NSW GOVERNMENT | Transport for NSW

Inquiry into Rail Infrastructure Project Costing in NSW

Mr Les Wielinga
Director General

Mr Chris Lock
Deputy Director General Transport Projects Division

Mr Rob Mason
Chief Executive, RailCorp

Mr Peter Duncan
Chief Executive, Roads and Maritime Services

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Transport Advisory Board

Minister for Transport
Minister for Roads & Ports

Les Wielinga
Director General

CORE DIVISIONS

- Customer Experience
- Planning & Programs
- Transport Projects
- Freight & Regional Development
- Policy & Regulation
- Transport Services

SUPPORT DIVISIONS

- Finance and Revenue
- HR and Business Services
- Corporate Services

PORT CORPORATIONS

- Sydney Ports Corporation
- Newcastle Port Corporation
- Port Kembla Port Corporation

PRIVATE OPERATORS AND AGENCIES

- Sydney Ferries
- Roads & Maritime Services
- Bus operators
- RailCorp
- Light Rail
- STA
- Transport Management Centre

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Customer Experience Division

- dedicated to customer needs in order to increase customer satisfaction and transport system use

Tony Braxton-Smith
Deputy Director General

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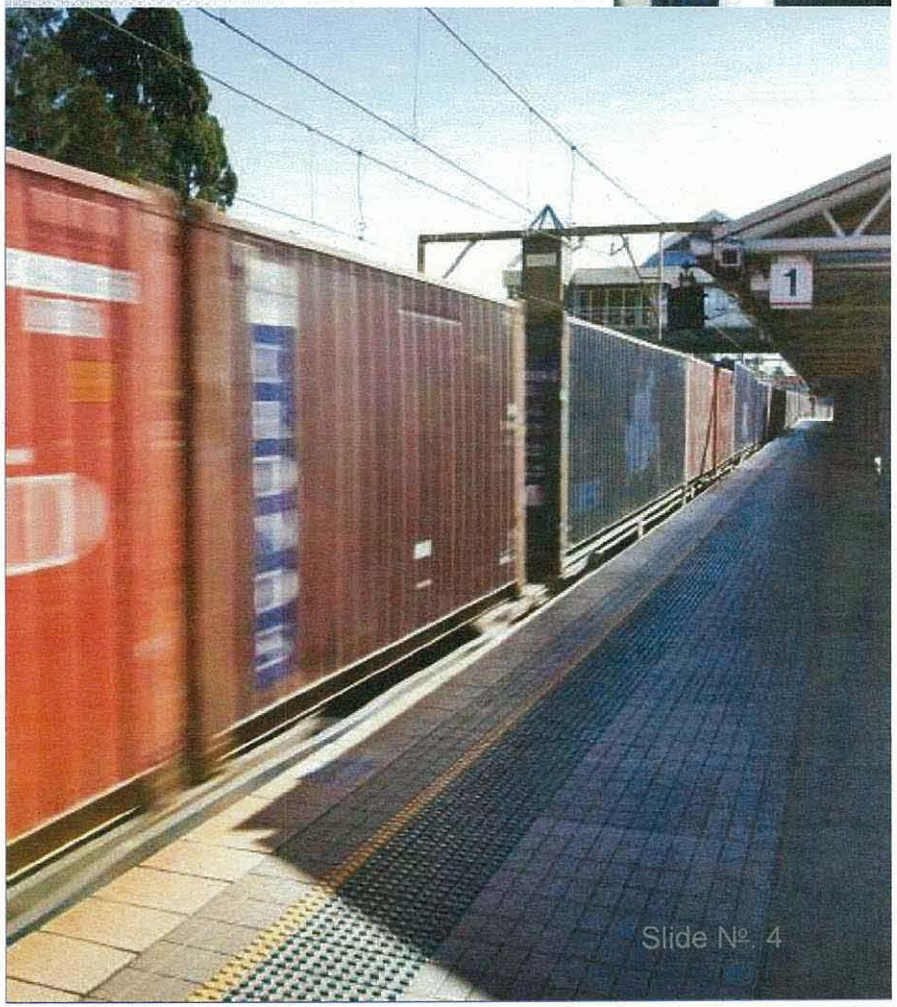
Rachel Johnson
Deputy Director General

Freight & Regional Development Division

- integrating freight strategies and programs to meet the current and future needs of the NSW economy and regional economies



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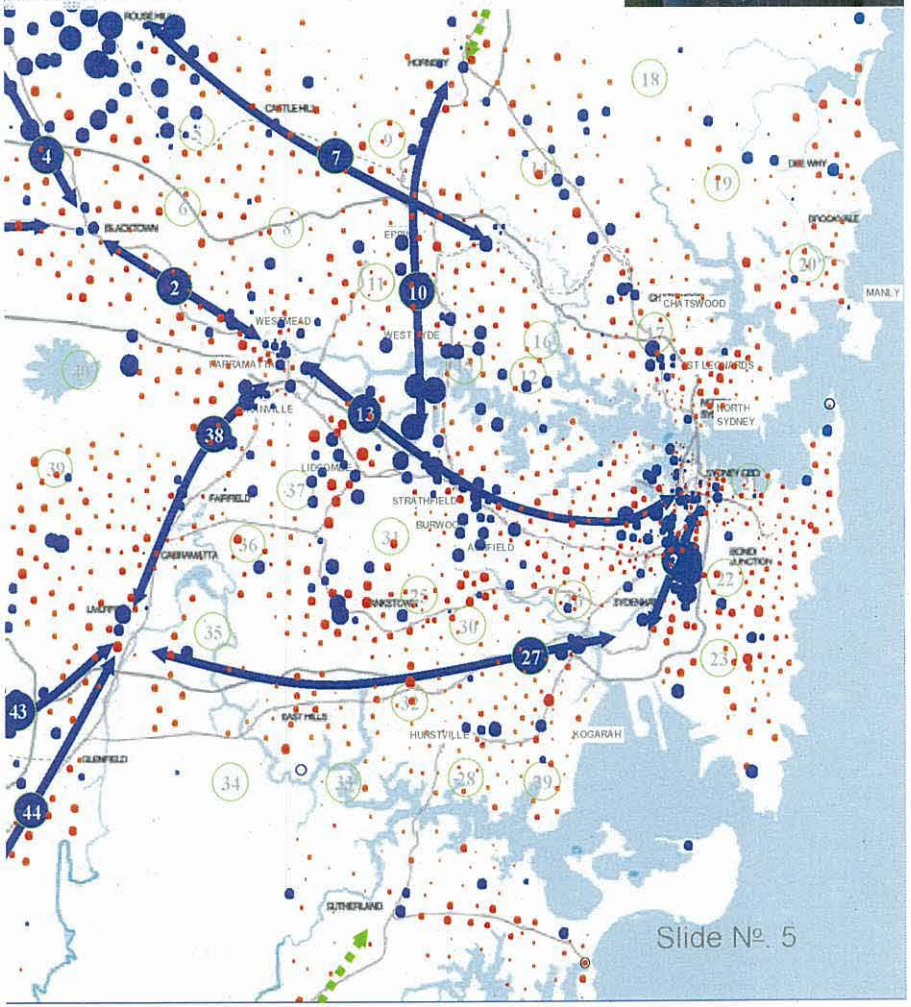
Carolyn McNally
Deputy Director General

Planning and Programs Division

- planning and investment advice for all modes of transport to drive the development of programs and services



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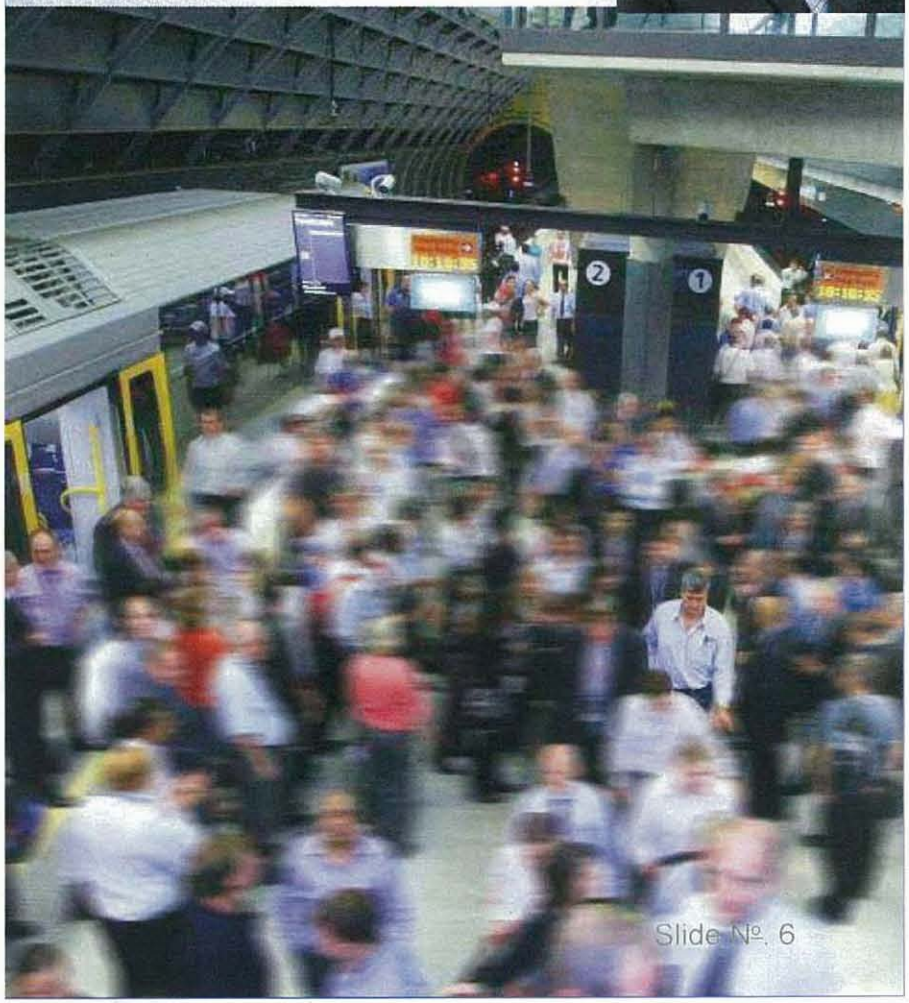
Policy and Regulation Division

- driving development and implementation of customer focused legislative, regulatory and policy solutions

Tim Reardon
Deputy Director General



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Fergus Gammie
Deputy Director General

Transport Services Division

- ensuring services across the whole transport portfolio meet the current and future needs of customers

