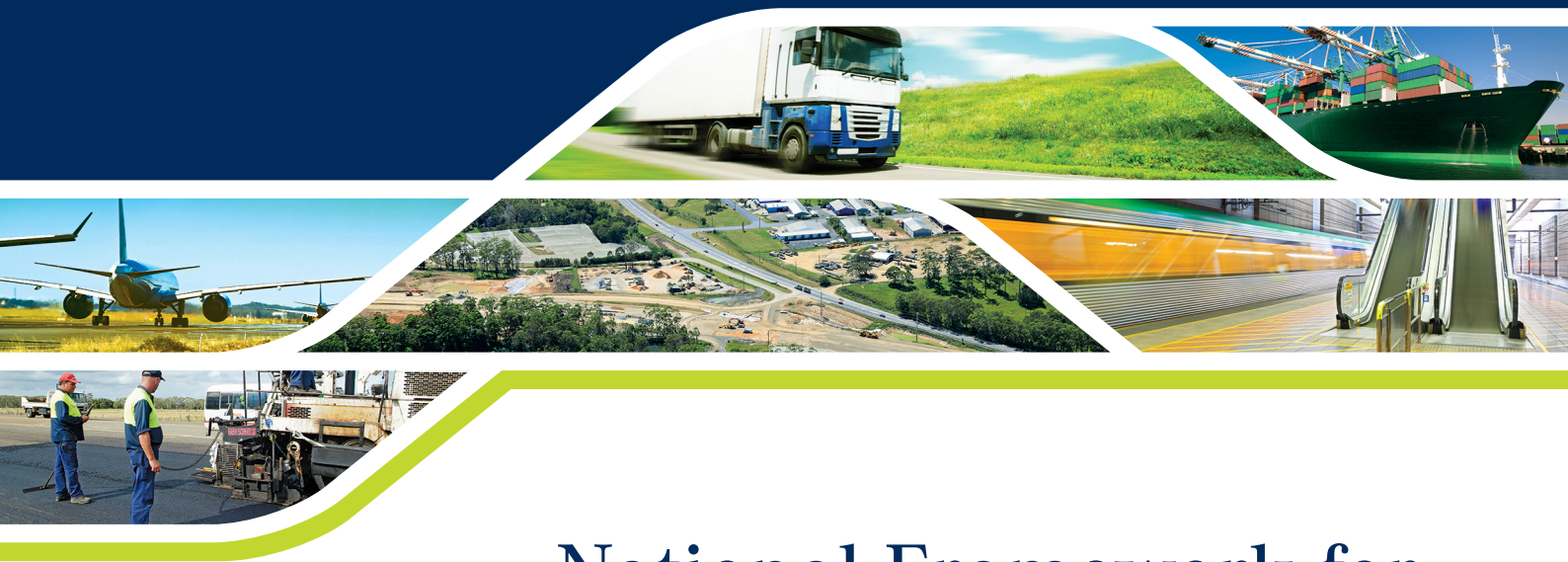




Australian Government

Department of Infrastructure and Regional Development



National Framework for Traditional Contracting

Topic Specific Guide 2 Project Budgets in Business Cases

September 2015



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Note

Governments in each jurisdiction will have their own individual approval processes for capital investment projects, as well as policies (e.g. probity) and legislation that will impact on all capital works delivery. These overarching jurisdictional requirements are precedent to the practices covered in this document.

Acknowledgement

This document has been prepared under the sponsorship of the Inter-jurisdictional Steering Committee for Alliancing & Traditional Contracting with membership from:

- Department of Treasury and Finance, Victoria (Chair)
- Treasury, New South Wales
- Treasury, Queensland
- Department of Treasury and Finance, Western Australia
- Department of Infrastructure and Regional Development, Commonwealth of Australia

The preparation of this document was led by the Victorian Department of Treasury and Finance with Evans & Peck Pty Ltd Level 2, 555 Coronation Drive Toowong, Queensland 4066.

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1 Introduction to the Topic Specific Guide

This Guide describes leading practices and principles that practitioners could apply in developing Project Budgets in Business Cases. This Chapter introduces the Guide.

1.1 Purpose

This Topic Specific Guide ('the Guide') forms part of the *National Framework for Traditional Contracting* suite of documents. It identifies the principles and practices that support a consistent national approach to developing Project Budgets.

The Guide seeks to assist in developing Project Budgets in Business Cases with greater accuracy in estimating the forecast outturn cost of infrastructure Projects delivered using traditional contracting. The Guide has been prepared by examining good principles and practices to:

1. Provide direction on the preparation of capital Project Budgets;
2. Promote greater transparency and accountability in managing capital budgets;
3. Reinforce the obligation and principle that public officials manage Projects to the lowest cost for the required performance, rather than to the maximum approved budget;
4. Put in place new governance arrangements for management of Project contingencies, and ensure this is addressed including how Additional Risk Allocation is handled in the Business Case; and
5. Provide clear direction on the communication of capital costs.

The Guide does not address issues related to the jurisdictional processes that apply to approval of a Project, or the process for the Client's assessment of alternative procurement strategy options as part of the Business Case. There are other (overarching and general) government policies and guidelines that cover these matters. By improving the quality and accuracy of Project Budgets, Investors will have better information on which to base their investment decision and Clients will have a greater chance of achieving successful Project outcomes within the investment budget.

The principles and practices described in this Guide are written from the perspective of a standalone major infrastructure project (say \$50M or more) procured through traditional contracting models.

Nevertheless, many principles and practices also apply to infrastructure programs, and some will apply to other procurement models (i.e. non-traditional contracting).

Similarly, principles in the Guide will apply for less complex, lower value projects, however, the practices described may be sensibly scaled down to a level appropriate to the project.

The Importance of the Business Case and Project Budgets

The absence of a robust and comprehensive Business Case is problematic for Government since it may lead to misallocation of its limited funds. In particular, where investment proposals involve

major physical infrastructure, the existence of significant cost changes (e.g. where the actual cost exceeds the Business Case estimate of Project cost) raises serious doubts around the 'opportunity cost of capital' criteria of the original investment decision. Put more simply, a significant under-/over-estimation of the Project cost could mean that an alternative Project/service should have been commissioned or that the Project itself should never have been built; or better project opportunities are foregone.

1.2 Who should use the Guide

The Guide is intended to be used by State and Federal agencies that undertake the roles of Investor or Client in the provision of new infrastructure assets. It provides practical guidance that complements the other Topic Specific Guides in the Framework.

It is also expected that this Guide will be of benefit to Suppliers who are involved in tendering for the Construction Phase of new assets and those firms that supply professional cost estimation services to Clients.

1.3 Structure of the document

This document provides guidance on specific topics that have been identified as having a high impact on Project outcomes and where there is significant opportunity for improvement.

This Guide covers the following topics:

Chapter 1: Introduction to the Topic Specific Guide

- Provides an introduction to the purpose and structure of the Guide and how it can be used.

Chapter 2: Introduction to Project Budgets in Business Cases

- Provides an introduction to the purpose of the Project Budget along with an overview of how it is developed and prepared.

Chapter 3: Foundations for good Project Budgets

- Provides an outline of the foundation points and the need-to-haves that ensure a good Project Budget can be developed. It is expected that all Business Cases presented to government for consideration satisfy these foundation points.

Chapter 4: Elements of a Project Budget

- Provides an overview of the elements of a Project Budget as they should be presented in a Business Case prepared in accordance with general Government requirements.

Chapter 5: Developing accurate base cost estimates

- Provides a description of a base cost estimate for a Project and the expected standards to be applied to its preparation.

Chapter 6: Developing Project Risk estimates

- Provides an overview of Project Risks, the different steps/phases and techniques of Project Risk estimates; how to set the Base Risk Allocation and Additional Risk Allocation; and undertaking a sense (or reality) check on whether the estimates are appropriate.

Chapter 7: Establishing a Project Budget

- Provides guidance on the mechanics and accountability of developing the Project Budget.

Appendix A: Glossary

- Provides definition of technical terms used throughout the Guide.

Appendix B: Instruction templates for professional services

- Provides various templates for engaging the professional services associated with developing the Project Budget for the Business Case.

Appendix C: Sign-off templates for professional work done

- Provides various sign-off templates for attesting to a professional standard of estimation, integrity of process and fitness of Project Budgets.

Appendix D: Template for presentation of the Project Budget

- Provides a form for presenting the Project Budget.

Key points are highlighted by three types of text boxes:



Overview of chapter



Practice and commercial insights



Example

1.4 How and when to use the document

This Guide has been written on the basis that Investors and Clients refer to other government policies and guidelines applying to procurement, planning, infrastructure delivery and government decision making.

The Guide describes better practice principles rather than providing detailed guidance for all aspects of budget development.

In some circumstances it may be appropriate to depart from the principles set out in this Guide. Each Investor or Client always has the flexibility to determine and recommend processes which are efficient, 'fit for purpose' and best suited to achieving Value for Money (VfM) for their specific Project.

The Guide has been prepared on the basis that readers already have:

- a reasonable knowledge of estimating practices;
- a good understanding of the terminology and general principles set out in the following chapters;
- familiarity with the relevant Acts and other jurisdictional policies and guidelines;
- an understanding of the practical challenges of prevailing market conditions that impact public sector infrastructure Projects; and
- an ability to call on specialist professional service providers (sourced internally or externally) to assist delivery of Projects in accordance with this Guide.

1.5 Terminology

There is a broad range of terminology in use across and within jurisdictions. It is necessary to introduce and use a consistent set of terms and definitions in this Guide. The Glossary provided at Appendix A provides a definition of these key terms used throughout the Guide. It is acknowledged that in each jurisdiction these terms may have a slightly different definition and / or usage.

1.6 Relationship with existing policies and guidelines

This Guide forms part of the National Framework for Traditional Contracting suite of documents. The National Framework is made up of the following documents:

- The National Framework for Traditional Contracting of Infrastructure.
- Topic Specific Guide 1: Project Definition and Tendering.
- Topic Specific Guide 2: Development of Project Budgets in Business Cases.
- Topic Specific Guide 3: Governance and Contract Management.
- Topic Specific Guide 4: Performance Assessment and Continuous Improvement.

Industry specific guidance or requirements can be expected to be used or mandated by the Australian Government or jurisdictions for areas such as transport, water, economic and social infrastructure. For example the Commonwealth Department of Infrastructure and Regional Development (Infrastructure) publishes its specific requirements and associated guidance for cost estimates for road and rail projects on its Infrastructure Investment Programme website at: <http://infrastructureinvestment.gov.au>. These documents are produced by Infrastructure in its role as an Investor on behalf of the Australian Government and jurisdiction agencies making application to the Australian Government for road and rail projects are required to follow the guidance and meet the requirements¹.

This Guide complements these sector specific guides. As part of the National Framework for Traditional Contracting it provides cross sector guidance on principles to be applied in preparing and approving a Project Budget and the purpose of the Project Budget more generally. Where there is a conflict in the guidance between this Guide and industry specific guides published by Investors, the Investor's guideline will take precedence as they are the funding body.

1.7 Updates to the document

Updates to the Guide will be published from time to time on <http://www.infrastructure.gov.au/utilities/contact.aspx>

¹ Note that in the Infrastructure cost estimation framework the 'Business Case', as described in this Topic Specific Guide, is broadly analogous to the Delivery Phase Project Proposal Report, noting that the Infrastructure framework recognises that funding can also be sought for the preceding Scoping and Development phases which are broadly analogous to the 'Inception' and 'Planning' steps in the Traditional Contracting Guide (Refer Figure 1 in this Guide).

2 Introduction to Project Budgets in Business Cases

This Chapter provides an introduction to the purpose of the Project Budget along with an overview of how it is developed and presented.

2.1 Better Business Cases and better Project Budgets

The Project Budget informs the Investor's infrastructure investment decision, and it is a key component of a Business Case where the benefits of investment proposals are analysed, quantified and articulated. The Project Budget is a key to the *value for money* and *opportunity cost of capital* assessment that informs this investment decision. Investors use the Business Case as the primary document to guide decision making on:

- **Investing in the right things**
 - Ensuring the Project responds to a real and priority community service need.
 - Articulating the service need and expected benefits.
 - Enabling effective ranking against competing priorities articulated in other Business Cases.
- **Quality of the implementation plans**
 - Understanding the time, quality and cost constraints for a Project to deliver value for money outcomes.
 - Determining the optimal management plan and procurement strategy.
- **Evaluation of outcomes**
 - Providing the primary source document by which success is defined and assessed in terms of meeting the service need and whether benefits are/were delivered.

The Client, and in turn the government as Owner accountable for the Client, is responsible for ensuring that individual Projects achieve their goals, deliver service benefits and that the public understand what the costs were. To make such evaluations, and provide quality recommendations, reliable cost information and standards are required.

The Business Case must therefore contain a high quality Project Budget detailing the financial assessment of forecast outturn capital costs, operational costs, risks and benefits to inform the Investor's decision.

2.2 The need for an accurate Project Budget

Where an approved Business Case contains a Project Budget that is subsequently found to have significantly understated or overstated the actual outturn capital cost, this raises serious doubts about the basis of the original investment decision. Poor cost estimates can lead to erroneous judgement on the relative merits of competing proposals (i.e. the 'opportunity cost of capital' criterion), and thereby undermine the investment decision making process. A significant underestimation of the forecast outturn capital costs could mean that an alternative Project or service should have been approved (i.e. the wrong decision was made). Overstating may result in

paying too much for a project; and/or reduce the ability of other projects (and hence service opportunities) to be funded or cause delays due to a lack of unallocated resources.²

2.3 Overview of cost estimating and Project Budget preparation

There is considerable literature on cost estimating practice; however, while there is a degree of commonality there are significant variations in the approach to cost estimating across Australian and international public sector Clients. Moreover, much of this material is presented from the view of the Project office, charged with the construction of capital assets, rather than that of the public sector Investor in the provision of services. This Guide seeks to assist in achieving a more consistent application of good practice across Australian government jurisdictions, and it addresses the Investor's interest.

The Guide does not repeat the wealth of knowledge already available, however, it does shift the focus from solely producing a Project 'cost number', to recognising the investment service rationale, increasing understanding of the overall cost estimate through to decision making and assisting in subsequent budget management. In turn, this will provide Government with greater assurance that Project Budgets are well targeted to their objectives, well developed, well understood and are being well managed. The Guide provides principles on:

- developing a base cost estimate for a proposed capital Project;
- developing and costing Project Risks;
- Integrating all elements of the estimates to develop a Project Budget.

This Guide is not prescriptive in how to develop cost estimates, but provides principles on the quality of analysis and information that can be presented in a Business Case for consideration by decision makers prior to approval. It is recognised that the most appropriate methods and techniques to develop specific cost estimates may vary from time to time given the unique features of some Projects; however, the principles in this Guide should be exceeded or met at a minimum.

"We found that uniform guidance on cost estimating practices and procedures that would be the basis for formulating valid, consistent, and comparable estimates was lacking.... In fact, evidence showed that each [Client] issued its own guidance for creating cost estimates and that the guidance ranged from a detailed estimating manual to a few general statements. In addition, we reported that cost estimators often ignored this guidance."

Comptroller General of the United States, *Theory and Practice of Cost Estimating for Major Acquisitions*, B-163058 (Washington, D.C.: July 24, 1972), p.1

² The importance of providing governments with good quality information and analysis on costs and benefits to assist with investment decisions is also recognised by the Productivity Commission 2014, Public Infrastructure, Draft Inquiry Report, and it provides a more expansive discussion on this issue (see page 81).

