

Achieving Civil Infrastructure  
Procurement Best Practice -  
a study by Civil Contractor's  
Federation in conjunction with  
VicRoads

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# Acknowledgements

The team involved in the preparation and steering of this report would like to thank the Victorian infrastructure industry organisations and Government agencies that made time freely available for discussions with their senior staff. These consultations provided valuable insights, comments and contributions, and have added greatly to this report.

In total some 25 organisations and more than 50 individuals were consulted during the preparation of this report. The consultations initially involved small, medium and large infrastructure Contractors from Victoria, and subsequently expanded to include Government stakeholders and other interested parties. The majority of the Government consultation to date has focused on VicRoads staff and the interested parties have included a mixture of Local, State and Federal Government departments and agencies and a regional water company.

Further consultations are yet to be undertaken across a broader spread of industry organisations and other stakeholders associated with the civil infrastructure industry in Victoria and beyond. To the extent this has occurred only with the Civil Contractors Federation and VicRoads at this time, this document is published as an interim report.

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## PLEASE NOTE

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Whilst this study report has involved consultation with and input from a range of Victorian Government Departments including VicRoads, it has not been finally released by these organisations for circulation.

The report should therefore be considered as interim, for information and comment only.

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## Key findings

This interim report presents the findings of work undertaken with Civil Contractors Federation (CCF) members in Victoria and representatives of VicRoads. Its scope will be expanded over time to include additional commentary and inputs from other Government agencies and industry clients as well as Industry participants from other Australian States.

The Report establishes that there is considerable interest by all parties in how procurement is carried out in the Civil Infrastructure sector within Victoria. Much has been achieved over the years yet there is clearly an appetite by all those involved to achieve further improvements.

Three primary methods of procurement have been identified as being in popular use. These are construct only, Design and Construct, and Alliance methods. Alternative procurement models including managing contractor, early contractor involvement and public private partnerships are becoming increasingly more prevalent within Victoria.

The selection of an appropriate procurement method is frequently a complex process and, for any given project, is a 'horses for courses' decision. Past procurement selection methods have often utilised a large number of project attributes as selection criteria. This report advocates the use of fewer, significant, selection criteria. This approach has been taken in order to place greater emphasis on the key client-centred criteria associated with making a procurement choice.


A number of procurement issues were identified through the consultation process in the production of this report. These include:

- Interest in the use of relational contracting models
- Discussion on the applicability of alternative procurement models and the methods for determining procurement routes
- A desire for robust pre-qualification systems that help to better evaluate contractor capability and to reduce the cost of tendering
- A desire for standardisation of the contractual forms in common use
- The need for more appropriate approaches to the identification and allocation of project risk
- A requirement to demonstrate value for money is being achieved, particularly in high value design and construct procurements and in alliance arrangements
- How innovation in bidding is to be assessed
- The need to improve project relationships and integrate the supply chain
- Skills development including in particular the ability of small and medium sized enterprises to participate in alliance arrangements and to bid for larger scale works
- Consideration of methods to fund training and development initiatives
- Approaches to dispute avoidance and proactive issue resolution

Through the use of case studies and research into international best practice, a number of recommendations have been made within the report. These are intended to assist clients and industry participants to generate ideas for collaborative working, overcome existing constraints to progress, create efficiencies and consolidate best practice. The recommendations are made under a number of logical groupings and culminate in the identification of a number of 'tools' that would assist the civil contracting industry in Victoria to go forward. Of these, the top ten procurement delivery support tools have been identified. These are described in the form of an 'agenda for change'. An outline of each tool is provided in the report so that methodologies by which these tools might be put into operation can be established at a later time.

The recommended tools are:

1. Forward planning
2. Pre-qualification criteria
3. Guide to the selection of delivery systems and use of standardised contracts
4. Risk registers
5. Value for money checks
6. Use of local contractors and labour
7. Jointly established training programmes

- 
8. Staged issue resolution processes
  9. Project reviews
  10. Strengthened sector Collaboration Forum

Together these tools provide the civil contracting industry in Victoria and its clients with a means to deliver efficiencies from integrating the whole of the civil infrastructure procurement improvement process. In this way, civil infrastructure procurement can be better matched to Victoria's current and emerging needs.

# 1. Introduction

## 1.1 Background

The Victorian civil construction industry continues to face pressure from all stakeholders for improved cost efficiency, demonstrable value for money services and better quality outcomes for the wide array of infrastructure projects it has the task of delivering.

Clear trends are emerging in project and service procurement models, to now consider different delivery arrangements. These seek to build on the strengths of the more traditional models in an environment where issues such as skills shortages and resources constraints are also evident. The new models are designed to encourage and provide more scope for innovation and collaboration.

There is now clear evidence that industry partners are committed to work together to ensure these trends are proactively embraced to enhance the long term viability of the civil infrastructure sector, particularly the small and medium sized contractors and subcontractors who typically have less capacity to influence decision making.

Reflective of this commitment, the Victorian division of the Civil Contractors Federation (CCF), in conjunction with VicRoads, has identified the need for a comprehensive strategic review and appraisal of the existing and emerging procurement arrangements for civil infrastructure. The Study has included feedback from industry participants, leading to a set of findings that would improve delivery of projects and a better understanding of the value of enhanced collaboration between the relevant parties. The Study was undertaken by Aurecon Australia Pty Ltd through a commission by the Civil Contractor's Federation Victoria. In performing the work, Aurecon:

- Consulted with a range of CCF members and VicRoads personnel
- Collected relevant data for analysis
- Examined key concerns and related issues
- Identified relevant best practice case studies
- Proposed possible solutions
- Recommended tools to support the civil infrastructure procurement process

## 1.2 Objectives

The guiding objective for this work is:

Ensuring long term sustainability and viability of the Victorian civil infrastructure construction industry through the delivery of tools to support improved understanding of infrastructure procurement processes and arrangements which will lead to better quality outcomes (CCF / VicRoads).

If this objective is achieved, then industry stakeholders and government will be well positioned to generate the following benefits:

- Clients – better risk management, greater price certainty, less disputes and delays, closer engagement with industry and improved value for money outcomes.
- Large contractors – improved ability to develop forward work plans and make business decisions (eg regarding investment in training and development), more consistency and accuracy in approach when responding to tender opportunities and more management capacity in dispute avoidance and issue resolution.
- Small and medium sized contractors and subcontractors – similar benefits as for large contractors, plus enhanced opportunity to progress through a pre-qualification process to larger scale works.
- Community – less delay and cost in gaining access to and ongoing use of new infrastructure resulting in improved value for money and a more sustainable environment.

### 1.3 Audience

This document is intended for a number of different audiences who are all involved in some capacity in the development and delivery of Victorian civil infrastructure projects. This report has been developed primarily based on information pertaining to road infrastructure projects that typically involve VicRoads, the DSE and the CCF. However, the procurement processes, arrangements and outcomes described by the report have application across a wide range of infrastructure sectors, including but are not limited to:

- Transportation (roads, rail, ports and airports)
- Urban development (buildings, schools, hospitals, housing and waterways)
- Utilities (water, power, gas, sewerage and stormwater)
- Industrial (mining, manufacturing and oil and gas)

The key audience groups therefore include:

- State Government departments, agencies and authorities
- Local Government / Councils
- Small and medium sized contractors
- Large contractors
- Key industry associations and other stakeholders

Each audience group stands to benefit in its own way from the information and findings presented in the report. This includes learning from past experience, understanding current practice and future trends, a better appreciation of the delivery arrangements applicable to other parts of the civil infrastructure industry and identifying tools for improving the outcomes achieved. This report is not intended to be a 'how to manual' but rather a Best Practice Guide to procurement.

### 1.4 Structure

The structure of the report is designed to inform the reader about the current approaches to infrastructure procurement and related issues, best practice, possible improvements to the delivery of infrastructure projects and procurement tools and methods that support this, as outlined below.

- Section 2 – Identifies the infrastructure procurement and delivery models that are currently in use and introduce alternative approaches for consideration
- Section 3 – Outlines the key criteria in selecting a model for infrastructure procurement
- Section 4 – Identifies the infrastructure procurement issues
- Section 5 – Recommends a framework for infrastructure procurement based on best practice
- Section 6 – Outline of tools that support the proposed framework for infrastructure procurement and delivery.
- Appendix A – Victorian, Australian and international case studies as examples of best practice
- Appendix B – Outline of the recommended procurement delivery support tools



## 2. Currently used delivery models

### 2.1 Introduction

This section of the report summarises the infrastructure procurement and delivery models that are commonly used for the delivery of civil infrastructure in Victoria at present, as well as alternative models that could potentially be considered for use in the future. The information presented in this section is not exhaustive, but provides a general platform for the data analysis, assessment and recommendations that are presented in the subsequent sections of the report. In addition, a list of references and supplementary reading is provided at the end of the report.

The material in this section discusses the specific features, characteristics, advantages and disadvantages of each infrastructure procurement and delivery model. These features determine the suitability of a particular infrastructure and procurement delivery model chosen by a client and will inform the contractor when considering how best to respond to and deliver a project.

If a project is large or complex in nature it may require the application of the Victorian Government Gateway process which could influence the timing of the client's decision making framework. The Gateway Review process identifies the party that is responsible for, and is therefore allocated the risks associated with project delivery, time and cost for each phase of the procurement.

The gates, if they are to be applied, are as follows:

1. Strategic assessment
2. Business case
3. Readiness for market
4. Tender decision
5. Readiness for service
6. Benefits evaluation

### 2.2 Commonly used procurement models

Procurement models commonly used in Victoria for the delivery of civil infrastructure projects are:

- Construct Only
- Design and Construct (D&C)
- Alliance

#### 2.2.1 Construct Only

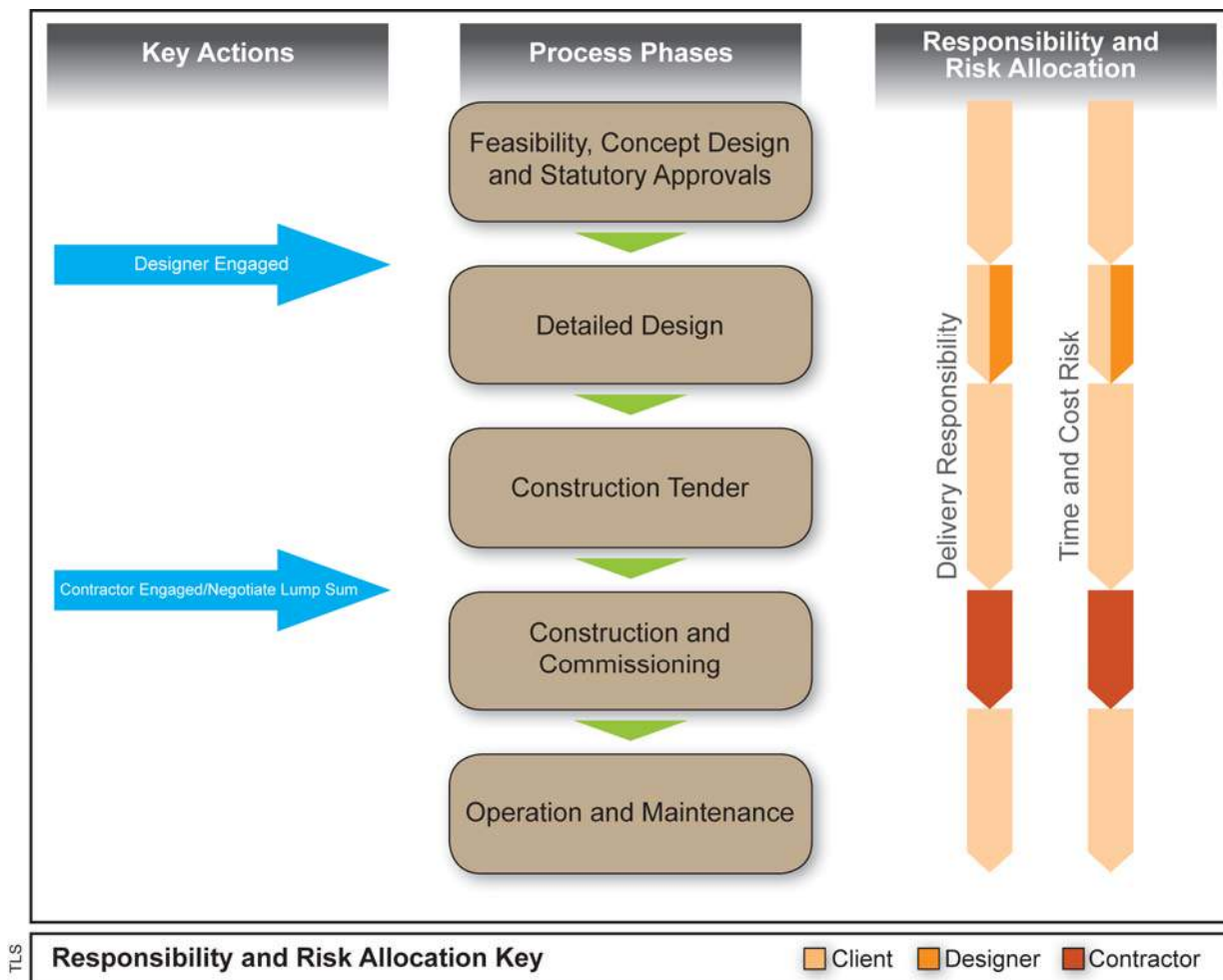
Construct only procurement is historically the procurement method that was used for the delivery of Victorian transportation and utilities infrastructure. It continues to be utilised where the required work can be specified in unambiguous terms and the complexities involved with other procurement methods do not deliver any significant benefits. Construct only procurement is generally limited to less risky infrastructure works.

A key characteristic of this model is that the client is directly involved in engaging a separate design consultant and contractor, unlike other methods of procurement in which the design consultant is engaged directly by the contractor. Although not always the case, with construct only procurement, the risks associated with the design remain substantially with the client, not the contractor and these may have impacts on delivery time, cost and the quality of the product.

The infrastructure design would, in large part, be completed by the design consultant prior to the appointment of the contractor, who can then be selected by the client through a competitive tendering process. The sequence of events is such that whilst the contractor may submit a non-conforming bid there is only limited time and opportunity to influence the design of the infrastructure, and hence the contractor is generally only appointed to execute the design prepared by the design consultant in line with client requirements.

Construct Only contracts are generally considered to be the cheapest for contractors to tender and are therefore a popular form of delivery.

Figure 2.1 provides a flow diagram for the construct only procurement model. It highlights the key client actions that are required during the procurement process.



Source: Aurecon (2009)

Figure 2.1 Construct Only flow diagram

## 2.2.2 Design and Construct

D&C procurement, which is frequently used for the procurement and delivery of civil infrastructure in Victoria, involves the contractor being engaged to design the works and construct them.

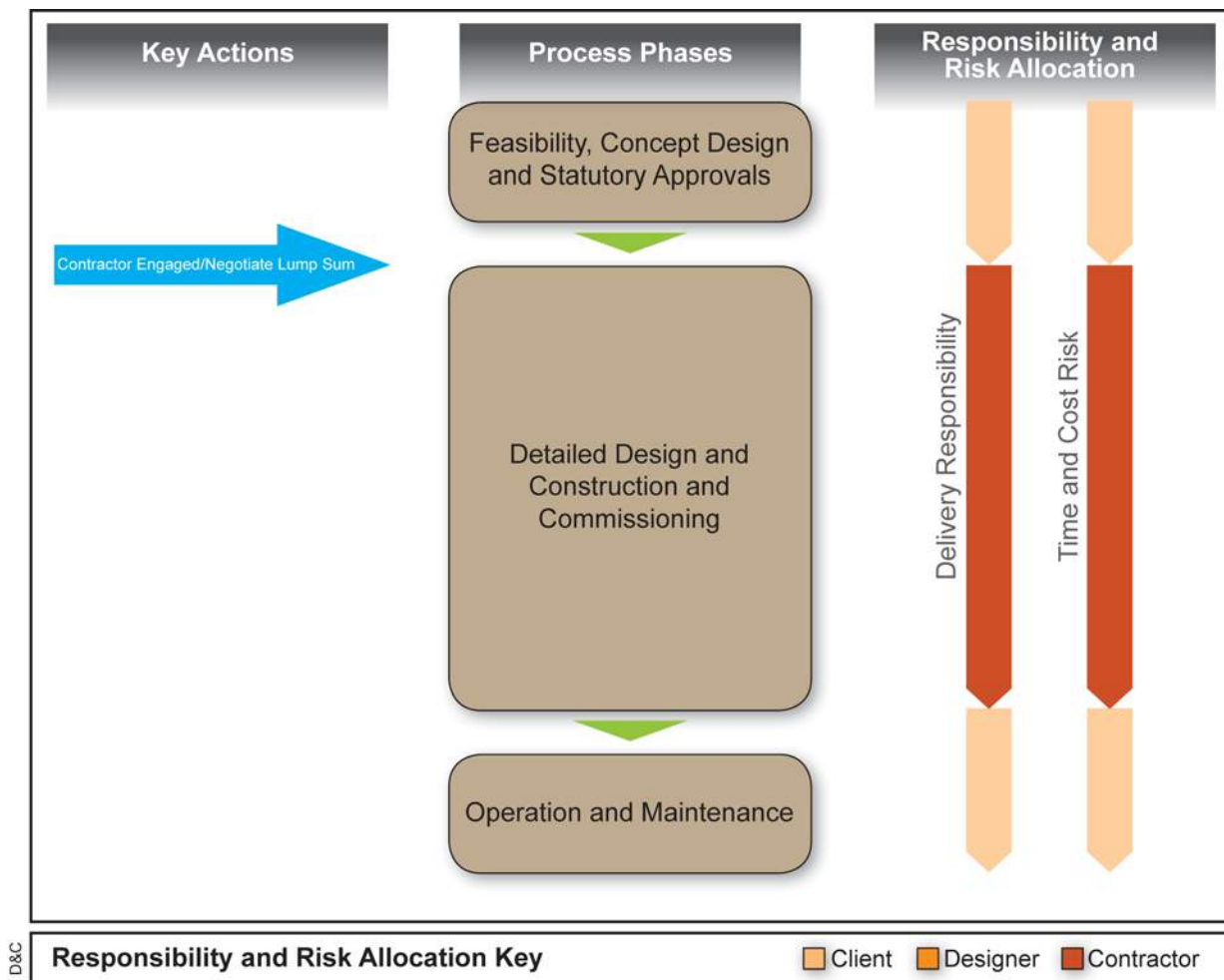
It is more commonly used for infrastructure projects that are of comparatively high value (\$30 million to \$200 million) and which may have more complex delivery or staging aspects. The contractor is given more capacity to order or stage the project and more opportunity to innovate in design approach which may better

suit their construction specialities and help to expedite the project. With this model, the contractor may perform the design function in-house or engage the services of a Design Consultant. Either way, the number of management interfaces are reduced, lessening risks because the Contractor is responsible for the design for the project, and has more control over the design activities and outputs.

Because the design control is with the contractor, the contractor can commence many early works in parallel with the design development, which can create efficiencies to the project delivery timeframe.

Where the client's requirements are fully identified and documented before the Contractor is engaged, a Design Consultant who is already appointed by the client may be novated to the contractor. This option is not widely endorsed or used.

Figure 2.2 provides a flow diagram for D&C procurement. It highlights the key client actions that are required during the procurement process and identifies the party that is responsible for, and therefore allocated the risks associated with project delivery, time and cost for each phase of the procurement.



