



Public Transport Authority

New Metro Rail Project

Lessons Learnt
May 2008

Reece Waldock, Peter Martinovich, Andrew Cartledge,
Ross Hamilton

Public Transport Authority WA

New Metro Rail Project Overview



New Metro Rail Project Overview



New Metro Rail Project Overview

Background:

- At \$1.663 billion, largest public transport project undertaken by the Western Australian State Government.
- Southern Suburbs Railway infrastructure was \$1.184 billion effectively doubled the size of the Perth urban rail network.

Major SSR infrastructure works included:

- Bored tunnel under Perth City and construction of underground railway infrastructure including two underground stations;
- Over 70kms of civil and rail infrastructure works from the Narrow Bridge to Mandurah;
- A new road bridge at Mount Henry, strengthening of the existing road bridge, a new rail bridge at the Narrows and strengthening of part of the western road bridge plus median preparation work in the Kwinana Freeway between the Narrows and Glen Iris;
- Nine suburban stations.

New Metro Rail Project Overview

NMR Works

- Extension to Clarkson
- Extension to Thornlie
- New Mandurah Line
- City tunnels



New Metro Rail Project - Packages

Package	Works
Package A:	<p>All works south of the Narrows</p> <ul style="list-style-type: none"> • Track and Civil Works • Communications and Signalling • Overhead, Power System and Sub-Station • Extensive works in Perth yard (east and west)
Package B	<p>Three stations</p> <ul style="list-style-type: none"> • Cockburn Central; Kwinana; Wellard
Package C	<p>Three Stations - Split into two because of the tender.</p> <ul style="list-style-type: none"> • Rockingham and Warnbro; Mandurah
Package D	<p>Three Stations</p> <ul style="list-style-type: none"> • Canning Bridge; Bullcreek; Murdoch
Package E	<p>Construction of the:</p> <ul style="list-style-type: none"> • Rail corridor from the Narrows to Glen Iris • Rail Bridge at the Narrows • Canning Bridge bus ramp relocation • Mount Henry bridge works • Leach Highway and South Street interchange modifications
Package F	<p>City Project</p> <ul style="list-style-type: none"> • Tunnels through CBD • Perth Underground and Esplanade stations • Railway works between the Narrows and Roe Street • Major civil, road and services works at the foreshore, through William Street and in the area west of Perth station <p>Stakeholder Management</p>
Package G	<p>Train control system</p> <ul style="list-style-type: none"> • Decommissioning of the old system • Commission of the new system
Package H Public Transport Authority	<p>Extensive track, electrical and railway systems works, particularly in Perth Yard area and integrating with Package F and A works.</p>

New Metro Rail Project Overview



New Metro Rail Project Overview



Public Transport
Authority

NewMetroRail
Making the Connection



New Metro Rail Project Overview



New Metro Rail Project Overview



New Metro Rail Project - Outcomes

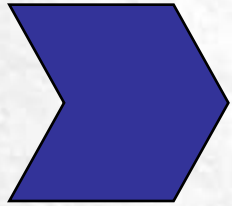
"How would you sum up the whole project?"

The general consensus included comments such as:

- The project is a success;
- Operationally the results are outstanding;
- Community, political and public success;
- Operates without any problems or delays;
- It was a challenging project;
- A High Quality State Asset and Value for Money;
- Patronage and demand since the railway was opened in December is very encouraging and is close to the forecasts; and
- The Supplementary Master Plan was excellent.

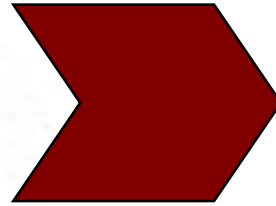
New Metro Rail Project – Lessons Learnt

Project Phases



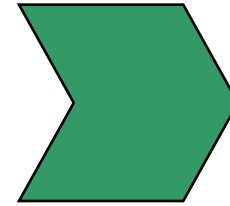
**Planning &
Masterplan**

Peter Martinovich



**Contracting methods
& Documentation**

Andrew Cartledge



**Construction and
Commissioning**

Ross Hamilton

Each speaker will address:

- What was done well? and
- What were the major issues and what could be done better?



Public Transport Authority

New Metro Rail Project

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Public Transport Authority WA

New MetroRail Planning Lessons

Peter Martinovich
Director of Rail Infrastructure Planning
Public Transport Authority

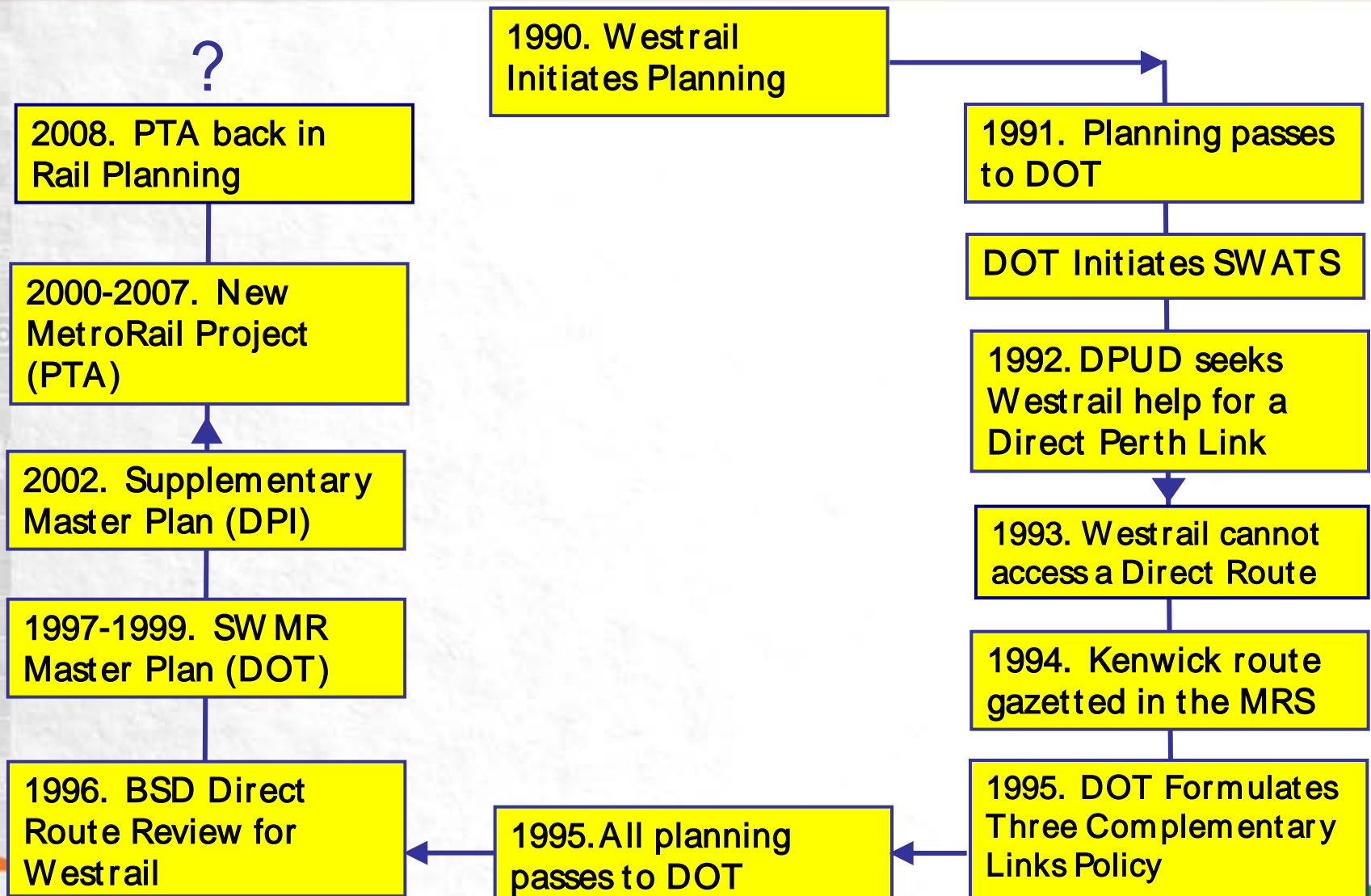
Knowledge Network Forum –Tuesday May 6, 2008