3 Foundations for good Project Budgets

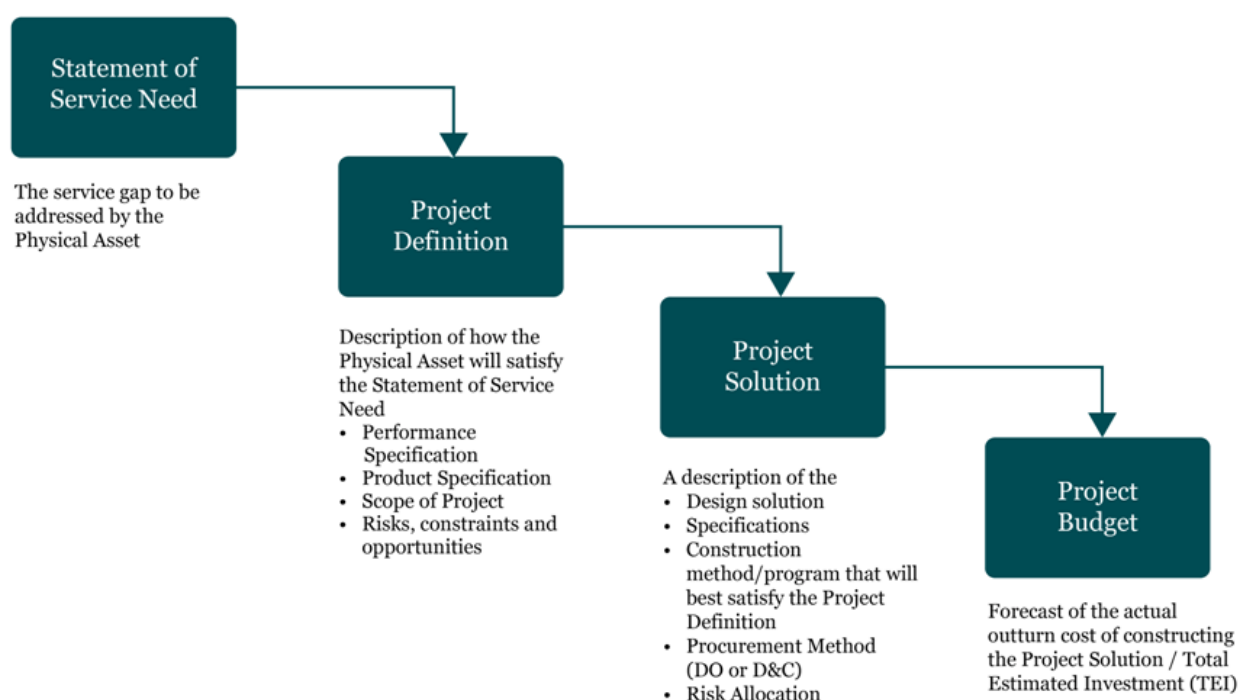
This Chapter provides an outline of the foundation points and the need-to-haves that ensure a good Project Budget can be developed. All Business Cases presented to government for consideration should satisfy these foundation points.

3.1 Foundation Principles

Each jurisdiction provides guidance about how to develop cost estimates in the form of instructions and manuals. There is no intention to repeat this information in this Guide; however it is important to confirm some of the key foundation principles outlined in The Guide and Topic Specific Guide 1 that underpin this Topic Specific Guide 2.

Firstly, it is important to understand the fundamental importance of the relationship between the Statement of Service Need³, the Project Definition, Project Solution and Project Budget as shown in Figure 1 below:

Figure 1 The development of the physical asset recommendation in the Business Case



It is also important to consider the common approaches to estimating the cost of risk for inclusion in the Project Budget, noting that each jurisdiction and sometimes agency has its own preferences and requirements.

³ To ensure success in a project investment, it is critical to have a clear linkage from the Government's approved service need to the project definition, project budget, tender documentation, contract awarded and to project completion.

3.2 Preparing for the development of a Project Budget

To be able to successfully prepare a Project Budget there are a number of significant criteria that must be addressed. These are closely related to the design development process (as set out in Topic Specific Guide 1: *Project Definition and Tendering*) and underpin the work required to prepare an accurate Project Budget.

These include, but are not necessarily limited to:

1. Clear identification of the service benefits to be delivered.
2. Demonstrable linkage between the service benefits and the proposed capital assets enabling that service delivery.
3. A clear Project Definition of the capital works in terms of:
 - (a) Performance function;
 - (b) Product specification;
 - (c) Scope; and
 - (d) Risks, constraints and opportunities⁴.
4. A well thought out concept/design that addresses the Project Definition in an efficient, effective and economical manner.
5. Expected timing of Project Development, date of contract award, construction start etc.
6. A good understanding of current and future market conditions.
7. Clear understanding of the Project Risk profile and the risk opportunity.
8. Availability of valid benchmarking data from exemplary Projects.
9. Appropriate resourcing of the Project Budget team.
10. Strong Leadership working within an appropriate governance framework.

Poor and/or truncated project planning

Experience suggests that there is an optimal number of analytical, planning and thinking activities that must be undertaken to develop a good quality Business Case.

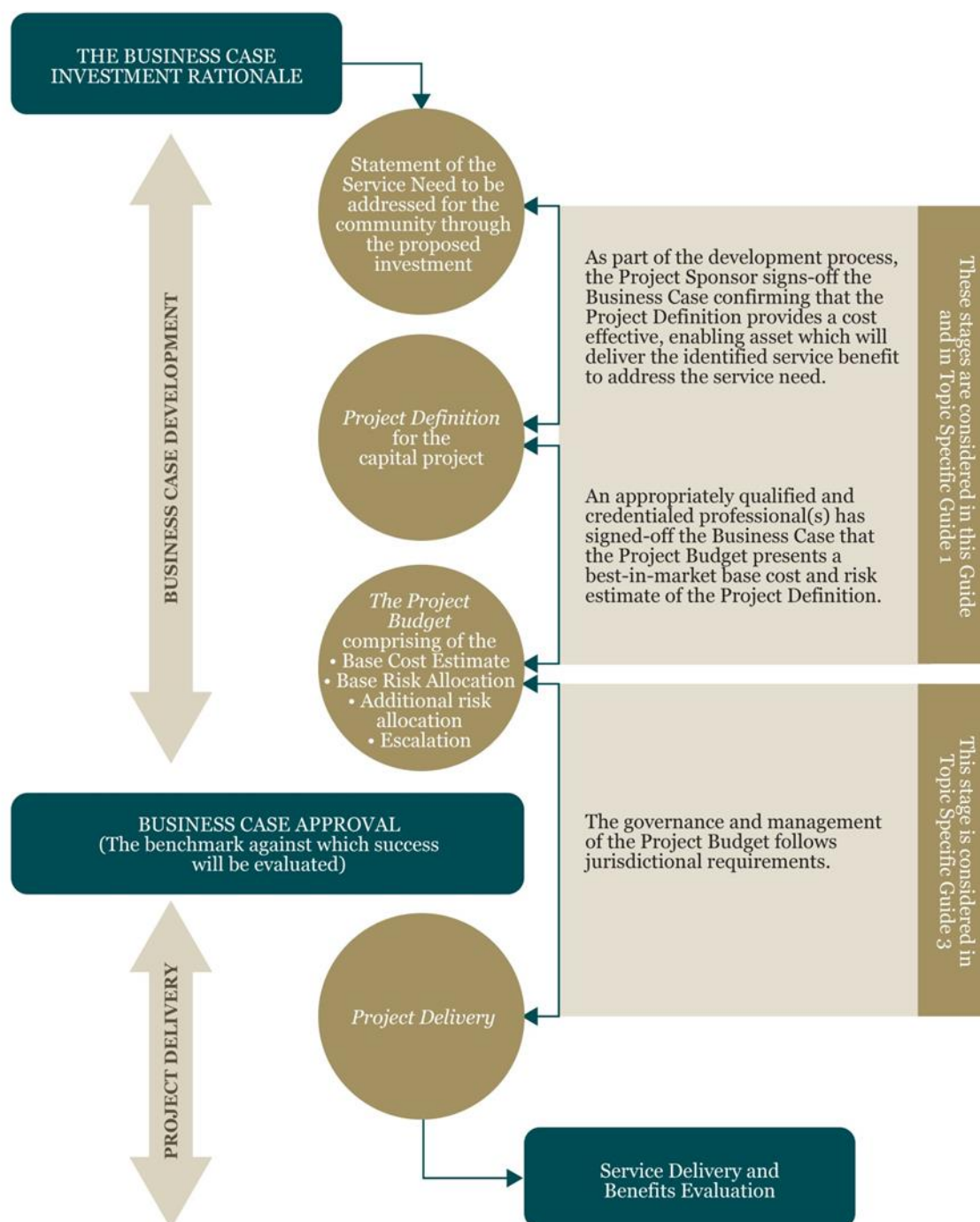
Experience also suggests that truncating the timeline or the number of activities will lead to a sub-optimal outcome. Expediency is damaging to good Project planning.

However, it is recognised that in some cases, projects must be “fast-tracked” to meet critical milestones. In these cases, limited timeframes must not serve as an excuse for sub-optimal planning, where necessary, project resources and effort must be increased to ensure that robust planning is still undertaken.

⁴ An important component of the project definition is setting out the context of the project to be delivered (for example, the physical environment, regulatory requirements, stakeholder interests etc). This context is normally articulated in terms of (project) risks (eg ground conditions), constraints (eg timelines, regulatory imposts) and opportunities (eg ‘value capture’ revenues arising from the infrastructure investment, or opportunities to trial new technologies and policies).

At all times, the Project, and the actual costs during Project delivery, should be traceable back to the Project Definition and ultimately to the service benefits of the Business Case (as articulated in the Statement of Service Need). These relationship elements are illustrated in Figure 2:

Figure 2 Inter-dependencies of key planning and management activities



3.3 Developing a Project Budget

In developing Project Budgets, the Client needs to be cognisant of the main elements making up the Project Budget and their relativities. Clients should not unnecessarily focus on high attention elements such as risks at the exclusion of more substantial elements like direct and indirect costs. Clients should ensure that they do not 'load up' the estimate of Project Risks to absorb the potential impacts of poor and/or truncated planning.

Table 1 summarises the foundation points that underpin the development activities of a Project Budget that is suitable for presentation in a Business Case, and would generally satisfy jurisdictional requirements. Where a Business Case does not satisfy the substance or intent of a foundation point, it is expected that this would be highlighted in the Business Case with the potential impacts and rationale discussed.

Table 1 Summary of foundation points to be satisfied during the Project Budget development

Foundation Point ('during')	Description
1. The Project Budget recommended in the Business Case is representative of a challenging but achievable outcome for an experienced and capable Project team	The Project Budget must be developed with the mindset that it will enable delivery of the Project through good planning and the application of hard and smart work by an experienced and capable team; and that all cost elements are traceable back to the specific elements in the Project Definition which in turn has a traceable link directly back to the service benefits of the Business Case. The government decision makers need confidence that the Project Budget is not inclusive of costs that inappropriately reduces the 'optic risk' of a budget over-run (i.e. leading to what is otherwise known as a 'fat lazy budget'). Refer to Topic Specific Guide 1: <i>Project Definition and Tendering</i>.
2. A robust estimating procedure	Documenting, implementing and conforming to a comprehensive estimating procedure that is industry best practice. This will provide a good basis for establishing a best-in-market Project Budget along with its assumptions.
3. The base cost estimate structured and presented in a format that promotes understanding by decision makers	An appropriate Cost Breakdown Structure and terminology should be applied consistently to promote understanding by decision makers. A Cost Breakdown Structure ensures that no portions of the estimate are omitted, double counted, and readily allows for comparisons to similar programs and systems. The documentation should be easy to use and comprehensive that informs the reader's understanding of the assumptions and its strengths and weaknesses.

Foundation Point ('during')	Description
4. Project Risks are estimated on the basis that responsibility is assigned to the party most able to manage the risk	The identification and quantification of Project Risks must proceed on the basis that all necessary and prudent investigations (e.g. geotechnical, regulatory planning etc.) have been done. Moreover, the risk estimation must be on the basis that the party best positioned to manage the risk, will take responsibility for that risk. The government decision makers need confidence that the Project Risks are not estimated with premiums loaded in 'just to be sure'.
5. Senior management attention to the preparation and detail of the estimate	There should be sufficient senior management attention to the quality of inputs, to the approach to the preparation of estimates to ensure adherence to procedures and processes. Important aspects to consider are: ▪ Using experienced and sufficient resources to perform the planning and investigatory work required to ensure the estimates reliability; ▪ Undertaking appropriate analysis and assessment to determine appropriate risk allowances and Escalation; ▪ Using benchmarking and cost databases effectively to validate cost estimates; ▪ Timely provision of information; and ▪ Reporting how the estimate is prepared including assumptions, qualifications and exclusions.
6. Senior Management review and sign-off	There should be a clear process and delegation for Senior Management review and sign-off at significant milestones. This is often governed by 'gateway' reviews according to each jurisdiction's requirements.
7. Appropriate independent review and sign-off	There should be a process of independent review by appropriately experienced personnel in order to determine that the cost estimate: ▪ captures all the relevant scope of the Project Definition; ▪ reflects, as best as possible at the Business Case stage, best practice design solutions, construction methodology, risks, constraints and opportunities, program scheduling etc.; ▪ the cost estimation process is prepared following best practice; and ▪ is reasonably based on professional judgement and experience and there is confidence that it can be achieved through good planning and application of hard and smart work. (The process of Project cost estimation should be subject to an approval process based on consistent and clear lines of responsibility and accountability that ensures costing standards

Foundation Point ('during')	Description
	applies to any budget information.)
Foundation Point ('during')	Description
8. Appropriate change management	Appropriate reporting, management and approval of changes to cost estimates, as they are being developed, should be in place to enable effective communication and accountability.
9. Good quality documentation that evidences the Project Budget estimate	The Business Case documentation of the Project Budget estimate needs to be of sufficient quality to clearly articulate and validate the Project Definition, state the key parameters, assumptions and constraints of the estimate; and provide a statement of the reliability/reproducibility of the Project Budget estimate. A Business Case must provide a level of confidence to decision makers that their decision based on a benefit: cost ratio, VfM and 'opportunity cost of capital' considerations is not invalidated by poor advice. The level of planning, investigation, design development and risk identification/quantification necessary at this stage must be to give this confidence.
10. Process and system reviews for continuous improvement	Regular process and system reviews should be conducted during the Project Budget development; and Project learnings from other exemplary Projects should be shared to increase corporate knowledge, encourage and facilitate continuous improvement.

"Overall HIP [the Home Insulation Program] has been a costly program for the outcomes achieved, including substantial remediation costs. It has also harmed the reputation of the Australian Public Service for effective service delivery. This experience underlines very starkly just how critical sound program design and implementation practices are to achieving Policy outcomes."

**The Auditor-General, Audit Report No.12 2010–11,
Performance Audit Home Insulation Program**

3.4 The Additional Risk Allocation allowance

Additional Risk Allocation is the allowance above the most likely value for all costed Project Risks⁵.

Where there is a portfolio of projects, best practice is that the Additional Risk Allocation (including associated escalation allowance) is managed by the Client at a portfolio level outside of the Project Team's or Project Office's area of responsibility. For large or complex projects, the approval to expend this allowance may be considered at Ministerial level.

⁵ When using a probabilistic estimating methodology, the Additional Risk Allocation would be the allowance above the P50 estimate; and often this allowance equates to the difference between the P90 and P50 estimates. A further risk allowance or risk contingency above the P90 estimate would be out of the ordinary and would require a comprehensive justification.