Source: Aurecon (2009)

Figure 2.2 Design and Construct flow diagram



### 2.2.3 Alliance procurement

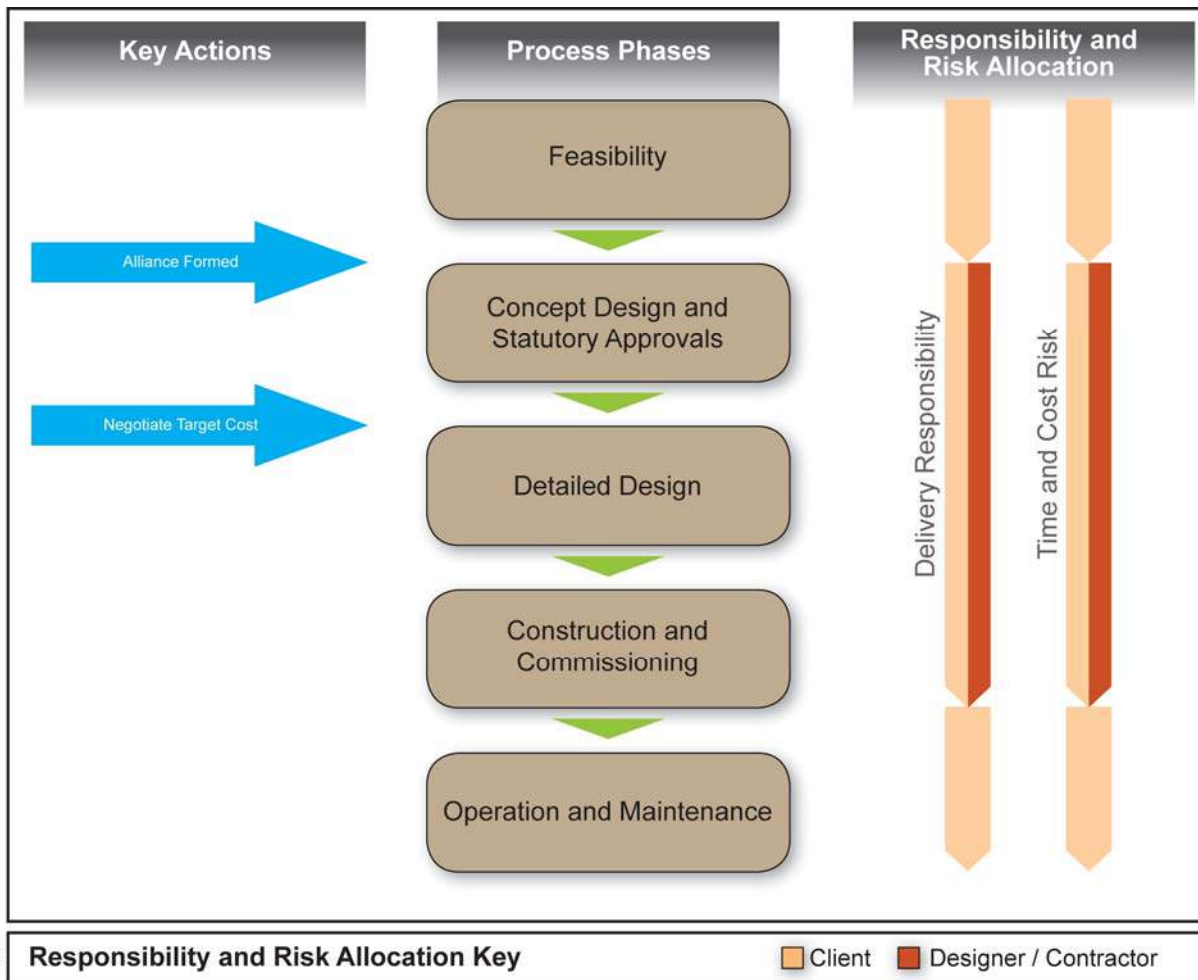
The Alliance procurement model is an option when there is a wide or limited scope, high complexity and / or large value of the project. High team set up costs preclude Alliances from being used on small scale projects, although many aspects of this form of delivery are now being incorporated into other popular forms of delivery in the Australian Civil Construction Sector.

The underlying principle of an Alliance is that the parties establish an agreement on the premise of a collective responsibility for delivering best for project outcomes and acceptance of the various types of risk by the alliance member best able to manage them, thus reducing their likely impacts. The Alliance team works collaboratively to deliver the project objectives in a “no blame” environment underpinned by pain share / gain share.

Once the Alliance parties have been selected by the client, the first step is the formulation of an interim agreement in respect of the actions required prior to construction commencing. The parties are then represented in the decision making process as part of an Alliance Leadership Team (ALT). The project is ready for construction when all associated costs and other project criteria have been unanimously agreed upon by all the members of the ALT.

In more recent times variations of the alliance model have developed, particularly in the contractor selection process. A pure alliance has a contractor selected prior to finalising a Total Outturn Cost (TOC). Formal engagement follows the agreement of a TOC. If this cannot be achieved, then negotiations commence with the next preferred contractor. A limitation of this model is the inability to demonstrate value for money in the contractor selection process, as the TOC is finalised through negotiation rather than direct competition. This can partially be addressed through reference to unit rates of Alliance partners and track record working in an “open book” environment. A competitive alliance takes two or more contractors through to final selection in a direct competitive process. Costs of bidding are therefore higher and the open competition can influence the tone of the relationship that is established between the client and contractor.

Figure 2.3 provides a flow diagram for procurement using the Alliance model. It highlights the key client actions that are required during the procurement process. It also identifies the party that is responsible for, and therefore allocated the risks associated with, project delivery, time and cost for each phase of the procurement.



Source: Aurecon (2009)

Figure 2.3 Alliance procurement flow diagram

## 2.3 Alternative procurement models

In addition to the commonly used procurement models there are a number of other project delivery systems that are becoming more prevalent within Victoria. These include:

- Managing Contractor (MC)
- Early Contractor Involvement (ECI)
- Public Private Partnerships (PPP)

Each of these procurement models involves varying levels of collaboration between members of the project team. They also have other subtle differences that suit particular situations. These models are briefly described below.

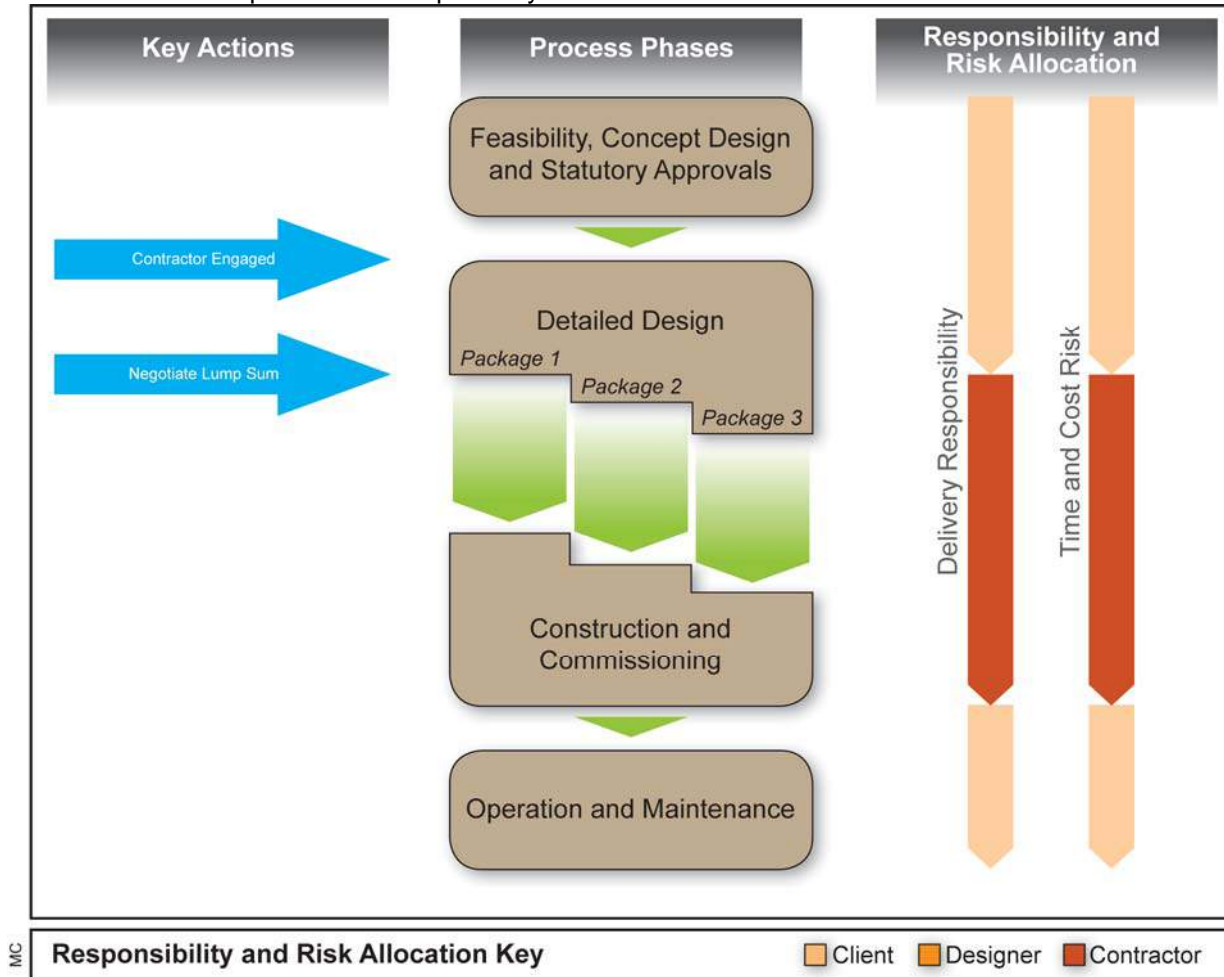
### 2.3.1 Managing Contractor

This form of procurement involves the engagement of a contractor, known as the Managing Contractor, who has responsibility for constructing the project, but who also provides input to the design phase activities. This method of procurement typically involves three phases. Firstly, an experienced construction contractor is engaged in a competitive process to provide input into the detailed design phase of the project under the client's control on a fee for service basis. Contractors also add value in terms of buildability and cost review. A lump sum fee to complete the project is then negotiated with the Managing Contractor once the design phase is

completed. Finally, work commences and the Managing Contractor assumes full design responsibility and risk, completes any outstanding design work and then constructs the project. Design risk is generally carried by the Managing Contractor but can also be partially retained by the client if agreed at contract stage.

Figure 2.4 provides a flow diagram for procurement using the MC model. Characteristics of this model compared with other contemporary forms of procurement include:

- Construction is able to be phased, subject to a lump sum cost being negotiated
- Can incorporate design flexibility, but this will impact on cost certainty and risk allocation
- The construction price is not competitively tendered



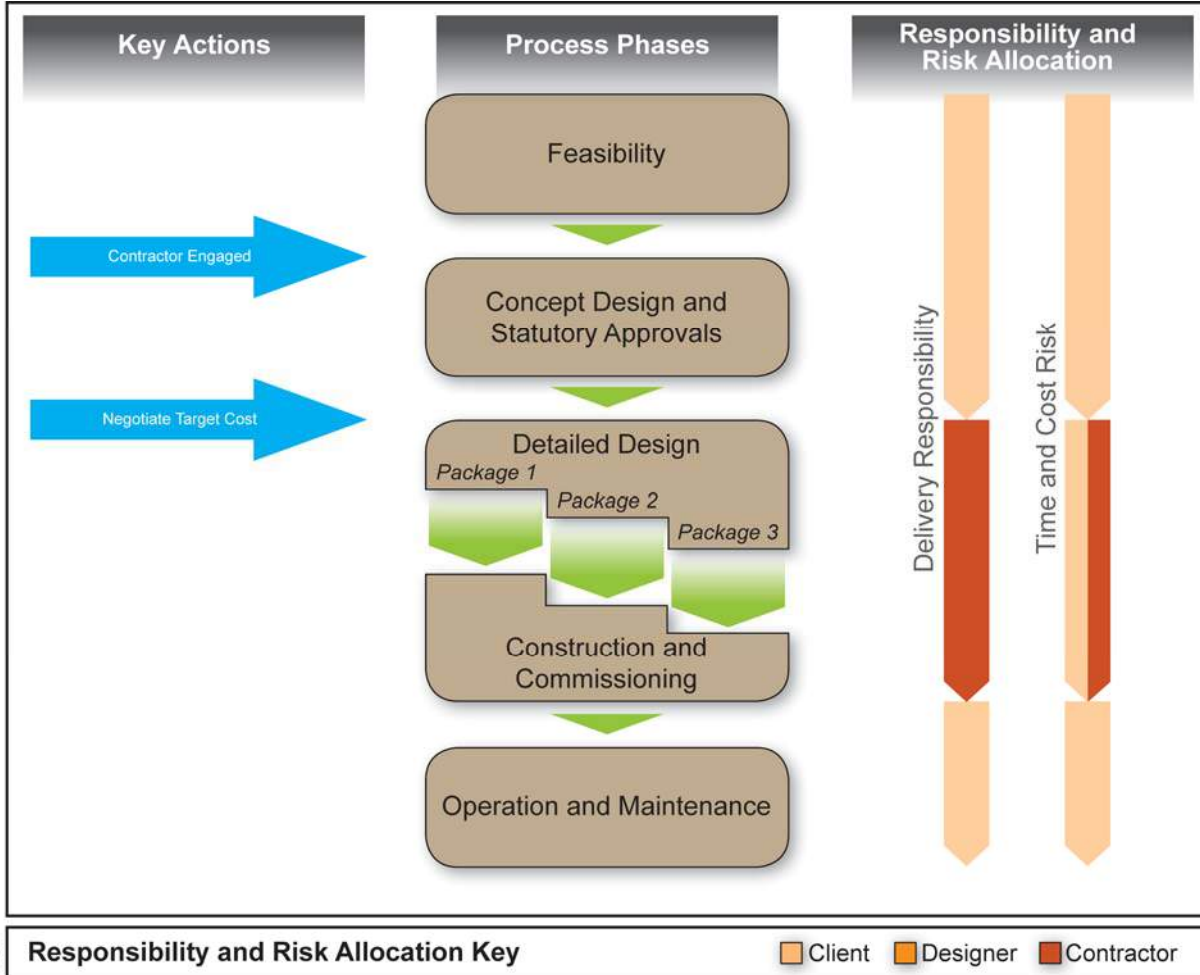
Source: Aurecon (2009)

Figure 2.4 Managing Contractor flow diagram

### 2.3.2 Early Contractor Involvement (ECI)

With ECI, the contractor is engaged shortly after the project has been identified, providing input to the concept design development phase of the project. Selection is based on a range of criteria including capability, trade record, financial stability and cost overhead structure. During the concept design phase, the contractor is engaged on a fee for service basis. The contractor is then invited to submit a comprehensive tender addressing all of the time, quality and environmental parameters with a project target cost. Typically, the client would then proceed to a 'Hard Money' contract with the contractor for design completion and construction although it remains open to the client to offer the project to the open market if a price cannot be agreed. From this stage on the procurement method is very similar to the D&C Model described earlier.

Figure 2.5 provides a flow diagram for procurement using the ECI model. It highlights the key client actions that are required during the procurement process, and also identifies the party that is responsible for, and therefore allocated the risks associated with, project delivery, time and cost for each phase of the procurement.



Source: Aurecon (2009)

Figure 2.5 Early Contractor Involvement flow diagram

### 2.3.3 Public Private Partnerships

The decision to use a PPP model rests with the Government and is typically limited to large value, complex projects with substantial ongoing operational costs and management risks. Often a special purpose agency is established by the government to run such a project. The client agency would then be directed to manage the project delivery by that mechanism.

The description of the PPP procurement model is very broad and covers a range of different levels and types of private sector participation within public sector projects. The common element is a partnership between a public sector agency and a private sector entity to enable the delivery of the best possible project outcomes for the community.

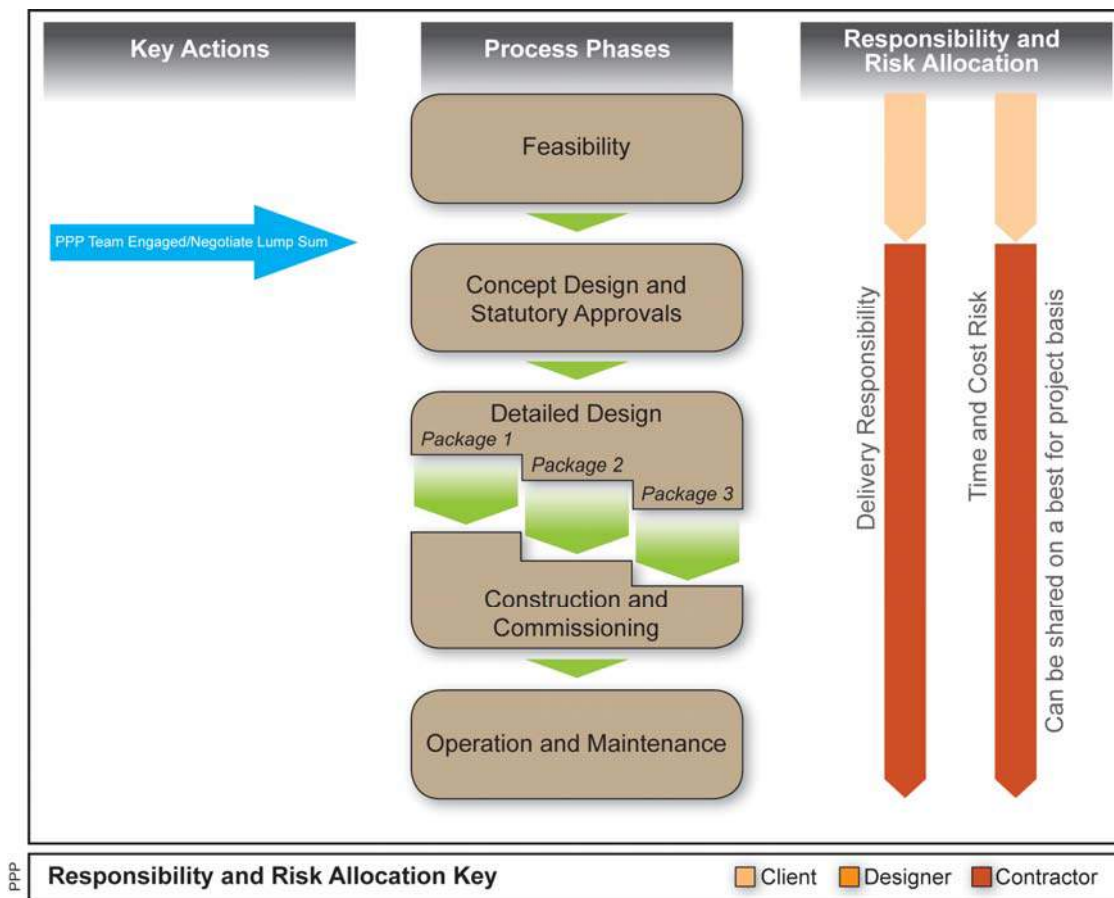
The level of the private participation is based on local factors and constraints for each project. These may include the ability of the public sector to deliver infrastructure, existence of specific Government procurement policies, project affordability, funding availability within the private sector, attractiveness of the project to the private sector and social and community need. Under this model the public and private sector organisations

enter into a contractual arrangement for the delivery of services for a long period of time (usually between 20 and 30 years), often involving the initial development and ongoing management of infrastructure. Project risks within a PPP are allocated to the party which is best able to manage them, thus reducing the potential impact of their consequences. Whilst this practice has been followed in recent PPPs it is generally the client's intent to allocate most if not all risks to the private sector.

The private sector brings to the PPP procurement model its significant infrastructure development expertise along with the ability to source and outlay the required funding external to the Government. These factors are used to meet the public sector aims and expectations of project delivery, more efficient operation and higher service levels. The revenue for the private sector is generated either by direct user charging (eg road tolls and rail fares), a service charge paid by the public sector or a hybrid of both arrangements. In all cases the payments are based on the project outputs, subject to meeting the service expectations and/or availability of the infrastructure.

PPPs are not without their limitations. In the project development and implementation phase there is the very high cost of bidding which significantly limits the number of players in the market. In the post construction phase concerns include exposure of the government to a higher cost of money over the longer term and the potential for the government to be forced to take back operating risk due to unforeseen changes in system operating levels. This is a fundamental issue in the negotiation of any PPP deed.