Presentation Format

- Planning Pre Master Plans
- SWMR & other Master Plans
- Planning during New MetroRail Project
- Outcomes

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Mandurah Railway - 20 Year Planning Cycle



Evolution of Planning the Perth – Mandurah Railway

Public Transport Studies; 1991 - 1993

Two studies – different approaches

1. DPUD / Westrail

Inter Corridor **Direct route** to Perth, wider catchments requiring motorised access.

2. Department of Transport (SWATS)

Intra corridor link to Fremantle heavily dependent on walking patronage.

“the rail transit systems were all assumed to co-exist with a complimentary express bus service operating in dedicated lanes on the Kwinana Freeway” (Rapid Transit Review – DOT June 1994)

Public Transport Studies; 1991 – 1993

Planning for what Market – System Comparison

System	Stops		Trip time	Trip speed (km/h)	All day trips	Year
Perth - Fremantle	13	19.0km	24'	48	25,000	2006
SWAT (Mandurah –Fremantle)	31	64.4km	75'	52	40,400	2021
SSR (Mandurah – Perth)	8	70.9km	48'	88	50,000	2008

Picking the Market

Make a mass transit rail applicable to:

- Pre existing, very low density urbanisation
- Among highest per capita world car ownership
- Entrenched culture of car usage for most trips
- Disregard for Public Transport
- A long, urban corridor
- Maximise access along the route to major centres including Kwinana and Thomsons Lake

The system was not targeted to potential users who currently made private trips, especially the journey to work at peak times.

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An Inter Regional Railway for The Market in Perth

A traditional mass transit railway achieves its “mass” through penetration of high urban densities.

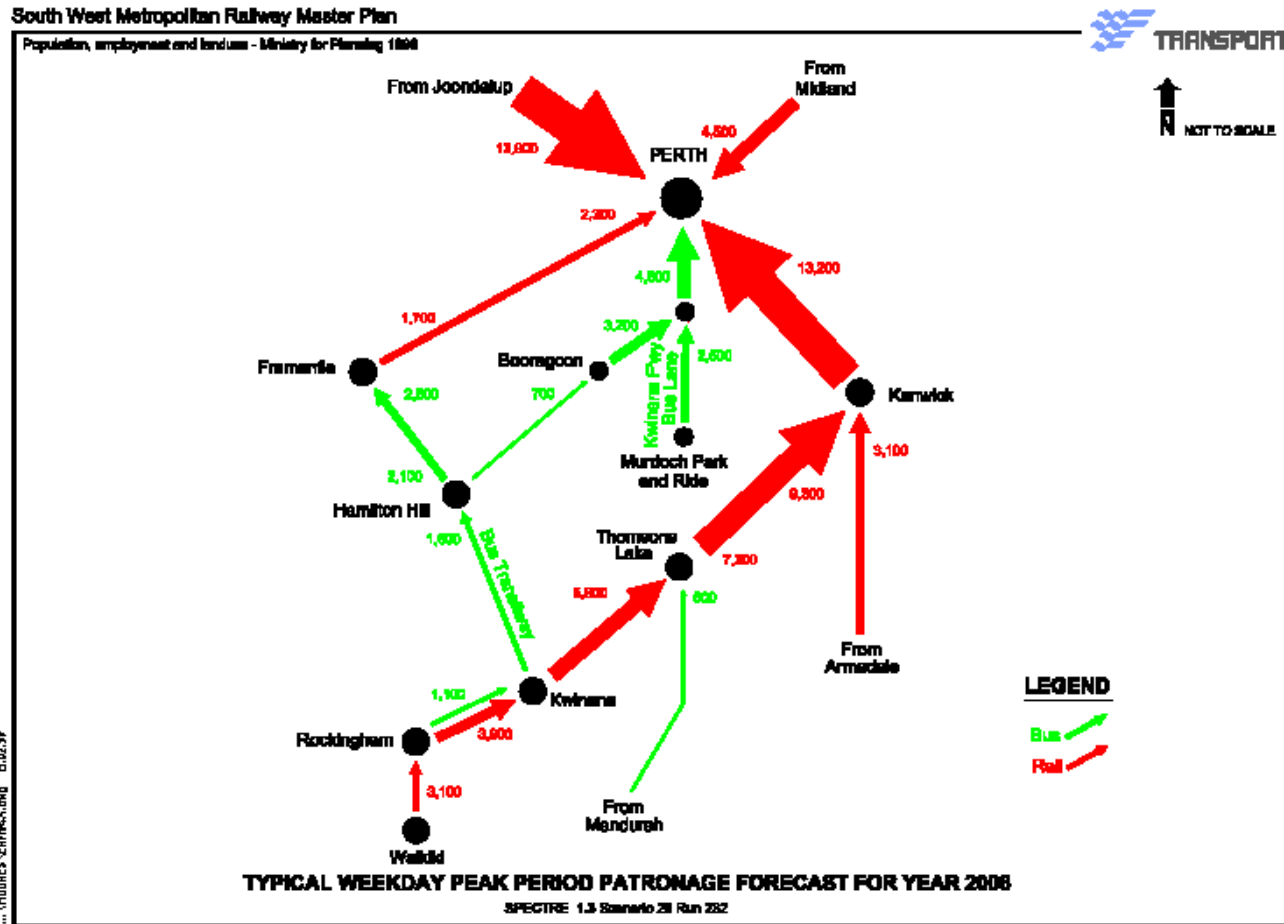
In low urban densities the “masses” must be brought, or come to the railway in their own way –the stations become the concentration points of population density

The following provisions have been made in Perth

- Strategically located stations at wider intervals than older systems
- Well designed, large stations with good bus & car / rail interchanges
- Frequent services
- Provide high standard rollingstock