3.5 Potential specific fixed cost allowances

If a work item is required but full details such as scope and cost are not available, the Client should propose a specific fixed allowance in the Base Cost Estimate, with an associated contingency (or in the case of a Probabilistic cost a range and probability distribution) for decision makers to consider. Rather than consolidating these various provisions into a single pool with a loss of purpose or detail, decision makers may make such funding single purpose and savings not available for reallocation to other project work or issues.

The inclusion of 'known unknowns' as Project Risks are not appropriate if these cannot be quantified with a reasonable level of confidence (see TSG1, section 3.5.1).

3.6 Communication about the Project Budget

The decision about communicating the Project Budget (i.e. when and to whom) is a decision made by the Client in accordance with jurisdictional requirements. Making it publically available may give the Community and prospective Suppliers a sense of commitment by the government on what it is prepared to 'spend up to'. However, it also informs the market (the prospective Suppliers) of the Government's reserve price and this may distort the tender price.

A foundation point of a good quality Project Budget is having in place a good Project Definition. The Project Budget should not be used to compensate for a poor quality Project Definition by using it to provide a metric defining the project scope for potential bidders.

4 Elements of a Project Budget

This Chapter provides an overview of the elements of a Project Budget as they should be presented in a Business Case.

4.1 The headline elements of a Project Budget

The Project Budget has three main parts:

1. **Base Cost Estimate:** which is the estimated cost to complete the Project at current prices and excluding risks;
2. **Project Risks/Contingency:** which is the Base Risk Allocation and Additional Risk Allocation; and
3. **Escalation:** which is applied to the cash flow and takes account of increased costs through the period from the date of the estimate to the completion of construction.

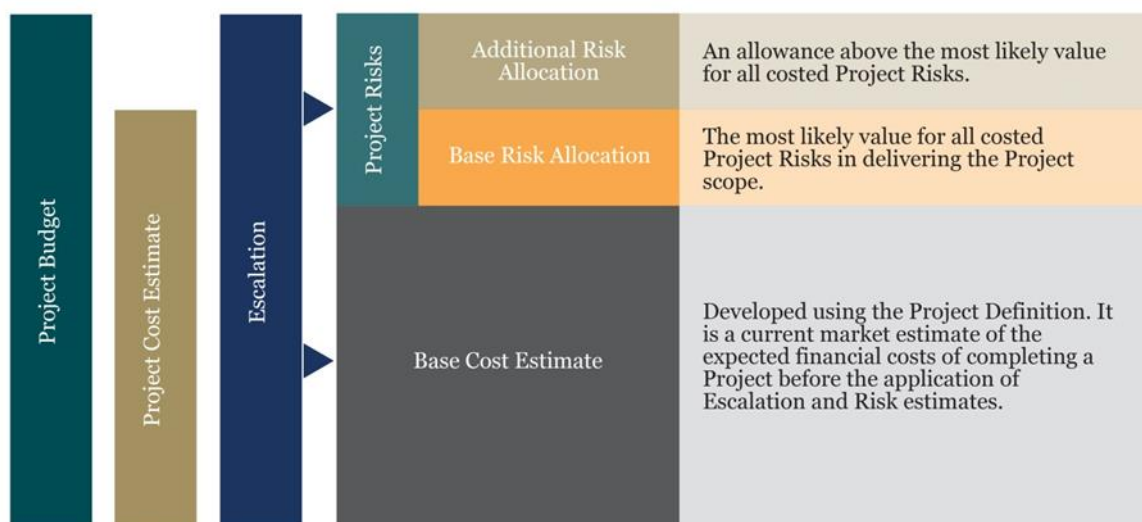
These headline elements are comprised of various sub-components and elements, some of which are summarised in Figure 3 below with more detail provided in Chapters 5, 6 and 7.

It should be noted that the cost of Client staff applied to the Project should not be included in the estimate of the indirect costs, if these costs are addressed within the Client's annual operation budget. In cases where a large Project requires the establishment of a special purpose statutory authority, it is appropriate to include such associated costs. At all times, double counting of staff and other costs needs to be eliminated.

As outlined in section 3.4, best practice draws a distinction between the funding provided to the project team responsible for delivery of the project and the total estimated investment allocated by Government. As illustrated in Figure 3:

- **The Project Cost Estimate** - made up of the Base Cost Estimate and the Base Risk Allocation and relevant Escalation – is normally the allocation provided to the project team.
- **The Project Budget/TEI** - made up of the Base Cost Estimate, the Base Risk Allocation, the Additional Risk Allocation and Escalation – is the total investment made by the Government. (Best practice is that the Additional Risk Allocation component (including the associated escalation allowance) of the Project Budget/TEI is managed by the Client at a portfolio level.)

Figure 3 Headline elements of a Project Budget⁶



When is an estimate the Project Budget?

The term Project Budget should be strictly reserved for the final Total Estimated Investment (TEI) required in the finalised Business Case, and is recommended and approved by the Client and Investor respectively. The term should only be applied to estimates developed in accordance with the rigour required of the relevant jurisdictional policies and guidelines (and to the principles outlined in this Guide).

Estimates of project costs based on an early or emerging Project Definition, with limited project planning and investigatory work should not be referred to as the 'Project Budget' and should not be widely communicated so that they achieve a status of credibility that is unwarranted.

4.1.1 Base Cost Estimate

The Base Cost Estimate is comprised of the following cost elements, and does not include any allowance for Escalation or risk:

- **Direct Costs:** the estimated cost of labour, plant, materials and specialist subcontract work required to deliver the asset based on calculated quantities derived from proposed design solutions and construction methodologies developed on industry best practice.
- **Indirect Costs:** the specific Project costs necessary to support the direct costs of Project delivery incurred by the Client and the Supplier. Typical examples include site facilities, Project insurances, professional fees, site management and supervision etc.
- **Contracting parties' fee:** this is an estimate of the contracting parties' profit margin and corporate overheads.

⁶ When considering the risk allowances in the Project budget, this Guide does not focus on the terminology of probabilistic estimating e.g. P10, P50, and P90. Furthermore while the term 'most likely value' is not specifically defined, the term is used in multiple places throughout this guide and general practice suggests that this would align with the intent of terms such as P50 (when contingency is calculated using a Probabilistic process).

It is essential that the Base Cost Estimate clearly articulates its boundaries and assumptions in full alignment with the risk assessment discussed in Chapter 6; otherwise there is a high probability of overlap or omission.

The Client is responsible for preparing the Base Cost Estimate (and identifying and assessing how much to allow for Project Risks).

“While it is clear that progress has been made in terms of implementing new acquisition reviews and reporting detailed baselines, there remain critical gaps in the material reported, particularly the quality of the underlying cost estimates needed to establish baselines.”

**Actions Needed to Improve Transparency and Accountability,
US General Accounting Office April 13, 2011**

4.1.2 Project Risks

In estimating the Base Cost Estimate, it is necessary for the Client’s cost estimator to take into account many variables and make numerous assumptions regarding the design and construction of the asset and what circumstances may arise as the Project is delivered. This could include an assessment of the accuracy of measured items (e.g. extent of rock excavation or utilities relocation) to items of a global nature that affect the overall Project (e.g. unanticipated weather conditions causing flooding and time delays). However, it is inevitable that the actual circumstances will make some of these assumptions incorrect and cause either cost increases or decreases relative to the base cost estimate.

These assumptions are termed ‘Project Risks’ and inform the Investor on the expected actual outturn cost by estimating the likely sum on top of the base cost estimate required to deliver the asset. However, it is not expected that all of that estimate for Project Risks will need to be actually expended on the project’s delivery.

To satisfy the risk profile identified by the Client, and agreed by the Investor, following contract award, many identified risks are transferred to the Supplier to manage at an agreed price.

The Project Risk estimate comprises two components:

1. the **Base Risk Allocation** (an allowance for the aggregate ‘most likely value’ for the project taking into account all costed Project Risks in delivering the Project scope including inherent and contingent risks); and
2. the **Additional Risk Allocation** (an allowance above the aggregate ‘most likely value’ for the project taking into account all costed Project Risks). Best practice is for the project office/team to be funded for the base cost estimate, the base risk allocation and the relevant escalation. The Investor determines who has the authority to expend any of the additional allowances for risk and escalation.

As illustrated in Figure 4, it should be noted that the base cost estimate has the greatest impact on the accuracy of the Project Budget estimate because it is, by far, the largest component and is the foundation on which the Base Risk Allocation and Additional Risk Allocation are developed. It therefore follows that the preparation of the Base Cost Estimate warrants considerable attention and effort, and the attention paid to project risks should not be at its expense.

Figure 4 Conceptual illustration showing typical proportion of Project Risks to Base Cost Estimate



The following box illustrates the headline components of a Project Budget.

Illustrative example of the headline components of a Project Budget:

Without attempting to provide the justification required in the Business Case to support the recommended amounts for the Base Risk Allocation, Additional Risk Allocation and Escalation; the headline figures for a low to medium risk infrastructure Project are provided in the following illustration.

Base Cost Estimate	\$300m
Base Risk Allocation	\$21m
Additional Risk Allocation	\$9m
Escalation	\$8m
Project Budget	\$338m

(As illustrated in Figure 3, the funding provided to the Project Team Project for its management (ie the ‘project cost estimate’) includes the Base Cost Estimate, Base Risk Allocation, and the relevant Escalation allowance.)

“[In relation to] cost estimating –there was a lack of ...capability to provide adequate cost estimates and inability... to evaluate the validity of the cost data.”

**The Australian National Audit Office - General Report No.17 2010-11,
Assurance Report2009–10 Major Projects Report**

5 Developing accurate Base Cost Estimates

This Chapter provides a description of a Base Cost Estimate for a Project and the expected principles to be applied to its preparation.

5.1 The need for an accurate Base Cost Estimate

The Base Cost Estimate represents the largest proportion of costs and has the greatest impact on the accuracy of the Project Budget. It is the foundation on which the estimate for Project Risk is determined. Base Cost Estimates can lack the detail, methodology and accuracy needed to produce accurate and reliable Project Budgets, which are essential for decision making in the Business Case. However, accurate Base Cost Estimates are achievable if a disciplined and rigorous approach is taken to their preparation using specialist knowledge.

Key to this preparation is a high quality Project Definition that provides the basis for establishing the optimal Project Solution and Project Budget. For example, if the underlying assumptions about the construction methodology and program change during the development of the Business Case, then the Base Cost Estimate and risk estimation must be adjusted accordingly.

These estimates are a forecast of the best in market price, not the public official's view of the prices. Prices are ultimately set by the market, and the government elects whether to accept that price or not.

The 'on time, on budget' metric

'On time, on budget' is essentially a predictability metric, it is not necessarily a metric of value-for-money outcomes. 'On time, on budget' can be a useful value-for-money metric when the Project Budget and project timeline have been comprehensively, robustly and independently verified that they represent the best-in-market outcomes. This verification should be documented in the Business Case.

5.2 The steps to producing an accurate Base Cost Estimate

The accuracy of the Base Cost Estimate will increase to acceptable standards if these four steps are followed in a systematic and integrated manner⁷.

1. Prepare a well-defined Project Definition (refer to Topic Specific Guide 1: *Project Definition and Tendering*).
2. Use competent and experienced estimators who are prepared to certify their work.
3. Adopt an estimating methodology that is consistent with industry recognised structures.
4. Ensure that insightful and meaningful reviews are undertaken by an independent estimator and senior management.

⁷ Whilst the principles underlining these four steps would apply for less complex, lower value projects (say, under \$50M), the practices described may be sensibly scaled down to a level appropriate for such projects (particularly in respect of Step 4 where peer review could be effectively used rather than senior management or external independent reviewers).

These steps are shown diagrammatically in Figure 5. The vertical axis displays the increasing accuracy of the Base Cost Estimate as additional effort is applied through the progressive application of the above four steps, and is discussed separately.

The range of $\pm 5\%$ refers to the level of reproducibility of the Base Cost Estimate arising from two equally capable cost estimators working from the same Project Definition and assumption book (including timelines).

Figure 5 Increasing the accuracy of the Base Cost Estimate



The four steps are discussed in detail below. Departures from the outline of these steps, which may arise from Client experience and/or specific Project characteristics, should be explained and justified in terms of best for the State outcomes; and the likely impact on the confidence level of the Project Budget.

1: Prepare a well-defined Project Definition

The Project Definition establishes how an improved, or new, Service Need will be delivered through the provision of a physical asset. It describes the performance function, scope and risks and opportunities under which the project will be delivered. A well-defined Project Definition is the single most critical contributor to an accurate Base Cost Estimate. A Base Cost Estimate that is founded on a poorly defined Project Definition is no more than an ill-informed guess.

Within the intent of this Guide, the Project Definition satisfies the Service Need and (refer to Specific Topic Guide 1) includes:

- Performance function;
- Product specifications;
- Scope; and
- Risks, constraints and opportunities.

There are various recognised classifications available that describe the level of Project Definition maturity that is needed to achieve differing levels of accuracy of Base Cost Estimates. Having consideration to those various classifications, and having achieved the acceptable standard of Business Cases submitted for consideration by Government, the following requirements should be met:

- The Project Definition should be developed to a sufficient level of complete definition to enable the required level of accuracy in the Base Cost Estimate to be achieved.⁸
- The Client will typically need to develop the Project Definition to within this range to establish the required Project Solution and subsequent Base Cost Estimate for the Business Case. The greater the Client knowledge, experience and track record in delivering the Project type, the more acceptable it is to work to a Project Definition at the lower range of development.
- For similar reasons it can be expected that low risk Projects could tolerate a lower level of Project Definition than high risk Projects due to their heterogeneous nature.
- The Project Definition should enable the Base Cost Estimate to be prepared to within a $\pm 5\%$ level of reliability. This is based on the principle that the cost estimator is working to cost the Project Definition rather than predicting what the actual outturn Project cost may be. This expected level of reliability should be capable of demonstration by another independent and competent cost estimator, producing a Base Cost Estimate from the same Project Definition and the same 'assumption book' (i.e. a register of key assumptions like timings, construction methodology etc.). In this situation it would be expected that the two estimates would be within $\pm 5\%$ of each other. If this level of reliability cannot be achieved, then there would be a need to question the maturity of the Project Definition, the assumptions book and/or the competency of the cost estimators.

During Project Definition development, there may be specific scope items required but for which full details are not available. For example, assume a Business Case recommends the inclusion of art work for the exterior of a new significant public building, which will be commissioned following an open competition. For examples such as this, it is expected that this uncertainty will be reflected in the contingency. Decision makers may make such funding single purpose and savings are not available for re-allocation to other Project works or issues.

An ill-defined Project Definition will result in significant uncertainty and misunderstanding, which will result in significant differences in expectations at contract award. This will lead to unpredictable increases in costs and/or poor outcomes.

Format and presentation of information

Developing a Cost Breakdown Structure (CBS) for the Project provides the structure needed for disciplined investigation, Project scheduling and presentation of costs. The Base Cost Estimate is best developed using this method.

⁸ It is very difficult to define a general metric on the level of appropriate project definition development. As noted earlier, whilst there are various estimates based on a percentage of Project Definition, there is a dearth of guidance on how to interpret that percentage and it remains a matter of judgement for the Client for each Project. However, in all cases the maturity of the Project Definition must enable preparation of a Base Cost Estimate within a $\pm 5\%$ level of reliability.

The CBS format is fundamental to the build-up of the estimate because:

- It relates directly to the Project Solution and Definition;
- It should follow the same principles regardless of the type of Project;
- It can be broken down into more levels of detail as required; and
- It allows budget development to be tracked as the design matures and cost certainty increases.

