

AUDITOR-GENERAL'S REPORT

PERFORMANCE AUDIT

Sydney Water Corporation

Northside Storage Tunnel Project

State Library of New South Wales cataloguing-in publication data

New South Wales Audit Office.

Performance audit: Sydney Water Corporation: Northside Storage Tunnel project/ [The Audit Office of New South Wales]

07347 2151

1. Sydney Water - Auditing. 2. Northside Storage Tunnel (Sydney, NSW) - Auditing. 3. Urban runoff - New South Wales - Management - Auditing. 4. Storm sewers - New South Wales. 5. Water quality management - New South Wales - Auditing. Title: Sydney Water Corporation: Northside Storage Tunnel Project. II. Title: Northside Storage Tunnel project. III. Title: Auditor-General's report: performance audit: Sydney Water Corporation: Northside Storage Tunnel project.

© Copyright reserved by The Audit Office of New South Wales. All rights reserved. No part of this publication may be reproduced without prior consent of The Audit Office of New South Wales.

Contents

Foreword

Executive Summary	1
1 Overview	15
1.1 The Overflow Problem	16
1.2 The Decision to Build the Tunnel	17
1.3 The Northside Storage Tunnel	18
1.4 What is Alliancing?	19
1.5 Why an Alliance?	21
1.6 The NST Alliance	21
2 The NST Agreement	25
2.1 Overview	26
2.2 Features	26
2.3 Target Direct Cost	32
3 Time	35
3.1 Overview	36
3.2 Separable Portion 1	37
3.3 Separable Portion 2	39
3.4 Informing the Board	40
4 Cost	41
4.1 Overview	42
4.2 Total Cost	42
4.3 Target Direct Cost	46
4.4 Disposal of Spoil	50
5 Environment, Community and Safety	53
5.1 Overview	54
5.2 Development of Performance Measures	54
5.3 Monitoring and Assessing Performance	55
6 Governance	57
6.1 Overview	58
6.2 Governance Arrangements	58
6.3 Monitoring and Review	61
7 Developments in Alliancing	63
7.1 Overview	64
7.2 Divergence of Expert Views	64
7.3 Alignment of Interests	65
Appendices	67
Appendix 1 About the Audit	68
Appendix 2 Terms Used in this Report	70
Appendix 3 When are Alliances Likely to be the Best Project Delivery Method?	72
Appendix 4 The Final Cost of the Tunnel	75
Performance Audits by the Audit Office of New South Wales	77

Foreword

Providing public infrastructure is a fundamental role of government. Unfortunately, there are sufficient examples - in this State and elsewhere - to suggest that governments do not always handle this role as well as they should. All too often, projects are completed late and/or over budget, do not deliver the benefits expected or are subject to continuing litigation between the parties involved.

Because of these concerns, I decided to look at two major asset acquisition projects in New South Wales to see how they had been managed. The first was the Millennium Train, which I reported on recently.

This report looks at a major sewerage infrastructure project - Sydney Water's \$466 million Northside Storage Tunnel.

The two projects have some similarities. Both are costly and will deliver services over many decades. Both involve contractual arrangements with the private sector. Both were seen as being driven, in part, by the timing of the Sydney Olympics.

However the two projects have some differences. The most important of these - and one that this Report particularly focuses on - is the form of the contractual relationship with the private sector. The Tunnel represents the first major construction project in New South Wales delivered through an 'alliance' between the public and private sectors.

Past experience indicates that major infrastructure projects delivered under the traditional approach can be plagued by costly and time-consuming disputes between the owner and contractors.

In an alliance, the asset owner and its partners adopt a team approach. They share both the costs of underachievement and the rewards of a job well done. They seek to resolve problems, rather than allocate blame. Contract variations only arise where there is significant change in scope.

The concept of an alliance offers the promise of a successful outcome. But it brings its own risks. One is the risk of not getting the incentives and sanctions right. Another is that the parties become too close. The 'owner', the party who initiates, and will ultimately own the project, needs to ensure that the alliance delivers value for money. An alliance should not compromise the principles of accountability and transparency that are so integral to the public sector.

This report should be relevant to those with an interest in major public infrastructure projects.

R J Sendt
Auditor-General
July 2003

Executive Summary

Executive Summary

The Tunnel

The Northside Storage Tunnel (NST) was built in response to a need to handle overflows in wet weather from the Northern Suburbs, thus reducing the level of untreated discharges of sewage entering Sydney Harbour.

The NST was completed in October 2001 at a cost of \$466 million.

It would seem that completing the project in time for the Sydney 2000 Olympics was an imperative for Sydney Water. While not complete, the tunnel was able to accept overflows during the Olympics.

The NST was extensive in scope, involved complex works and was constructed in the context of sensitive natural environments and community concern.

The tunnel is owned and operated by Sydney Water Corporation (Sydney Water).

Alliancing

The NST was built using a construction approach known as an alliance.

An alliance brings the owner, designer and constructor together into a single entity to:

- increase co-operation between the partners
- share the benefits or costs that might befall any of the partners during the project
- pool significant risks.

The Audit

The audit examined the:

- Alliance arrangement used in the construction of the tunnel
- arrangements to manage, monitor, review and evaluate construction of the tunnel.

Sydney Water

Sydney Water is a State Owned Corporation and is governed by a Board. The Chief Executive Officer of Sydney Water reports to the Board. In its day-to-day operations, Sydney Water and its Board are presumed to be independent from the Government.

Audit Opinion

The Northside Storage Tunnel was the first major public sector construction project using an alliance approach.

In our opinion, the outcome of the project suggests that an alliance approach, when applied to a suitable project and managed appropriately, can support positive project outcomes. And in many respects the Alliance worked well. There are, however, a number of issues that we believe need to be addressed for future alliances.

There is a need to ensure that a 'value for money' outcome is clearly demonstrated in any future alliances of this type. This is particularly so in the public sector.

In our opinion there is insufficient evidence available to judge whether the cost of the tunnel represents 'value for money'.

Sydney Water has yet to undertake a review of the tunnel following its completion. This is all the more important as the cost increased significantly during the life of the project.

Additional costs were incurred in seeking to complete the tunnel by the Olympic deadline. The costs and benefits of meeting the deadline were not quantified. In our opinion, this should have been carried out.

Effective governance and oversight were important given the tight deadline, the size and sensitivity of the project, and the adoption of a new approach to managing a major project and its associated risks.

Our view is that Sydney Water's governance of the project was not as robust as it should have been.

As with most major projects undertaken for the first time there are lessons to be learned. Sydney Water has applied the knowledge gained from the tunnel to subsequent alliances.

Key Findings

A New Approach

Despite many constraints and technical difficulties, the NST:

- was delivered as a 'fast-track' project
- was innovative in linking financial rewards to achievement of community, environment and safety objectives
- risk/reward arrangement worked effectively to pool responsibility, encourage innovation and promote cooperative problem resolution.

Positive Outcomes

Indications are that:

- the Alliance agreement promoted an open, honest and co-operative culture in pursuit of project objectives
- Sydney Water and its alliance partners shared the cost overrun, and a number of cost-saving initiatives were implemented during construction which mitigated overrun
- unpredicted, severe construction problems were encountered and worked through co-operatively, whereas serious disputes could have arisen over the allocation of responsibility for these 'latent' conditions under a conventional contract
- there were a number of design enhancements made to the tunnel, the additional cost of which was shared between the alliance partners
- experts were used to provide assurance that the *Target Direct Cost* of the tunnel was not excessive.

Flexibility

A claimed advantage of the alliance approach, compared to a traditional construction approach, is a greater capacity of the alliance partners to respond to specific challenges arising in the course of the project.

The flexibility with which the alliance responded to ensure that a substantial part of the tunnel was completed by the Olympics demonstrates this advantage.

However, flexibility may give rise to risks that need to be managed if the integrity of the alliance approach is to be preserved.

This is particularly important in the public sector where 'value for money', accountability and transparency are key considerations in the expenditure of public money.

For instance:

- a reward to be paid for successful early completion of the entire works was paid on completion of part of the works by the Olympics
- a possible penalty of \$5 million for not meeting the revised completion date for remaining work was negated
- Sydney Water incurred \$1 million in additional costs to bring the tunnel 'on-line' before the Olympics and take it 'off line' after the Olympics
- Sydney Water accepted a risk that if the tunnel had been required to take overflows during the Olympics, it would have had to be de-contaminated before work could recommence.

There is no documentary evidence that decisions on these issues were based on a formal analysis of costs and benefits. This may indicate a view that to have the tunnel operational by the Olympics was considered more important than cost.

'Value for Money'

Whether the cost of the NST represented 'value for money' is less clear, because:

- the original estimate for the tunnel in the planning stage was not soundly based, even though this was the cost used to determine that the project should proceed
- Sydney Water chose alliancing as the only project delivery method which could meet the Olympic deadline. Delivery methods were assessed primarily on the capability to meet the deadline rather than cost
- there was no formal re-evaluation of the project despite the increases between early cost estimates and the contracted cost
- additional construction costs were incurred in seeking to meet the Olympic deadline. These were not quantified
- the selection of the private sector partners and the determination of the commercial elements of the Agreement were not subject to price competition, albeit this was inherent to the alliance approach adopted
- substantial costs were incurred and committed before the *Target Direct Cost* was agreed, in a practical sense limiting the Board's option to withdraw from the project
- the reasons for rejecting a more economical option for spoil disposal, with possible environmental and social benefits, are not clear
- while detailed close-out reports have been prepared on many aspects of the project, Sydney Water has not as yet conducted a comprehensive post-implementation review.

Informing the Board

There were occasions throughout the project when the advice given to the Board was not as precise, complete or timely on important matters as it should have been. For example the Board was not advised:

- that some personnel of the private sector partners had been involved in pre-tender work on the project or that some unsuccessful tenderers were of the view that the partners were advantaged by that arrangement
- fully of the implications for risks, rewards and incentives of rearranging work so that two of the four overflow sites were available during the Olympics
- of the verified *Target Direct Cost* for nine months, by which time \$80 million had been spent on the project and another \$55 million committed (the Agreement signed in late January 1998 provided that the *Target Direct Cost* would be completed by the end of March 1998 and then submitted for verification, and the Board approved the project on the condition that it would be completed and verified in three months)
- of an extension of time which increased the risk that the tunnel would not be completed by the Olympics until well after the extension was granted.

Sydney Water management has recently advised the Board that:

- lessons learned from the NST have been incorporated into subsequent alliance arrangements
- alternative approaches, such as the introduction of price competition into the selection of partners and determination of commercial arrangements, are being considered.

Recommendations

It is recommended that Sydney Water:

- completes a post-implementation review of the project
- evaluates further and documents the lessons learnt from the project, with particular emphasis on:
 - refining how alliances are to be established
 - governance arrangements for managing an alliance project
 - how to establish more reliable cost estimates
 - assessing cost variations.

Response from Sydney Water Corporation

Thank you for your letter of 20 June 2003. Sydney Water welcomes the opportunity to comment on the Performance Audit on the Northside Storage Tunnel Project.

Sydney Water fully accepts the Recommendations in the Report.

While recognising that the Northside Storage Tunnel's performance and benefits are outside the scope of the Audit, Sydney Water believes that it is in the public interest to provide comment on these matters.

The tunnel has performed as it was designed to do and is meeting all EPA licence requirements. It has operated 45 times since it first captured sewage overflows in January 2001 and has collected over 11 billion litres of diluted sewage that would otherwise have entered the environment during wet weather from the major overflow points at Lane Cove River, Scotts Creek, Tunks Park, Quakers Hat Bay and Shelly Beach, Manly. The results speak for themselves with Sydney Harbour being cleaner than it has been for a generation. Evidence of this improvement has been widely reported and is demonstrated by the re-emergence of rock oyster colonies along the foreshores as far inland as Lane Cove and even the return of whales to the inner harbour.

The project was very successful and groundbreaking in many areas. Despite many constraints and difficulties, the project -

- achieved its targeted outcome of being ready for the Sydney 2000 Olympics;*
- was delivered as a fast-track project using the alliancing contracting method, a first such public sector contract in the Australia;*
- was innovative in linking financial rewards to achievement on non-cost objectives;*
- achieved exceptional results in its delivery of community relations, environmental management and safety systems; and*
- was completed at a final cost which represented an increase of only 3.3% over the original target cost estimate (adjusted to include escalation and accounting policy changes), despite significant technical, environment and social problems and delays.*

The implementation of the project encountered significant problems including statutory and regulatory delays, and unforeseen difficult geotechnical conditions which resulted in three months delay in tunnel construction. There were additional project issues involving substantial community action resulting in two NSW Legislative Council Inquiries, which significantly limited activities at certain times. In spite of these difficulties, the outcomes were achieved at a reasonable cost. In completing the project, Sydney Water broke new ground in alliance contracting, environmental management, and community relations. The lessons learned from the project are being successfully applied to many projects throughout Australia and New Zealand and the benefits are substantial.

The body of the Report notes many positive aspects of the Northside Storage Tunnel, which Sydney Water believes should be highlighted in the Executive Summary.

Sydney Water's comments on specific issues raised in the Performance Audit are set out below.

The Alliance Agreement

Sydney Water, after a detailed review, selected the Alliance contracting method as the most suitable option to ensure completion of the tunnel by the Sydney 2000 Olympic deadline. The Alliance Agreement was the first in the Australian Public Sector and established an effective working structure between Sydney Water and its private sector partners.

In the report, the Audit Office stated that the Alliance worked well and found that -

- *the process to establish the Alliance was sound and transparent;*
- *the Alliance agreement promoted an open, honest and co-operative culture in pursuit of project objectives;*
- *the Alliance Agreement was effective and provided a good balance of incentives for cost and non-cost objectives;*
- *the commercial arrangements were reasonable;*
- *the Alliance Agreement was innovative in linking financial rewards to achievement of community, environment and safety objectives; and*
- *the risk/reward system worked well and encouraged responsibility, innovation and*
- *co-operative problem resolution.*

The Alliance provided a structure that was highly responsive to the changing priorities on the project and effective at managing the work to achieve maximum outcome with minimum cost impact. Sydney Water is convinced that no other procurement method would have achieved the objectives of the project.