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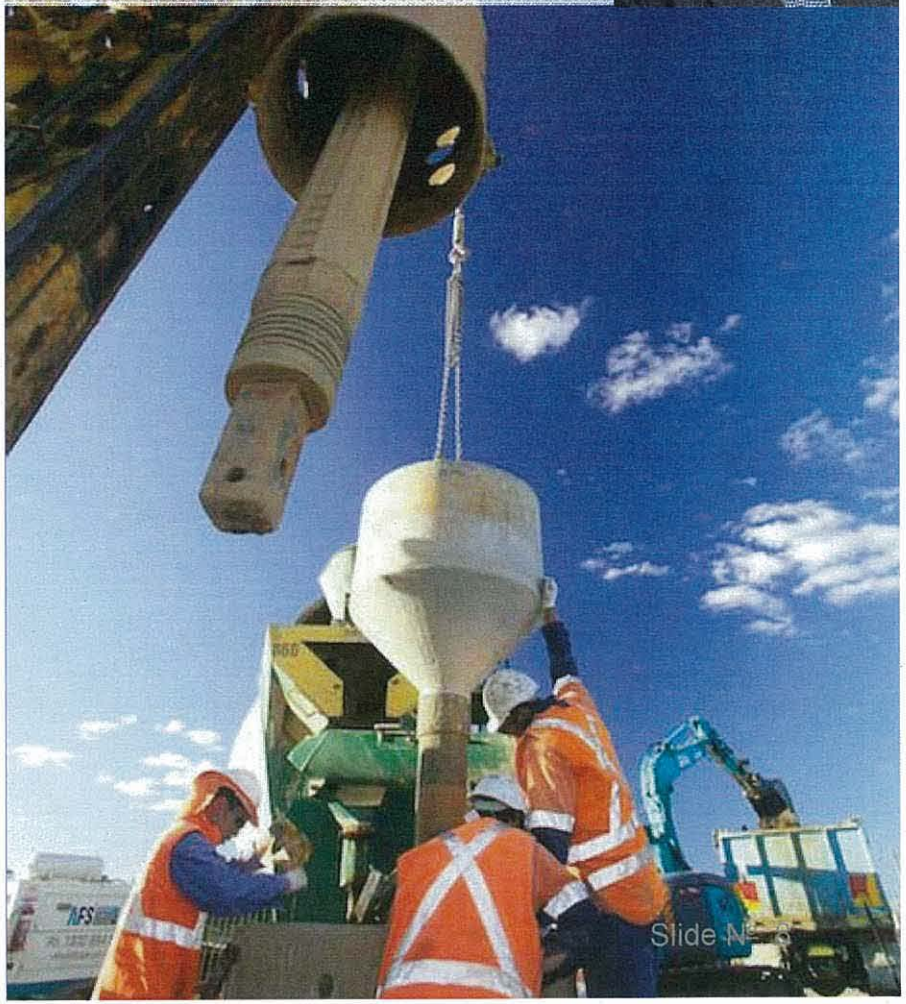
Chris Lock
Deputy Director General

Transport Projects Division

- developing and delivering transport infrastructure projects and strategic assets to meet time, cost and quality objectives



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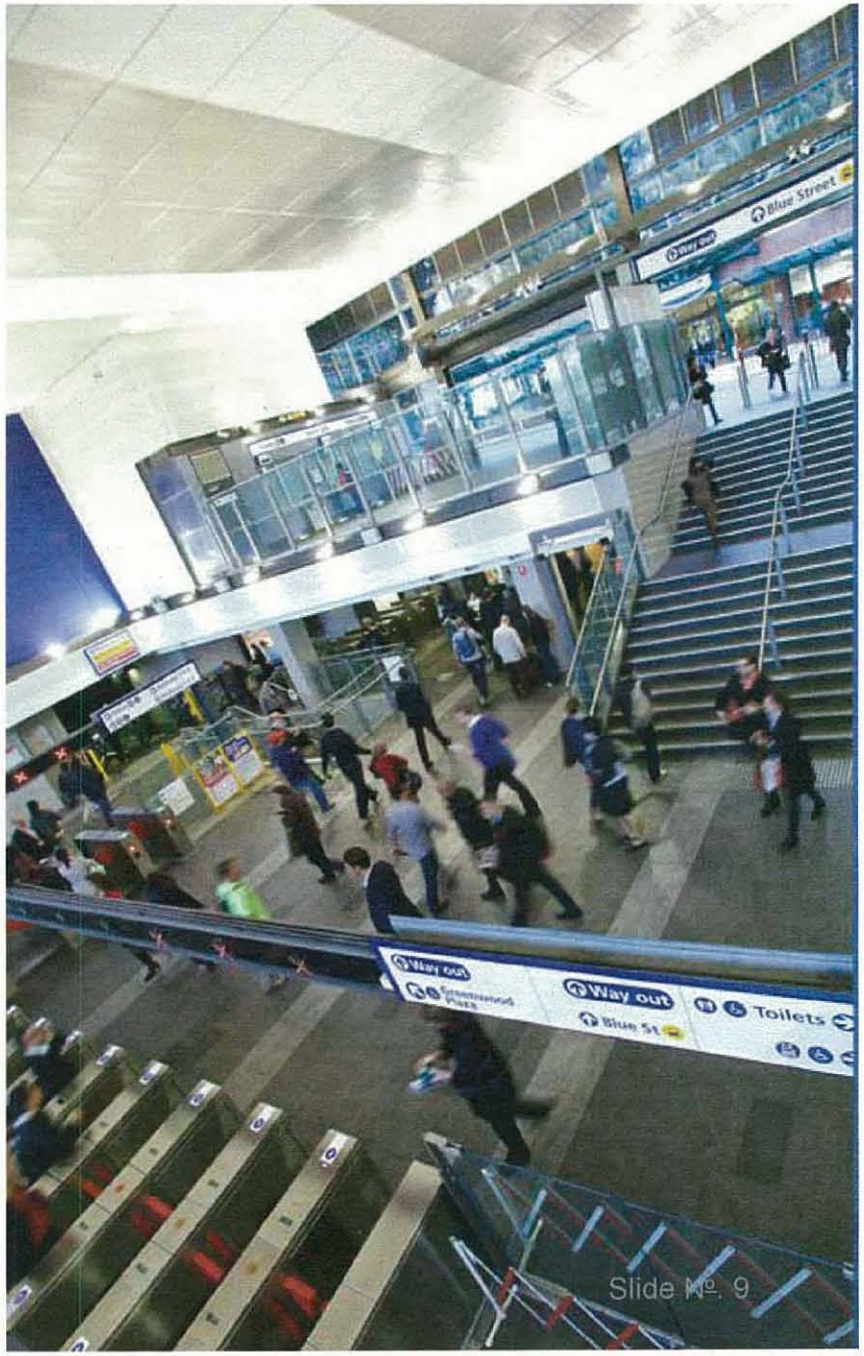
Centre of excellence for infrastructure and fleet asset contracts

- cost estimating
- project management
- procurement
- strategic procurement
- engineering
- community and stakeholder relations



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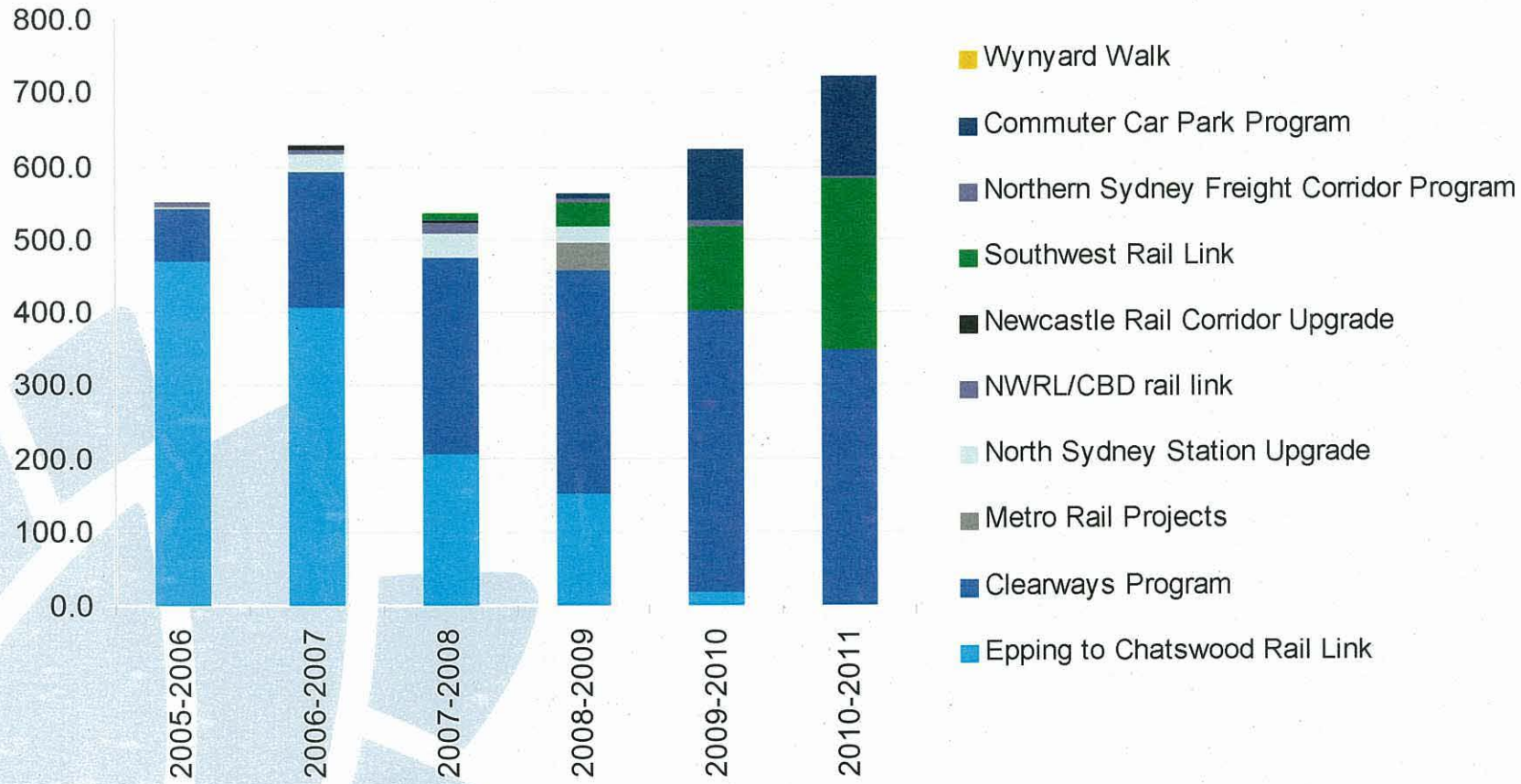
Project Expenditure



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Completed Projects

Completed

- Parramatta Transport Interchange (2006)
- Newcastle Rail Corridor (2007)
- Epping to Chatswood Rail (2008)
- Chatswood Transport Interchange (2008)
- North Sydney Station Upgrade (2008)
- Rail Clearways Program (9 Projects 2006-2011)
- Commuter Car Park Program (20 projects 2009 – 2011)

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Projects in hand

In Construction

- Rail Clearways Program (4 Projects)
- South West Rail Link
- Commuter Car Park and Interchange (7 Projects)

In Planning and Development

- Wynyard Walk
- Commuter Car Park and Interchange (14 Projects)
- Northern Sydney Freight Corridor Program (4 Projects)
- Asset Divestment Program (1 Project)
- North West Rail Link (support)

