answer is Yes, decrease the contingency. 						

Table 7 – Total Risk Considerations, Level 1 Estimates (Marine Projects)

Element	Factors			Highly Confident & Reliable	Reasonably Confident & Reliable	Not confident & Not Reliable	Selected Percentage (example only)
Project Scope	Are project objectives and performance criteria well defined?	Yes V	No Λ	4%	5%	7%	6%
	Are project scope assumptions and exclusions defined?	Yes V	No Λ	4%	5%	7%	6%
	Are concept drawings available?	Yes V	No Λ	4%	5%	8%	7%
Risks	Are significant risks (political, community, technical, financial) anticipated?	No V	Yes Λ	2%	3%	4%	4%
	Has a detailed risk analysis been undertaken?	Yes V	No Λ	4%	5%	7%	6%
	Has the project delivery / procurement method been determined?	Yes V	No Λ	4%	5%	7%	6%
Constructability	Has a constructability review been undertaken?	Yes V	No Λ	1%	2%	3%	3%
	Does the project involve complex staging of works?	No V	Yes Λ	1%	2%	3%	3%
Key Dates	Have key dates been determined to enable the assessment of escalation / out-turn costs?	Yes V	No Λ	1%	2%	3%	3%
	Is the project planned to occur in the short term?	Yes V	No Λ	1%	2%	3%	3%
Site Specific Information	Have geotechnical, heritage, environmental, technical etc. specialists provided estimate input?	Yes V	No Λ	1%	2%	3%	3%
	Have enabling works been identified and adequately allowed for in the estimate?	Yes V	No Λ	4%	5%	8%	7%
Project Interfaces	Have external interfaces been defined and adequate costs allowed for within the estimate?	Yes V	No Λ	1%	2%	3%	3%
	Have impacts to commercial and/or recreational usage been adequately assessed/allowed for?	Yes V	No Λ	2%	3%	4%	4%
Total contingency percentage to be adopted for an estimate with a 90% confidence of not being exceeded				34%	48%	70%	64%
Total contingency percentage to be adopted for an estimate with a 50% confidence of not being exceeded <i>(assessed to be 40% of the Contingency percentage for a 90% confidence level of not being exceeded)</i>							38%
Notes:							
<ul style="list-style-type: none"> • No V denotes that if answer is No, decrease the contingency. • No Λ denotes that if answer is No, increase the contingency. • Yes Λ denotes that if answer is Yes, increase the contingency. • Yes V denotes that if answer is Yes, decrease the contingency. 							

Contingency allowances for these early estimates of road and rail projects are summarised as follows:

Table 8 – Summary of Contingency Allowances for Level 1 Estimates

Probability %	Range of Contingency Allowance
ROAD PROJECTS	
50%	10% to 24%
90%	25% to 60%
RAIL PROJECTS	
50%	20% to 42%
90%	34% to 70%
MARINE PROJECTS	
50%	20% to 42%
90%	34% to 70%

Note: The determination of a project to be either a road, rail or marine is to be made by the Estimator based on their perception of the predominant project type.

2.9.2 Estimate Levels 2 to 5B (Estimating Consultants)

For these estimates risk is assessed probabilistically using a computer program such as @Risk to sample the project cost with varying levels of confidence. This process requires the Estimator to assign cost and quantity ranges to each line item of the estimate (sections 1 to 5) along with a probability of their occurrence which when modelled (with the risk software) the resulting output provides P50 and P90 project values. In order to present the combined inherent and contingent risk values at P50 and P90, the Base Estimate value is deducted from the calculated P50 and P90 values.

In determining the ranges to apply in arriving at low and high values, Estimators should consider the output values as representing their opinion of a one in twenty occurrence (i.e. P5 and P95 respectively) with the resulting range for each cost element representing the possible variation and subsequent impact to the final cost if these variations were to occur, considering the impact of variances to both rates and quantities.

A probability of 100% is applied to each line item as by definition their inclusion in the base estimate means they are considered 100% likely to occur in completion of the project.

Contingent risk items (section 6) are then derived, where available this should include consideration of the items detailed within the project risk register. For each of the identified items likely rates and ranging values are to be applied in the same manner as for items in sections 1 to 5. Probability percentages are also applied to each of the risk items based on the Estimators perceived likelihood of the identified risk eventuating.

Note: It is important that the factors or influences that make up the recommended contingency amount are recorded in the Standard Estimate Template (either within Section 6.1 – Contingent Risk or on a separate/additional worksheet within the estimate). By providing a clear breakdown of the items which have been considered, their estimated costs along with details regarding the risk/assumption and the assigned ranges and likelihoods, those reviewing the estimate are provided with a view of what is forming the basis of the contingent risk value.

Having completed the derivation of contingent risk items and the assignment of inherent risk ranging and specific probabilities to these items, the probabilistic calculation of P50 and P90 project values is then undertaken using the chosen risk analysis software.

General rules for the probabilistic assessment of inherent and contingent risk values are as follows:

- Calculations are to be performed by experienced operators who have been trained in their chosen form of risk analysis software;
- It is recommended that for all projects calculations sample the project using no less than 5000 iterations;
- It is generally not acceptable to assign a 100% probability to any contingent risk items as this percentage suggests that an event is certain to occur and it should therefore be included as a line item within the base estimate;
- It is expected that Estimators will establish ranges based on their professional judgement and not simply apply a set variation percentage (e.g. +/-10%) for all estimate items; and
- To avoid optimism bias and over confidence, ranges should be both wide and biased toward the upside.

More detailed information regarding probabilistic contingency estimation and methods can be found within DITRDC Cost Estimation Guidance Note 3A.

2.9.3 Estimate Levels 2 to 5B (where prepared by DIT Staff)

For these estimates the range based deterministic method is used to assess both inherent and contingent risk. This process requires the application of low and high ranging to the assigned quantities and rates of each line item within the base estimate (sections 1 to 5).

In determining the ranges to apply in arriving at low and high values, Estimators should consider the output values as representing their opinion of a one in twenty occurrence (i.e. P5 and P95 respectively) with the resulting range for each cost element representing the possible variation and subsequent impact to the final cost if these variations were to occur, considering the impact of variances to both rates and quantities.

A probability of 100% is applied to each line item as by definition their inclusion in the base estimate means they are considered 100% likely to occur in completion of the project.

Contingent risk items (section 6) are then derived. Where available this assessment should include consideration of the items detailed within the project risk register. For each of the identified items likely rates and ranging values are to be applied in the same manner as for items in sections 1 to 5. Probability percentages are also applied

to each of the risk items based on the Estimators perceived likelihood of the identified risk eventuating. The following categories are to be considered when determining contingent risk values:

- **Performance and Functionality:** may include increased requirements such as traffic capacity, axle loads, design speed, etc., compared to what was originally described in project definition;
- **Third Party Influences:** may include requirements of service authorities i.e. delayed relocation works, unknown services identified during construction which require protection or alteration resulting in additional project costs etc;
- **Policy and Standards:** may include changes to the design and management requirements mandated by the Department through ongoing improvements in safety, and whole-of-life considerations;
- **Design Development:** may include increased costs resulting from greater work scope identified during the design process required to meet previously stated performance requirements. These increases are often incurred through lack of investigation, geotechnical and survey work. This category is not scope creep, i.e. it is not an increase in work requirement to meet previously given outcomes; and
- **Other:** may include any other potential project costs in excess of those identified in the above categories.

These key headings are to remain the same regardless of project size. However, it is anticipated that the level of detail and time spent in the identification, assessment and costing of unplanned risk items will increase in proportion with the value and/or risk of projects.

Having completed the derivation of contingent risk items and the assignment of inherent risk ranging and specific probabilities to these items, the range based deterministic calculation of equivalent P50 and P90 project values is then undertaken using the 'Johnson modification of the Pearson-Tukey formula' to each of the WBS Level C (as described in Table 3) section totals ,e.g. 4.4 Earthworks and Demolition. This formula is detailed as follows:

$$\frac{(3 \times L) + (10 \times ML) + (3 \times H)}{16 \times P}$$

Where: *L* = Lowest (or optimistic) estimated cost
ML = Most likely estimated cost
H = High (or pessimistic) estimated cost
P = Probability %

The sum of the resulting section totals is deemed to be the equivalent P50 value.

The equivalent P90 value is then determined through the following calculations which are shown in their respective order of occurrence. Of the following steps the first three calculations are undertaken for each section total (e.g. 4.4 Earthworks and Demolition), while the remainder are reliant on the outputs of these.

1. Approximation to Variance (AV):

$$(H - L) / 3.25$$

2. Skewness Adjustment (SA):

$$0.2 \times (((L + H) - (2 \times ML)) / AV) ^ 2$$

3. Variance (V):

$$((H - L) / (3.35 - SA)) ^ 2$$

4. Sum of Variance (SV):

Variance items (V) are summed for each of the section totals

5. Half of a Standard Deviation of the Sum of Variance (HSDSV):

$$SV ^ 0.5$$

6. Calculation of Equivalent P90 value:

$$P50 \text{ Value} + (HSDSV \times 1.2815515)$$

The application of the processes and formulas described above is automated within the relevant estimate template (EST600-3).

More detailed information regarding deterministic contingency estimation and the methods set out above can be found within DITRDC Cost Estimation Guidance Note 3B.

2.10 Program and Cash Flow

To assist in development of the Formal Estimate and to ensure an accurate representation of likely project timing and escalation costs, Estimators are typically required to prepare a project program and cash flow in addition to the estimate.

The summary worksheet of the estimate templates for Levels 2, 3, 4, 5 and 5B estimates contains an indicative cash flow which is to be completed for each estimate. Where a more detailed cash flow is required this may be sought via the Estimating Work Order. The EST 600-7 Cash Flow Template ([KNet #12245240](#)) provides a template that can be pasted within the summary worksheet of the estimate file to assist with the presentation of cash flow values.

Estimated cash flows should consider expenditure as having occurred at the time work is carried out rather than when a contractor's claim is submitted or payment is made.

2.11 Estimate Review Process

On completion of the estimate, Estimators are responsible for ensuring the review of estimates prior to their submission. Appendix 7 provides the steps that are required to be followed during the review of estimates. Any issues or errors identified by estimating consultants and/or those responsible for the preparation of estimates during this review are to be corrected prior to the estimate being submitted to the Principal Cost Manager (Estimating & Programming).

2.12 General Considerations in the Development of Estimates

2.12.1.1 Road Projects

Key components of road project costs and hence those where the greatest level of effort should be made by those developing scope and in-turn estimates typically include bulk earthworks, bridge structures, pavements, bituminous surfacing and service relocations/modifications. Factors such as the project's physical location, site working time constraints, minimum lane requirements and specific geotechnical features vary the rates of production and the subsequent unit rates which are ultimately derived for contributing items.

With the exception of items such as retaining wall components, drainage culverts, bridge beams and road furniture items there are typically few manufactured or proprietary items in comparison to rail projects. Most materials such as quarried fill and pavement materials are sourced as locally to the project as possible with the cost applied for the purchase of these items a key consideration in accurately determining the estimated project cost.

Another important factor in the determination of costs associated with road projects is that of the scope associated with public realm and landscape treatments that will ultimately be required. Examples of this include street trees, verge planting, street furniture and water sensitive design.

The procurement method to be utilised for the delivery of a project may also have a significant impact on the estimated delivery cost, as such estimating work orders provide a section for the anticipated procurement/delivery method to be detailed by those requesting estimates.

2.12.1.2 Rail Projects

The majority of rail projects tend to be associated with upgrade or duplication of existing rail infrastructure. Unlike roads, typically these projects incorporate a high proportion of manufactured items of a proprietary nature such as sleepers, track, turnouts, signalling and communications components, power equipment and rolling stock. Within operating rail networks works have to be planned around track possessions and as such estimates need to incorporate the often limited time available and/or specific considerations associated with an intense program of work.