A disciplined approach to the CBS and budget development, that consistently and accurately records the basis of assumptions and decisions made as the work progresses, will bring benefits for individual projects as well as across a portfolio of projects. These benefits include:

- Clarity and consistency in the way agencies capture and allocate costs;
- Ability to track and monitor changes through the Project lifecycle;
- Increased readiness and capacity to deal with risk events;
- Accurate placement of costs that permits comparison and review of different Projects;
- Adding to the Client's data base to assist future benchmarking.

Benchmarking

Benchmarking is a common approach used to gauge relative performance across industries and jurisdictions. It involves collecting data to construct indicators that enable comparisons of economic performance and of approaches to policy across jurisdictions. Indicators can either be quantitative (statistical or empirical) or qualitative (descriptive).

When done well, benchmarking can be a powerful analytical tool that helps to identify practices that work well and those that do not. Benchmarking to international or other local jurisdictions can help identify persistent levels of inefficiency even if there has been no trend change. It fosters accountability and can lead to improved efficiency and effectiveness by: exposing areas where improvement is needed; identifying good practice processes; setting targets for improvement; and encouraging innovation.

Productivity Commission *Inquiry into Public Infrastructure*

Final Report, July 2014

Presentation of Project Budget information must distinguish between different needs and levels of detail:

- For the Business Case approvals process the primary costs and key elements should be summarised with the details available in an appendix.
- For independent review and examination there must be sufficient level of detail in all elements for the estimate to be clearly defined and professionally checked.

2: Use competent and experienced estimators prepared to certify their work

The Base Cost Estimate should be founded on a Project Definition that is sufficiently developed to enable the required level of estimating accuracy to be achieved. The focus in this Guide is on Project Definition that enables a $\pm 5\%$ level of reliability for the Base Cost Estimate; the design effort required to achieve this will vary. For example; additional effort may need to be expended on high risk design elements in comparison to low risk design elements that may be as costly or even more, in construction terms.

An incomplete Project Definition represents a significant challenge to producing an accurate Base Cost Estimate and will necessitate the use of estimators who are experienced in their field and able to exercise sound judgement and knowledge to bridge both the inevitable information gaps and to ensure effective integration of the Base Cost Estimate with the Project Risk assessment.

Notwithstanding this lack of full definition, it is clear that experienced estimators are very capable of producing highly accurate estimates as evidenced by Lump Sum Design and Construct Tenders (which include both Base Cost Estimates and Project Risk estimates) where the design is often only at the 20-30% level of definition. Competent and experienced estimators are capable of producing accurate estimates consistent with the level of Project and scope definition available.

Describing and defining an appropriate standard of experience for estimators is not simple since it involves the need for tacit knowledge, judgement and experience that will be Project specific and not conducive to a simple specification. The track record and industry reputation of the individual estimator and their company can often therefore be of greater importance.

Developing cost estimates at the Business Case phase where, for some unavoidable reason, there is a low level of Project Definition is a job for experienced personnel. In such cases, the development of cost estimates particularly requires an estimator with:

- a depth of experience on many estimates;
- maturity in assessing scope definition at early phases; and
- a 'sense' that understands what will be required, even though it is not clearly identified 'on paper'.

Experienced estimators working with other senior Project team members can assist in providing the continuity and knowledge to help bridge the information gap between what is included in the Base Cost Estimate and what allowance has to be made for residual Project Risks arising from the Project Risk assessment.

In addition to the pre-requisite skills and experience, it is expected that the estimator should be prepared to certify the quality of their estimate, expressly acknowledging the adverse consequences for government should the resultant Base Cost Estimate not address the levels of accuracy expected for Business Cases. A suggested template for estimator sign-off is provided in Appendix C.

Skills and capability for base cost estimating:

Estimating the base cost is complex and when done properly it requires a high level of professional skill and judgement. Essentially, an agency can employ two types of engagements:

- **Development of the Base Cost Estimate**

The Base Cost Estimate is prepared by senior experienced cost estimators that have a track record of successful estimation practice. They are required to understand and have relevant experience to the Project they are engaged on. They need to be recognised by peers as showing wisdom and knowledge of the current market and future trends.

- **Independent review of the base cost estimate developed**

Independent review of the base cost estimate should be carried out by an appropriately experienced estimator. Generally a minimum of 5 years estimating experience in the specific sector would be expected, and preferably additional specific industry experience in other sectors.

3: Adopt a robust estimating methodology that is consistent with an industry recognised structure

Principles

A fundamental principle of cost estimation is that the cost estimate *has integrity and can be believed*. It has to make sense, especially when benchmarked and checked against other Projects. This requires both understanding of the Project Definition and sufficient attention to the quality and accuracy of the cost data used to build up the estimates. By presenting the Project costs in a consistent CBS format manner from the earliest stages of the Project Lifecycle it is easier to see how the accuracy of the estimate develops and allow any inconsistencies to be identified on a like for like basis.

Methodology

To provide the accuracy expected of Base Cost Estimates, the estimating methodology will entail a hybrid of 'First Principles' and 'Unit Rates' approaches for estimating the Direct Costs, Indirect Costs (including design fees) and Owner's Costs.

By way of guidance it is expected that this hybrid will be a 50:50 ratio (First Principles: Unit Rates) recognising that this ratio will be Project specific and will vary accordingly. More effort using a 'First Principles' approach would be expected for the high-value and/or high-risk elements and 'Unit Rates' for the low value and/or low risk items. Using simple rules of thumb, such as '5% allowance for Owner's Costs', will not provide sufficient accuracy.

A clear, consistent and transparent format for both the presentation and underlying structure of the Base Cost Estimate is necessary in order to facilitate a constructive and independent interrogation, and benchmarking to comparable Projects, by both the peer reviewer and the Senior Responsible Officer. (Refer to Step 4 for more details.)

The summary presentation of the Base Cost Estimate should follow the format outlined in Appendix D.

4: Ensure that insightful and meaningful reviews are undertaken by an independent estimator and Senior Management

Every Base Cost Estimate requires rigorous and insightful reviews. These reviews should occur at two levels.

1. **Peer review by another independent estimator.** This involves a rigorous 'line by line' review by an alternative and independent⁹ estimator. This may be someone with necessary qualifications and experience as a service provider of cost estimation. The peer review should result in a $\pm 5\%$ level of variation from the original estimate.

⁹ Whilst the notion of 'independence' is generally taken as well understood by the general public, it becomes more difficult to codify in a complex professional environment. It is often better understood in its breach, where we observe the appearance and/or substance of a conflict of interest. For example, 'independence' is assured where an agency does not regularly alternate the role of original estimator with that of the independent estimator across projects, where the independent estimator is at arms-length from project teams that will be charged with delivery of the project, the client instructions for the independent estimator do indeed allow for a 'line by line' review etc.

2. **Review by the Senior Responsible Officer (SRO).** While the preparation of the Base Cost Estimate requires specialist and experienced skills, it is also necessary that the Base Cost Estimate be reviewed from a business perspective by the Client to ensure that the estimate reflects the proposed capital asset in terms of the Project Definition and service benefits. This review ensures that the SRO is familiar and comfortable with the Base Cost Estimate, as representing the best-in-market pricing, for the application of best practice Project delivery.

Avoid over specification in the Project Definition

Avoid over specification, the application of unnecessary high standards or specifications and usage of bespoke or 'gold plated' solutions when off the shelf design is sufficient. Encourage more outcome based specifications and a greater consideration of value for money, delivering cost certainty and programme certainty.

6 Developing Project Risk estimates

This Chapter provides an overview of Project risks, the different steps/phases and techniques of Project risk estimates, how to set the Base Risk Allocation and Additional Risk Allocation; and undertaking a sense (or reality) check on whether the estimates are appropriate.

6.1 Principles of Project Risk estimation

Clients are encouraged to adopt risk analysis processes that are robust and defensible and to make 'realistic cost allowances for different levels of risk'. Broad reference should be made to other similar and exemplary Projects to verify the risk analysis as reasonable. Despite increasing levels of sophistication in analysis tools and the increased emphasis on probabilistic tools, risk assessment still relies heavily on access to suitably experienced personnel, relevant and robust reference data and the application of common sense, which is applicable whatever risk assessment process or tool is used. The process for determining the Project Risk estimation should be based on the following principles:

1. the identification and quantification of Project Risks follows best practice, including:
 - opportunities as well as risks and constraints are considered throughout this process;
 - an appropriate level of investigation in order to mitigate risks;
 - predicated on Project management capability being employed commensurate with the challenges of the Project; and
 - risks are allocated to the party best able to manage (and therefore price) the risk;
2. the estimate discloses all material assumptions and avoids 'double counting';
3. the estimate is a robust figure within which the Project can be delivered through good planning and effort involving active and capable management (a robust estimate is not one that delivers a Project within it simply because the estimate is pitched high);
4. value for money for the State is a critical criterion, with the State seeking the lowest cost for the required performance of the infrastructure;
5. good planning and discipline is maintained to eliminate optimism and pessimism bias in determining the Project Risk estimation; and finally
6. departures from this Guide are explained and justified in terms of what is best for the Investor's outcomes.

Good Project planning is the key to developing robust Business Cases that support Project Budgets that are sufficient to deliver Projects. Good planning greatly reduces and can even eliminate extravagant cost over-runs or alternatively 'fat lazy budgets', the impacts of *optimism* and *pessimism* bias (see the following box). Whilst these biases are identified in Project management literature, they do not excuse poor estimating. It is the responsibility of the Client and also its advisers to recognise the potential for bias and ensure that Project Budgets are not adversely affected.

In particular, the engagement of any risk professional must be to assist the Client beyond 'group think' outcomes, avoid embellishment and provide a Project Risk estimate that is neither optimistic nor pessimistic. Good planning requires full transparency and agencies must be able to demonstrate in the Business Case the work that has been done to support the mechanics of developing the Project Budget.

Optimism bias ('go low, ask for more later'): This describes the case where base costs and risks are systematically underestimated during the Business Case development phase. This results in Project Budgets based on optimism rather than on a rational weighting of gains, losses, and the considered likelihood that adverse hazard events may impact on the Project.

It is unacceptable to use optimism bias (inflating benefits and/or deflating costs and thereby improving the Benefit Cost Ratio) as a way of artificially maximising chances of a Business Case attracting funding support.

Pessimism bias ('fat lazy budgets'): This describes the alternative scenario, where the costs, risks and time required are overestimated. The risk of this bias is heightened when a Project, arising from an urgent and compelling public interest need, has been pre-announced and committed to before finalisation of a comprehensive Business Case. In this case achieving the predictability metric of 'on time on budget' is made easier, and (with pre-commitment) there is no downside to attracting project approval with a lower Benefit Cost Ratio.

It is unacceptable to use pessimism bias as a way of artificially maximising chances of the Project being delivered on time and on budget.

It is poor practice for risk to be either ignored or dealt with in an arbitrary way, for example, having a corporate practice of simply adding a 30% 'contingency' onto the Base Cost Estimate to arrive at a 'Project Budget'. Rather, best practice is that all significant Project Risks are identified, usually through workshops based on the input of capable and experienced practitioners; and then each residual risk is understood and dimensioned in terms of likelihood and potential consequence. Where appropriate this may include assessment of the risk correlation.

6.2 Undertaking a risk analysis

Risk and Certainty

"An undesirable event that is a certainty still belongs in the base cost estimate, not in risk or contingency."

Senior Executive
Australian Infrastructure Advisor (February, 2013)

The Project Solution is the primary source of information which allows the Client to make an assessment of the projects risks and informs the risk estimate in the Project Budget. The process of ongoing project risk analysis throughout the Project Solution activities informs decisions as the design develops and is finalised.

The identification and accurate quantification of risk is dependent on having sufficient Project and design definition information available to estimators. However, it is good practice to separate the activity of identifying risks from the quantification and pricing of risks. The unique characteristics, opportunities and risks of the Project must be considered hand in hand with the Project Definition as the preferred Project Solution and design are developed. Design development cannot be carried out in isolation of the risk analysis as the nature and size of Project Risks will be influenced by the Project design and conversely, the 'riskiness' of design elements will influence the design development. This understanding of project risks, constraints and opportunities then informs the quantification and pricing of the risks which is an input in the development of the Project Budget. Any risk being assessed must be capable of being quantified. Risks which can be identified but not quantified should not be included in the risk estimates.

Across the spectrum of Project development tasks, the context and purpose of a risk analysis will vary however the process followed must be consistent.

Opportunities should be given equal consideration in a risk model and considered in the estimate.

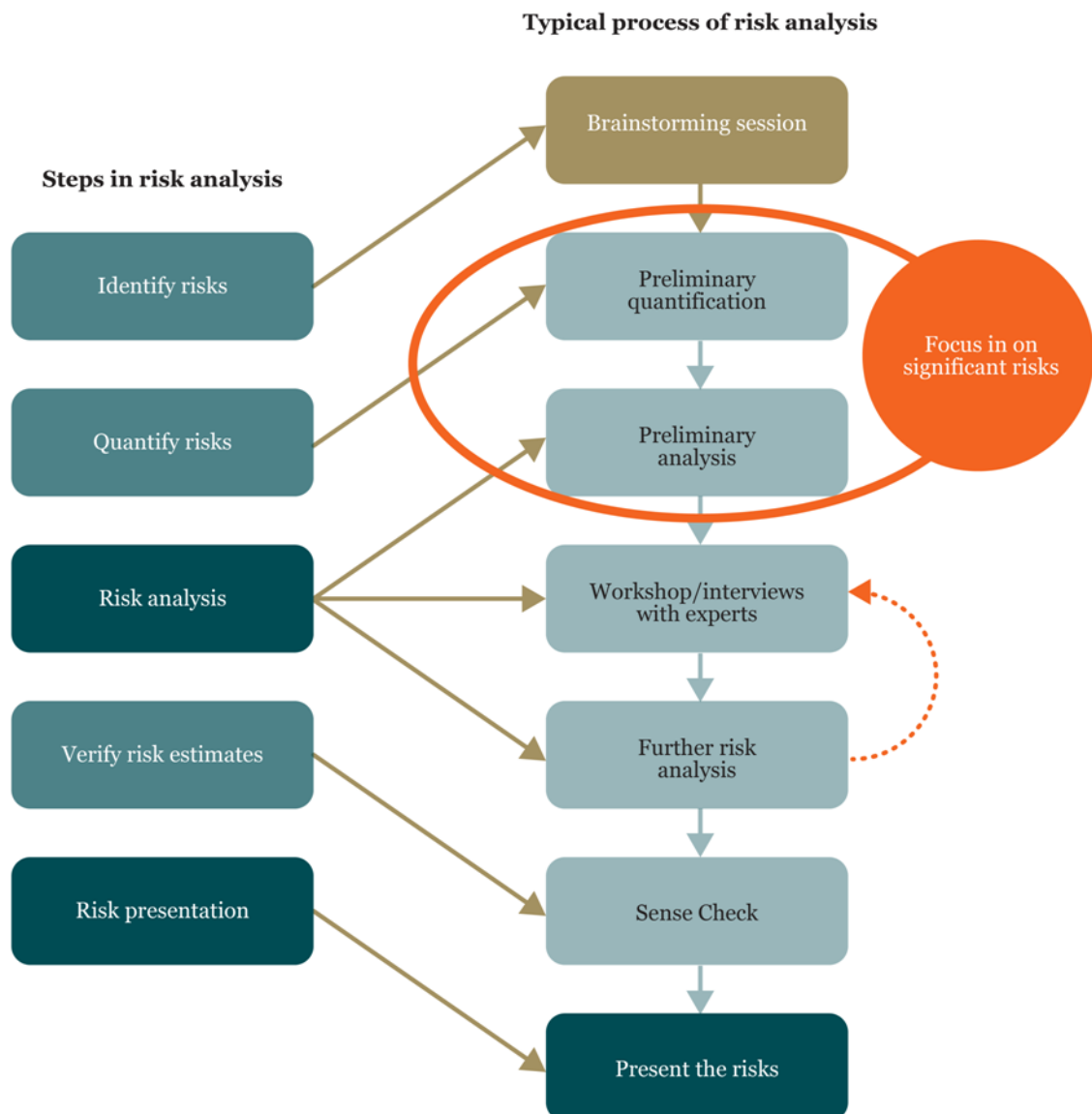
The process of risk analysis is a large subject that can be organised in different ways; however, best practice risk analysis should proceed through the following steps¹⁰:

- Step 1. Identifying Project Risks;
- Step 2. Quantification of Project Risks;
- Step 3. Allocation of risk and development of risk management strategies;
- Step 4. Verifying the risk estimates; and
- Step 5. Presentation of the risk analysis work.