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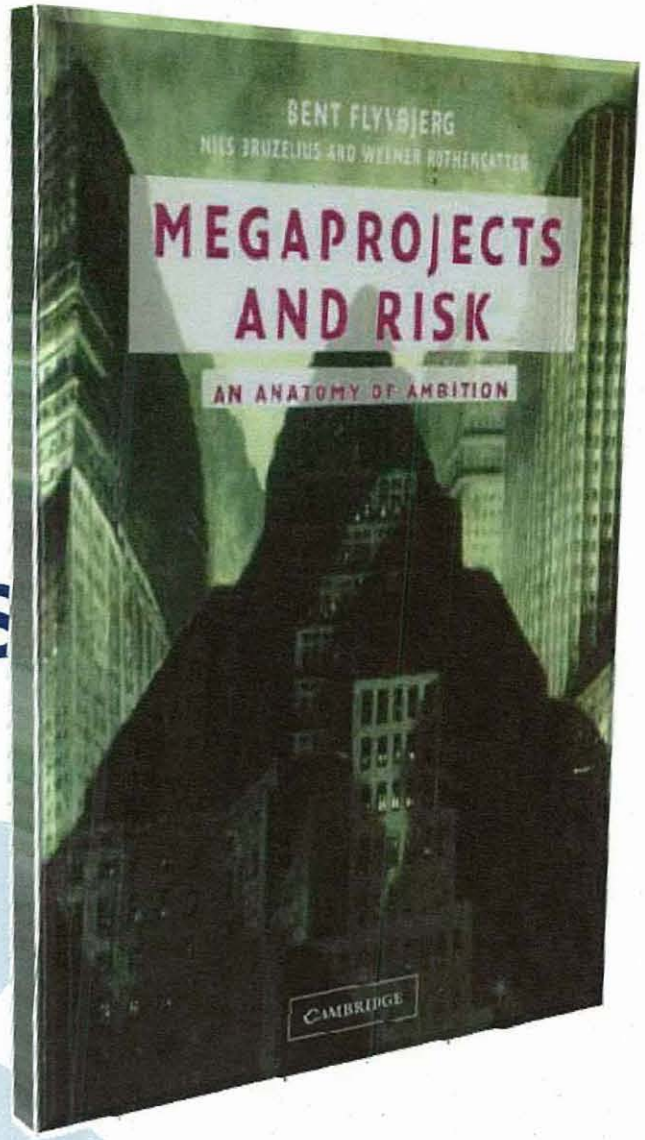
THERE IS

we are not alone



2 A calamitous history of cost overrun

constructively from experience by identifying lessons that may prove useful in improving future decisions regarding megaprojects. Given the large amounts of money spent on major transport infrastructure projects, it is remarkable how little data and research are available that would help answer the two basic questions: (i) whether such projects have the intended effects; and (ii) how the actual viability of such projects compares to

A first step in reducing cost overrun is to acknowledge that a substantial risk for overrun exists and cannot be completely eliminated; but it can be moderated.

The problem of cost overrun

Cost overruns in major transport infrastructure projects are widespread. The difference between actual and estimated investment cost is often 50–100 per cent, and for many projects cost overruns end up threatening project viability. A first step in reducing cost overrun is to acknowledge that a substantial risk of overrun exists and cannot be completely

Transport for NSW

Table II.i *Examples of construction cost overruns in large transport projects. Constant prices. For patronage figures, see Chapters 3 and 4*

Project	Cost overrun (%)
Boston's artery/tunnel project	196
Humber bridge, UK	175
Boston–Washington–New York rail, USA	130
Great Belt rail tunnel, Denmark	110
A6 Motorway Chapel-en-le-Frith/Whaley bypass, UK	100
Shinkansen Joetsu rail line, Japan	100
Washington metro, USA	85
Channel tunnel, UK, France	80
Karlsruhe–Bretten light rail, Germany	80
Øresund access links, Denmark	70
Mexico City metro line	60
Paris–Auber–Nanterre rail line	60
Tyne and Wear metro, UK	55
Great Belt link, Denmark	54
Øresund coast-to-coast link	26

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COST ESTIMATION

aka 'Costing', 'Cost Planning', 'Forecasting', 'Budgeting', 'Cost Engineering'

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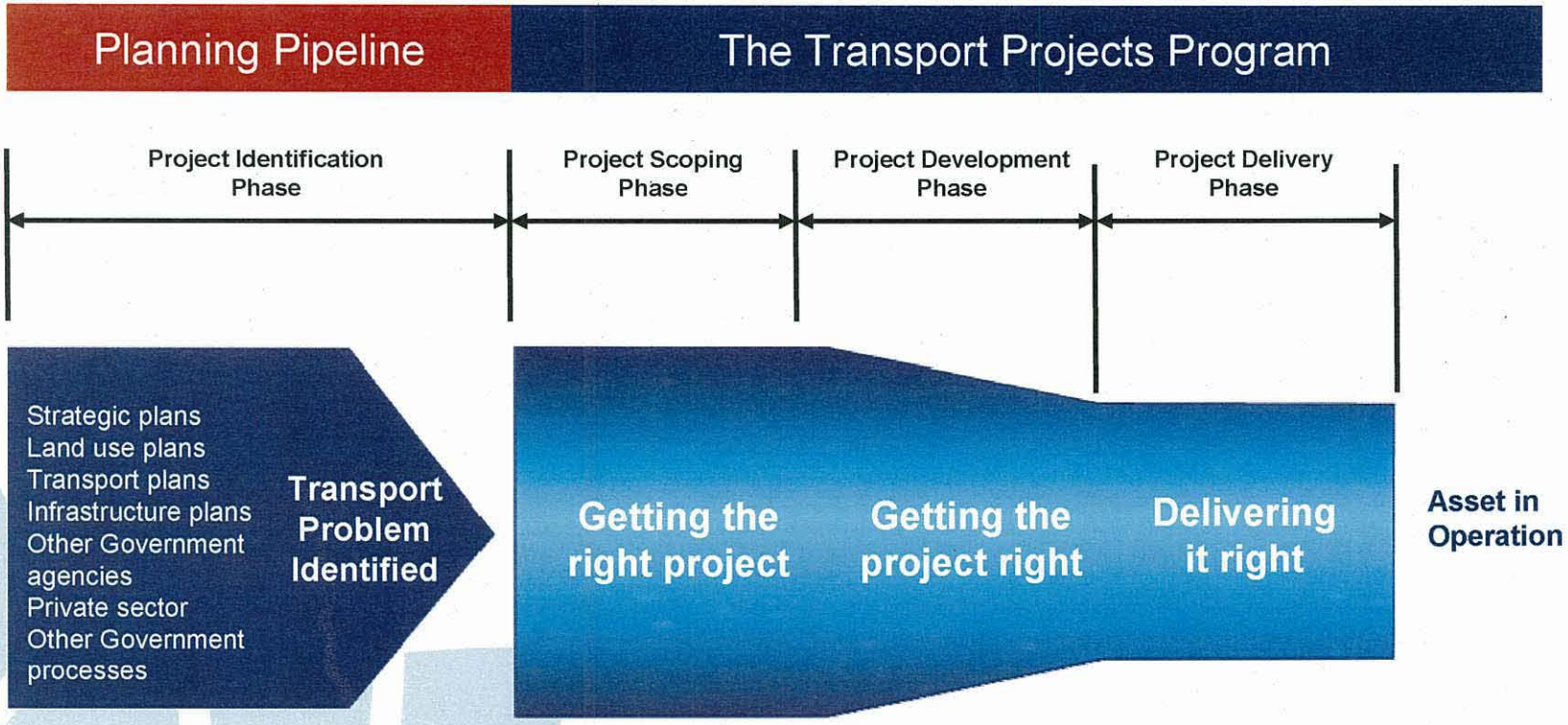
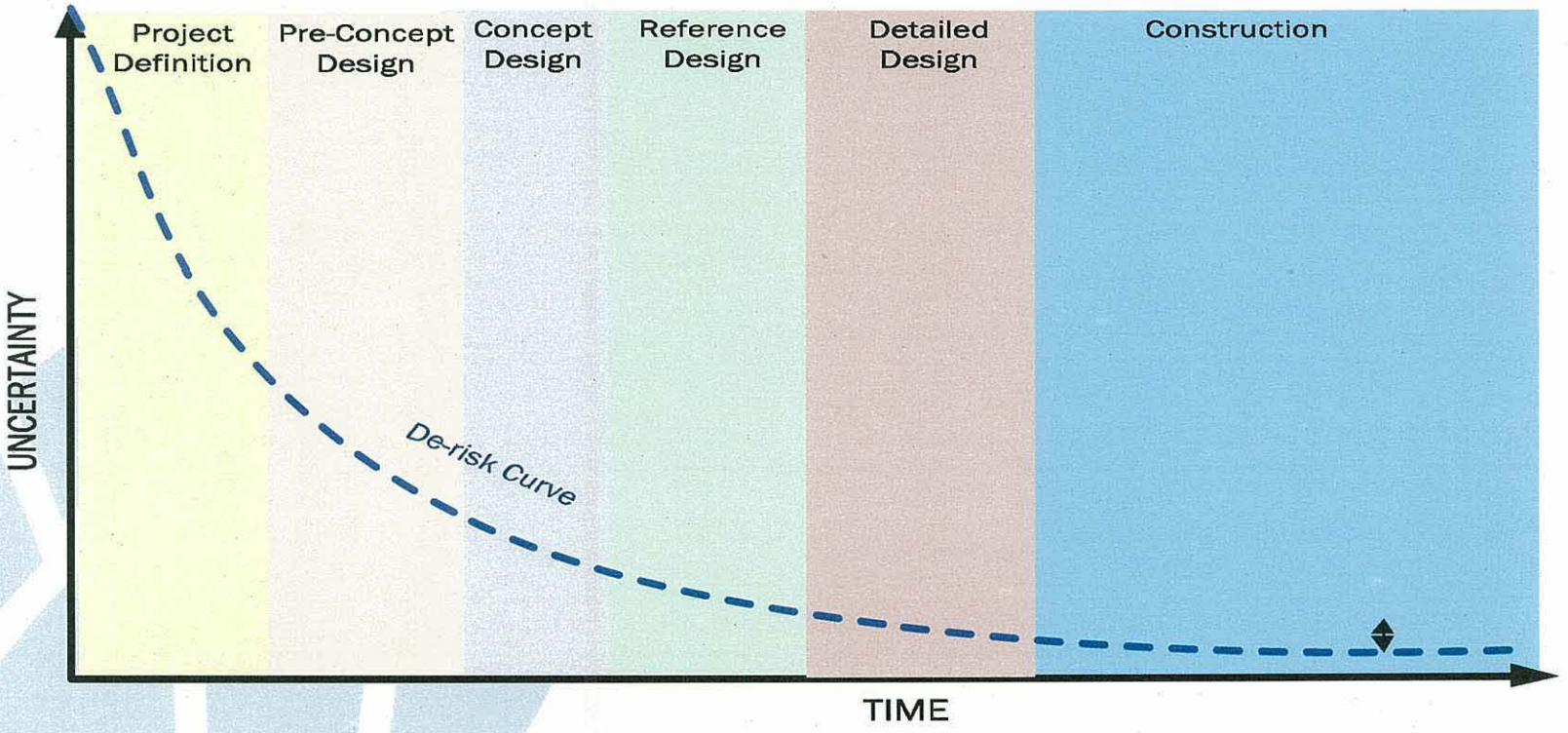
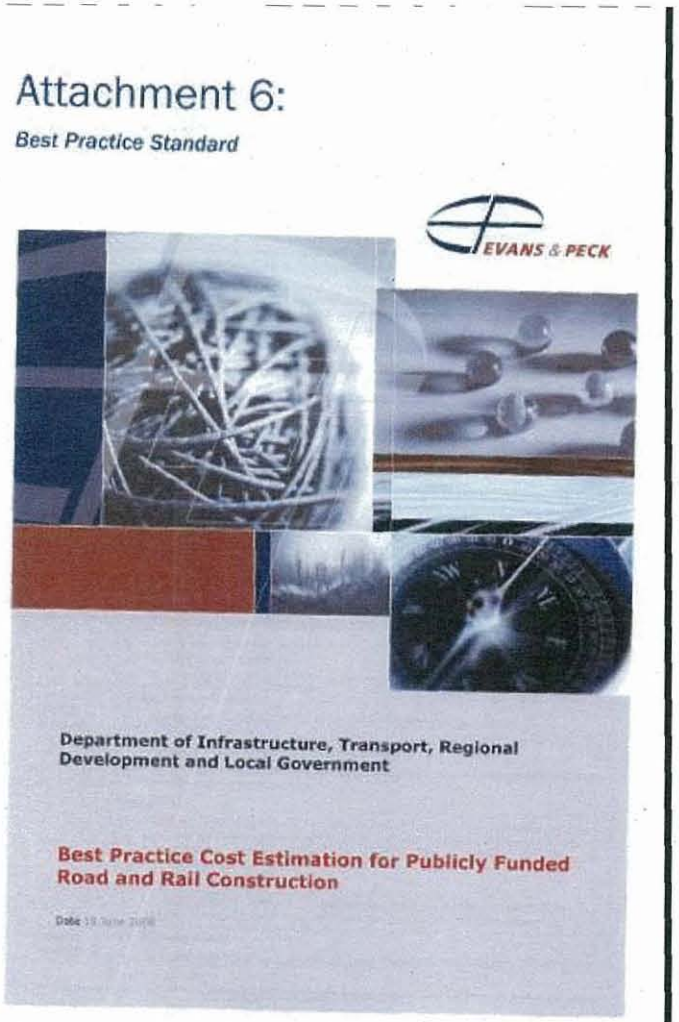
Project Phases