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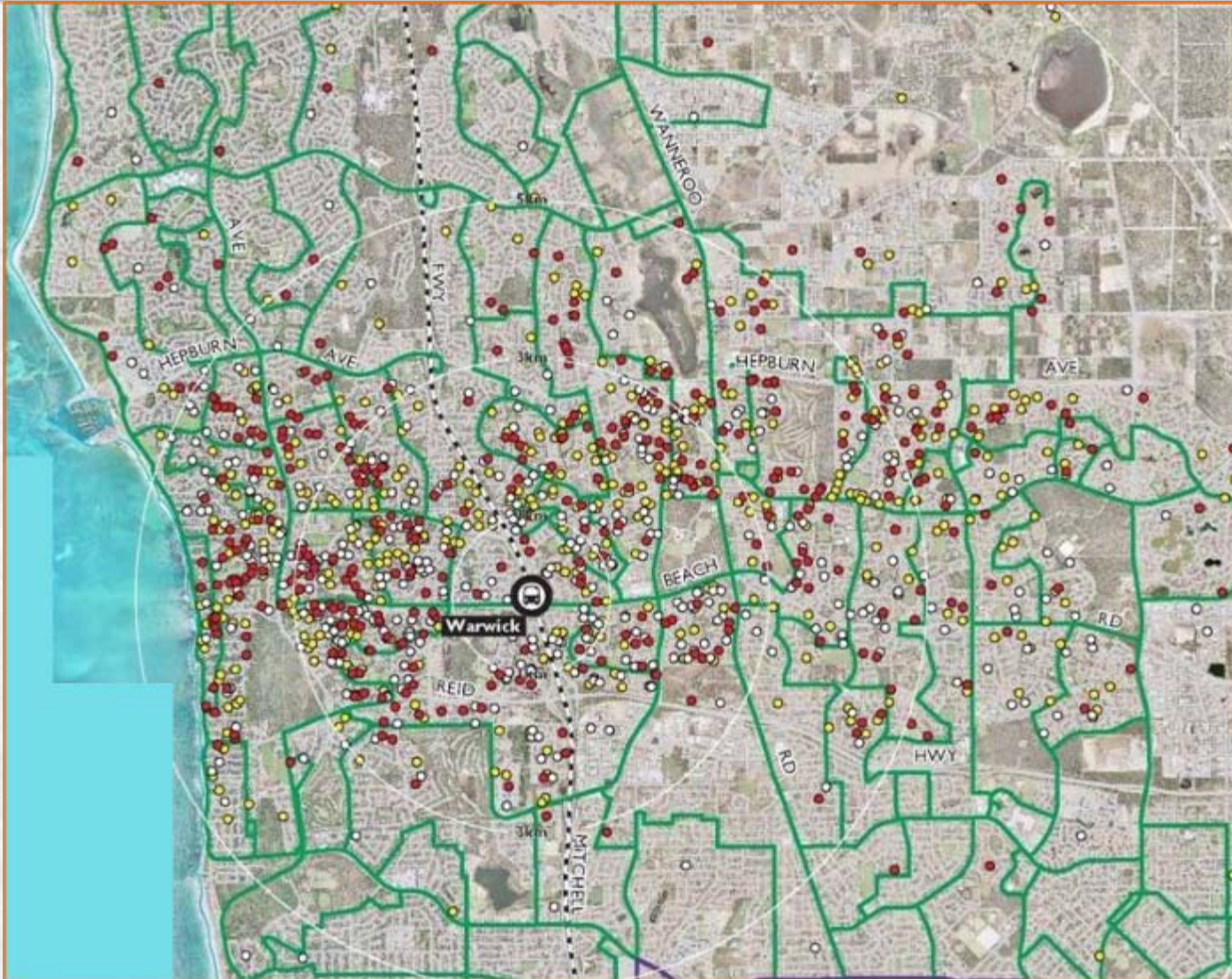
Understanding and Defining the Demand – Perth, or Fremantle



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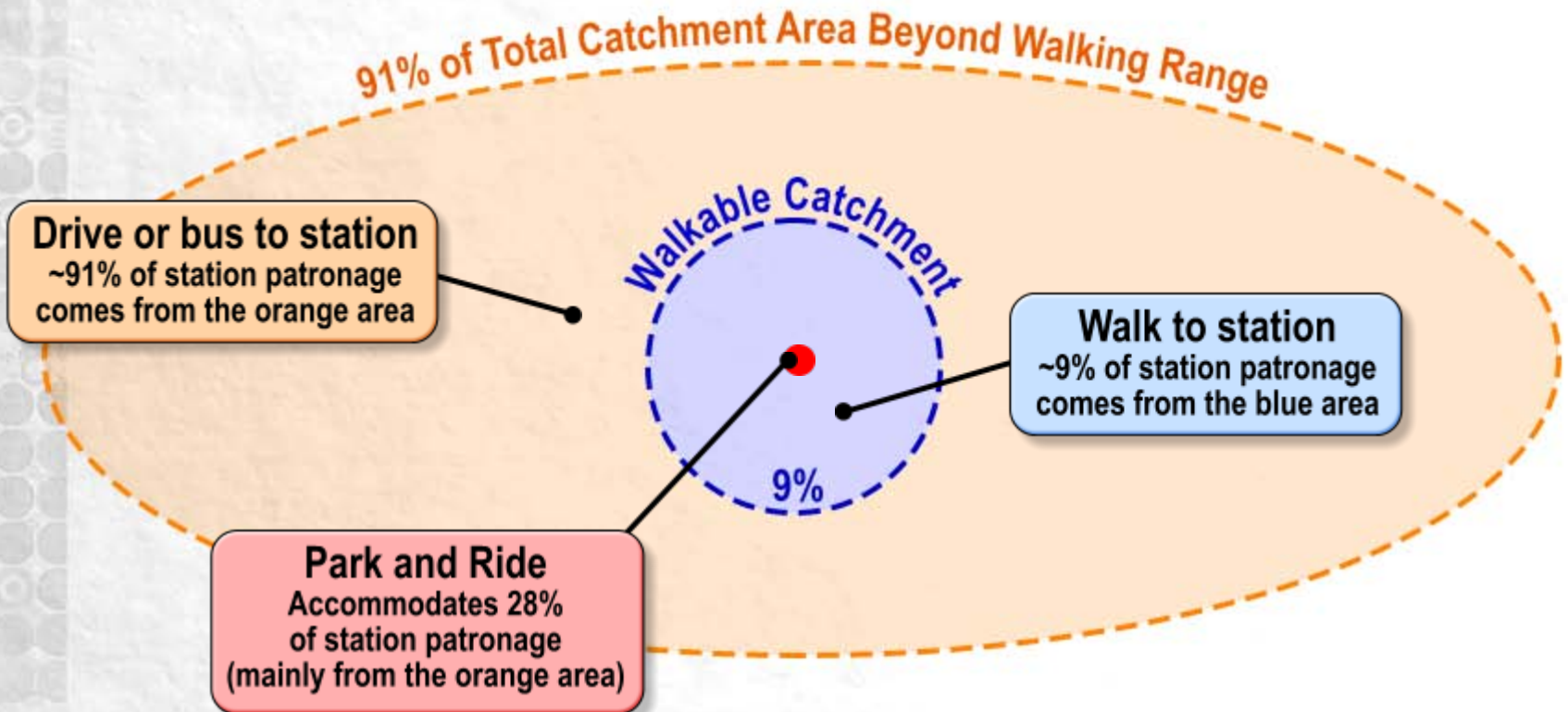
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Typical Market – Warwick Station Catchment 2007



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Perth Rapid Transit - Typical Station Catchment



Perth Urban Rail Network Master Planning

The now completed Rail Extensions were based on three Master Plans.