Figure 6 demonstrates how these steps fit into a typical risk analysis process for a Project.

¹⁰ Whilst the principles underlining these five steps would apply for less complex, lower value projects (say, under \$50M), the practices described may be sensibly scaled down to a level appropriate for such projects.

Figure 6 The phases in a typical risk analysis



In the context of preparing accurate Project Budgets and undertaking a good risk analysis, the most critical factor is the quality of the thinking and deliberation that goes into the analysis and quantification of the risk estimate (including verifying the estimate), that must also be considered by Clients.

Topic Specific Guide 1: *Project Definition and Tendering* addresses how the process should be applied as the design is developed.

6.3 Identify risks

In developing the design of the asset a series of Project Risks, constraints and opportunities will be identified and recorded in a robust Project Risk register. The risk register will not identify risk outcomes (e.g. the cost overrun associated with the discovery of poor ground conditions), rather it is a list of risk events (e.g. 'poor ground conditions'). The risks should be ranked relative to each other, using qualitative risk analysis tools, and risk management controls considered (including their likely impact on the qualitative ranking of the risks). This provides the essential foundation on which the quantitative estimates can then be established.

Opportunities or positive risks, which introduce design innovation or better construction techniques to save money on what was initially planned and designed, are often not accounted for in preparing project estimates as the baselines are regarded as "all necessary". However opportunities should be given equal consideration in a risk model, as this is where the cost savings should be targeted.

The practice of identifying and assessing too many risks in quantitative terms is not likely to improve accuracy of the Project Budget but could lead to a lack of perspective on what are the really important risks and could also potentially lead to double counting of risks.

It is better to consider the headline risks when undertaking any risk analysis. Wherever possible identified risks should be mitigated by management or design actions such that remaining risks are only residual risks, being those risks that cannot be fully mitigated at any given phase.

6.4 Sizing Project Risks [Quantifying risks]

The Project Budget requires a monetary allowance to cover the costs incurred if Project Risks eventuate, in full or in part. The magnitude of that monetary amount in the Project Budget depends upon how those risks are assessed, managed and the level of risk to be covered in terms of likelihood and potential consequence.

It is critical that estimates are prepared on the basis of best practice management of risks. Best practice management of risks is to identify, assess and then allocate the residual risks to the party best able to manage the risk (and therefore price it at the lowest cost to the Project). Risks which can be identified but not quantified should not be included in the risk estimates. Provided this principle is rigorously adopted agencies will have a solid foundation on which to avoid either optimism or pessimism bias. This principle must also be applied irrespective of the procurement strategy adopted for the Project.

The quality of the project definition and expertise applied is critical

There are two broad approaches often used to identify and quantify project risks - probabilistic and deterministic. Both of these methods require the input of experienced practitioners.

Inexperienced practitioners simply following a methodology and applying tools may unknowingly over-identify risks, distorting the Project Budget and diluting the usefulness of the risk identification activity.

Probabilistic modelling (e.g. Monte Carlo simulation) is a tool that identifies the likelihood of achievement of any specific project cost estimate. Any probabilistic modelling method must be underpinned by access to suitably experienced personnel, relevant and robust reference data and the application of common sense, initially in determining the ranges and probability distributions of individual cost elements and risks, and subsequently in reviewing and validating the overall estimates of the dollar provision for project risk.

Similarly, a deterministic approach where appropriate for the scale and complexity of the project requires a high level of professional skill and judgement. This will also call for senior experienced cost estimators that have a track record of successful estimation practice relevant to the project's requirements and the delivery risks, constraints and opportunities. Inexperienced practitioners will need to ensure, for example, that they do not apply an arbitrary contingency to address "unknown eventualities or unknown project risks".

For both methods, it is important that the results are 'sense-checked' by someone with the appropriate expertise. Ultimately, the accuracy of any cost estimation process, probabilistic or deterministic, will be significantly impacted by the quality of the project definition and the expertise applied.

Whilst there are many different means of sizing risks from deterministic to probabilistic methods, there is still a need for what may be described as the *sense check*. Despite all the calculations and sophisticated analytic tools the question to be asked is "do the risk profile and the monetary amounts proposed make *sense*?". In any analytic activity it is good practice to ensure quantitative analysis is overlaid with a high degree of qualitative analysis (provided by an experienced professional), and if the results do not make sense then the inputs and assumptions should be reviewed, and amended as necessary

Achieving best in market pricing

The Investor and the Client's objective is to achieve best in market pricing for the Project (for its requirements of defined build, performance, quality etc.). Appropriate development of the Project Budget enables the Client to be an 'intelligent Client' who can engage the market effectively. The Project cost will be set by the market, and the prices proposed by Tenderers are influenced by their perception of how well informed the Client is and how effective the Client was in engaging the market.

Tenderers can use probabilistic methods in developing their price; together with their experience and judgement. For Clients, probabilistic methods provide a valuable approach to the development of the Project Budget but should always be informed by experienced and well-informed practitioners.

Where an Investor requires the Client to apply a probabilistic method, the Client should ensure they have appropriate capability to understand the methodology and provide the inputs, and to conduct a sense check of the results.

Where the outcomes of risk modelling effect risk allocation, the allocation should be clearly identified (e.g. to Client or Supplier) and the contract price adjusted accordingly through the contract negotiation process.

For the purpose of this document a Project Budget's monetary amount for risks that are *known knowns*¹¹ is made up of two parts:

1. **Base Risk Allocation:** the most likely value for all costed Project Risks; and
2. **Additional Risk Allocation:** an allowance above the most likely value for all costed Project Risks.

Depending on the complexity of the Project, different tools may be appropriate to quantify the risks (Step 4). The Client should ensure that the right analytical tools are used, commensurate with the complexity and riskiness of the Project.

A Project Risk

A Project Risk must satisfy two criteria:

- it is an event for which the probability of occurrence can be reasonably estimated (and it would be less than 100%), or a degree of uncertainty in a cost element; and
- for which the financial impact on the project can also be reasonably estimated.

If these two criteria cannot be satisfied then that event is not a 'Project Risk'.

Quantification of risk is best based on a combination of professional judgement (and the most suitable analytical tools) and previous project data (where available and it is proven as representative of best practice). The result should be presented as a range of outcomes; with the sensitivity of the estimates to the underlying assumptions and the confidence the Client places on the estimates clearly stated.

The greatest uncertainty in the identification and cost estimation of risk is in the earliest stages of a Project, which is also when decisions of greatest impact are often made. A Client and its expert

¹¹ See section 3.5.1 of Topic Specific Guide 1: Project Definition and Tendering

advisers should operate as a single team to avoid any shortcomings of incomplete commitment and inconsistent decisions when it comes to estimating risks. Risk estimation is essentially about compiling realistic forecasts and answers to questions that start with 'what if?' A further consideration in risk identification relates to the level of confidence (or more precisely the lack of confidence) that can be put on the likelihood of a potential event and the cost estimation of its impact. The need for judgement should not be used as an excuse for failing to give adequate consideration to a formal analysis of Project Risk.

In some cases, the answer to "what if?" and the level of confidence can only be arrived at once further investigations and work on the Project Definition are carried out. The identification and cost estimation of risk is not limited to workshops or modelling exercises, there are cases where the best (and only reasonable) estimate comes from additional research and investigations of the project site conditions, supply chain deliverables, construction methodologies, program scheduling, stakeholder interests etc. Often these investigations are not only desirable but necessary to satisfy the foundation points for good project budget development. Unless investigatory work is undertaken that results in quantifying an uncertainty to the appropriate standard of risk analysis, there should not be an allowance or provision for these in the Project Budget.

Clearly one size doesn't fit all. However, for the majority of public sector Projects that are well investigated and analysed in the Business Case, at the point of commitment (when the Government considers approval) agencies should be able to estimate Project Budgets that include an estimate of Project Risks in the indicative range of 5 – 20% above the Base Cost Estimate. It may be higher for a few other Projects depending on the nature of the projects and their level of complexity. Generally:

- Business as usual or routine Projects (low risk low value), such as school buildings and simple road and health Projects, that can draw on corporate history, should result in a Project Risk estimate (Base Risk Allocation and Additional Risk Allocation) of 5-10 % above the Base Cost Estimate.
- More complex building Projects that are not regularly undertaken by agencies, or larger infrastructure Projects regularly undertaken, are more likely to include Project Risk at the higher end of this range of say 15-20%.
- Idiosyncratic or one off Projects, that are high risk due to unique engineering or other high risk, the Client may need to move outside of this indicative range and include a Project Risk estimate over 20% (an example is Victoria's Synchrotron Project).

The difference between a Project Risk estimate of say 25% versus 15% might simply be further investigation and research (i.e. greater planning) to eliminate as much risk as possible. On the other hand and notwithstanding the planning that has been undertaken a higher Project Risk estimate may be appropriate to cover a genuinely high value and high risk Project. The above ranges are indicative, but agencies should use them as a guide to inform the level of effort that is expected to go into the planning. This work must be documented and demonstrate that the monetary allowances for risk genuinely covers Project Risk and that planning risk has been largely eliminated.

Cautionary Note

It is poor practice and contrary to the public interest to 'load up' the Project risk estimate to compensate for absent or poor Project planning risk. This may have the undesirable effect of producing padded budgets (i.e. 'fat lazy budgets') that maximise the optics of successfully delivering a Project to the Business Case's Project Budget.

Clients need to apply a realistic view on risks. Australian construction and design companies are among the most successful in the world and promote a reputation of excellence. They typically have a long history of delivering complex and high risk Projects and have a history of enjoying good financial outcomes. Therefore, agencies should ensure that they do not over-identify and over-inflate the uniqueness and/or the challenges of delivering a Project. An informed and experienced view needs to be taken of the industry's capability and expertise to manage Project risks.

Whilst the inclusion of estimated or guessed financial impacts arising from uncertainties (including those arising from poor project planning and analysis) are not acceptable as project risks and should not be included as an allowance or a provision in the Project Budget, it may be appropriate to deal with some uncertainties through Real Options. Real Options provide a way of dealing with some uncertainties associated with project planning and delivery by incorporating flexibility in the investment planning process to allow Investors to adapt investments to address that uncertainty.

6.5 Risk Allocation

The Risk Allocation represents the upper limit sum the Investor accepts as the Project Risks provision in the Project Budget. The Risk Allocation is made up of the Base Risk Allocation and the Additional Risk Allocation allowances.

The Base Risk Allocation

The Base Risk Allocation is the most likely value of the aggregate of all costed Project Risks.

The Base Risk Allocation combined with the Base Cost Estimate is the most likely cost outcome to government in delivering the Project and includes:

- Risks transferred to another party¹² (e.g. contractor) – done at a price to government that reflects the optimal effectiveness and efficiency (value for money) that is expected in transferring the risks to the party best able to manage them; and
- Risks retained by government – the estimate reflects both the optimum and the most likely outturn cost to government of managing these residual risks (i.e. these are risks that the government is best placed to manage and attempting to transfer to another party would incur unreasonable added expense).

'Most likely' implies a statistical average of weighted probabilities and impacts. Ostensibly the representation of a single figure estimate represents the most probable outcome for the Project considering all the risks and their respective weighted likelihoods of occurring and impacts (and

¹² Note that insurable Project risks (that is, Project risks for which the cost impact can be transferred to an insurer at a cost acceptable to the Client and Government) are to be accounted for in the Base Cost Estimate in the form of insurance costs. . Transferring risk under insurance contract effectively exchanges what otherwise would be a risk estimate (with all the variability of actual outcome versus estimate entailed), with a fixed cost, i.e. the insurance premium.

potentially range of impacts). However, it remains a judgement, one that should be informed by informed analysis and experience.

The Client's Business Case will need to provide the basis for the proposed Base Risk Allocation in the makeup of the Project Budget.

The Additional Risk Allocation

The Additional Risk Allocation allowance, being the allowance above the most likely value for all costed Project Risks should be managed and used at the Investor's discretion.

Notwithstanding that 'success', from a Project costing point of view, is to deliver the full scope within the Project Cost Estimate (i.e. the sum of the Base Cost Estimate ,Base Risk Allocation and relevant Escalation), there are circumstances where this does not occur, as risk impacts that were unlikely to occur, materialise. In these situations, the Project Cost Estimate will be exceeded. To proactively recognise these situations, Project Budgets include a risk allocation above and beyond the Base Risk Allocation.

The Additional Risk Allocation estimate should be based on an informed analysis and experienced judgement of the volatility of the Project's risks; and the complexity and interdependency of these Project Risks. Specifically, in sizing the Additional Risk Allocation, the agencies must consider:

- The volatility of the Project's risks as demonstrated by the spread of likely cost outcomes determined through the risk analysis steps;
- Any significant risks that fall outside of the norm, and are significant reasons for the Project being volatile; and
- The sensitivity of the Project to underlying risk assumptions, such as correlations between risks and / or secondary risk impacts.

A high risk Project with a volatile cost profile, e.g. a large spread of potential outcomes as measured using statistical tools, may justify a significant percentage Additional Risk Allocation. In these circumstances the Additional Risk Allocation may be a significant figure in itself; and together with the Base Risk Allocation, may be greater than the 5-20% (above the project Base Cost Estimate) expected amount for the majority of government Projects. In contrast, for a 'business as usual', low risk Project that has a low level of volatility and high level of certainty in its Base Cost Estimate, the Base Risk Allocation and Additional Risk Allocation may be in the range of 0-10% above the Base Cost Estimate.

Investors may wish agencies to take a portfolio management approach to determining the amount of Additional Risk Allocation they include in each Project Budget making up a portfolio of projects. In this case, the Investor may determine that 'Portfolio Additional Risk Allocation' could be less than the sum of the Additional Risk Allocation amount for each individual project.

Recommending the Base Risk Allocation and Additional Risk Allocation amounts

In presenting recommendations for the Base Risk Allocation and Additional Risk Allocation amounts in the Project Budget, the Client will again need to employ judgement and a test that involves the notion of likelihood; which sits comfortably with the concept of risk. Furthermore, agencies are required to provide sufficient justification in the Business Case for both recommended amounts.

The justification must include a rationale for the limit of the Additional Risk Allocation that provides an appropriate upper limit for the total Project Budget 'beyond the most likely aggregate value of all Risks' (i.e. the Base Risk Allocation). This upper limit must provide a realistic estimate (and not an easy target) that the Project cost is unlikely to exceed this amount.