Figure 2.6 provides a flow diagram for procurement using the PPP model. It highlights the key client actions that are required during the procurement process, and also identifies the party that is responsible for, and therefore allocated the risks associated with, project delivery, time and cost for each phase of the procurement.



Source: Aurecon (2009)

Figure 2.6 Public Private Partnership procurement flow diagram



## 3. Procurement model selection criteria

### 3.1 Selection of an appropriate procurement route

The eventual selection of an appropriate procurement method depends largely on the accurate identification of the requirements by the client. Frequently these emanate from organisational procedures, previous experience, in-house and consultant expertise. Accordingly, there are frequently many factors that might influence selection of a procurement method. It also means that subject to whatever criteria are adopted, the ultimate choice of procurement route can become a highly subjective task. This section of the report discusses a small number of client focused selection criteria that have application to the procurement methods discussed above in support of a more systemised approach to selection.

At the project level, the delivery model choice will have impacts on the quality and durability of the product. Models which have the capacity to allocate ongoing asset management responsibility such as Alliances and PPPs drive a stronger focus on long term asset performance whereas D&C can have the opposite effect.

At a sector level the varying obligations have a significant impact on shaping the contracting sector's training needs, skills and resource bases.

Although there is the potential for selection criteria to be many and varied, from technical, financial, management, contractual, market through to political, it would be useful to narrow these down to a few key criteria. The choice and the weightings given to the criteria need to be risk based and should reflect the client's most important strategic objectives. The adoption of a large number of broad based criteria can distort the selection of a procurement method and make selection of an appropriate choice overly complex. Table 3.1 provides a summary of common criteria used in civil infrastructure projects.

**Table 3.1 Recommended procurement delivery model selection criteria**

Selection criteria	Matters for consideration
Criteria 1 – Involvement of the contractor in the design process	The level of involvement and control the client wishes to offer to the contractor over the project design development process and definition of project deliverables
Criteria 2 – Capacity of the client to make design changes	The flexibility in accommodating design changes during the project arising from incomplete information or unforeseen external factors
Criteria 3 – Ability to support a collaborative approach	The client may choose a delivery model that encourages collaboration between partners and aggregates best practice features from the wider industry base
Criteria 4 – Ability to incorporate innovation	In the case of complex projects or those without extensive precedent the client may wish to optimise innovation from industry partners in the development of design solutions or project staging or construction
Criteria 5 – Organisational complexity of the project	The complexity of the project deliverables, the site and other client requirements and the impact that these factors have on other project variables such as time for completion and cost
Criteria 6 – Speed from inception to completion	The speed and timeframe for project delivery including any internal deadlines for project stages
Criteria 7 – Certainty of price	Predictability of the final contract price (and cash flow) during each stage of and for the whole of the project

Source: Aurecon (2009)

These criteria must be considered having regard to:

- Any applicable Federal and State legislation (including procurement policies)
- The capacity to identify and distribute risk between the parties
- The complexities associated with managing the contractual arrangements of the procurement models (considered in Section 2)
- The purpose of the contractual documentation (ie the extent to which the contract defines rights and obligations alone or includes elements of relational contracting)
- The applicability of the form of contract (ie the use of standardised forms of contract unamended or with clearly defined Special Conditions)
- The ability and / or capacity of the industry to respond to the selection criteria employed
- The ability and resources of the client
- The means by which tenders are to be assessed

Thus deciding upon the most appropriate method of procurement is a matter of applying the selection criteria to each of the possible procurement models, and determining which of them offers the best fit to the Client and Industry to achieve the best outcome for a project.

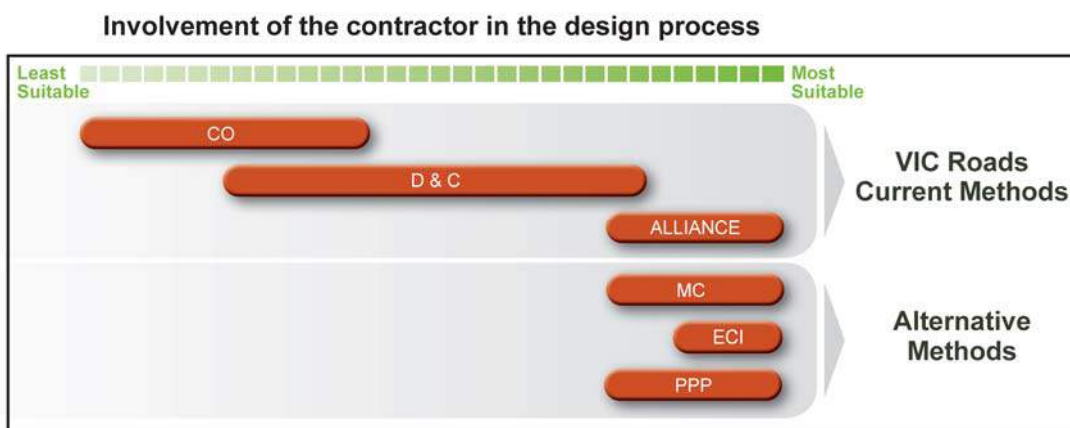
### 3.2 Key procurement selection criteria

Figures 3.1 to 3.7 illustrate the extent to which each procurement model responds to the above-mentioned selection criteria, using a scale from 'least' suitable through to 'most' suitable. The width of the horizontal bars indicates an approximate range for which each procurement method might prove suitable against a criterion. The procurement methods that are commonly used to deliver civil infrastructure in Victoria are discussed and also represented graphically in the figures. The alternative procurement models identified in the previous section are represented graphically in the figures for comparative purposes.

#### 3.2.1 Criteria 1 – Involvement of the contractor in the design process

A client may see an advantage in the contractor being involved in the preliminary design process. This is certainly the trend but there may be other cases in which this is not considered necessary as the client wishes to maintain full control.

Construct Only typically involves a more direct involvement of the client in the design process as this precedes the procurement phase, compared to projects delivered through D&C and Alliances.

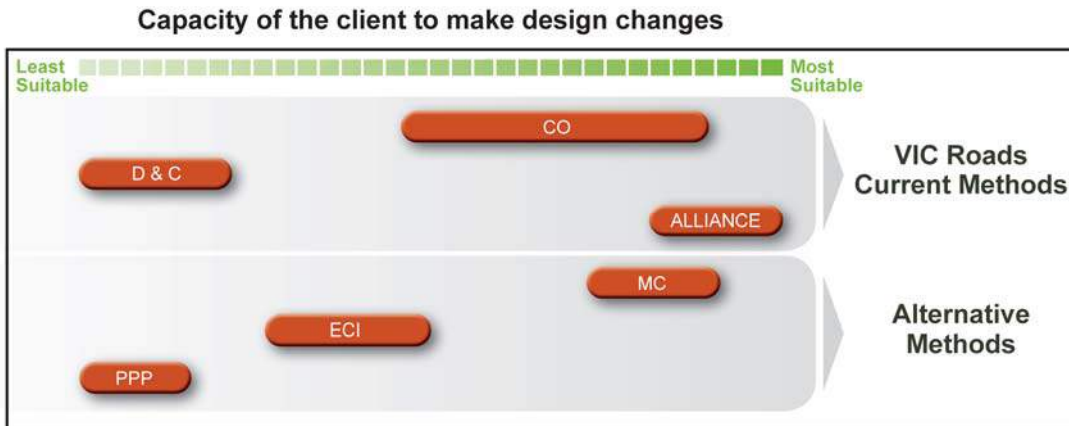


Source: Aurecon (2009)

Figure 3.1 Involvement of the Contractor in the design process alignment

### 3.2.2 Criteria 2 – Capacity for client to make design changes

The client may wish to change the scope of the project due to incomplete information (eg poor initial scoping of the infrastructure requirements), or unforeseen external factors (eg political imperatives). While the contractor is obliged to do the contracted work, it is also entitled to seek variations for changes in scope initiated by the client. Terms and conditions of variation clauses relating to changes in project scope are commonly found in Construct Only contracts. They are also found in D&C contracts, but generally with less risk carried by the client. On the other hand, Alliances are designed to accommodate scope changes, which may be initiated by the client or contractor, over the life of the project.



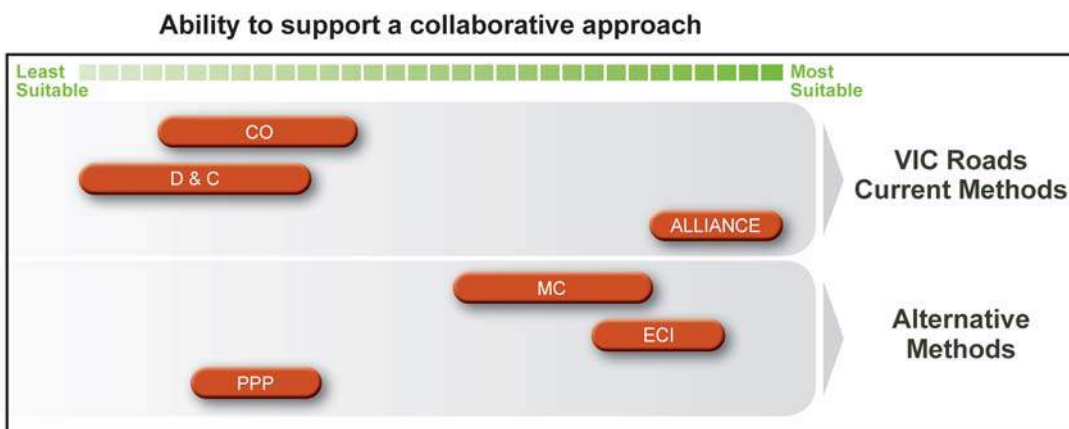
Source: Aurecon (2009)

Figure 3.2 Capacity of the client to make design changes

### 3.2.3 Criteria 3 – Ability to support a collaborative approach

More recent forms of procurement promote ‘shared’ decision making, encouraging both the client and contractor parties to strive for ‘best for project’ outcomes. This requires open dialogue, no surprises and generally open book negotiations.

A collaborative approach also fosters an environment of trust and respect between parties and in some instances such as Alliances a ‘no blame’ culture. It does however require both parties to have very well developed communication skills, and experience in negotiating win / win outcomes.

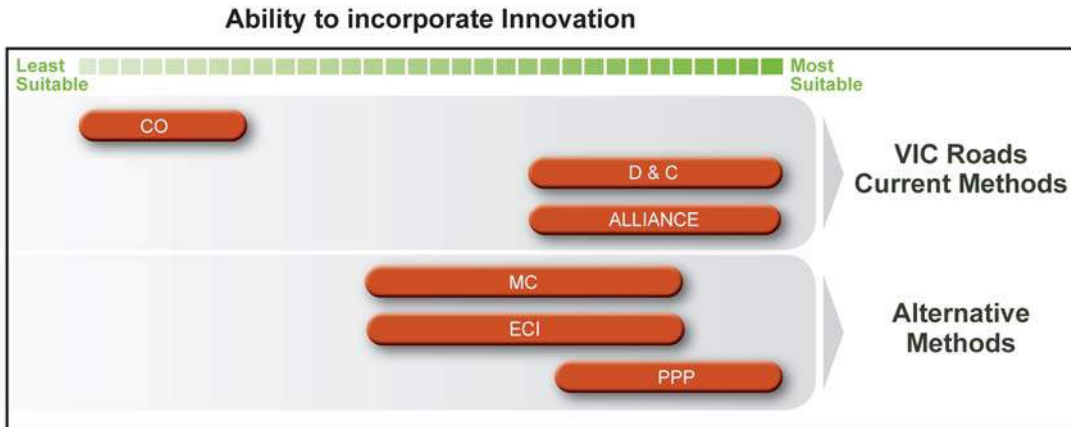


Source Aurecon (2009)

Figure 3.3 Ability to support a collaborative approach

### 3.2.4 Criteria 4 – Ability to incorporate Innovation

The capacity to stretch design or performance parameters or to incorporate new techniques into civil infrastructure projects is often a key differentiator in selecting a contractor. Whilst most procurement models have the capacity to reward a contractor for promoting innovative solutions through a selection process, the D&C, PPP and alliance processes drive contractors to even higher levels of creativity.

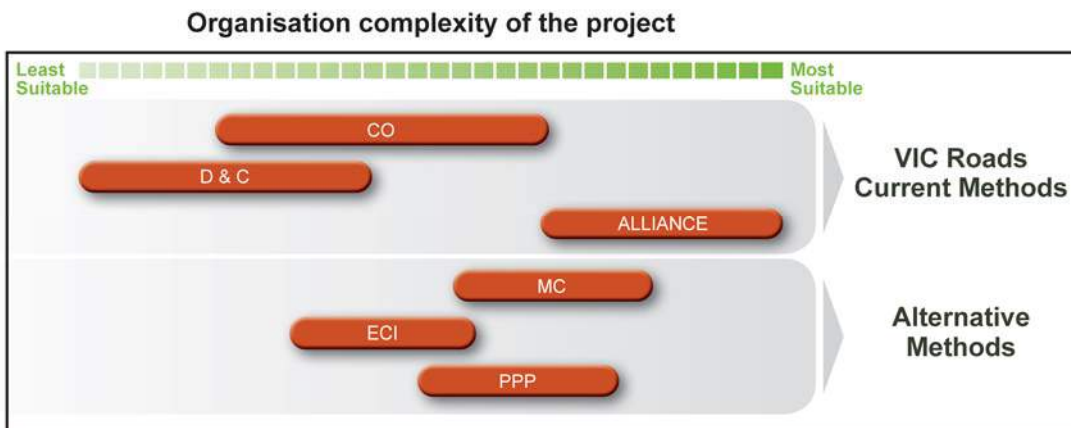


Source Aurecon (2009)

Figure 3.4 Ability to incorporate Innovation

### 3.2.5 Criteria 5 – Organisational complexity of the project

Organisational complexity can be an issue where several organisations are involved in the procurement process and it is necessary to manage across multiple interfaces to deliver the project. The construct only structure may be the most suitable form of delivery where the design parameters can be clearly specified and the project outcomes well understood. In such cases, D&C procurement may offer a more appropriate solution. However, the D&C procurement model can be problematic where projects have competing objectives, involve many different stakeholders and require dealing across multiple interfaces. For highly complex projects, the Alliance, Managing Contractor and PPP models are designed to accommodate the variable nature of the tasks undertaken and outputs of the process, through the involvement of individuals who are well trained and experienced in operating within such an environment.

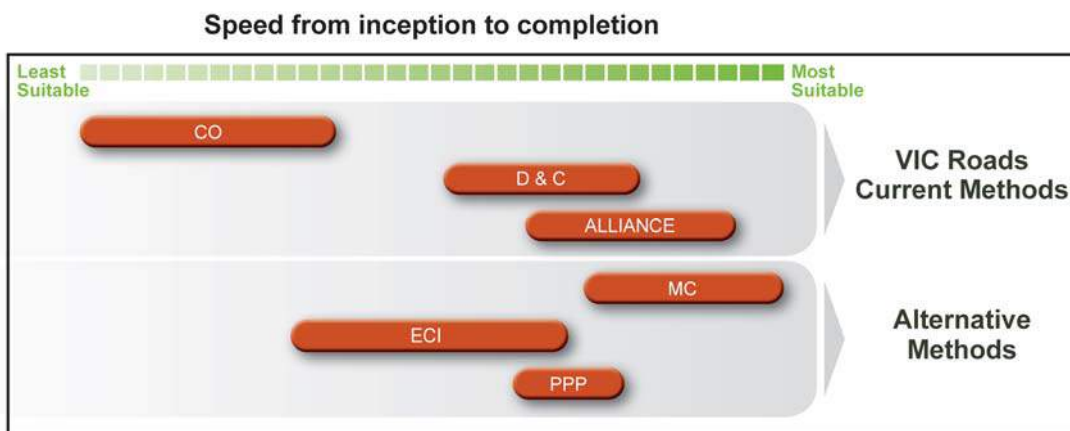


Source: Aurecon (2009)

Figure 3.5 Organisational complexity of the project alignment

### 3.2.6 Criteria 6 – Speed from inception to completion

The procurement process for civil infrastructure projects involves a number of stages, from concept to design to construction. There are occasions when a client requires the time from inception to completion to be reduced as this has implications for cost and meeting other strategic objectives. In such cases, the sequential nature of activities in Construct Only procurement tends to slow down the process. The D&C procurement model offers the Contractor greater flexibility in fast-tracking certain elements of the work (eg site work and bringing forward the purchase of items that have long lead times during the design phase). This can only be undertaken after having given due consideration to the work involved while still in the design phase and arriving at the conclusion that there is little risk to bringing forward these elements of work. Alliance and PPP contract forms offer enhanced capacity to shorten the overall procurement process. Whilst there may be an appearance of some delay at the early stage, that is from inception to turning the first sod, close working arrangements between client and contractor through the initial phases generally lead to a streamlined and well coordinated construction phase.

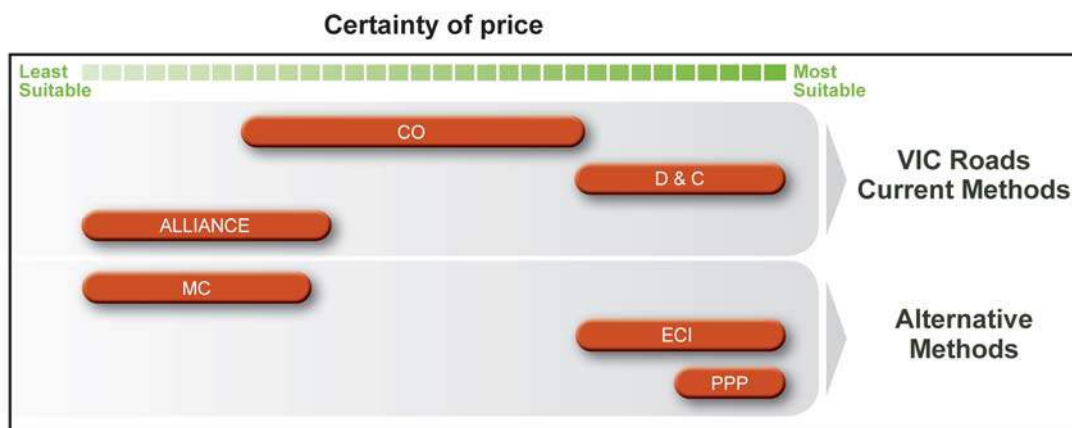


Source: Aurecon (2009)

Figure 3.6 Speed from inception to completion Alignment

### 3.2.7 Criteria 7 – Certainty of price

Certainty of price relates to the client’s ability to establish a price with the expectation that there will be little or no variation from the agreed figure. Construct only procurement trends toward price certainty, although this is dependent on factors such as agreement over quality parameters in the design that are consistent with those applied in the construction phase, and a reasonable level of contingency being applied to accommodate any remaining unforeseen price variations. D&C procurement offers a high degree of price certainty due to the lump sum nature of the contractual arrangements. Alliances, on the other hand, offer little price certainty at commencement of the project but trend towards greater certainty by the time the expected Total Outturn Cost (TOC) is established.



Source: Aurecon (2009)

**Figure 3.7** Certainty of price

### 3.3 Balancing the requirements

The selection criteria described above provide a basic framework for determining which procurement model is likely to be suitable for any given project. The criteria are not intended to be comprehensive or exhaustive – they merely offer guidance in the decision making process. When used in conjunction with other ranking elements they nonetheless present a sound basis for selecting an appropriate procurement route. However, public sector clients will also need to take into account issues such as accountability for public infrastructure projects and the fit with any government policy directives that may influence the choice of a procurement model. In general, selection criteria should be framed with value for money in mind, responding to environmental issues and ultimately benefit to the community.

Other selection criteria not covered above but are often used in civil infrastructure projects include:

- Suitability for projects with undefined scope
- Opportunity for local contractor involvement
- Capacity for risk sharing between parties
- Opportunity to provide incentives
- Ability to stage works
- Project management resource needs
- Opportunity for open-book approach
- Cost to industry of bidding work
- Industry knowledge of delivery method

## 4. Procurement delivery issues

### 4.1 Consultation process

In order to understand the key procurement issues that currently impact the civil infrastructure construction sector in Victoria, a range of relevant organisations were consulted. The consultations and data gathering exercise occurred through a combination of workshops, face to face interviews and telephone interviews that were undertaken between early December 2008 and late March 2009 with VicRoads staff and CCF member companies.