The Report presents a view that lack of price competition in establishing an alliance makes it more difficult to establish value for money for a project. Sydney Water is considering this issue as part of its progressive improvement of contracting methods. However, based on the worldwide evidence to date, it is uncertain that price competition can be introduced into alliancing contracts without losing some of the positive benefits that are currently achieved. Nonetheless Sydney Water is considering competitive mechanisms in these types of contracts.

Sydney Water has a process of continuous improvement and the lessons learned from the project have been invaluable in improving its own alliance agreements. These lessons have been shared openly in the marketplace and many other public and private sector organisations have been following and benefiting from Sydney Water's leadership and experience in this area.

The Audit Office has identified that Sydney Water has yet to complete a formal post implementation review of the project. Notwithstanding the absence to date of this formal review, Sydney Water has used the knowledge gained from the project and applied it to later contracts effectively. The Audit Office has recognised this in the Report.

Sydney Water intends to complete a post-implementation review and has documented many of the lessons learnt, with a focus on improved governance arrangements, alliance establishment and management, and reliable cost estimating processes.

Governance

Sydney Water believes that governance on the project was sound, particularly since 1999, when a range of revised oversighting and reporting changes were implemented. Most of the governance issues raised by the Audit Office took place early in the project. The Audit Office acknowledged that the governance of the project by the Sydney Water Corporation Board improved significantly from 1999. Issues identified in the Report from 1999 onwards were of a minor nature and did not influence the outcome in any substantive way.

The Audit Office noted the following matters in their Report:

- *Board and management membership changes impacted on the project;*
- *stability and communication between the Board and management improved from 1999;*
- *the Alliance effectively planned, managed, and controlled the project. It had effective risk management processes in place and effectively captured and documented decisions;*
- *external experts were used to assist in the establishment of the project, the contract and the risk/reward arrangements;*
- *external experts were used extensively to advise and monitor the project;*
- *probity auditors were used to ensure probity on all appropriate issues;*
- *lessons learned were documented and effectively transferred to new projects.*

The Audit Office has raised a number of issues relating to perceived lack of information between the Board and management and has concluded that the Board should have been provided with more detail and should have had a more direct involvement in day-to-day oversight of the project. Sydney Water considers that its management of the project was of a high standard and that Board involvement was at an appropriate level. Most of the issues raised by the Audit Office were management issues and did not require Board oversight. It is considered that none of the outcomes would have been different if the Board had had a more “hands on” involvement.

Cost

Sydney Water considers that the Northside Storage Tunnel represents good “value for money”. It is important to separate the accuracy of the original planning estimate and the decision to proceed with the project, from the effectiveness of the implementation of the actual project. Sydney Water believes that value for money should be assessed on whether the price for the project was competitive against industry standards.

The independent expert verified that the target estimate agreed in November 1998 represented a competitive price for the work, based on it being within a range of the likely winning tender in a conventional contract. Despite the severe geotechnical difficulties encountered and the very tight construction schedule, the final cost of the project represents an increase of only 3.3% over the 1998 target estimate adjusted to include escalation and accounting policy changes.

The commercial arrangements in the Alliance Agreement contributed significantly to the achievement of this performance. Under the Agreement Sydney Water and its alliance partners shared cost outcomes, which meant that cost impact of problems was minimised for Sydney Water, as the Alliance was able to work effectively to minimise cost when faced with unpredicted construction problems.

Increases in cost were minimised in spite of the following issues:

- *the original deadline was very tight;*
- *expert advice was that completion of the tunnel by the Olympics would be a significant challenge;*
- *a range of delays that occurred were beyond the influence and responsibility of the Alliance to resolve;*
- *additional costs were incurred to accelerate the work to compensate for the delays in order to ensure that the tunnel was ready for the Olympics.*

Overhead costs were minimised using the Alliance approach with cost sharing. The overall financial reward paid to the alliance partners, including overheads, was approximately 6.5% of the total cost of the tunnel, which Audit Office has acknowledged to be moderate. Sydney Water's cost of managing the project was approximately 2% of the total project cost, significantly less than the cost of previous similar projects, and this contributed to the overall cost minimisation. This was achieved because Sydney Water was part of the Alliance and used the alliance processes to manage the project. The Audit Office has identified that the processes were effective and thorough.

Sydney Water recognises that it made some mistakes, particularly at the beginning of the project. The preliminary planning estimate clearly and perhaps understandably underestimated the complexity of the overall project and the physical, regulatory and social difficulties involved. This is a universal problem and a challenge on any major project when clients, stakeholders and investors need to know costs before all risks have been identified and costed.

Sydney Water considered that the availability of the tunnel by the Olympics was a critical outcome and that some additional costs, if necessary to achieve the outcome, were justifiable given the importance of the event to Sydney and its reputation worldwide.

Time

Time was the most critical aspect of the project. In August 1997, the NSW Government accepted the recommendation of the Waterways Advisory Panel that Sydney Water should build the Northside Storage Tunnel by the Sydney 2000 Olympics. Sydney Water undertook the task understanding that the deadline was tight but achievable. The alliance approach was implemented as the only viable method of achieving the intended outcome by the start of the Olympics.

Sydney Water awarded the Alliance Contract in January 1998 leaving only 30 months to complete the project. Independent experts advised that the schedule was very tight and could only be achieved if there were no unforeseen delays. A range of problems with statutory approvals and community concerns, beyond the control of the Alliance, delayed the commencement of certain works by several months.

The alliance approach enabled flexible working arrangements to be implemented, allowing work sequences to be re-arranged to minimise the effect of such external delays that would otherwise have prevented achievement of the original deadlines. To ensure that the Alliance was not subjected to unreasonable penalties arising from the delays, it was agreed to change the formal completion dates for certain sections of the tunnel works.

The Audit Office has identified a range of subtle contractual implications arising from the changes implemented and has been critical on this issue. However none of these had any material impact on the cost or the outcome of the contract. Sydney Water is disappointed that the Audit Office has focused on the potential implications of the contractual changes rather than the achievement of having the tunnel available for the Olympics despite statutory and regulatory delays, unpredicted problems, and community action.

The Audit Office has criticised Sydney Water for putting time ahead of cost in executing the project. Sydney Water accepts that its focus was to have the tunnel available by the Olympics and believes that the modest cost penalty incurred was necessary and justified to help ensure that the Games were not affected by potential sewage pollution of Sydney Harbour.

Environment, Community and Safety

The performance of the Northside Storage Tunnel Project in the non-cost objective areas of community, environment and safety was exceptional. Whilst acknowledging that the Audit Office has recognised the excellent performance in this area in the body of the Report, Sydney Water is disappointed that this was not highlighted in the Executive Summary.

The Northside Storage Tunnel was the first project where Sydney Water has attempted to link non-cost objective performance with risk/reward. The establishment of quantitative measures for environment and community was innovative and challenging. The process of establishing benchmarks and the process of finalising the measurement of performance was more difficult and took longer than anticipated, but was successfully implemented.

The processes for monitoring and assessing performance were robust and independent experts carried out the assessment of performance. Performance measured against each of the objectives was rated as best practice or better. In particular, the independent environmental assessor rated the environmental performance on the project as outstanding and at a level achieved by very few construction projects of similar magnitude. The community consultation process achieved excellent results and set new standards. The external assessment panel rated the community performance as best practice.

The methodologies applied and lessons learnt in the development and implementation of these non-cost objectives have subsequently been adopted on numerous other alliance projects across Australia.

Yours sincerely,

(signed)

Greg Robinson
Managing Director
Sydney Water Corporation
Dated: 14 July 2003

1. Overview

1.1 The Overflow Problem

The Sydney metropolitan area has experienced overflows from the sewerage system during wet weather.

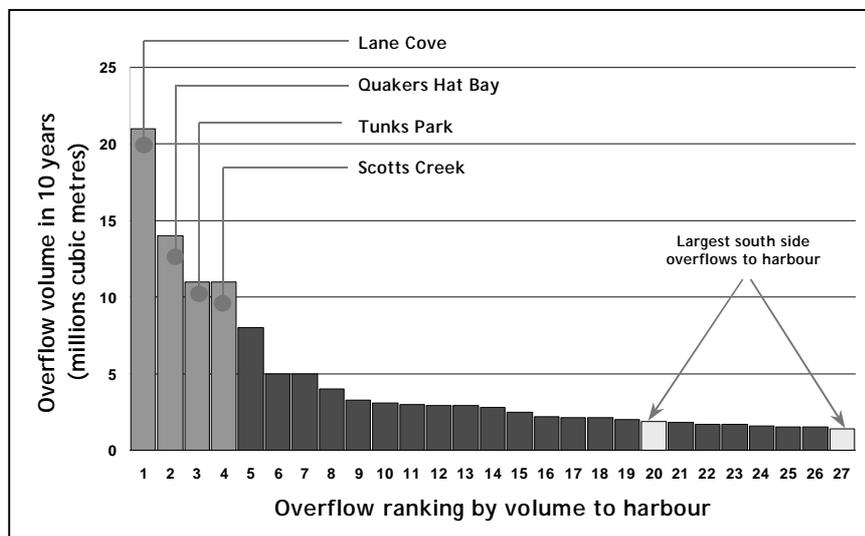
These overflows result from stormwater getting into the sewerage system, through illegal connections, faulty joints and other damage to sewer pipes and, in some older areas, common sewerage and stormwater pipes. When the sewer pipes cannot handle the volume of stormwater, they overflow.

Overflows occurring on the north side of Sydney Harbour have had the greatest impact on water quality in the harbour. The major overflows were at:

- Lane Cove River, Tunks Park and Quakers Hat Bay on the main northern suburbs sewer, and
- Scott's Creek (a major trunk sewer).

The following exhibit shows the points of overflow, in order of severity, into Sydney Harbour. Only two of the top twenty-seven overflow points that directly affected the harbour were located on the south side.

Figure 1.1 Ranking of Overflow Points



The 27 largest overflows into Sydney Harbour

Sydney Water considered several options to address the issue. The locations of the four major overflow points on Sydney's north-side suggested that effective capture and storage (of overflows) could be provided by a tunnel system connected to those overflow points. The tunnel would provide a temporary bypass storage during heavy rains.

In 1996 and based on extensive computer modelling of overflows and water quality, Sydney Water decided that the construction of the storage tunnel should form a key part of the overall solution.

1.2 The Decision to Build the Tunnel

Significant overflows again entered the harbour in January 1997.

As a result the Environment Protection Authority (the EPA) asked Sydney Water to focus on a solution. It would appear that Sydney Water was requested by the EPA to address the issue by the Sydney Olympics 2000 which commenced on 16 September 2000.

Sydney Water wrote subsequently to the EPA stating that:

- it could bring forward work to increase the capacity of the Northern Suburbs Ocean Outfalls Sewer
- a tunnel would, most likely, be the solution
- work could be completed by the Olympics.

In March 1997, Sydney Water's Board approved a budget of \$500,000 for the development phase of the tunnel to proceed.

The Government

In May 1997, the Premier of New South Wales announced the Government's Waterways Package, and established the Waterways Advisory Panel to assess the proposal by Sydney Water to build the tunnel against other options.

The Panel was asked to identify the best option to 'clean up' the harbour in time for the Olympics.

Sydney Water indicated to the Panel that the tunnel could be completed by June 2000, in time for the Olympics, using an alliance approach (alliancing is discussed at section 1.4 *What is Alliancing?*).

The Government accepted a recommendation of the Waterways Advisory Panel (August 1997) that Sydney Water proceed to build and complete the tunnel by the Olympics.

Sydney Water

In August 1997 the Managing Director of Sydney Water decided that the tunnel should be delivered by an alliance.

In January 1998, the Board of Sydney Water approved an alliance arrangement to construct the tunnel, and executed an Agreement with the preferred tenderers.

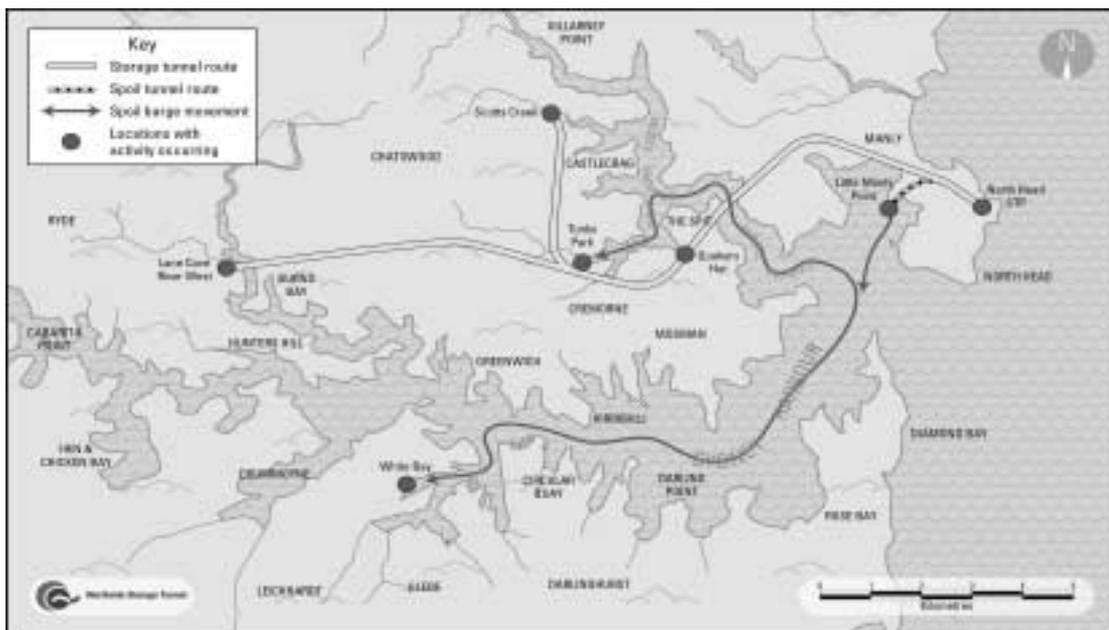
Completion of the project in time for the Olympics thus became an imperative for Sydney Water.

In the absence of a specific direction by the Government or the shareholding Ministers, however, it was the Board's decision to treat the Olympics as a deadline.

