National PPP Forum – Benchmarking Study, Phase II

Report on the performance of PPP projects in Australia when compared with a representative sample of traditionally procured infrastructure projects

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Executive Summary

The purpose of this research is to benchmark Australian PPP projects against a representative sample of traditionally procured infrastructure projects on time and cost performance indicators.

The research has been commissioned by the National PPP Forum and has been conducted in two phases. Phase 1 involved identification of a range of possible projects from around Australia that could be included in the research. Phase 1 forms the foundation for Phase 2. Some additional projects were added to the Phase 1 listing. Projects included in the data set were determined through a robust sampling process developed as part of the Phase I study; data for specific projects was provided by staff associated with the projects nominated from each jurisdiction and verified as appropriate.

 This Phase II report details the findings of a high level analysis of twenty-five (25) PPP style projects and forty-two (42) Traditional style projects from seven Australian government jurisdictions, namely: the Australian Government; New South Wales; Northern Territory; Queensland; Tasmania; Victoria and Western Australia.

The resulting total sample of sixty seven (67) projects was subdivided into the following categories:

- Social infrastructure projects   32 projects
- Transport projects   23 projects
- Sustainability (water, energy & waste)   8 projects
- Information Technology (IT)   4 projects

This Australian wide study statistically analysed and compared the project data set of Traditional and PPP projects. Time and cost parameters were normalized such that projects of differing contractual value and project duration could be benchmarked against each other.

Key findings

Key findings of the study are:

Conclusion 1:   The sixty seven projects analysed are representative of projects where government procures major Capital assets.

Conclusion 2:   There are sufficient data samples in the study upon which to draw conclusions with confidence.

Conclusion 3:   Over all time periods considered in this study, PPPs delivered projects for a price that is far closer to the expected cost than if the project was procured in the Traditional manner. Based on the inter-quartile percentage for the period from initial project announcement to the actual final cost, PPPs were 31.5% better than traditional projects.

Conclusion 4:	PPP contracts had an average cost escalation of 4.3% post contract execution compared to Traditional projects that had an average cost escalation of 18.0% for the same period.
	PPP projects provide far greater cost certainty than Traditional contracts and there is little variation in cost of a PPP project after the contract is signed.
Conclusion 5:	Australian Traditional projects have better cost performance than UK projects with 43.3% of Traditional Australian projects being completed within 5% of the expected cost compared with 27% of UK Traditional projects being completed within budget, refer NAO [4].
Conclusion 6:	Over the period from initial announcement of a project to when it is finally commissioned PPPs and Traditional projects are delivered with the same confidence in the likely overall time performance.
Conclusion 7:	During the period prior to project execution, PPP projects are frequently delayed (average 14.8%). However, once PPP projects reach financial close there was only, on average, a further 2.6% delay to these projects. This indicates that PPP contracts are well developed prior to release to market and changes after financial close are minimal.
Conclusion 8:	Predictions of the duration to reach commissioning are optimistic for Traditional projects with estimates of duration being on average 18.1% early at budget and 19.4% early at contract execution. An average delay of 25.9% occurs during the construction phase of Traditional contracts when compared to the actual final outcome. These delays may be due to: the initial optimism and/or required changes after contract signing to achieve Government's requirements, and/or due to uncertain contractual terms or risk allocation.

The relative time and cost performance for PPP projects and Traditionally procured projects are indicatively represented in the summary diagrams Figures S1 and S2.

Cost Performance (based on averages)
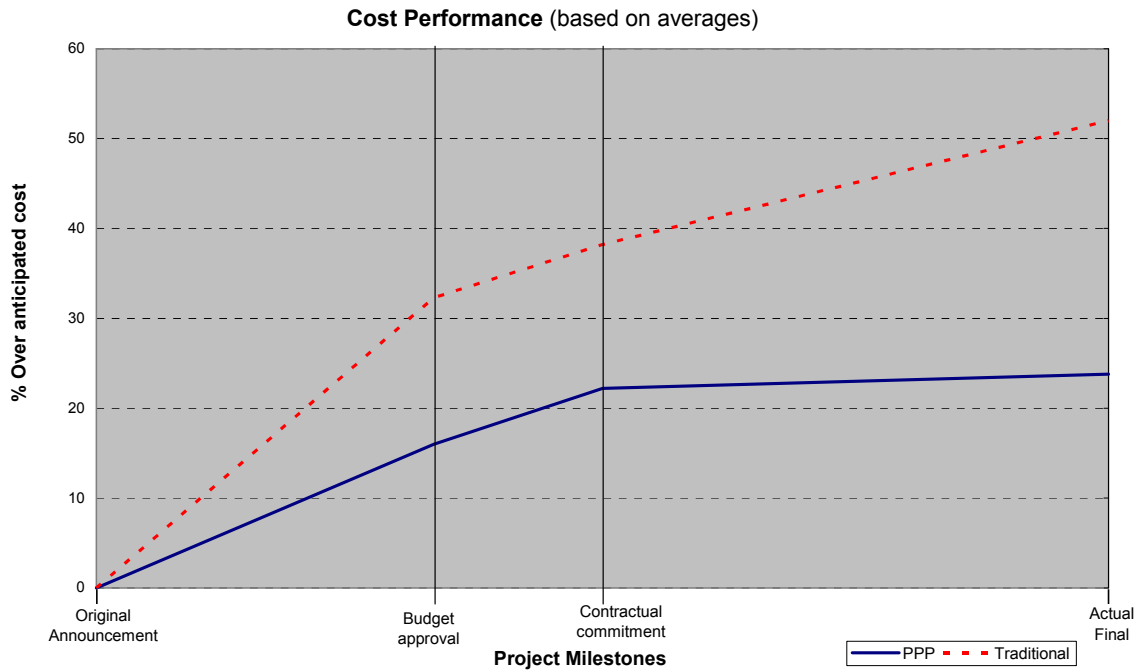

Figure S1: Cost performance over project initiation and delivery (source: Duffield 2008)

Time Performance (based on averages)

Figure S2: Time performance over project initiation and delivery (source: Duffield 2008)

1. Introduction

1.1 Project Background

In October 2005, the National PPP Forum endorsed a National Benchmarking Study. The University of Melbourne was commissioned in January 2008 to oversee the collection of data from projects identified from Phase I of the study and to undertake a high level study to evaluate the time and cost performance of PPP projects and Traditional public sector projects. It was anticipated that most, if not all State, Territory and Australian governments would provide data on all PPP projects and approximately 40 Traditional public sector projects that met the criteria for nominated projects.

The projects were nominated for the Study according to the following selection criteria:

1. All contracted PPPs commenced since 2000;

2. Contracted Traditional projects;

3. Projects approved since January 2000 with a capital cost of $20 million or more; and

4. A balance of social, economic, technological and water PPP and Traditional projects.

The two objectives of the Study were to:

1. provide a statistical basis to improve the quality and accuracy of financial estimates and timeframes in infrastructure project procurement across government; and

2. provide a basis for further research in terms of the development of benchmarks which can be used to assist in measuring optimism bias for projects.

Future research may include the assessment of when and why certain project risks occur in order to develop measures to improve national delivery of PPP and Traditional public sector projects.

1.2 Definition of procurement categories

In this study we define the style of procurement as follows:

'Public-Private Partnerships' (PPPs) are defined as a contracting arrangement in which a private party, normally a consortium structured around a Special Purpose Vehicle (SPV), takes responsibility for financing and long term maintenance or operation of a facility to provide long term service outcomes. This may involve the private entity taking responsibility for the design and construction of a component of new infrastructure; and/or taking over a long-term lease or concession over existing assets; and/or the development of a new long-term contract to operate and manage the infrastructure. Typical forms of procurement include: Design, Build, Finance and Operate/Maintain (DBFO/M), Build-Own-Operate and Transfer (BOOT) or Build-Own-Operate (BOO). A key component of such arrangements is that there is a requirement to pay only for defined assets or services when they are delivered;

'Traditional projects' are defined to be those capital projects that are financed by government through a short term design and construct contract. Ongoing operation of these facilities and responsibility for service delivery remains with government departments and/or agencies. Typical forms of procurement include: Traditional lump sum fixed price contracts, guaranteed maximum price contracts, Design and Build (DB) contracts and Alliances.

1.3 Structure of report

The report is structured as follows:

- Section 2 provides a brief summary of previous studies investigating the relative value for money between PPPs and Traditional procurement;

- Section 3 details the methodology adopted for this study;

- Section 4 presents a summary of the data collected and the results of this benchmark study based on a compilation of all jurisdictions considered;

- Section 5 discusses the results of the study and considers the implications of the findings.

2.　Previous Benchmark studies

Previous comparative studies of contemporary PPP projects and Traditional projects are summarized in Table 1. Each of these previous studies has suffered from a difficulty in obtaining sufficient data to make a complete comparison of PPPs to Traditional projects, this difficulty has in part been due to the lack of whole of life costs associated with Traditional projects and the commercial in confidence nature of actual project data. The result is that whilst this study has had access to commercial in confidence data it lacks information on whole of life costs for Traditional projects and thus comparisons are only possible for capital costs.

The UK Treasury Taskforce report [1] was mainly based on 21 projects as detailed in their business cases, the UK Mott MacDonald report [2] retained data from 50 projects albeit that some of these projects lacked key data, the US report by Haskins et al [3], the UK NAO [4] report and the Victorian Fitzgerald review [5] were all based on small samples that only considered time and cost data for the period between budget and final delivery of the facility. This limitation in these earlier studies led to considerable debate as to what was actually being compared as PPPs have tended to have considerable more effort put into establishment of the budget (as part of a Public Sector Comparator or reference project) whereas many Traditional projects seek a budget which is refined then tested via a competitive bidding process. This difference in approach gave rise to comments that comparative studies based on this budget to actual completion simply removed some optimism from the budget rather than reflecting any true difference between the performance of PPPs and Traditional procurement.

The 2007 Australian Allen et al report [6] attempted to overcome this deficiency in previous studies by comparing costing data over a range of time periods that included: from initial announcement of the project to final, budget to final and from contract execution to final. This study was based solely on publicly available data and thus requires confirmation based on actual verified project data.

This study seeks to address identified gaps in past studies.