Uncertainty and Time



Best Practice Estimation



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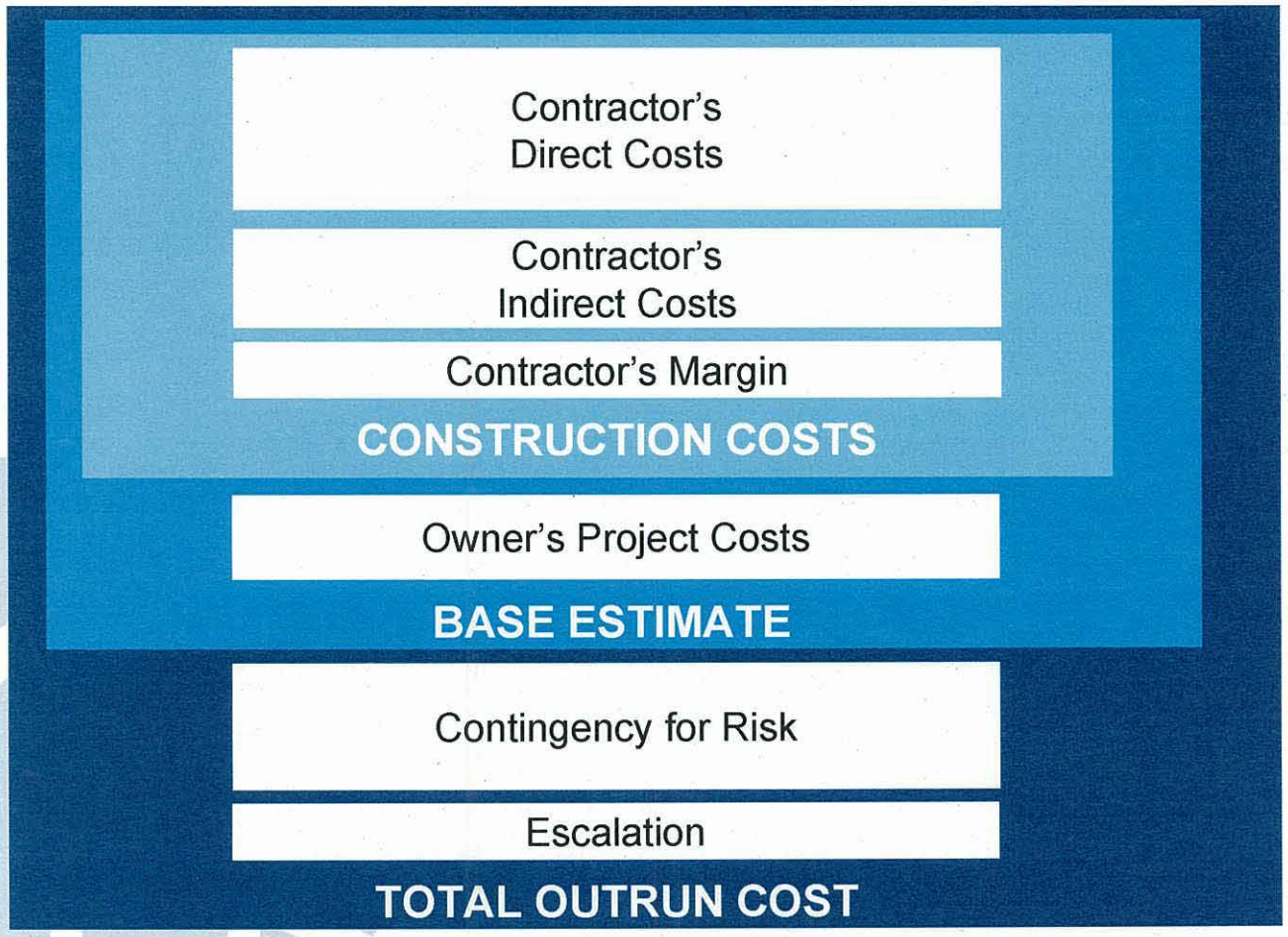
Cost Estimate Structure



Direct Cost

Direct Cost Estimates

Printed : July 3, 2007 08:28:51

Line	Comment	Resource	Unit	Quantity	Rate	Labour	Material	Plant	Subcont.	Total
Line no : 12 Item no : 7000	**Retaining walls**		Quantity :	1			Item Contributing (Qty)			
1	RETAINING WALLS									
2										
3	=(275*2). m2 Along Railway Parade, max 2m high	KEYSTONE		550	602	58853	190235	80084	1658	330831
					330831	58853	190235	80084	1658	330831
Line no : 13 Item no : 8000	**Bridges (Pedestrian, Road & Rail)**		Quantity :	1			Item Contributing (Qty)			
1	BRIDGES / STRUCTURES									
2										
3	GLENFIELD STATION									
4	A. New deflection wall to back of platform									
5	=(129) m			129						
6	=(129[#LQ5]/0.75) No Allowed 750mm cts			172						
7	=(5) m Typical 600mm dia pile length			5						
8	=(129[#LQ5]*2.5*0.5) m3 Forks			161						
9	=((129[#LQ5]/0.75)*7.9*0.025) tonne 'H' pile at 750mm cts			34						
10	=(129[#LQ5]*4.6*2) m2 formwork walls			1187						
11	=(175) kg/m3 reinforcing			175						
15	=(172[#LQ6]*5[#LQ7]) m	BORED PILE 600	m		860	620				533200
16	=(161[#LQ8]) m3	EWKS DETAILED	m³	161	45	3801		3432		7233
17	=(1187[#LQ10]) m2	FW WALL	m²	1187	165	174676	16860	4494		196029
18	=(1187[#LQ10]*1*2/2) Allowed 1m wide, one sided scaffold, 2weeks	SCAFFOLD	$	1187	1		1187			1187
19	=(34[#LQ9]) tonne	STRUCT STEEL <25KG/M	tonne	34	1250		42463			42463
20	=(356[#LQ12]*175[#LQ11]/1000) tonne	REBAR	tonne	62	1843	2262	72401	1236	38942	114840
21	=(356[#LQ12]*1.05) m3, Allowed 5% waste	CONC 32MPA-B1	m³	374	147		54955			54955
22	=(356[#LQ12]) m3	CONC PUMPED 10M3	m³	356	55	5565		10374	3560	19499
23	=(77[#LQ13]) m2	CONC FINISH	m²	77	7	509		2		512
24	=(1187[#LQ10])/2) m2	CONC CURE	m²	593	3	1088	296	79		1463
25	=sl(5:24,356[#LQ13]) m3				2728					971381
26										
27	B. Platform structural works (As per TENIX estimate)									

