Executive Summary

The Perth Light Rail Study has been commissioned by the Department for Planning and Infrastructure to investigate the feasibility of introducing a light rail alignment between East Perth and the City of Subiaco. Such an alignment would connect some of the major Activity Centres of inner Perth, and would provide improved public transport capacity between the Queen Elizabeth II Medical Centre (QEIIMC), the University of Western Australia's (UWA) Crawley campus and the Perth CBD.

The purpose of this study has been to identify a route for a light rail service that could link Subiaco with East Perth. The project included an engineering feasibility study to investigate the physical dimensions of a light rail system that could be suitable for Perth, including:

- A detailed review of technological options
- An assessment of the impact of a light rail system on:
  - Existing public transport services and patronage
  - Traffic circulation patterns
  - Public on-street facilities
  - The development potential of adjacent land
  - Other planning issues including the amenity of the urban streetscape
- Development of:
  - A concept design
  - Preliminary costing of the infrastructure, discounting the new signalling requirements and the cost of any additional land

Members of stakeholder organisations were invited to sit on a project Steering Committee and also a project Working Group to assist the development of the study and decision making processes.

During project inception the Steering Committee agreed that the study needed to be undertaken in light of the prospective roles light rail could be required to fulfil in Perth; light rail as a mass transit system, and light rail as a place-making urban regeneration catalyst.

The Role of Light Rail

As a mass-transit system, light rail can provide a mixture of the on-street accessibility of buses and the higher speed and service reliability of heavy rail. It can be put on the street like a bus, or in a separate corridor like a train. It can also provide new network links between key activity nodes and a fast and efficient service if the appropriate road space and direct route alignment can be identified.

Light rail is more visual than buses due to the greater level of permanent infrastructure introduced into the urban realm, and it is because of this that it is often claimed to assist the regeneration of urban areas that require a boost to their local economy; the provision of a permanent public transport service with a high degree of visibility and permanence, which attracts businesses, employment and spending.

Technology Options

Light rail vehicles vary in size with a wide range of configurations from single car rigid vehicles to the longer articulated vehicles. Two types of light rail operations exist:

- Single-ended vehicles that the driver can only operate from the front that require a turnaround loop at the end of each line

- Double-ended vehicles where the driver can operate the vehicle from cabs located at each end of the vehicle

Light rail transit vehicles can be propelled by various types of power including overhead electric, third-rail electric, diesel and alternative fuels. They can operate over a variety of smooth surfaces that can be designed to complement the surrounding environment. Light rail systems also require depots to provide a safe and secure location for storage of vehicles, facilities for efficient and economic inspection and cleaning of vehicles and for regular maintenance. The Steering Committee adopted a position that a light rail system for Perth comply with the following attributes:

- Low-floor double-ended electric light rail vehicles
- Overhead power supply using light weight span wires to minimise visual intrusion (ground-level pickup could be possible once technology is more reliable)
- Provision of two depot sites, one with a heavy maintenance facility
- Brick or block-paved track for transit malls, concrete track corridor for other street sections
- Vegetated track adjacent to parklands and residential areas
- Advanced real time information and tracking systems
- The use of SmartRider for ticketing with integrated public transport fares

Route Alignment and Depot Locations

Five potential light rail route alignment options were identified and were reviewed by the Working Group and Steering Committee. A single base route was selected from these five, linking QEIIMC and UWA to East Perth via Subiaco and the Perth CBD. The route incorporated an extension along Hay Street to a potential secondary depot site at Jolimont and included two sub-route options through Subiaco:

1. Rokeby Road (primary place making)
2. Thomas Street (superior operating speed mass transit)

The Steering Committee workshopped the two sub-routes and judged each against three overarching project objectives:

- Creating an economic catalyst for development
- Ensuring nett positive impact on local area
- Facilitating an integrated public transport system

The Rokeby Road option was selected as the preferred route due to its larger patronage catchment area and place-making potential.