The results of these former studies, refer Table 1, are presented as either normailsed time and costs (normalised against budget data[1] for Mott MacDonald and Fitzgerald and normalised against the original announcement data for the Allen study). The UK Treasury report [1], the NAO report [4] and that of Haskins et al [3] provide percentile performance data. All previous studies reviewed indicate PPPs perform considerably better in respect to cost than that of Traditional procurement. The difference between PPPs and Traditional procurement is less definite for time performance; the NAO report [4] indicates that PPPs are considerably better than Traditional projects for time performance whereas the Allen report [6] indicates time performance is generally similar for the projects except that PPP projects are not adversely affected by an increasing scale of the project as was identified for Traditional projects.

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[1] In the Mott MacDonald report this normalized data for cost was termed 'Optimism Bias' and defined as:

Optimism bias = $100 x \dfrac{(Actual - Estimated)}{Estimated}$ (%) or normalized value of $1 + \dfrac{(Actual - Estimated)}{Estimated}$

Table 1: Comparison of previous benchmark studies (source: Duffield 2008)

BENCHMARK COMPARISON	Treasury Taskforce 2000 [1]	Mott MacDonald 2002 [2]	Haskins et al 2002 [3]	NAO 2003 [4]	Fitzgerald 2004 [5]	Allen Consulting et al 2007 [6]
Number of projects in sample	21	50	<10	<10	8	54
Cost (CAPEX)						
- Normalised PPP performance (Budget to Actual) • General				78% on budget	0.91	1.03
- Cost savings from PPPs	17%		30-40%			
- Normalised Traditional project performance (Budget to Actual) • General				27% on budget		1.25
• Standard buildings		1.24				
• Standard Civil Engineering		1.44				
• Non-standard buildings		1.51				
• Non-standard engineering		1.66				
Time performance						
- Normalized PPP performance (Budget to Actual) • General				76% on time		1.12
- Normalised Traditional project performance (Budget to Actual) • General				30% on time		1.13
• Standard buildings		1.04				
• Standard Civil Engineering		1.34				
• Non-standard buildings		1.39				
• Non-standard engineering		1.15				

In a critique of the Mott MacDonald [2] and UK NAO results [4], Unison [7] outlined a number of methodological problems that it considered were biasing the empirical findings in favour of PPPs. This report addresses previous criticisms of earlier studies by:

- being transparent in the sampling methodology;

- describing the population analysis;

- outlining the sample and explaining how it is representative of current experience;

- the time period for both PPP and Traditional projects is the same; and

- consistency in comparison removing measurement bias.

3. Methodology

3.1 Data sample

The list of projects included in the sample set was determined by collecting a list of relevant projects initiated after 1 January 2000 with a value exceeding $20 million across all participating jurisdictions in Australia. Specific projects meeting this criterion included projects from the Transport, Accommodation, Hospitals, Justice, Education, Information Technology (IT), Water sectors and projects generically classified as 'Other' categories. From this total project data list, the sample set was established by:

- Random selection of projects from the listing nominated by each state;
- Preference given to projects with a high likelihood of data existing in a collectable form;
- Projects that appeared unique and had skewed data were avoided, e.g. projects dominated by land purchases;
- A balance between all states for each project type in each category was also sought where appropriate;
- An Australian wide data set was chosen by the research team and confirmed by participating jurisdictions.

3.2 Data collection and validation

Data from each participating jurisdiction was sourced through the use of:

1. A standard template that was forwarded for completion by each participating jurisdiction. This template was based on refinements resulting from a pilot study undertaken for the Department of Treasury and Finance Victoria, a copy of the template is enclosed as Appendix 1.

2. The data provided by each jurisdiction was checked for consistency in conjunction with the Secretariat for the PPP Forum.

3. Data was validated and any ambiguous data was corrected in collaboration with the case study project manager/team.

4. The data was normalized and then analysed to produce findings for all of Australia that was generic.

3.3 Data Sample

In the first phase of the study the research team identified 96 projects which could be examined as part of the Study, refer Table 2. These projects were subject to a structured sampling to ensure the overall sample was balanced, (e.g. the Traditional projects from WA, which were mainly road projects were randomly rationalized to a more representative size relative to the country as a whole).

Table 2: Phase I Projects Identified (source: Duffield 2008)

	Cwth	NSW	Qld	SA	Vic	WA	Total
Total PPP Projects	1	7	0	5	12	4	29
Total Traditional Projects	1	7	0	14	12	33	67
Total Projects	2	14	0	19	24	37	96

Post the rationalized sampling some adjustments of the Phase I sample were necessary to overcome difficulties in capturing adequate data from all Phase I projects. A revised set of data was sought and captured as a part of this Phase II study as detailed in Table 3.

It should also be noted that South Australia did not submit data but NT, Queensland and Tasmania provided project data as part of Phase 2.

Table 3: Phase II Data Received (source: Duffield 2008)

	Cwth	NSW	NT	Qld	Tas	Vic	WA	Total
Total PPP Projects	1	6	2	1	0	15	0	25
Total Traditional Projects	1	10	4	0	7	17	3	42
Total Projects	2	16	6	1	7	32	3	67

The representative sample size (67) is considered reasonably substantive and can be used with some confidence to illustrate national trends in infrastructure.

The sample set projects were subdivided into four categories as detailed in Table 4.

Table 4: Phase II: Projects by category (source: Duffield 2008)

Category	Traditional	PPP	Total
Social Infrastructure	17	15	32
Transport	19	4	23
Sustainability (water, waste and energy)	5	3	8
Information Technology	1	3	4
Total Projects	42	25	67

A full list of projects included in the study is detailed in Appendix 2.

It should be noted that not all data was collected for all milestones detailed in section 3 and thus it is not possible to simply arithmetically manipulate the analysis periods as different stages may have slightly different projects included in the sample analysed due to limitations in the completeness of data provided.

3.4   Project time periods for analysis

To overcome the limitations of earlier studies that simply compared the budget to actual project outcomes it was decided to adopt four time periods between project milestones for assessment. These four time periods were used to measure, compute and compare the relative performance of PPPs and Traditional procurement, they were:

- Full period   Original Announcement to Actual Final;
- Stage 1   Original Announcement to Contractual Commitment;
- Stage 2   Budget Approval to Actual Final; and
- Stage 3   Contractual Commitment to Actual Final.

Original Announcement means the first time the project was publicly announced.
Budget Approval means the point at which the relevant government approved the project budget prior to engaging the market.
Contractual Commitment is the time of contract execution and/or financial close.
Actual Final is the commissioning time for the infrastructure.
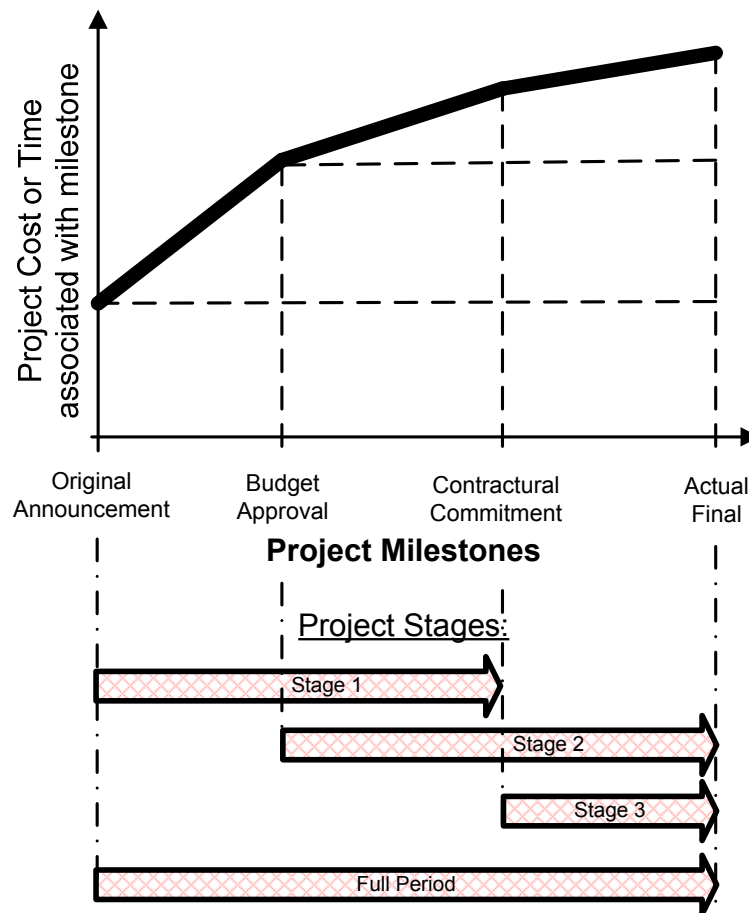
These four periods are shown graphically in Figure 1.

Figure 1: Comparative periods of assessment (source: Duffield 2008)

Each of these periods provides insight into different aspects of the projects and the inclusion of all periods provides the opportunity for a balanced appraisal of PPPs versus Traditional projects taking into account the different project processes between the two approaches. The rationale of the different periods is provided below:

Full Period: Original Announcement to Actual Final

> The originally announced project data is based on the least robust information for the project. Frequently this data is announced prior to a detailed scope of work being defined or robust costings developed. None the less this time point becomes an important milestone in public projects as it is against this original announcement information that projects are frequently reported against by interested parties and the media. In the context of this study it is also important as it is a definitive milestone that

can occur prior to the choice of a procurement strategy. It is therefore a starting point that is independent of the processes used for either PPP projects or Traditional projects.

Stage 1: Original Announcement to Contractual Commitment

The period from original announcement to contractual commitment is the period whereby a project is fully scoped and expectations and requirements of client and end users should be fully developed, understood and confirmed by the market place clarifying what is required and the price to deliver the project. In many ways a comparison based on this time period is an indicator of the accuracy and adequacy of project procurement processes within government.

Stage 2: Budget Approval to Actual Final

Project success is often internally measured and reported as performance against an agreed budget. Ideally such comparisons would be made based on linking approved budget to scope of work delivered, such as via the Earned Value Technique. This is frequently not done and in fact budgets are often adjusted as the need arises. To avoid errors in the benchmark study that would occur if current budget data was used this study adopts the final approved budget prior to going to market as the milestone.

This particular metric is the one adopted in the previous studies by Mott MacDonald, the NAO and Fitzgerald and thus it is useful as a comparator. However, it could be argued that this particular period simply gives an indicator of the accuracy of the budget estimate and that differences in the answer may be attributed to different levels of optimism at budget stage due to the rigour of the estimate. To avoid problems associated with optimism bias at budget approval it is considered comparisons based on the full period are more appropriate as optimism bias is reduced.