- South West Metropolitan Railway Master Plan (1999 & 2000)
- Northern Suburbs Currambine To Butler Extension Master Plan (2000)
- Perth Urban Rail Development Supplementary Master Plan (2002)

The Role Of Government

- Develop and own the Vision for its citizens
- Articulate the requirements for Private Sector Response and seek bids
- Adjudicate between competing responses received
- Award contracts
- Manage to ensure expectations are delivered and to protect the public's interest

The more defined the requirements, the more certainty that can be expected from the responses in substance and in cost – the more certain the outcomes.

Perth Urban Rail Network

Strategy behind the Railway Master Plans

To produce

- A comprehensive, rigorous, credible and persuasive document for the case to build the railway
- The more rigorous the plan, the greater the confidence that can be placed in the outcomes, especially the cost estimates
- To integrate the Railway into the Community

Preparation of the Master Plans required a core interdisciplinary team of railway and project expertise across a broad spectrum of railway engineering, operations and public consultation.

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SWMR Master Plan (April 2000)

- Produced by the Department of Transport's Urban Planning Group, having commenced in 1997.
- Intensive Public Consultation.
- Fully developed final concepts and costs.
- Advised services could commence to Mandurah 6 ½ years after Project Initiation
- Costed the Project at \$941m (July 1998 \$value)

Note, applying an annual increase of 6%, \$941m (July 1998) is equivalent to \$1685 million (July 2008).

SWMR Master Plan

Public Transport Policy Framework

In 1995 the Department of Transport recommended three Complementary Links which formed the foundation of the SWMR Master Plan (Clause 3.1.2):

1. Express buses on the Kwinana Freeway
2. A busway Linking Fremantle, Kwinana, Rockingham and Mandurah primarily for inter corridor movements; and
3. A railway consistent with the existing metropolitan train system, connecting Perth, Rockingham and Mandurah, for mainly inter corridor movement

South West Metropolitan Railway Master Plan Governance Steering Committee

- Public Transport Authority
- Treasury
- Department for Planning and Infrastructure
- Main RoadsWA
- State Solicitor's Office
- Local Government
- Minister for Planning and Infrastructure

South West Metropolitan Railway Master Plan Objectives

- Determination of patronage
- Definition of service to satisfy demand
- Quantification of rolling stock and infrastructure
- Integration with town planning, environment etc
- Involvement of Stakeholders
- Engenderment of Stakeholder Ownership
- Preparation of conceptual plans
- Finally, estimation of cost

South West Metropolitan Railway Master Plan

Determination of Patronage

- Defining/ Understanding the market
- Applying the Projected Land Use (DPUD - High Self Sufficiency in Land Use (lowest inter regional trips) adopted
- Avoidance of Rose Coloured Pictures
- Outcome sought was the Weekday Morning Peak Inbound Trip data

South West Metropolitan Railway Master Plan Stakeholder Consultation Strategy

- Inform stakeholders of requirements and objectives
- Make clear what is and what is not negotiable
- Establish Stakeholder Reference Groups
- Maximise information exchange
- Genuinely respond to feedback
- Engender stakeholder ownership

Strategy did not pre-script; or attempt to Second Guess; or control by first anticipating likely scenarios and outcomes.

Second Guessing limits outcomes to its proponent's view.

South West Metropolitan Railway Master Plan Stakeholder Consultation Strategy

Some mindsets that were adopted

- Perception of the potential commuter

“ I want to go when I want to go, not when you want to give me a car or train – but if I can get there and it’s ready for me, I just might use it”.

- Response to messages that didn’t hit the mark.

“ If THEY cannot understand or agree with our proposal, then WE have failed.”

- Take the risk and initiate the first approach in establishing Relationships – (otherwise it may not happen)

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The Final Direct Route - Supplementary Master Plan

In early 2001, the new State Government asked could the Kwinana Freeway Busway be replaced with a railway.

Previous studies confirmed by further work showed a Direct Route was feasible.

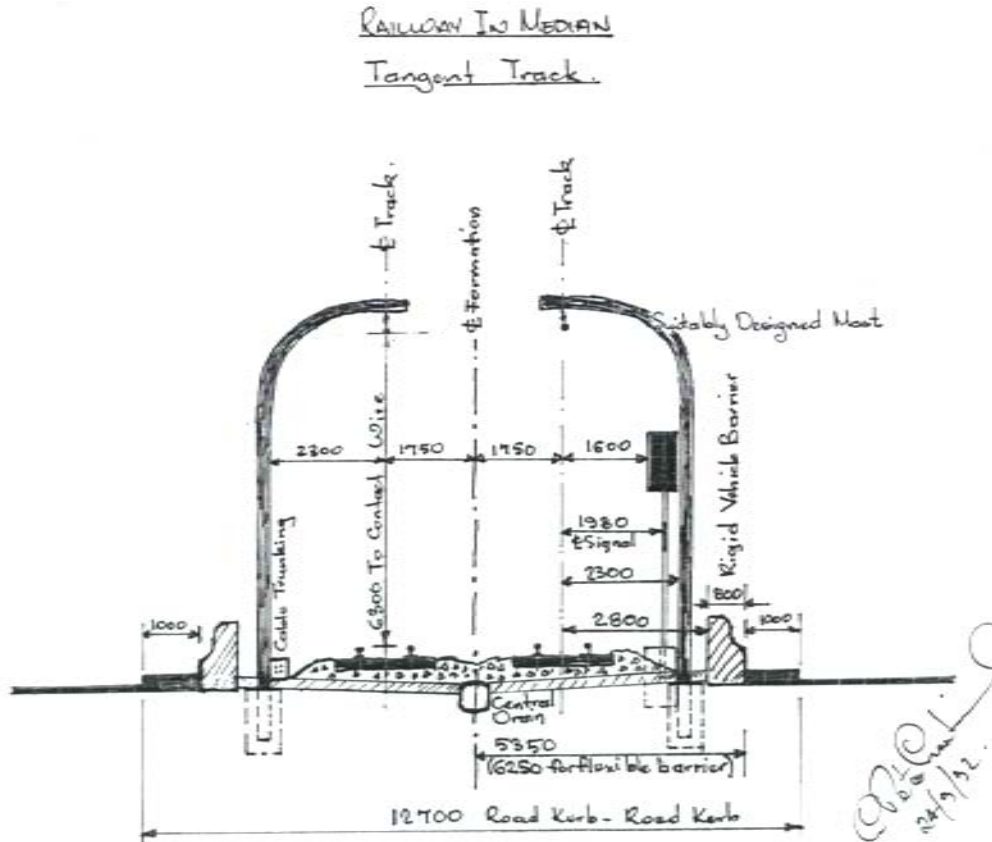
The PURD Supplementary Master Plan (2002) developed the Direct Route which was adopted in principle in July 2001.