Also these organisations included small, medium and large Contractors and Government sector (State) Clients. Approximately 25 organisations, including small, medium and large Contractors and Government sector (State) Clients, and 50 individuals were consulted.

The information presented in this report is based on each party's qualitative view of Victorian infrastructure procurement and gives particular attention to the findings arising from the consultation.

### 4.2 Procurement issues identified

Given the different backgrounds of the organisations and individuals consulted, it was to be expected that the views expressed by them about procurement models for civil infrastructure projects in Victoria would be different and, at times divergent. The approach taken has been to treat each point of view as a valid representation of the situation, and to avoid applying a 'one size fits all' solution to the issues raised. Accordingly, a range of possible solutions and improvements have been considered, as discussed further in Section 5.

In general, the views expressed can be categorised as follows:


- Procurement model strengths and weaknesses
- Project scope and size
- Bidding arrangements and requirements
- Contractual form
- Delivery risk and reward
- Value for money
- Innovation
- Project and relationship management
- Staff, skills knowledge and experience

#### 4.2.1 Procurement model strengths and weaknesses

Clients have expressed increased interest in using relational contracting models, such as Alliances, to deliver larger and more complex projects and term maintenance work. This was partly in response to a prevailing shortage of suitably experienced contractors available to bid on large projects prior to the global financial crisis but also in the pursuit of better traffic and environmental management, project delivery and quality outcomes. Contractors also favour relational procurement models, including Alliances, and are keen to explore greater use of this model. One of the major benefits of an Alliance model from a contractor's perspective is the opportunity to establish a more cooperative approach to management of significant project risks through a more comprehensive risk allocation process.

Caution in adopting the Alliance model generally relates to:

- The difficulty in demonstrating value for money early in the process
- The perceived lack of open competition (pure Alliance model)
- Undefined scope and therefore lack of cost certainty, potentially resulting in the owner unnecessarily taking back risk



In general the success of an alliance will depend on a strong commitment by both parties to ensure that standards are not compromised or project target costs exceeded, and that a balanced view of the 'Best for Project' objectives is established and maintained.

Present trends indicate that, from both a client and contractor perspective, the Alliance and MC models will gain greater acceptance as contractors and clients build on their team synergies, core skills and delivery competencies.

Strengths of the Construct Only model include a precise understanding of the project deliverables and a clear framework for defining value for money objectives. The relatively low cost of bidding is also a considerable advantage. The weakness of this model is the limited scope for design and/or delivery innovation.

The Design and Construct model is not limited to sequential project delivery and hence offers more scope for innovation but incurs a higher cost of tendering, with multiple parties bidding competitively.

In order to address some of the limitations of these models, efforts are being made by agencies to develop more collaborative approaches including higher levels of engagement with contractors earlier in the project implementation cycle.

Industry players expressed reservations about the practice in some areas (although not widely evidenced) of novating design consultants. Care should be taken in the use of this technique as it may bind contractors to design consultants and/or designs that do not have a good fit with the contractors work arrangements.

#### **4.2.2 Project scope and size**

Contractors interviewed in this process have strongly supported Government agencies actions in undertaking an analysis of each project to determine the most suitable procurement option. VicRoads also supports this approach and already use a number of established procurement models which they are continuously refining. VicRoads has also expressed that it is keen to explore the use of other alternative models of procurement as appropriate.

#### **4.2.3 Bidding arrangements and requirements**

Bidding arrangements and requirements were keenly discussed issues with the following points raised through discussions:

- Clients expressed a need to review and update existing pre-qualification systems. This is currently being undertaken via an AUSTROADS Harmonisation of Prequalification Process,
- Clients prefer to have various 'grades' of pre-qualification applied to contractors based on performance. This practice supports the use of the selective tendering process which is designed to avoid contractors wasting resources bidding for projects outside their accredited competency range.
- Contractors are generally supportive of the pre-qualification process and believe that short-listing for the final bidding stage of a project and the use of panels helps reduce the costs incurred.
- Contractors encourage clients to have due consideration of the overall costs of tendering (including those incurred by the client, contractors and industry at large) when opting for a procurement model.
- There is a perception by contractors that projects are being aggregated into relatively large contract packages. Anecdotal evidence suggests that projects have grown from approximately \$70 million five years ago to approximately \$200 million today. Whilst this provides obvious cost and project management benefits for clients, it also means that only the larger contractors with adequate resources are in a position to bid for such contract packages. The small and medium sized contractors who cannot afford the staff time and costs associated with the preparation of such large bids are left with no other option but to subcontract to larger contractors.

Whilst the client groups acknowledge that there have been recent examples of some large contract packages being brought to the market, these still only represent a small percentage of the total value of the infrastructure delivery program, with the majority of projects being put to the market still being in reach of small to medium sized contractors. Clients aim to package works logically and to deliver projects in a way that is most beneficial to the community.



- Contractors expressed the view that it is difficult to provide realistic bids where the scope of work is poorly defined due to the large number of unknowns that are present in tenders. It is felt that 10% to 20% of all infrastructure projects fall into this category of inadequately scoped projects.
- Both clients and contractors are supportive of the wider use of mandatory pretender briefings. VicRoads requires these on projects of more than \$5 million in value or on lesser value but highly complex projects.
- A number of contractors expressed the view that unduly tight tender periods are a major issue with current procurement arrangements, because the limited time jeopardised opportunities to maximise innovation and value for money solutions being developed
- A number of small and medium sized contractors held the view that, when it comes to the application of relational contracting models, it has been difficult to achieve comparable ratings to large contractors. Larger contractors had developed skills and experience from their involvement in larger infrastructure projects and this presented a barrier to entry for the small and medium sized firms, even for projects that were of a manageable size.
- The cost of bidding relational contracting models, including Alliances, was believed to be significantly higher than for other procurement models. This is attributable to the need for contractors to allocate senior staff to bid development and the cost of involving external facilitators and consultants to support their bidding activities in such projects.
- Contractors are keen to ensure that intellectual property owned by them is not shared inappropriately with other bidders. They encourage a high level of probity oversight throughout the project development and delivery processes. VicRoads advises that this occurs on projects of more than \$10 million value or those of a lower monetary value but of a particularly sensitive nature.

#### **4.2.4 Contractual form**

The variation in contracts employed across Victoria including State Government departments and Local Government places significant demands on contractors who serve a range of clients in terms of responding to bid documents and their accompanying amendments. The use of project specific terms and conditions adds to this variation although it was acknowledged this was a function of the law firm(s) engaged by clients. This issue is acknowledged and is driving clients to work towards establishment of updated versions of AS4300 and AS2124.

#### **4.2.5 Delivery risk and rewards**

The management of project risk, including its identification, evaluation and treatment, is generally handled poorly in civil infrastructure projects. This is attributed to a lack of understanding of the civil infrastructure and a lack of skills and experience with risk management on the part of contractors and clients alike.

The appropriate allocation of project risk is critical to the success of civil infrastructure projects, and it has been noted that failure to do so, by the contractor or the client, ultimately results in increased delivery costs. The contractor's team structure is strongly influenced by the project risk profile, particularly when sub-contractors and consultants are also part of the team and share in some of the risks. Sub-contractors and consultants become responsible for specific elements of the project, and therefore bear the risks associated with that responsibility.

When risks are correctly identified and allocated to the party best able to manage them, and the payment mechanisms reflects this allocation of risks, contractors are encouraged to participate in the procurement model. Clients and Contractors play a key role in shaping these arrangements to achieve the desired project outcomes. The late or untimely submission of claims also has an adverse effect on how risk is viewed on later projects.

#### **4.2.6 Value for money**

- There is a perception in the contracting industry that clients focus more on total construction cost instead of the whole of life costs of a given project. This is thought to be a reflection of the need to satisfy Department of Treasury and Finance (DTF) capital cost requirements. This is not supported by clients who state that seeking better value for money outcomes based on whole of life considerations is a standard part of the tender selection process.

- DTF has recently completed a study defining value for money objectives involving Melbourne University and will shortly be publishing a more comprehensive framework for government agencies to aid the evaluation of project proposals and the articulation of expected community outcomes. This body of work will inform the development of a value for money tool for the civil infrastructure sector, identified as needed by this paper.
- The ability to achieve greater value on infrastructure projects can be hindered by poor initial estimating undertaken by clients, or their advisors, during the project planning stage. The key issue with these budget estimates is that they often are too simple, based on limited or out of date cost data and information. They may not reflect the complexity of the project, not take into account the current level of work within the market place and the level of competition for the work in question. As projects are often selected on the basis of their benefit to cost ratio (BCR) then it would be appropriate that the BCR is re-evaluated prior to tendering to ensure that what is intended can, in fact, be realised.
- Involvement of contractors during the design phase of projects permits constructability advice to be taken into account from the outset and fully incorporated into the design. This is frequently not the case in practice and contractors often find themselves needing to undertake a total review of the designs provided by the client / design consultant to ensure deliverability.
- The use of locally based contractors on infrastructure projects that are located outside the Melbourne metropolitan area is a sensitive issue for contractors. It is believed that benefits can be achieved due to the lower labour costs of local staff and the savings generated through not having to pay expenses related to importing resources. Client groups operating outside the metropolitan area recognise this opportunity and are developing regional KRAs that encourage competent local contractor engagement.

#### 4.2.7 Innovation

- The procurement model selected by clients has a significant impact on contractors' ability to respond with innovative solutions on projects. Procurement models that are overly focused on costs generally result in fewer innovations than other procurement models. Relational contracting models, such as Alliances, are better at encouraging innovation as they provide a framework within which new methods of working can be identified, explored and delivered.
- When clients are purely focused on assessing construction tenders on a level playing field basis, it can be difficult to recognise and quantify the innovation that may be present in the bids. Contractors, however, see innovation as a key differentiator but are of the view that it is often overlooked during the bidding process due to the assessment process being too rigid. Contractors feel that clients have a preference for prescribed solutions and are unwilling or unable to evaluate innovative bids. From the client's perspective, innovation is a feature to be encouraged and the trend towards D&C and Alliance models supports this objective. It must be said however, that where a number of innovative bids are received, they may be more difficult to assess and to arrive at a clear position about which offers the best outcome and value for money.

#### 4.2.8 Project and relationship management

- A number of the small and medium sized contractors believed that larger contractors use the procurement process to apply unreasonable commercial pressure on the supply chain. This has a negative impact upon the long term viability of small and medium sized contractors. The preference is to operate as 'partners' rather than 'sub-contractors' when entering into project arrangements. Clients too would like to see better integration of the supply chain but this is difficult to achieve in the current environment due to the contract conditions that prevail.
- Clients expressed concern about the practice by head contractors of 'Bid Shopping' after the award of tenders and the unacceptable pressure this places on the junior contract partners to drive down costs and hence impact on their resilience, capacity or sustainability. This is in breach of the National Code.
- There was also a view expressed by contractors that some clients found it difficult to allocate enough time and resources to managing the delivery performance of infrastructure projects. Understandably, the amount of time spent and resources allocated by the client would depend on the procurement model selected, and the specific drivers involved in each case which may not always be apparent to the contractor.
- Some contractor representatives see discussions involving variations with clients as being adversarial. Whether this is perception or reality, both clients and contractors have acknowledged the value of collaborative negotiations to reach agreement.

- There was genuine interest from both contractor and client parties on the study sponsored by the CRC for Construction Innovation on "Dispute Avoidance and Resolution". This study, with cross industry representation, has highlighted the need for a changed approach to contractual processes, with a stronger focus on avoidance rather than disputation. The findings of this study are consistent with feedback received through our contractor and client discussions.
- There is evidence of poor contractor/sub-contractor relationships resulting from the absence of competent, formal, written sub-contract agreements. These can be used to effectively inform and strengthen the obligations of the parties to existing security of payments legislation.
- In some Alliances, contractors felt that clients expected staff of a certain level to sit on the Alliance Leadership Team (ALT) and that those present on the ALT were not always those that could add the most value to the discussion. It is essential for the effective working of the ALT that delegates have the necessary authority to act on decisions. Careful thought must therefore be given to nominating the members of the ALT to ensure an effective balance of all parties decision making capacity and on the job, day to day project knowledge.

#### 4.2.9 Staff, skills, knowledge and experience

Currently, the knowledge and experience gained from involvement with infrastructure projects is generally only passed on to those who are directly involved in the relevant projects. However, this information needs to be shared more widely in order that the industry as a whole is able to improve its infrastructure delivery skills and outcomes. There is scope for a stronger alignment between client and contractor groups in the development and delivery of ongoing vocational training for the industry

The view has been expressed that, particularly within Local Government, there is a shortage of skills which is more pronounced when considering the significant expansion of infrastructure programmes in recent years. The general lack of procurement skills and experience has a negative impact on the delivery of infrastructure projects, can indirectly affect the viability of the small and medium sized contractors and has implications for the Lead Contractor / Subcontractor relationship.

The civil infrastructure industry has changed rapidly over the past three to five years. As a result, relationship management skills have become increasingly important, especially when implementing the alternative procurement models. However, these skills are often lacking within the contracting sector, a situation which is exacerbated by a large proportion of contracting personnel being relatively inexperienced.

The large contractors require their staff to undergo some form of training in relational contracting along with technical, safety and other training, and felt that this needed to be expanded and undertaken by all players within the industry. Whilst this is beneficial, staff retention and business sustainability amongst small and medium contractors is an issue. They have difficulty in retaining skilled staff with the required procurement skills and experience as these people are also attracted to larger contractors. There is also a need for sub-contract staff to increase their relational contracting skills, in order to be able to accept greater responsibility for delivery. In this way they will be able to participate more fully in partnership orientated roles rather being restricted to traditional sub-contractual arrangements.

In keeping with this theme, the Victorian Skills Summit 2009 recognised the need for a change in attitude and approach to recruitment, training and retention of a skilled workforce in the civil contracting industry. It identified that there is a cost associated with developing a sustainable workforce but also that it is an essential business and infrastructure expense.

The Summit recommendations are supported by the contractors and include, amongst other things, a proposal that a provisional sum equal to 1% of the contract amount be included in infrastructure contracts tendered by Government Agencies, Councils and Water Companies expressly for the purposes of providing training. It is acknowledged that this provision should be capped when applied to very large (PPP or Alliance type) projects. Legislation exists in both NSW and QLD requiring project funded industry training and is regarded as being very valuable in addressing the workforce skills shortage issues in those states.



#### **4.2.10 Civil Contractor's Federation current position on these issues**

Independent of this report, the Civil Contractor's Federation has undertaken the development of eight individual studies specifically targeted to the contracting industry. These include development of:

- Guidelines for civil contractors in resolving disputes
- A sample risk register for use by civil contractors
- A benchmarking framework for contractors providing a mechanism for sharing of information and data
- A set of guidelines that illustrates the benefit of collaboration between contractors and subcontractors, and between contractors and clients
- A code of behaviour for contractors in contractual relationships
- A set of contractual clauses for both contractors and subcontractors entering into contractual relationships
- A framework for training developments for contractors to address the skills shortage currently existing in the industry

These initiatives of the Federation demonstrate their commitment to addressing the current shortfall of processes, systems and skills currently existing in the civil infrastructure industry in Victoria.

## 5. Improved procurement delivery framework

### 5.1 Introduction

The principal approaches to procurement (excluding panel and term arrangements) are:

- Traditional procurement (Construct Only)
- Design and Construct (D&C) procurement
- Management procurement (such as MC)
- Integrated procurement (such as Alliances and ECI)
- Private Finance procurement (such as PPP)

Within each of these forms there are a number of variants. For example, traditional procurement includes not only lump sum contracts but also target cost and schedule of rates approaches, whilst integrated procurement includes all forms of partnering and alliances. D&C methods can include novated design contracts and Engineer, Procure and Construct forms. Delivering efficiency and best value for the Victorian Community from these processes is a fundamental purpose of procurement. Such efficiencies will become increasingly important as Governments seek to offset the financial effects of the global financial crisis in future years.

### 5.2 International identified procurement process gains

An essential requirement is to obtain the benefits that improved procurement practices can afford. The establishment of new working arrangements across all activities of the procurement process can help the Victorian civil infrastructure industry and the Victorian Government generate efficiencies that will bring it into line with international best practice. The Ernst & Young report into Local Government Procurement identified the potential to yield annual savings in the order of \$180 million to \$350 million through the adoption of better procurement practices. This is reinforced by the CT Management Group's findings that overall savings of 10% to 20% are achievable by taking a fresh look at the procurement of civil infrastructure.

The four key questions that will need to be addressed are as follows:

- In what ways do Government and Industry wish to collaborate to create procurement efficiencies?
- How are the issues and constraints inherent in current procurement practice in Victoria to be overcome?
- How can all participants benefit from working together on civil infrastructure projects?
- How should best practice for the Victorian civil infrastructure industry be identified?

Experiences in comparable sectors in United Kingdom, such as the Highways Agency, suggest that whilst there is generally some enthusiasm for collaborating on techniques to improve procurement in civil infrastructure provision, there are few clues existing to the preferred form of these arrangements. Nonetheless, it is generally agreed that all participants see the letting of contracts in a timely manner in order to better manage peak workloads as important. So too is collaboration on performance measures. Like the Victorian experience, aggregation of works into bigger, single, contracts is occurring. This is being done in the United Kingdom in pursuit of economies of scale and administrative efficiency although it is perhaps contrary to the industry view prevailing in Victoria.

There is a strong belief in the United Kingdom that there needs to be increased support for collaborative working. Current global economic conditions have prompted some agencies to call for a return to lowest price tendering but at least for now the principles of collaboration espoused by Latham (1994 UK) and Egan (1998 UK) in their reports to Government on Construction Sector reforms hold good.

Efforts to ensure the necessary cultural change occur throughout the civil infrastructure industry in the UK, particularly amongst second and third tier contractors are continuing. This cultural change is coming about by the establishment of appropriate performance measures and ensuring measurements are made. For example, there is broad recognition of the need to focus on outcomes valued by stakeholders, such as, minimising disruption to road users.



Recent recommendations put forward by the Highways Agency (UK) for achieving procurement efficiencies in local Government civil infrastructure procurement include:

- Ideas for increasing collaborative working
  - Public Private Partnerships
  - Integrated Teams
  - Early Contractor Involvement
- Ideas for overcoming constraints
  - Open performance reporting
  - Pilot projects
  - Learning from experiences in other sectors and industries
  - Financial incentives
  - Meaningful partnering/output based contracts
  - Sharing of risk and experiences
  - Communication and cultural focus
- Ideas for procurement efficiencies
  - Standardised documentation
  - Savings on procurement costs for all parties (though how this is to be achieved was not identified)
  - Sharing of overall goals and best practices
  - Making better use of resources ie staff and specialist expertise, resourcing peaks and troughs, greater consistency in scoping and specification of works
- Identifying best practice
  - Establishing key measures of success i.e. consistent and agreed set of KPIs, capturing and sharing lessons learned
  - Collaborative arrangement of pilot schemes
  - Focus on service outcomes
  - Defining value for money
  - External inspection and self assessment of work
  - Setting up national/regional benchmarking groups
  - Using existing industry forums where these can help

### 5.3 Study outcomes to improve procurement practices

Arising out of the workshops and interviews and having regard to the principle of procurement best practice, a number of potential procurement improvement areas have been identified. These actions are grouped under headings that link to related themes.

#### Programming and packaging of works

- **Action 01** – Rolling forward construction programmes – to develop and issue on a regular basis (half yearly) the currently anticipated forward programme (over 1 to 5 years) of State and Local Government infrastructure works covering projects that are currently committed, anticipated and considered probable. This will enable a better match of upcoming infrastructure projects to the resources available within the industry using contemporary programming arrangements. This approach would require financial commitments by State and Local levels of government to their forward plans. A collaborative stakeholder Task Force would enable Government to match the capacity of industry to the level of demand.