Stage 3: Contractual Commitment to Actual Final

Comparison of performance from contractual commitment to actual final is a measure of the robustness of the risk transfer within the contractual forms. It is also a good check on the price certainty that is obtained via either contractual approach.

4. Results

The research objective is to provide headline statistical analysis on two key metrics – time and cost, and to use these metrics to compare PPP delivered projects with Traditionally procured projects. The study results are presented in Tables 5 to 10 as categorized below:

Metric	Cost	Time

Normalised project performance
    based on the average
    based on the median
	Table 5
	Table 6
		Table 8
		Table 9

Percentiles of project outcomes	Table 6	Table 9
The number of projects within ± 5% of target time and cost estimates	Table 7	Table 10

Even though the number of projects included in this study is the largest sample of similar studies, the number of projects in any particular category of projects is relatively small and thus statistical results should be treated as indicative outcomes rather than definitive results.

Full statistical results for the study are provided as Tables A3.1 and A3.2 in Appendix 3 and salient findings detailed in Tables 5 to 10.

Table 5 presents a summary of the cost-over-runs for projects and Table 8 presents a summary of time performance of projects when compared with the expected outcome at the start of the particular period under consideration.

4.1 Cost Performance

Cost performance results are presented as Tables 5 to 7 below.

Table 5 Cost over-runs: Traditional and PPP projects relative to anticipated cost at the start of the period under consideration (based on averages) (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	40	45	43	40
Traditional projects	52.0%	38.2%	19.7%	18.0%
PPP projects	23.8%	22.2%	7.8%	4.3%
Difference (Traditional – PPP)	28.2%	16.0%	11.9%	13.7%

The results in Table 5 demonstrate that PPPs perform better than Traditional projects for each time period investigated. The difference in performance was 28.2% for the full period.

The average results as presented as in Table 5 are comparable with Mott MacDonald results for Stage 2 and those of Allen et al report presented in Table 1.

The use of averages in a relatively small sample may lead to extraneous results if there is a wide variation in the extreme values in the sample. This is the case for this data set, particularly for Traditional projects, where there are a few projects that have performed poorly. These poorly performing projects influence the average and thus may skew the interpretation of what happens more generally. A graphical representation of one of the outputs, detailing specific project outcomes and variation, is provided as Figure 2.

Full Period-Normalised Original Announced Cost to Actual vs. Project Size
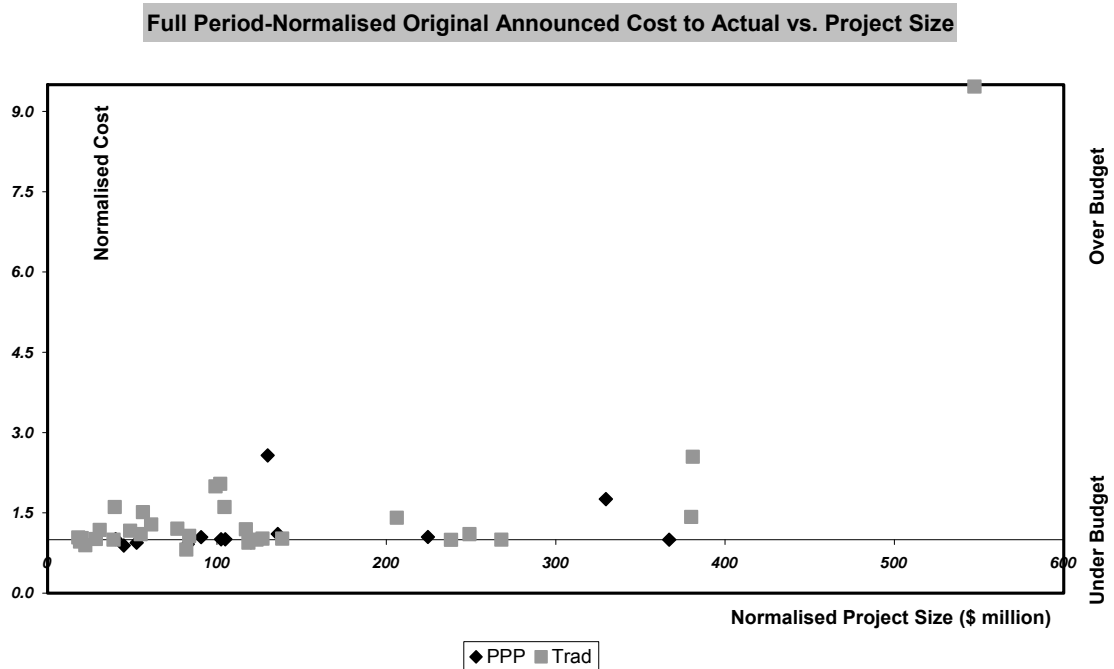
Figure 2: Full period: Normalised cost results: Original announced cost to actual final cost
(source: Duffield 2008)

To overcome the limitations with averages, use of median values are appropriate as individual results do not skew the outcome. The median (sometimes called the P_{50} value) provides a balanced outcome of what is to be expected. The range of outcomes between P_{25} and P_{75} (termed the inter-quartile range) provides an indicator of the likely variance in the predicted outcome; the use of P_{25} and P_{75} provides every opportunity to avoid extreme outcomes and provides a 50% confidence in the results. The lower the variance the more likely it is to achieve the median result. These indicators are presented for cost as Table 6.

Table 6   Cost over-runs: Traditional and PPP projects relative to anticipated cost at the start of the period under consideration (based on median results) (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	40	45	43	40
Traditional projects: Median (P_{50})	10.1%	5.6%	4.0%	3.6%
PPP projects: Median (P_{50})	0.7%	0.3%	2.6%	0.0%
Difference in medians (Traditional – PPP)	9.4%	5.3%	1.4%	3.6%
Inter-quartile range for Traditional projects (i.e. $P_{75} – P_{25}$)	41.6%	31.1%	28.3%	17.4%
Inter-quartile range for PPP projects (i.e. $P_{75} – P_{25}$)	10.1%	18.5%	21.3%	1.4%
Difference in Inter-quartile range (Traditional – PPP)	31.5%	12.6%	7.0%	16.0%

The results as presented in Table 6 again indicate that PPPs perform better than Traditional projects for each time period investigated. The difference in performance was 31.5% for the inter-quartile range over the full period.

To facilitate comparison of the findings of this study with those from the NAO study [4] results have also been produced based on the number of projects achieving the expected outcome. A zone of acceptability of ± 5% has been applied to the stated expected outcome for this purpose. The results of this approach for cost are detailed in Table 7 below.

Table 7   Cost over-runs: Traditional and PPP projects relative to anticipated cost at the start of the period under consideration (based on number of projects >5% over expected value) (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	40	45	43	40
Traditional projects >5% over expected	56.7%	50.0%	48.5%	43.3%
PPP projects > 5% over expected	40.0%	46.7%	50.0%	30.0%
Difference (Traditional – PPP)	16.7%	3.3%	-1.5%	13.3%

Comparison of the Stage 2 results with those obtained by NOA [4] indicate that Australian traditional projects perform better in respect to cost than comparable UK projects and that on this metric there is little difference between PPPs and Traditional projects from the period from Budget Approval to Final. Based on this metric PPPs provide a better cost outcome than Traditional projects for all other time periods.

4.2 Time performance

Time performance results are presented as Tables 8 to 10 below.

Table 8 **Time over-runs: Traditional and PPP projects relative to the expected time at the start of the period under consideration (based on averages)** (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	30	30	24	39
Traditional projects	15.4%	-4.0%	18.1%	25.9%
PPP projects	17.4%	14.8%	11.7%	1.4%
Difference (Traditional – PPP)	-2.0%	-18.8%	6.4%	24.5%

The average results for time as presented in Table 8 indicate there is very little difference between PPPs and Traditional projects over the full period (the difference is statistically insignificant). There is however major differences between the procurement approaches during the different periods, in particular, PPPs perform very well (1.4% over-run) once a contract is signed. This compares with a relatively poor performance from Traditional projects where there is a time over-run of 25.9% on average.

Percentile results are presented as Table 9.

Table 9 **Time over-runs: Traditional and PPP projects relative to the expected time at the start of the period under consideration (based on median results)** (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	30	30	24	39
Traditional projects: Median (P_{50})	10.9%	0.0%	3.7%	7.3%
PPP projects: Median (P_{50})	5.6%	0.0%	8.8%	0.0%
Difference in medians (Traditional – PPP)	5.3%	0.0%	-5.1%	7.3%
Inter-quartile range for Traditional projects (i.e. $P_{75} – P_{25}$)	38.0%	19.4%	40.4%	43.4%
Inter-quartile range for PPP projects (i.e. $P_{75} – P_{25}$)	37.7%	31.5%	23.6%	12.0%
Difference in Inter-quartile range (Traditional – PPP)	0.3%	-12.1%	16.8%	31.4%

The percentile results for time as presented in Table 9 support the average results and indicate there is very little difference between PPPs and Traditional projects over the full

period (the difference is statistically insignificant). Again PPPs perform far better than Traditional projects once a contract is signed (difference 31.4%).

Compatible analysis to that of the NAO study [4] results have also been produced for time, refer Table 10. Unlike the UK finding there appears little difference in time performance between PPPs and Traditional projects based in the acceptability criterion of ± 5%.

Table 10   **Time over-runs: Traditional and PPP projects relative to the expected time at the start of the period under consideration (based on number of projects >5% over time)** (source: Duffield 2008)

	Full period	Stage 1	Stage 2	Stage 3
No of observations	30	30	24	39
Traditional projects >5% over expected	57.1%	28.6%	50.0%	52.4%
PPP projects > 5% over expected	50.0%	37.5%	50.0%	27.8%
Difference (Traditional – PPP)	7.1%	-8.9%	0.0%	24.6%

4.3   Consolidated Results

Consolidated plots combining time and cost performance were prepared, refer Figures 3 and 4. However, these plots are limited in that the number of projects with complete sets of both time and cost data has limited the richness of the graphs. In addition, statistical interpretation of these graphs through the use of linear regressions can be confusing, refer Figure 4. It is considered that the most appropriate form of presentation of the results is through the use of box plots based on the percentile outcomes for the study, a box plot containing cost results for the study is provided as Figure 5 and a similar graph for time is provided as Figure 6.