The Final Direct Route - Supplementary Master Plan Westrail SW Corridor studies - September 1992

7530-070-634

Sheet _____ of _____
Date SEPT. 24. 1992.
Ref. _____

Civil Engineering Branch
Section: Calculations for Proposed South West
Corridor Railway



Planning & Design During the New MetroRail Project

Challenges to Operate within the Kwinana Freeway Median

- Safety of Road & Rail Users
- Major bridge constraints
- Traffic barrier specification
- Visual perceptions
- Environmental Requirements
- Converting a Busway to a Railway
- Regulatory Requirements
- Locating the railway infrastructure (tracks, overhead electric tractive power equipment, signalling, communications) within narrow Rights of Way
- Construction of railway and associated freeway works
- Operational management of freeway and railway
- Freeway and railway maintenance
- Maintenance of Emergencies

This required a major co-operative effort between Main Roads WA & the PTA.

Road & Rail planning during the New MetroRail Project Challenges to Operate within the Kwinana Freeway Median

A Holistic Approach to Risk was adopted by both agencies

- The activity to be assessed - **commuter travel** rather than merely considering the impact of, or on the train
- Railway transit provides a far less hazardous alternative to car travel

What emerged was the concept of a **Combined Transportation Corridor**

Kwinana Freeway Transportation Corridor

Joint Management of Operations and Emergencies

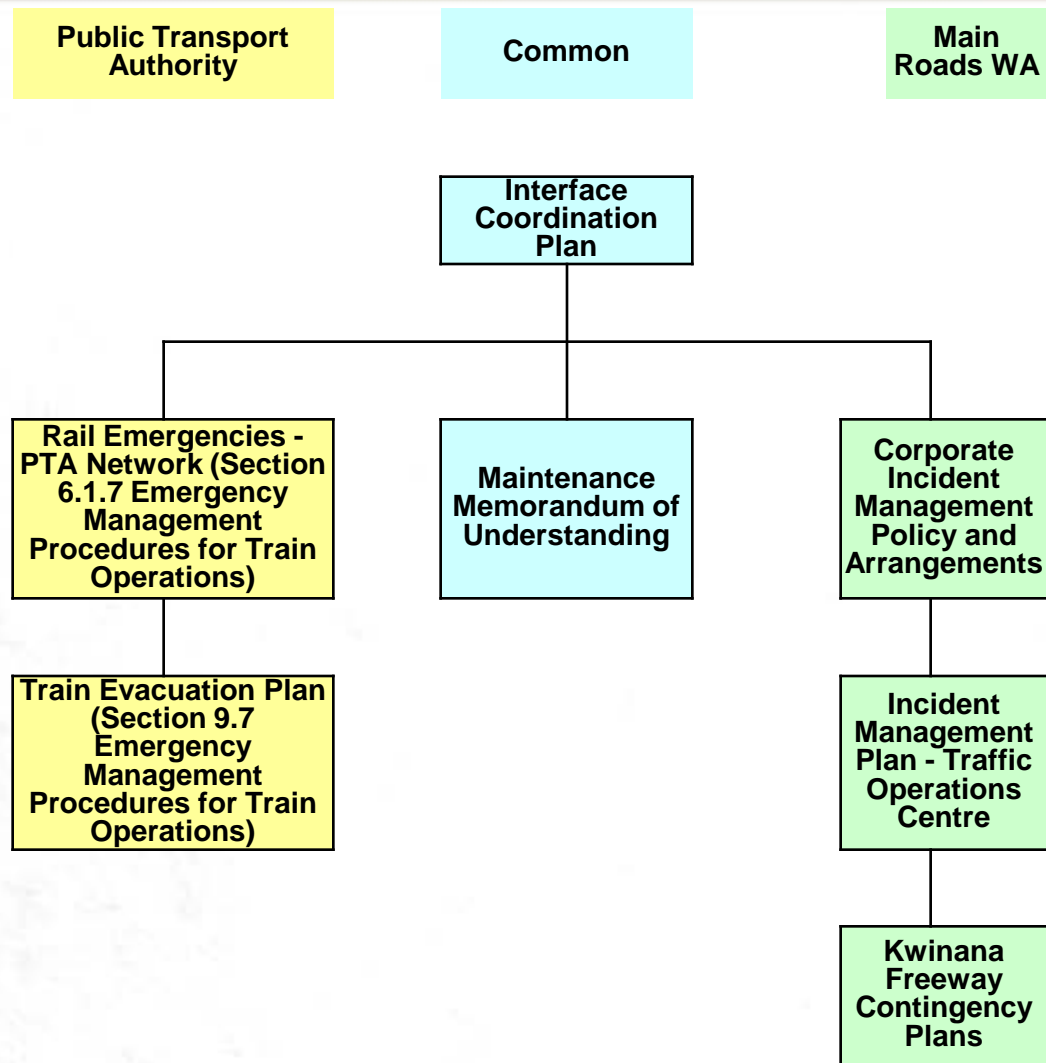
- The concept of a shared transportation corridor led to the formation of a joint Stakeholder Consultancy Forum
- Included Main Roads WA, the PTA, the WA Police Service and Fire and Emergency services
- The group provided valuable leadership and guidelines
- The Independent Validator commented on the (high level of cooperation rarely seen

Agreement was reached between Main RoadsWA and the PTA to implement.

- General Interface Coordination Plan & MOU
- Responsibility for assignment and maintenance of Assets
- Priority links between train & traffic control centres
- Ext ending CCTV coverage
- Sharing CCTV images
- High commitment to continuous review to maintain safety

Kwinana Freeway Transportation Corridor

Joint Management of Operations and Emergencies



Mandurah Railway

Kwinana Freeway, South Perth – April 2008



Road & Rail planning during the New MetroRail Project Murdoch Station – A Cooperative PTA / Main Roads Approach



Perth - Mandurah Railway

A Railway Leading to Disaster?

Mandurah is home to 45,000 people, of whom roughly 350 commute to Perth by bus each week day.

The government hopes that by reducing the 68 minute bus journey to a 48 minute train ride, 1,350 more Mandurah residents will choose to spend \$75 each week travelling to Perth.

How many people want to spend 10% of their weekly salary and 96 minutes travelling to work in Perth each day?