#### Procurement model selection and usage

- **Action 02** – Procurement selection matrix – to develop and publish a procurement selection matrix to assist clients and project teams to identify and understand reasons for the procurement model choice that is the most appropriate for the identified project and the basis of a range of appropriate key criteria.(VicRoads project currently underway).
- **Action 03** – Early Contractor Engagement support framework– to develop early contractor engagement arrangements including wider use of the formal ECI model on projects of sufficient size or having significant complexity or uncertainty. This should include provision of guidance and support to clients to maximise ECI outcomes.

- **Action 04** – Relational contracting usage framework and guidance – to introduce a framework to encourage the use of relational contracting models for the delivery of projects that are of sufficient size or have significant complexity or uncertainty. These should be supported by the provision of guidance on the key issues associated with the use of relationship contracts. Having regard to probity issues, conduct workshops with an appropriately skilled contractor in order to better understand how the industry will develop their budgets, review budget estimates and consider constructability, safety, operations and maintenance arrangements in tender bids.
- **Action 05** – Novated design procurement model – to research the strengths and weaknesses of the use of novated design based procurement models for the delivery of infrastructure projects.

### Streamlining procurement processes

- **Action 06** – Encourage use of standardised contract documents – to develop a standard set of infrastructure delivery contracts covering the principal procurement models for use across all State and Local Government Clients. This should include guidance for industry on the development and implementation of collaborative arrangements within infrastructure procurement contracts, including information on successful examples and limitations.
- **Action 07** – Facilitate the use of electronic tender processes for projects – to facilitate the use of electronic tender process within the Victorian industry through the development of a range of appropriate guidance, support and recommendations.
- **Action 08** – Client / Contractor Code of Behaviour – to amend the Code of Practice for the Building and Construction Industry to govern procurement actions for use on infrastructure construction projects that is agreed by all parties including clients, contractors and subcontractors. These amendments should include reference to the security of payments legislation and have regard to the principles of the MAV/IPWEA Best Practice Guide.
- **Action 09** – Project risk registers – to include requirement for projects, over a certain size or level of complexity, to include a joint Client / Contractor Project Risk Register from the initial bidding stage onwards. This requirement should be emphasised at pretender workshops and ensure the full transparency of risk allocation at all stages of the project to support the commercial arrangement and reduce the incidence of disputes. The action should include a legal assessment of the implication of project risk registers on both the client and contractor.
- **Action 10** – Restricted timeframes for lodgement of claims – to emphasise within the contractual arrangements, provisions of the Australian Standard contract conditions which limit the time for lodgement of claims after an issue has been identified. This should apply, for example, to all parties to the contract (ie clients, contractors, subcontractors, suppliers, etc).
- **Action 11** – Encourage use of prequalification / panel arrangements on projects – to refine the processes for Government Clients to use prequalification / panel arrangements on projects where it has the potential to achieve savings to the total cost of bidding. These arrangements are to clearly define performance levels required by contractors in order to retain prequalification status or be considered for elevation to higher levels.
- **Action 12** – Provision of supply chain guidance and advice – to develop guidance and provide advice to the sector to ensure consideration of the key supply chain issues as early as possible and incorporate processes, procedures and activities to support the long term viability of the industry.

### Maximising project value for money

- **Action 13** – Project bundling framework and guidance – to support the industry to undertake further research into the current and predicted size and shape of the civil infrastructure development market within Victoria (covering road, rail, water, property and other infrastructure), the distribution of proposed projects within each of the sectors and the extent and impact of aggregation. This would include the preparation of a practice note to promote awareness in the industry of the basis of aggregation of projects (ie bundling projects together for delivery in a single work package) for the delivery of Victorian infrastructure projects. This would include an assessment of the opportunities and constraints and the potential impact on the sustainability of the Victorian construction industry (including the economic impacts for small and medium sized contractors).

- **Action 14** – Infrastructure innovation delivery review – develop a framework to provide guidance on how best to incorporate innovation within civil infrastructure projects and the key activities (from both client and contractor perspectives) that need to be undertaken to ensure that it is successful and achieves the best long term outcomes.
- **Action 15** – Use of performance measures to independently assess value for money – to provide key performance indicators and benchmarks for civil infrastructure procurement projects against which future performance can be measured. These could, for example, be based on the contract performance criteria contained within the Victorian Civil Construction Industry Best Practice guide for Tendering and Contract Management.

### Contractor and Subcontractor relationships

- **Action 16** – Assistance for small and medium sized contractors to be collaboratively involved in projects – to provide assistance, advice and support to interested small and medium sized contractors in increasing their engagement as full delivery partners rather than as sub-contractors to the lead contractors. To work collaboratively with government clients in understanding and implementing the objectives of the Victorian Industry Participation Policy ( VIPP) in establishing targets for an appropriate proportion and mix of infrastructure projects for delivery by small and medium sized Contractors.

### Continued industry viability

- **Action 17** – Local contractor and supplier usage framework and support – to recognise and apply the Government wide VIPP framework to encourage the use of local contractors, suppliers and labour where value for money can be demonstrated, together with the development a range of information, tools and data to support this initiative.

### Improving industry 'soft' skills

- **Action 18** – Industry procurement training and engagement – to fund, develop and deliver a programme of training and engagement with the civil infrastructure industry to support efficient procurement across all sectors and at all levels and to be responsive to the needs of government clients. This should include the development of a package of civil infrastructure focused risk management guidance, training and engagement to ensure that the level of understanding of risk management skills and outcomes is raised among Clients and Contractors.

### Bridging Client skills gaps

- **Action 19** – Victorian project delivery support agency – to support and extend the State wide DPCD initiatives to provide ongoing advice, guidance and support to State and Local Government clients in connection with the procurement and delivery of infrastructure projects, including civil infrastructure.
- **Action 20** – Project review workshops and reporting – to support and secure funding within the project costs for reviews to be undertaken at the end of each project to identify improvements in the efficiency and effectiveness of project delivery. Workshop reports should include a key findings section and be distributed via an internet based portal and / or disseminated through the Victorian Civil Construction Industry Alliance forum
- **Action 21** – National infrastructure procurement information repository – to promote knowledge within the sector of the Australian Procurement and Construction Council through which a register of civil infrastructure procurement information may be developed to enable skills, knowledge and experience to be shared between the States and support best practice procurement initiatives. Also to explore relevant Austroads initiatives.
- **Action 22** – Research into the level of Client time and resources required to successfully deliver infrastructure projects – to undertake further qualitative and quantitative research into Client and Contractor capability requirements to successfully deliver required infrastructure projects. This research should consider a range of issues including skills and the understanding of political, environment and community elements.





## **5.4 Best practice procurement framework**

A framework for procurement best practice was developed from the issues identified in Section 4 and the recommendations made in Section 5. Benchmarks against which progress can be measured will be created through a consistent approach to the development and use of these best practice elements.

To assist in the introduction of this framework, a series of procurement delivery support tools, based on the recommendations made above, are provided in the following section.

## 6. Procurement delivery support tools

### 6.1 Introduction

To address the existing procurement issues identified in Section 4 and provide support to the improved procurement delivery framework outlined in Section 5, this report establishes a number of potential procurement delivery support tools. These tools are practical solutions that Victorian civil infrastructure clients can take forward and develop in conjunction with industry in order to drive improvements in procurement processes and ultimately ensure that the infrastructure delivered meets Victoria's needs.

Ten tools have emerged from the list of recommendations. These are:

- Tool T1 – Forward planning
- Tool T2 – Pre-qualification criteria
- Tool T3 – Guide to the selection of delivery systems and use of standardised contracts
- Tool T4 – Risk registers
- Tool T5 – Value for money checks
- Tool T6 – Use of local contractors and labour
- Tool T7 – Jointly established training programmes
- Tool T8 – Staged issue resolution processes
- Tool T9 – Project reviews
- Tool T10 – Collaboration forum

These tools have been identified to assist the Victorian civil infrastructure industry and Clients to make the necessary changes in the way that projects are planned, designed, procured, managed and delivered. Outline information sheets for each of these key delivery support tools are provided in Appendix B and a summary of the individual tool described below.

### 6.2 Key delivery support tools


The tools described here will require development and expansion by the whole of the civil contracting industry (that is involving clients, large contractors and small and medium sized contractors) in a spirit of mutual trust and cooperation before they can be regarded as suitable for use in helping to improve the procurement processes and outcomes.

#### **Tool T1 – Forward planning (Client driven)**

The Forward Planning tool identifies civil infrastructure works and services over a rolling period. It considers how to best achieve continuity of output in infrastructure projects having regard to client funding arrangements, creating long-term relationships and adopting strategies that are appropriate to market capacity and capability.

#### **Tool T2 – Pre-qualification criteria (Client driven)**

The Pre-Qualification Criteria tool builds on existing pre-qualification systems in order to make them robust for clients and well understood by contractors. This is done by reviewing contractor performance in a formal way and using those reviews to update the contractor's pre-qualification status. Contractors listed in the pre-qualification system can expect to rise up to higher levels of the scale for superior performance, but equally drop to the lower levels of the scale if they do not measure up to the performance expectations of the client. In this way the pre-qualification system becomes more useful as a tool for identifying contractors according to their capability and risk profile. Procurements should then be let in parcels suited to and balanced between client needs and the capability of the industry to respond, especially insofar as small and medium sized contractors are concerned. A particular innovation that may assist smaller contractors to improve their business practices is to engage them under the auspices of the Client's own quality assurance system for works. Whilst this requires a demonstration of client leadership it also maximises the opportunity to grow contracting organisations in areas where that development may not naturally occur eg in regional areas.



### **Tool T3 – Guide to the selection of delivery systems and use of standardised contracts (Client / CCF driven)**

This tool provides a jointly produced guide to the selection of the most appropriate delivery system to suit the needs of the client, the ability of the civil infrastructure industry to respond and the circumstances of the project. For example, it will detail when and how to use 'Early Contractor Involvement' to best effect including the operation of pain/gain mechanisms. The use of standardised plain English contracts tailored to reflect appropriate risk allocation for each contract type will make the task of contract formation and administration consistent across the State and easier to administer.

### **Tool T4 – Risk registers (Client / CCF driven)**

The allocation of risk to the party best able to manage it and the treatment of risk is a fundamental that should be applied to projects of any size, complexity or value. Clients and contractors must be encouraged to use the risk register to provide early warning of issues. Regular review of the risk register at project and site meetings will minimise the occurrence of unplanned events that adversely affect project outcomes, This tool needs to research potential impacts on insurance covers.

### **Tool T5 – Value for money checks (Client driven)**

This tool provides increased confidence that value for money outcomes will be achieved in civil infrastructure procurement. It provides for the independent assessment of contract sums and total overall costs for selected large value Design and Construct contracts and Alliances. The independent nature of this tool ensures that verification of costs can be carried out objectively.

### **Tool T6 – Use of local contractors and labour (Client driven)**

Whilst competition legislation and State procurement policies preclude positive discrimination in favour of specific groups, this tool advocates the introduction of policies that encourage the allocation of work to small and medium sized contractors. This is achieved by identifying within the forward programme of work projects that are particularly suited to small and medium sized contractors. Whilst it is not possible to then further restrict the available supplier base, for example by geographical region, the use of appropriate and relevant selection criteria can increase the involvement of small and medium sized contractors. This approach is used extensively within European Union public sector procurement to ensure that small and medium sized contractors are afforded equal opportunity to bid for work without restricting competition.

### **Tool T7 – Jointly established training programmes (Client / CCF driven)**

By working together to jointly establish training programmes for client bodies and industry participants, it will be possible to establish programmes that meet the needs of all parties irrespective of the procurement method ultimately selected or the form of contract employed. This is especially so in cultural change areas where a greater understanding between client and contractor is sought, for example in encouraging small and medium sized contractors to participate in relational contracting. The training programme will fit comfortably with the preparation and adoption of a client/contractor code of behaviour. This will reinforce best practice in procurement and engagement and support other tools by providing guidance on their implementation.

### **Tool T8 – Staged issue resolution processes (Client / CCF driven)**

An essential ingredient in ensuring that contracts operate effectively is the ability of project participants to identify and openly discuss issues of concern in a non-confrontational environment. This can be achieved in many ways, including the use tools such as risk registers to provide early warning of pending events. It is also important that participants are equipped with the communication and interpersonal skills to operate effectively in these environments. This requires a paradigm shift in the way in which clients and the civil infrastructure industry conduct their business. The introduction of a robust dispute avoidance mechanism for the early identification of issues, coupled with restricted time frames for raising them, and the addressing of issues without fear of retribution or retaliation will work to preserve relationships within the project environment and across future programmes of work.

### Tool T9 – Project reviews (Client driven)

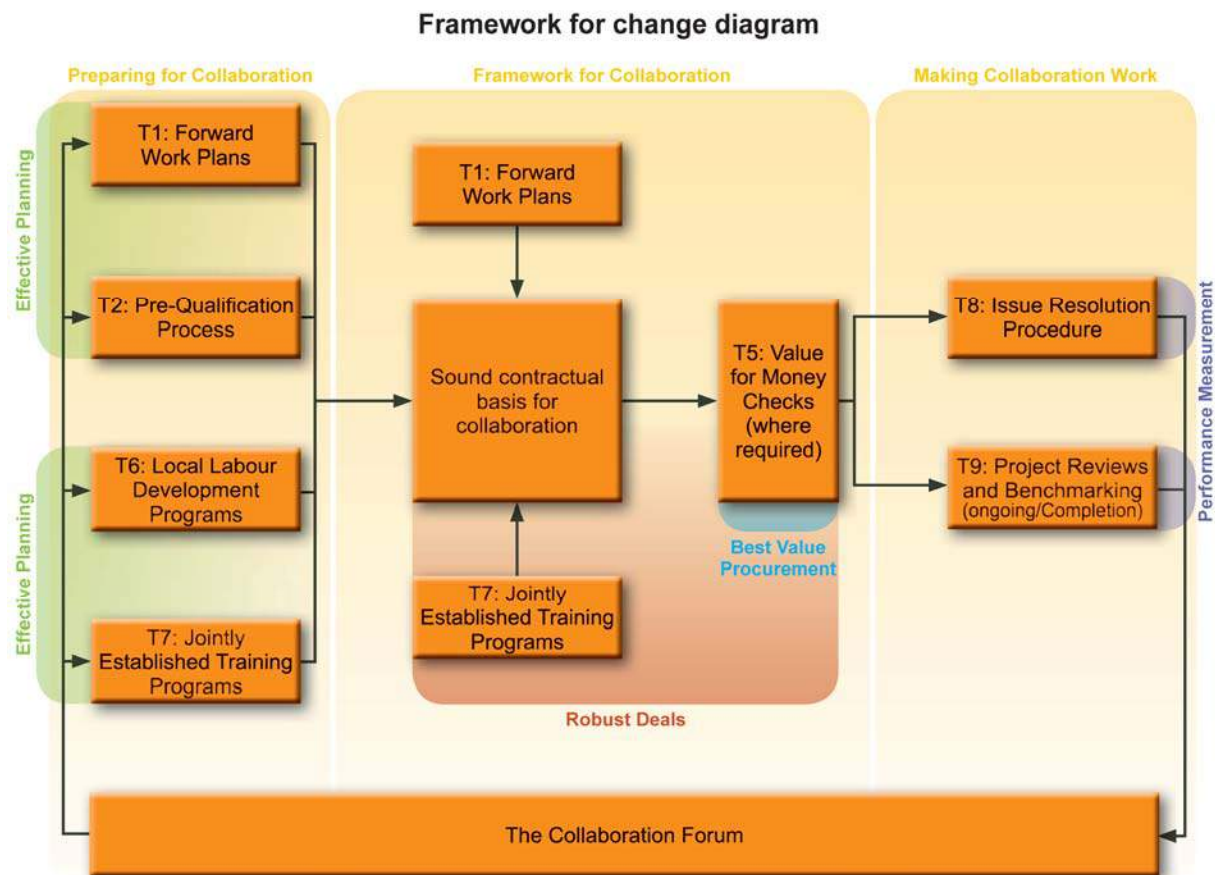
By undertaking a review of all projects over say a \$2 million threshold, it is possible to establish a concise set of benchmarks for performance. This will aid the determination of whether value for money has been achieved and will identify those performance measures where improvement is required. Reviews should be undertaken independently involving all relevant project participants and stakeholders. Reviews should be scalable in their scope to match the size, complexity, cost and duration of the individual project whilst retaining the efficacy of the key performance indicators that are measured.

### Tool T10 – Collaboration forum (Client driven)

This tool provides for the provision of a Civil Infrastructure sector stakeholder forum to share information on civil infrastructure best practice. It will provide support and guidance to Victorian Government agencies and the local contractor and supplier network. It would be supported by a repository or information portal of infrastructure procurement information. It may be provided with resources to enable it to act as a steering group for key research activities, for example, into the level of client time and resource required to successfully deliver infrastructure projects. It may be that this tool can utilise an existing State Government function to mobilise this initiative.

## 6.3 An agenda for change

Figure 6.1 shows how the tools described above, once developed, are capable of working together to create a framework for change in the Victorian civil infrastructure industry.



Source: Aurecon 2009

**Figure 6.1 Change framework**



### 6.3.1 Preparing for collaboration

Tools T1, T2, T6 and T7 all operate to ensure that the demand and supply sides of the Victorian civil infrastructure industry are properly prepared to work together to maximise benefits.

Tools T1 and T2 operate to ensure effective planning of Government requirements and the ability of the civil infrastructure industry to respond are appropriately identified. This leads to effective planning.

Tools T6 and T7 operate concurrently to ensure maximum utilisation of local labour in association with the development of a greater understanding of the need for and ability to work collaboratively. These tools are the lynch-pins of the cultural change that is required to effectively deliver the new behaviours that will be required.

### 6.3.2 Framework for collaboration

Tool T3 seeks to ensure that the most appropriate procurement method is adopted, having regard to client and project requirements. Tool T4 is applied to every project irrespective of size, complexity or value. It is a key component in ensuring projects run smoothly and unwanted surprises are avoided. Where the project is in the form of an alliance or is a high value D&C, then it may be appropriate to have a negotiated TOC or proposed contract sum independently certified by a DTF representative so that an assurance of value for money in procurement can be obtained before work commences. The use of these tools together with the choice of an appropriate form of contract will form the core of successful collaborative procurement arrangements.

### 6.3.3 Making collaboration work

A key factor in making any successful collaborative arrangement is the ability to raise issues and resolve them in a culture of 'no-blame'. Tool T8 facilitates just such an approach.

The ongoing review of project performance against key performance indicators and formal reviews on completion of project activity provide valuable feedback to project participants about their performance. Tool T9 governs the process of measuring performance and benchmarking.

There is a need for collaborative effort on the part of client and contractors, both in the way people are engaged and in commercial terms. Tools T8 and T9 address the people needs associated with good project outcomes.

### 6.3.4 Maintaining momentum

Tool T10, the Collaboration Forum provides the opportunity to produce the greater efficiencies that become available from integrating the whole of the civil infrastructure procurement improvement process. Integrated approaches should be based, wherever possible, on delivering strategic programmes of work. Knowledge and expertise can then be transferred more effectively from one project to the next. This creates improved service based on past experience, the ability to innovate and through the development of a culture of continual improvement.