1.3 The Northside Storage Tunnel

The objective of the Northside Storage Tunnel (NST) is to collect sewage overflow in wet weather and store it in the tunnel until treated at the North Head Sewage Treatment Plant.

Figure 1.2 Route of the Northside Storage Tunnel



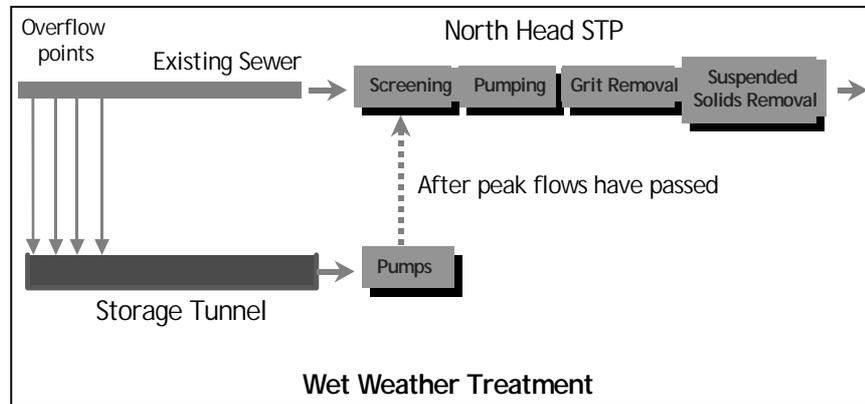
In this way, untreated discharges of sewage into Sydney Harbour are significantly reduced. The tunnel is designed to capture:

... 80-90 per cent of sewage overflow events from the four largest overflow points which release diluted sewage directly into Sydney's Waterways during heavy storms.

Source: Northside Storage Tunnel: *Submission for Australian Construction Achievement Award 2003*

The tunnel was expected to reduce the number of overflows from an average of sixteen times a year to an average of twice a year.

Figure 1.3 How the Tunnel Works



1.4 What is Alliancing?

Alliancing is a comparatively new approach to a construction project that has at its core, a mutually beneficial relationship between the parties to produce outstanding results.

Objectives

An alliance is intended to:

- increase co-operation between the partners
- reduce disputation
- allow a sharing of the benefits or costs that might befall any of the partners during the project.

Typically the relationship between the owner of the project and the alliance partners involves a risk/reward arrangement through which all parties benefit if outstanding performance is achieved.

Features	<p>An alliance incorporates the following features:</p> <ul style="list-style-type: none">▪ it involves two or more parties bound by a single agreement (the partners may include the owner, designers and constructors)▪ the performance obligations are generally stated to be collective, not individual▪ a commitment to resolve issues within the alliance without recourse to litigation except in the case of 'wilful default'▪ all transactions by all parties are 100 per cent open book and subject to audit▪ the project is governed by a leadership team with representatives from all parties who carry full authority to bind the party they represent, and all decisions by the team must be unanimous▪ the project is managed by an integrated project management team where members are assigned to the team on a 'best for project' basis▪ the alliance participants develop and commit to abide by an agreed set of alliance principles▪ reimbursement to the Other Alliance Partners is a 3-limb compensation model:<ol style="list-style-type: none">1. all direct costs incurred on the project2. a fee to cover corporate overheads and profit3. a performance based gain/pain sharing arrangement.¹
Alliance Contracts/Agreements	<p>Alliance contracts or agreements are variable cost arrangements, not fixed price instruments and allow important risks, for example design and construction, to be pooled.</p>
Risk Treatment	<p>Under traditional forms of contracting, such as Design and Construct, responsibilities and risk are allocated to the contractual parties. Commercial or legal consequences may arise if risks are not managed appropriately, or the parties do not discharge their obligations as set out in the contract.</p> <p>Under an alliance, uninsurable risk is shared between the alliance partners using a risk/reward model. The model provides that where agreed profits and overheads have been paid to the partners, the owner bears the costs of any future risks that emerge.²</p> <p>Some major NSW public sector agencies have, or are in the process of, implementing alliances. Sydney Water is entering into more alliances.</p>

¹ Jim Ross, *Project Alliancing in Australia, background, principles and practice, June 1999.*

² For a more detailed explanation, see Jim Ross, *Introduction to Project Alliancing, April 2003 Update,* pp 1-2

1.5 Why an Alliance?

Sydney Water was of the view that an alliance:

- was the only viable option to complete the tunnel by the Olympics (this conclusion was supported by expert advice)
- offered the possibility of exceptional results for a range of project objectives, namely cost, safety, environment and community consultation
- was the best way to manage the risk in respect of cost and completion by the schedule date in view of the uncertain ground conditions beneath the Sydney Harbour and along the route of the tunnel. To meet the deadline, only limited underground testing would be possible before a contract had to be let.

1.6 The NST Alliance

Objectives

The NST project had five delivery objectives:

- cost which was 'high value for money' by industry standards
- completion on or before 30 June 2000
- world class environmental practices and procedures
- sensitive and responsive management of community and social issues
- world class safety.

Principles of the Alliance

The principles of the NST Alliance were to:

- act in a way that is 'best for project'
- build a champion team which is integrated across all disciplines and organisations
- commit to a no blame culture
- use breakthroughs to achieve exceptional results in all project objectives
- commit corporately and individually to openness, integrity, trust, cooperation, mutual support and respect, flexibility, honesty and loyalty to the project
- provide outstanding rewards for outstanding results
- deal with and resolve all issues within the alliance
- spread the alliance culture to all stakeholders.

The Other Alliance Partners

Sydney Water entered into an alliance arrangement with three private sector firms referred to in this report as the Other Alliance Partners. They were:

- Transfield as the construction contractor
- Connell Wagner and Montgomery Watson as the engineering consultants.

Common with most construction alliances, Sydney Water:

- selected the Other Alliance Partners following a selection process (discussed below)
- subsequently agreed remuneration arrangements with the Other Alliance Partners
- entered into an Agreement with its alliance partners (discussed in chapter 2 *The NST Agreement*).

Selection Process

In selecting the Other Alliance Partners, Sydney Water:

- advertised for proposals
- briefed tenderers, and provided planning information and technical data
- established an evaluation team, tender selection criteria and weightings prior to assessment of proposals
- involved senior, well-credentialed Sydney Water staff and independent, external members
- arranged for an overview of the process by probity auditors.

Sydney Water followed expert advice in developing and using the above process.

Selection criteria were also chosen to determine those tenderers best able to contribute to the key areas, being:

- cost management
- schedule management
- environmental management
- community relations management
- safety/industrial relations/quality management
- an understanding of, and commitment to, 'alliancing'.

Critical in assessing proposals against the criteria were the skills, experience and past performance of the tenderers. The criteria did not require tenderers to submit an estimate of cost to build the tunnel.

Two tenderers were short-listed. The selection committee found both tenderers able to build the tunnel, but preferred the proposal of Transfield/Montgomery Watson/Connell Wagner to that of the other tenderer.

***Audit
Observations***

The process used by Sydney Water to select the Other Alliance Partners, within the constraints of selection without price competition, was generally satisfactory.

However, prior to the calling for tenders to select the Other Alliance Partners, staff of the Other Alliance Partners were involved in developing the initial scope and cost estimate for the project.

While the prior involvement of the successful tenderers in the concept phase of the tunnel was accepted by the probity auditors engaged by Sydney Water, it nevertheless exposed Sydney Water to complaint by other tenderers.

It is also of concern that we found no evidence that:

- the Board was specifically informed of their prior involvement when it approved the successful tenderers (although there is evidence that the Board was advised of those companies involved in the scoping work some eight months prior)
- the complaints by other tenderers were specifically brought to the attention of the Board.

2. The NST Agreement

2.1 Overview

Sydney Water entered into an Agreement with its alliance partners. This is common practice in an alliance. In line with the principles of the alliance discussed earlier, the Agreement:

- promoted an open, honest and co-operative culture in pursuit of project objectives
- established a risk/reward arrangement to promote the achievement of project objectives.

2.2 Features

The Agreement included the following features:

- adoption of world's best practice and innovation to achieve outstanding results for the project
- a 'no blame' culture to avoid disputation and litigation
- decisions of the Project Alliance Leadership Team (PALT) to be unanimous
- practical completion by 30 June 2000
- Sydney Water to meet the direct costs of the project
- the Other Alliance Partners place at risk profit, and then their overheads, in the event of poor performance on non-cost objectives
- establishment of *Target Direct Cost* and performance benchmarks for environment, community and safety objectives, to occur after the agreement was entered into
- a minimum reward pool of up to \$4 million for outstanding performance on time, environment, community and safety, with the possibility of an additional \$6 million if the actual direct cost was less than the *Target Direct Cost*
- *Target Direct Cost* to be verified by an independent expert.

In accordance with the Agreement, Sydney Water:

- would pay the direct costs on the project, irrespective of the quality of the work of the Other Alliance Partners (short of wilful default) and would pay 50 per cent of cost overruns with the Other Alliance Partners also paying 50 per cent
- did not have access to a range of sanctions normally associated with the traditional lump sum contract, such as liquidated damages for delay
- was able to vary the construction sequence and timing without variation cost
- was able to accept changes in regulatory and community input after the completion of the EIS process without specific contract compensation
- was able to retrospectively define technical performance parameters at no penalty.

Leading legal experts on alliancing developed the Agreement.

Profit and Overhead

The Agreement incorporated profits and corporate overheads based on:

- profits and corporate overheads on previous projects of the partners
- industry profit and corporate overheads.

The preferred partners were required to 'open their books' to an accounting firm engaged by Sydney Water, so that the profits and corporate overheads on recent projects could be verified. An industry expert provided advice to Sydney Water on industry profits and corporate overheads.

The Agreement provided for the profit and overheads to be paid to the Other Alliance Partners to be 12.2 per cent of the *Target Direct Cost* subject to:

- the tunnel being delivered to the *Target Direct Cost*
- satisfactory performance on non-cost objectives.

Use of Experts

The use of industry experts and auditors to provide assurance of 'fair and reasonable' profits, overheads and gain sharing was accepted better practice for alliancing. Sydney Water engaged leading practitioners to assist in this process.

Reports of the industry expert and the auditors do, however, highlight some of the limitations experts face in providing such assurance. These limitations include:

- the small number of precedents to guide the selection of profits and overheads due to their 'commercial-in-confidence' sensitivity
- the use of unaudited figures
- that two of the Other Alliance Partners had not previously separated direct costs from overheads
- the lack of a standard definition of direct cost and overhead.

The industry expert advising Sydney Water endorsed a rate of 12.2 per cent for profits and overheads to be paid to the successful tenderer.

Another expert has indicated that based on the risks taken by the private sector partners in an alliance compared with the risks taken in other project delivery methods an appropriate rate on an alliance project would be in the range of 8-10 per cent.

It is common practice for rewards in a construction project to relate to completion of the project on time (or on 'schedule') and within the agreed budget. Many contracts do not have risk/penalty provisions.

The financial reward or penalty pertaining to the objective of:

- cost (of 'high value for money' by industry standards) was based on the achievement of the *Target Direct Cost*
- schedule (completion of the tunnel on or before 30 June 2000) was based on completion of the tunnel 'on time'.

The Agreement was the first contract entered into by Sydney Water that linked risks and rewards to performance on the following 'non-cost' objectives:

- world class environmental practices and procedures (environment)
- sensitive and responsive management of community and social issues (community)
- world class safety (safety).

The logic in the risk/reward structure is:

- exceptional performance → exceptional return
- normal performance → normal return
- poor performance → poor return

A leading expert on alliancing assisted the development of the system.

The following is an overview of the risk/reward system incorporated in the Agreement.

<p>Risks</p> <p>Fixed dollar values for overheads and profit margin are agreed with the <i>Other Alliance Partners</i>.</p> <p>Cost</p> <p>Both overheads and profit margins are placed at risk in the event of cost overrun of the <i>Target Direct Cost</i> and/or poor performance in any or all of the non-cost objectives (time, environment, community, safety).</p> <p>Any direct cost overrun will be shared 50/50 between the Other Alliance Partners and Sydney Water, subject to a cap equal to the sum of profit margin and overheads.</p> <p>Non-cost</p> <p>If the performance is poor in a non-cost objective, there is a direct cost penalty up to a maximum equal to the reward for outstanding performance.</p> <p>In addition, poor performance on a non-cost objective can also impact negatively on reward for cost margin. This is known as a 'fee modifier' and is designed to ensure poor performance on one objective is not traded off against another. If performance against one non-cost objective is poor, the net gains (i.e. profit margin and any share of cost savings/overrun) is reduced by 50 per cent. If performances are poor on more than one non-cost objective, net gains are reduced by 100 per cent.</p>
--

Rewards**Cost**

In the event that actual direct costs are below the *Target Direct Cost*, the difference is to be shared between Sydney Water and the Other Alliance Partners.

The first \$20 million of savings is to be shared on the basis of 60 per cent for Sydney Water, and 40 per cent for the Other Alliance Partners. Sydney Water is to make 50 per cent of their share of savings (up to \$6 million) available to the non-cost incentive pool (see next paragraph). Any savings above the \$20 million are shared equally between Sydney Water and the Other Alliance Partners.

The incentive pool is created to promote outstanding performance in the non-cost objectives. It has a minimum of \$4 million, and up to \$10 million through the addition of 50 per cent of Sydney Water's share of savings up to \$20 million (as described in the previous paragraph).

Non-cost

If the alliance achieves above normal performance in:

- time, then a reward of up to \$4 million is available (where the pool is \$10 million)
- environment, community and safety, then a reward of up to \$2 million is available for each (where the pool is \$10 million).

Each reward is on a sliding scale depending on the results of the independently audited performance.

Performance Ratings

Performance ratings were to be used in conjunction with the risk and reward models and applied to the 'non cost' objectives. The ratings were:

- 'poor'
- 'business as usual'
- 'best practice'
- 'outstanding'.

The performance ratings were developed subsequent to the signing of the Agreement, and are discussed in Chapter 5.

The implementation of the models was subject to audit by a firm of chartered accountants. The firm concluded that the calculations in relation to the risk/reward components of environment, time and safety complied with the Agreement and can be substantiated to supporting documentation.