Source: "The West Australian" Friday 23/1/2004; Special Advertisement – open letter to all West Australians

Perth – Mandurah Railway

Mandurah Station – March 2008



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Perth – Mandurah Railway

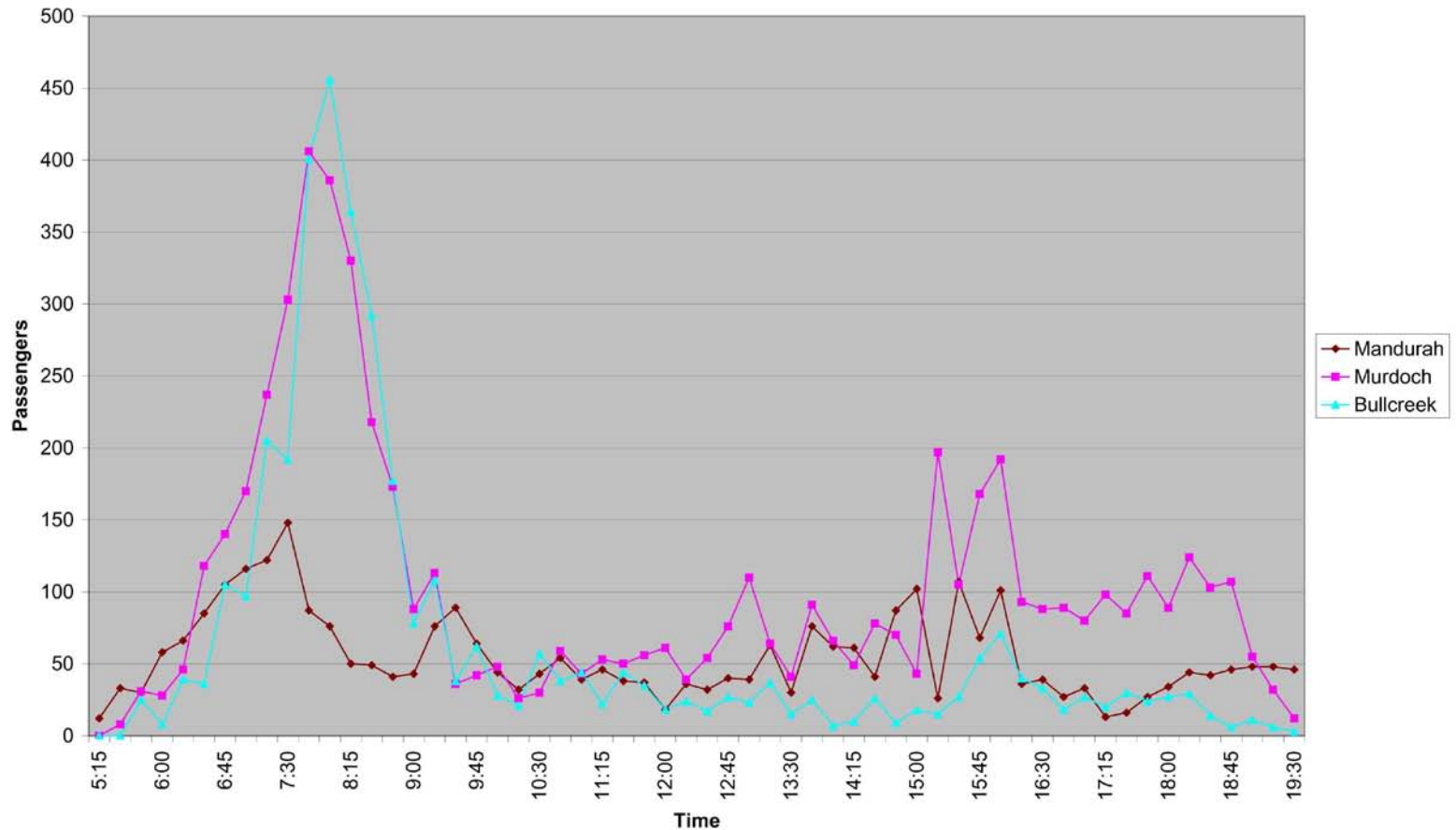
March 2008 vs. Master Plan Patronage Projection

Station	All Day Boardings		March 2008 Arrival Mode		
	Master Plan	March 2008	Bus	Car	Other
Bull Creek	3,110	3,700	NA	NA	NA
Murdoch	4,980	6,000	3240	2280	480
Mandurah	3,490	3,200	1150	1820	230

Perth – Mandurah Railway

Patronage and Modes of Arrival – April 2008

Boardings



Mandurah Line Patronage Trend versus Projections



Source: PTA 2008 passenger data

Planning & Design

Some Key Points

- Preparation of the Master Plans required a core interdisciplinary team of railway and project expertise across a broad spectrum of railway engineering, operations and public consultation.
- The people best placed to understand, plan and manage a major change are those most intimately involved.
- Retention of core engineering planning and design skills over the life of the project are essential
- Retention is especially critical in the execution of design and construct contracts
- Only the Government can properly, accountably, represent its constituents

Planning & Design During a Project

Retention of core engineering planning and design skills

Especially critical in the execution of design and construct contracts.

They can be project or stakeholder driven.

Some examples from New MetroRail;

- To ensure conformance to Master Plans
- Substitution of slab with conventional track Mt Henry to the Narrows
- Redesign of Major interchanges to ensure transit and traffic functions
- Risk analysis for Safety Validation
- Effect on design and operations
- South Perth freeway redesign
- New Earthing and Bonding Guidelines
- Environmental Issues
- Stakehill / Ennis redesign of roads & rail alignment
- Approval of design variations
- Accountability for final designs on behalf of the Owner

New MetroRail Project

Personal Reflections

Recognise that:

- Railways are inherently Dangerous involving large vehicles carrying massed people, at high speeds
- The unique culture evolved over many years to ensure safety and reliability
- An Accredited Owner / Operator is accountable for specific risks that cannot be outsourced – even during planning, procurement and construction
- Railway operations and engineering are highly specialised
- Large rail projects are “one off” events – each one is a prototype
- Rail Projects are complex, inter-disciplinary interfaces
- Rail Projects must conform to a specific Rail Safety regulatory framework for a finished system – not just for the finished infrastructure

END

Centre for Excellence & Innovation
in Infrastructure Delivery

Knowledge Network Forum

Tuesday May 6, 2008, 1500 hrs

Public Transport Authority, Public Transport Centre,
West Parade, East Perth

**Lessons Learned from the New Metro Rail Project
Contracting Methods and Documentation**

**Andrew Cartledge, Manager Project Coordination,
NMR**

New MetroRail Project

Budget

\$1.663 billion

Completion December 23, 2007

Scope

93 railcars and depot

Northern Suburbs Railway Extension

Infrastructure Improvements Armadale line

Thornlie spur

Mandurah Line (Southern Suburbs Railway \$1.184 billion)

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NMR Lessons Learned - Overview

Line	Km
Clarkson (Northern Suburbs Railway)	33
Midland	14
Armadale	28
Thornlie	4
Fremantle	21
Mandurah (Southern Suburbs Railway)	72
Total	172



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NMR Lessons Learned – Project Milestones

- 1997-99 SWMR Master Plan
- 1999 Enabling Legislation
- 2000 NSTS Master Plan
- 2000 Perth Urban Rail Development (PURD) Project
- 2001 'Direct Route' adopted in principle
- 2001 NSR Construction starts
- 2002 Supplementary Master Plan
- 2002 Railcar contract awarded
- 2003 Perth to Thornlie construction starts
- 2003 New MetroRail (NMR) Project
- 2003 Southern Suburbs Railway (SSR) design in progress
- 2004 SSR construction starts
- 2004 NSR Completed (October)
- 2005 Perth to Thornlie Completed (August)
- 2007 Mandurah Line Completed (December)

Project Managed by the New MetroRail Division within the Public Transport Authority of WA.