# References, abbreviations and glossary

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# Abbreviations

The following abbreviations have been used within this publication:

<b>ALT</b>	Alliance Leadership Team
<b>ANZGPA</b>	Australian and New Zealand Government Procurement Agreement
<b>ATS</b>	Automatic Tracking Sensor
<b>AUSFTA</b>	Australia-United States Free Trade Agreement
<b>BCR</b>	Benefit Cost Ratio
<b>CCF</b>	Civil Contractors Federation
<b>D&amp;C</b>	Design and Construct
<b>DMR</b>	Department of Main Roads (Queensland)
<b>DOT</b>	Department of Transport
<b>DSE</b>	Department of Sustainability and Environment
<b>DTF</b>	Department of Treasury and Finance
<b>ECI</b>	Early Contractor Involvement
<b>GPS</b>	Global Positioning System
<b>HA</b>	Highways Agency (UK)
<b>KPI</b>	Key Performance Indicators
<b>KRA</b>	Key Reporting Area
<b>MC</b>	Managing Contractor
<b>MOCS</b>	Minimum Conditions of Service
<b>PPP</b>	Public Private Partnership
<b>SAC</b>	Special Area of Conservation
<b>SRIA</b>	Split Rock Inca Alliance
<b>SSSI</b>	Sites of Special Scientific Interest
<b>TLS</b>	Traditional Lump Sum
<b>TOC</b>	Total Out-turn Cost



# Glossary

The following procurement and infrastructure terms have been used within this publication:

<b>Alliance Contract</b>	The alliance model of contract is based on the premise of a collective responsibility for delivering the project and collective ownership of risks. The client and other partners, generally including the design consultants and the contractor, work together as part of the Alliance to achieve the project goals and manage risks collectively. Alliances are generally based on “no blame no sue”.
<b>Client</b>	A client is a person or organisation who commissions the design and construction of a construction project. It includes any agent appointed to manage the works on behalf of the client.
<b>Design and Construct</b>	The client will prepare a project brief and the contractor will independently engage a design contractor (or perform the design themselves) to perform the whole of the design.
<b>Designer</b>	A designer is a person or organisation whose profession, trade or business involves them in: preparing designs for facilities/structures, including variations or changes to a facility/structure or arranging for people under their control to prepare designs for facilities/structures.
<b>Early Contractor Involvement</b>	The Early Contractor Involvement (ECI) model sees the contractor (construction manager) engaged once the project has been identified and before the commencement of the project and they will provide input into the concept design development of the project. The contractor then provides a price for the work, which if seen to be excessive can then be taken to a competitive bidding process.
<b>Key Performance Indicators</b>	Key performance indicators (KPIs) are performance measures that focus on the achievement of outcomes critical to the current and future success of an organisation or project. They are a set of quantifiable performance measures that are used to gauge, compare and/or manage the performance in terms of meeting both strategic and operational goals.
<b>Managing Contractor</b>	<p>The Managing Contractor (MC) procurement model is a three stage process.</p> <ol style="list-style-type: none"><li>1. A Managing Contractor is engaged, usually an experienced construction contractor, to provide input into the design phase of the project, under the client’s control.</li><li>2. A lump sum fee to complete the project is then negotiated once the design stage is complete.</li><li>3. The contract commences and the MC takes over the design responsibility and risk, completes the design and then constructs the project.</li></ol>
<b>Novated Design</b>	The model involves the client separately engaging the Design Consultants and then passing on the design and subsequent risk to the Contractor once engaged. The majority of the delivery, time and cost risks are held by the contractor, rather than the client or Design Consultant.
<b>Public Private Partnership</b>	The procurement model of Public Private Partnerships (PPP) is quite broad and can cover a range of different levels and types of private sector participation in a project. The common element is a partnership between a public entity and the private industry to deliver the best possible project outcomes. With finance provided mainly by the private sector eg Banks.

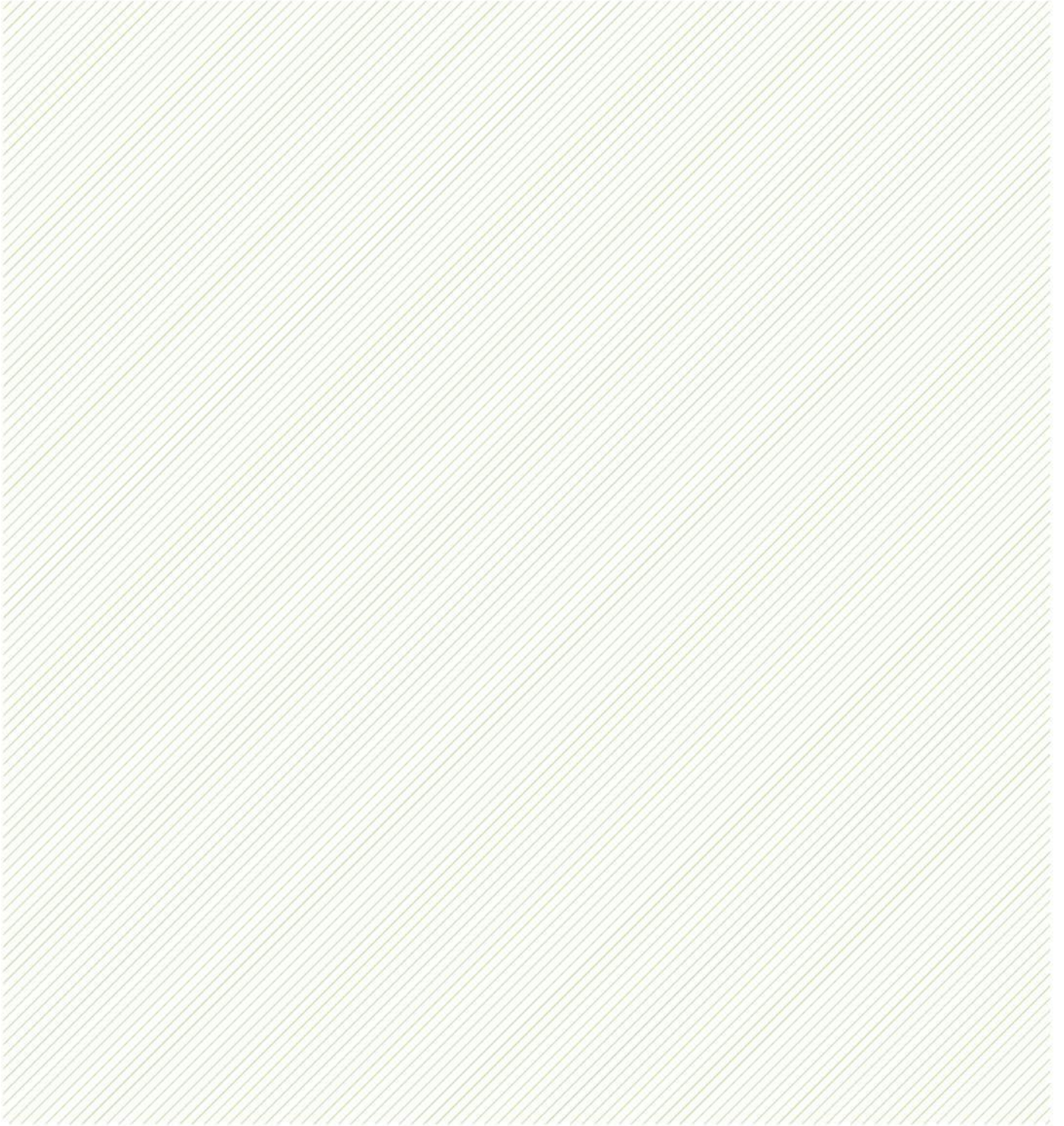


**Traditional Lump Sum**

Traditional Lump Sum (TLS) – in the context of this paper, this means – Construction Only contracts, is historically the form of procurement that was used for the delivery of Victorian transportation and utilities infrastructure. The model involves the Client directly and separately engaging the Design Consultants and Contractors. In addition with this procurement model the majority of the delivery, time and cost risks are held by the Client, rather than the Contractor or Design Consultant.



**Appendix A**  
**Best practice procurement case studies**



## Case Study 1 – Goulburn Campaspe Link Pipeline Project, Bendigo

### Project summary

Project name:	Goulburn Campaspe Link Pipeline Project
Client:	Coliban Water
Delivery period:	2006 to 2007
Project delivery team:	Coliban Water (Client), GHD (Designer) Fulton Hogan (Main Contractor)
Key project elements:	Development of a new pipeline to supply water to Bendigo and surrounding areas

In September 2006 the Coliban Water system storages, which supply the City of Bendigo and surrounding areas, were at 13.6% of capacity after significantly lower than expected winter and spring rainfall. This was a record low for the area and as a result Coliban Water customers had moved to the regions harshest ever water restrictions (Stage 4).

To help address this situation Coliban Water decided to progress faster with the development of a new pipeline linking the Goulburn River to the Campaspe River and Lake Eppalock, thus improving the overall capacity and reliability of the Bendigo water supply system. This involved the construction of approximately 47 km of buried pipeline, two pumping stations, intake and discharge structures, and a range of ancillary installations and facilities.


The pipeline planning and design had already been undertaken by engineering consultants GHD during 2006 and using this information Coliban Water put the pipeline construction out for tender using a Traditional Lump Sum (TLS) procurement model. The outcome of this competitive tender was Fulton Hogan being awarded the pipeline construction contract during December 2006.

As the pipeline project involved significant risks, including the shortened delivery timeframes and potential material, equipment and staff supply constraints and issues the Fulton Hogan contract was quickly converted from a TLS to an Alliance contract. This change enabled a combined Fulton Hogan and Coliban Water team, supported by GHD staff, to direct the project delivery within a collaborative working and achievement focused environment. This enabled the key project risks and technical complications to be proactively managed and any unnecessary project delivery restraints to be removed.

The conversion to an Alliance contract enabled all the critical project target dates to be achieved and the contract delivery scope to be significantly increased. This included taking on a number of client risk and responsibilities that were excluded under the original TLS contract, such as the finalisation of the detailed designs, and management of the material and equipment supply contracts.

### Procurement method used

The project was initially developed with a traditional lump sum procurement method. After two tenderers were identified using pre-selection criteria, Coliban Water invited contractor input into the finalisation of tender documents.



In April 2007, the project converted from a lump sum head contract to an alliance style arrangement. The challenges of weather, schedule and pipeline supply required high involvement from the client, ability to make changes and variations, and management of a complex process, suiting an alliance contract better. The alliance model allowed for greater collaboration and enabled completion without distraction from preserving contractual rights and obligations.

### **Key objectives**

Coliban Water identified the following as being the key objectives for the project (in no order of priority):

- **Cost** – Minimising the overall project cost and achieving the maximum value for money for Coliban Water
- **Schedule** – Delivery of water (30 ML/day) to the City of Bendigo and surrounding areas by 1 September 2007 (two months prior to originally being required). Full completion of the project scope was required by 1 November 2007.
- **Quality** – Delivery of high quality infrastructure that fully meets the requirements of the design specifications
- **Community / stakeholder** – Minimal disturbance to existing landowners and their operations, compliance with external stakeholder requirements and the pursuit of landowner satisfaction on completion of restoration works
- **Environment** – Minimal disturbance to the natural environment, putting in place the required environmental protection measures and effective proactive management of sensitive flora, fauna, cultural and heritage sites
- **Safety** – No harm to staff, stakeholders and general public and the proactive management of safety on site

### **Achievements and benefits**

The main achievements and benefits of using an Alliance contract for the delivery of the Goulburn Campaspe Link Pipeline Project are outlined below.

#### *Innovation*

The extremely tight schedule and the challenging community liaison environment created an atmosphere where innovative thinking was essential in order to achieve project goals. A number of innovative construction and/or environmental solutions were implemented on this project. These included:

- Construction techniques associated with air valve and scour valve installations
- Use of construction access openings for temporary access during construction of pipeline bends
- Early access to land by mutual agreement with landowners
- Management and disposal of subsoil material involving preservation and use for backfill
- Construction and design teams worked together to devise safe construction methods for deep excavation include thrust restraint design and steel reinforcement

#### *Risk management*

A risk register was developed early in the project and was regularly reviewed throughout the project.

#### *Collaborative working*

The project team benefited from working within an alliance, on conversion to the new model the alliance team members were immediately relocated so that all were working under one roof. This enabled improved planning of works activities, open exploration of initiatives to improve project outcomes and facilitated rapid decision making which optimised the realisation of opportunities and risk management. The collaborative environment provided the opportunity for consultants, clients and contractors to work together and undertake roles that they would not normally be exposed to. All team members left the project with a greater depth of understanding and awareness of pipeline and pump station construction.



### *Timely completion*

The short timeframe in which the project was to be delivered required the project team to adopt a fast-track approach to project management and planning. Close coordination of the works allowed works to proceed as quickly as possible in line with pipe deliveries, availability of design and development of property access. Works were programmed to tackle the high risk activities as early as possible. This created time to manage all components of testing and commissioning.

### *Quality management*

When the project was converted to an alliance a number of ex superintendent representatives became part of the design team. This ensured that quality assurance was maintained at the highest standard and that the design intent was realised.

## **Major issues and resolutions**

### *Multiple stakeholders*

The long length of the project site meant that there were many external stakeholders involved with the project. The project crossed a regional boundary and therefore interfaced with two catchment management authorities, two local councils, and two water authorities as well as DSE and VicRoads.

### *Non performance of key supply contracts*

Early in the project existing delays were exacerbated by the forecast of further delay due to non performance on key supply contracts. Coliban Water did not want to compromise on project delivery and Fulton Hogan did not want to be perceived as contractually aggressive in order to protect their rights under the contract. It was clear that in order to maximise the chances of achieving the completion date, the contractual arrangement and the management structure needed to be changed to a collaborative style alliance agreement. Once converted to an alliance, the team assumed direct responsibility for supply of materials and dealt directly with the suppliers. An enormous amount of energy was redirected from claims resolution into planning and programming the works. The difference in progress was substantial and the outcome could not have been achieved under the former contract model.

## Case Study 2 – Middleborough Road Rail Separation Project, Melbourne

### Project summary

Project name:	Middleborough Road rail separation project
Client:	VicRoads
Project delivery period:	September 2006 to January 2007
Project delivery team:	VicRoads (Main Client) Department of Transport (Secondary Client) Connex (Train Operator) John Holland (Main Contractor)
Key project elements:	Rail-Road separation design and construction project in the middle of busy urban, commercial and transport hub.

The Middleborough Road Rail Separation Project lowered the existing railway line to avoid level interaction with Middleborough Road in Melbourne's eastern suburbs. The project consisted of lower the line by up to six metres, building a road bridge across the line, construction of a new rail bridge at Laburnum Street and demolition and reconstruction of a new Laburnum railway station. The major works of the project were completed in 27 days, eight days ahead of schedule by the Middleborough Road Alliance, comprising of VicRoads, John Holland, Connex and the Department of Infrastructure.

The short intensive program compares to the alternative 18 month night and weekend works program traditionally used on VicRoads projects. The elimination of the railway and pedestrian crossings improved traffic flow, pedestrian, motorist and rail passenger safety and reduced noise pollution significantly.

### Case defining aspects

- Completion of project during intensive four week period, reducing impact on traffic and community, and achieving 'game-breaking' target for Key Performance Indicator's (KPIs)
- Key Reporting Areas (KRA) relating to community such as noise, lighting, complaints were all handled successfully within a difficult 24 hour seven day-a-week urban working environment

### Procurement method used

The six week construction method was chosen as it had significantly less long term impact on local residents, train commuters and road users. There was a high organizational complexity in the project and need to alter specifications and adjust rapidly.

An alliance was seen as the only method to utilise cross company expertise to achieve 'success in every aspect' and to achieve six weeks of major construction by have successful communication and skill sharing. VicRoads needed to utilise the expertise of Connex, the Department of Public transport and a constructor to ensure the success of the project.

## Key objectives

The success of the project was measured on the achievement of predetermined goals:

- Programme
- Community and stakeholder relations
- Environment and aesthetics
- Safety
- Functionality
- Cost
- Legacy

The key areas were programme and community and stakeholder relations, with relevant pain/gain share placed on these objectives. The measurement goals recognised the need for innovation to complete the project ahead of schedule while maintaining and developing community and environmental outcomes.

The KRA are shown in Table A1 below, with the game-breaking KPI, Minimum Conditions of Service (MCOS) and failure scores outlined. Both KRAs achieved positive scores and the overall KRA score achieved was 87.3%.

**Table A1 Middleborough Road road / rail separation project key result areas**

Key Reporting Area (KPA)	Key Performance Indicator (KPI)	Game Breaking Benchmark	Minimum Conditions of Service (MCOS)	Failure
1. Programme	a) 2 Track Operation / Signalling Commissioned and Booked In	First Train 30 January (+100) Linear to 3 February (+50) Linear to MCOS	First Train 5 February (0)	First Train 5 to 12 February (0) 12 February (-25) Linear to 19 February (-100)
	b) Laburnum Station Operational	30 January (+100) Linear to 3 February (+50) Linear to MCOS	5 February (0)	5 to 12 February (0) 12 February (-25) Linear to 19 February (-100)
	c) Laburnum Street Option	14 January (+100) Linear to MCOS	5 February (0)	5 to 12 February (0) 12 February (-25) 19 February (-100)
	d) Middleborough Road Open	22 January (+100) Linear to MCOS	5 February (0)	5 to 12 February (0) 12 February (-25) 19 February (-100)
	e) Project Complete	31 March (+100) Linear to MCOS	31 May (0) Linear to Failure	31 July (-100)





<b>Key Reporting Area (KPA)</b>	<b>Key Performance Indicator (KPI)</b>	<b>Game Breaking Benchmark</b>	<b>Minimum Conditions of Service (MCOS)</b>	<b>Failure</b>
2. Community and Stakeholder Relations	a) Oval Complete / Re-instated	31 August (+100)	30 September (0)	31 October (-100)
	b) Bus Company KPIs – Peak and Off-peak	100% (+100)	N/A	N/A
	c) Customer Service KPI	More compliments than valid complaints	Complaints but no compliments	Complaints but no compliments
	d) Residents (Compliance with Community Charter)	More compliments than valid complaints	Complaints but no compliments	Complaints but no compliments

Source: Cook, S. 2008

## Achievements and benefits

### Construction

The Middleborough Road Rail Separation Project was constructed in three phases, as detailed in Table A2 below.

**Table A2 Middleborough Road rail separation project phasing and construction activities**

Project Phases	Key Construction Activities
Phase 1 – September to December 2006	Preparatory works, including five weekends of 24 hour construction with road and rail closures.
Phase 2 – January 2007	Major construction for four weeks, 24 hours a day.
Phase 3 – Late January 2007 to mid 2007	Finishing works including architectural works, landscaping and reinstatement of occupied areas.

Source: Cook, S. 2008

A project of this magnitude is rarely completed in such a short time frame. The reduced construction period was chosen in an effort to minimise the disruption to local residents, rail commuters and road users.

The alternative construction method would have involved 18 months of continuous night time and weekend works. With the rail line remaining open, workers would have had to work very close to operating trains.


The six week construction method was chosen as it had less long term impact on local residents, train commuters and road users. It could only have been achieved in this time through the improved communication and skill-sharing achieved by an alliance.

The unique nature of the project and the innovation required to complete major works in just 27 days has been recognised within the construction industry. The project received the following awards in 2007:

- Victorian Engineering Excellence
- National and Victorian Civil Constructors Federation Earth Award
- Alliancing Association of Australasia
- Australasian Railway Association
- Alliance Contracting Excellence

The strategic review by the alliance facilitator and coach (Alchimie Pty Ltd) found the following key points as to what was done well in the leadership, management of risks and framework of the alliance:

- Had critical people on the Alliance Leadership Team (ALT)
- A good culture developed and aligned
- Increase knowledge in industry from Alliancing
- Improve participants on the fringe
- Alliance Management Team fully integrated in the Wider Project Team
- The creation of a no blame delivery environment
- Skills other than engineering in ALT
- Able to reach into organization to solve problems
- Open discussion
- Correct delivery strategy (6 weeks, not 18 months)
- Most of key risks were identified early (community and program handled well)
- KRAs aligned with key risk areas and project outcomes
- Everyone on the team understood KRAs
- Negotiation was quick, transparent, clear
- Tried for innovation in TOC process



The review contained items listed below in which the alliance could have performed better for leadership, management of risks and framework:

- Designers in ALT
- More focus on forming relationships with stakeholders
- More focus on cost admin.
- Involve contractor earlier in the process
- Cost monitoring process to match short timeframe
- Cost and quality systems and processes to be given same priority as the program
- More emphasis on building win-win stakeholder relationships, in particular council
- Improve the definition of value for money
- Don't include TOC or estimate in selection process
- A lot more design needs to be complete by the Alliance prior to setting TOC
- More time to develop TOC or (if not possible) a separate team to develop TOC

Surveys conducted after the project also indicated that human resources management had mixed reactions, with a perception of lower human resources focus on project objectives and a perceived lack of commitment to responsibility to the community for areas such as waste management and environmental protection. However, communication within the Alliance was generally regarded positively.