Illustrative Examples

Where performance on the *Target Direct Cost* was satisfactory or better, the potential reward for outstanding performance on non-cost objectives was low in comparison to the potential penalty for 'poor' performance on non-cost objectives.

The following examples illustrate.

Example 1: Actual and Target Direct Costs Equal

Rewards available for outstanding performance on non-cost objectives:

- schedule: \$1.6 million
- environment: \$0.8 million
- safety: \$0.8 million
- community: \$0.8 million.

Poor performance on any:

- one of these objectives would have cost the Other Alliance Partners \$10 million of the profit and a performance penalty
- two would have cost \$20 million of the profit and a performance penalty.

Example 2: Actual Direct Cost \$20 million less than Target Direct Cost

Rewards available for outstanding performance on non-cost objectives:

- schedule: \$4.0 million
- environment: \$2.0 million
- safety: \$2.0 million
- community: \$2.0 million.

Poor performance on any:

- one of these objectives would have cost the Other Alliance Partners \$14 million of the net gain (profit plus cost margin) and a performance penalty
- two would have cost \$28 million of the net gain (profit plus cost margin) and a performance penalty.

This was not the case, however, where actual direct costs exceeded *Target Direct Cost*. As cost overruns increased, the potential penalty for poor performance on non-cost objectives diminished. The reward pool remained, however, at the minimum level. Example 3 illustrates.

Example 3: Actual Direct Cost \$20 million more than Target Direct Cost

Rewards available for outstanding performance on non-cost objectives:

- schedule: \$1.6 million
- environment: \$0.8 million
- safety: \$0.8 million
- community: \$0.8 million.

Poor performance on any:

- one of these objectives would have cost the Other Alliance Partners \$5 million of the profit and a performance penalty
- two would have cost \$10 million of the profit and a performance penalty.

Had the cost overrun been more than \$80 million, poor performance on any of the non-cost objectives would result in no further cost penalties (beyond the amounts available in the incentive reward pool). The situation, however, would result in every additional hour of work being carried out at zero margin and overhead recovery to the Other Alliance Partners.

**Audit
Observations**

The Agreement established a framework which promoted alliance principles and encouraged achievement of project objectives.

The '*no blame/no dispute*' culture promoted:

- innovation and lateral thinking
- focusing of attention on solutions, rather than finding the 'guilty' partner when an unintended and negative consequence eventuates.

We note, however, that while the Agreement worked in a satisfactory manner:

- the '*no blame*' clause could have mitigated against an alliance partner's legal obligation to use reasonable care. Had an alliance partner been negligent, other partners would have a cause of action only if *wilful default* was present
- the alliance partners may not have had recourse to professional indemnity insurance had a breach of professional duty occurred
- the absence of an objective deadlock-breaking mechanism in the event of dispute between the alliance partners in the opinion of some may have rendered the Agreement unenforceable.

Sydney Water considers, on balance, the potential benefits in co-operation, lateral thinking and innovation from alliancing outweigh any commercial and legal issues compared to the traditional contract.

Sydney Water management recently advised the Board that:

Current contracts contain provisions to overcome concern that the terms of the NST alliance contract did not provide certainty and was therefore unenforceable.

**Risk/Reward
Arrangements**

Overall, the risk/reward system and models appeared to work effectively to pool responsibility, encourage innovation and promote co-operative problem resolution.

Alliance documents and the observations of independent construction experts and researchers who sat in on project meetings indicate that the alliance:

- focused on all objectives
- dealt well with unexpected occurrences, and
- promoted innovation and high rates of productivity.

As recently put to the Board:

... Sharing of risk between all participants and linking performance to commercial return (risk/reward), forces better management of risks. This not only allows better approaches to reducing the risks, through cross discipline solutions with lower costs, but also provides greater certainty that the objectives will be achieved within the approved budget.

It is not clear why the penalties for 'poor' performance on 'non-cost' objectives should:

- increase in severity if there are cost savings
- decline in severity if there are cost overruns.

Driving performance when rewards diminish

As a project progresses, the likely performance on project objectives, and the likely profits and overheads, become increasingly apparent. A risk arises that the rewards available for distribution to the Other Alliance Partners may not be sufficient to drive timely and economical completion of the project.

The risk is heightened if the *Target Direct Cost* includes hidden profit and overhead. While the review by the industry expert and auditors should prevent this, expert advice is that it has occurred on some other projects.

Employee rewards were also linked to project performance. As the project neared completion it became apparent that staff rewards would be lower than expected.

A risk emerged that valued employees would resign from the project prior to its completion. The alliance, at the completion of the tunnel, paid a 'finish-up' allowance to staff to mitigate this risk. This was a cost shared by Sydney Water and the Other Alliance Partners.

2.3 Target Direct Cost

The Agreement signed in late January 1998 provided for the development of a *Target Direct Cost* by the end of March 1998.

The *Target Direct Cost* is a critical element of alliancing. It forms the baseline for the rewards and penalties flowing from the risk/reward model.

Common Interests

Common interests between the alliance partners are at the core of project alliancing. The commercial interests of the principal and Other Alliance Partners are aligned when the *Target Direct Cost* is determined.

It is in the commercial interests of the Other Alliance Partners to maximise the *Target Direct Cost*, and to hold back on cost-saving ideas until after the *Target Direct Cost* is established.

On the other hand, it is in the commercial interests of the owner to minimise the *Target Direct Cost*, and to ensure that the design and scope of works build in as many cost-saving ideas as possible.

For these reasons, one of the biggest challenges of alliancing is to ensure that the *Target Direct Cost* is not 'soft'. A soft *Target Direct Cost* can come about through over-design or through high cost estimates.

Achievement of the *Target Direct Cost* results in payment of the agreed profit and overheads to the Other Alliance Partners.

If the project had been completed at less than the *Target Direct Cost*, savings would have been shared between the partners, including Sydney Water.

As it happened, the cost overrun was shared between the partners. The Agreement capped the sharing of cost overruns at agreed profit and overheads. After this, Sydney Water, as the owner, would have met the cost overruns.

Issues associated with the *Target Direct Cost* are discussed in chapter 4 *Cost*.

3. Time

3.1 Overview

Sydney Water sought to complete the tunnel by 30 June 2000 and in time for the Olympics.

The Olympic deadline was very tight. Experts considered that it would be difficult to achieve and that an alliance was the only way to meet the deadline.

The alliance approach offered the ability to commence work quickly and schedule work flexibly. This was critical to 'fast-tracking' the project.

The Olympics deadline became imperative in decision making.

As events unfolded it became clear that the completion of the tunnel in time for the Sydney Olympics could not be achieved. The main reasons were that more time than planned was needed for:

- Sydney Water to determine modifications to the 'conditions of approval' for North Head
- other relevant bodies to grant certain approvals related to the project.

As a result two extensions had to be granted to complete the tunnel; one in October 1998 and the other in October 1999. These extensions were granted with the imprimatur of Sydney Water management.

The extensions took the date for practical completion to 12 October 2000, after the Sydney Olympics 2000 (which commenced on 16 September 2000).

Sydney Water and the alliance used the flexibility of the Agreement to reorganise work so that the tunnel could have accepted overflows from two sites during the Olympics.

To achieve this outcome, construction work was divided into two parts, called 'separable portions'. The Agreement allowed this.

This had implications for the project risks and costs.

3.2 Separable Portion 1

Separable portion 1 comprised:

... the tunnel and associated facilities reasonably capable of taking overflows from the four overflow sites (emphasis added).

The completion date for separable portion 1 was 12 October 2000, the same as it had been for practical completion of all tunnel works.

Sydney Water issued a *Certificate of Practical Completion* that separable portion 1 met the requirements for 'practical completion' on 13 September 2000, or three days before the commencement of the Olympics.

Background

The tunnel was able to accept overflows during the Olympics from the Lane Cove and Quakers Hat Bay overflow points. These points represented approximately two thirds of the capacity of the four overflow points. Sydney Water has advised that:

Although construction of the facilities at the other two sites was essentially complete, final testing and commissioning of the facilities was not pursued.

Sydney Water felt that it would be prudent not to take overflows during the Olympics from:

- Scott's Creek due to the status of negotiations with the community at the time
- Tunks Park as this could adversely impact on remaining tunnel work and would not greatly improve pollution of the main harbour.

The decision to give priority to work that would allow the tunnel to accept overflow from two points during the Olympics meant Sydney Water incurred:

- \$1 million to bring the tunnel 'on-line' before the Olympics and take it 'off line' after the Olympics
- a risk that, if the tunnel had been required to accept overflows during the Olympics, it would have had to be decontaminated before all remaining work could recommence.

The rewards and sanctions payable to the Other Alliance Partners relating to 'schedule' or 'on time' were now 'tied' to practical completion of separable portion 1 rather than, as was originally the case, completion of the tunnel in its entirety.

**Audit
Observations**

As it turned out, the tunnel was able to accept overflows from only two of the planned four overflow sites by the Olympic deadline.

The other two overflow points had not met the requirement for practical completion as not all appropriate testing and commissioning had been carried out.

It was determined, however, that this outcome met the requirements for 'practical completion'. On this basis the issue of a certificate of 'practical completion' was not consistent with the definition for separable portion 1.

The Board of Sydney Water :

- was advised that Sydney Water management was aiming to commission two of the four overflow points
- approved the proposal to commission the tunnel for temporary use during the Olympics.

However, a review of Board papers and minutes does not indicate that the Board was advised:

- fully of the implications for risks, rewards and incentives arising from the creation of separable portions
- that Sydney Water management had certified that separable portion 1 met the requirements for practical completion when only two of the four overflow points had technically met the requirements for practical completion.

In our view, the Board should have been better informed.

The decision and a determination of 12 October 2000 as the date for 'practical completion' of separable portion 1:

- made it easier for the alliance to earn the bonus for early completion
- reduced the alliance's risk of a penalty of approximately \$5 million which would have been incurred if practical completion had not occurred on or before 28 November 2000 (or some later date if further extensions of time had been granted in accordance with the Agreement).

3.3 Separable Portion 2

Separable portion 2 comprised the work remaining to complete the tunnel after separable portion 1. This included work such as:

- automation of tunnel pumping stations
- construction work at tunnel access points
- earthworks and landscaping
- site demobilisation and reinstatement
- final training of Sydney Water staff
- handover of project documents to Sydney Water
- repair of minor defects and omissions.

No specific 'schedule' rewards or sanctions applied to separable portion 2 (rewards and sanctions for 'schedule' applied to separable portion 1).

The completion date for portion 2 was 12 December 2000. Sydney Water issued a *Certificate of Practical Completion* on 18 December 2001 which indicated that practical completion was achieved on 30 October 2001. Sydney Water advises that:

- for all practical purposes the tunnel was complete in early January 2001
- interruptions to construction would have meant that the completion date could have been moved justifiably to mid January 2001, and
- that 30 October 2001 was selected as the 'formal' date for handover to Sydney Water's Operations Group.

***Audit
Observation***

The Audit Office was not able to verify the above advice from Sydney Water.

3.4 Informing the Board

Extension of Time

In October 1998, the alliance formally requested the date for practical completion be extended from 30 June 2000 to 31 August 2000.

In April 1999, the Board was advised that:

- the extension of time was justified, and
- had been decided by PALT (PALT included Sydney Water representatives).

The April 1999 Board papers also indicate that:

... over the period May to September 1998, the alliance has suffered some delays arising from Sydney Water and the consequent effects on the Department of Urban Affairs and Planning.

The Board papers do not show that these matters were brought to the attention of the Board before April 1999.

Audit Observations

The delays increased the risk that the project would not be completed by the Olympic deadline. In our view, this should have been brought to the attention of the Board sooner.

4. Cost

4.1 Overview

An objective was for the tunnel construction to be:

... cost competitive and meet industry standards for exceptional value for money.

On the evidence available, we are not in the position to judge whether the cost of the tunnel represented 'value for money'. Sydney Water has yet to undertake a post-implementation review of the project.

This review, once undertaken, may support a view held by Sydney Water management and its alliance partners that the cost of the tunnel represents 'value for money'.

Important components of the total costs of the tunnel were:

- actual direct cost of construction of the tunnel, comparable to the *Target Direct Cost* for risk/reward calculations
- direct cost of spoil disposal (not subject to profit, overhead or risk/reward arrangements)
- profits and overheads
- risk/reward adjustment
- Sydney Water project management costs, sales tax and borrowing costs.

Appendix 4 provides an outline of the key costs.

4.2 Total Cost

The final cost of the tunnel is yet to be determined. Sydney Water expects the cost of the tunnel at completion will be \$465.7 million.

Certain insurance claims are outstanding and equipment sales are yet to be finalised. The determination of these matters will affect the final cost and payments to the Other Alliance Partners.

The total expected cost of the tunnel changed over time as shown in the following table:

Date	Budget	Comment
August 1997	\$375m	Cost estimate provided to the Waterways Advisory Panel for review. The estimate includes \$50m for biosolids and other conduits, and \$35m for other connections, including connection of Shelly Beach pumping station to the tunnel.
January 1998	\$300m	Indicative cost at the time the Board approved the alliance contract of \$270m plus \$30m contingency. The budget includes overheads and profit. Biosolids and other conduits now down to \$5.5m. Excludes Shelly Beach.
November 1998	\$300m	The Board of Sydney Water is advised that estimated cost is now \$412m, much higher than previously estimated. The Board asks management for a detailed report on the costs and project risks, including spoil disposal costs.
April 1999	\$430m	The Board: <ul style="list-style-type: none"> ▪ receives a detailed report on project costs and risks ▪ approves budget, which incorporates <i>Target Direct Cost</i> (\$322m), which includes Shelly Beach connection. It also approves an escalation allowance.
August 1999	\$451m	Board approve adjusted budget, which adds sales tax and borrowing costs of \$21m.
July 2000	\$453m	Board approves adjusted budget, which adds additional Olympic commissioning costs.
December 2000	\$470m	Board approves adjusted budget, which provides for expected additional project costs, principally tunnelling related. Final <i>Target Direct Cost</i> is \$333m, incorporating minor scope changes and escalation.