Comparison of Project Outcomes: Original Approval to Actual Outcome
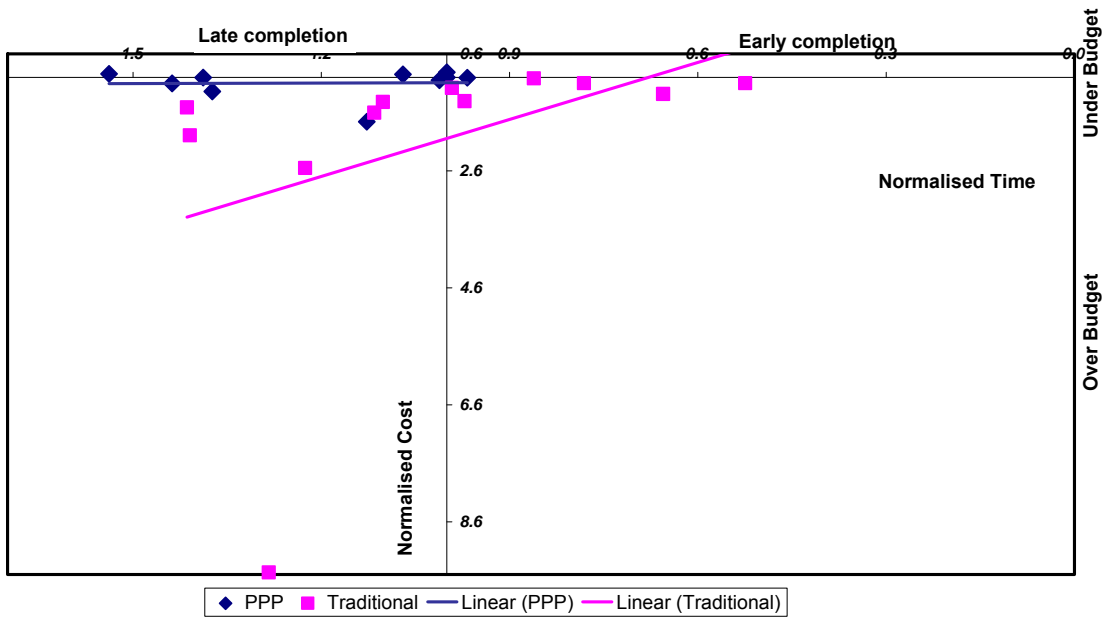
Figure 3: Full period: Normalised results: Comparison of overall results including time and cost (source: Duffield 2008)

Comparison of Project Outcomes: Stage 2- Budget approval to Actual final

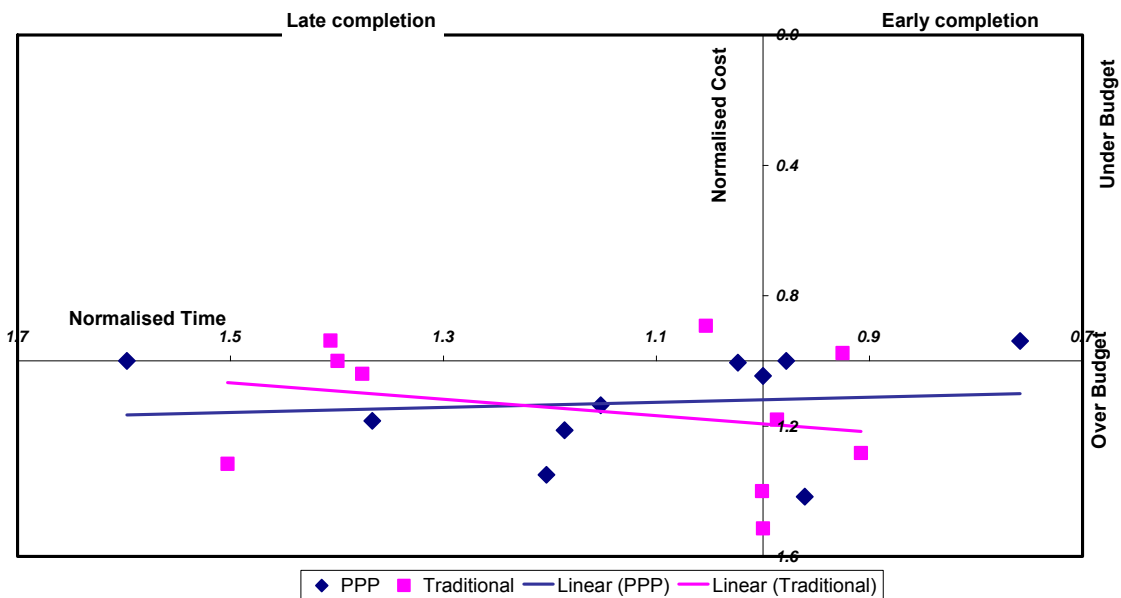**Figure 4: Stage 2: Budget to Actual Final: Normalised results: Comparison of overall results including time and cost** (source: Duffield 2008)

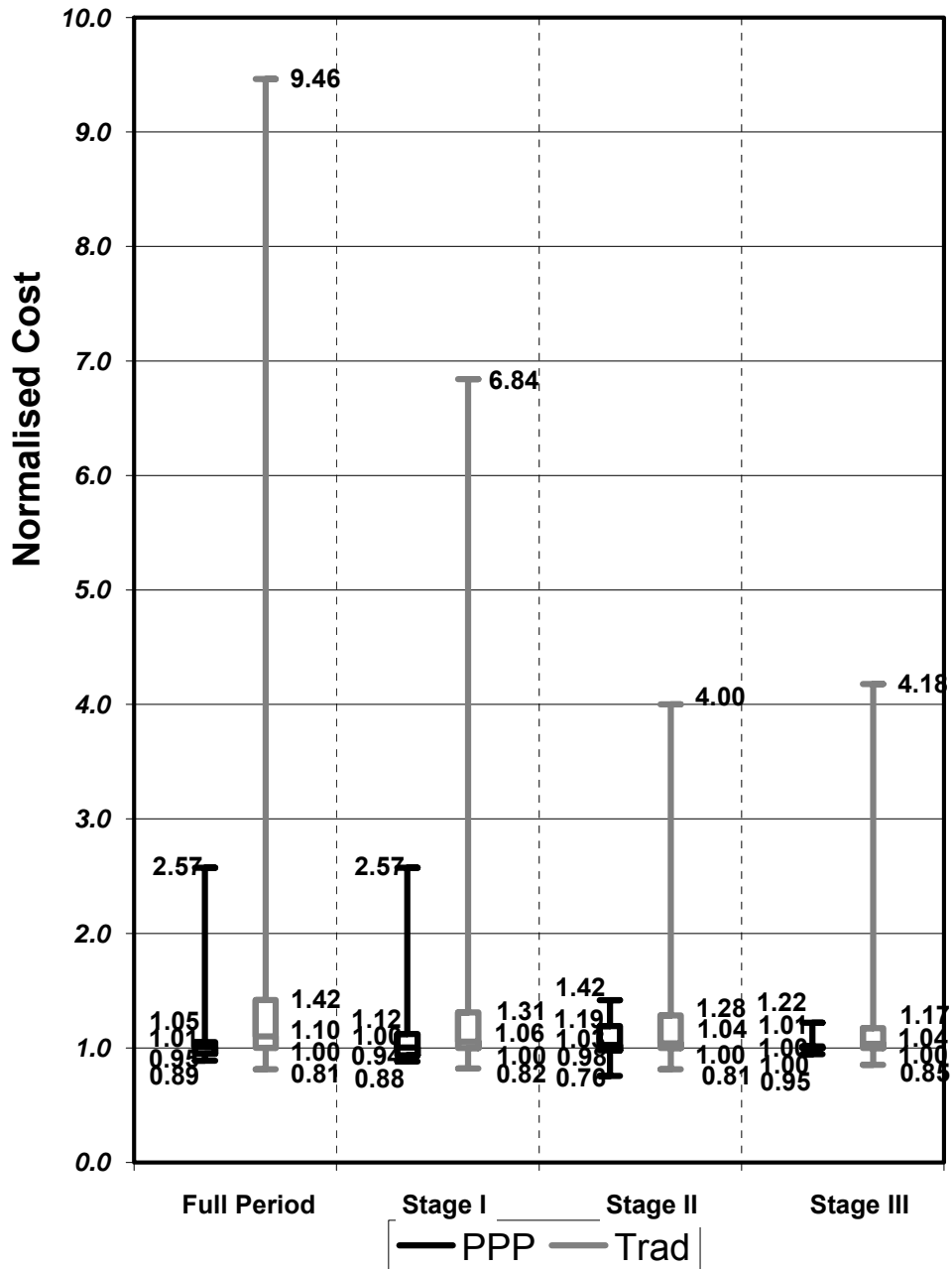**Figure 5: Normalised results based on percentile: Comparison of cost performance** (source: Duffield 2008)
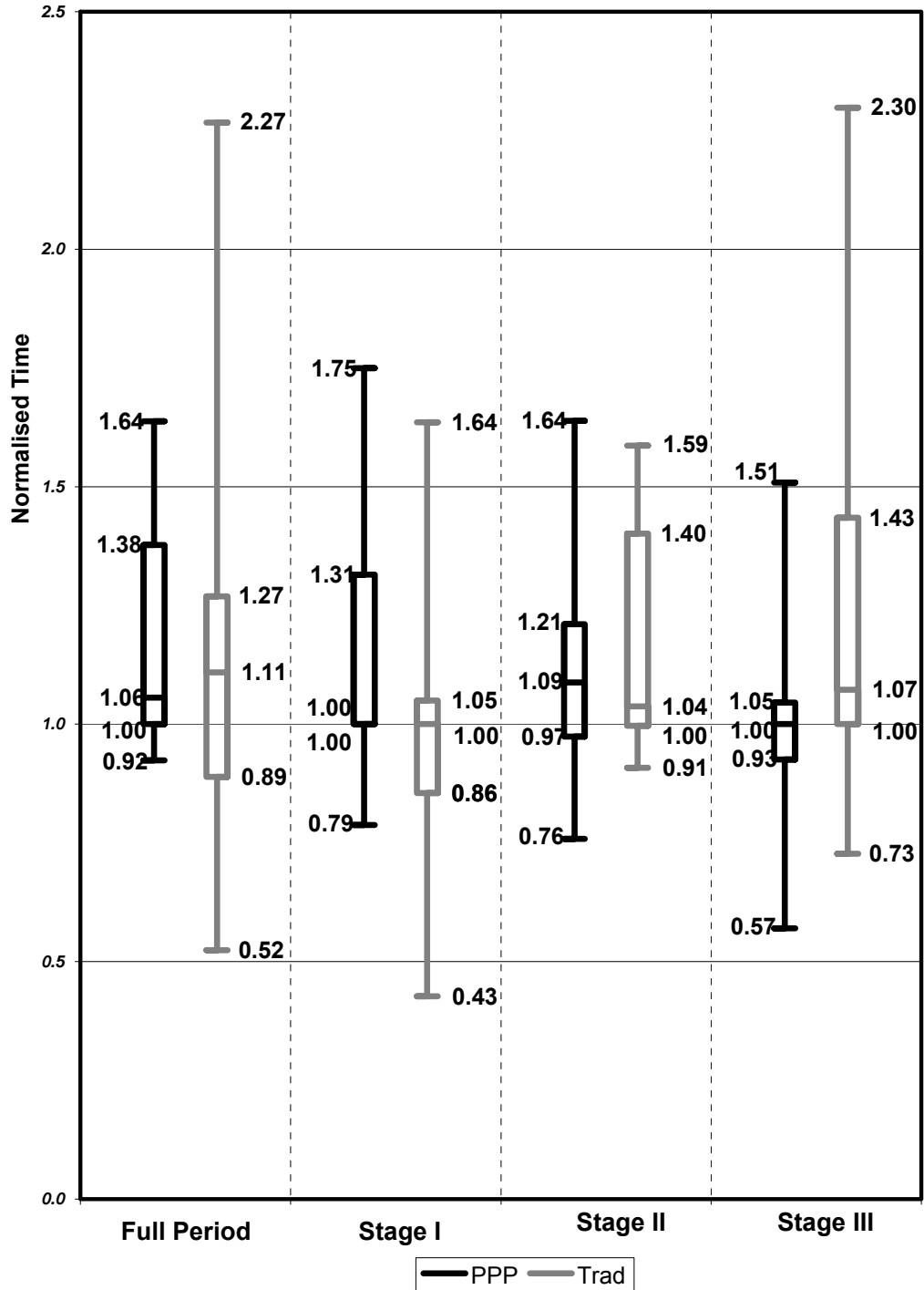
Figure 6: Normalised results based on percentile: Comparison of time performance (source: Duffield 2008)