- To ensure the Government remained an informed client
- To ensure the Principal (PTA) controlled risks for which he was accountable as an Accredited Owner and Operator of the finished system
- In recognition of specialised railway expertise to ensure delivery of outcomes
- To manage scope creep and tightly manage cost
- To ensure conformance with Master Plans

Major Challenges faced by New MetroRail were:

- Delivery of a system with multi-disciplinary interfaces
- **Selecting appropriate contractual models**
- **Packaging the works for contract delivery**
- Project Management of contracts
- Integrating the new railway with an existing network
- Commissioning an enterprise that doubles an existing system

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NMR Lessons Learned – Procurement – SSR works

Master Plan	WHAT..&..WHY	Scope Budget Timing Government endorsement
Project Plan	HOW	Responsibilities Processes Procedures Quality Safety
Master Procurement Strategy	PACKAGING	Rollingstock Design and Superintendence Infrastructure Supply
Procurement Plans	EACH PACKAGE	Contract method Procurement timeline Responsibilities Controls
Contracts	EACH CONTRACT	Scope Cost Conditions Risk share Quality and Safety

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NMR Lessons Learned – Procurement – SSR works

In general, contract packaging was by discrete discipline, i.e.

Rollingstock	Design, Construct & Maintain
Underground Stations and tunnels through Perth	Relationship Type & Maintain
Major freeway bridges and infrastructure	Design, Construct & Maintain
Track and overhead wiring infrastructure	Construct Principal's Design
Signals, traction power and communications	Design & Construct
Civil infrastructure (incl. roads, bridges, drainage)	Design & Construct
Train Control System	Design & Construct
Stations	Construct Principal's Design

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NMR Lessons Learned – Procurement – SSR works

	Scope	\$ m
A	Civil, structures, track, power, overhead, signalling and communications between Perth and Mandurah	402.9
B	Cockburn Central, Kwinana and Wellard stations	41.8
C	Rockingham, Warnbro and Mandurah stations	49.6
D	Canning Bridge, Bull Creek and Murdoch stations	45.6
E	Kwinana freeway median works; bridge works at Narrows, Canning bridge and Mount Henry	124.4
F	Bored tunnels under city; Perth Underground and Esplanade stations. Track and overhead works through tunnels	398.1
G	Train control and customer information system	5.9
H	Track, electrical and power works associated with 'A' and 'F'	9.1
Ins	Principal Controlled Insurance (Material Damage and Public Liability)	26.3

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NMR Lessons Learned – Procurement – simplicity amid complexity

SSR contract packaging was relatively simple, but disarmingly complex

Package	Design contracts	Major Construction contracts
A	1 (concept)	1
B	1	1
C	2	2
D	1	1
E	1 (concept)	1
F	1 (concept)	1
G	1	1
H	multiple	multiple
Ins	1	1

CEID Knowledge Network NMR Lessons Learned – Procurement – complexity

SSR contract packaging was relatively simple, but disarmingly complex



Things that generally went well

- **Rollingstock:** Good documentation. A ‘good’ contractor delivered an acceptable train and depot. On time and on budget.
- **Freeway Road and Bridge Works:** D&C (MRWA model) approach resulted in innovative bridge solutions at Mount Henry and Canning Bridge. MRWA ownership was essential for works in the freeway environment.
- **Stations:** Traditional full design by Principal. Despite limited market capability and experience, the stations were delivered to acceptable standard.
- **Civil and Railway Infrastructure Works:** D&C approach resulted in economic and functional results.

Things that generally went well (contd)...

- **City Project:** Relationship based contract using MRWA D&C model (modified). Extensive identification of risks. Contract allows design and construction flexibility for complex parts and has appropriate risk allocation.
- **Interface Identification and Management:** The recognition of interface complexity led to appropriate controls in management structure and contract requirements. Rail projects are complex and involve many inter-disciplinary interfaces. (However see areas for improvement)
- **Project Control and Management:** The NMR project structure, management and financial controls and strategic governance were appropriate to the project.

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NMR Lessons Learned – SSR Package Interfaces

	A	B	C	D	E	F	G	H	Ins
A		Acceptable/Manageable risk.			Moderate risk. Timing and/or site occupancy issues	Critical interface risk.	Acceptable/Manageable risk.	Critical interface risk.	Acceptable/Manageable risk.
B	Acceptable/Manageable risk.						Acceptable/Manageable risk.		Acceptable/Manageable risk.
C	Acceptable/Manageable risk.						Acceptable/Manageable risk.		Acceptable/Manageable risk.
D	Acceptable/Manageable risk.				Acceptable/Manageable risk.		Acceptable/Manageable risk.		Acceptable/Manageable risk.
E	Acceptable/Manageable risk.			Acceptable/Manageable risk.		Moderate risk. Timing and/or site occupancy issues			Acceptable/Manageable risk.
F	Critical interface risk.				Moderate risk. Timing and/or site occupancy issues		Acceptable/Manageable risk.	Acceptable/Manageable risk.	Acceptable/Manageable risk.
G	Acceptable/Manageable risk.					Acceptable/Manageable risk.		Acceptable/Manageable risk.	Acceptable/Manageable risk.
H	Critical interface risk.					Critical interface risk.	Acceptable/Manageable risk.		Acceptable/Manageable risk.
Ins	Acceptable/Manageable risk.								

Interface criticality



Acceptable/Manageable risk.



Moderate risk. Timing and/or site occupancy issues



Critical interface risk.

Things that could have been done better

- **Contractor selection:** The end result largely depends on quality of contract documentation and getting the right contractor.
- **Contractor management:** The end result requires that Principal establish and maintain an experienced and well resourced contract management group that is balanced and matched to the contractor's team.
- **Interface identification and management:** Contract documents recognised the complexities, but needed better response during construction and commissioning.

Things that could have been done better contd...

- **Specialist technical areas:** For an electric railway, both the Contractor and the Principal need to have experienced, well resourced design, construction and commissioning teams. Future contracts need to better define this requirement.
- **Contractor's Plans and Deliverables:** Need to improve and strengthen contracts to give certainty to the delivery of contractor's plans, drawings and deliverables. Need to set appropriate cost against non-delivery of these key items.