Review by Sydney Water

In November 1999 Sydney Water undertook a major review comparing the estimated cost of the tunnel in January 1998 (\$300 million) with April 1999 (\$430 million). The review identified the following main reasons for the increase:

- various scope changes (\$34 million)
- higher costs of spoil disposal due to unavailability of the preferred disposal option (\$30 million)
- allowance for escalation (\$18 million)
- rising costs of tunnelling labour, and foreign exchange rate movements which increased the cost of equipment (\$15 million)
- changes to site configurations to allay community concerns and achieve regulatory requirements (\$14 million)
- additional tunnelling equipment and operations due to poor geological conditions under Middle Harbour (\$12 million)
- increased insurance (\$6 million).

The review also found that the indicative budget provided to the Board in January 1998 was in error, understating expected costs by some \$28 million.

A Review of Sydney Water's Capital Expenditure Program in March 1999 indicated that:

The Northside Storage Tunnel has increased in cost from an original estimate of approximately \$270 million (\$300 million approved by the Board in January 1998 after an additional \$30 million contingency was added) to a current estimate of \$412 million. The extent of this cost increase indicates that the risk management process was potentially inadequate in this case, as Sydney Water was left exposed to large potential cost increases (eg removal of excavation material)³.

The increase from \$430 million in April 1999 to the final budget of \$470 million is largely a result of:

- sales tax and borrowing costs, not previously accounted for
- additional tunnelling costs related to worse than predicted tunnelling conditions under the harbour, which slowed progress and necessitated the use of an additional tunnel boring machine and continuous shift operation to have the tunnel available during the Olympics.

Net Present Value

The benefit of a proposed project can be measured by its Net Present Value (NPV) which is expressed in dollar terms. The NPV is the sum of the estimated benefits of a proposed project less its estimated costs, with future benefits and costs reduced to their 'present value'.

A project is potentially worthwhile if the NPV is greater than zero. Economic, environmental and social benefits and costs are considered in arriving at the NPV.

The Environmental Impact Statement for the tunnel (September 1997) indicated that Sydney Water calculated the NPV of the tunnel to be a negative \$64 million. It is not evident that the Board acknowledged this when approving the project in January 1998.

³ Pacific Road Corporate Finance, Gutteridge Haskins & Davey Pty. Ltd. Review of Capital Expenditure Programme Sydney Water Corporation March 1999, p 5.

**Audit
Observations**

We recognise that:

- the alliance risk/reward model provides an incentive to minimise costs (although not at the expense of other objectives)
- the alliance encouraged all parties to focus on overcoming construction problems when difficult ground conditions were encountered in sections of the tunnel (under a conventional contract serious disputes could have arisen over the allocation of responsibility for such 'latent' conditions, leading to inevitable delays and associated cost increases)
- there were a number of cost-saving initiatives implemented during the life of the project:
 - indications are that some savings came from innovations
 - some came from the alliance successfully challenging Sydney Water's traditional approach to design and operational philosophy
- some design enhancements, which improved the tunnel's operation, were made without change to the *Target Direct Cost*
- the industry expert's verification of the *Target Direct Cost* provided a constraint on an excessively high construction cost
- the *Actual Direct Cost* exceeded the *Target Direct Cost* by \$25.4 million for reasons beyond the control of the alliance (in line with the risk/reward model, Sydney Water and the Other Alliance Partners shared the penalty from the direct cost overrun)
- the financial reward paid to the Other Alliance Partners, including overhead, represents approximately 6.5 per cent of total cost of the tunnel and is considered to be moderate
- Sydney Water's project management costs for the NST were about 2 per cent. Sydney Water advises this compares favourably with its project management costs of almost 10 per cent on the Deep Ocean Outfalls Project, a design and construct project (this is attributed to the different approaches to management under the two contract models).

Our concerns include the following:

- the cost estimates provided to the Board and Waterways Advisory Panel to support the tunnel project proved to be significantly understated
- the Board approved the project in 1998 on the basis of an indicative budget only, which turned out to be materially inaccurate
- there was no formal consideration of whether another method could have delivered the project at less cost (the alliance approach was selected because it was believed to be the only option which could meet the Olympic deadline)
- no comprehensive post-implementation review of the project has been undertaken to assess whether the final cost represents 'value-for-money', whether savings have come about from true innovations or efficiencies or as a result of a 'soft' Target Direct Cost, and to identify what lessons could be learnt for the future
- Sydney Water did not recalculate the NPV notwithstanding a significant increase in the cost to build the tunnel (it is good practice to update the NPV as planning proceeds, and formally reconsider the worth of the project, particularly where there is a significant change to the project in terms of scope or cost)
- Sydney Water has not quantified the additional costs incurred to meet the Olympic deadline or the expected benefits from meeting the deadline.

We note that Sydney Water management advised the Board at its meeting on 19 March 2003 that it had improved its processes for estimating project costs, so that risks were better assessed and taken into account.

Sydney Water advises that in subsequent alliances, the project concept has been further advanced and costs more refined before going to the market to seek alliance partners, a lesson learned from the Northside Storage Tunnel project.

The remaining sections of this chapter discuss, in more detail, the *Target Direct Cost*, and the cost of the disposal of spoil.

4.3 Target Direct Cost

The *Target Direct Cost* is the direct cost, as agreed between Sydney Water and the alliance, to be incurred by the alliance to build the tunnel. The *Target Direct Cost* is independently verified.

Development

The following table summarises the development of the *Target Direct Cost* for the tunnel.

29 January 1998	NST Agreement signed, requiring PALT to submit <i>Target Direct Cost</i> by April 1998 for verification by industry expert.
April 1998	<i>Target Direct Cost</i> developed, based on a design estimated to be 50 per cent complete. At over \$400m, the alliance considers this 'over-design' in meeting the project objectives.
April to July 1998	Sydney Water staff not involved in the alliance and other experts work with the alliance to undertake an extensive review of the design and cost assumptions. The Industry Expert was engaged in June 1998 to examine the <i>Target Direct Cost</i> . This occurred over June and July.
27 July 1998	The Industry Expert receives a revised <i>Target Direct Cost</i> , from the alliance which is based on a design estimated to be 70 per cent complete.
July to Oct 1998	Discussions occur with the Industry Expert. Further information provided. <i>Target Direct Cost</i> revised.
27 October 1998	The Industry Expert verifies a revised <i>Target Direct Cost</i> as within the 'competitive range' for the tunnel.
18 November 1998	The Board of Sydney Water considers the verified <i>Target Direct Cost</i> , noting costs are much higher than previously estimated. Estimated total cost of the tunnel is now \$412m. The Board asks management for a detailed report on the costs and project risks, including spoil disposal costs.
6 April 1999	The Board approves the proposed <i>Target Direct Cost</i> of \$322m, adding the connection to the Shelly Beach pumping station to the scope of works. Total expected cost \$430m.
Post April 1999	Additional minor expansions of scope, and allowance for cost escalation, increase the <i>Target Direct Cost</i> to its final amount of \$333m.

Board Decision

The Board of Sydney Water on 7 January 1998 approved the Northside Storage Tunnel Project:

... subject to the fully detailed project estimate [the *Target Direct Cost*] being independently verified by third party project estimating specialists within three months of signing the contract.

In implementing the Board's decision the industry expert:

- was engaged through a competitive process on a fixed-price basis to determine if the cost estimate originally established by the alliance was reasonable
- relied on the design and scope developed by the alliance
- was not engaged to review the appropriateness of design and scope.

The Agreement signed in late January 1998 required the development of the *Target Direct Cost* by the end of March 1998.

Advice to the Board

In April 1998, the alliance estimated the tunnel would cost approximately \$450 million with a *Target Direct Cost* of over \$400 million.

While Sydney Water considered that 'over-design' was a major factor in these estimates, it was an indicator that the total cost of the tunnel was likely to be substantially higher than the indicative budget at the time of \$300 million. Board papers:

- do not show that this was drawn to the attention of the Board at the time
- for May 1998 indicate that the Board was advised that the verified *Target Direct Cost* was anticipated to be delivered by the end of June 1998 (it would seem the quantum of the *Target Direct Cost* was not discussed)
- do not show that the cost of the tunnel was again raised prior to the November 1998 Board meeting at which the Board was advised that the estimated cost of the tunnel was \$412 million.

Audit Observations

Sydney Water has advised that:

- the target for the verification of the *Target Direct Cost* was ambitious
- four months was required to finalise the first estimate of cost due to various difficulties
- further time was required to review and reduce the estimate, and
- the industry expert determined that the *Target Direct Cost* was not excessive.

Nevertheless, in our view, the Board should have been informed formally of the delay in verifying the *Target Direct Cost* and the reasons for the delay. Equally, however, the Board does not appear to have pursued executive management on the issue between June 1998 and November 1998.

As it was, by the end of October 1998, \$80 million had been expended and a further \$55 million had been committed on the tunnel.

Under the circumstances, and having regard to other imperatives, like completion of the tunnel by the Olympics, the Board was not in a position to consider its options.

If the Board had been advised in April 1998, when some \$9 million had been spent on the project, it would have been in a better position to review the project. It is also of concern that the project operated for 15 months without an agreed *Target Direct Cost*.

It would seem the Agreement should have incorporated mechanisms to ensure that a verified *Target Direct Cost* was obtained prior to substantial expenditure and commitments.

- Reliance on Experts* Significant reliance was placed on:
- alliance staff, Sydney Water staff and experts examining aspects of the design to ensure the overall design was optimal
 - the industry expert to ensure that the *Target Direct Cost* was not excessive.

The success of this arrangement can only be judged through a detailed examination of the actual direct cost against the *Target Direct Cost*. This is yet to occur.

Subsequent Improvements The Board was recently advised that in Sydney Water's more recent alliances:

... More robust approaches to the development and testing of the target cost estimates by the independent estimators has driven better solutions and improved Sydney Water's ability to demonstrate achievement of market rates.

Also more recent Sydney Water alliances have used:

- an interim Agreement for development of the design and *Target Direct Cost*, including verification
- a final Agreement incorporating the agreed *Target Direct Cost*, if acceptable to Sydney Water.

This approach has resulted in finalisation of the *Target Direct Cost* before substantial expenditure has occurred.

A leading expert on alliancing believes there remains potential to improve the development and testing of *Target Direct Costs*:

- better education of all parties before embarking on the development of the Target Direct Cost
- more focussed access to the contractors' previous estimates and outturn cost against which to benchmark relevant elements of the *Target Direct Cost*
- better facilitation of the *Target Direct Cost* development process to ensure all parties are fully involved, informed and satisfied
- more rigorous analysis of the actual direct cost versus the *Target Direct Cost* to determine and record the real reasons for under runs (or overruns) and assess whether savings have come about from true innovations or efficiencies or as a result of a 'soft' *Target Direct Cost*.⁴

The Board of Sydney Water was recently advised that Sydney Water:

... is continuing to refine how alliance contracts are established and managed to reduce the risk and increase the value to Sydney Water.

⁴ J Ross, *Introduction to Project Alliancing (on engineering and construction projects) - April 2003 update*, p 20

4.4 Disposal of Spoil

The disposal of spoil from excavating the tunnel cost \$48.2 million.

July 1997

On 16 July 1997, Sydney Water wrote to Environment Australia seeking comment on a proposal to dump the spoil at sea (Australia is a signatory to the *International Convention on Sea Dumping* and Environment Australia is the ultimate Determining Authority).

August 1997

Environment Australia replied (19 August 1997) indicating that it could:

... see no reason as to why a sea dumping permit would not be issued provided that Sydney Water has thoroughly investigated and exhausted all possible options for the disposal of crushed rock, and there is no feasible alternative other than sea disposal.

September 1997

The Environmental Impact Statement (EIS) for the tunnel (September 1997) considered a range of options to dispose of spoil from excavating the tunnel. One option listed in the EIS was to dump the spoil at sea ('offshore') at an estimated cost of \$15 million. The EIS indicated that disposal at sea had the:

least cumulative environmental and social impacts

and was the:

least cost alternative.

Sydney Water assessed the options against the following criteria:

- preference for beneficial reuse, consistent with Sydney's Water's commitment to ESD and the waste hierarchy adopted in the *Waste Minimisation and Management Act 1996*
- certainty that the option will be available when required
- cost
- community and environmental impact
- life cycle assessment of energy consumption and greenhouse gas generation.

Source: Northside Storage Tunnel Environmental Impact Statement September 1997.

Three options were short-listed:

- 'onshore' storage for beneficial reuse of spoil as clean fill for construction sites (cost \$35 million)
- direct barge transport to Botany Bay for reuse of spoil as clean fill for construction of a dock extension (cost \$15 million)
- transport the spoil by barge to White Bay Dock, haulage by road or rail to beneficial reuse opportunities (cost \$35 million).

Disposal at sea was not short-listed although this option was estimated to cost \$20 million less than two of the options short-listed.

Further Developments

December 1997

In December 1997, the Director General of Planning recommended to the Minister for Planning that spoil not be dumped at sea. The Minister subsequently determined the Conditions of Approval for the construction of the tunnel. One such condition was that no spoil shall be disposed of to the ocean.

September 1998

In September 1998, the Board was advised that dumping the spoil at sea was at that time being investigated.

Audit Observations

We sought to gain an appreciation as to why disposal at sea was not pursued given the potential savings and other benefits identified in the EIS.

Sydney Water did not provide documentation (additional to the EIS) to explain:

- how the criteria were applied to the various options, and
- why disposal at sea was not a short-listed option.

It is not clear to us whether, and to what extent, costs were considered in reaching the short-listed options.

Consequently the Audit Office is not able to form a view that the decision to pursue the more expensive options was based on a transparent cost benefit analysis.

In response to the draft audit report Sydney Water advised that:

- '*the political and policy framework in September 1997 required beneficial re-use*', and
- beneficial re-use was '*a prime criteria*' in the selection of the three short-listed options. The EIS did indicate a preference for beneficial reuse.

5. Environment, Community and Safety

5.1 Overview

In addition to the conventional objectives of 'cost' and 'on-time', the alliance Agreement had objectives to:

- be sensitive and responsive to the environment
- involve the community in the planning, design and construction processes
- achieve world class safety standards.

This was the first time Sydney Water attempted to link performance in these objectives to rewards.

Performance in the above areas is discussed in more detail in this section of the report.