When preparing estimates for rail projects Estimators should give specific consideration to factors such as, but not limited to:

- The constraints imposed by the operating rail and safety requirements;
- Working at night and/or during weekends;
- Specialist knowledge associated with the implementation of rail systems such as signalling and communications including requirements for interim staging and commissioning of the works; and
- Often narrow sites which provide limited physical access causing specific safety requirements that typically result in extended construction and overall program durations and a significantly higher proportion of indirect costs than would typically apply for road projects.

In addition to the above, the scope and therefore cost associated with connectivity adjacent stations (e.g. lifts, stairs, active pedestrian crossings etc.) to facilitate

patronage along with public realm and landscaping type requirements are also important considerations when preparing estimates for rail projects.

The procurement method to be utilised for the delivery of a project may also have a significant impact on the estimated delivery cost, as such estimating work orders provide a section for the anticipated procurement/delivery method to be detailed by those requesting estimates.

2.12.1.3 Marine Projects

Marine projects undertaken by the Department typically relate to the repair and/or upgrade of existing marine facilities. These projects will often require a high proportion of supply costs associated with the purchase of the associated steel and/or timber piles, crossheads, girders, walers, corbels, kerbing, decking, handrail etc items along with generally more complex and varied considerations as to the actual implementation/undertaking of works.

When preparing estimates for marine projects Estimators should give specific consideration to factors such as, but not limited to:

- The nature of the site and work varying the ability to complete the applicable works using either land and/or sea-based plant;
- The availability of specialist labour, sea-based plant, specific materials and the like;
- The effect of tidal movements, general weather conditions, shipping/general boat access and the like which may constrain the effective working time;
- Site specific environmental requirements and constraints; and
- The condition of existing infrastructure which may necessitate additional repairs/works to those anticipated.

The procurement method to be utilised for the delivery of a project may also have a significant impact on the estimated delivery cost, as such estimating work orders provide a section for the anticipated procurement/delivery method to be detailed by those requesting estimates.

2.13 Retention of Estimate Input Information

Estimators are required to retain all information used as the basis of their estimates along with any resulting outputs to allow for future revision of estimates, any required audits etc. The following key records to be retained include, but are not limited to:

- First principles estimate calculations, in particular those created within proprietary estimating software;
- Copies of marked up drawings (hard or soft copies) detailing assumed temporary works, tie-ins, pavement rehabilitation areas etc;
- Programs/schedules created within proprietary software; and
- Input data associated with risk calculations in order to enable probabilistic risk models to be re-run if necessary.

SECTION 3

Appendices

Appendix 1 – Information Requirements for Estimate Levels

In order to provide estimates that accurately represent the likely cost of a project it is essential that the Project Manager/Planner clearly determines the applicable scope of works for each option that is to be costed.

The level of detail that is available for each option will increase as the project proceeds through the Cost Estimating Framework. The following is a guide to the minimum level of documentation that should be made available for each estimate.

For Level 6 Actual Costs, values are to be recorded relative to each of applicable work breakdown structure items.

Estimate Level & Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 5A	Level 5B		
	Strategic Options Estimate	Preliminary Options Estimate	Preliminary Concept Estimate	Concept Estimate	Detailed Estimate	Principals Tender Estimate (priced schedules only)	Implementation Estimate		
1.0 CLIENT COSTS	Very limited project detail, estimate typically based on benchmark costs from similar previous projects (e.g. per site, per km, per m2)	First principles by Estimator based on anticipated project duration and staffing levels unless information otherwise provided on the Estimating Work Order			First principles client cost to be provided by estimate requestor either via the Estimating Work Order OR using EST600-5 First Principle Client Costs Estimate (KNet #5729453)	Not included		First principles client cost to be provided by estimate requestor either via the Estimating Work Order OR using EST600-5 First Principle Client Costs Estimate (KNet #5729453)	
1.1 Scoping Phase, Project Management									
1.2 Scoping Phase, Design and Investigation									
1.3 Development Phase, Project Management									
1.4 Development Phase, Design and Investigation									
1.5 Delivery Phase, Project Management									
1.6 Delivery Phase, Design and Investigation		Insurance Rate as provided by Principal Cost Manager (Estimating & Programming) via DIT Procurement & Contracting							As per Levels 2 to 5
1.7 Principal Arranged Insurances and Levies		Levies as advised by Project Manager/Planner or otherwise determined by Estimator							
1.8 Environmental Assessment	Estimator to price based on previous projects			Estimate requestor to provide Environmental Assessment type values as have been incurred/are anticipated to be incurred based on their work to date		Estimate requestor to provide Environmental Assessment type values as have been incurred/are anticipated to be incurred based on their work to date			

1.9 Other Client Costs		Estimator to price based on previous projects		Estimate requestor to provide details of associated scope and likely costs where available otherwise Estimator to price based on previous projects	Not included	Estimate requestor to provide details of associated scope and likely costs where available otherwise Estimator to price based on previous projects		
1.10 DIT Overhead Charge		Percentage as provided by Principal Cost Manager (Estimating & Programming) via DIT Finance				Percentage as provided by Principal Cost Manager (Estimating & Programming) via DIT Finance		
2.0 PROPERTY ACQUISITION	Very limited project detail, estimate typically based on Global Estimate (benchmark rates) / Composite Rates / Unit Rates from similar previous projects (e.g. per site, per km, per m2)	Indication of any areas likely to be acquired, Estimator to assess if values not yet available		Indication of areas likely to be acquired and preliminary cost advice from DIT's Acquisition Services group or the like	Clearly defined acquisition areas and full costing advice from DIT Property Section	Not included	Clearly defined acquisition areas and full costing advice from DIT Property Section	
2.1 Property Purchase Costs								
2.2 Transaction, Legal and Other Costs								
2.3 Business Compensation								
2.4 Property Modification								
3.0 SERVICES (BY DIT)								
3.1 Electricity								
3.2 Communications								
3.3 Gas								
3.4 Water and Sewer								
3.5 Other Services								
4.0 CONSTRUCTION COSTS								
4.1 Environmental Works			See 4.4 to 4.18					
4.2 Traffic Management			Anticipated traffic constraints such as the minimum through and turning lane requirements along with the times these restrictions will apply	Known traffic constraints including minimum through and turning lane requirements along with the times these restrictions will apply				
4.3 Services (if by Contractor)			See 3.0, Estimator to assess which portions of work likely to be performed by contractor and include here					
4.4 Earthworks and Demolition								
4.5 Retaining Walls								
4.6 Drainage								
4.7 Bridges								
4.8 Tunnels								
4.9 Pavement								
4.10 Bituminous Surfacing / Asphalt								
4.11 Secondary Pavements								
4.12 Pavement Marking								
4.13 Road Furniture								
			Assumed design relevant to category (less than nominal 5% design)	Assumed design relevant to category (nominal 5% design)	Preliminary design relevant to category (Nominal 15 to 30% Design)	Final Design Relevant to Category (to nominal 100% / IFC design)	As described within the tender documentation	Prices as tendered, substituted for estimated values in previous Level 5 estimate

4.14 Lighting		Assumed design relevant to category (less than nominal 5% design)	Assumed design relevant to category (nominal 5% design)	Preliminary design relevant to category (Nominal 15 to 30% Design)	Final Design Relevant to Category (to nominal 100% / IFC design)	As described within the tender documentation	Prices as tendered, substituted for estimated values within the previous Level 5 estimate	
4.15 Landscaping and Urban Design								
4.16 Traffic Signage, Signals and Controls								
4.17 Rail								
4.18 Other								
5.0 CONTRACTORS PRELIMINARIES AND SUPERVISION	Very limited project detail, estimate typically based on Global Estimate (benchmark rates) / Composite Rates / Unit Rates from similar previous projects (e.g. per site, per km, per m2)							
5.1 Design (if by Contractor)		Estimator to determine including consideration of construction duration effects on onsite overheads. Estimating Work Order to provide detail regarding the anticipated procurement method					Estimator to determine based on completion of the work described within the tender documents	Prices as tendered, substituted for estimated values in previous estimate
5.2 Overheads (Onsite)								
5.3 Overheads (Offsite)								
5.4 Contractors Margin								
6.0 CONTINGENT RISK	Assessed by Estimator					Estimator to include appropriate contractor risk within relevant section of tender schedules	Assessed by Estimator	
6.1 Contingent Risks								
7.0 P50 AND P90 RISK AND CONTINGENCY								
7.1 P50 Inherent and Contingent Risk								
7.2 P90 Inherent and Contingent Risk								

Appendix 2 – Estimating Work Order

While primarily intended as a means of formally requesting the services of estimating consultants from the Department's PSAESC, the Estimating Work Order also aims to identify and record key project information and considerations which form the basis of the estimate.

The following information is to be recorded within the estimate file using the format provided within the Estimating Work Order:

- Drawings and Documentation – type, description, KNet number, KNet version.
- General Overview – broad statement regarding the project and its scope.
- Project Objectives – what the project is aiming to provide, e.g. additional through lanes, reduce particular accident types.
- Performance Criteria – includes functional requirements such as increased intersection/road capacity, increased design speed limits, pavement life etc.
- Option Number and Title – specific to each option details regarding:
 - Extent and limit of work.
 - Scope of work.
 - Client costs.
 - Property acquisition.
 - Services work.
 - Environmental assessment.
 - Option exclusions.
- Known Risks and Constraints.
- Milestone Dates.
- Procurement/Delivery Method.
- Other Project Information.
- Required Estimating Deliverables.

The Estimating Work Order template (EST 600-4) can be found at [KNet #4479522](#).

Where estimating services are to be procured separately to the PSAESC, either as deliverables associated with a planning study or for some other requirement, the alternative Estimating Work Order (EST 600-4.1 Estimating Work Order, Estimates Procured via Designers, [KNet #17537788](#)) is to be used in place of EST 600-4. In this occurrence the Departmental representative requesting the estimate is required to work with the relevant Planning/Design Consultant or the like to develop the Estimating Work Order, including seeking the applicable estimate number from the Principal Cost Manager (Estimating & Programming) or their delegate. Upon completion of this work order the Planning/Design Consultant is required to provide the document to Estimator for them to use in the same manner as the standard work order previously detailed above.

Appendix 3 – Procedure for Duplicate Estimates

Duplicate estimates are not required for each level of estimate but can be requested by the Project Manager/Planner at any time. However, for projects with a total P90 Project Estimate (real \$) which is anticipated to be in excess of \$25 million, duplicate estimates are recommended prior to seeking project funding.

The recommended process for the preparation of duplicate estimates is as follows:

- 1) Having identified that the estimated P90 Project Estimate is likely to exceed \$25 million (or for any projects where additional confidence in the estimate is required) the Project Manager/Planner completes the relevant section of the Estimating Work Order requesting the provision of a duplicate estimate. Two Estimators will then be assigned to the task and invited to attend a single Estimate Commencement Meeting, with the prefixes OE and DE assigned in order to differentiate between the deliverables of the two estimators.
- 2) The selected Estimators attend a single combined meeting to discuss the project, its objectives, scope, constraints, etc., and the deliverables that are to be provided. To ensure that the final estimates provide useful comparisons, clear option boundaries and any project considerations which may impact the approach used and subsequent estimating deliverables are to be discussed and a common approach agreed at this meeting. Project Managers/Planners are to ensure that both parties receive identical information as the basis of their subsequent estimates.
- 3) Estimators prepare their individual estimates based on the project details and constraints that have been provided. Where either estimator seeks clarification from the Principal Cost Manager (Estimating & Programming) and/or Project Manager/Planner during the process of preparing the estimate, responses are to be communicated to both estimators to ensure consistency is retained.
- 4) Both estimates are reviewed in accordance with the Estimate Review Process (see Appendix 7).
- 5) Where DIT consider necessary, Estimators may be invited to attend a joint meeting to discuss variations between their individual estimated costs. This will typically include discussion around any key areas of variance in the estimated costs at the summary level along with, as appropriate, variances on assumed construction methodologies, constraints, assumptions and inclusions/exclusions.
- 6) Following the joint meeting noted in the previous step, one or both of the Estimators may be requested to revise their estimate(s). Alternatively one of the Estimators may subsequently be asked to prepare a reconciled estimate incorporating agreed methodologies, rates and scope items. Where this approach is used, once completed this Estimator shall seek endorsement from the other Estimator prior to the submission of the reconciled estimate.
- 7) The completed estimate(s) shall again be subject to the Estimate Review Process (see Appendix 7) with the Principal Cost Manager (Estimating and Programming) or

Project Manager/Planner requesting any further reviews/updates from the Estimator(s) as deemed necessary.