A purely statistical representation of risk (by means of stochastic tools) is insufficient evidence, in itself, to justify either the Additional Risk Allocation or the Base Risk Allocation. These approaches should be supported by a rigorous and in depth rationale, the 'sense check' and assurance by management.

Cautionary Note – Interpreting Project Budget outcomes

The 'P50 estimate' is the Project Cost Estimate (ie the Base Cost Estimate + Base Risk Allocation + relevant Escalation) where the probability of final cost exceeding this value is 50%. It is only valid to refer to "P" numbers however if contingency for a project has been estimated using a robust probabilistic (stochastic) approach. As the 'most likely' final cost outcome, adoption of the P50 estimate as the Project Cost Estimate is appropriate. The 'P90 estimate' is the Project Cost Estimate where the probability of exceeding this value is only 10%. The greater level of certainty in the P90 estimate is achieved through a larger risk allocation.

From time to time, with the best of project management expertise and good will among all parties, a project will (for good and rational reasons) exceed the P50 estimate and come in at or just under the P90 estimate. Such a project cost outcome could be considered as satisfactory. Similarly projects can come in well under the P50.

However, if a number or portfolio of projects are delivered on average at the P90 estimate, then this should not be considered satisfactory.

If a portfolio of projects is delivered on average around the P90 estimate, a detailed root cause analysis should be undertaken to understand what practices have led to this outcome. And indeed the agency should be alive to the possibility that the root cause problem may lie in planning, project management or contracting practices; and not in the cost estimation practices.

6.6 Verify risk estimate

The purpose of this verification step is to introduce a formal verification and checking process which considers the risks identified and reviews the 'most likely' value has been calculated in terms of the estimate of probability of occurrence and impact of the primary risks. This verification checks for the risk of unreasonably low costs, exaggerated benefit, and underestimated risks (or overestimating capabilities to manage risks), which make Projects seem to have a more attractive benefit cost ratio (i.e. optimism bias). Equally important, this verification checks for pessimism bias, artificially high costs, underestimated benefits, and overestimated risks which can make ultimate 'success' more assured.

The sense check is introduced to the process to assist agencies in overcoming these challenges, introducing an outsider's view and to increase confidence that the risk allocations are appropriate. The development of cost estimates can be characterised as an insider's view of the Project. The insider's view is, off course, valid when based on sound professional skills and judgements. Nevertheless it looks at the Project from the insider view (normally 'Project office') that can be both knowingly and unknowingly compromised by an understanding that, ultimately, the Project office will be judged by their performance in delivering the Project against these estimates.

Whereas the insider view is the conventional and intuitive approach to planning Projects and estimating costs and risks, the outsider view takes a high level view of the Project and compares it to similar Projects already completed in an exemplary manner. A relevant comparison to a number of similar Projects (e.g. on type of Project, procurement strategy, the complexity, geographic location etc.) to assess and review the levels of risk that are attributed to projects and learn from similar Projects and actual outcomes is good practice.

When using the outsider view the Client is not necessarily required to re-employ analytical techniques on the Project itself, therefore, the outside view is much more likely to avoid the effects of bias on the Project. The aim is to provide a knowledgeable and realistic benchmark or sense check on whether the estimates are reasonable and truly represent the most likely outcome for the Project.

Clients can present the sense check as evidence that the costs and risks are fair and reasonable. Evidence must be provided in the Business Case supporting the rationale for the Base Cost Estimate, Base Risk Allocation and Additional Risk Allocation.

6.7 Present risk estimate

Clear and unambiguous presentation of the risk estimate is fundamental to the Investor in making the investment decision and allocating a risk allowance. There must be a clear correlation between the risk register and the outcome of the risk quantification process, which will allow the Investor to assess the proposed risks allowances.

Risk allowances should be accompanied by a succinct explanation of the basis of the assessment and any assumptions made in setting the monetary sum.

6.7.1 Escalation

Most agencies now require Project Budgets to be expressed in outturn costs based on the program of development and delivery. This requires the application of Escalation for rise and fall in costs from the date of the estimate to Project completion.

Two key elements that must be forecast as accurately as possible in calculating the monetary amount for Escalation are:

- the cash flows in each financial year, remembering that most of the costs are construction costs and will not be paid until quite late in the Project timeline. The cash flows are the sum of the Base Cost Estimate together with the amount for risk spread across the cash flow, with the vast majority of it allocated to the construction years; and

- the annual rate of Escalation (rise and fall in costs) each financial year, noting that sometimes this means forecasting up to 5 years ahead with its resultant risks. Each Client, and sometimes the Investor, will have its own policy on what forecast annual rates should be used to calculate Escalation.

Of all the various ways of calculating the amount for Escalation the simplest and easiest way, yet relatively accurate, is to apply an assumed rate of Escalation for each financial year to the estimated cash flow each year. If a Project is dominated by a specific material or supply item (e.g. steel or asphalt) then it is worthwhile doing a separate forecast calculation of Escalation for that item to achieve a more likely result.

No risk allowance should be made on the Escalation rate as it is itself a Project Risk.

Escalation

Escalation (and the calculation of the escalation allowance that provides adequate compensation for forecast cost increases due to the rise and fall of costs during Project delivery) is applied after the cash flow for the risk adjusted project costs have been determined based on the project program.

Escalation is highly sensitive to predictions of market conditions, to both systemic changes and to the supply and demand of specific Project inputs. Whilst various measures of cost movements are available in industry publications (particularly the ABS), these are based on observed historical data that is available for a range of specific components of the Project, for example, concrete, cement and sand; petroleum and coal products; steel etc. A cost estimator is required to use judgement to determine appropriate escalation factors (for the Project specific components) and the overall escalation (a single figure often used for presentation purposes).

In conditions of high volatility, as well as in more stable conditions, cost estimators need skill, experience and wisdom to successfully use historical data and forecast future escalation. The range of possible escalation factors can be very large. In circumstances of volatility this needs to be brought to the fore in the presentation of the Project Budget so that the Client and Investor can better understand the assumptions underlying the budget.

7 Establishing a Project Budget

This Chapter provides guidance on the mechanics and accountability of developing the Project Budget.

7.1 Establishing a Project Budget

A Project Budget, arising from the work outlined in Chapter 3 and 4, needs to be recommended by the Client as part of the Business Case submission. By this stage, a Client should have invested time and resources in the Statement of Service Need, Project Solution, Project Definition and Project Budget, including analysis of the risks to produce high quality advice to enable high quality government decision making. The initial Project Budget may need several iterations as the draft Business Case is refined and more work is done on the procurement strategy and sizing of risks.

A Business Case is not ready for submission if there has not been a high quality and transparent process, with determination of the Project Budget rigorously calculated and defensible.

The Business Case needs to provide to the Investor the clear assurance that the recommended Project can be delivered successfully. Successful Project delivery sees:

- the full Project scope delivered as intended within the cost envelope of the Project Cost Estimate;
- the lowest outturn cost for the required performance; and
- no or little call made on the Additional Risk Allocation allowance.

The aim is as always to deliver value for money for the State. In that context both over estimation and under estimation of Project Budgets place financial strain on the overall government budget processes and can constrain or compromise government's ability to deliver its full program of service priorities and is therefore not in the public interest.

Question: Can a sound Project budget be produced from poorly prepared base-cost estimate with a well-considered risk assessment?

Answer: No.

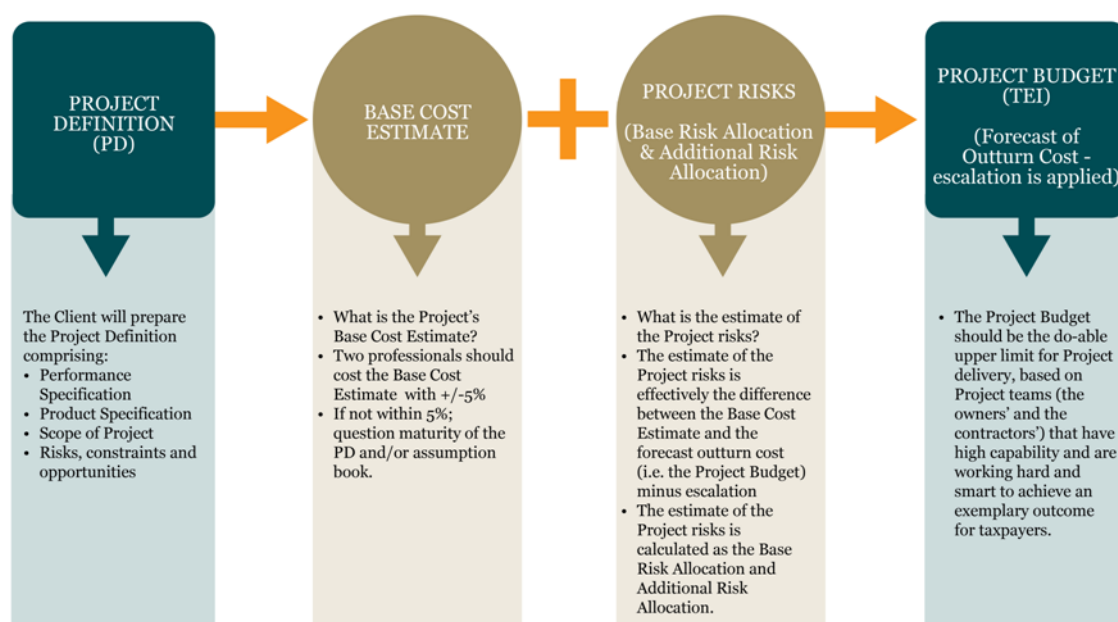
A well prepared base cost-estimate is an essential element of a sound budget and is the platform from which a risk review is undertaken.

"A rubbish estimate with a thorough risk review is still a rubbish estimate that produces a rubbish budget."

Senior Officer
UK Central Government Agency (October, 2012)

Figure 7 illustrates the relationship between the cost estimates arising from Chapters 3 and 4 to arrive at the Project Budget in the Business Case.

Figure 7 The relationship between Base Cost Estimate, Project Risks and Project Budgets



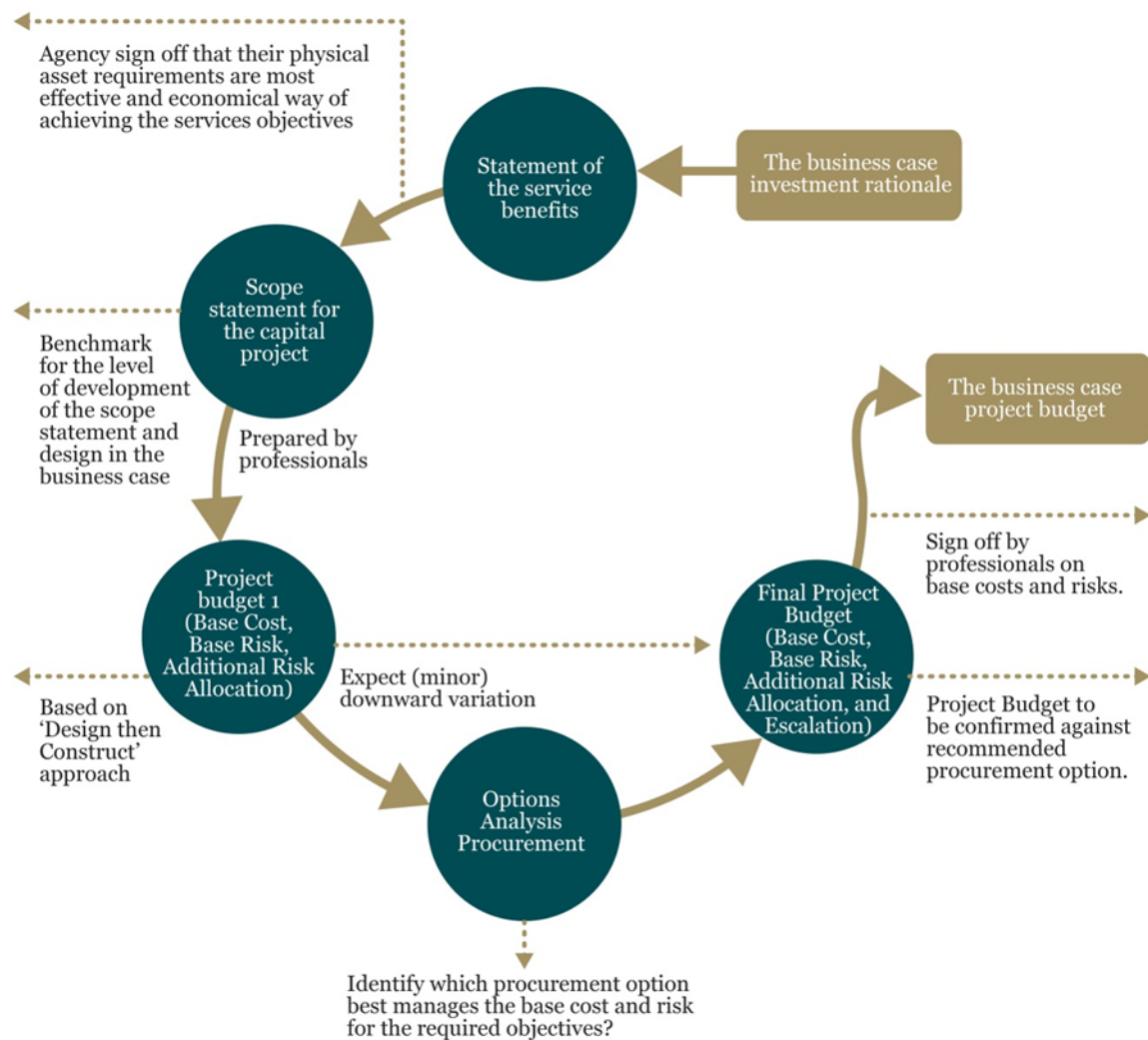
7.2 The mechanics of developing the Project Budget

A Business Case needs to recommend the preferred procurement strategy (and contracting model) for the capital Project. The recommendation should be based on the best procurement strategy that overall delivers the best outcome for the State based on a number of factors (which are normally inter-related) such as:

- Delivery of the lowest cost for the required performance standards, including effective management of:
 - base costs;
 - Project Risk;
- Management of ongoing stakeholder requirements and then issues during the Project delivery phase; and
- Prevailing market conditions.

A common practice used by agencies is to develop Project Budgets as illustrated in Figure 8. The initial Project Budget should be based on a 'design and then construct' or 'construct only' strategy. Once the Project Budget is developed ('Project Budget 1'), the identification of the best procurement strategy is finalised. At this stage it may be necessary to refine the Project Budget ('Final Project Budget') in light of the procurement strategy. The expectation here would be that an alternative procurement strategy, to that of 'construct only', is selected because this will best manage the base costs and Project Risks for the required objectives, and thereby provides a more attractive and predictable outcome for the State. Hence, the final Project Budget should be equal to or less than that initially estimated.

Figure 8 The mechanics of developing the final Project Budget



It is worth noting here that the Project Budget for the Business Case is the sum of all estimated cost for the successful delivery of the capital Project. This means that the Project Budget will have components that will be allocated to different parties:

- The Client's Project delivery office:** The Project Budget will normally include such cost estimates for site acquisition, contractors and/or externally sourced professional services etc. that will be managed and paid directly by the Client. In addition, the Client may retain certain risks it is best placed to manage and this will be reflected in the Base Risk Allocation as funding available directly to the Client as, and when, appropriate; and the relevant escalation
- The main Project contractor:** The construction contract will be awarded to the successful tender, and the Project Budget components of the Base Cost Estimate and that of the transferred risks in the Base Risk Allocation, as well as Escalation, will effectively equate to the contract price.
- The CEO/Minister/Treasurer:** Additional Risk Allocation (including the associated escalation) is managed by a party not having direct responsibility for Project delivery (such as the Client's Project delivery office). Approval for expenditure against this allowance may be from the CEO/Minister/Treasurer.