5.2 Development of Performance Measures

The Agreement provided that the performance of the alliance in terms of the environment, community and safety objectives affected the quantum of reward or penalty to the Other Alliance Partners.

Based on expert advice the alliance determined benchmarks and measurement methodologies for the stated objectives of the environment, community and safety.

Standards

The benchmarks and measurement methodologies applied to both management processes and outcomes. Performance levels were:

- 'poor'
- 'business as usual'
- 'best-practice'
- 'outstanding'.

The scoring system adopted for:

- environment had six process and six outcome indicators
- community had twelve process and five outcome indicators
- safety had twelve process and one outcome indicator (based on accident and injury levels statistics).

In Sydney Water's most recent alliances, performance benchmarks and measurement processes are:

- more refined, in part based on the experience of the Northside Tunnel project
- developed under an interim alliance Agreement, and form part of the final agreement.

**Audit
Observations**

The process for developing performance benchmarks and measures for the tunnel was generally robust. However the:

- benchmark documents took almost 12 months for development and issue/implementation
- benchmark documents for safety and community could have been simpler, with a greater emphasis on outcomes, more like the environment benchmark documents
- safety indicator gave substantial weight to process over outcomes. Measured injury statistics only accounted for one thirteenth of the overall score.

Development of outcome indicators for community and environment presented particular challenges. For example, it is often difficult to separate facts and belief in community debate. There is a need, however, to reconcile the needs of the broader community with those directly affected by a decision.

It can also be difficult to separate performance of the alliance from that of the owner in community consultation. For example Sydney Water decided before the Alliance was formed to not proceed with the biosolids treatment plant.

This affected community attitudes towards the tunnel and the consultation process.

Sydney Water has gained from the experience and built lessons learned into subsequent alliances.

5.3 Monitoring and Assessing Performance

**Environment,
Community and
Safety**

At monthly intervals throughout the project, internal audits were conducted of compliance with the benchmark standards established for the project.

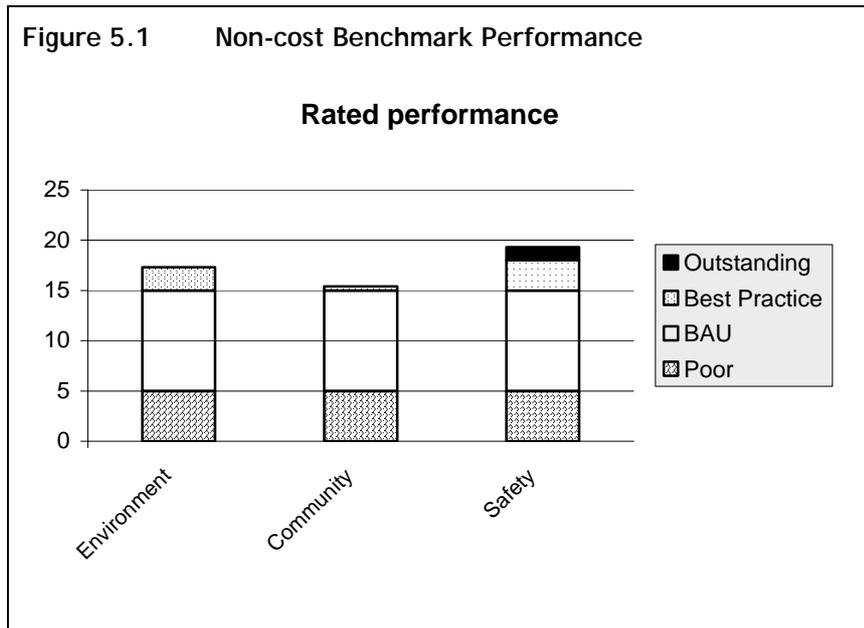
In order to determine the risk/reward status throughout the project, external assessment of performance against the benchmarks was undertaken at about six monthly intervals.

Experts in the environment, occupational health and safety, and community consultation undertook the assessments.

Experts concluded that that alliance performed at:

- 'best practice' for objectives relating to community and environment, and
- 'outstanding' on the safety objective.

The following figure demonstrates assessed performance diagrammatically.



Audit Observations

Community

The processes adopted for monitoring and assessing performance were robust.

An expert panel rated performance on the community objective as 'best practice'. But some residents were not satisfied with the quality of consultation. This illustrates the challenges in developing outcome indicators for community consultation discussed in *section 5.2*.

The external assessments were delayed due to the delays in completing the benchmark documentation, discussed in *section 5.2*. For the community benchmarks it took almost 20 months before the first assessment was carried out.

6. Governance

6.1 Overview

It is important that the owner establishes effective governance and management arrangements for any major construction project to promote:

- performance
- accountability
- transparency.

In terms of the NST project the Board of Sydney Water had a responsibility to establish appropriate governance arrangements over critical phases of the tunnel.

An important tool in these arrangements is timely communication between management and the Board of matters of significance.

As discussed in previous chapters there were occasions during the project when management's advice to the Board was not as precise or complete on important matters as it should have been.

Conversely, the Board, especially in light of the importance of the project, could have given greater attention to the project in its early stages.

6.2 Governance Arrangements

The NST was a significant project. The Board of Sydney Water approved:

- the construction of a tunnel
- entering into an alliance Agreement
- the *Target Direct Cost*
- changes to scope
- budget variations.

The Board also monitored progress of the project against target outcomes.

From project inception to 1999, Sydney Water had four Managing Directors and a substantial turnover in Board membership.

Each change of Managing Director brought about structural and reporting changes affecting the project. Stability at Board and Executive level improved from 1999.

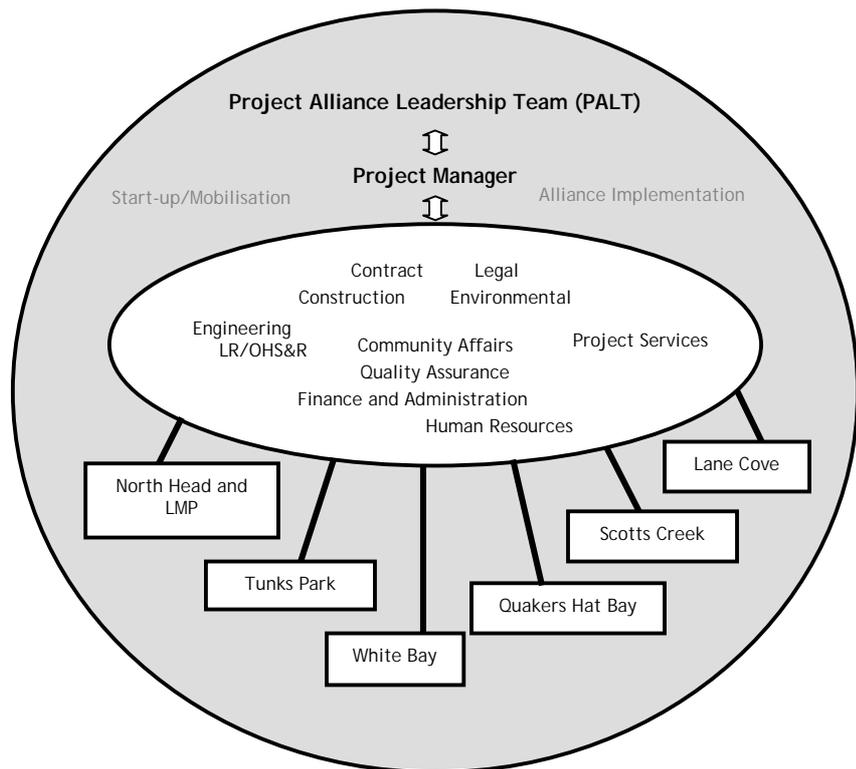
- PALT** The Alliance Leadership Team (PALT):
- comprised two representatives from each alliance partner
 - was in effect a Project Board.

Sydney Water’s project manager for the tunnel was also Sydney Water’s representative on PALT.

- IPT** An Integrated Project Team (IPT) had the responsibility to deliver the project and:
- was headed by the Alliance Project Manager
 - comprised personnel drawn from all four partners and other organisations on the basis of ‘best person for the job’.

'Best for Project' The Alliance participants were required to act in a way that is 'best for project'.

Figure 6.1 Alliance structure



**Audit
Observations**

The Australian National Audit Office commented in its 'Contract Management' Better Practice Guide:

The obvious risk to address and manage in alliance relationships is that the parties get too close. This is a natural convergence but presents risk for all concerned if it is not managed.

In the early stages of the project it was not apparent that the Board of Sydney Water had established an adequate mechanism to manage this risk, and to ensure critical information and advice was conveyed to it in a timely manner.

At the beginning of 1999 the Board appointed a senior officer, separate from the alliance, to support its oversight of the project. This improved communication between management and the Board.

The stability in Board and Executive management from 1999 led to a greater focus by Sydney Water on the project.

Documentation

The records of the alliance were well maintained.

The Audit Office experienced some difficulty, however, in obtaining certain key documentation from Sydney Water.

Skills Transfer

An important principle of alliancing is to engage the best person for the project, regardless of that person's employer. Sydney Water provided a limited number of staff to the alliance.

The opportunity for skills transfer, consequently, was similarly limited.

The Board was recently advised that:

... with each alliance contract, more Sydney Water staff from across divisions, are working side by side with staff from other alliance partners sharing goals, experiences and learnings.

and that:

... Sydney Water staff now undergo training before joining the team to better understand the principles, risks and benefits of an alliance and behaviours appropriate for building and maintaining a mutually beneficial relationship.

General

The Board of Sydney Water was recently advised that:

... The experience of two audits of the NST project by the NSW Audit Office has enhanced governance processes for the selection and management of alliance contracts.

6.3 Monitoring and Review

Sydney Water

Sydney Water used experts to:

- develop the alliance agreement
- determine profits and overheads and the risk/reward models
- review the *Target Direct Cost* for the NST.

The Alliance

The alliance used experts to:

- determine the risk/reward model
- establish the performance benchmarks and methodologies for community, environment and safety objectives
- monitor performance on community, environment and safety objectives.

The alliance:

- developed and maintained a project plan and project management systems
- undertook extensive risk planning and management
- adopted effective quality assurance systems
- documented extensively the lessons learned on the project
- effectively captured project documentation and decisions.

The alliance also conducted reviews of the project that had a functional or technical discipline basis.

Audit Observations

Sydney Water and PALT made widespread use of 'external' experts to advise, monitor and review various aspects of the project. Sydney Water however, did not separately plan for and manage risks borne by it as owner separate to the alliance.

While the alliance documented the lessons learned from the project, Sydney Water has not done so from its perspective as owner. A small number of key staff in Sydney Water retain this knowledge.

A risk arises that this knowledge may deteriorate over time and in the event of staff separations. Indications are there has been a movement of Sydney Water staff who worked on the alliance to the Other Alliance Partners, and that Sydney Water relies on these former officers for 'corporate knowledge' about the project.

Sydney Water is yet to undertake an 'overall' post-implementation review of the project. The Board was recently advised that:

... the results of these reviews (i.e. of a functional and technical discipline focus) are to be drawn together and an independent assessment made of the project's overall performance.

7. Developments in Alliancing

7.1 Overview

To date, most alliances in the public and private sector have been of the kind adopted by Sydney Water for the Northside Storage Tunnel.

A recent development is the introduction of price competition into selecting the alliance partners.

Under such an approach:

- at least two groups, in a tender-like environment, separately develop: a *Target Direct Cost*, a fee for profit and corporate overheads and risk/rewards share arrangements
- each team includes at least one representative of the owner, contractors and consultants
- the owner selects the proposal considered to offer the best 'value for money' solution consistent with the objectives of the project
- the owner and the successful alliance team then enter into a Project Alliance Agreement.

This approach seeks to preserve the benefits of alliancing while introducing a competitive environment into the commercial elements.

Price competition is designed to secure potentially a better 'value for money' outcome to the owner. It also reduces the reliance on experts to provide assurance that the *Target Direct Cost* and risk/reward arrangements are not excessive.

7.2 Divergence of Expert Views

There are few examples of the use of price competition in an alliance selection process, and it is as yet not possible to assess whether competition in the selection process may come at a cost to some of the co-operative benefits of alliancing.

There is a divergence of expert views on the matter.

In the view of one leading expert:

... an owner introducing competing [*Target Direct Cost*] processes will need to take great care to not lose sight of the less tangible factors that ultimately determine the actual outcome: people, understanding, corporate and individual commitment, value of reputation, affinity for alliancing, teamwork, compatibility etc. Time will tell if the competing [*Target Direct Cost*] methodology can achieve value for money (or the perception of value for money) without corrupting the selection process and undermining the very foundation of the alliance.⁵

⁵ J Ross, *Introduction to Project Alliancing (on engineering and construction projects) - April 2003 update*, p20

The Board was recently advised that Sydney Water:

... is to investigate the potential to introduce a form of price competition into the selection process, without compromising the fundamental principles that successful alliance contracting depends on.

Sydney Water and some experts have expressed reservations about price competition including:

- whether it can be consistently applied without compromising the fundamental principles that successful alliance contracting depends upon
- whether it can be structured to ensure a transparent process for all tenderers and to ensure an open discussion of concepts that may constitute intellectual property
- how to reconcile *Target Direct Costs* based on materially different designs
- how to reconcile profit and overhead margins that use different assumptions of inputs from the alliance participants; and different risk/reward frameworks
- lack of data on the success of competitive alliances to date in achieving their target outcomes
- concerns about public sector organisations funding tender preparation costs of private sector companies
- possible increase in the time needed to finalise the tender process
- potential for increased risks of legal disputes concerning the conduct of the tender process
- possible issues of intellectual property during and after the tender process.

***Audit
Observations***

The emergence of price competition in the selection process, while as yet unproven, is a development worthy of further investigation. It offers an approach with potential better to demonstrate that the commercial arrangements represent value for money.