- 8) At the completion of the review process all relevant estimate values are to be provided to the Senior Responsible Officer to aid in the decision as to which values to adopt as the current project estimate and subsequent to this for use in the calculation of any applicable escalation.

At the discretion of the Senior Responsible Officer, Project Manager/Planners may opt to have a concurrence review undertaken in place of a Duplication. See section 1.9 for information regarding the use of a Concurrence Review.

Appendix 4 – Numbering Convention of DIT Estimates

To accurately track projects as they move through the levels of the Cost Estimating Framework the following number convention has been devised:

EXAMPLE: 2503 OE L4 R3

In the above example:

2503 The number allocated to the project option estimate for proposed works at a given site, which for this example notes the project as being 2503 in the database of project estimates. Typically this number will remain with the site/project unless an entirely different scope of work/objective is being considered.

OE Indicates that the estimate is an Options Estimate. An unlimited number of options may be included within the single estimate file. The inclusion of all project options estimates within the single file ensures that the cost and scope of each of the various options being considered for a single project are readily comparable along with being more easily stored, retrieved and communicated within DIT.

Within estimate files specific options are to be designated throughout using the same option numbers which have been allocated on any relevant drawings/documentation.

Where a duplicate estimate is requested, OE is to be substituted with DE by one of the Estimators as directed by the Principal Cost Manager (Estimating & Programming).

The Formal Estimate form within the Options Estimate file will be labelled with FE in place of OE (or DE in the case that the duplicate estimate is formalised).

L4 Is the level of the estimate as per the Cost Estimating Framework. As such, entries are limited to ranging from L1 to L6 as a project progresses through the framework from a strategic estimate to actual costs. Level 0 (L0) will be assigned to other estimating tasks/services which do not specifically belong to one of the other estimating levels (e.g. cost advice, value for money assessment, variation cost assessment, concurrence reviews, program reviews etc.)

R3 This number represents the revision of the Options Estimate. For this example the file would be the third revision of the estimate. As an endless number of revisions may be made for a particular estimate this number is unlimited but must always start with the prefix R.

Importantly Estimators must:

- Compile all estimate options for a project in a single estimate file, ensuring that if additional options are added that the revision number continues to increase rather than reverting to R1.
- Ensure that as an estimate for a given project progresses to a subsequent estimate level that the revision number reverts to R1.
- Label the first estimate issued to the Department at each estimate level as R1.

- Sequentially apply new revision numbers to each revised estimate that is to be issued to the Department. Revision numbers are to only be increased at the point where estimates are issued to the Department, they are not to apply to an Estimators own internal reviews or for any other purpose.

All estimates are to be recorded and labelled using this numbering convention.

Appendix 5 – Completing the Standard Estimate Spreadsheet

All estimates are to be presented using one of the following Standard Estimate spreadsheets.

- EST 600-1 [KNet #5751720](#). For estimates at Level 1.
- EST 600-2 [KNet #5751722](#). For estimates at Levels 2, 3, 4, 5 & 5B where prepared by estimating consultants. *Note: typically these estimates will be prepared using proprietary estimating software and transferred to the template. A complete copy of the first principles estimate including all labour, plant, materials, rates of production etc. along with the files used as the basis of risk calculations and any other aspects of the estimate are to be retained by the Estimator and made available to the Department upon request.*
- EST 600-3 [KNet #5751723](#). For estimates at Levels 2, 3, 4, 5 & 5B where prepared by DIT staff.
- EST 600-8 [KNet #9683206](#). Used for recording actual project costs (Level 6) and comparing these with estimates, further details regarding the use of this template can be found in section 2.2.4.

Each of the Standard Estimate Spreadsheets consists of several worksheets. The following worksheets are included in the spreadsheets and require input by the Estimator. *Note: The inclusion of these worksheets varies between spreadsheets, not all worksheets exist in each spreadsheet.*

- Formal Estimate;
- Cover Sheet;
- Scope, Risk, Calculations – All Options;
- Scope, Risk & Methodology;
- Summary Sheet;
- Calculation Sheet;
- Inherent & Contingent Risk – Option X (Road);
- Inherent & Contingent Risk – Option X (Rail);
- Inherent & Contingent Risk – Option X (Marine); and/or
- Inherent & Contingent Risk Output.

The requirements for completing each worksheet are detailed as follows:

Formal Estimate

Project Managers/Planners are required to complete this form in accordance with Appendix 8. DIT staff preparing estimates should complete this form as part of preparing the estimate. Estimating consultants are not required to enter any details on this form.

Cover Sheet

Common to all estimates regardless of estimate level or Estimator, the Cover Sheet requires Estimators to:

- **Estimate No.** – enter the estimate number as provided on the Estimating Work Order (or as otherwise provided by the Principal Cost Manager (Estimating & Programming) or their delegate). This entry is automatically transferred to each of the other worksheets. The revision number is to be updated for each subsequent revision and all revisions must be issued to DIT. A detailed description of the numbering convention to be applied is included in Appendix 4.
- **Project Name** – enter the project name using words identical to those which have been provided on the Estimating Work Order to allow the project to be consistently recorded and tracked. This entry is automatically transferred to each of the other worksheets.
- **Date Prepared** – enter and update this cell to reflect the date of the current estimate revision. Where estimate revisions occur over a period of time it is the responsibility of the Estimator to ensure that all rates used within the estimate are current. This entry is automatically transferred to each of the other worksheets and is used as the basis of the 'Year \$ Values' which are also presented on this page of the worksheet.
- **KNET No.** – do nothing. Once the estimate is received and saved to the Departments document management system (KNet), the Principal Cost Manager (Estimating & Programming) or their delegate will enter the relevant KNet file and version number in this cell to facilitate future internal identification and retrieval of the estimate. The entry in this cell (#XXXXXXXX (Version #X)) is to be retained by estimating consultants.
- **Estimate Level** – indicate by placing an 'x' under the appropriate level description as has been set out in the Estimating Work Order. This entry varies the estimate type as detailed in the top row of the worksheet. The resulting entry is automatically transferred to other worksheets.
- **Basis** – unless otherwise requested, no action is required and this should remain as 'Cost to Complete'. Occasionally Project Managers/Planners will require previous expenditure associated with former studies or the like to be realised (requiring them to provide details of the relevant items and values), in this occurrence the entry is to be updated to 'Total Project Cost'. In the case that only an estimate of construction costs (i.e. sections 4 and 5) are required this entry is to be updated to 'Construction Cost Only'. For Strategic Options Estimates 'Total Project Cost' shall be used.
- **Year \$ Values** – do nothing. This cell of the worksheet is automated based on the 'Date Prepared' entry as detailed above. It displays the current year of the Options estimate to indicate the base estimate date for future escalation considerations.

- **Option & Brief Option Description** – enter the option number and brief option description as specifically detailed on the Estimating Work Order, option numbers should align with those shown on the relevant drawings. These entries are automatically transferred to each of the relevant summary and calculation worksheets to provide clear detail as to which option they represent. Where new worksheets are added relevant formulas will need to be adjusted within individual worksheets to detail the relative option number and title.
- **Review Information** – following completion of their roles within this process the Estimator and Estimate Reality Checker (and the Additional Reviewer where applicable), are required to complete each of the relevant cells prior to the estimate being submitted to the Department. Likewise the Principal Cost Manager (Estimating & Programming) and the Project Manager/Planner are also required to enter their details following their review of the estimate.

Reviews are to be completed for each estimate revision.

A detailed description of the Estimate Review Process is provided within Appendix 7.

- **Revision Status** – for each revision of the estimate the applicable revision number, the date of the revision and a broad description of what the revision involved is to be recorded.

Scope, Risk, Calculations – All Options

Applicable to Level 1 estimates only, the Scope, Risk, Calculations – All Options worksheet requires Estimators to:

- **Project Objectives** – detail the key objectives of the project.
- **Project Scope** – clearly detail the anticipated project scope including the anticipated project length, number of lanes, land and services impacts, extent of any structures (e.g. bridges, tunnels etc.) and the like.
- **Project Assumptions / Risks** – record details of all assumptions made and risks identified in the development of the estimated cost.
- **Project Exclusions** – record details of any specific project exclusions. Importantly estimators should note that all items identified as being necessary in the completion of the project are to be included. It is not appropriate to simply exclude components of the work, e.g. services or land acquisition due to uncertainty associated with their cost.
- **Basis of Cost Advice** – enter details of the costs used as the basis of the high-level rates applied to the estimate. Typically these will be values that have been benchmarked from previous project estimates or actual costs, with these adjusted to account for site specific variances, cost escalation and the like.

- **Strategic Cost Advice for Project** – enter relevant details and applicable rates. This is the main area in which costs are developed, typically this will include \$/m² or \$/km rates from previous projects as is described in the previous dot point.
- **Addition of Inherent & Contingent Risk** – using either the ‘Inherent – Contingent Risk (Road) Option X’, ‘Inherent – Contingent Risk (Rail) Option X’ OR ‘Inherent – Contingent Risk (Marine) Option X’ worksheet, the estimator is to apply percentages within Column I for each of the risk items based on their level of confidence and reliability in the information used as the basis of the estimated cost. The entries made within these worksheets will derive the risk values which as a result are applied to this section of the estimate.
- **Anticipated Project Cash Flow** – enter annual estimated annual cash flow percentages, with these percentages forming the basis of values used on the calculation of escalation values in the following section.
- **Addition of Cost Escalation** – do nothing, no entries are required by the Estimator. These values are determined by the escalation rates applied in the following section.
- **Annual Cost Escalation Rates** – using the annual escalation rates found within [KNet #4624055](#), determine the estimated out-turn cost of the project. This worksheet provides annual cost escalation percentages both State and Federal funded projects. Estimators should note that where projects are anticipated to include any degree of Federal Government funding that alternative rates will apply, these alternative values can be found within the same document.

Scope, Risk & Methodology of Estimate

Applicable to Level 2, 3, 4, 5 & 5B estimates only, Estimators are required to complete the following details within the Scope, Risk & Methodology of Estimate worksheet as follows:

- **Reference Documentation** – copy and paste the details of reference documentation, being the ‘drawings and documentation to be provided to the Estimator’ from the Estimating Work Order. Where additional documentation is provided during the course of completing the estimate, including for subsequent revisions, details of such information must also be recorded by the Estimator.
- **Client Description of Scope as Provided on the Estimating Work Order** – copy and paste details the ‘project information’ as provided in the Estimating Work Order. Where a work order is not provided, Estimators are required to enter ‘Not Provided – Estimators understanding of project details is as follows’ prior to them entering details regarding the overview, objectives, performance criteria etc. as would otherwise typically be provided via the Estimating Work Order. Where this occurs those preparing the estimate are responsible for sourcing the relevant details for inclusion in the estimate file.