This management and application of the Project Budget to different parties is illustrated in Figure 9.

Figure 9 Illustration of an option for managing various components of the Project Budget



7.3 Governance of Project Budgets during delivery

The development and implementation of successful governance frameworks for Projects is specifically addressed in the Topic Specific Guide 3: *Governance and Contract Management*. However, the following discussion is provided to inform the distinction made in the Guide between Base Risk Allocation and Additional Risk Allocation.

Any governance framework that is effective must give the Government confidence that the Project can be successfully delivered as planned and for the lowest cost.

The UK DTF Infrastructure Cost Review¹³ report states that outturn costs rise because the processes of budget preparation, approval and management do not provide effective incentives to minimise the outturn cost. In particular, insufficient consideration is given to the assessment, placement and management of the Project's Contingency. There was a finding that many large infrastructure Projects tend to be managed within a quoted budget, rather than aiming at lowest cost. If the budget includes contingencies this tends to be viewed as 'available' budget and should be spent.

¹³ Infrastructure Cost Review, Technical Report HM DTF/ Infrastructure UK, December 2010.

The report identifies that successful Projects tend to share common characteristics such as:

- a strong governance and culture to reduce costs, clear roles and responsibilities including role separation between the sponsor, funder and the delivery Client;
- working to the principle that public officials should manage Projects to the lowest cost for the required performance, and not to full Project Budget expenditure or maximum allowable affordability; and
- the effective allocation and control of the Additional Risk Allocation of the Project by the funder rather than the Project delivery office.

“Within the ... [capital works programme enabling the 2012 Summer Olympics hosted by London] there is a very clear delineation of accountability for cost control and the management of contingency budgets. All contingency is clearly identified as either ‘Project’ or ‘Program’ and either ‘in scope’ (available to the Project) or out of scope (funder’s contingency is not viewed, as is often the case, as available budget). A strong governance structure is built around the process for allocating contingency which, combined with effective incentivisation at all levels, has instilled a culture of cost awareness and accountability. The achievement of cost and risk reductions at the delivery level frees contingency for reassignment within the programme, subject to justification and approval. Success in part has been driven by the clarity of decision making and commitment to ensuring that the sponsor was set up as an effective and properly empowered sponsor organisation.”

**Infrastructure Cost Review, Technical Report HM DTF/ Infrastructure UK,
December 2010**

Recent audit reports from the USA¹⁴ and UK¹⁵ suggest that there are significant opportunities for government improvement in setting realistic Project baselines, managing risk and reducing the excessively high costs of constructing infrastructure. In the UK alone, this estimated saving is £20 to £30 billion over the next decade.

¹⁴ How much will this program really cost? Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs (GAO-09-3SP), 2 March 2009.

¹⁵ Infrastructure Cost Review, HM DTF/ Infrastructure UK, December 2010.

Appendix A

Glossary

Term	Definition	Comment
Additional Risk Allocation	A provision for costed Project Risks in excess of the Base Risk Allocation; and provides a reasonable financial allowance in the event that greater than the 'most likely' risk impact eventuates during Project delivery.	This provision (including the associated escalation) is best managed externally to the Client's Project team as it is a management 'reserve'
Base Cost Estimate	The current best-in-market estimate of the expected financial costs of delivering the Project. This does not include any estimates for Escalation or Risk.	A Base Cost Estimate for a capital Project would comprise costs for design, margins, Project management, consultants, site preparation, building materials, labour, and use of plant and equipment. It is prepared by a suitably qualified professional, and should be provided in an appendix of the Business Case.
Base Risk Allocation	A financial calculation of the most likely or probable total financial impact of all costed Project Risks after the application of best practice risk management as agreed by government.	
Business Case	Includes a statement of costs and benefits (and supporting information) associated with the proposed Project on which the Investor relies to make the investment decision. If this information is materially amended, the Business Case is usually returned to the investor for approval.	'Preliminary' work undertaken and documented is sometimes referred to as the 'preliminary business case' however this is not the formal Business Case that underpins the investment decision.
Contingency	The aggregate of all risk allowances	The term aggregate is used because it is the sum for Deterministic contingency estimation or the statistical combination for Probabilistic contingency estimation
Escalation	The anticipated variation in Project costs over time as a result of factors such as inflation, market conditions, supply constraints, timeframes etc.	The escalation factors (or rates) are sensitive to market conditions and their determinations require experienced judgement. The base cost estimate and risk allocation is determined at a particular point in time, and this allows the Project cash flows to be forecasted by taking into

Term	Definition	Comment
		consideration the Project implementation timeline and schedule of works. An allowance for escalation is calculated by applying the escalation factor to the cash flow.
Portfolio Additional Risk Allocation	The aggregate of the Additional Risk Allocations of each Project that makes up the Portfolio.	
Project Budget / Total Estimated Investment (TEI)	Comprises of the Base Cost Estimate, Base Risk Allocation, Additional Risk Allocation and Escalation. It addresses all delivery aspects of the approved Project.	This amount is approved by the Investor as part of the Business Case decision.
Project Cost Estimate	The sum of the Base Estimate, Base Risk Allocation and the relevant escalation.	This amount is normally the 'budget' that is managed by the Client's Project office.
Project Definition	The foundation document for the Project Budget. It is directly aligned to, and enables, achievement of the service benefit as set out in the Statement of Service Need. It defines the Performance function; Product specification; Scope; and Contingency relating to the capital project.	The Project Definition needs to be of sufficient quality and detail (see Specific Topic Guide 1) to enable determination of the Project Budget, and should be provided as an appendix of the Business Case.
Project Risk ¹⁶	Variability in future Project delivery outcomes for which a likelihood and impact of occurrence can be estimated. Variability arises from events which are known hazards or are readily observable in practice or from experience. A reasonable estimate of the range of variation in actual outcomes can be quantified or derived from calculation. The total allocation for Project Risk provided in a Business Case Project Budget is the Base Risk Allocation plus the Additional Risk Allocation.	The estimations for all Project Risks (inherent and contingent) are usually determined through risk workshops with the participation of experienced and capable officials and, as appropriate, external consultants. Estimates need to be prepared by a qualified professional, and should be provided as an appendix of the Business Case. (Risks can result in either a positive or negative impact.) Caution must be exercised to ensure that Project Risks are neither over- nor under- estimated; and are benchmarked to actual events and contemporary risk management responses.
Project Solution	A definition of the design solution; specifications; construction method and program; procurement method and the risk allocation.	This articulates the Client's best understanding of the Project to allow the Project Budget to be established.

¹⁶ The term 'Project risk', refers to possible events in Project delivery/construction, associated regulatory planning approvals etc. with outcomes that can be substantially dimensioned at the time the Business Case is developed to the standard supported by jurisdiction guidelines. There are other (often very substantial) risks arising from poor or incomplete analysis of the investment rationale and Project planning. That is, Business Cases not completed in accordance with jurisdiction guidelines and are of insufficient quality for Government decision making. The potential adverse financial impacts arising from the risks of 'poor Project planning and analysis' are outside the scope of this Policy; and Government decision making processes will not confirm funding for such flawed submissions.

Term	Definition	Comment
Contingency	The aggregate of all risk allowances.	
Statement of Service Need	The investment rationale in the Business Case that defines the service need and outlines the service delivery improvements and the expected outcomes to be achieved from the proposed investment of resources.	This statement articulates the service need and benefits that the capital Project will enable. It can be articulated in a strategic assessment, an investment logic map, an investment concept brief, or other such similar document.

Appendix B

Instruction templates for professional services

This appendix has:

1. Example Instruction templates for base cost estimation
2. Example Instruction templates for Project Risks

Whilst the principles and intent underlining these templates would apply for less complex, lower value projects (say, under \$50M), the detail of the templates may be sensibly scaled down to a level appropriate for such projects.

1. Instruction templates for base cost estimation

There are two main types of engagements:

- 1.1 developing the base cost estimate; and
- 1.2 reviewing the base cost estimate that has been developed.

The following suggested instructions are provided for agencies seeking to engage these services, either externally or internally.

1.1 Developing the base cost estimate

The importance of an accurate Project Budget has been highlighted in Chapter 4, which also explained how the accuracy will be increased by using competent and experienced cost estimators. A template of instructions that Clients could consider for engaging such professional services is given below.

Template Instructions: Developing the base cost estimate

The 'Brief' below sets out a template for the estimator roles for preparing the Base Cost Estimate for large scale Projects.

Brief – Senior Cost Estimate Advisory Services

Role Context

While roles titled 'Estimator' exist at various levels in Project development, management and advisory organisations, the particular role defined below is at the executive level as a key member of a Project team for \$50m to \$multi-billion multi-disciplinary Projects. Typically the role requires high level functional capability and the capacity to understand the uncertain nature of costs and key risks of large scale Projects throughout the Projects life cycle. The position should report to the Project Director.

Role Accountabilities

- Producing accurate and reliable base cost estimates based on well-developed scopes of work.
- Ensuring that Project Budgets are produced that factor in Project Risk associated with uncertainty; incomplete information and the complex inter relationships between Project variables.
- Applying a robust estimating methodology recognised within the industry that adopts sound value management techniques and change management processes.
- Creating and maintaining a competent and efficient estimating team appropriate for Project requirements.
- Ensuring the accuracy and quality of decisions being made within the Estimation team e.g. related to construction sequencing and productivity.
- Ensuring necessary accuracy and reliability of data and information on which estimates are based including the quality of benchmarking and analyses undertaken.
- Ensuring necessary accuracy and reliability of the project program, cash flow and

Escalation including the analyses undertaken.

- Effectively integrating the output of the estimating team (procurement, quantity surveying) and across the project team (design, constructability, risk) to achieve the most accurate and reliable overall result.
- Collaborating and communicating effectively across all functions of the project team.
- Identifying risks, constraints and opportunities and responding for best overall outcome.
- Systematically implementing rigorous estimate reviews.
- Documenting the underlying assumptions as articulated above.

Background, Skills and Competencies

- Background in quantity surveying, estimation, Project engineering, contracts and procurement with a proven track record at a senior technical or Project management level.
- In excess of fifteen years Project experience with preference given to senior estimators with a broad background in providing accurate and achievable cost plans, first principle estimates and value management advise for large infrastructure Projects involving partnerships and alliances’.
- Ability to lead teams to produce accurate Project cost estimates and budgets from concept to definitive information.
- Thorough knowledge of current estimating strategies and techniques.
- Conceptual and integrative thinking capacity related to complex systems and operating environments and ability to accurately infer or visualize a whole Project in all aspects (e.g. scope, program, risks, constraints and opportunities and stakeholders) with incomplete information.
- Relevant tertiary engineering or construction related qualifications are desirable but not essential.
- Proven ability to lead, communicate with and influence people to achieve complex and challenging objectives.
- Commercial acumen necessary for accurate cost estimates on multi-million / billion dollar Projects.
- Rigorous and thorough in approach including ability to apply a high level of attention to detail.

1.2 Reviewing the base cost estimate

The importance of insightful and meaningful reviews has been explained in Chapter 3. The nature and extent of the review must be appropriate to the Project profile. This can range from a basic peer review for simple, lower value, lower risk Projects; ranging up to independent external review by experienced professional estimators for more complex, higher value, higher risk Projects. A template that Clients could consider for engaging such professional services is given below.

Template Instructions: Reviewing the base cost estimate

Some of the review assessments that Clients should consider addressing include whether:

- The Project Definition has been described and quantified in an industry recognised, methodical way, conforming to an agreed Cost Breakdown Structure that is specific to the sector.
- The standard of works conforms to technical, design and construction requirements in legislation, industry and other standards, codes and recognised manuals. Compatibility with existing and adjacent infrastructure is relevant as is consideration of modern engineering equivalents and technologies. Compliance with Strategic Asset Management Plans and Total Management Plans are likely to be highly relevant.
- The Base Cost Estimate aligns with the Project Definition and enables the requirements of the statement of service benefits.
- The Base Cost Estimate is consistent with standard of works and the conditions prevailing in the market for engineering, engineering supply and construction.
- The Base Cost Estimate reflects the construction methodology, staging, productivities, site or working conditions (including constraints as well as high productivity conditions) etc.
- The unit rates used in the Base Cost Estimate are market competitive and are supported by a logical build up with relevant productivity and wastage factors.
- The Base Cost Estimate excludes allowances for risk, contingencies and Escalation; and is free of calculation errors and double counting.
- The Base Cost Estimate presentation conforms to the required format.
- Sanity checks conform to known benchmarks achieved from prior best practice Projects.
- The assumptions, exclusions, qualifications and any limitations of the estimate are appropriately documented and accompany the estimate.
- Review of cash flow and Escalation and the analyses undertaken.
- Any material changes from previous approvals or reviews of Base Cost Estimate are clearly explained addressing the 'why' as well as the 'what'.
- Departures from the Policy and the Guide are identified and justified.

2. Instruction templates for Project Risks¹⁷

Identifying and quantifying risks is a specialist task that requires a multi-disciplinary approach. The skills necessary to develop a robust Base Risk Allocation and Additional Risk Allocation in accordance with this Guide are not necessarily only acquired by completing a tertiary course. Generally these skills are a combination of professional qualifications and experience. Typically this requires agencies to supplement Project team resources with external professional services. That said, agencies should not think that this task can be delegated entirely to consultants. Ultimately, the Client itself must play a central role in establishing the Base Risk Allocation and Additional Risk Allocation.

Effective engagement with professional services requires a clear scope of work and active management of advisers by agencies. As a starting point agencies should determine the perspective from which the risk review is being carried out and the principal stakeholders. This will usually require agencies to prepare a brief on the objectives, scope and timing of the capital investment, including an assessment of its value and importance to the Client, and its complexity.

To get the best out of professional advisers, agencies should actively engage and develop collaborative working relationships. This is particularly the case when it comes to risk analysis and agencies must expect to spend considerable time briefing advisers on their requirements and working with them to identify and quantify risks. Expecting a professional adviser to deliver on a scope of work with minimal or no communications on the issues will invariably not deliver an appropriate nor acceptable Project Budget estimate.

At a high level the scope of professional risk services is to:

- Identify risks;
- Evaluate risks;
- Develop mitigation strategies including optimal risk allocation (as between the State and contracted parties);
- Assess residual risks;
- Plan response to residual risks;
- Prepare and recommend Base Risk Allocation estimate;
- Prepare and recommend Additional Risk Allocation;
- Document and communicate for the wider Project team the strategy and plans for managing the Project Risks.

Broadly speaking there are likely to be three roles that agencies can seek to engage professional services on (it should be noted that one firm or individual may be qualified to provide all these services):

¹⁷ *Partnership Victoria* Public Sector Comparator Supplementary Technical Note provides an appropriate reference for undertaking risk analysis and quantification. Whilst it was developed for Partnerships Victoria Projects the approach to risk and the techniques described for quantifying risk are equally applicable to all capital investment Projects. The methodologies described (Simple and Advanced valuation techniques) are a useful point of reference for establishing the instruction template and scope of work for Project risks.

1. **Project Risk and Control Services:** include coordination and facilitation of the risk process, and being able to facilitate workshops and apply best practice risk management standards. These services are relatively well established in the market, including:

- Qualitative risk analysis in line with risk standards;
- Quantitative risk analysis that depending on the complexity of the Project and the nature of the risks (includes risk modelling using various stochastic software packages);
- Verifying the risk estimates (undertaking a sense check).