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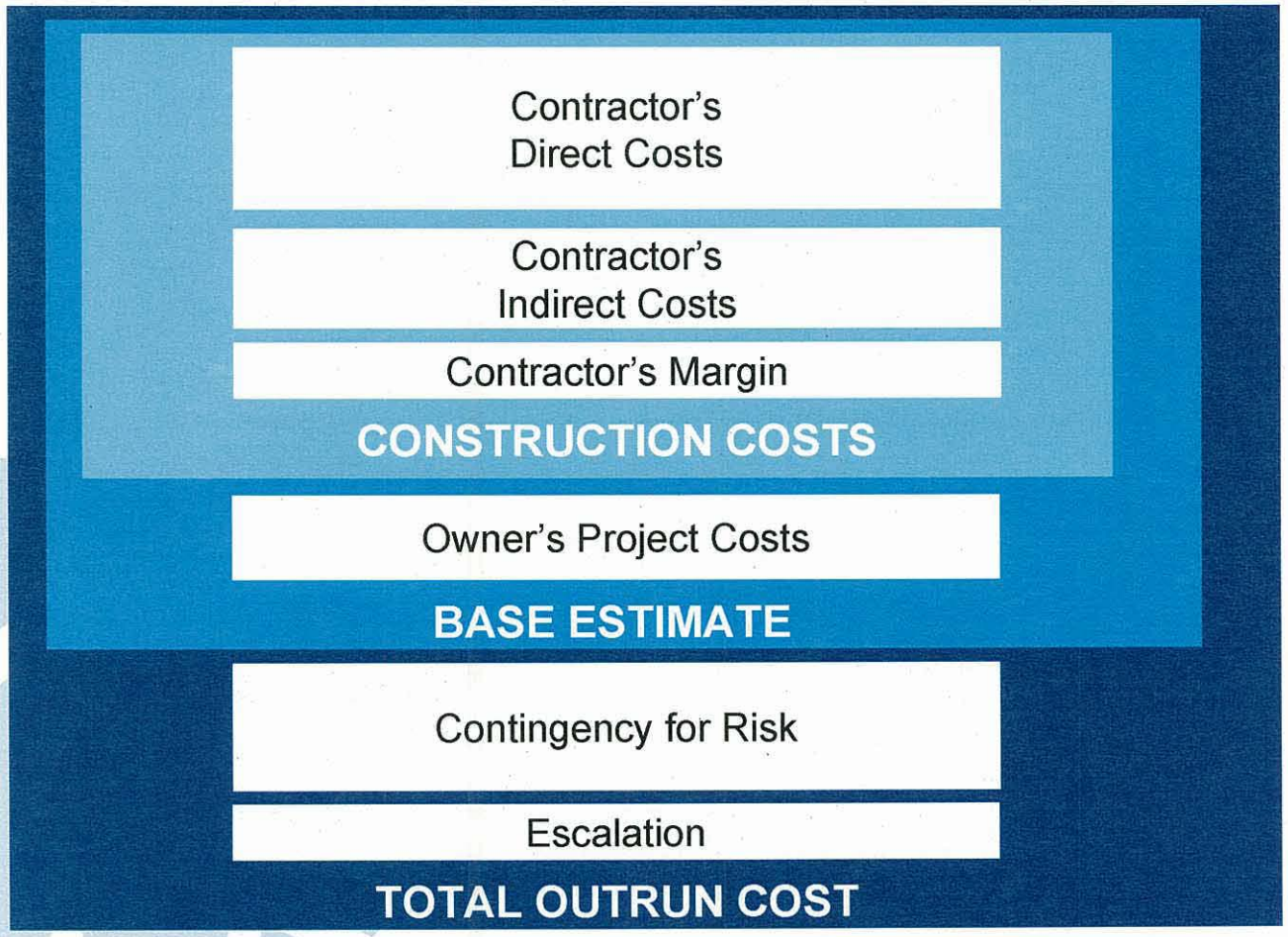
Cost Estimate Structure



Owner's Project Costs

MREP - COST PLANNER, MAY 2007

South West Rail Link - TIDC Delivery Costs

Item	Description	Unit	Amount	Min	ML	Max	Comments
1	Staff Costs		**25,753,123**	**75%**	**100%**	**150%**	Summation below items (3% const. cost)
3	- Technical staff costs	Item	4,312,310				Refer estimate from TIDC
2	- Planning & environmental staff costs	Item	1,750,540				Refer estimate from TIDC
3	- Commercial procurement staff costs	Item	1,593,580				Refer estimate from TIDC
4	- Communication staff costs	Item	1,846,188				Refer estimate from TIDC
5	- Reliability and operational readiness staff costs	Item	1,351,191				Refer estimate from TIDC
6	- Property staff costs	Item	320,733				Refer estimate from TIDC
7	- Project management staff costs	Item	14,240,136				Refer estimate from TIDC
8	- Safety staff costs	Item	338,445				Refer estimate from TIDC
9	Corporate costs	Item	**45,000,000**	**80%**	**100%**	**120%**	Allowance of 5% of Project Budget (estimated at $900m)
10	Contingent risk	Item					Itemised separately
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
6.3	**TOTAL COSTS**		**70,753,123**				

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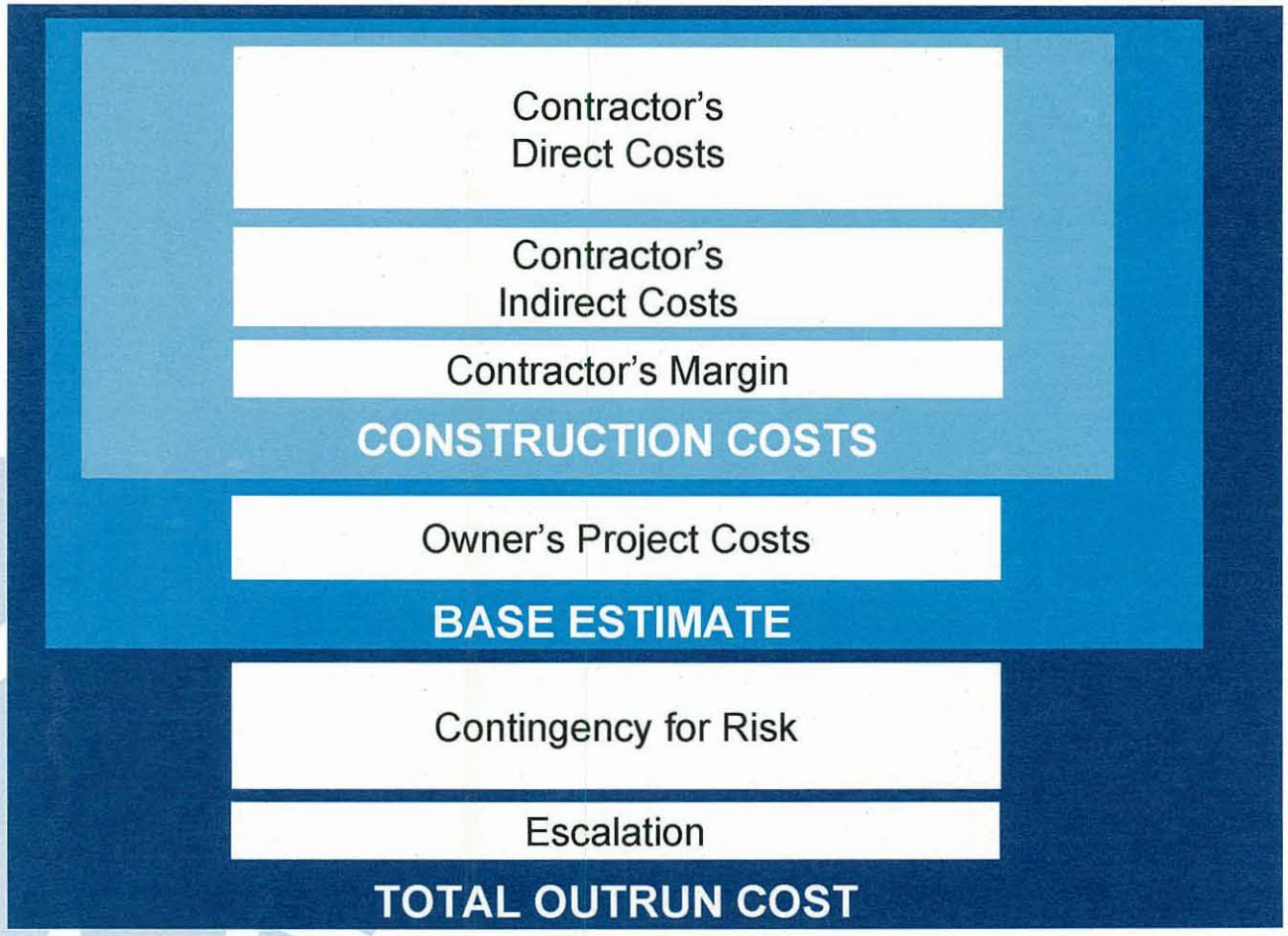
Cost Estimate Structure



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ESCALATION

Escalation

South West Rail Link - systematic escalation calculation for CPI plus Infrastructure Premium

MREP SWRL - D&C PROJECT CASHFLOW	Costs	Start Date	End Date	2006	2007	2008	2009	2010	2011	2012	2013	Cashflow Totals
per annum (year 07 to 12, range 3% to 5%)					4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	
cumulative - year					2.0%	6.1%	10.2%	14.5%	18.8%	23.2%	27.7%	
Design												
per annum (year 07 to 09, range 10% to 20%) (year 10, 5%)(year 11 to 12, range 3% to 5%)					15.0%	15.0%	15.0%	5.0%	4.0%	4.0%	4.0%	
cumulative - year					7.5%	23.6%	41.0%	52.2%	57.8%	63.0%	68.3%	
Work Package Risk (general & assumptions)												
per annum (year 07 to 12, range 3% to 5%)					4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	
cumulative - year					2.0%	6.1%	10.2%	14.5%	18.8%	23.2%	27.7%	
Contractors Margin												
per annum (year 07 to 9, 10%) (year 10 to 12, 8%)					10.0%	10.0%	10.0%	8.0%	0.0%	0.0%	0.0%	
cumulative - year					5.0%	15.5%	26.5%	31.5%	31.5%	31.5%	31.5%	
D&C SYSTEMATIC ESCALATION FORECAST COSTS CPI plus Infrastructure Premium				2006	2007	2008	2009	2010	2011	2012	2013	Cashflow Totals
General Construction												
Labour Cost					$ -	$ -	$ 1,045,843	$ 4,260,153	$ 4,443,512	$ 816,038	$ -	$ 10,565,546
Plant Cost					$ -	$ -	$ 439,238	$ 1,789,334	$ 2,080,773	$ 443,712	$ -	$ 4,756,057
Material Cost					$ -	$ -	$ 1,386,074	$ 5,466,343	$ 6,486,514	$ 1,405,966	$ -	$ 14,744,896
Subcon Cost					$ -	$ -	$ 6,089,742	$ 17,642,644	$ 15,850,498	$ 2,731,425	$ -	$ 42,314,309
Subtotal - General Construction					$ -	$ -	$ 8,960,898	$ 29,158,474	$ 28,863,297	$ 5,395,140	$ -	$ 72,380,808
Systems (Track & System, Sig\Comms/Power)					$ -	$ -	$ 885,273	$ 10,255,101	$ 14,151,236	$ 3,042,650	$ -	$ 28,334,261
Indirect Job Costs												
Staff					$ -	$ 646,899	$ 8,824,719	$ 18,639,990	$ 16,897,584	$ 7,121,717	$ -	$ 51,930,709
Other					$ -	$ 116,502	$ 1,944,991	$ 3,823,074	$ 3,807,355	$ 1,839,572	$ -	$ 10,931,092
Subtotal - Indirect Job Costs					$ -	$ 763,201	$ 10,369,310	$ 22,263,064	$ 20,504,939	$ 8,961,289	$ -	$ 62,861,802
Design					$ -	$ 194,552	$ 2,654,817	$ 5,607,631	$ 5,023,280	$ 2,142,488	$ -	$ 15,622,769
Work Package Risk (general & assumptions)					$ -	$ 131,527	$ 1,743,803	$ 4,090,357	$ 4,298,495	$ 2,076,829	$ -	$ 12,340,924
Contractors Margin					$ -	$ 362,161	$ 4,878,029	$ 9,614,184	$ 7,778,378	$ 3,043,812	$ -	$ 25,676,543
TIDC Retained Work Package Contingency					$ -	$ 176,145	$ 2,643,404	$ 7,023,949	$ 7,422,443	$ 3,446,278	$ -	$ 20,712,218
RailCorp					$ 106,385	$ 692,406	$ 1,885,848	$ 3,061,266	$ 2,817,193	$ 1,682,441	$ -	$ 10,248,498
TIDC Project Development					$ 88,286	$ 574,613	$ 1,567,908	$ 2,540,485	$ 2,337,865	$ 1,396,216	$ -	$ 8,504,974
TIDC Delivery Costs					$ 112,449	$ 731,874	$ 1,996,508	$ 3,235,772	$ 2,977,699	$ 1,778,336	$ -	$ 10,832,636
TOTAL SYSTEMATIC ESCALATION COSTS					**$ 307,120**	**$ 3,626,481**	**$ 37,588,479**	**$ 96,850,303**	**$ 96,174,673**	**$ 32,968,478**	**$ -**	
CUMULATIVE ESCALATION COSTS					**$ 307,120**	**$ 3,933,600**	**$ 41,522,079**	**$ 138,372,382**	**$ 234,547,055**	**$ 267,515,533**	**$ 267,515,533**	