- **Estimator's Record of Additional Information Subsequent to the Estimating Work Order** – record details of specific scope information obtained subsequent to that provided on the Estimating Work Order. It is anticipated that entries in this section will typically result from the Estimator requesting items of information which had not been previously identified or provided by the Project Manager/Planner.
- **Estimator's Methodology, Assumptions, Risks, Opportunities and Exclusions** – for each of the options included in the estimate file, enter information specific to each of the headings provided. This section should be considered as providing the Project Manager/Planner (and any others who may view the estimate) with a snapshot of key scope details, construction methodologies, durations, assumptions, risks and opportunities which have been considered in the build-up of the estimate, along with specific exclusions and areas where additional detail would allow the estimate to be further refined.

Entries in this section should generally be able to be taken directly from where they have been recorded in the calculation worksheet(s), with these entries tailored to them being read as part of this page.

Summary Sheet

Applicable to Level 2, 3, 4, 5 & 5B estimates only, the Summary Sheet is automated to record summary data from the calculation worksheet. Estimators must not change the format or names of standard items within this worksheet. The format provided is used to enable cost reporting and to allow for internal benchmarking comparisons of project component costs and percentages with projects of a similar type and magnitude to be made.

With the exception of the indicative cash-flow which commences at row 107, this worksheet requires no input from Estimators. For this section (row 107 onwards) all project values are to be assumed as occurring within Year 1, the only exception being where costs are attributable to previous years and/or the Estimator determines that the project duration will exceed one year. In the event that costs are anticipated to be incurred over more than one year it is anticipated that a more detailed cash flow will be sought by the Project Manager/Planner through the completion of the relevant part of the Estimating Work Order.

A cash flow template (EST 600-7 [KNet #12245240](#)) is available for Estimators to paste within this worksheet as a means of detailing the cash flow which they have determined.

Calculation Sheet

Applicable to Level 2, 3, 4, 5 & 5B estimates only, the Calculation Sheet is where project specific items, quantities, costs, comments, risk ranges (for both quantities and rates) and contingent risk items are to be recorded by the Estimator.

The estimate is built-up by identifying each of the items relevant to the delivery of the given project scope and including them within the appropriate section based on the DIT standard Work Breakdown Structure prior to the calculation of associated quantities and rates. In addition to this, low (or optimistic) and high (or pessimistic) ranging is applied to the

identified quantity and rate for each line item of the estimate. A probability percentage is also assigned for contingent risk items (*Note: probability percentages are deemed to be 100% for all items in section 1 to 5*).

Appendix 6 details the Departments Standard Work Breakdown Structure which includes a comprehensive listing of items to be considered for each of the following sections contained in the Calculation Sheet.

- **Client Costs** – Client costs are those costs incurred by the Department to conceptualise, develop, deliver and finalise a project. Costs include staff costs, engaged consultancy costs, some design costs, some insurances, some environmental costs, other client costs and the DIT overhead charge.
- **Land Acquisition** – Costs associated with the procurement and modification of land and property that are to be paid for by the Department.
- **Services** – Services costs include costs associated with identification and relocation and/or alteration of infrastructure owned by public utilities which are procured directly by the Department. Where service relocations are managed and/or undertaken by DIT these are included at section 3.0, where they are undertaken as part of the head contract or as a separate early works contract these are included within section 4.3 of the construction costs to ensure that appropriate contractor overheads and margin are also applied to their cost.
- **Construction Costs** – Construction costs (direct costs) include the direct cost of labour, plant and materials required to complete each activity, sub-activity or task associated with the construction component of the project.
- **Contractor's Preliminaries and Supervision** – Contractor preliminaries and supervision (direct and indirect costs) include allowances for the indirect job costs that contractor's require to manage and supervise the project. Where the project requires contractors to undertake design (e.g. a design and construct or an alliance type contract) these costs are also recorded within this section.
- **Risk and Contingency** – Includes items for both inherent and contingent risks applicable to the scope of work considered within the project estimate.

Commensurate with the approach set out within Table 4 of this manual, all items are to be adequately detailed with the calculation worksheet(s) of the estimate file. Regardless of estimated costs being developed based on an assumed or defined scope of works, the associated line items are to be clearly detailed and priced accordingly. As an example, for drainage items the quantities and costs associated with kerbing, culverts, headwalls and the like are to be individually presented, they must not be combined into a single item and price which provides no specific scope or cost information to reviewers or future users of the estimate.

Estimators should note that all estimates are to be prepared exclusive of GST.

Inherent and Contingent Risk Table

The Inherent and Contingent Risk Tables (Road, Rail, Marine) are provided for use in Level 1 estimates only. Details regarding the use of this table are included within the

above Scope, Risk, Calculations – All Options section. Additional details can also be found within Section 2.9.1 of this manual.

Inherent and Contingent Risk Output

The Inherent and Contingent Risk Output worksheet is provided for estimates completed by estimating consultants for Level 2, 3, 4, 5 and 5B estimates only. The Estimators are required to paste a screen shot of the output which results from their probabilistic risk assessment software.

Estimators should note that all inputs used to generate the resulting risk values are to be retained for future estimate revision and review requirements.

Appendix 6 – Standard Work Breakdown Structure Items and Content

The following work breakdown structure is to be used by Estimators when determining the allocation of all items within DIT estimates.

Section 1 – Client Costs

Client costs are to be developed using a first principles approach which considers the number, duration and subsequent cost of DIT staff and any consultants that are likely to be associated with the completion of tasks relevant to each of the client cost activities listed against items 1.1 to 1.6 below.

To assist in the preparation of these costs using first principles the following template has been developed: EST 600-5 First Principles Client Costs Estimate ([KNet #5729453](#)).

Figure 1 of this manual provides a visual representation of estimate levels relative to each of the Departments Project Lifecycle Phases and Assurance Gates.

Client cost phases are defined as follows:

Scoping Phase

Scoping phase costs are those incurred during the investigation of specific project options during the project Proving Phase, often as part of a specific planning study which leads to the identification of the preferred project option(s) and P50/P90 estimate(s) in out-turn dollars against a proposed timeframe for their delivery. The work completed during this phase concludes with the preparation of a Final Business Case for the delivery of the preferred project option/solution.

Estimators are to typically consider these costs as those incurred in developing projects and their estimates through Levels 2, 3 and 4.

Note: Estimates at Level 1 are used to undertake the initial cost assessment of strategic initiatives. They are not used to seek project funding and are not deemed to typically incur costs against proposed or allocated project budgets, as such associated costs are not included within estimates.

Note: For all estimates, costs associated with the scoping phase are typically not included unless they are project specific, can be readily applied to the total project cost and will be incurred or are necessary to be recovered in completion of the project.

Development Phase

Development phase costs are those costs associated with detailed planning (environmental approvals, land acquisition, community consultation etc.) and design (field studies, preliminary detailed design, estimates etc.) to develop and finalise the preferred/approved project option which has resulted from the Final Business Case as this progresses through the Pre-Delivery and Procurement Phases to the point where a tender is awarded for its delivery.

The final estimate is to be based on the fully completed design (Construct Only contracts) or to a reasonable preliminary stage (Design and Construct, Early Contractor Involvement, Alliance type contracts).

This phase may include preliminary construction works (e.g. relocation of services, road network upgrades etc.) that may proceed the main contract, although it is possible that some such work/costs may be occur at various points during the subsequent Delivery Phase.

Estimators should typically consider these costs as those incurred in developing projects and their estimates at Level 5, 5A and 5B.

Delivery Phase

Delivery phase costs represent those associated with management and supervision of the contractor(s) appointed for the construction/delivery of the project and the subsequent handover of the completed project to the asset owner.

Regardless of the phase to which they apply, potential client cost activities include, but are not limited to the following:

1.1 Scoping Phase - Project Management

- Mobilisation / Demobilisation of People
- Project Administration
 - Project Manager
 - Project Engineer
 - Services Engineer
- Community Liaison
 - General Communications
 - Forum Facilitation
 - Presentation Materials
- Management Support Activities
 - Document Control System – Fixed Costs
 - Document Control System – Monthly Hosting Fees
 - Document Controllers
 - Risk Workshop Facilitation and Venue Costs
 - Construction Methodology Workshop Facilitation and Venue Costs
 - Request for Price / Tender Workshop Facilitation and Venue Costs
 - Value for Money Workshop Facilitation and Venue Costs
 - Project Audits
 - OH&S Activities (advice, audits, inspections etc.)
- Consultant Fees. Applicable to any services provided by consultants (if by DIT staff included at 1.10), including but not limited to:
 - Contract Management
 - Contract Administration
 - Environmental Assessment and Approval
 - Estimating Consultants

- Constructability Consultants
- Programming/Scheduling Consultants
- Construction Verification
- Community Consultation
- Fees and Approvals
 - Project Fees
 - Legal Fees
 - Commissioning and Handover Costs

1.2 Scoping Phase – Design and Investigation

- Consultant Fees. Applicable to any services provided by consultants including but not limited to:
 - Planners
 - Specialists
 - Investigations
 - Traffic Counts and Data
 - Traffic Modelling
 - Boundary Survey
 - Engineering Survey
 - Identification of Services
 - Vegetation Survey
 - Environmental Assessment
 - Structural
 - Geotechnical
 - Pavement Testing and Design
 - Hydraulic
 - Property Section Costs
 - Design Verification
 - Road Safety Audits

Note: If these services are provided by DIT staff their cost will typically be accounted for within these are included within Section 1.10 DIT Overhead Charge.

1.3 Development Phase – Project Management

See items under 1.1 Scoping Phase – Project Management

1.4 Development Phase – Design and Investigation

See items under 1.2 Scoping Phase – Design and Investigation

1.5 Delivery Phase – Project Management

See items under 1.1 Scoping Phase – Project Management

1.6 Delivery Phase – Design and Investigation

See items under 1.2 Scoping Phase – Design and Investigation

1.7 Principal Arranged Insurance and Levies

1.7.1 Principal Arranged Insurance: This figure represents a levy which is charged to the majority of the Department's construction projects to recover the costs associated those insurances which are provided by the Principal.

Estimators will be required to calculate a value for Principal Arranged Insurance based on a cent per dollar amount (as provided by the Principal Cost Manager (Estimating & Programming) which is applied to the Section 2.4 (Property Modification), Section 3 (Services), Section 4 (Construction Costs) and Section 5 (Contractors Preliminaries & Supervision) costs. This figure is revised annually by the Principal Cost Manager (Estimating & Programming) based on the advice values provided by the Department's Procurement and Contracting Section.

Principal Arranged Insurances are deemed to indemnify DIT against the legal liability to pay damages or compensation in respect to:

Construction Costs - Public Liability

- Death
- Personal Injury
- Property Damage
- Advertising Injury

Sustained as a result of an occurrence within the Territorial Limits in connection of the Business:

- During the construction period or defects liability period in respect of the insured operations
- During the period of insurance in respect of the insured services
- During the period of insurance in respect of the insured products and/or completed operations

In addition, insurers will pay defence and other costs.

Additional insurance costs apply for projects where:

- The estimated contract value exceeds \$500,000,000
- For the following projects:
 - Tunnels
 - Airport (Tarmac, Taxi or Runway)
 - Offshore Work
 - New Dam Construction & Infrastructure
- The original estimated construction period for the contract exceeds 36 months

Construction Risks – Material Damage

Provides insurance for:

- Contract Works – property of every description used or to be used in part of or incidental to the insured operations. Includes, but is not limited to:
 - The whole of works whether permanent or temporary, structures, materials and supplies
 - Temporary buildings, all other project buildings and their contents

- Formwork, falsework, scaffolding, access platforms, hoardings, mouldings and the like whether consumable or reusable
- Consumables, drawings and other documents

But excluding:

- Construction plant and equipment and existing property not specified above AND all construction plant, tools and equipment of every description including spare parts, employee's tools, equipment and personal property at a worksite
- Existing structures – existing buildings, structures, plant, contents and real property of every description situated at a worksite

Additional insurance costs apply for projects where:

- The estimated contract value exceeds \$250,000,000
- For roadworks contracts, the estimated contract value exceeds \$100,000,000
- For pipelines contracts, the estimated contract value exceeds \$100,000,000
- For bridge contracts, the estimated contract value exceeds \$30,000,000
- For tunnelling contracts (excluding HDD techniques), the estimated contract value exceeds All values
- For tunnelling contracts (HDD/Trenchless techniques), the estimated contract value exceeds \$5,000,000
- For wet civil contracts, the estimated contract value exceeds \$15,000,000
- Rail projects, the estimated contract value exceeds \$125,000,000
- For desalination plants, the estimated contract value exceeds \$100,000,000
- The original estimated construction period for the contract exceeds 36 months.