A factor correlation was conducted for the data relating to the full period, results are presented as Table 11.

Table 11   Factor correlation of total sample, PPP projects and Traditional projects for the Full Period (source: Duffield 2008)

Factor Correlation	Procurement	Jurisdiction	Category of Infrastructure	Value of project	Duration of project	Date of Original Announcement
Normalised Time (Full sample)	-0.03	-0.03	-0.12	-0.03	-0.12	-0.26
Normalised Cost (Full sample)	0.09	-0.14	-0.02	0.72	-0.15	0.01
Normalised Time (PPP)	N/A	-0.05	0.19	-0.48	-0.18	-0.39
Normalised Cost (PPP)	N/A	0.57	-0.32	0.22	0.06	0.35
Normalised Time (Traditional)	N/A	-0.02	-0.37	0.04	-0.10	-0.19
Normalised Cost (Traditional)	N/A	-0.20	0.00	0.80	-0.22	-0.02

The results in Table 11 indicate the following correlations:

- The normalised cost of PPPs with the jurisdiction
- The normalised cost of PPPs with the category of infrastructure
- The normalised time of Traditional projects with the jurisdiction
- The normalised time of PPPs with the value of the project (short duration and low cost projects were adversely affected by time over-runs)
- The normalised cost of Traditional projects with the value of the project (the higher the cost of the project the worse it performed)
- PPPs commenced around 2000 had a poorer time record but more controlled costs than current projects

5. Discussion of Results and Conclusions

The findings of this report are discussed below:

This study has the largest number of projects (67) included in sample set of any comparable benchmark study undertaken throughout the world. There is a good balance of Traditional and PPP projects. There is also a reasonable balance of projects according to sector -Social Infrastructure projects, Transport projects, Sustainability projects (incl. water, energy and waste) and Information Technology projects.

Conclusions:

Conclusion 1:	The sixty seven projects analysed are representative of projects where government procures major Capital assets.

Conclusion 2:	There are sufficient data samples in the study upon which to draw conclusions with confidence.

Cost comparison

In terms of a comparison of cost performance between Traditionally procured infrastructure and that procured via a PPP mechanism it is concluded that:

Conclusion 3:	Over all time periods considered in this study, PPPs delivered projects for a price that is far closer to the expected cost than if the project was procured in the Traditional manner. Based on the inter-quartile percentage for the period from initial project announcement to the actual final cost, PPPs were 31.5% better than traditional projects.

Note:

- This finding was confirmed regardless of whether the analysis involved average results, percentiles or simply the number of projects that achieved the target cost. The conclusion also holds true for all time periods involving the original announcement of a project, the budgetary approval, the bidding phase or the actual delivery of the infrastructure during the construction period as explained below.

- From the original announcement to final actual cost (the full period) PPPs perform 28.2% (based on averages, refer Table 5) better on cost than Traditional projects. The median (P_{50}) result for PPPs from the study was 9.4% better (refer Table 6) than for Traditional projects and PPPs had a far greater cost certainty (31.5% better) than Traditional projects as measured by the difference in the inter-quartile percentile range. Similarly 16.7% (refer Table 7) more PPP projects were completed within the original expected cost estimate over the full period (if an acceptability criterion of ± 5% was set) than was the case for Traditional projects.

The cost analysis for the periods: Original Announcement to Contract, Budget Approval to Actual Final and Contractual commitment to actual final, led to the same conclusions (with differing metrics) as for the full period. These results are presented graphically as Figure 7 to demonstrate this finding.
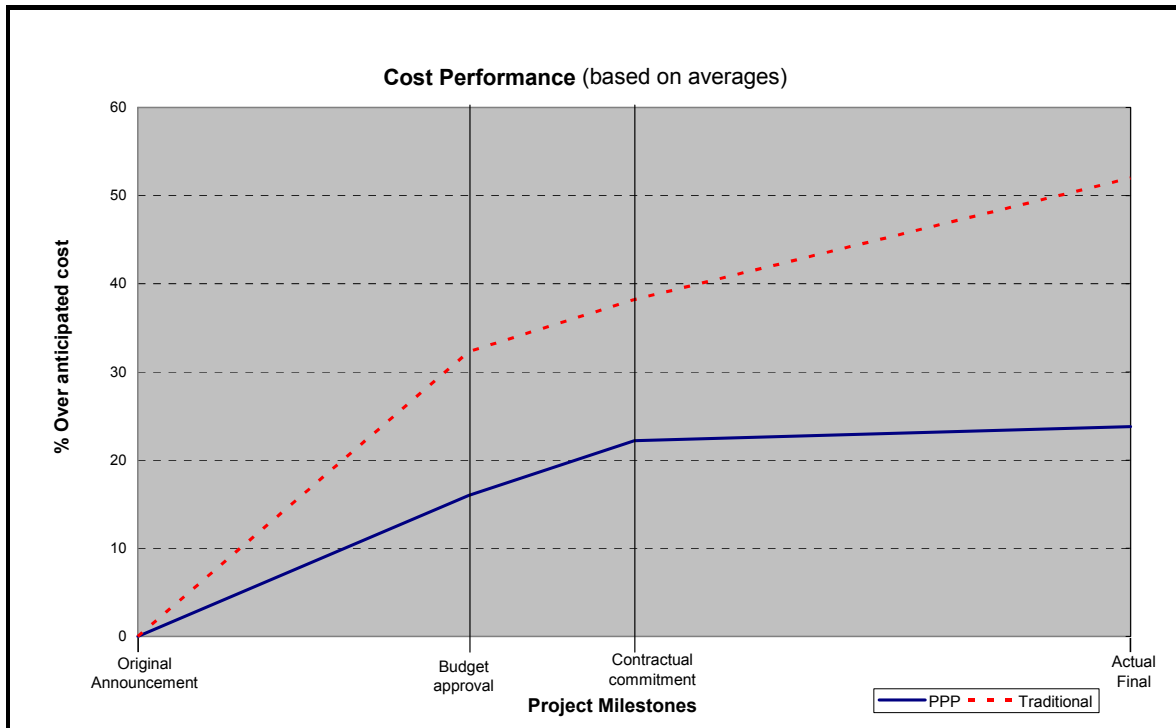
Figure 7: Cost performance over project initiation and delivery (source: Duffield 2008)

The contractual sum for PPPs, as determined when the contracts were signed, has a P_{50} of zero when analysed against the actual final price, this result has a variance as measured by 50% of the records ($P_{75} - P_{25}$) of 1.4%. This is a far more certain outcome than for Traditional projects that had corresponding results of P_{50} of 3.6% cost overrun with a variance as measured by 50% of the records ($P_{75} - P_{25}$) of 17.4%. It is concluded that:

Conclusion 4:	PPP contracts had an average cost escalation of 4.3% post contract execution compared to Traditional projects that had an average cost escalation of 18.0% for the same period.
	PPP projects provide far greater cost certainty than Traditional contracts and there is little variation in cost of a PPP project after the contract is signed.

The findings of this study are consistent with the findings of the 2007 Allen et al [6] study. It is further observed by comparison with previous studies; refer Table 1, that Traditional projects in Australia have greater cost certainty than such projects in the UK.

Conclusion 5:	Australian Traditional projects have better cost performance than UK projects with 43.3% of Traditional Australian projects being completed within 5% of the expected cost compared with 27% of UK Traditional projects being completed within budget, refer NAO [4].

Time comparison

In terms of time performance for the full project period (i.e. original announcement to actual final) **there is very little difference in performance between PPPs and Traditional projects** as evidence by:

- o Based on averages Traditional projects are 2% closer to the estimate than are PPPs over the full project period.

- o Based on median results PPPs are 5.3% closer to the estimate than Traditional projects over the full project period. Both PPPs and Traditional projects have similar inter-quartile ranges in their results, refer Figure 6.

- o Normalised results show that 7.1% more PPP projects finish on time than Traditional projects refer Table 10, based on the number of projects.

Conclusion 6:	Over the period from initial announcement of a project to when it is finally commissioned PPPs and Traditional projects are delivered with the same confidence in the likely overall time performance.

Albeit that the overall time performance is similar, the spectrum of time performance over the project initiation and delivery periods for PPPs and Traditional projects are quite different in time performance. It is likely that this difference is related to the different processes adopted for either procurement methodology.