### **Lessons learnt**

#### *Noise*

With the potential for 24 hours a day 7 days a week work for up to six weeks, significant effort went into the reduction of night time construction noise. Although possible in some instances, the demanding construction program made it difficult to schedule quieter activities at night.

A project specific noise management policy was developed to minimise noise emanating from construction activities and focused on reducing noise that could be controlled, including generators, truck movements and lighting.

An industry leading step employed by the Alliance was the installation of broadband reversing alarms on all plant working at night. Standard reversing alarms are typically a source of annoyance for nearby residents. Broadband alarms emit a directional, lower, less intrusive sound and were important in minimising the impact of night works on nearby residents.

The lighting systems installed adjacent to residential properties were typically connected to a single silenced generator rather than individual diesel generators. Lights were also directed to prevent light spillage onto neighbouring properties.

#### *Dust suppression*

The proximity of housing, schools and businesses also made it imperative that the project managed and reduced dust emissions, especially during bulk excavations. Numerous measures were adopted to suppress dust and minimise impacts on the environment including:

- Placement of ballast on site entry and exit points
- Installation of a cattle grid at the truck exit to the main stockpile to shake excess dirt from wheels and reduce dust being taken onto roads
- The material stockpile area was covered in a layer of crushed rock at the outset to reduce dust generation
- Incoming ballast was moistened prior to delivery and water was used to suppress dust during loading and unloading
- The majority of trucks involved in the haulage of bulk excavated material and carting of new material and ballast were fitted with load covers



### *Resource recycling and reuse*

With the demolition of existing infrastructure and excavation of a significant amount of spoil, surplus material needed to be taken off site.

Excavated material was trucked to a nearby construction site to be used as fill for a new development. Steel and copper was salvaged from the gantries and overhead wires and recycled as scrap. Concrete used for the driveway at the temporary Box Hill bus interchange and from existing footings was also recycled.

The old railway sleepers were collected, de-spiked and sold for reuse, with the rail carefully removed to ensure it could be reused.

More than one million litres of recycled water was used to help establish turf during the reinstatement of Whitehorse Reserve following the removal of stockpiled material.

### *Programme solutions*

In order to achieve the ambitious timeframe and reduce major construction to five weeks, the following innovations were used for construction:

- Five weekend rail closures leading up to major construction period
- Advance completion of retaining wall piles
- Bridge construction using modular components, allowing them to be constructed in stages during weekend rail closures
- Installing a computer based interlocking signalling system to eliminate lengthy change-over and testing periods
- Stockpiling excavated material to allow excavation to continue 24 hours a day
- Using large mining plant for bulk excavation
- Use of long welded lengths of rail to reduce track construction time
- Maximising the use of soil nails in the retaining walls to replace bored piles

## Case Study 3 – Barkly Highway Upgrade Project, Queensland

### Project summary

Project name:	Barkly Highway Upgrade Project
Client:	Queensland Department of Main Roads (DMR)
Project delivery period:	2006
Project delivery team:	Queensland Department of Main Roads (Client) Seymour Whyte Construction (Main Contractor) Myuma Pty Ltd
Key project elements:	Providing 35.4 km of dual lane sealed highway for the final stage of the Barkly Highway upgrade between Mt Isa and Darwin

The Barkly Highway is the main traffic route between Queensland and the Northern Territory. The stretch of road between Mount Isa and Camooweal, in the State's far north-west, was constructed during World War 2 and comprised a single lane, poor quality roadway. In 2003, the Federal Government announced an upgrade to this road would be undertaken at a cost of \$125 million and completion scheduled for 2009.

Two alliances were initially established. The first of these was established with Leighton Contractors (the Nowranie Creek Alliance) and the second with Seymour Whyte (the Johnson Creek Alliance). These alliances were assembled following a competitive process for contractor selection. Following their proven performance on the Johnson Creek Alliance, Seymour Whyte was subsequently awarded two further contracts, the Buckley River Alliance and the Split Rock Inca alliance, on a single source basis.

The examination of all the Barkly alliances demonstrates how the Split Rock Inca Alliance (SRIA) achieved value for money. The progression of target KPIs and the achieved results gives an indication of the success of the alliance over time.

As part of its commitment to the delivery of projects to the community, Main Roads Department used Alliancing and Early Contractor Involvement (ECI) as the project delivery mechanism. The aim was to develop longer term relationships, assist in the evolution of the design and better apportion projects risks to the party that can manage them.

The SRIA project involved moving 219,000 m<sup>3</sup> of earthworks, laying 230,000 tonnes of paving, installing 602 culverts and 4000 m<sup>2</sup> of bridge deck. The project Target Out-turn Cost (TOC) was agreed as \$37.2 million.

### Case defining aspects

- Use of alliance model to manage risk and achieve non-cost Key Results Area's (KRAs)
- Use of sole source contractor

### Key objectives

Some of the key objectives of the alliance included:

- Attracting, retaining and developing human resources including suppliers and subcontractors
- Manage planning and implementation to minimise impacts of the 'wet' season
- Accumulating and applying the knowledge gained from earlier work to subsequent stages of the SRIA
- Engaging the whole project team in meeting objectives and establishing appropriate reward for doing so
- Integrating Main Roads Department personnel into the project team
- Adopting a 'fit for purpose' philosophy
- Trialling new approaches with a rigorous 'adopt or discard' culture
- Maintaining strict design control and robust technical and commercial reporting mechanisms

## Achievements and benefits

### Achievements

- The road upgrade programme was completed two years ahead of schedule
- The project produced work of recognisably exceptional quality
- A strong relationship was established with traditional owners
- Commercial and training gains were realised for the local community
- There was minimal impact on road users during construction and an enhanced level of safety for road users is now provided
- Key metrics improved over the course of the three successive alliances. Shown below in Table A3.

**Table A3 Improvement in metrics**

Metric	Johnson Creek Alliance	Buckley River Alliance	Split Rock Inca Alliance
Time required to negotiate the alliance agreement	6 months	4 months	<3 months
Risk allowance included within the Target Out-turn Cost	5%	3%	2%
Earthworks production rate	<1500 m <sup>3</sup> /day	2000-2500 m <sup>3</sup> /day	>2500 m <sup>3</sup> /day
Paving production rate	1500 – 2000 tonnes/day	2000 – 2500 tonnes/day	2500 tonnes/day
Bridge construction speed	50-75 m <sup>2</sup> of deck area /week	100 m <sup>2</sup> of deck area /week	>150 m <sup>2</sup> of deck area /week
Indigenous employment	35% of man hours	45% of man hours	>55% of man hours
Indigenous training	20-25% of man hours	20-25% of man hours	25% of man hours
Actual out-turn cost vs. Target out-turn cost (SRIA)	\$36.4 million versus \$37.2 million (\$0.8 million saving)		

Source: [Seymour Whyte, 2009]

## Major issues and resolutions

There were several significant risks relating to the project which influenced the use of an alliance as a procurement model. The major risks identified included weather, cultural significance and the remote location.


### Weather

The Barkly highway is subject to extremes of weather and is prone to flooding during the wet season. The wet season is both significant and unpredictable as evidenced by 204 mm of rain in what was meant to be the end of the wet season, causing six days delay. The wet season made it essential to complete the work in a single annual cycle, before the commencement of the next wet season due to remobilisation costs.

### Cultural significance

The INC alliance work on the Barkly Highway crossed through two native title claim areas, in an area rich in Aboriginal cultural heritage sites. The project not only had to operate within state and federal legislation, but also consider the need of the local community and indigenous culture.

The significance of cultural heritage management was demonstrated by the involvement of Myuma Pty Ltd, which represented the Indjilandji-Dhidhanu indigenous people, as a full alliance partner. Indigenous workforce participation, training and local community interaction was key to successfully managing the cultural heritage of the site.



Local traditional owners groups conducted training of personnel so that potential items of cultural interest would be recognised. The trust, knowledge and relationships established with the indigenous traditional owners groups and their level of involvement in the project allowed potential problems to be overcome.

#### *Remote location*

The SRIA operations were located more than 150 km away from Mt Isa, introducing significant complexities relating to supply of materials, work force and facilities.

The remote location meant fully contained base camps for workers had to be established. During construction, the alliance team consisted of over 120 full time personnel on-site. Water was a key resource, required for both the camp operations and construction. Collaboration with the Indjilandji-Dhidhanu people providing invaluable information in locating sufficient bore water supplies.

The availability, distance, time and procurement of materials, resources and supplies were major issues due to the large distance from Mount Isa, Townsville and Brisbane. This issue was managed by sourcing materials from local suppliers and using relationships which had been established during the previous Barkly highway projects.

The alliance operated in a period of high labour demand, with strong competition from higher wages in the mining industry. Construction labour requirements were fulfilled from various sources. The local Myuma people provided labour and trainees, avoiding recruitment difficulties and air travel costs. It provided an opportunity to improve the skills of the local community, assist in the economic development of local communities, and reduce the stress on employees and families living away from home.

### **Lessons learnt**

#### *Strengths of the project*

The primary reasons of why an alliance was used for the project were management of project risk and flexibility. Using traditional 'hard dollar' contracts, project risks are typically transferred from the owner to the contractor. If that was the case, the high risks of weather, cultural significance and remote location would have precluded a substantial contingency added to the contractors fixed price and a higher possibility of significant variations. In an alliance, risk is allocated to the party best placed to manage it, playing a significant role in reducing the TOC project risk contingency of the SRIA alliance to two percent.


A standard remuneration model was used, typical of most pure alliances, with three limbs of compensation. The pain/gain payments (limb 3) consist of both cost outcomes and non-cost aspects covered by KRAs. The weighting of the non-cost areas gives an indication as to relative importance to the Alliance and are as follows:

- Indigenous training and development (30% weighting)
- Cultural heritage (25% weighting)
- Quality (40% weighting)
- Community relations (5% weighting)

The benchmarks for non-cost performance were initially set from a traditional value for 'business as usual' project at the formation of the first Barkly highway alliance, and increased progressively based on 10% improvement for each project, or the productivity rates of the last project became the target base productivity of the next. The alliance exceeded performance targets on all projects.

#### *Weaknesses of the project*

One aspect to emerge from the SRIA was some potential disadvantages of alliances, even if they weren't realised in this project. One area identified was complacency, suggesting that the alliance team could become too friendly, or that less animosity and reduced commercial pressure may lead to a drop in productivity and quality. The opposite was actually the case for the Barkly highway projects, however, this perceived risk of complacency, inefficiency and stagnation is more credible in long term relationships.



The possibility of a conflict of duty between employer and alliance was also identified as a significant risk despite checks and balances to mitigate this risk. It is felt that little guidance is provided in government guidelines or policy manuals to address this concern. There was no suggestion of conflicts on the Barkly Highway alliances, nor should there be if goals of the alliance and the alliance participants are congruent.

While the first Barkly Highway alliance was awarded based on competitive tendering, the following two alliances were based on sole sourcing of Seymour Whyte based on performance. Sole selection is not typical of DMR contracts and may be considered anti-competitive and contrary to value for money principles. However, value for money can be achieved in this case of iterative TOC developments through benchmarking and aggressive stretch targets. Bundling alliance projects into programs is seen as an alternative to awarding sole source contracts progressively.

### *Innovation*

Local gravels were procured for road construction by Department of Main Roads prior to the award of the alliance contract due to unreliable supply of gravel supply in regional areas. DMR therefore accepted the risk of procuring gravel early which enabled the timeframe to be maintained. Using local gravels was also complicated by peculiar grading curve, which created compaction issues. By using blended materials up to sub-grade and quarried gravels for all pavement layers, supply of local gravel was maintained.

Local indigenous people were engaged on the alliance at significantly higher rates than were initially targeted (20%), and continued to increase from the initial Barkly Highway projects, such that SRIA had 55% indigenous employment. This benefited the management of a culturally significant area and foster regional development goals.

The application of precast concrete structures was brought about by the lack of availability of skilled personnel and the logistical issues with concrete construction on site. The construction of bridges and culverts almost exclusively used precast concrete structures delivered from Townsville.

Non-owner alliance partners established base camps and mobilised the workforce before the contract award. This allowed maximum construction time and was largely due to the relationship developed by alliance continuity and the sole sourcing for the alliance contract.

Global Positioning Systems (GPS) and Automatic Tracking Sensors (ATS) survey technology training was implemented for supervisors and leading hands, allowing many activities to proceed with a reduced reliance on skilled plant operators and scarce surveying resources. Overall productivity of graders on bulk earthworks and pavement construction was also increased to more than double the traditional allowances which had been factored into the first stage of SRIA.

During construction on the existing the alignment, side tracks were used to divert traffic, in lieu of passing traffic through the actual construction site and using traffic controllers and traffic lights. This resulted in safer operation with fewer delays for public traffic.

Many of the innovations were technically based; however, it was the alliance model which allowed the contractors and owners to work in a harmonious group dedicated to continual improvement. It is a key indication of a successful alliance that decisions could be made on technical merit without having to consider individual contractual ramifications.



## Case Study 4 – A30 Bodmin to Indian Queens Road Improvement Project, United Kingdom

### Project summary

Project name:	A30 Bodmin to Indian Queens Improvement Project
Client:	UK Government Highways Agency (HA)
Project delivery period:	July 2005 through to July 2007
Project delivery team:	Highways Agency (Client) Mouchel (Client Representative) Alfred McAlpine (Main Contractor) Scott Wilson (Designer) RPS (Client Environmental Advisor)
Key project elements:	Upgrading 11.5 km (7 miles) from single lane highway to dual lane carriageway. Also 6.5 km of side roads, three over-bridges, four underpasses & two grade separated junctions.
Project costs:	Total cost – £93 million Construction cost – £60 million

A large number of schemes to improve the A30 road between Bodmin and Indian Queens have been examined since the 1970s. Large seasonal variations in tourist traffic resulted in severe congestion, affecting communities and businesses, and the route of the old A30 bisected a nationally important piece of Moorland designated a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI).

There were numerous issues with the road including:

- Congestion – traffic volumes forecast to increase to 37,000 vehicles per day by 2022
- Summer months particular problem
- Accidents – low visibility at busy side roads
- Vehicle impacts at railway bridge – long diversions along county roads


### Case defining aspects

- One of the first cases of using Early Contractor Involvement (ECI) as a procurement method
- Gained recognition in achievement of non-cost areas relating to environmental and cultural management and community relations

### Procurement method used

The A30 Bodmin to Indian Queens is a landmark project in the use of ECI as a procurement method. ECI was developed in the UK by the Highways Agency (HA) as part of its drive to deliver better value and improved performance. ECI is similar to Design and Construct (D&C), utilising the contractors knowledge of construction processes to benefit the design process, however, ECI involves the contractor far earlier. Using D&C, the contractor is presented with a plan and design that is generally at least 80% fixed. By the time the contractor comes on board, the scope for its input is limited.

The earlier involvement of the contractor and the supply chain allows more scope for innovation, improved risk management, better forward planning of resource requirements, better ability to recruit and retain staff, improved consideration of buildability and health and safety, shorter construction periods and reduced impacts during construction. Alternately, the inherent duplication of effort by the client's design consultant and the



contractor's design consultant can lead to duplication of costs in the early design phase. Effective interaction between consultants, in transferring information and agreeing on design is essential to minimise wasted time and money.

The HA first adopted ECI in 2001 and it is now its preferred procurement route. It selects contractors not by lowest price bid, since there is not yet a design to bid for, but by an assessment of the company's track record via its Capability Assessment Toolkit. The two sides then work together on an open-book basis to develop a target price. The contractor is incentivised to design and construct the scheme within this target price, based on a pain / gain share formula.

Difficulties with implementing ECI by the HA have occurred due to budget overruns and large increases in estimated costs. A study was commissioned by the secretary of state for transport in July 2006 to review the HA's Major Roads Programme, undertaken by the Nichols Group. It found that ECI was not inherently increasing cost, but rather commercial skills and estimation by the HA was largely at fault. The report indicates a change in culture and management processes required for ECI as compared to traditional D&C. The HA was reportedly slow to adopt change, with a perceived lack of training and commitment. Therefore, improved skills and training were recommended and it was recognised that the success of projects based on open-book target prices relied on accurate estimation.

The subjectivity of the selection process has potential to prompt questions of competition and value for money. The HA asserted that its procedure was endorsed by the National Audit Office and the Office of Government Commerce and that monitoring continual improvement and innovation are key aspects to achieving value for money.

## **Achievements and benefits**

### *Benefits of Early Contractor Involvement*

The A30 Bodmin to Indian Queens scheme was one of the first to be procured on an ECI basis. Although ECI is now the norm, in 2002 it was considered a dramatic step, showing the Highways Agency's commitment to improving value through effective partnering and proactive procurement.

The ECI process allowed the project team to develop and grow in a trusting and mutually respectful environment. Continuity of delivery team staff resulted in a dispute-free scheme, where all members had genuinely worked together with a common goal and common objectives.

Specialist supply chain partners were also brought to the team early. Proactive partnering with the supply chain resulted in no disputes and early settlement of final accounts. The local china clay quarrying industry, which produces granite-based sand and gravel as a waste product was sourced for 98% of the imported stone, using this waste as secondary aggregate. Bardon Contracting, Bardon Aggregates and Needham & Cullen (all part of the Aggregate Industries Group) used their joint expertise to maximise the use of china clay waste.

## **Major issues**

### *Environmental constraints*

The project had the following environmental constraints:

- SSSI
- SAC
- County wildlife sites
- Protected species
- Buried archaeology



### *Heritage*

Site clearance was completed under expert supervision, as was the archaeological investigation, where, on land near the hamlet of Belowda and at Deep Tye Farm, evidence of human occupation of Romano-British and Bronze Age origin was found.

### *Environmental mitigation*

Goss Moor is a SAC and in some areas the moor has SSSI status. The site was previously bisected by the A30 trunk road. The improvement reroutes the road to the north of the SAC to an area of low-grade agricultural land.

Working in Partnership with Natural England, the area of the old trunk road route was enhanced to provide a natural amenity space for the public and allow the moor to regenerate.

### *Sustainability*

Over 98% of the imported stone used for the entire works was sourced from the china clay industry, thereby utilising a waste product available in abundance in the vicinity of the site. With the china clay industry in decline, the use of this waste material provided an economic benefit to the local community in difficult times.

A mobile coating plant for the surfacing was established at the source of the secondary aggregate, further minimising transport impacts through local villages.

Existing roads that were no longer required have been planed and the chippings reused for access tracks.

All vegetation and roots cleared were chipped and reused as mulch. The scheme was carefully designed to have an exact balance of cut-and-fill, negating the need to import or export material.

### *Cost*

As with many ECI projects, the project over-ran costs by approximately 9%, the target cost of the project was \$85 million, while the actual cost ended up at \$93 million. This highlights the difficulty of establishing accurate Target Overall Cost's (TOC's) for complex projects before all requirements are known.



**Appendix B**  
Procurement delivery support tools





The following product descriptions are provided for each of the tools described in Section 7 of this document. Product descriptions are used to provide a common basis for the development and production of the tools. The drafts contained in this appendix may be refined and amended as the product it to which it relates becomes better understood.

Documented and agreed product descriptions will ensure that all personnel involved in its production have the same understanding. The product description provides a pointer to the way in which the product is to be developed and to define the expectations arising from it. The use of product descriptions to describe the tools is in itself an example of best practice. This technique is used widely in projects managed under the PRINCE2 methodology.