1.7.2 Project Fees and Levies: Costs associated with the payment of fees or levies to other State or Local Government bodies (or similar) are to be included within this section.

1.8 Environmental Assessment

DIT projects are required to be assessed for potential environmental impacts in accordance with Environmental Approval Procedures, Environmental Instruction 21.1 ([KNet #1645388](#)). Those responsible for implementation of a project are required to ensure that an Environmental Impact Assessment has been undertaken and that all necessary approvals have been obtained.

Environmental Impact Assessment (EIA) is a process for the orderly and systematic evaluation of a project, including its alternatives and objectives and their effect on the environment, including the mitigation and management of those effects. Environmental issues should be considered from the early concept development stage through to detailed planning and design, delivery, handover and where appropriate, decommissioning phases of the project.

Environmental assessment and approvals typically consider tasks and in turn costs that may be associated with the following categories:

- Environmental advice and coordination: Seeking external environmental technical advice, coordinating the procurement of technical services and collating information which contributes to the Preliminary Environment Impact

Report, Environment Impact Assessment or similar public documents, development of contract specific requirements and/or the provision of surveillance of environmental risks on site during the delivery phase

- Vegetation: The identification and assessment of vegetation that will be impacted by the works in order to recognise and where necessary obtain approvals under State and Commonwealth legislation to remove and offset this vegetation
- Contamination: The assessment of excess spoil for re-use onsite and/or offsite disposal against the requirements of the Environment Protection Authority
- Landscape: Consultation with relevant stakeholders to arrive at an agreed design for landscape works to be delivered on site
- Noise/Vibration: Noise and vibration modelling to ascertain impact of the works along with preparation of mitigation plans
- Air Quality: Typically only applicable to large scale projects, this assessment is generally only applicable if there are significant changes to traffic volumes, traffic composition, proximity to sensitive receivers and if the proposal includes the construction of a tunnel, the air quality assessment assesses predicted air quality parameters and potential build-up of fumes against the National Environment Protection measures
- Aboriginal Heritage: Obtaining legal advice in relation to Native Title and Aboriginal heritage matters, engaging a heritage consultant to assist with identification of high-risk areas, the preparation of a heritage management plan, facilitating consultation with traditional owners and obtaining approvals under the Aboriginal Heritage Act
- European Heritage: Relevant dilapidation surveys and obtaining statutory approvals prior to works commencing. Environment, Protection, Biodiversity and Conservation (EPBC) referrals may also be applicable
- Water Quality: Project impacts on water quality, identifying opportunities for incorporating stormwater sensitive design principles including treatment systems and the like. The preparation of an erosion management plan and water quality monitoring may also be applicable
- Fauna: The assessment of impacts on fauna, obtaining approvals for impacts on nationally protected species and mitigation through redesign and/or monitoring through delivery of landscape or payment of SEB offsets
- Sustainability: Projects with a construction cost in excess of \$4 million (excluding GST) are required to be submitted to Public Works Committee and Cabinet for approval. A Sustainability Management Plan is required to be submitted as supporting documentation. Projects with an estimated construction cost over \$11 million (excluding GST) are required to be assessed using the Infrastructures Sustainability (IS) Tool which will include a once off registration fee
- Climate Change: Includes assessing the climate change impacts on infrastructure in accordance with the Climate Change Adaptation Guidelines for Asset Management Guideline. Climate Change risk could result in change

to types of materials used and design consideration from early planning stages (e.g. height of bridges, jetties and coastal projects)

Project Manager/Planners should endeavour to obtain applicable cost information relevant to any of the above categories for use by Estimators within this section of the estimate.

Note: Any physical measures/on site requirements associated with the implementation of measures resulting from these assessments are to be included within the relevant section of 4.0 Construction Costs.

1.9 Other Client Costs

Other client costs include those which cannot otherwise be attributed to a relevant section of the estimate. Examples of these costs include, but are not limited to:

- Testing and Commissioning – generally applicable only to rail projects this includes costs incurred in commissioning, driver training, rail operator costs and the acceptance of the works which are in excess of those within sections 4 and 5
- Possession and Bussing – typically these are costs associated with the suspension of rail operations and supply of alternative travel arrangements (usually bussing) while construction works are undertaken

1.10 DIT Overhead Charge

The DIT overhead charging model provides a consistent approach to distributing overhead costs to all projects in line with the applicable policy mandating full cost recovery. Costs are allocated to works considered in scope based on a profile which is determined by the value of the project/program, type of works and its delivery methodology (Internal vs. External).

This charge covers the following staff and overheads which are inclusive of all associated project specific costs:

- Corporate Charges – accommodation, administration, finance, HR, payroll, procurement, executive, risk, media & communications, legal
- Plant – light vehicles and heavy plant
- Contract Management – including advice and all contract management services
- Technical advice from DIT specialists, including:
 - Technical Services – Structures, Geotechnical, Drainage & Environmental
 - Rail Risk & Assurance
 - Road and Marine Assets
 - Programs & Concept Planning
 - Rail Infrastructure Maintenance & Management
 - Architecture & Built Environment
 - Traffic Operations

The DIT Overhead Charge does not include any costs associated with services provided by external consultants, these costs are to be accounted for within relevant Scoping, Development and Delivery Phase items (1.1 to 1.6).

The DIT Overhead Charge is the final cost calculated within the base estimate spreadsheet. It uses a percentage which is applied in addition to all other base estimate items.

The applicable percentage is varied depending on the estimated P90 project cost, with these rates updated on occasion by the Department's Finance Section. The Principal Cost Manager (Estimating & Programming) will provide these rates to estimating consultants when revisions to the applicable percentages are made available for distribution.

When applying inherent risk associated with this charge Estimators are required to consider the potential fluctuations of this percentage in the same way as for other estimate items along with correlating its value to ensure that values assigned during risk simulations fluctuate relevant to the occurrence of quantities and costs for other estimate items.

Section 2 – Property Acquisition

Estimated costs for the procurement of land/property are typically provided by DIT's Acquisition Services group who engage the Office of the Valuer General (OVG) or their external contractors to prepare these valuations.

All acquisition estimates are to be sought by the relevant Project Manager/Planner who will be required to adequately detail their requirements including the extent of project impacts and the desired acquisition type (partial or full). In requesting these estimates Project Managers/Planners are to seek a detailed breakdown of the resulting estimates to aid the assessment of:

- Scope, including any particular inclusions and/or exclusions
- Property modification items
- Contingency values, to ensure that these values are not duplicated in the overall assessment of risk values within other sections of the estimate
- The overall reasonableness of the values provided

Items to be assessed for inclusion within the estimate are as follows:

2.1 Property Purchase Costs

- Purchase costs associated with the purchase of property (typically detailed as the market or land value within DIT property estimates).

Importantly Project Managers/Planners and Estimators should note that income gained through the sale of land is not typically credited to the project; rather these funds are returned to general government revenue and therefore are not to be considered as credits to the estimated project cost unless otherwise directed.

2.2 Transaction, Legal and Other Costs

- Disturbance costs
- Severance
- Injurious affection

- DIT legal and valuation costs
- Owner legal and valuation costs
- Tennant legal and valuation costs
- Out of pocket expenses
- Stamp duty
- DIT coordination costs (management, administration)
- Ongoing operating costs (Council rates, Government levies, utility services fees, insurances, maintenance costs etc)

2.3 Business Compensation Costs

- Owner compensation costs
- Business/tenant compensation costs
- Business relocation costs
- Solatium (see [Land Acquisition Act 1969](#))

2.4 Property Modification

- Accommodation works
- Building works associated with partial acquisition properties
- Property boundary modifications (including the upgrade of boundary fencing, associated retaining walls and the like to adjoining properties) where completed by DIT/outside of the construction contract (otherwise include within section 4.13)

Estimators should be aware of the need for the potential for modifications to existing properties that may be in excess of those considered within the acquisition cost estimate items and make appropriate additional allowances.

Where land acquisition estimates incorporate items such as those detailed above, Estimators are required to review these values to ensure their concurrence with the figures prior to applying them to the estimate.

Costs associated with works which are likely to be completed by the head contractor (or their sub-contractors) are to be included in relevant sections of the estimate. Examples of this include:

- Demolition of residential or commercial property, section 4.4 Earthworks and Demolition
- Construction of noise walls, section 4.1 Environmental Works

Section 3 – Services (By DIT)

The presence and costs associated with any required service relocations or alterations will typically involve, but is not limited to one or more of the following services:

3.1 Electricity (SAPN etc.)

- Identification of applicable services (potholing etc.)
- Design of applicable service relocations
- Relocation of applicable services
- Supply, installation and/or modification of SAPN lighting

3.2 Communications (Telstra, Optus, NBN etc.)

- Identification of applicable services (potholing etc.)
- Design of applicable service relocations
- Relocation of applicable services

3.3 Gas (Origin, APA etc.)

- Identification of applicable services (potholing etc.)
- Design of applicable service relocations
- Relocation of applicable services
- Designated spotters during the undertaking of works

3.4 Water and Sewer (SA Water etc.)

- Identification of applicable services (potholing etc.)
- Design of applicable service relocations
- Relocation of applicable services
- Raising of top stones

3.5 Other Services

- Identification of applicable services (potholing etc.)
- Design of applicable service relocations
- Relocation of applicable services

The service authorities detailed above should not be considered as an extensive list of those which may be impacted. Estimators are required to identify and record costs associated with the relocation and/or alteration of the infrastructure of any other service providers which are impacted by the proposed works within relevant sections of the above. The disconnection of existing services to acquired and/or modified properties are also to be included under each relevant section.

Some service relocation and/or alteration works may be completed as part of a separate early works contract and/or by the main construction contractor. Where this is to occur estimated are to be included within section 4.3 Services (by Contractor) so that appropriate contractor overheads and margin costs are realised.

Note: As an exception to the above, where service works are to be completed as a separate early works contract it may be appropriate to include relevant items at 4.3 and make them inclusive of overheads so as to retain an anticipated head contract/acquisition plan value within sections 4 and 5 of the estimate. Where this applies items are to be clearly detailed as being anticipated to be procured in this manner.

Where temporary service relocations are required, these costs are to be clearly detailed under relevant service headings, this is most likely to occur within section 4.3.

Note: Costs associated with road lighting and traffic signals are considered elsewhere (see sections 4.14 Lighting and 4.16 Traffic Signage, Signals and Controls respectively), while costs associated with rail electrification, signalling and communications are included with relevant sections of section 4.17 Rail.

Section 4 – Construction Costs

The following section defines items that may be considered within each of the standard direct cost items. Items include, but are not limited to:

4.1 Environmental Works

- Preparation and implementation of Environmental Management Plan
- Temporary and permanent environmental controls (silt fencing, shaker grids, retention, detention and sediment basins, containment structures etc. and their maintenance)
- Controls and monitoring of noise, vibration, water quality etc.
- Dilapidation surveys (pre and post construction)
- Provision of fauna habitats, underpasses, overpasses, culverts/tunnels, rope crossings, poles and the like
- Construction of noise walls and/or mounds
- Noise attenuation to properties e.g. double glazing, additional insulation etc.