This point is evident from the statistical, percentile and number of projects late results and the trends of the timing information are consistent regardless of the analysis undertaken. These trends are graphically illustrated in Figure 8.
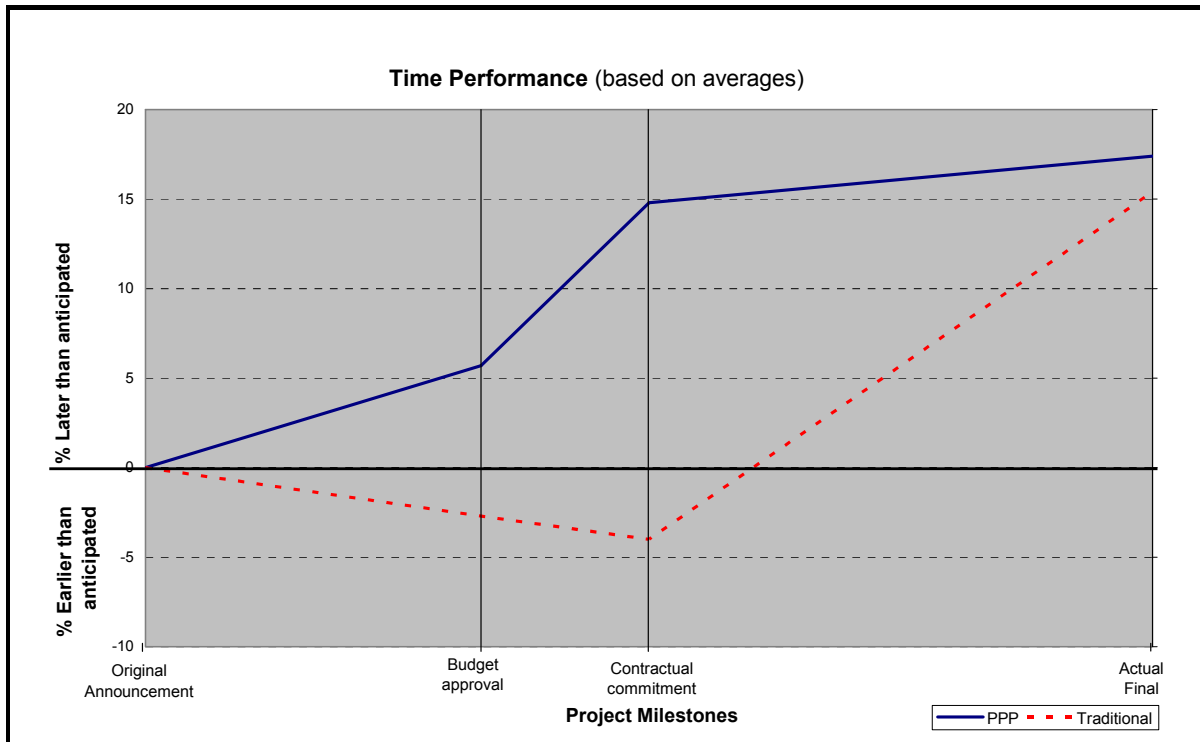
Figure 8: Time performance over project initiation and delivery (source: Duffield 2008)

It is concluded that:

Conclusion 7:	During the period prior to project execution, PPP projects are frequently delayed (average 14.8%). However, once PPP projects reach financial close there was only, on average, a further 2.6% delay to these projects. This indicates that PPP contracts are well developed prior to release to market and changes after financial close are minimal.

Conclusion 8:	Predictions of the duration to reach commissioning are optimistic for Traditional projects with estimates of duration being on average 18.1% early at budget and 19.4% early at contract execution when compared to the actual final outcome. An average delay of 25.9% occurs during the construction phase of Traditional contracts. These delays may be due to: the initial optimism and/or required changes after contract signing to achieve Government's requirements, and/or due to uncertain contractual terms or risk allocation.

The factor correlation analysis, refer Table 11, has identified a number of issues that are worth mentioning and may warranted further investigation in the future, namely:

- The value of a project is significant in respect to the overall cost performance (i.e. the larger a project the greater the likelihood of a poor cost outcome). This is

particularly true for Traditional projects where there is a strong correlation between the size of a project and its susceptibility to budget over-runs.

- The duration of a project influences a projects performance:
  o PPP having a relatively short procurement period (less than six months) are frequently delayed and the short duration offers little opportunity to recover lost time, however the loss of time does not translate into cost over-runs;
  o Similar short duration Traditional projects frequently run over budget when delays occur.
- There are different project outcomes depending on the particular jurisdiction. This is evident in respect to time and cost for PPP projects and in the cost performance of Traditional projects.
- PPP projects are improving in their time performance. Traditional projects are also improving on time performance but to a lesser extent than PPPs.

Acknowledgement

References

[1] Treasury Taskforce Limited. (2000) *Value for money drivers in the Private Finance Initiative*. Report prepared by Arthur Andersen and Enterprise LSE, HM Treasury, London, UK.

[2] Mott-MacDonald (2002) *Review of Large Public Procurement in the UK,* London: Mott-MacDonald

[3] Haskins, S., Gale, D., and Kelly, L. (2002) Creating and optimizing new forms of public–private partnerships in Seattle. Water Science & Technology: Water Supply, 2(4): 211–218.

[4] National Audit Office NAO (2003) *PFI: Construction Performance – Report by the Comptroller and Auditor General,* UK Audit Office, HC 371 Session 2002 - 2003

[5] Fitzgerald, Peter (January, 2004), *Review of Partnerships Victoria Provided Infrastructure*, Final Report to the Treasurer, Growth Solutions Group.

[6] Allen Consulting Group, Duffield, CF and Raisbeck, P. (2007). *Performance of PPPs and Traditional Procurement in Australia*. Melbourne, Infrastructure Partnerships Australia: 57

[7] UNISON (October 2005), *The Private Finance Initiative: A Policy Built on Sand*, A report for UNISON by Prof. Alyson Pollock, David Price and Stewart Player, Public Health Policy Unit, UCL.

Appendix One

Guidance Notes for Data Collection and definition of terms

DATA CAPTURE FOR EACH PROJECT - Background

The data capture templates seek to collect information for both Traditional procurement and PPP projects in respect to cost, time and risk data, as well as some data on scope cost impacts and value for money. These notes are intended to assist those collecting project data by providing explanations and definitions of the data sought.

Information collection will be an ongoing process. Data should be input at each milestone point throughout the project. The information, once complete, will be displayed by project sector and size. The information will be used for research purposes to identify trends in infrastructure project delivery.

Data sought in the templates include:
 - cost information for capital costs and Net Present Value (NPV) cost;

 - risk information, particularly the portion of risk retained or transferred;

 - major cost impacts including scope changes on the project;

 - time information relating to scheduled milestone dates for the project; and

 - Value for Money (VFM) measurements or perception.

Timing definitions
Data is to be collected at the following milestone points:

Initial Announcement: The first time (or earliest time) the project is announced and going forward to market. Announcement may be made a number of ways (commonly via a Ministerial media release) and may be on the basis of limited project development or a preliminary or a full business case. The project may be announced:
→ as part of a strategic policy statement;
→ following agreement to conduct a business case;
→ as part of the budget cycle; and/or
→ by releasing documents to the market.

At Budget Approval (prior to market release): The time Cabinet (or a delegated approved authority) agrees to project budget, normally as part of the annual budget, or may be at another time during the year. Budget approval is:
→ likely to be as part of the budget process and announcements;
→ may be agreed to at another time during the year outside of the budget cycle; and/or
→ budget variations may occur following full business case or development of a Public Sector Comparator (PSC), therefore the latest budget approved figure should be referenced, that is the latest figure prior to releasing the full tender documents (Project Brief) to market.

At contract signing: The date on which the State signs the contractual agreement with the successful Tenderer and it becomes effective.

→ For PPP projects this is defined as financial close.

→ **Financial close:** for PPP Projects this may be the same date as contract execution or may be a slightly later date, following financial adjustments. It is the final NPV contract price at this point in time that is to be recorded.

Actual: Is the commissioning date for the infrastructure. The date upon which the State accepts the infrastructure as operational in accordance with the contract. There may be times when there are staged openings and these could be noted. This date is after all acceptance testing, etc is completed and the infrastructure becomes operational.

Contract end date: *For PPP projects only* - it is the date upon which the contract specifies that the contract finishes and the infrastructure is handed back to the State. This date may be varied (extended or reduced) during the operational phase and the database should be updated if that occurs.

1 Cost data

Tracking the cost information in the project can be complicated. It is important to input the data at key milestones points so cost changes can be analysed. The cost information for PPP projects is more complicated in that it includes an analysis of nominal capital costs and then also the NPV costs of the contract and risk valuations.

Recommended sources: business case, media release, budget documents, financial benchmarks and technical reports, the PSC (*for PPP projects only*).

Timing of data input: At budget approval, updated at contract signing and again at actual (commissioning).

Issue: For Traditional projects the budget approved Total Estimated Investment (TEI) relates to the capital costs for the project. It should include any risk allowance or contingency amounts identified. It should include any associated funding sources (e.g. revenue from land sales) used for the project. It should include any costs for early works agreements. It is **NOT** to include the recurrent costs or any project management costs if they are separately identified**.**

Issue: For PPP projects the tracking of costs can become complicated throughout the project as costs are referred to both in nominal capital costs and also net present values. At the start of the project the announced figure is usually an estimated nominal capital cost. The second measuring point is the Cabinet's budget approved capital figure which should be included as the nominal capital cost. At this point it should also be possible to determine the relevant total NPV project cost by referring to the Total Risk Adjusted PSC in the project business case.

Issue: For PPP projects the NPV at contract signing/financial close may also be accompanied by an equivalent capital cost which can be included. Or it may be possible to derive the capital cost component of the tenderer's bid to include in the table.

Cost definitions

Nominal Capital Budget: the figure that is used at the start of project to identify project costs. Budget submissions include the nominal capital budget for infrastructure projects over the forecast period.

Government funding: the CAPEX identified as the government's capital contribution to the project.

External funding sources: there may be alternative funding sources, from other jurisdictions, from other organisations, or proceeds from land sales that contribute to the project funding.

Project Management: the running costs of a project. Sometime specific project management costs are sought to cover project management and external adviser costs for individual projects. When they are separately identified as recurrent costs do not include them in the table, but they may be wrapped up in the capital funding submission and, if so, should be included.