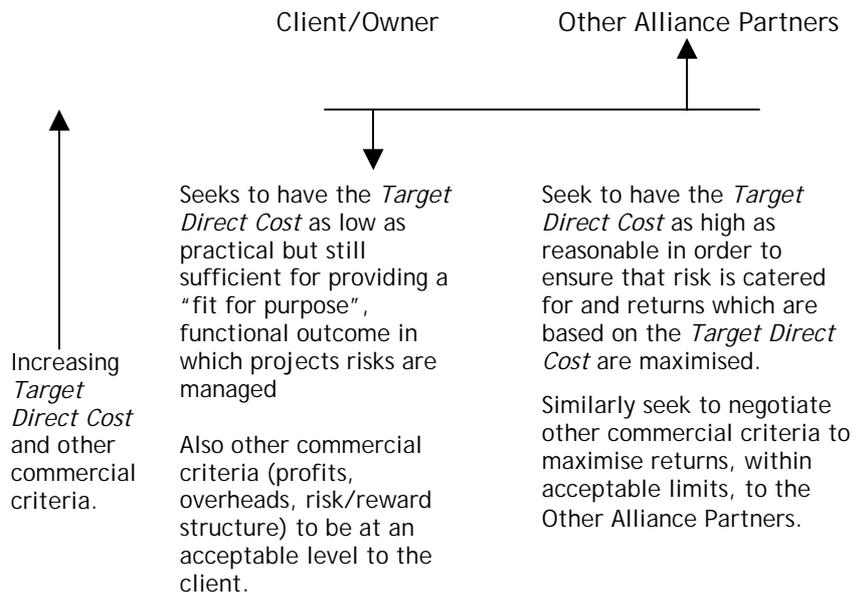
However, it will be important to assess whether this comes at a cost to the cooperative elements of alliancing.

We note approvingly Sydney Water management's undertaking to its Board to investigate the introduction of price competition into the selection process.

7.3 Alignment of Interests

Introduction of price competition into the selection process stems from the view that until such time as the *Target Direct Cost* is agreed the commercial objectives of the owner/client and the Other Alliance Partners are not aligned. This non-alignment is diagrammatically represented below.

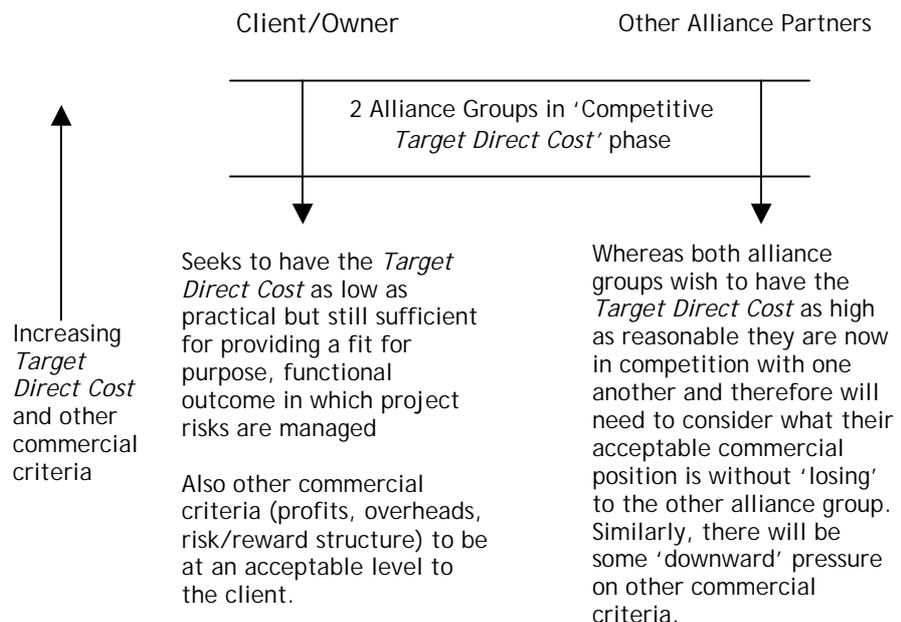
Figure 7.1 Without Price Competition



In the absence of price competition, industry experts and auditors (the latter to review profits and overheads on partners' recent projects) are used to assist both the owner/client and Other Alliance Partners in reaching an acceptable agreement to the *Target Direct Cost* and other commercial elements.

A claimed benefit of price competition is that the commercial objectives of the client/owner and the Other Alliance Partners are better aligned during the *Target Direct Cost* estimate phase. This realignment is diagrammatically illustrated below:

Figure 7.2 With Price Competition



Appendices

Appendix 1 **About the Audit**

Objectives	The objective of the audit was to provide an opinion on Sydney Water's monitoring, management, review and evaluation of construction of the Northside Storage Tunnel.
Criteria	<p>Whether there were robust processes and adequate, documented justifications for decisions to:</p> <ul style="list-style-type: none">▪ build the tunnel using an alliance approach▪ select the alliance partners. <p>Whether Sydney Water established effective governance and management arrangements for construction of the NST to provide assurance that the project would:</p> <ul style="list-style-type: none">▪ be delivered to schedule (i.e. on time)▪ be cost competitive and meet industry standards for exceptional value for money (including comparison with 'traditional' contracting methods)▪ be sensitive and responsive to the environment▪ achieve world class safety standards▪ involve the community in the planning, design and construction processes.
Scope	<p>The scope of the audit was limited to the construction of the Northside Storage Tunnel using an alliance approach. The audit did not seek to:</p> <ul style="list-style-type: none">▪ assess whether the project represented 'value for money' but did seek to review what steps Sydney Water had taken to determine whether the cost of the tunnel represented value-for-money▪ assess the operational effectiveness of the tunnel or whether the tunnel solution represented the best option for addressing the overflow problem.
Methodology	<p>The methodology encompassed:</p> <ul style="list-style-type: none">▪ analysis of Sydney Water documents and papers relating to the monitoring, management, review and evaluation of the Northside Storage Tunnel project▪ review of papers, articles, speeches, presentations etc on the Northside Storage Tunnel and project alliancing in general▪ interviews with key stakeholders and experts both within the public sector and elsewhere, and analysis of information provided by these stakeholders and experts.

Experts and stakeholders consulted included representatives of the:

- Infrastructure Coordination Unit, NSW Premier's Department (former)
- NSW Treasury
- NSW Department of Public Works and Services (former)
- NSW Planning (former)
- ANAO (experience with a Commonwealth project alliance - the National Museum).

An expert was engaged to provide the Audit Office with advice on construction issues and alliancing.

Acknowledgements

The Audit Office gratefully acknowledges the assistance and advice of staff and management of:

- Sydney Water
- Transfield
- Connell Wagner
- Montgomery Watson.

Others consulted in the course of the audit are also thanked for giving generously of their time.

The expert advice of Mr Rob Aldis, Evans & Peck Australia Pty Ltd, on important aspects of project alliancing, has been invaluable.

The views expressed in this report are those of the NSW Audit Office.

Audit Costs

The cost of the audit is estimated at \$291,240, including an allowance of \$8,000 for printing.

Appendix 2 Terms Used in this Report	
Alliance	A contracting method where the owner and the principal contractors enter a relationship to design and construct the project in a manner that enhances harmony and innovation, and with risks and rewards shared in an agreed manner
Alliance Partners	Sydney Water Corporation (SWC), Transfield, Montgomery Watson (MW) and Connell Wagner (CW)
Actual Direct Cost	All Direct Costs incurred on the project (see definition of Direct Costs). In the case of the NST, the bulk of the costs of disposal of spoil are excluded from the Actual Direct Cost.
Direct Costs	Defined in the Agreement to include costs such as labour, materials, transportation, site accommodation, insurance and associated administration directly consumed on the project. It includes normal overheads uniquely associated with the direct costs.
Target Direct Cost	Referred to in the Agreement as Business as Usual Direct Cost Estimate. Defined in the Agreement as the independently verified estimate of all Direct Costs to be incurred on the project. It is the base from which Risk/Reward payments are measured. In the case of the NST, the bulk of the costs of disposal of spoil were not included in the <i>Target Direct Cost</i>
Fee Modifier	A payment adjustment mechanism to penalise poor performance against the non-cost objectives of Time, Environment, Community and Safety: <ul style="list-style-type: none"> ▪ Poor performance with any one objective leads to loss of 50 per cent of Net Gains ▪ Poor performance with any two objectives leads to loss of 100 per cent of Net Gains
Corporate Overhead	The amount agreed to be paid to alliance partners to permit them to recover their corporate overheads. It is based on independent review of overhead rates for the market and for companies selected as alliance partners. Initially it was a percentage of <i>Target Direct Cost</i> , which was converted to a fixed amount once the <i>Target Direct Cost</i> was agreed
Margin: Cost	The Other Alliance Partners' share of the amount by which the actual project direct cost exceeds/is exceeded by the <i>Target Direct Cost</i> . This sharing occurs in a pre-agreed proportion; alliance partner gain is uncapped, while penalty is capped
Margin: Time	The reward paid to/penalty incurred by alliance partners if the project is completed ahead/behind schedule. Both reward and penalty are capped at a maximum 40 per cent share of the Reward Pool, with the reward/penalty determined from a pre-agreed time-reward/penalty graph
Margin: Environment	The reward paid to/penalty incurred by alliance partners based on the environmental performance of the project. Both reward and penalty are capped at a 20 per cent share of the Reward Pool, with reward/ penalty determined from a pre-agreed performance-reward/penalty graph

Margin: Community	The reward paid to/penalty incurred by alliance partners based on the community relations performance of the project. Both reward and penalty are capped at a 20 per cent share of the Reward Pool, with reward/ penalty determined from an pre-agreed performance-reward/penalty graph
Margin: Safety	The reward paid to/penalty incurred by alliance partners based on the safety performance of the project. Both reward and penalty are capped at a 20 per cent share of the Reward Pool, with reward/ penalty determined from an pre-agreed performance-reward/penalty graph
Total Margin	The sum of Profit Margin, Cost Margin, and the four reward/penalty margins: Time, Environment, Community, Safety. If the sum of these margins is negative, the maximum negative margin is capped at the value of Corporate Overhead. That is, the Other Alliance Partners (other than SWC) could lose up to their Profit Margin plus Corporate Overhead in the event of severe cost over-run, and in the process lose access to any entitlement otherwise payable from the Reward Pool
Net Gain	The sum of profit margin and cost margin
NST Budget	The budget approved by Sydney Water's Board for the NST project
Other Alliance Partners	Transfield, Montgomery Watson (MW) and Connell Wagner (CW)
Project Alliance Leadership Team (PALT)	The 'board of directors' of the alliance. Each partner, including SWC, has two representatives. The overriding task of PALT is to ensure that Project Alliance Principles are satisfied and that all obligations and commitments of the alliance are fulfilled
Practical Completion	The stage in the execution of the works when: <ul style="list-style-type: none"> ▪ work is complete other than minor omissions and defects ▪ requirements of all relevant certifying authorities and insurance surveyors have been met ▪ all appropriate testing and commissioning has been carried out ▪ all documents and other information have been provided
Reward Pool	The sum set aside to reward non-cost performance. It consists of a minimum of \$4 million, which may increase to a maximum of \$10 million. This increase is funded by a 30 per cent share of any positive Cost Margin, being half of SWC's share of the first \$20 million of positive Cost Margin
Separable Portion	Any part of the work, as determined by SWC, may be separated out from the remainder. PALT determined the date for Practical Completion and modification to the Time Margin graph

Appendix 3 **When are Alliances Likely to be the Best Project Delivery Method?**

Projects that are delivered under conventional delivery mechanisms do not perform well in some circumstances. Project Alliances are generally best suited and appropriate where one or more of the following characteristics are likely:

1. complex projects that are subject to significant internal and external change as they develop
2. technology is state-of-the-art and involves research and development
3. external factors such as government regulations and the physical environment are likely to constrain management
4. size (physical, manpower, financial) exceeds a previously established threshold for the industry, technology or enterprise
5. the project must interface and coexist with an existing, operating facility
6. the project is aiming to set new benchmarks for early completion
7. the required works consist in whole or in part of maintenance or augmentation activities which can be improved and made more economical by integration of the Owner and the Contractor into one team
8. the Client/Owner does not require the price (or tender) to be market tested
9. the Client/Owner is prepared to enter into a risk sharing arrangement where most risks are shared. In the event that the shared risk is capped by the other parties, the Client/Owner will need to be prepared to accept the cost of further downside risk.

Well defined, simple projects would not necessarily benefit from delivery under an alliance to any great extent, and consideration needs to be given to the effort and cost involved in establishing an alliance as compared to that of a more traditional form of contract.

For many projects, until construction starts the schedule critical path will be dominated by the two stage regulatory consent process required under most Government planning laws, bylaws and regulations

In many instances, the Agency responsible for a project prefers to or is obliged to retain sole responsibility for the approvals.

The time effects and the likely project constraints imposed by the planning processes can further reduce the benefits of alliancing because there is a need to wait for approvals and there is therefore time to develop the scope and design

The table below provides a brief description of the more traditional forms of delivery and the issues that these face

This table is not intended as a thorough analysis of these forms of delivery or the many variants on them

Method	Circumstances When Used	Issues
Traditional design then construct under Schedule of Rates Construction	<p>Generally used when the client wishes to maintain control of the design and the scope of work may change in quantity but not in character.</p> <p>The Contractor generally carries both management and productivity risks.</p> <p>Also used for ongoing programmes of work where rates have been agreed in advance with pre-selected contractors (Housing, Public Works, ongoing infrastructure maintenance works).</p>	<p>The agreed rates often will not reflect the actual work that is to be undertaken, requiring negotiation of new rates. This often leads to dispute.</p> <p>The Contractor has an incentive to increase the scope as much as possible requiring the Principal to provide resources to manage this risk.</p>
Traditional design then construct under fixed price lump sum Contract	<p>Similar to above, but in this case the scope of the work is well defined and the contractor now carries the risk of quantification of the scope of work as well as both management and productivity risks. Usually involves one or more independent design consultants employed directly by the principal and an independent contract "superintendent" or assessor.</p>	<p>There is direct conflict between the objectives for the principal and the contractors.</p> <p>When the scope is not well defined or the scope is subject to change for reasons beyond the control of the contractor, costs and time traditionally overrun. This is the main source of dispute in these forms of delivery.</p>
Traditional design then construct under Cost Plus Construction	<p>In this case the principal pays for all of the works performed by the contractor on a cost reimbursable basis rather than a schedule of rates or lump sum basis, subject to the contractor performing with appropriate diligence. Often used by Government entities when an internal division is undertaking the work.</p> <p>Used for some ongoing works programs where overhead rates are pre-agreed.</p> <p>Also used, although infrequently, for urgent work.</p>	<p>The contractor effectively has an incentive to spend as much money as possible. The work therefore requires significant management resources from the principal to control the scope.</p>
Design and Construct	<p>Work can be delivered based on a performance or functional brief rather than detailed documentation, where the principal wants to start quickly and is less concerned with design detail. Often used for major civil works.</p> <p>Contractor undertakes all design and construction in accordance with the brief, usually by subcontracting the design work.</p> <p>Of particular benefit where the work method may have a substantial bearing on the design, such as in dams or large bridges.</p> <p>In this case the contractor now carries design risk in addition to the risk identified for traditional design then construct under a fixed lump sum basis.</p>	<p>Where the scope is unclear, there is often dispute either as a result of work that is perceived to be substandard or as a result of claims for additional costs and delays</p>

Method	Circumstances When Used	Issues
Build Own Operate and Transfer	<p>Used for off-balance sheet funding of projects, where private development, ownership and management is of interest to private investors. Generally these projects are delivered on a Design, Construct and Maintain basis with the contractor potentially also providing some funding and thereby now taking some of the funding/investment risk.</p>	<p>There are often issues regarding the quality of the work and large variations as a result of scope changes due to regulatory processes where the Principal's leverage to negotiate is small.</p> <p>The issues relate more to how the Agency can or should fund the project than to potential cost, time or quality impacts</p>

Experienced practitioners in both Project Cost Estimating and Project Delivery Methods can use computer-based models to determine a probability cost distribution for the methods under consideration.