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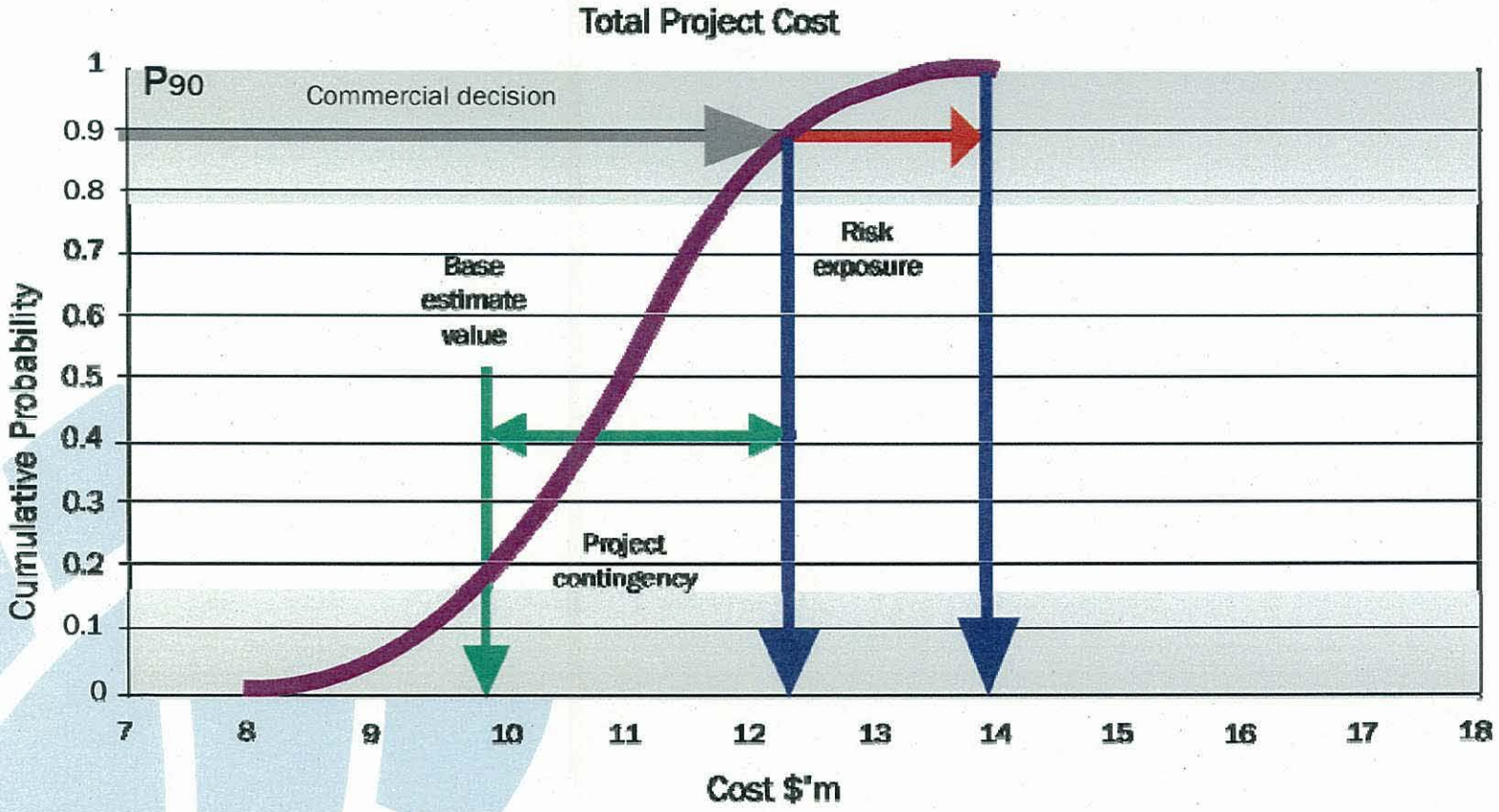
CONTINGENCY

Too large and the project may be unviable
Too small and cost over runs occur

Probabilistic project cost curve



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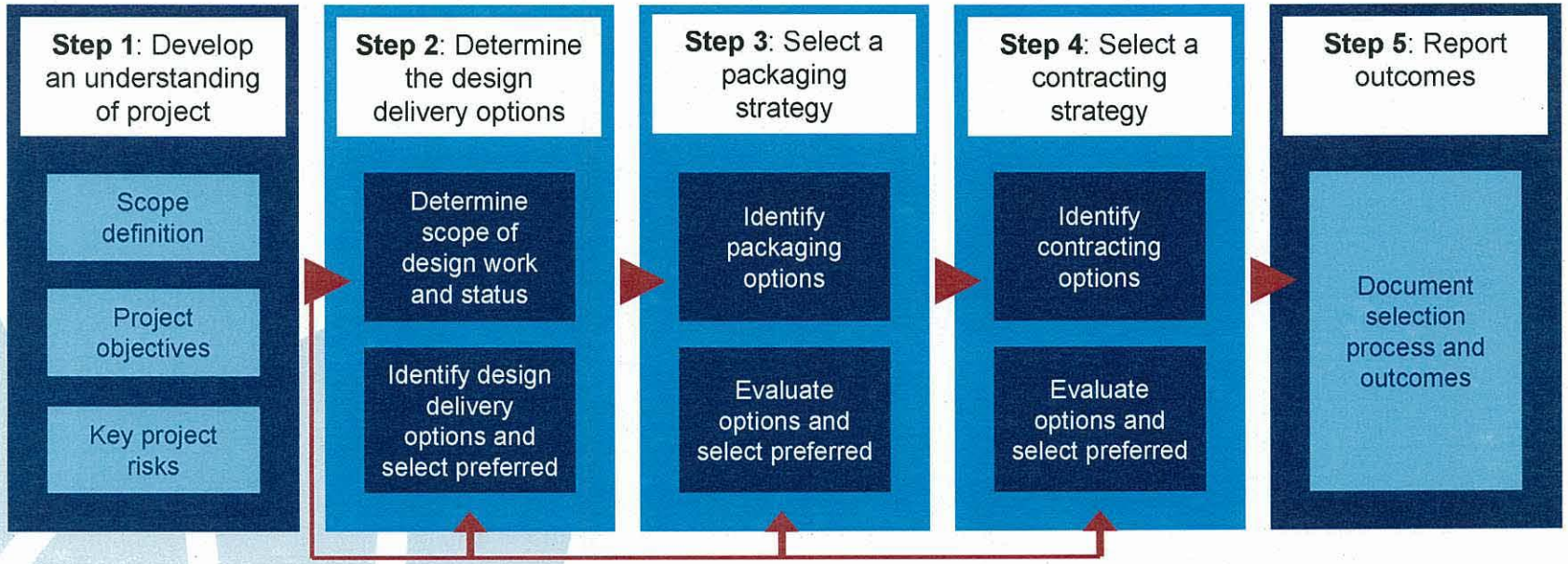
TENDERING

Delivery Strategy Selection Process



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South West Rail Link

The $2.1 billion South West Rail Link includes a major upgrade of Glenfield Station and interchange and a new twin track passenger rail line from Glenfield to Leppington via Edmondson Park

The project responds to issues of reliability and passenger growth on the metropolitan rail network and population growth in south-west Sydney

Benefits include increased rail service capacity, improved reliability of passenger and freight operations, better station access and amenity and relief to network congestion

Final planning approval for SWRL was received in November 2010

Construction commenced at Glenfield in 2009

Trains will commence operation on SWRL in 2016

New Edmondson Park Station: will include 400 commuter car parking spaces and a street-level concourse and transport interchange.

New Leppington Station: will include 850 commuter car parking spaces. The new station will also include lifts and a street-level concourse and transport interchange.

Glenfield multi-storey commuter car park: was opened in September 2010. The new facility provides 730 free, untimed commuter parking spaces. It also includes lifts, CCTV and security lighting. The design of the car park's external panels incorporates community feedback.

Glenfield Junction Northern Flyover: will carry the new East Hills track over the existing South Line. Construction of the flyover commenced in June 2010.

Glenfield station upgrade: involves construction of a fourth platform, railworks, upgrade of the railbus interchange, a new station concourse including lifts and the realignment of Railway Parade.

Rosemore train stabling facility: will provide train stabling (parking) facilities for the network. The facility will be able to accommodate 20 eight-car train sets.

Glenfield Junction Southern Flyover: will connect the new rail line to the existing network, carrying it over the South Line and Southern Sydney Freight Line. Construction of the flyover in the rail corridor commenced in June 2010.

Seddon Park commuter car park: was opened in October 2009. The extended car park provides 112 free, untimed commuter parking spaces.

Rail bridge over Sydney Water Supply Canal

Rail bridge over Camden Valley Way

Rail bridge over Cowpasture Road

Rail bridge over Campbelltown Road

Rail tunnel under Hume Highway

Glenfield South Substation

ROSSMORE

LEPPINGTON

EDMONDSON PARK

GLENFIELD

CASULA

MOOREBANK

LIVERPOOL

SWRL construction contracts

Glenfield to Leppington rail
(10.5 km)

Glenfield Transport Interchange
(2.4 km)

Stabling facility | Leppington Station | Edmondson Park Station | Southern flyover | Glenfield Station | Northern flyover

Earth and civil works, rail system works, signalling, Edmondson Park and Leppington Stations
Design and Construct contract (John Holland)

Auburn Stabling
Design and Construct contract

Airport Line power upgrade

Civil, building, design of rail works
Glenfield Junction Alliance (TCA/Macmahon/Parsons Brinckerhoff/ Bouygues/MVM Rail)

Glenfield rail works
RailCorp (NovoRail & Internal delivery groups)

Glenfield multi-storey car park
Design and Construct contract (St Hilliers)

Seddon Park car park
Design PSC (Aurecon/AECOM)
Construct only contract (North Shore Paving)

Glenfield South Substation
Design PSC (Hyder)
Construct only contract (Tenix)

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ISSUES

so what goes wrong?