4.2 Traffic Management

- Preparation of Traffic Management Plan
- Temporary variable message signs
- Temporary traffic signals
- Temporary lighting (temporary light towers and associated running costs)
- Temporary traffic barriers
- Temporary covered pedestrian walkways
- Provision and maintenance of temporary traffic controls (road, rail, pedestrian) for the duration of project
- Maintenance of property accesses

Note: Costs associated with temporary items relevant to other sections are to be included within these accordingly, e.g. temporary asphalt pavements within section 4.10, temporary pavement marking within section 4.12, temporary light poles, footings etc within section 4.14.

4.3 Services (by Contractor)

Where service relocations are to be undertaken and/or managed/procured by the head contractor relevant costs are to be included at section 4.3 to ensure the addition of contractor overheads and margin applicable to these works. While the exact nature of the works to be undertaken prior to the main contract (to be included within section 3.0) or as part of the main contract (to be included here) will become clearer as the project develops, along with the need for any temporary service relocations, Estimators are to make reasonable judgement as to how service relocations will be procured when assigning service items within their estimates.

Services items are to be included using the same format as for section 3.0 Services (by DIT), being:

- 4.3.1 Electricity
- 4.3.2 Communications
- 4.3.3 Gas
- 4.3.4 Water/Sewer

- 4.3.5 Other

4.4 Earthworks and Demolition

- Demolition and disposal costs (including those associated with temporary works)
- Demolition of acquired properties, residential and/or commercial (including temporary fencing, block slashing, security etc.)
- Construction of turkey's nest dams (earthworks, lining, fencing of dam, sinking and casing of bore, pump and pipe infrastructure etc)
- Clearing and preparation of stockpile sites
- Clearing and grubbing
- Tree Removal and/or trimming
- Saw cutting
- Topsoil stripping
- Bulk earthworks, (for larger/mass type operations, items such as cut to fill, import to fill, cut to spoil, cut to stockpile, material disposal and/or purchase costs, borrow pit establishment, raising and crushing of borrow pit materials etc.)
- Detailed Earthworks, (for smaller and/or more detailed operations as described in the previous items along with items such as pavement box out)
- Ground improvements including earthworks stabilisation, impact rolling and pre-loading activities
- Provision and/or removal of rock in cuts and/or fills
- Trimming of sub-grade
- Proof rolling and repairs to unsuitable sub-grade
- Dewatering
- Contamination testing and treatment
- Compaction testing
- Material testing
- Formation of batters and trimming
- Formation of swale drains
- Provision and/or respreading of topsoil (*Note the provision and placement of specific landscaping soils are to be included within section 4.15*)
- EPA Licences
- Earthworks for the ripping and/or rehabilitation of redundant roads, borrow pits, stockpile sites and the like

Note: Where the above items relate specifically to a bridge structure, they are to be detailed within section 4.7.

4.5 Retaining Walls

- Demolition or adjustment of existing retaining walls
- Temporary retaining structures
- Reinforced earth and soil nailed walls, including detailed excavation and backfill
- Cantilever walls, including detailed excavation and backfill
- Crib or interlocking walls, including detailed excavation and backfill
- Post and panel walls, including detailed excavation and backfill

- Diaphragm walls, including detailed excavation and backfill
- Shotcrete including all preparation, reinforcement, placement etc.

Note: Where the above items relate specifically to a bridge structure, i.e. as a reinforced earth wall or the like, they are to be detailed within section 4.7.

4.6 Drainage

- Removal/demolition of redundant and temporary drainage items
- Temporary drainage items
- Box and pipe culverts, including excavation, bedding, backfill and associated compaction testing
- Headwalls
- Drainage structures (side entry pits, junction boxes etc)
- Floodways (cut off walls etc)
- Gabion matting/outfall structures
- Gross pollutant traps
- Specific filter layers (excluding where part of a pavement design)
- Kerbing (all types)
- Driveway/property crossovers
- Spoon drains
- Pedestrian ramps
- CCTV inspections of drainage network

Note: Where the above items relate specifically to a bridge structure, they are to be detailed within section 4.7.

4.7 Bridges

All (road, rail, pedestrian etc.) bridge construction activities for all methods, not limited to:

- Temporary works: Edge protection barriers, scaffolding,
- Substructure works: foundation systems/piling, pile caps, piers
- Mobilisation / demobilisation of specialist bridge construction equipment
- Earthworks: Detailed excavation, backfilling, disposal of excess spoil
- Reinforced earth walls: Strip footing, facing units, capping beam, backfill, monitoring instrumentation
- Piling: Piles by type, diameter and length
- Cast in situ concrete: For each of the abutments, pile caps, piers, deck, approach slabs, wing walls, headstock and other items, where applicable specify details of blinding, concrete, reinforcing, formwork, jointing, block outs and the like
- Structural steel: Girders, throw screens, handrails, barriers, walkways
- Bridge deck surfacing: By type and thickness
- Bridge deck drainage: By type and size where attached to bridges
- Bridge lighting: Road, pedestrian and feature lighting components
- Specific testing requirements
- Other bridge items

Note: For projects with more than one bridge the pricing of each bridge is to be detailed separately.

4.8 Tunnels

All tunnel construction activities for all methods, not limited to:

- Demolition or adjustment of existing tunnels
- Mobilisation / demobilisation of tunnelling equipment
- Excavation and support
- Tunnel linings
- Tunnel drainage
- All finishing works including pavements, architectural linings, barriers, signage, markings etc.
- Cross passages
- All tunnel services including fire and life safety, lighting, ventilation, maintenance systems etc.
- Ventilation structures and equipment
- Control buildings and tunnel control systems
- Specific testing requirements
- Other tunnel items

Note: For projects with more than one tunnel pricing of each tunnel is to be detailed separately.

4.9 Pavement

- Temporary pavements
- Specific fill layers (where specified as part of the pavement design)
- Working platform
- Unbound sub-base Layers
- Unbound base Layers
- Stabilisation treatments (the addition of cement or lime)
- Pavement maintenance activities (where required prior to sealing works occurring, prior to project handover etc)
- Specific testing requirements

4.10 Bituminous Surfacing / Asphalt

- Temporary spray seal / asphalt
- Prime
- Tack coat
- Spray seal
- Bound asphalt sub-base layers
- Bound asphalt base layers
- Asphalt levelling courses
- Asphalt wearing courses
- Profiling/plane and reinstate, including disposal costs
- Removal of existing seal
- Crack sealing
- Disposal costs associated with any of the above items
- Specific testing requirements

Note: Where the above items relate specifically to a bridge structure they are to be detailed within section 4.7.

4.11 Secondary Pavements

- Temporary secondary pavement items
- Footpaths and cycle ways (concrete, asphalt, paved including temporary provisions and base course layers)
- Tactiles for pedestrian ramps
- Provision of new/alteration of existing property accesses/driveways
- Median islands (including concrete or rubble infill)
- Concrete roundabout annulus (including base course layers)
- Concrete bus bays (including base course layers)
- Specific testing requirements

4.12 Pavement Marking

- Removal of existing markings and associated devices
- Temporary markings including removal as necessary
- Longitudinal markings: lane lines, edge lines, barrier lines, clearway lines etc.
- Transverse markings: chevrons, arrows, symbols, messages, rail box hatchings etc.
- Coloured lane markings (e.g. green bikeways, red bus lanes)
- Kerb painting
- Raised Pavement Markers
- Pavement Bars
- Audio tactile line marking
- Specific testing requirements

4.13 Road Furniture

- Removal/demolition of road furniture items
- Guardrail and associated terminals, box beams, structural transitions and the like
- Bus stops/shelters (new, relocation, modification)
- Bins and shelters
- Pedestrian fencing
- Fencing (where completed by the construction contractor, otherwise include within section 2.4)
- Rest area and/or street furniture and amenities
- Bike storage areas (unless associated with rail station)
- Car park wheel stops
- Temporary road furniture

Note: Where the above items relate specifically to a bridge structure they are to be detailed within section 4.7.

4.14 Lighting

- Demolition of existing lighting infrastructure, removal and/or filling of existing conduits

- Temporary lighting (*Note: temporary poles, footings etc. Note temporary light towers and associated running costs are included within section 4.2*)
- Light pole footings
- Single, double and quad outreach poles
- Luminaires
- Lighting connected to SAPN poles (brackets, luminaires), *Note: where SAPN tariff these are to be included at section 3.1 or 4.3.1*
- Pedestrian lighting
- Feature lighting
- Ducting/conduit
- Pits
- Switchboards
- Testing and commissioning of lighting

4.15 Landscaping and Urban Design

- Landscaping/revegetation (trees, grasses, shrubs, turf etc.)
- Minor earthworks/formation works associated with landscaping
- Landscaping soils
- Watering systems
- Mulching
- Staking of trees
- Erosion control of landscaping works
- Landscape drainage, including associated subsurface drainage
- Seed collection
- Propagation and nursery storage
- Public art
- Maintenance of plantings (e.g. weed control, watering etc.) and hard elements (e.g. graffiti removal) for a given period of time after construction, including traffic control, access equipment, safety requirements etc. as necessary

Note: Where landscaping and urban design costs occur beyond the duration of the main contract Estimators are required to consider and make adequate allowances for the requirements and subsequent costs associated with the provision of additional traffic control and/or service locations which may be required to perform the applicable works.

4.16 Traffic Signage, Signals and Controls

- Removal of existing signage, signals and controls
- Temporary signage, signals and controls
- Road signage
- Wayfinding signage
- Guide posts
- Bollards
- Pedestrian/cyclist holding rails
- Traffic signals (all types, components etc.), signal poles, and associated infrastructure
- Ducting
- Loops

- Gantries
- Intelligent transport systems
- Permanent variable message and/or speed limit signage
- Permanent lane status signage
- CCTV (unless specific to rail, see 4.17.5)
- Red light cameras
- Testing and commissioning of ITS systems, traffic signals and controls

4.17 Rail

Items included under this heading are to be included using the following standard structure. In determining scope and developing costs particular consideration is to be given to limitations associated with site access and timing constraints, the impact of works of existing timetables/scheduling, the availability of specialist skills and knowledge (e.g. signalling and communications) etc.

4.17.1 Trackwork

- Removal and disposal of existing rail track
- Temporary track
- Slewing or adjustment of existing rail track
- Rail track complete, including ballast, sleepers, rail, rail fittings, track laying, tamping and grinding
- Acoustic rail track, including associated track slab, acoustic or vibration track fittings, track laying, grinding
- Track turnouts, crossovers, actuators, check points, associated with the rail installation
- Buffer stops including sliding friction, hydraulic and fixed stops

4.17.2 Overhead Wiring and Poles

- Removal of existing wiring and poles
- Temporary overhead wiring and poles
- Overhead traction power wiring, including all associated support structures, catenary wiring and power supply
- Trackside posts, gantries and fittings associated with the support of overhead track wiring
- Catenary and power wiring and associated tensioning systems within or outside of tunnels
- Transformers, switchgear, insulators, earthing, bonding, registration equipment
- Undertrack crossings for overhead wiring installation

4.17.3 Power Supply and Distribution

- Removal of existing power supply and distribution items
- Temporary power supply and distribution items
- Incoming raw power supply to sub-stations
- Substations
- High and low voltage power distribution along corridor
- Transformers for supply to overhead wiring
- Trackside installations associated with power distribution

4.17.4 Signalling

All signalling and cabling and associated activities, including but not limited to:

- Removal of existing signalling items
- Temporary signalling items
- Signal plans, control tables and design directly associated with signalling
- Mechanical and civil works where associated with signalling installation, including the services route where solely for signalling
- Control systems, automatic trail protection and control
- Interlocking
- Trackside installations associated with signalling, including location cases, track circuits, axle counters, signal posts and signals, boom gates, compressed air systems, ground frames, under track crossings, and other line side items
- Signalling power supply from substation or transformer
- Signal boxes and buildings

4.17.5 Rail Communications

- Removal of existing communications items
- Temporary communications items
- Public address systems
- Closed circuit television (CCTV)
- Passenger information systems
- Precise clocks
- Train radio
- Telecommunications systems (mobile phones, data and radio broadcast etc)
- SCADA
- Trackside installations associated with rail communications

4.17.6 Combined Services Route

- Removal of existing combined services route items
- Temporary combined services route items
- Excavation, backfilling, conduits, pits and markers to provide a trunk route for a range of rail services

Note: If the route is solely for one service, e.g. for signalling the cost of this route is included in section 4.17.4 Signalling.