(Risk facilitation is a skilled role that is usually carried out by a professional that has a deep background in capital investment and a track record in facilitating workshops and applying best practice risk management standards.)

2. **Risk Quantification and Modelling Services:** specialist modelling capability is engaged for complex Projects with significant and many inter-dependent risks. This requires a combination of professional skills in co-ordinating risk assumptions and combining these in a risk quantification model. Often this work is combined with the Project Risk and Control Services as both involve co-ordination and interpretation of risk assumptions provided by technical experts.

(These services require experience in capital investment Projects in order to be able to accurately model interdependencies such as correlation between risks.)

3. **Risk Estimation Services:** these individuals typically have deep practical experience in their industry acquired over many years. Their role is to critically analyse the risks relevant to their discipline and to apply professional judgement to quantify the risk to a reasonable level of confidence. These services are usually included within the scope of work for these broader roles provided by technical consulting firms.

(Technical risk experts are typically experts already engaged on the Project in a technical discipline that is integral to planning the Project, e.g. architects, engineers, quantity surveyors, demand forecasters etc. Technical qualification to undertake these roles is a given.)

The following instruction templates can be used for engaging these professional services (which may be sourced from both internal and external professionals).

1. **Template Instructions: Project Risk and Control Services**

As a guide, agencies should consider engaging professional services for the following:

- Coordination and facilitation of the risk analysis process, including being able to facilitate workshops and apply best practice risk management standards.
- Define and agree with the Client's Project team the overall strategy for the risk review including the level of risk analysis to be carried out and the quantification tools that will be used. Establish the base line by defining the context and basis for the risk analysis and risk management plans.
- Define and agree with the Client's Project team the methodology for establishing a robust Base Risk Allocation including the justification and reference Projects that will be used as a sense check.
- Form a risk management team by identifying and assigning those who will act as technical

risk experts to identify risks and provide estimation of probability and impact.

- Introduce the risk analysis plan and manage progress throughout the process.
- Identify as exhaustively as possible all significant Project Risks and uncertainty associated with the Project. Ascertain the cause of the risk (hazard event) and assess how the risks are related to other risks (correlated). Classify the risks according to a risk categorisation framework. Consider each risk identified and record in a risk register:
 - Cause of the risk by identifying the hazard event (not the outcome), e.g. poor ground conditions (not cost overrun);
 - Trigger events that give rise to the risk occurring;
 - Timing and frequency of the risk occurring;
 - Range of possible outcomes in terms of cost, time and impact on performance of the asset;
 - Management response or control actions to mitigate the impact of particular risks;
 - Residual risks after the control response;
 - Range of possible outcomes post control action in terms of cost, time and impact on performance of the asset.
- Identify the risk analyst responsible for further analysis and quantification of the risk.
- Prepare risk management strategy including the robust case for the Risk Allocation.
- Quantify the combined impact of all risks quantified to establish the recommended Base Risk Allocation and Additional Risk Allocation.

The level of quantification and consequently risk modelling that is required will depend on the complexity of the Project and the nature of the risks. A highly complex Project that is high risk will typically require more complex risk quantification and modelling than a relatively low risk Project. The level of sophistication in risk quantification is discussed in section 4.3 including an outline of some of the techniques available. The scope of work should reflect the complexity of the Project and the level of risk.

The following can be used as an instruction template for engaging these professional services.

2. Template Instructions: Risk Quantification and Modelling Services

The professional services will vary from a simple to a complex Project Risk profile. Clients can consider the following guide:

Simple Risk Quantification

- Develop analysis that appropriately quantifies the Base Risk Allocation based on the assumptions provided by the Risk Experts.
- Critically analyse the risk assumptions provided by the Risk Experts and identify any interdependencies and correlations. As part of this analysis identify and eliminate any double counting, optimism and pessimism bias.
- Carry out sensitivity analysis to determine which assumptions and variables are most and least sensitive to changes impacting on the Base Risk Allocation.

- Analyse the results of the analysis and recommend an appropriate Base Risk Allocation and Additional Risk Allocation for the Project.

Advanced Risk Quantification

- Develop an advanced probability analysis using stochastic tools and software that appropriately quantifies the risks based on the assumptions provided by the Risk Experts. The output from an advanced probability analysis is a statistical distribution.
- Critically analyse the risk assumptions provided by the Risk Experts and identify any interdependencies and correlations and factor these into the risk quantification. As part of this analysis identify and eliminate any double counting, optimism and pessimism bias.
- Carry out sensitivity analysis to determine which assumptions and variables are most and least sensitive to changes impacting on the Base Risk Allocation.
- Analyse the results on the modelling and recommend an appropriate Base Risk Allocation and Additional Risk Allocation for the Project.

Risk estimation services are usually a component of the scope of work for technical advisers. The requirement for these experts is to take on the role of risk expert in their discipline. The following can be used as an instruction template for engaging these professional risk services from technical advisers.

3. Template Instructions: Risk Estimation Services

Clients can consider the following guide for these professional services technical experts:

- Apply the standards of your professional technical discipline to quantify the risks in accordance with the Project's risk strategy.
- Work cooperatively with the Project Risk and Control Services provider and the other technical experts to identify, quantify and establish risk characteristics (including interdependencies between risks known as correlation).
- Assess the likelihood (probability) and impact (consequence) of each risk (the risk assumptions).
- Provide the risk assumptions to the Project Risk and Control Services provider in a format that is in accordance with the Project Risk strategy.

Appendix C

‘Letter of assurance’ templates for professional work done

Letter of assurance templates for professional work done

As stated earlier, whilst the principles and intent underlining these templates would apply for less complex, lower value projects (say, under \$50M), the detail of the templates may be sensibly scaled down to a level appropriate for such projects.

Potential “limitations” in letters of assurance

It is acknowledged that (particularly) external consultants may seek to insert limitations that apply to their letters of assurance or certification.

Agencies should ensure the scope of any limitations does not unduly impact on the rigour of the certification; and that the professional advice remains fit for its stated purpose.

Letter of assurance template for the statements of service and scope

The Client’s senior responsible officer (or Project sponsor) is required by the Policy to provide in the Business Case a letter of assurance stating that the Project Definition provides for a cost effective enabling asset for delivery of the identified service benefit that underpins the Business Case’s investment rationale (i.e. the Statement of the Service Benefits). The letter of assurance can be provided at the front of the Business Case’s Appendix documenting the Project Budget.

The wording of the letter may need to be tailored to suit the specific Project; however, it should at least meet the intent of the following Template.

Letter of assurance template: The statements of service and scope

Client assurance on the Statements of the Service Benefits and Project Definition

I attest that:

- (i) the Project Definition defines a fit for purpose capital asset that is directly linked to, and enables delivery of the identified Business Case service objectives (i.e. the Statement of the Service Need) in an efficient, effective and economical manner;
- (ii) the Project Definition is sufficiently mature to allow development of a Project Budget to the standard required by the Policy and the Guide;
- (iii) all material information, including the ‘assumption book’, that evidences the development of a high quality Project Budget is reported in this Appendix of the Business Case;
- (iv) the Project Budget has been reviewed from a holistic perspective to ensure that it does reflect the proposed capital asset in terms of the Project Definition and service objectives; and as SRO I am familiar and comfortable with the Base Cost Estimate as representing the best-in-market pricing for the application of best practice Project delivery;
- (v) the Project Budget recommended in the Business Case is of high quality suitable for Government decision making, and has been developed to the lowest cost for the required performance; and
- (vi) departures from the Policy and the Guide are identified explained and justified in terms of

best for the State outcomes.

<Name>

Senior Responsible Office

Signature: _____

Date: _____

Letter of assurance template for Base Cost Estimate

To assist the SRO sign their attestation, the base cost estimator needs to certify the quality of their estimate and expressly acknowledge the adverse consequences for government should they produce a Base Cost Estimate that does not meet the levels of accuracy expected for Business Cases.

The wording of the certificate may need to be tailored to suit the specific Project; however, it should meet the intent of the following Template, which can be in the form of a letter to the Client's senior responsible officer.

Letter of assurance template: Base Cost Estimate Services

<Date>

Addressee: Senior Responsible Officer
Client

RE: Assurance for Project Base Cost Estimating Services

We refer to the contract dated [] between [] and [], through which [] has been engaged to provide base cost estimating services (the 'Contract'). This letter and the advice it refers to has been developed pursuant to the Contract.

The Report of our advice was developed in accordance with the Department of <insert jurisdiction> policies and guidance, which has been wholly and consistently applied in determining the Base Cost Estimate for the Project.

I acknowledge that the accuracy of this Base Cost Estimate is critical to a sound assessment of the merits of the Business Case for the XYZ Project and that an inaccurate Base Cost Estimate may lead to flawed investment decisions with serious consequences for Government.

I have prepared this Base Cost Estimate in accordance with <name of technical> Standard and I certify that it represents the most likely 'best in market' assessment of the outturn costs of the Project as described in Project Definition provided to me; and that it is accurate and reproducible to within ± 5 (against another cost estimator working from the same Project Definition and assumption book).

Estimator (Partner or Principal)

<Company name>

Signature: _____

Date: _____

Letter of assurance template for Project Risk

The Client and its advisers collectively involved in the preparation of the Base Risk Allocation and Additional Risk Allocation are expected to provide assurance that they have prepared robust estimates based on a rigorous and thorough process in accordance with this Guide.

Overarching assurance is required in the Business Case from the Client and its advisers that:

- All significant risks have been identified and analysed.
- The Base Risk Allocation represents a robust and reasonable 'most likely' estimate of all Project Risks.
- The Additional Risk Allocation represents a robust and reasonable estimate (and not an easy target) of the upper limit for the total Project Budget 'beyond the most likely value for all Project Risks'.
- The overall impact of risks has been assessed using recognised tools that have included probabilistic, sensitivity and scenario testing (as appropriate).
- The Base Risk Allocation and Additional Risk Allocation have been sense checked against an appropriate range of benchmark risks and Projects and this demonstrates that they are robust estimates.
- The process adopted is in accordance with the Policy and Guide.

The assurance should be against an outline of the risk profile of the Project and a justification for the decision to select the Base Risk Allocation and Additional Risk Allocation quanta in the context of the risk profile. This should also include a description of the sensitivity of the Risk Allocation to the input data, the range of risk estimates analysed, and the level of confidence in the accuracy of the figures stated.

Deliberately, the Guide is not prescriptive on the tools and therefore the statistical language that agencies and advisers adopt. Therefore, the sign-off should be a meaningful statement and expression of the work that has gone into preparing the Risk Allocation and agencies should ensure that the sign-offs are appropriately drafted to reflect the level of professional skill that has been applied to the process.

The following Template, which should be in the form of a letter to the Client's senior responsible officer, can be adapted by the Client as appropriate.

Letter of assurance Template: For Project Risks Services

<Date>

Addressee: Senior Responsible Officer

Client

RE: Project Risk and Control Services (including Risk Quantification)

We refer to the contract dated [] between [] and [], through which [] has been engaged to provide Project Risk and Control Services including Base Risk Allocation and sizing the Additional Risk Allocation (the 'Contract'). This letter and the advice it refers to has been developed pursuant to the Contract.

We confirm that our professionals engaged to assist you have the requisite background in Project Risk and Control Services including risk quantification and associated financial modelling.

Base Risk Allocation & Additional Risk Allocation Our attached report Risk Analysis (the 'Report') recommends an appropriate Base Risk Allocation and Additional Risk Allocation for the [] Project (the 'Project'). The Report was developed in accordance with the <insert jurisdiction> policies and guidelines, which has been wholly and consistently applied in determining the Base Risk Allocation and sizing the Contingency for the Project.

The assumptions contained in the Report were developed in conjunction with the Client and its advisers including Technical Risk Experts. The advice and recommendations have been discussed with your nominated stakeholders.

The Base Risk Allocation represents the most likely outcome for the Project. The Additional Risk Allocation represents the appropriate confidence limit, that is, it provides an appropriate upper limit for the total Project Budget 'beyond the most likely value for all Risks' (i.e. the Base Risk Allocation). This confidence limit provides a realistic estimate (and not an easy target) that the Project cost is unlikely to exceed this amount based on information available at this time. We analysed the Base Risk Allocation and Additional Risk Allocation in accordance with the Guide as documented in our analysis in the Report. Our view is that the Base Risk Allocation and Additional Risk Allocation recommended are appropriate for the Project.

Yours sincerely

Signature: _____

Date: _____

Specific assurance is required from each Technical Expert on the underlying assumptions that go into the risk analysis, including:

For each identified risk the qualitative analysis of probability and impact is reasonable and based on professional judgement and experience.

The detailed and quantified evaluation of likelihood, consequence, timing, expected value and dependencies are reasonable and based on professional judgement and experience.

Letter of assurance Template: For Project Risks Services for Technical Experts

<Date>

Addressee: Senior Responsible Officer
Client

We refer to the contract dated [] between [] and [], through which [] has been engaged to provide Technical Risk Expert services (the 'Contract'). This letter and the advice it refers to has been developed pursuant to the Contract.

We confirm that our professionals engaged to assist you have the requisite technical background and experience necessary to provide these services.

Our advice was developed in accordance with the <insert jurisdiction> policies and guidelines, which has been wholly and consistently applied by us in contributing to determining the Base Risk Allocation and sizing the Additional Risk Allocation for the Project.

Base Risk Allocation & Additional Risk Allocation Assumptions

In relation to the report *Risk Analysis* (the 'Report') that recommends an appropriate Base Risk Allocation for the [] Project (the 'Project'); we prepared the risk assumptions (the 'Risk Assumptions') identified in the Report.

The Risk Assumptions were developed in accordance with the Guide. In our professional opinion the Risk Assumptions are appropriate for the purposes of estimating the Base Risk Allocation and Additional Risk Allocation.

Yours sincerely

Signature: _____

Date: _____

Appendix D

Template for presentation of the Project Budget

Note: This template for a road project is derived from the current Road Project Cost Breakdown (PCB) template that the Department of Infrastructure and Regional Development requires proponents to complete and include in submissions for infrastructure funding under the Australian Government Infrastructure Investment Programme. A similar PCB template has been developed for Rail projects. For the PCB template, proponents are required to provide costings at Level 3 for each identified cost element, in addition to aggregate project contingency at P50 and P90, cash flows for the Base Estimate, and cash flows for P50 and P90 costs both escalated and non escalated. Further information on the Department's cost estimation requirements can be found in Appendix B of the Notes on Administration which can be downloaded from: <http://investment.infrastructure.gov.au/funding/projects/>

PCB Level 1	PCB Level 2	PCB Level 3
Client Management & Oversight Cost		
	SCOPING	
		Project Management-Scoping
		Design & Investigation-Scoping
	DEVELOPMENT	
		Project Management-Development
		Design & Investigation-Development

DELIVERY	
	Project Management-Delivery
	Design & Investigation-Delivery
	Client supplied Insurances, Fees, Levies - Delivery
PROPERTY ACQUISITION	
	Purchase Price
	Transactional Cost & Other costs
	Business Compensation
	Environmental Offsets
Construction Cost	
CONTRACTOR	
	Environmental Works
	Traffic Management and Temporary Works
	Public Utilities Adjustments
	Bulk Earthworks
	Retaining Walls
	Drainage
	Bridges
	Tunnels
	Pavements
	Finishing Works
	Traffic Signage, Signals and Controls
	Design (if by contractor)
	Supplementary Items

CLIENT

Client supplied Materials and
Construction Services - Delivery