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Announcements too early Changing Priorities

	Glenfield to Leppington rail line (GLRL)	Glenfield Junction	Auburn Stabling Project	Airport Power	Estimated total cost	Year of completion
December 2004 announcement	$688m*	-	-	-	$688m	
June 2005 announcement	$500m*	-	-	-	$500m	
2008/09 Budget	$983m	$382m	-	-	$1,365m	2012
November 2008 Mini Budget	Staged (later)	$617m**	$200m	$40m	$857m	2013
Current	$1,245m	$637m	$200m	$40m	$2,122m	2016

*$ of the day ** Glenfield Station upgrade, car parks etc.

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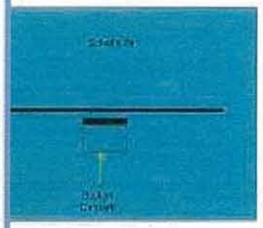
Unclear Scope

From Schofields

To Quakers Hill

From Quakers Hill

To Schofields

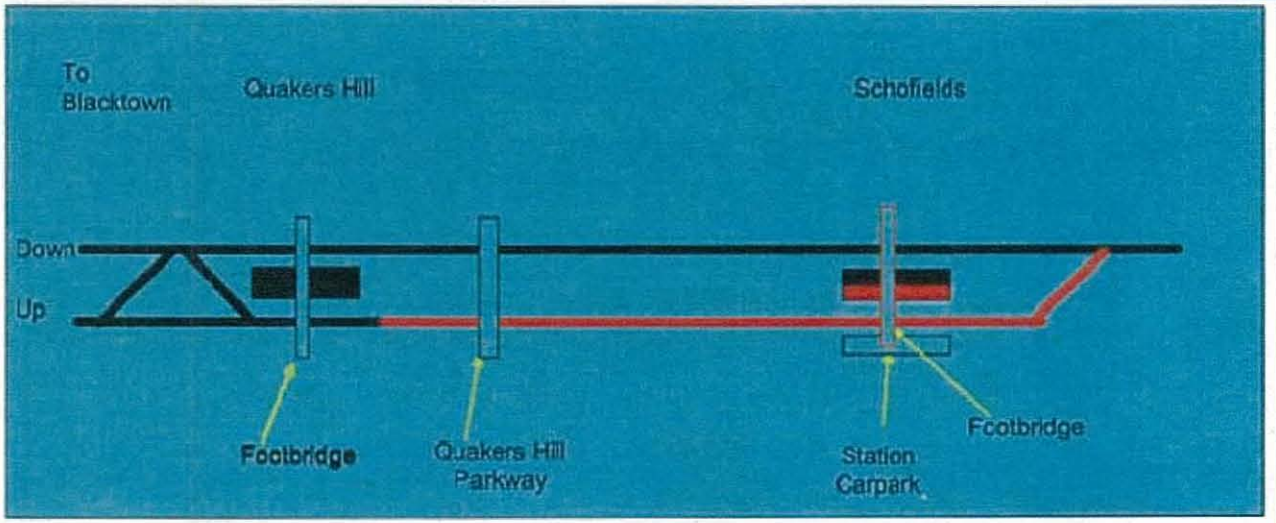


1.3 KEY EXISTING RELIABILITY AND C

The existing track duplication on the approximately 150m on the country side line to the terminus at Richmond, apart stations to provide train crossing. Servic via Strathfield before proceeding to the N Berowra.

The single track between Quakers Hill an and frequency of services due to the need Richmond (i.e. services operating in one direction). As a result, the current morn maximum three trains per hour to the C equivalent limitations for the afternoon pe

Predicted regional population growth ass and predicted land releases will increase Schofields Station in 2004 was approxim 2020, this is expected to grow to betwee significant increase in train services.



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it became .....

Change of Policy

NSW GOVERNMENT | Transport for NSW

THE HON CARL SCULLY MP
Minister for Transport
Minister for Roads

MEDIA RELEASE

Thursday 21 August 2001

OLYMPIC TEAM TO FAST-TRACK RAIL LINK

The State Government has secured the services of key personnel involved in the successful delivery of infrastructure and services for the 2000 Olympic Games to assist in fast-tracking the Parramatta Rail Link project.

The Minister for Transport, Mr Carl Scully, said the new project team would be responsible for exploring all options for completing the section of the rail link from Epping to Parramatta by 2010.

Mr Scully said planning for the Epping to Chatswood section had stepped up a gear, with tenders for the

"There is $1.6 billion of State Government funding locked in to complete the Chatswood to Epping section by 2008 and deliver a new Parramatta Transport Interchange by 2006," Mr Scully said.

assess all opportunities for moving the project forward.

- **Bob Leece**, the former Executive Director of the Olympic Roads and Transport Authority, has been appointed to the Board of the Parramatta Rail Link Company (PRLC). Mr Leece was also the Deputy Director of the Olympic Coordination Authority (OCA) that was responsible for all Olympic-related construction activity.
- **Michael Eyers** has also been appointed to the PRL the Sydney Organising Committee for the Olympi the Games.
- **John Barraclough**, the former Executive Director Project Director for the Parramatta Rail Link. Mr B sporting and non-competition venues during the Stadium. These included the White Water Stadium,

"The Government recognises the importance of the Parramatta Rail Link in supporting the growth of western Sydney," Mr Scully said.

"That is why I have instituted a new project team to fully investigate the options for completing the project through to Parramatta. They are people with clear runs on the board."

If planning approval is granted, construction of the Parramatta Rail Link will commence in approximately 12 months, with the project expected to create up to 1,000 jobs at its height of construction activity.

Contact: **Jodie Brough, Minister's office (02) 9228 4455 or 0411 020 292**
Helen Willoughby, Parramatta Rail Link (02) 9895 2800 or 0408 952 895

PROJECT DESCRIPTION	LOCATION	START	COMPLETE	ESTIMATED TOTAL COST $'000	EST EXPEND TO 30-06-01 $'000	ALLOCATION 2001-02 $'000
RAIL INFRASTRUCTURE CORPORATION (cont)						
BROADBAND VIRTUAL CIRCUIT NETWORK	Various	1999	2002	107,100	76,100	31,000
DUMP TRUCKS	Wallerawang	2000	2002	480	1	479
DUNGOG - CRAVEN RESLEEPERING	Dungog	1999	2002	25,200	13,200	12,000
INTERCITY TRAIN STOPS	Various	1999	2002	17,099	13,547	4,302
LAND PURCHASE	Bomba	1998	2002	1,801	122	1,679
NEWCASTLE SHIP LOADING FACILITY	Newcastle	1999	2002	16,746	1,796	14,950
NSW NORTHERN NETWORK MAINTENANCE CONTROL	Broadmeadow	1998	2002	21,550	16,450	5,100
RATIONALISATION OF MOSS VALE SIGNAL BOX	Moss Vale	2000	2002	1,017	27	990
TOTAL, RAIL INFRASTRUCTURE CORPORATION						144,221
PARRAMATTA RAIL LINK						
PROGRAM OVERVIEW						
WORK-IN-PROGRESS						
PARRAMATTA RAIL LINK* - EPPING TO CHATSWOOD AND PARRAMATTA TRANSPORT INTERCHANGE	Various	1999	2008	1,621,000	38,492	119,000
						119,000
TOTAL, MAJOR WORKS						119,000
TOTAL, PARRAMATTA RAIL LINK						119,000

* In addition to the $119 million projected to be spent as part of the asset acquisition program, $26 million will be spent on project management and engineering assessment.

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Complex construction in a Live Rail Environment

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BUT IT'S NOT ALL BAD

some urban myths exploded

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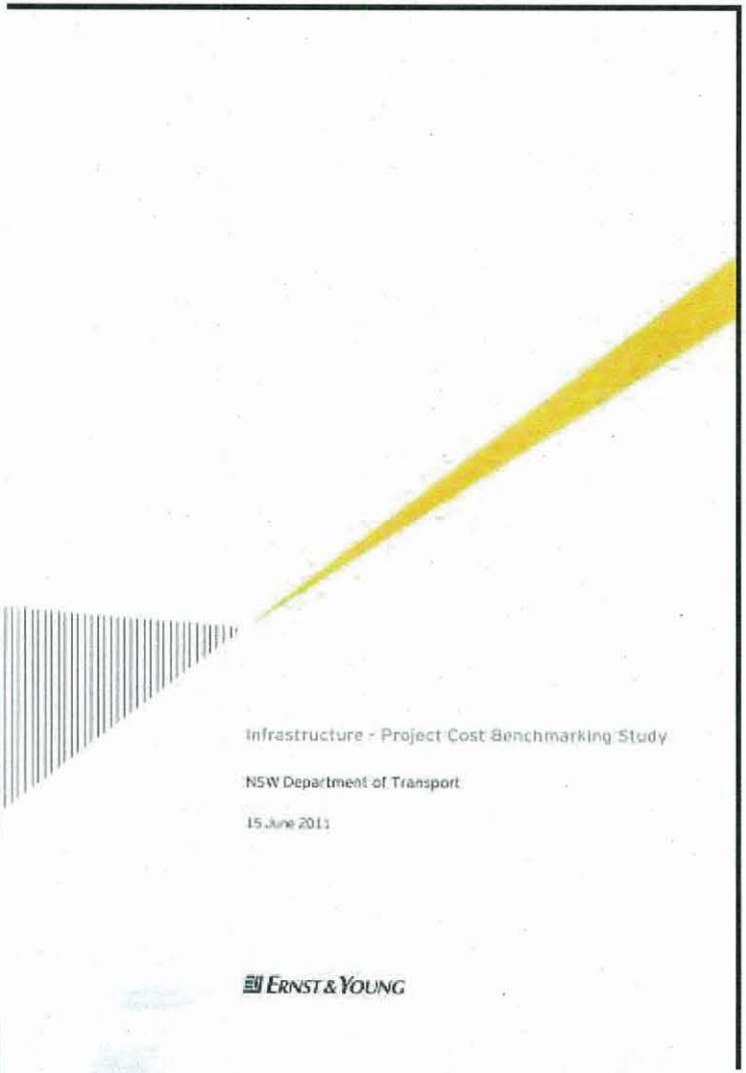
Epping to Chatswood

TARGETS	ACHIEVEMENTS
Time: Project completed in 2008	✓ Handed over Epping to Chatswood Rail Link to RailCorp on schedule in December 2008.
Cost: Deliver project for $1.6 billion ($ 2001)	✓ Delivered the project for an outturn cost of $2.35 billion ($2008) – $100 million below escalated original forecast cost.
Epping Station: Upgrade station and aerial concourse	✓ Achieved an end-result that included the additional delivery of a new footbridge with lift and an upgrade of the existing bus interchange to create a modern transport interchange.
Chatswood Station: Build two additional platforms	✓ Added value by using an innovative delivery model to replace the entire station and bus interchange.
Parramatta Station: Upgrade station	✓ Delivered an integrated transport facility that breathes new life and vitality into the whole precinct and serves as a catalyst for the revitalisation of Parramatta's city heart. Delivered the project 10 months ahead of schedule.
Safety: Achieve a lost time injury frequency rate for the life of the project of 10 (half the industry average at the time)	✓ Achieved a lost time injury frequency rate of 4.4 for the life of the project – significantly below the industry average.
Compliance: Achieve compliance with the project's 260 conditions of approval	✓ Achieved 95% compliance as a rolling average over the life of the project.
Environmental management: Responsible management of environmental assets along the route	✓ Proactively rehabilitated the worksite at Lane Cove National Park to a level exceeding pre-construction activity. Planted more than 14,000 trees and plants across the project sites. More than 95% of spoil re-used. Sensitively managed and rehabilitated heritage items at Parramatta, Epping and Chatswood stations.
Stakeholder engagement: Keep stakeholders informed of project activities	✓ Used community involvement to help shape the project; at Lane Cove National Park TIDC delivered an outcome that balanced the needs of the community with operational requirements. Successfully implemented a stakeholder engagement program involving 30,000 households and businesses, five local government areas and five community liaison groups.