Tool title	Tool T1 – Forward planning
Purpose and use	This tool identifies civil infrastructure works and services over a rolling period. It considers how to best achieve continuity of output having regard to funding arrangements, creating long term relationships, adopting strategies appropriate to market capacity and capability.
Composition	<p>The forward plan identifies the engineering and construction work needed by Victorian State Government Agencies and Local Government Authorities over a rolling period of 5 years. It examines how continuity might be best achieved by facilitating long term relational contracting arrangements, the use of joint contracts between Agencies, how savings on tendering costs can be achieved for all players and how continuous improvement in delivery can be established.</p> <p>The forward plan takes cognizance of base budgets, best value performance plans, procurement strategies appropriate to small and medium sized contractors and industry focused labour availability and investment plans.</p> <p>Requirements for future funding and the sources of that funding are identified.</p>
Derivation	<p>The forward plan is produced from the plans maintained by each State Government Agency and each local Government Authority.</p> <p>Joint planning teams can be established bringing together all those who may need engineering and related construction work to be carried out in the current period. These may include regional managers, relevant finance and contracts people, in-house technical services and industry representatives. Their role will be to critically appraise Asset Management Plans challenging the need for and timing of work.</p> <p>Like categories of work should be grouped together into (there may be some overlap):</p> <ul style="list-style-type: none"> <li>• Capital and revenue</li> <li>• Civil engineering work</li> <li>• Specialist works</li> <li>• Building work</li> <li>• Maintenance work</li> <li>• Reinvestment work</li> <li>• New work</li> <li>• Major projects</li> <li>• Work suitable for small and medium sized contractors</li> </ul> <p>The forward plan can be used to demonstrate to DTF a holistic approach to ensuring a value for money approach is being adopted.</p>
Format and presentation:	Published plan updated quarterly being a summary of the plans of each State Government Agency and each Local Government Authority.
Leadership:	State and Local Government Agencies



Tool title:	Tool T2 – Pre-qualification criteria
Purpose and use	<p>The pre-qualification process should be designed to guide contractors and suppliers through the steps to be taken to obtain and maintain a performance rating used in the selection of contractors for future work allocations. It must contain detailed explanations of what information the Agency will need, why it is collected and how it will be assessed. This tool needs to build on work currently being facilitated by Austroads.</p>
Composition	<p>The pre-qualification system collects data about contractors and their performance typically based on:</p> <ul style="list-style-type: none"> <li>• General company information</li> <li>• Health and safety</li> <li>• Technical ability</li> <li>• Financial stability</li> <li>• Management attributes</li> <li>• Project performance</li> <li>• Ability to add value</li> </ul> <p>A key component is the rating of contractors to undertake work for different types of project having regard to project complexity, risks, timing, value and other factors present in the project. Small and medium sized contractors should not be disadvantaged when compared to larger organisations if they are capable of undertaking the work. The pre-qualification system must be flexible and contractors should be able to improve their rating based on good performance and growth in their management capability. Conversely underperforming contractors should have their ratings reduced until they demonstrate an ability to work at the higher level. In this regard, other tools will be of assistance to help those contractors to implement any changes required, especially where these relate to cultural change issues.</p>
Derivation	<p>The pre-qualification system is produced from responses by individual contractors to a set of performance criteria which is then updated and refined based on subsequent contractor performance. This latter information being produced through project reviews (see Tool T9).</p> <p>There should be a number of indicators that reflect the attributes being sought of contractors. Guidance must be provided as to how the scoring system will operate in order to allow each contractor as much opportunity as possible of demonstrating how it meets the criteria.</p> <p>Evaluation may involve examination of past project activity random visits to premises and interviews with the contractors personnel.</p> <p>The over-riding principle of the pre-qualification system is to provide an assessment of capability. Equally capable contractors (whether small and medium sized or large) should be provided with equal opportunity to acquire work which they are qualified to carry out.</p>
Format and presentation	<p>The Pre-Qualification System should be published as framework and set of working documents that enable accurate data to be collected and consistent measures of contractor capability and performance to be monitored.</p>
Leadership:	<p>State and Local Government Agencies/Industry Associations</p>



Tool title	Tool T3 – Guide to the selection of delivery systems and use of standardised contracts
Purpose and use	<p>A guide to the selection of the most appropriate procurement method taking into account the circumstances of the project to hand and the industry's ability to service the need will assist clients in engaging the civil infrastructure industry.</p> <p>A longer term objective would be a collaborative approach to update standard contract forms (or mutually agree considered amendments to existing standard forms) the administration of contracts will be greatly simplified both at the time of bid preparation and during the course of the works.</p>
Composition	<p>An appropriate form of contract suited to the circumstances of the project serves the needs of that project. It fosters good working relationships and reduces the cost of supervision. Improved risk allocation and predictability of out-turn costs and timely delivery aids in reducing disputation.</p> <p>A key challenge will be to reduce the number of different forms of contract currently in use by State and Local Government Agencies and to reduce the number of special conditions provided.</p>
Derivation	<p>There are a number of standard forms of contract that might form the basis of considering an approach to developing industry wide standardised contracts. These include:</p> <ul style="list-style-type: none"> <li>• Australian Standards Forms of contracts, eg AS 4000 (General Conditions of Contract which superseded AS 2124), AS 4300 (design and construct) and AS 4122 (appointment of consultants). The use, strengths and weaknesses of these forms is probably well understood.</li> <li>• The NEC Engineering and Construction Contract published by the Institution of Engineers UK and which is finding increasing popularity amongst an international audience. NEC provide a suite of interlocking contract conditions suited to varying procurement models including lump sum, target cost and partnering. Contracts are written in plain English.</li> <li>• PPC 2000 published by the Association of Consulting Architects UK and Trowers and Hamlin, Solicitors. This contract is a multi-party two stage contract and is especially suited to Early Contractor Involvement projects. It too is penetrating the international market particularly on large scale building and engineering projects in the Middle East.</li> </ul>
Format and Presentation	<p>The guide to selection of the most appropriate procurement method should be presented as a methodology by which means clients who initiate procurements do so in a logical and systematic manner that produces consistent decision making. This may be in the form of a logic based tool that directs Clients to the most appropriate form based on selected project criteria.</p> <p>Standardised contracts and/or amendments to published forms should be freely available for industry use and be supported by guides to their use and application.</p>
Leadership	State and Local Government Agencies/Industry Associations





Tool title	Tool T4 – Risk registers
Purpose and use	<p>The allocation of risk to the party best able to manage it and the treatment of risk is a fundamental that should be applied to projects of any size, complexity or value. Encouragement must be given to the use of the risk register to provide early warning of issues. Regular review of the risk register at project and site meetings will minimise the opportunity for unplanned events to adversely affect project outcomes. This tool is to also explore the legal implications of including risk registers in any contract engagement process.</p>
Composition	<p>Risk is the chance of something happening that will have an impact on project objectives. Proper risk management enables everyone to work to identify risks and design them out. Risk management is the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating, treating and monitoring risks.</p>
Derivation	<p>Australian Standard AS/NZS 4360:2004 provides a generic guide for the management of risk. Use of this standard as a basis for industry wide management of risk provides consistency of approach. Its simple seven point approach means that a wide take up by clients and contractors can be expected. These steps include:</p> <ul style="list-style-type: none"> <li>• Establishing the context, that is determining the environment in which the project will operate</li> <li>• Identification and documentation of risks that may impact upon the project during its life cycle. These include risks that are present within the project environment and those that are outside of the project boundary but which may have impact upon the project.</li> <li>• Analysis of risks to quantify the potential impact of each risk on the project</li> <li>• Evaluating and prioritising risks.</li> <li>• Developing strategies for managing risks including designing out risks, reducing the likelihood of occurrence, reducing the consequences of risks that do eventuate, transfer of risks to other parties or providing contingency plans (and budgets) for risks that must be managed.</li> <li>• Implementing, monitoring and reviewing risks by means of a risk management plan</li> <li>• Consulting and communicating with stakeholders on risk management actions.</li> </ul>
Format and presentation	<p>Risk management principles should be published as a set of guidance notes including worked examples and templates for keeping risk registers. A training module should be provided for the assistance of those clients and contractors who may be unfamiliar with formalised risk management processes in construction and engineering environments.</p>
Leadership	<p>Clients and Contractors</p>



Tool title	Tool T5 – Value for money checks
Purpose and use	<p>This tool provides increased confidence in the production of value for money outcomes from civil infrastructure procurement. It provides for the independent assessment of contract sums and total overall costs for selected large value Design and Construct contracts and all alliances. The independent nature of this tool ensures that verification of costs is carried out not by Agency personnel or consultants engaged by an Agency but rather by an organisation acceptable to the DTF.</p> <p>An outcome may be the development of VFM index (like the BCR).</p>
Composition	<p>In the expenditure of public money, it is important to provide confidence that every dollar spent is done so in the pursuit of a benefit for the Victorian taxpaying community. Value for money is a foundation principle that underpins Victorian Government procurement. It is therefore necessary that not only is value for money achieved in the procurement of major civil infrastructure but that it is seen to be achieved. This is particularly the case where an Alliance method of procurement is adopted but it may also have application to very large value design and construct contracts.</p> <p>Value for money checks provide objective appraisals and analyses of proposed contracts in terms of costs, quality, social and environmental objectives, what bidders bring and the options available. They check for compatibility with Government objectives and provide for an effective audit trail. Subjectivity is reduced.</p>
Derivation	<p>The value for money check is conducted in tandem with the development of the proposed bid using the same source materials as the project team and the intended contractor.</p> <p>The budget, program and risk register are key documents used to control any infrastructure project. Particular attention will therefore be paid to these. However, it is not for the person undertaking a value for money check to warrant these documents rather they need to use professional expertise and sector knowledge to provide the Department of Treasury and Finance and the client with an informed overview of these documents and highlight any areas of concern and significant omissions that may present additional risks.</p> <p>There may also be a case for the value for money check to advise on any areas of concern during the development of the project and throughout construction. Data streams and methodologies for assessing life cycle costs may also form part of this review.</p>
Format and presentation	<p>Independent Audit Report for each project referred provided by an organisation acceptable to the DTF.</p>
Leadership	<p>State and Local Government Agencies / DTF</p>



Tool title	Tool T6 – Use of local contractors and labour
Purpose and use	<p>The Victorian civil infrastructure market is large and should be accessible to all competitors. However, many of the procedures adopted by State and Local Government Agencies have the effect of disadvantaging small and medium sized contractors over larger competitors. A significant proportion of the wide range of projects required by Victorian civil infrastructure clients are well within the scope of small and medium sized contractors to provide. The many barriers which discourage small and medium sized contractors from competing require that positive action be taken to support them.</p>
Composition	<p>Whilst competition legislation and State procurement policies generally precludes positive discrimination in favour of specific groups, this tool advocates the introduction of policies that encourage the allocation of work to small and medium sized contractors. This is achieved by identifying within the forward programme of work projects that are particularly suitable for small and medium sized contractors to undertake.</p> <p>The use of appropriate and relevant selection criteria can increase the involvement of small and medium sized contractors. This approach is used extensively within European Union public sector procurement to ensure that small and medium sized contractors are afforded equal opportunity to bid for work without restricting competition. The establishment of policies similar to the Western Australian Government's 'Buy Local' Policy would also assist, provided that obligations such ANZGPA and AUSFTA continue to be met.</p>
Derivation	<p>Changes to existing procurement policies and the development of a new approach to the use of local labour and contractors comes from:</p> <ul style="list-style-type: none"> <li>• Recognition of the role that procurement plays in delivering civil infrastructure clients objectives and its contribution to the community strategy, workforce issues, diversity, equality and sustainability</li> <li>• Detailing how clients will encourage a diverse and competitive supply market, including small and medium sized contractors and ethnic minority businesses</li> <li>• A commitment that where it is decided that the best value is to be had from aggregating supply or letting long term contracts, bidders will be invited to demonstrate their track record in achieving value for money through effective use of their supply chain including details of how small and medium sized contractors are included in those arrangements</li> <li>• A commitment to consider the role of small and medium sized contractors in delivering elements of larger contracts, such as Alliances, including specifically Client requirements of contractors to ensure sufficient and fair use of sub-contractor capabilities.</li> </ul>
Format and presentation	<p>Amendment to procurement policies and publication of a concordat that encourages the involvement of small and medium sized contractors.</p>
Leadership	<p>State and Local Government Agencies</p>



Tool title	Tool T7 – Jointly established training programmes
Purpose and use	By working together to jointly establish training programmes for client bodies and industry participants, it will be possible to establish programmes that meet the needs of all parties irrespective of the procurement method ultimately selected or the form of contract employed. This is especially so in cultural change areas where a greater understanding between client and contractor is sought, for example in encouraging small and medium sized contractors to participate in relational contracting. The training programme will fit comfortably with the preparation and adoption of a client/contractor code of behaviour. This will reinforce best practice in procurement and engagement and support other tools by providing guidance on their implementation.
Composition	The establishment of jointly developed training programmes helps to create a better understanding of each party's skills, difficulties, roles and responsibilities. This approach helps to develop more capable staff and leads to improved flexibility of personnel. This in turn helps to reduce the potential for conflict whilst increasing commitment to project and organisational objectives. For example, this approach might be used to demonstrate that delivering design quality is seen as everyone's responsibility and merely that of the designer. Investment in training improves the civil infrastructure industry's knowledge base, helps to attract and retain good quality staff and is an essential part of any long term relationship building programme.
Derivation	<p>Jointly established training programmes may come from:</p> <ul style="list-style-type: none"> <li>• Secondments within partner organisations</li> <li>• Monitoring progress and setting targets including incentives for performance</li> <li>• Enabling and encouraging seconded staff to widen their horizons on different types of schemes and without increasing risk unduly to take on different roles and responsibilities</li> <li>• Building a training budget into every contract</li> <li>• Provide work experience and build the cost into the project</li> <li>• Develop links with universities, colleges, schools and trade and professional associations so they can produce the type of people that the civil infrastructure industry and its clients need</li> </ul>
Format and presentation	Published programmes of training and development accessible to all sides of the civil infrastructure industry including client bodies.
Leadership	State and Local Government Agencies/ Industry Associations/ Educators



Tool title	Tool T8 – Staged issue resolution process
Purpose and use	<p>An essential ingredient in ensuring that contracts operate effectively is the ability of project participants to identify and openly discuss issues of concern in a non-confrontational environment. This can be achieved in many ways including the use of tools such as risk registers to provide early warning of pending events. It is also important that participants are equipped with the communication and interpersonal skills to operate effectively in these environments. This requires a paradigm shift in the way in which clients and the civil infrastructure industry conduct their business. The introduction of a robust dispute avoidance mechanism for the early identification of issues, coupled with restricted time frames for raising them, and the addressing of issues without fear of retribution or retaliation will work to preserve relationships within the project environment and across future programmes of work.</p>
Composition	<p>The time, effort and energy spent on resolving claims and disputes represents an opportunity cost to the civil infrastructure industry. If these costs can be avoided by appropriate attitudes and practices the same resource pool is capable of producing more public and private infrastructure for the benefit of the community as a whole.</p> <p>Traditional methods of dispute resolution are adversarial in nature and do not start until the parties have developed contrary positions and a difference or dispute has crystallised.</p> <p>Today's best practice requires proactive issue resolution processes to be employed that attempt to resolve issues as they arise and before a dispute forms. That is proactive issue resolution seeks to resolve claims as well as disputes.</p>
Derivation	<p>Proactive issue resolution seeks to resolve issues in a practical, cooperative and mutually acceptable manner as they arise. This requires parties to possess the ability to operate in this way and to have the commitment to do so. The ability and commitment of the project team to resolve issues that arise on their project will enhance their effectiveness in delivering successful project outcomes.</p> <p>Processes that have been developed to assist project team members to work together to gain the benefit of proactive issues resolution include:</p> <ul style="list-style-type: none"> <li>• Proactive issue resolution managed directly by project participants</li> <li>• Project mediation</li> <li>• Dispute resolution boards and variants thereof (such as the 'three wise men' approach which is designed to reduce the high costs traditionally associated with the operation of fully established dispute resolution boards)</li> </ul> <p>This tool should build on the work already undertaken by the CRC for Construction Innovation in its publication 'Draft Guide to Best Practice for Dispute Avoidance and Proactive Issue Resolution'.</p>
Format and presentation	<p>Documented staged issue resolution processes for inclusion within contracts supported by training programmes to assist project participants resolve issues in non-adversarial ways.</p>
Leadership	<p>Client personnel, contractors personnel, consultants and others involved in project design, administration and delivery.</p>



Tool title	Tool T9 – Project reviews
Purpose and use	By undertaking a review of every project it is possible to establish a concise set of benchmarks for performance. This will aid the determination of whether value for money has been achieved and will identify those performance measures where improvement is required. Reviews should be undertaken independently involving all relevant project participants and stakeholders. Reviews should be scalable in their scope to match the size, complexity, cost and duration of the individual project whilst retaining the efficacy of the key performance indicators that are measured.
Composition	Project reviews are used to exploit the results of project activity by distilling the key lessons into relevant themes. The results can be used to: <ul data-bbox="448 656 1347 871" style="list-style-type: none"><li>• Inform the pre-qualification system as regards contractor performance</li><li>• Provide benchmarks on project performance</li><li>• Disseminate knowledge on best practice to industry participants including clients and industry participants</li><li>• Improve the performance of small and medium sized contractors by applying the lessons learned from larger scale operations to their businesses</li></ul>
Derivation	The project review is based on the establishment of key performance indicators prior to the commencement of the project and evaluating performance against these at completion (and at other times during the project of this is appropriate). Any number of key performance indicators can be developed but it should be borne in mind that there is a cost and time implication in gathering the data, especially if it cannot be drawn readily from ordinary project activity. Likely key performance indicators might include: <ul data-bbox="448 1072 1174 1413" style="list-style-type: none"><li>• Client satisfaction (eg product, service, value for money)</li><li>• Construction performance (eg cost, time, defects)</li><li>• Contractor satisfaction (eg timely payment, information flow, etc)</li><li>• Predictability (eg of cost, of completion time)</li><li>• Productivity</li><li>• Profitability</li><li>• Safety</li><li>• Variances (eg against budget, against frozen design, etc)</li></ul>
Format and presentation	A standard format for capturing and publishing data should be developed. This may be in the form of technical papers, the production of benchmarks and/or by publishing details of 'demonstration projects'.
Leadership	The Collaboration forum



Tool title	Tool T10 – Collaboration forum
Purpose and use	<p>This tool provides an agency, preferably within an existing government framework, to collect, collate and publish information on civil infrastructure best practice. It will provide support and guidance to Victorian Government agencies and the local contractor and supplier network. It will be a repository of infrastructure procurement information. It may undertake key research activities, for example, into the level of client time and resource required to successfully deliver infrastructure projects.</p>
Composition	<p>There is a need for a single organisation charged with driving the change agenda in civil infrastructure. This should be a cross client/supply chain organisation operating for the good of the civil infrastructure industry and its stakeholders.</p> <p>The Collaboration forum should aim to deliver improved industry performance resulting in a demonstrably better civil infrastructure industry. It should represent a unique bridge between clients, industry and the research community. It will assist the civil infrastructure industry to improve the service it provides to its clients whilst also ensuring future viability for the wide range of organisations that operate in the industry.</p>
Derivation	<p>The Collaboration forum is a vehicle striving for innovation. Innovation is the effective generation and implementation of a new idea that supports the objectives of the civil infrastructure industry. Innovation:</p> <ul style="list-style-type: none"> <li>• Can include ideas – both administrative and technical</li> <li>• Can be completely new or just new to some</li> <li>• Requires both generation and implementation to be effective</li> <li>• Must lead to improvement somewhere in the organisation and/or client or supply chain</li> <li>• Must be cost and/or quality effective</li> </ul> <p>The Collaboration forum must help to create a climate and a culture within the civil infrastructure industry which supports successful innovation. It must link to client and industry strategic objectives. Services should include:</p> <ul style="list-style-type: none"> <li>• Innovation and research</li> <li>• Measurement and diagnostics</li> <li>• Showcasing and exemplars</li> <li>• Tailored services for business improvement</li> <li>• Leadership and influence</li> </ul> <p>Terms of reference and a management structure will be required together with appropriate support and funding.</p>
Format and presentation	<p>The Collaboration forum could include a web based facility made available over the internet to subscribing members (whether for payment or not).</p>
Leadership	<p>State and Local Government Agencies/Industry Associations/Educators</p>