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NMR Lessons Learned – Procurement – Interface nightmares

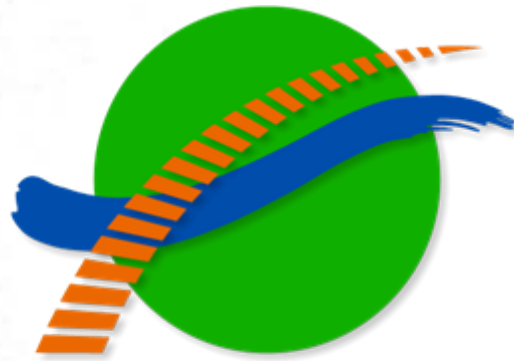


Murdoch: Operating freeway; operating bus station; rare flora; Package E;
Package D; Package A

CEID Knowledge Network NMR Lessons Learned – Procurement – Interface nightmares



Perth: Central city location; operating freeway; operating bus way; Package E; Package A; the public eye



NewMetroRail

Next Speaker

**Ross Hamilton, Contract Manager, Package A
Construction and Commissioning of the Southern
Suburbs Railway**



Lessons Learnt Southern Suburbs Railway

CONSTRUCTION – COMMISSIONING - OPERATIONS

Agenda








Construction

- Activities
- What went well
- What could be done better
- What would we do differently next time

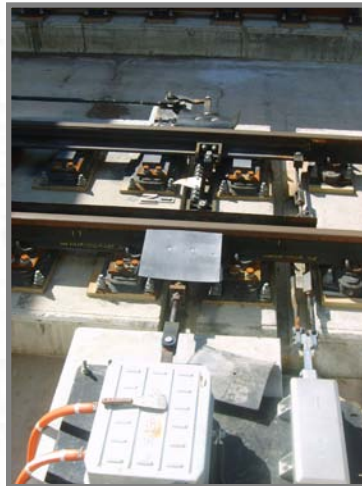
Commissioning and Operations

- Activities
- What went well
- What could be done better
- What would we do differently next time

Construction Activities

-  A. Railway construction Narrows Bridge Mandurah
-  B. Station Construction
-  C. Station Construction
-  D. Station Construction
-  E. Freeway and Road alterations
-  F. City Railway and Station construction
-  G. Train Control changes

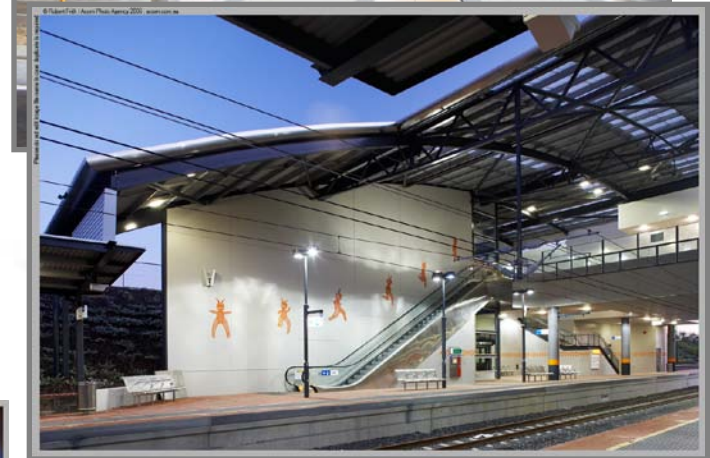
A. Railway Construction Narrows Bridge - Mandurah



B. Station Construction



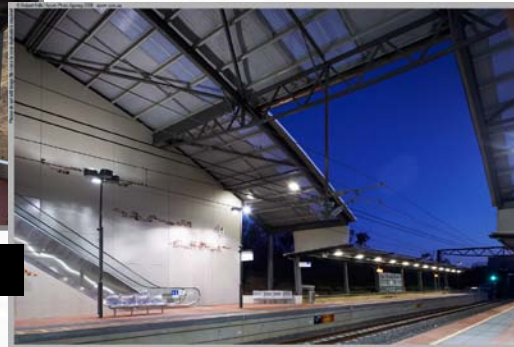
Cockburn Central



Wellard Station



Kwinana Station



C. Station Construction



Rockingham Station



Warnbro Station



Mandurah Station

D. Station Construction



Canning Bridge Station



Bull Creek Station



Murdoch Station



E. Freeway and Road Alterations



F. City Railway and Station Construction



G. Train Control Changes



Construction – What Went Well?

1. Governance and interagency co-operation during construction was very effective with confidence at the highest level of government;
2. Outstanding safety record achieved through strong PTA safety presence;
3. Good quality surveillance, measurement and monitoring throughout the life of the project;
4. The number of firsts in Perth for design and construction;
5. Public relations and information management;

Construction – What Could Be Done Better?

1. Number of interfaces between the various packages ie complicated interfaces, boundary issues, overlap of systems. Also mix of design and design & construct;
2. Joint Venture partners were civil based and did not have the resource expertise in the Electrical and Signalling fields.
3. Project specifications were not to an appropriate and suitable standard leading to scope changes and variations;
4. Issues resolution was poor from a Contractor perspective but this project presented challenges when pressure of commercial impacts upon Contractors;
5. Poor program management by Contractors;

Construction – What Would We Do Differently Next

Time?

1. Tighten and manage project scope or ensure a suitable model is in use that allows for variations to be more successfully managed;
2. Make better use of contract management clauses and tools available to manage poor performance and program management;
3. Develop a means to deal with interface issues resulting in scope change by initial works packaging;
4. Ensure specifications are set to appropriate level with key elements prescriptively defined. Take a more proactive approach to risk management with appropriate interventions included in standard specifications.
5. Ensure suitable investment in the retention of appropriately skilled technical expertise in house.

Commissioning and Operation Activities

- Commission train control system.
- Commission underground station operations
- Change NSR operations to underground stations through W5 Shutdown
- Commission SSR Railway.
- Driver training
- Commence passenger operations SSR
- Training maintenance and operations staff

Commissioning & W5 Closure



Perth underground and Esplanade Station

– first day of operation



Commissioning and Operation – What Went Well?

1. Establishment of the internal Commissioning and Handover Steering Committee;
2. Locking in time for W5 drove the contractor performance;
3. Management of the 5 day shut for commissioning of tunnels and underground stations;
4. Independent Peer Review by a worldwide expert in tunnel systems – Mr Arnold Dix;
5. Massive public acceptance and support;

Commissioning and Operation – What Could Be Done Better?

1. Forcing of W5 – PTA took on significant risk;
2. Provide better incentives for the contractor to deliver a program to pre-commissioning;
3. Retention of resources and management of maintenance needs to be better co-ordinated;
4. Training and familiarisation of operational maintenance staff and drivers was not as good as it could be;
5. Underestimating the interest and use of the railway by unfamiliar users;
6. Defect management, as constructed drawings and documentation;

Commissioning and Operation – What Would We Do Differently Next Time?

1. Ensure suitable and appropriate lead time and resources are allocated for pre-commissioning task;
2. Adopt a staged commissioning approach where possible and appropriate;
3. Ensure consideration is given to identifying and mitigating pre-commissioning risks early in the procurement process to ensure it is included in the delivery process;
4. Improve the overall ownership and completeness of budgeting, financing and resourcing of operational activities earlier in the delivery process via an Operational Committee;
5. Ensure mechanisms for building durability and defects performance in the contract documents;
6. The updating of PTA technical standards is required with a routine ongoing review process needed.

Questions