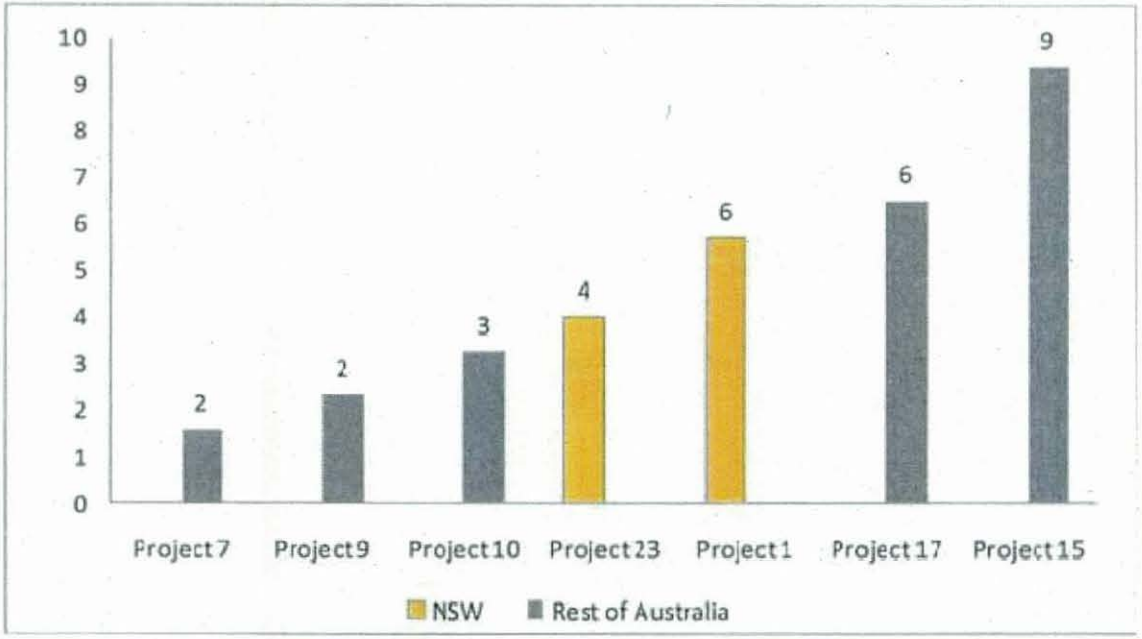
Benchmarking



6.5.1 Road - Total construction cost per lane kilometre ($m)

In the figure below, the total construction cost per kilometre for road projects is shown. There are 6 road projects included in the cost per kilometre analysis.

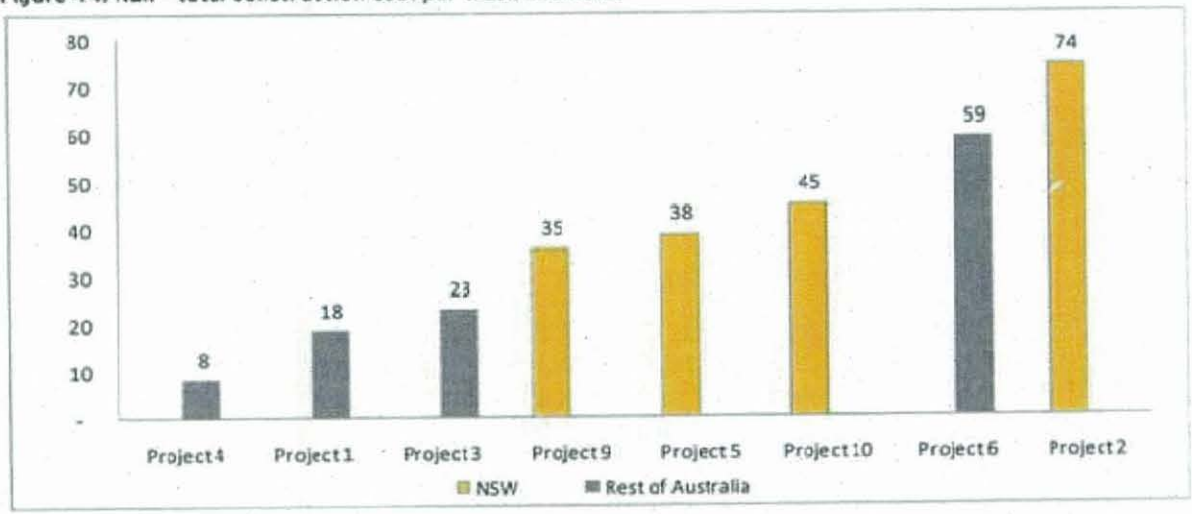
Figure 42: Road - total construction cost per lane kilometre



6.5.3 Rail - Total construction cost per track kilometre ($m)

In the figure below, the total construction cost per track kilometre for rail projects is shown. There are 8 projects included in the per kilometre analysis. The total construction costs are inclusive of the client costs.

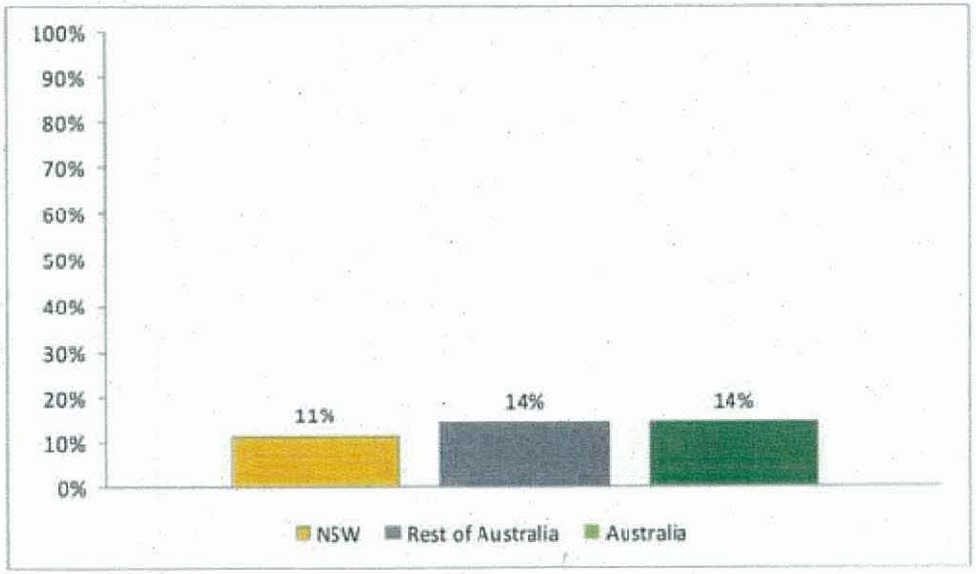
Figure 44: Rail - total construction cost per track kilometre



6.1.3 Road - Average client cost as percentage of total construction cost

The average road client costs as a percentage of total construction costs for NSW and the rest of Australia are shown in the figure below.

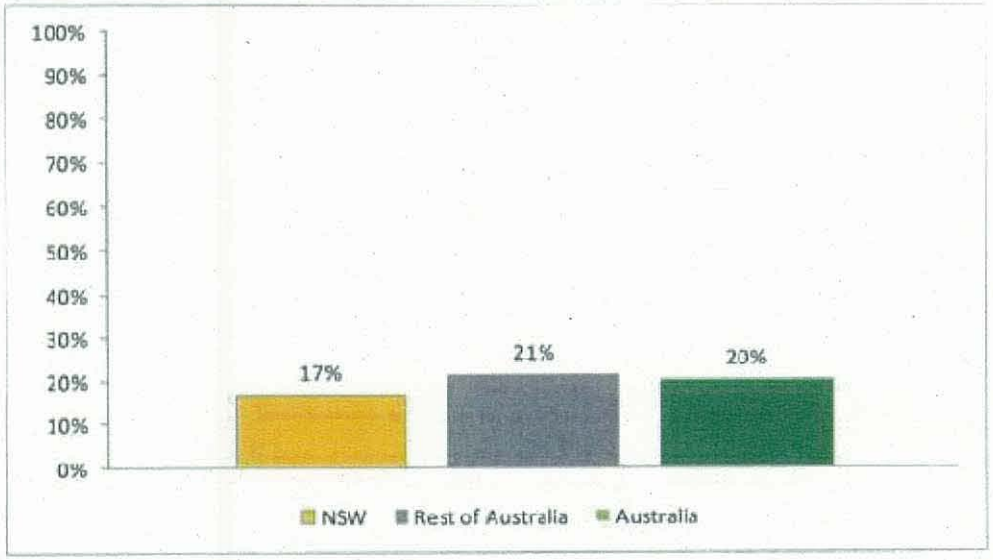
Figure 4: Road - Average client cost as percentage of total construction cost



6.2.3 Rail - Average client cost as percentage of total construction cost

The average rail client costs as a percentage of total construction costs for each project considered in the benchmarking analysis are shown in the figure below.

Figure 16: Rail client costs as a percentage of total construction costs



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Internal Benchmarking

	Current Estimate
Rail in CBD / Tunnels	**$/track km**
Epping to Chatswood Rail Line	$84m
Package F Perth Mandurah	$89m
Greenfield Rail	**$/track km**
South West Rail Link	$51m
Regional Rail Link, Vic	$48m
Brownfield Rail	**$/track km**
Cronulla Line Duplication	$40m
Richmond Line Duplication	$59m
Kingsgrove to Revesby Quad	$43m
Corinda to Darra, Queensland*	$42m
South Morang Rail Extension, Vic*	$51m
Commuter Car Parks	**$/space**
Glenfield Multi Storey Car Park	$21k
Perth Elder Street Car Park	$29k
Warwick Farm	$27k

Safety Performance

Key achievements 2010/11

- lost time injury frequency rate of 1.8 rolling 12-month average (national industry average of 11)
- no major rail safety incidents requiring investigation by the Rail Safety Regulator
- conducted 803 consultative safety inspections
- conducted 162 safety audits across a range of programs
- implemented a Safety Performance Index
- enhancing knowledge and management of safety risks
- improving project safety assurance methodology.

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