TEI: Total Estimated Investment the total government funding approved for the project (identified in a budget submission).

General Assumptions: in determining the project costs a number of financial assumptions are made in order to ensure that there is enough funding available for the project, either over the short term Traditional construction contracts, or the longer term PPP contracts.

Construction Escalation: financial analysis or quantity surveyor reports will include a percentage figure for escalation costs associated with the raw materials and labour over the 1-4 year construction period. In some cases escalation figures may be separated out into various material and labour costs, in this case put the overall escalation figure in the table.

No. of years of construction: The number of years over which construction is scheduled to take place.

For PPP projects only

Net Present Value of Contract: calculated by aggregating the discounted values of a series of future cash flows with the initial investment. This applies to PPP projects that have a long term payment stream. Once the contract is executed the initial nominal capital budget cost is replaced by a Net Present Value cost which reflects all the costs (capital and operating) of the project contract.

PSC: **Public Sector Comparator** is the hypothetical whole of life risk adjusted cost of government delivering the project output specifications.

2 Major Cost Impacts

It is important to track the reason behind any major changes to the cost of a project. Project costs can be affected by time changes, scope changes, price escalation factors and many other reasons.

Recommended sources: Project management timelines, budget documents, quantity surveyor or other technical adviser reports.

Timing of data input: Ongoing throughout project.

Issue: The table is a fairly high-level snapshot of changes and their impact. The comments section is where explanations can be provided.

Issue: It may not be possible to translate time changes into a $ impact (e.g. additional project management costs may be identifiable but not opportunity costs). In this case note the explanation for the major time changes in the table or comments section.

Issue: Scope changes and price changes may impact either or both of capital or recurrent components of the project budget/cost. Where it is possible to separate, then there is space to do in the comments section.

3 Time

In order to assess whether a project was delivered on time we need to capture the key milestone dates at each key point in the project. Ongoing data collection as the project moves through the key stages will assist in the accurate recording of dates.

Recommended sources: Media releases, project management timetables, business case, budget documents, tender documents, and contractual documents.

Timing of data input: Ongoing throughout project.

Issue: The initial announcement is often when the project is first announced and may or may not be when a business case is completed. Dates may therefore be identified as a range/year/quarter etc. Not all figures are expected at the initial stage so there will be gaps, however as the project develops, the formal timelines should be available.

Issue: In some projects, not all stages will be identified, e.g. some Traditional projects may not go to an Expression of Interest. And in some projects additional stages may be identified, e.g. a Registration of Interest prior to an Expression of Interest or the inclusion of an Environmental Impact Statement stage. These issues can be noted in the comments section or added to the table. Generally while the stages may have different names, e.g. Project Brief and Request for Tender, the milestones mean the same thing.

Issue: The financial close date is relevant for PPP projects. Financial close may be the same time or follow soon after contract execution. It may be necessary to note both dates if a public announcement was made on contract execution.

4 Risk data

The aim is to collect general risk information and to track the changes to the risk profile in the tender period from market release to contract signing and then record any occurrence of risk in the construction period.

Recommended sources: business case, risk analysis document, risk matrix, cost benchmark, contract terms, contract schedules.

Timing of data input: At market release and updated at contract signing and following commissioning.

Issue: timing of recording of the risk data is important. Risk data should be available and input prior to the release of the tender documents to the market. It may occur, that following negotiations with the successful Tenderer, some risk positions may vary from the original position. In this case it would be important to record the final risk position in the table and make comments in the space provided.

Issue: there are many different interpretations of risk categories. The table generalises the risk into very broad categories. This is why adding comments by way of explanation will be very useful to future analysis.

Issue: the risk categories in a PPP project may be more detailed and therefore general assessments will be required. If necessary change the risk descriptions.

Issue: risk categories, apportionment and $s may not be available for all the categories listed for a Traditional project. Consider the make up of the contingency amounts or consult the quantity surveyors report for some risk information.

Issue: *for PPP projects only* the risk categories will extend to risks that may occur during the operational period of the infrastructure.

Issue: f*or PPP projects* a retained risk amount will have been identified for the project and following commissioning it may be possible to identify if any risks occurred during construction for which the State had to use the retained risk allowance. Likewise for Traditional projects the extent that any contingency or risk allowance was utilised should be noted.

5 Value for Money

This information can only be provided once the contract is signed for the project. Value for Money (VFM) may have been measured for the project. Alternately the perceived VFM may be able to be described for the project.

Recommended sources: The project finalisation review, evaluation reports, budget documents, departmental briefings prior to contract execution, project summaries, audit reports, Gateway Reviews or other reviews.

Timing of data input: Contract signing (*financial close for PPP projects*).

Issues: VFM must be identified for PPP projects. Value for money is identified in comparison with the Public Sector Comparator. Should be identified as a $ figure and a percentage. Should also be supplemented with a description of other elements of the offer that represent value for money (eg items provided in addition to the scope requested and at no additional cost such as rail station upgrades associated with EastLink).

Issues: For Traditional projects the perceived VFM should be noted. Perception is always going to be subjective but should be rated in light of the general views of the project not just one specific project officer.

Traditional project template

JURISDICTION :						
TRADITIONAL PROJECT DELIVERY						
PROJECT:						
SECTOR:						
NOMINAL CAPITAL VALUE:						
DESCRIPTION:						
DATE TEMPLATE UPDATED						
PROCUREMENT METHOD (e.g. Design & Construct)						
NB: Items marked as mandatory are essential for this PPP benchmark exercise. Items marked optional are desired and will add significantly to the outcomes possible from this study.						

1. Nominal Capital Cost (Mandatory)

	Preliminary Estimate / Initial Announcement	Budget Approval (prior to market release)	At Contract Signing	Actual (at Project Commissioning)	
Nominal Capital Government Funding (Total Expected Investment: TEI)					
* Please refer to guide notes for clarification on what comprises these figures.					
Further relevant budget information on external funding sources, or any capital components outside of scope					
(E.g. Early works agreements)					
Comments:					
General Assumptions (Optional)					

	Construction Escalation (%)	No. of years of construction	Risk Allowance ($)	Risk % of TEI	Contingencies if accounted for separately from risk($)	
Comments:						

2. TIME (Mandatory)

	Insert "date" information for the following:					
Dates	**Initial Announcement** **	**At EOI release**	**At RFT release**	**At contract signing**	**Actual (commissioning)**	
Project Announced						
EOI						
RFT						

Contract Signing						
Actual (commissioning)						

*** Full figures not expected, fill in where figures available. As at project announcement or preliminary business case*

Comments:

Please document reasons for key variations in timelines throughout the project procurement phase			

3. Major Cost Impacts (Optional)

Insert "impact of scope changes" comments, in relation to the costs in the following chart:

	Any cost implications ($)	**At what stage of the project did they occur**	**Reason or explanation Y/N elaborate below**	
Time Variance				
Scope Variance				
Price/Escalation				
Other				
Comments:				
What are the reasons behind the scope/cost/time changes?				
How have they impacted the various costs of :				
Capital				
Recurrent				
Explain if and why these scope changes make the project different from similar projects in this sector?				

4. RISK - profile over time (Optional)

Risks as at Market Release	**% of Total Risk Allowance**	**Proportion Transferred : Retained**		**Key risks for the project within this particular category**
Strategic / Preliminary Scoping				
Site / Panning				i.e. sight is highly contaminated
Design				design is very complex and is a one off project
Construction / Commissioning		**e.g. 90**	**10**	access to site is restricted and within an operating environment
Others				
Comments:				
Risks as at Contract Signing	**% of Total Risk Allowance**	**Proportion Transferred : Retained**		**Key risks for the project within this particular category**
Strategic / Preliminary Scoping				

Site / Panning				i.e. sight is highly contaminated		
Design				design is very complex and is a one off project		
Construction / Commissioning		**e.g. 90**	**10**	access to site is restricted and within an operating environment		
Others						
Comments:						

As at commissioning what % of contingency or risk allowance has been utilised? And for what risk occurrences?

Comments:						

5. Value for Money (Optional)		To be finalised following contractual close				
Please comment on 'value for money' assessment of the project:						
Was the 'value for money' measured for the project?						
	If Yes, detail the assessment/details:					
	If No, please move to next question to provide your perception as to how you would rate the 'value for money'.					
Please comment on your view of 'value for money' for the project:						

Your perception of Value for money for:	**Rate value for money on 1-5 scale given**		**Are there any comments regarding value for money or reasons/items impacting value for money of the project?**			
Functional Benefit						
Long Term Facility						
Operational						
Maintenance						

	Value for Money Scale					
	1	Very Low				
	2	Low				
	3	Average				
	4	High				
	5	Very High				
Comments:						

Are there any comments regarding the value for money for this project?

GENERAL COMMENTS OR DISCUSSION FOR PROJECT, DATA AVAILABILITY, OUTCOMES, ETC.:

PPP project template

JURISDICTION :	(e.g. Partnerships Victoria)					
PPP PROJECT DELIVERY						
PROJECT:						
SECTOR:						
NOMINAL CAPITAL VALUE:						
PV CONTRACT VALUE (NPV):						
DESCRIPTION:						
DATE TEMPLATE UPDATED						
PROCUREMENT METHOD (e.g. BOOT)						
NB: Items marked as mandatory are essential for this PPP benchmark exercise. Items marked optional are desired and will add significantly to the outcomes possible from this study.						

1. Nominal Capital Cost & NPV (Mandatory)

	Preliminary Estimate / Initial Announcement	Budget Approval (prior to market release)	At Contract Signing (NPV at Financial close)	Actual (At Project Commissioning)	Modifications During Operations	
Nominal Capital Government Funding (Total Estimated Investment: TEI)			1			
Net Present Value of PSC/Contract						

* Please refer to guide notes for clarification on what comprises these figures.

1. Record the nominal capital component of the final contract price if it can be ascertained.

Further relevant budget information on external funding sources, or any capital components outside of scope

(E.g. Early works agreements)						
Comments:						

General Assumptions

	Construction Escalation (%)	No. of years of construction	Risk Allowance ($)	Risk % of TEI	Contingencies if accounted for separately from risk($)	
Comments:						

2. TIME (Mandatory)
Insert "date" information for the following:

Dates	Initial Announcement **	At EOI release	At RFP/Project Brief release	At Financial close	Actual (commissioning)	Operating phase variations
Project Announced						
EOI						
RFT/Project Brief						
Contract Signing						

Financial Close						
Actual (Commissioning)						
Contract end date						

*** Full figures not expected, fill in where figures available. As at project announcement or preliminary business case*

Comments:

Please document reasons for key variations in timelines throughout the project procurement phase

3. Major Cost Impacts (Optional)

Insert "impact of scope changes" comments, in relation to the costs in the following chart:

	Any cost implications ($)	At what stage of the project did they occur	Reason or explanation Y/N elaborate below	
Time Variance				
Scope Variance				
Price/Escalation				
Other				

Comments:

What are the reasons behind the scope/cost/time changes?