4.17.7 Stations, Interchanges, Buildings, Stabling and Maintenance Facilities

- Removal of existing stations, interchanges, buildings, stabling and maintenance facilities
- Temporary stations, interchanges, buildings, stabling and maintenance facilities
- Above ground stations including all associated components (platforms, vertical transport etc.)
- Below ground stations including all associated components (in particular excavation and support)

- Transport Interchanges, including structures, road pavements, lighting, vertical transport, signage etc.
- Car parks (at grade and multi-level), complete including associated access roads, controls, entry/exit boom gates etc.)
- Rail administration buildings
- Stabling buildings
- Maintenance facilities
- Cleaning facilities
- Driver amenities
- Public amenities
- Ticketing systems
- Bike storage lockers / buildings
- Other related buildings

Note: For each building type, a further elemental breakdown is required (e.g. foundations, structure, façade, roof, building services etc.).

4.17.8 Commissioning and Handover

- Testing and commissioning of component and integrated systems
- Overall commissioning of the integrated systems
- Handover of completed facilities
- Training of operators and management
- Accreditation costs associated with regulatory approval

4.17.9 Rolling Stock

- Design, procurement, commissioning and delivery of rolling stock

4.17.10 Other Rail Specific Works

- Alternative commuter costs (bus substitute costs where not provided by the Principal/included at section 1.9, network upgrades to facilitate temporary passenger movements)
- Other rail specific items which cannot reasonably be included within one of the previous rail sections

4.18 Other

Works associated with buildings and marine type items are to be included within this section. With the exception of these, items should only be included in this section if they cannot reasonably be included within one of the previous WBS sections.

Section 5 – Contractor’s Preliminaries and Supervision

5.1 Design (by Contractor)

This section of the estimate will typically only be required to be used where works are to be undertaken using an alternative contract method which includes the provision of the design. Where applicable, Estimators are to allow for all relevant design activities that are likely to form part of the contractor’s work. Inclusion within

this section ensures the addition of contractors' overheads and margin are applied to this component of the work. Activities include:

- Preliminary design functions
- Design costs (typically presented by design gates)
- Construction phase services (design inspections and reporting)
- Independent design certification
- Construction verification
- Provision of as-built drawings

5.2 Contractor's Overheads (On-site)

Items such as (but not limited to) those listed below should be considered when calculating the value of Contractor's On-site Overheads:

5.2.1 Non-Recurring On-Site Overheads

- Mobilisation of plant, equipment and personnel
- Establishment of Site Facilities
- Provision of insurances, bank guarantee fees and other contract approvals
- Information management system
- CITB levy
- Industry levies
- Council permits and fees

5.2.2 Recurring On-Site Overheads

- Project management
- Contract management
- Site engineer
- Site supervision
- Design manger
- Quality manager
- Safety representative
- Environmental representative
- Consultants
- Community and stakeholder requirements and management
- General site labour
- General site vehicles, plant, equipment, scaffolding, small tools. *Note: where these are specific to items within the estimate, e.g. a crane to lift in bridge beams, costs are to be included within the relevant WBS heading*
- Site accommodation running, services and general expenses
- Communications – computer and IT costs, plan printing and copying, telephones, couriers, stationery
- Site security
- Site safety – protective clothing, safety signage, site inductions, drug and alcohol testing
- Survey costs

5.2.3 Demobilisation

- Demobilisation of plant, equipment and personnel

- Dis-establishment of site facilities
- Site clean up
- Contract works maintenance

5.2.4 Industry and Workplace Participation and Skills Development

- Industry participation planning and reporting
- Upskilling and training, including planning and reporting

5.3 Contractor's Overheads (Off-site)

Items such as (but not limited to) those listed below should be considered when calculating the value of Contractor's Off-site Overheads:

- Head office costs
- Head office staff/administration

5.4 Contractor's Margin

Accounts for the percentage of profit that contractors could reasonably be expected to assign to the costs associated with the project. In developing this percentage Estimators should take into consideration factors such as:

- Current market conditions
- The location of the project
- The size of the project
- Specific requirements of the project
- The number and type/size of contractors able to complete/likely to bid for the work etc.

Note: Contractors off-site overheads and margin are typically applied as a percentage to all section 4 and 5.1 costs.

Section 6 – Contingent Risks

Estimators should be aware of the need to avoid optimism bias, as such ranging applied during the assessment of inherent and contingent risk should be both wide and biased towards the upside, i.e. a range of -10% and +20%.

6.1 Contingent Risk

The value of contingent risk is determined by assessing items which have a less than 100% chance of occurring. Whilst the assessment of these specific categories is not compulsory and nor should be considered as covering all possible types, the following five categories provide a guide to the main types of contingent risks that may be considered.

6.1.1 Design Development

- Includes increased costs resulting from a greater scope of work being required than that which was identified during the previous project phases in order to meet previously stated performance requirements, often due to a lack of investigation, geotechnical and survey work
- Design changes resulting from actual site conditions
- This category includes 'scope creep'

6.1.2 Third Party Influences

- Includes requirements of service authorities such as them imposing unexpected changes during the course of the project, delayed relocation works, unknown services identified during construction which require protection or alteration
- Failure in relationships between joint venture partners, contractors/subcontractors
- Market issues such as skilled labour shortages, supply/demand issues
- Community issues such as expectations not being met, impacts on/severance of local road networks, failure to identify special interest groups, impacts on local businesses, complaints lead to reduced working hours. Project requirements may also vary based on community consultation outcomes

6.1.3 Policy and Standards

- Includes changes to the design and management requirements mandated by the Department through ongoing improvements in safety, and whole-of-life considerations
- Changes arising from safety audits

6.1.4 Performance and Functionality

- Increased requirements such as traffic capacity, axle loads, design speed, etc., compared to what was originally described in project definition
- Additional works to meet desired project outcomes as a result of these objectives not being clearly defined
- Changes under this category should not be considered as 'scope creep'

6.1.5 Other

- Contingent risks which cannot be attributed one of the above headings are to be included and described in this section.

Where project risk registers have been developed by the project team Estimators are to consider the inclusion of relevant items when developing contingent risk values.

Section 7 – P50 and P90 Risk and Contingency

Values determined during the risk assessment are presented in the following sections:

7.1 P50 Inherent and Contingent Risk

- Include P50 value as calculated

7.2 P90 Inherent and Contingent Risk

- Include P90 value as calculated

Further Estimate Considerations

In developing estimates Estimators should also consider the following:

Cost to Complete (CTC), Total Project Cost (TPC), Construction Cost Only (CCO)

The majority of DIT estimates will represent a 'Cost to Completion (CTC)', recognising only those costs which are yet to be incurred to complete the project. Where a 'Total Project Cost' is to be developed Project Managers/Planners are required to provide details of all applicable previous expenditure for inclusion within the relevant sections of the estimate, with Estimators to detail these items/costs as having already been incurred with contractor overhead costs and risk percentages assigned accordingly. On occasion an estimate of 'Construction Costs Only' (i.e. sections 4 and 5) will be required, estimates should only be prepared in this manner where requested by the Project Manager/Planner for a specific purpose where costs beyond those associated with construction/those applicable to the contractor are not required.

Principal Supplied Items

Although uncommon and typically only applicable to Level 5 and 5B estimates, Estimators are to ensure Principal supplied items are recorded within the applicable section of the estimate and are labelled in a way that identifies them as being procured in this way.

Estimators are to ensure that other costs (e.g. transport, storage and the like) associated with Principal supplied items are identified and included in the relevant section of the estimate and that these items are appropriately considered when assessing risk, client and contractor overheads and the like.

Appendix 7 – Estimate Review Process

All estimates, including any subsequent revisions are required to be reviewed prior to being submitted to the Principal Cost Manager (Estimating & Programming).

On each occasion as reviews are completed by those performing the roles below, the entry in the 'Check/Date' column of the Estimate Cover Sheet is to be recorded/updated to state that the following reviews have occurred.

Estimator

Upon completion of the estimate the Estimator is responsible for checking all aspects of their work and entering their initials and the date in the check/date box on the Estimate Cover Sheet. Following this the estimate is to be forwarded to their Estimate Reality Checker for review.

Estimate Reality Checker

The Estimate Reality Checker should typically be a more senior Estimator, typically from within the same organisation as the Estimator. Their role involves providing an overall assessment of the estimate and a peer review of the estimated cost for the given scope of work/project.

It is expected that at a minimum the Reality Checker will review and check the following items prior to submission of each revision of the estimate:

- Estimate is presented in the correct format and is consistent with this manual
- All required sections of the Scope, Risk & Methodology worksheet (or equivalent in Level 1 estimates) have been completed including the transfer of reference documentation and scope as provided on the Estimating Work Order, along with ensuring that the entries provided by the Estimator are complete and adequately document and convey details of the anticipated methodology, project assumptions, risks, opportunities and exclusions etc.
- All project components described on the Estimating Work Order, in any subsequent meetings or correspondence have been recorded and allowed for within the estimate, with due considerations made for related constructability, staging and methodology issues
- All items detailed within the Calculation worksheet are included within the correct work breakdown structure headings
- Quantities (including the units used) and rates appear reasonable for the given project type and scale, with no obvious errors and omissions
- Concurrence with items included in the estimate and their costing

- Section subtotals are of suitable magnitude for the given scope of works and generally correlate with previous projects of a similar nature (or that variances are reasonable given project specific considerations)
- No items have been excluded or zero values applied for items which are known or are likely to be in scope. It is expected that for any items that can reasonably be anticipated to be in scope that an assessment will be made of their magnitude, with reasonable rates determined/applied within the estimate
- Percentage variances that have been used in ranging of costs and quantities for the development of risk values are reasonable and commensurate for the degree of information available, level of estimating effort and the like
- Contractor overheads and margins are reasonable for the nature of the project, current market conditions and the anticipated procurement approach
- Contingencies values have been correctly calculated and the resulting values applied for risk are of a suitable magnitude given the information available, project type, project nature, constraints etc.
- Where possible, review with recent projects of a similar nature in terms of benchmarking against current actual and/or estimated project costs

Once all checks are completed the reality checker is required to enter their initials and the date in the check/date box on the Estimate Cover Sheet.

Additional Reviewer

For specific projects, those which incorporate specialist skills (i.e. specific technologies, rail electrification and/or signalling, marine works or the like) estimating organisations may choose to utilise particular specialists in order to gain confidence in their own work and/or to provide additional assurance to the Department.

In the case that estimates have been procured by a third party (i.e. by a Planning/Design Consultant or the like who has been engaged by the Department) this consultant is required to also review the estimate. In this instance the relevant consultant is required to review the estimate from the point of concurring that all necessary scope items and anticipated project aspects have been considered and accounted for within the estimate, along with ensuring that all relevant sections of the estimate template have been completed.

Upon the completion of these reviews (Estimator, Estimate Reality Checker and where applicable the Additional Reviewer) the estimate and any associated deliverables are to be forward to the Principal Cost Manager (Estimating & Programming) or their relevant client.

Where this review is not applicable this section of the Cover Sheet is to be marked as 'Not Applicable'.

Principal Cost Manager (Estimating & Programming)

The Principal Cost Manager (Estimating & Programming) or their delegate, is responsible for providing an initial review of each revision of the estimate. This review includes items such as the scope, identified risks, assumptions made and a broad review of rates and the overall estimated project cost compared to those for recent similar projects.