This can be used to form an opinion as to whether or not a project could be delivered at a lower cost by using a different delivery method. Obviously the inputs are critical and need to be carefully considered within the overall project context.

When using this form of comparative and predictive model, it is necessary to clearly identify and quantify the project risks. In addition to this risk identification, it needs to be recognised that different delivery methods and contract conditions result in certain risks either being transferred to a contracting entity or retained by the client. Certain risks may also be shared between the client and the contracting entity. In addition to this risk transfer, it also needs to be recognised that different delivery methods will have different capacities to deal with risk or capture opportunity. A risk model will generally be used to support the question of retained, shared or transferred risk.

Appendix 4 The Final Cost of the Tunnel

Item	Final cost (Estimated \$m)
Direct Costs	362.0
Overhead	19.0
Profit Margin	19.6
Risk/reward for cost objective	-8.4
Risk/reward for non-cost objectives	1.9
Escalation	10.5
Insurance Recovery	-9.9
Asset Recovery	-11.3
Savings from North Head Sewage Treatment Plant Reliability Upgrade Project	-3.5
Savings from North Head Sewage Treatment Plant Safety Upgrade Project	-0.1
Shelly Beach	
Direct costs	3.9
Overhead	0.3
Profit margin	0.3
Risk/reward for Cost Objective	0.6
Risk/reward for Non-Cost Objectives	0.1
Other Tunnel Costs	
Olympic Availability	1.0
Vent Upgrades	0.3
Owner's Costs	
Management Costs	3.2
Excess Insurance Costs	5.9
Borrowing Costs	3.9
Sales Tax	18.0
Spoil disposal	48.3
Total	\$465.7

Performance Audits by the Audit Office of New South Wales

Performance Auditing

What are performance audits?

Performance audits are reviews designed to determine how efficiently and effectively an agency is carrying out its functions.

Performance audits may review a government program, all or part of a government agency or consider particular issues which affect the whole public sector.

Where appropriate, performance audits make recommendations for improvements relating to those functions.

Why do we conduct performance audits?

Performance audits provide independent assurance to Parliament and the public that government funds are being spent efficiently and effectively, and in accordance with the law.

They seek to improve the efficiency and effectiveness of government agencies and ensure that the community receives value for money from government services.

Performance audits also assist the accountability process by holding agencies accountable for their performance.

What is the legislative basis for Performance Audits?

The legislative basis for performance audits is contained within the *Public Finance and Audit Act 1983, Part 3 Division 2A*, (the Act) which differentiates such work from the Office's financial statements audit function.

Performance audits are not entitled to question the merits of policy objectives of the Government.

Who conducts performance audits?

Performance audits are conducted by specialist performance auditors who are drawn from a wide range of professional disciplines.

How do we choose our topics?

Topics for a performance audits are chosen from a variety of sources including:

- our own research on emerging issues
- suggestions from Parliamentarians, agency Chief Executive Officers (CEO) and members of the public
- complaints about waste of public money
- referrals from Parliament.

Each potential audit topic is considered and evaluated in terms of possible benefits including cost savings, impact and improvements in public administration.

The Audit Office has no jurisdiction over local government and cannot review issues relating to council activities.

If you wish to find out what performance audits are currently in progress just visit our website at www.audit@nsw.gov.au.

How do we conduct performance audits?

Performance audits are conducted in compliance with relevant Australian standards for performance auditing and operate under a quality management system certified under international quality standard ISO 9001.

Our policy is to conduct these audits on a "no surprise" basis.

Operational managers, and where necessary executive officers, are informed of the progress with the audit on a continuous basis.

What are the phases in performance auditing?

Performance audits have three key phases: planning, fieldwork and report writing.

During the planning phase, the audit team will develop audit criteria and define the audit field work.

At the completion of field work an exit interview is held with agency management to discuss all significant matters arising out of the audit. The basis for the exit interview is generally a draft performance audit report.

The exit interview serves to ensure that facts presented in the report are accurate and that recommendations are appropriate. Following the exit interview, a formal draft report is provided to the CEO for comment. The relevant Minister is also provided with a copy of the draft report. The final report, which is tabled in Parliament, includes any comment made by the CEO on the conclusion and the recommendations of the audit.

Depending on the scope of an audit, performance audits can take from several months to a year to complete.

Copies of our performance audit reports can be obtained from our website or by contacting our publications unit.

How do we measure an agency's performance?

During the planning stage of an audit the team develops the audit criteria. These are standards of performance against which an agency is assessed. Criteria may be based on government targets or benchmarks, comparative data, published guidelines, agencies corporate objectives or examples of best practice.

Performance audits look at:

- processes
- results
- costs
- due process and accountability.

Do we check to see if recommendations have been implemented?

Every few years we conduct a follow-up audit of past performance audit reports. These follow-up audits look at the extent to which recommendations have been implemented and whether problems have been addressed.

The Public Accounts Committee (PAC) may also conduct reviews or hold inquiries into matters raised in performance audit reports.

Agencies are also required to report actions taken against each recommendation in their annual report.

To assist agencies to monitor and report on the implementation of recommendations, the Audit Office has prepared a Guide for that purpose. The Guide, *Monitoring and Reporting on Performance Audits Recommendations*, is on the Internet at www.audit.nsw.gov.au/guides-bp/bpqlist.htm

Who audits the auditors?

Our performance audits are subject to internal and external quality reviews against relevant Australian and international standards. This includes ongoing independent certification of our ISO 9001 quality management system.

The PAC is also responsible for overseeing the activities of the Audit Office and conducts reviews of our operations every three years.

Who pays for performance audits?

No fee is charged for performance audits. Our performance audit services are funded by the NSW Parliament and from internal sources.

For further information relating to performance auditing contact:

Tom Jambrich
Assistant Auditor-General
Performance Audit Branch
(02) 9285 0051
email: tom.jambrich@audit.nsw.gov.au

Performance Audit Reports

No.	Agency or Issue Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
64*	Key Performance Indicators	<i>Government-wide Framework Defining and Measuring Performance (Better practice Principles) Legal Aid Commission Case Study</i>	31 August 1999
65	Attorney General's Department	<i>Management of Court Waiting Times</i>	3 September 1999
66	Office of the Protective Commissioner Office of the Public Guardian	<i>Complaints and Review Processes</i>	28 September 1999
67	University of Western Sydney	<i>Administrative Arrangements</i>	17 November 1999
68	NSW Police Service	<i>Enforcement of Street Parking</i>	24 November 1999
69	Roads and Traffic Authority of NSW	<i>Planning for Road Maintenance</i>	1 December 1999
70	NSW Police Service	<i>Staff Rostering, Tasking and Allocation</i>	31 January 2000
71*	Academics' Paid Outside Work	<i>Administrative Procedures Protection of Intellectual Property Minimum Standard Checklists Better Practice Examples</i>	7 February 2000
72	Hospital Emergency Departments	<i>Delivering Services to Patients</i>	15 March 2000
73	Department of Education and Training	<i>Using Computers in Schools for Teaching and Learning</i>	7 June 2000
74	Ageing and Disability Department	<i>Group Homes for people with disabilities in NSW</i>	27 June 2000
75	NSW Department of Transport	<i>Management of Road Passenger Transport Regulation</i>	6 September 2000
76	Judging Performance from Annual Reports	<i>Review of Eight Agencies' Annual Reports</i>	29 November 2000
77*	Reporting Performance	<i>Better Practice Guide A guide to preparing performance information for annual reports</i>	29 November 2000
78	State Rail Authority (CityRail) State Transit Authority	<i>Fare Evasion on Public Transport</i>	6 December 2000
79	TAFE NSW	<i>Review of Administration</i>	6 February 2001
80	Ambulance Service of New South Wales	<i>Readiness to Respond</i>	7 March 2001
81	Department of Housing	<i>Maintenance of Public Housing</i>	11 April 2001

No.	Agency or Issue Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
82	Environment Protection Authority	<i>Controlling and Reducing Pollution from Industry</i>	18 April 2001
83	Department of Corrective Services	<i>NSW Correctional Industries</i>	13 June 2001
84	Follow-up of Performance Audits	<i>Police Response to Calls for Assistance The Levying and Collection of Land Tax Coordination of Bushfire Fighting Activities</i>	20 June 2001
85*	Internal Financial Reporting	<i>Internal Financial Reporting including a Better Practice Guide</i>	27 June 2001
86	Follow-up of Performance Audits	<i>The School Accountability and Improvement Model (May 1999) The Management of Court Waiting Times (September 1999)</i>	14 September 2001
87	E-government	<i>Use of the Internet and Related Technologies to Improve Public Sector Performance</i>	19 September 2001
88*	E-government	<i>e-ready, e-steady, e-government: e-government readiness assessment guide</i>	19 September 2001
89	Intellectual Property	<i>Management of Intellectual Property</i>	17 October 2001
90*	Intellectual Property	<i>Better Practice Guide Management of Intellectual Property</i>	17 October 2001
91	University of New South Wales	<i>Educational Testing Centre</i>	21 November 2001
92	Department of Urban Affairs and Planning	<i>Environmental Impact Assessment of Major Projects</i>	28 November 2001
93	Department of Information Technology and Management	<i>Government Property Register</i>	31 January 2002
94	State Debt Recovery Office	<i>Collecting Outstanding Fines and Penalties</i>	17 April 2002
95	Roads and Traffic Authority	<i>Managing Environmental Issues</i>	29 April 2002
96	NSW Agriculture	<i>Managing Animal Disease Emergencies</i>	8 May 2002
97	State Transit Authority Department of Transport	<i>Bus Maintenance and Bus Contracts</i>	29 May 2002
98	Risk Management	<i>Managing Risk in the NSW Public Sector</i>	19 June 2002
99	E-government	<i>User-friendliness of Websites</i>	26 June 2002
100	NSW Police Department of Corrective Services	<i>Managing Sick Leave</i>	23 July 2002

No.	Agency or Issue Examined	Title of Performance Audit Report or Publication	Date Tabled in Parliament or Published
101	Department of Land and Water Conservation	<i>Regulating the Clearing of Native Vegetation</i>	20 August 2002
102	E-government	<i>Electronic Procurement of Hospital Supplies</i>	25 September 2002
103	NSW Public Sector	<i>Outsourcing Information Technology</i>	23 October 2002
104	Ministry for the Arts Department of Community Services Department of Sport and Recreation	<i>Managing Grants</i>	4 December 2002
105	Department of Health Including Area Health Services and Hospitals	<i>Managing Hospital Waste</i>	10 December 2002
106	State Rail Authority	<i>CityRail Passenger Security</i>	12 February 2003
107	NSW Agriculture	<i>Implementing the Ovine Johne's Disease Program</i>	26 February 2003
108	Department of Sustainable Natural Resources Environment Protection Authority	<i>Protecting Our Rivers</i>	7 May 2003
109	Department of Education and Training	<i>Managing Teacher Performance</i>	14 May 2003
110	NSW Police	<i>The Police Assistance Line</i>	5 June 2003
111	E-Government	<i>Roads and Traffic Authority Delivering Services Online</i>	11 June 2003
112	State Rail Authority	<i>The Millennium Train Project</i>	19 June 2003
113	Sydney Water Corporation	<i>Northside Storage Tunnel Project</i>	July 2003

* Better Practice Guides

Performance Audits on our website

A list of performance audits tabled or published since March 1997, as well as those currently in progress, can be found on our website www.audit.nsw.gov.au

If you have any problems accessing these Reports, or are seeking older Reports, please contact our Governance and Communications Section on 9285 0155.



THE AUDIT OFFICE MISSION

Assisting Parliament improve
the accountability and
performance of the State

For further information please contact:

The Audit Office of New South Wales

Street Address	Postal Address
Level 11 234 Sussex Street SYDNEY NSW 2000 Australia	GPO Box 12 SYDNEY NSW 2001 Australia
Telephone	(02) 9285 0155
Facsimile	(02) 9285 0100
Internet	www.audit.nsw.gov.au
e-mail	mail@audit.nsw.gov.au
Office Hours	9.00am - 5.00pm Monday to Friday
Contact Officer	Denis Streater Director Performance Audit +612 9285 0075

This report is available free from our website

**To purchase a printed copy of this Report
please contact:**

The NSW Government Bookshop

Retail Shops

Sydney CBD

Ground Floor
Goodsell Building, Chifley Square
Cnr Elizabeth and Hunter Streets
SYDNEY NSW 2000

Telephone and Facsimile Orders

Telephone

Callers from Sydney metropolitan area	9743 7200
Callers from other locations within NSW	1800 46 3955
Callers from interstate	(02) 9743 7200

Facsimile

(02) 9228 7227