How have they impacted the various costs of :

Capital

Recurrent

Explain if and why these scope changes make the project different from similar projects in this sector?

4. RISK - profile over time (Optional)

Risks as at Market Release	% of Total Risk Allowance	Proportion Transferred : Retained		Key risks for the project within this particular category		
Strategic / Preliminary Scoping						
Site / Panning				i.e. sight is highly contaminated		
Design				design is very complex and is a one off project		
Construction / Commissioning		**e.g. 90**	**10**	access to site is restricted and within an operating environment		
Lifecycle (i.e. Hard FM)						
Operating (i.e. soft services if applicable)						
Demand/Market (if applicable)						
Others						

Comments:

Risks as at Financial Close	% of Total Risk Allowance	Proportion Transferred : Retained		Key risks for the project within this particular category		
Strategic / Preliminary Scoping						
Site / Panning				ie sight is highly contaminated		
Design				design is very complex and is a one off project		
Construction / Commissioning		**e.g. 90**	10	access to site is restricted and within an operating environment		
Lifecycle (i.e. Hard FM)						
Operating (i.e. soft services if applicable)						
Demand/Market (if applicable)						
Others						
Comments:						
As at commissioning what % or retained risk has been utilised? And for what risk occurrences?						
Comments:						
5. Value for Money (Optional)		To be finalised following contractual close				
Please comment on 'value for money' assessment of the project:						
Was the 'value for money' measured for the project?						
	If Yes, detail the assessment/details:					
	If No, please move to next question to provide your perception as to how you would rate the 'value for money'.					
Please comment on your view of 'value for money' for the project:						

Your perception of Value for money for:	Rate value for money on 1-5 scale given		Are there any comments regarding value for money or reasons/items impacting value for money of the project?			
Commercial Benefit						
Functional Benefit						
Long Term Facility						
Operational						
Maintenance						
	Value for Money Scale					
	1	Very Low				
	2	Low				
	3	Average				
	4	High				
	5	Very High				
Comments:						
Are there any comments regarding the value for money for this project?						
GENERAL COMMENTS OR DISCUSSION FOR PROJECT, DATA AVAILABILITY, OUTCOMES, ETC.:						

Appendix Two

Projects included in the Study:

Project Name	Category	Project type	Jurisdiction
Defense Headquarters Joint Operations Command project	Social	PPP	FED
Commonwealth Law Courts Adelaide	Social	Trad	FED
Cross City Tunnel	Transport	PPP	NSW
Eastern Creek Alternative Waste Treatment Facility	Sustainable	PPP	NSW
New Schools Program 1	Social	PPP	NSW
Hunter Rail Cars	Transport	Trad	NSW
Long Bay Prison and Forensic Hospitals	Social	PPP	NSW
Lane Cove Tunnel	Transport	PPP	NSW
Newcastle Mater Hospital Redevelopment	Social	PPP	NSW
Kellyville High School	Social	Trad	NSW
Liverpool Hospital New Mental Health Centre	Social	Trad	NSW
Mid North Coast (Kempsey) Correctional Centre-Stage 2	Social	Trad	NSW
Mt Annan High School	Social	Trad	NSW
Outer Suburban Cars Stage 2	Transport	Trad	NSW
Pacific Highway, Karuah Bypass	Transport	Trad	NSW
West Camden STP Stage 2 Amplification & Upgrade	Sustainable	Trad	NSW
Western Regional (Wellington) Correctional Centre	Social	Trad	NSW
Windsor Rd from Mile End Rd to Boundary Rd	Transport	Trad	NSW
Alice Springs to Darwin Railway	Transport	PPP	NT
Darwin Convention Centre (component of the Darwin Waterfront redevelopment)	Social	PPP	NT
Northern Territory Middle Schools	Social	Trad	NT
Refurbishment of Alice Springs Hospital	Social	Trad	NT
Refurbishment of Royal Darwin Hospital	Social	Trad	NT
Stage 2 of East Arm Wharf	Transport	Trad	NT
Southbank Education and Training precinct	Social	PPP	QLD
Bass Highway, Penguin to Ulverstone Stage 1	Transport	Trad	TAS
Bass Highway, Penguin to Ulverstone Stage 2	Transport	Trad	TAS

East Tamar Highway	Transport	Trad	TAS
Kingston Education Project	Social	Trad	TAS
North East Tasmania Access Study	Transport	Trad	TAS
Rail Rescue Package	Transport	Trad	TAS
Sorell Causeway	Transport	Trad	TAS
Barwon Water Biosolids Management Project	Sustainable	PPP	VIC
Campaspe Water Reclamation Scheme	Sustainable	PPP	VIC
Casey Hospital	Social	PPP	VIC
Country Court	Social	PPP	VIC
TV & Film Studios at Docklands	Social	PPP	VIC
Eastlink tollroad	Transport	PPP	VIC
Emergency Alerting system	IT	PPP	VIC
Melbourne Convention Centre	Social	PPP	VIC
Metropolitan Mobile Radio	IT	PPP	VIC
Mobile Data Network	IT	PPP	VIC
Royal Children's Hospital	Social	PPP	VIC
Royal Showgrounds redevelopment	Social	PPP	VIC
Royal Women's Hospital	Social	PPP	VIC
Southern Cross Station	Social	PPP	VIC
Victorian Correctional Facilities	Social	PPP	VIC
Activated sludge	Sustainable	Trad	VIC
Austin Hospital	Social	Trad	VIC
Commonwealth Games Village	Social	Trad	VIC
Craigeburn Bypass	Transport	Trad	VIC
Craigieburn Rail Project	Transport	Trad	VIC
Geelong Bypass	Transport	Trad	VIC
Hallam Valley Sewerage Treatment	Sustainable	Trad	VIC
Melbourne Sports and Aquatic Centre	Social	Trad	VIC
Middleborough Road underpass	Transport	Trad	VIC
New Ticketing system	IT	Trad	VIC
Pakenham Sewerage system	Sustainable	Trad	VIC
Relocatable School Classrooms	Social	Trad	VIC
Synchrotron	Social	Trad	VIC
Tulla Calder Freeway	Transport	Trad	VIC
Western Treatment Plant	Sustainable	Trad	VIC
William Barak Bridge	Transport	Trad	VIC

Yarra Arts Integration Project	Social	Trad	VIC
Aqusition of 31 "B Series" EMU Rail Car Sets	Transport	Trad	WA
Geraldton Hospital	Social	Trad	WA
Roe Highway Stage 4 and 5 (Welshool Rd to Nicholson Rd)	Transport	Trad	WA

Appendix Three

Detailed Results

Table A3.1   Normalised Costs: Traditional and PPP projects: Statistical results

		Time				Cost			
		Full period	Stage 1	Stage 2	Stage 3	Full period	Stage 1	Stage 2	Stage 3
PPPs									
	Average	1.17	1.15	1.12	1.01	1.24	1.22	1.08	1.04
	Standard Deviation	0.23	0.26	0.23	0.20	0.53	0.47	0.17	0.08
	Variance	0.05	0.07	0.05	0.04	0.28	0.22	0.03	0.01
	No of samples	16	16	12	18	10	15	10	10
	No of projects > 5% over	8	6	6	5	4	7	5	3
	% projects > 5% over	0.50	0.38	0.50	0.28	0.40	0.47	0.50	0.30
Test for bias	Lower	0.94	0.93	0.93	0.95	0.83	0.88	0.95	0.97
	Upper	1.06	1.07	1.07	1.05	1.17	1.12	1.05	1.03
Traditional projects									
	Average	1.15	0.96	1.18	1.26	1.52	1.38	1.20	1.18
	Standard Deviation	0.45	0.27	0.25	0.42	1.55	1.09	0.53	0.58
	Variance	0.20	0.07	0.06	0.18	2.40	1.19	0.28	0.33
	No of samples	14	14	12	21	30	30	33	30
	No of projects > 5% over	8	4	6	11	17	15	16	13
	% projects > 5% over	0.57	0.29	0.50	0.52	0.57	0.50	0.48	0.43
Test for bias	Lower	0.88	0.93	0.93	0.91	0.72	0.80	0.91	0.89
	Upper	1.12	1.07	1.07	1.09	1.28	1.20	1.09	1.11

Table A3.2: Percentile results for Time and Cost performance

Percentile results	Time				Cost			
	Full period	Stage 1	Stage 2	Stage 3	Full period	Stage 1	Stage 2	Stage 3
PPPS								
Maximum	1.64	1.75	1.64	1.51	2.57	2.57	1.42	1.22
P_{75}	1.38	1.31	1.21	1.05	1.05	1.12	1.19	1.01
Median: P_{50}	1.06	1.00	1.09	1.00	1.01	1.00	1.03	1.00
P_{25}	1.00	1.00	0.97	0.93	0.95	0.94	0.98	1.00
Minimum	0.92	0.79	0.76	0.57	0.89	0.88	0.76	0.95
Inter-quartile range (i.e. $P_{75} - P_{25}$)	0.38	0.31	0.24	0.12	0.10	0.18	0.21	0.01
Full range (i.e. Maximum – minimum)	0.72	0.96	0.88	0.94	1.68	1.69	0.66	0.27
Traditional projects								
Maximum	2.27	1.64	1.59	2.30	9.46	6.84	4.00	4.18
P_{75}	1.27	1.05	1.40	1.43	1.42	1.31	1.28	1.17
Median: P_{50}	1.11	1.00	1.04	1.07	1.10	1.06	1.04	1.04
P_{25}	0.89	0.86	1.00	1.00	1.00	1.00	1.00	1.00
Minimum	0.52	0.43	0.91	0.73	0.81	0.82	0.81	0.85
Inter-quartile range (i.e. $P_{75} - P_{25}$)	0.38	0.19	0.40	0.43	0.42	0.31	0.28	0.17
Full range (i.e. Maximum – minimum)	1.75	1.21	0.68	1.57	8.65	6.02	3.19	3.33