Items or areas of concern identified through this review are brought to the attention of the Project Manager/Planner for further assessment or consideration. Typically this will be the result of things such as specific rates or overall project costs that show significant variation from recent benchmarks without reason along with apparent omissions or scope errors based on the information provided to and/or discussed with the Estimator during the development of the estimate.

The Principal Cost Manager (Estimating & Programming) or their delegate shall undertake the following checks of items within the estimate:

- Estimate is presented in the correct format including the completion of all required sections of the Scope, Risk and Methodology worksheet
- Review of the scope that has been included and its correlation with what has been requested
- Review project details recorded by the Estimator including the assumed construction methodology, project/construction duration, assumptions, risks and opportunities, exclusions
- All estimate items in the Calculation worksheet are included within the correct work breakdown structure headings
- Broad review of the quantities (including units used) and rates ensuring that they appear reasonable for the given project type and scale, with no obvious errors and omissions and that specialist advice (e.g. land acquisition costs, quotes from service authorities) have been correctly included
- Broad review of the reasonableness of ranges that have been applied to quantities and rates within the estimate
- Review section dollar value and percentage subtotals ensuring they are of suitable magnitude for the given scope of works and generally correlate with benchmarks for previous projects of a similar nature (or that variances are reasonable given project specific considerations)
- Review the reasonableness of calculated risk and contingency values

Once all reviews have been completed the check/date box of the Estimate Cover Sheet is completed and the estimate is forwarded to the Project Manager/Planner together with any questions and/or comments raised from this review. On occasion the Principal Cost Manager (Estimating & Programming) or their delegate may elect to seek clarifications and/or updates to the estimate prior to submitting the estimate the Project Manager/Planner for review.

Project Manager/Planner

The Project Manager/Planner is ultimately responsible for the acceptance of the estimate. As such they must have sufficient confidence that the estimate accurately reflects the scope and subsequent estimated costs which have been developed for the project.

Where errors, or apparent omissions are identified necessitating the estimate to be revised, these are to be referred to the Principal Cost Manager (Estimating & Programming) or their delegate for initial discussion and where ultimately deemed necessary, adjustment by the Estimator.

At a minimum the Project Manager/Planner is required to check the following items within the estimate:

- Review all project risks and assumptions
- Broad review of the scope that has been included and its correlation with what has been requested
- Where provided, review any scheduling or methodology information to ensure its practicality and appropriateness given any known project constraints
- Broad review of specialist advice or costs provided have been correctly incorporated into the estimate
- Review the reasonableness of ranges that have been applied to quantities and rates within the estimate
- Review quantities and rates to ensure they are suitable to a degree that a reasonable level of confidence is obtained with the overall estimated project cost
- Review the reasonableness of calculated risk and contingency values
- Ensure that issues or concerns raised by either the Estimator and/or Principal Cost Manager (Estimating & Programming) or their delegate are reviewed and addressed as necessary

At the discretion of the Project Manager/Planner, a peer review of the estimate by more experienced staff members or other consultants may be undertaken, providing a further level of confidence and assurance.

Once the Project Manager/Planner is satisfied with the completed estimate and all reviews have been completed they are required to complete the check/date box of the Estimate Cover Sheet prior to proceeding with the completion of the Formal Estimate form as described in Appendix 8.

Appendix 8 – Completion of Formal Estimate

Information on the following page(s) provides instructions for completing each section of the Formal Estimate form. Formal estimate values are those which are to be used when seeking project funding and/or confirming the estimated project cost before proceeding to project delivery, hence they are only developed for estimates from Levels 2 to 5 and 5B (as such the Formal Estimate form is only found within estimate templates relative to these estimate levels).

Project Managers/Planners should note the requirement to initially complete the Formal Estimate Summary Form (which commences at Line 78 of the Microsoft Excel spreadsheet) and to verify that the estimate has been reviewed in accordance with the DIT Estimating Manual (as per Appendix 7) prior to completing this form. The Formal Estimate Signoff and Acceptance Form (which commences at Line 5 of the Microsoft Excel spreadsheet) is intended to be used as an overlying cover sheet where the various final Project Estimate values of the highest cost realistic option are presented, with only summary details and signatures otherwise recorded on this page.

Section 1: Summary of All Considered Realistic Options

Following completion of estimates for each of the proposed options at a given level in the Cost Estimating Framework, Project Managers/Planners are required to enter relevant Project Option Estimate number(s), description(s), P50 and P90 values (or equivalent P50 and P90 values where prepared by DIT staff) for each of the options which have considered.

Project Managers/Planners are to review each of the proposed options and their associated costs to determine those which are considered as being realistic and therefore still have potential to be delivered. The highest valued realistic option (the Project Estimate) is to be identified in the column provided and values from this option carried forward through the Formal Estimate form. *Note: when seeking project delivery funding the project estimate must represent a defined option/scope of work.*

Section 2: Key Assumptions and Risks Relating to the Project Estimate (Highest Valued Options Estimate)

A summarised version of the key assumptions, risks and opportunities are recorded in this section. Typically, these details are sourced directly from those provided in the Scope, Risk and Methodology worksheet of the estimate.

Project Managers/Planners may become aware of some additional items to those identified by the Estimator and these may also be recorded at this point.

Section 3: Items Specifically Excluded from the Project Estimate (Highest Valued Options Estimate)

Details of any items which have been excluded from the estimate are recorded in this section. Typically, these details are sourced directly from those provided in the Scope, Risk and Methodology worksheet of the estimate.

While the exclusion of known project scope items from the estimated cost is not recommended, in the event that occurs or is directed to occur for a particular reason, Project Managers/Planners are responsible for ensuring that clear statements are made in any subsequent documentation regarding the exclusion of these items from the estimated cost.

Section 4: Project Estimate Values (Highest Valued Options Estimate)

At this point Project Managers/Planners are required to enter the relevant section costs from the highest realistic Options Estimate for both the previous (where available) and current Project Estimates.

This comparison provides a quick overview of areas where project costs may have changed from the previous Formal Estimate and may provide the Project Managers/Planners with an indication of areas where scope creep, over/under estimating and the like have occurred. It may also assist in the identification of areas where estimates are either consistently high or low at early levels and therefore aid future early estimate considerations.

Comments describing the reason for cost changes against particular categories should be recorded in the relevant cells provided.

Section 5: Project Estimate Inherent and Contingent Risk Values and Total (Highest Valued Options Estimate)

This section details the combined inherent and contingent risk values which have been included in the Project Estimate. The calculated P50 and P90 values (or equivalent) for combined inherent and contingent risk are included in the relevant cells to show the current Project Estimate totals applicable to the cash flow in Section 6 of the form.

Section 6: Estimated cash flow of the Project Estimate (Highest Valued Options Estimate)

Cash flows to be applied to the formal estimate form can be found or derived in one of the following ways:

- Indicative cash flow:
 - Included at the base of the summary worksheet of the estimate
- Detailed cash flow:
 - As prepared by the Estimator, noting this will typically only occur where specifically requested via the Estimating Work Order
 - As prepared by the Project Manager/Planner using EST 600-7 'Cash Flow Template' ([KNet #12245240](#)) which is pasted into the summary worksheet of the estimate, with percentages applied for applicable quarterly periods

Project Managers/Planners should ensure that estimated construction cash flows are relatively conservative to counteract the effect of delays associated with the approval of funding, land acquisition/site access, design delays, procurement issues and the like. As such the majority of contingency values should (where appropriate) be considered in later years of the project including some during the year after project completion. These cash

flows should also consider expenditure as having occurred at the time work is carried out rather than when a contractor's claim is submitted or payment made.

Project Managers/Planners should note that expenditure associated with the P50 (or equivalent) value may occur more rapidly than that of the P90 (or equivalent) value as completing the project for the lower P50 value is likely to represent that project risks have not occurred and as such less of the contingency funds have been required.

Section 7: Price Escalation

At this point Project Managers/Planners are required to use the link provided within the form to access the 'Price Escalation Calculation Spreadsheet' ([KNet #4624055](#)) to calculate the value of escalation to be included within the formal estimate form. To allow ease of calculating the value and future traceability, Project Managers/Planners should import this worksheet into the relevant estimate file.

Estimated P50 and P90 (or equivalent) cash flows are to be entered into the relevant cells of the escalation spreadsheet with the resultant data transferred back to relevant price escalation cells within sections 7 and 8 of the Formal Estimate form. Price escalation values from the previous Formal Estimate (where available) should also be recorded along with any relevant comments.

It should be noted that Options Estimate values are provided in present day (real) dollar values only and therefore make no allowance for price escalation.

Section 8: Estimated Cash Flow of Formal Estimate

Project Managers/Planners are required to record the price escalation values determined in section 7 within the relevant rows of the Formal Estimate form. This section is then automated to add the cash flowed values from section 6 with these escalation values, resulting in out-turn dollar values for each of the Base Estimate, P50 and P90 (or equivalent) project cost values.

Completing the Formal Estimate Signoff and Acceptance Form

Once sections 1 to 8 of the formal estimate form have been completed Project Managers/Planners are to commence completion of the Signoff and Acceptance Form (which commences from Line 8).

Reponses to each of the sections which require entries are either automated or should be apparent from the work completed prior to this point.

Cells where the final P50 and P90 values are reported within this section are automated to round these figures to the nearest 1000 dollars. Project Managers/Planners are required to forwarding to the Principal Cost Manager (Estimating & Programming) for sign off. Upon completion of this step Project Managers/Planners are also required to sign off the form prior to seeking sign-off from the relevant Senior Responsible Officer.

The completed Formal Estimate form is to be scanned (in colour copy and with all relevant pages) prior to being forwarded to the Principal Cost Manager (Estimating & Programming) or their delegate for the form to be recorded in KNet.

Appendix 9 – Process for Updating Old Estimates to Present-day (Real) Dollars

The updating of estimates developed in a previous year to present-day (real) dollars, is required to reference the following index:

ABS Producer Price Index, catalogue # 6427.0
“Road and Bridge Construction Index for South Australia” component
Table 17 Output of the Construction Industries, subdivision and class index numbers
Road and Bridge Construction (3101) South Australia
Series ID A2333748X
<http://www.abs.gov.au/ausstats/abs@.nsf/mf/6427.0>

Note: Click on the ‘Downloads’ tab when this site opens and follow the path above

Methodology Example:

The old estimate is to be multiplied by the ratio:

$$\frac{\text{the current index value}}{\text{the index value at the time of the old estimate}}$$

Where the index value represents the published quarterly value following the applicable month.

Example:

A cost estimate was previously prepared in January 2020 dollars to be \$10.1m, i.e. in present-day value (real) dollars at that time.

This estimate needs to be updated to present-day (real) dollars – November 2021

The ABS index values for these two points in time were:

- Index value at time of estimate:
 - Estimated prepared in January 2020, therefore the March 2020 index value applies. The March 2020 index value is 122.1
- Current index value:
- Current date is November 2021, the last published index value is September 2021. The September 2021 index value is 127.3

The updated cost, in November 2021 present-day (real) dollars
= (\$10.1m * (127.3 / 122.1)) = \$10.53m

This figure would then be cash flowed and escalated using the approach detailed in Section 1.20 and 1.21 of this manual.

Project Managers/Planners should also assess the potential for cost increases beyond those associated with cost escalation, recognising that some project scope changes are

likely to occur due to factors such as changes to design standards, existing site conditions and the like from when the estimate was originally prepared. In this instance it may be prudent to seek the preparation of a revised estimate which considers these factors in place of indexing the previous estimate.

The process of escalating an old estimate to current day dollars using the Road and Bridge Construction Cost Index is recommended to only occur where the original estimate has been prepared within the last two years. This is due to engineering construction market pricing dynamics changing over time leading to market pricing of elements like profit margins and the treatment of risk changing over time. In instances where estimates are more than two years old, it is recommended that an updated estimate is prepared.



Government of South Australia

Department of Planning,
Transport and Infrastructure