The primary depot (inclusive of the maintenance facility) location has been proposed between Royal Street and Brown Street in the East Perth, adjacent to Central TAFE and close to Claisebrook railway station. A secondary depot location has been proposed in Jolimont between the Matthews Netball Centre and the Pat Goodridge Hockey Centre off Selby Street.

Alignment Design Characteristics

The road reservation width along the majority of the route is 20 metres, although there are some 16 metre pinch points in the Perth CBD area and more generous widths in the outer city areas (30-40 metres). A collection of desirable streetscape characteristics and facilities along the light rail route

were compiled from discussions with local Council traffic engineering and planning officers, the results of kerbside and land use surveys along the preferred route, and specific road design standards for:

- Traffic lanes
- Dedicated light rail lanes
- Easy access light rail stops
- On-street car parking
- Service vehicle bays
- Al fresco dining space
- Pedestrian circulation space
- Trees and shop awnings

Some flexibility is required along the road reservation between route sections to allow for a variety of uses within the streetscape.

Public Transport Integration

The following issues regarding existing public transport services and future modal integration are relevant to the preferred alignment:

- The Red CAT route would be discontinued upon introduction of the light rail
- The Free Transit Zone would be maintained. Any cross-boundary trips between the Cities of Perth and Subiaco would generate at least a Zone 1 fare
- Interchange between heavy and light rail would be possible at Subiaco, Perth Central, William Street and Claisebrook railway stations
- New interchange opportunities would arise between light rail and bus at the Jolimont depot site, Stirling Highway at UWA, and QEIIMC

Feasibility

Traffic Impact

In general the results of traffic modelling show no fatal flaws along the proposed light rail route, although results from the assessment of isolated intersections conclude that some increased congestion will occur at:

- Intersection between Rokeby Road / Bagot Road
- Intersection between Stirling Highway / Broadway / Hampden Road

The reintroduction of two-way traffic along a number of current one-way routes such as William Street, Barrack Street, Murray Street, and Roberts Road could potentially address anticipated negative impacts that result from the implementation of a light rail route. Detailed traffic and public transport micro-simulation will be required to clarify levels of impact and appropriate network changes as well as potential schedule integration.

Patronage

The total daily weekday patronage on the light rail system can be estimated as the sum of the residential and employee use, plus the QEIIMC/UWA specific growth and the lunch peak Red CAT patronage, which equates to some 45,600 trips per day. This is similar to the current daily patronage of the northern heavy rail commuter line to Joondalup.

Engineering

A concept design was developed for the preferred alignment utilising the design parameters agreed for technology and street environment. It has been found that the alignment is physically possible to

implement and it is probable that increased economic activity would occur alongside the light rail corridor.

The concept design segregates the light rail corridor from the vehicle carriageways for as much of the alignment as physically possible without causing detriment to the pedestrian environment and general street amenity; there are a few locations where mixed traffic and light rail corridors have been proposed. A traffic management plan would need to accompany the detailed design for each of these sections of the alignment.

Costs

It is estimated that infrastructure costs will be in the order of $252 million, rolling stock costs $140 million and annual operating costs $10 million. The infrastructure cost estimate includes indicative costs for land acquisition of the two depot sites and a 10 percent provision for urban design and place-making initiatives to ensure the successful integration of the light rail infrastructure into the surrounding streetscape.

Future Network Extensions

A light rail link between Subiaco and East Perth could potentially be the core of a new light rail network for central Perth, which in future could branch out across the inner metropolitan Perth area. Key trip generators external to the core route that could act as anchors for new termini in the inner metropolitan area could include:

- Perth Airport
- Curtin University
- North-eastern inner suburb activity centre (Mt Lawley to Embleton)
- North-western inner suburb activity centre (Northbridge to Yokine)
- South-eastern inner suburb activity centre (Victoria Park to Waterford)
- Challenge Stadium

There may also be a demand to connect Claremont to South Perth via an inner orbital route, which could provide interchange opportunities with the radial routes.

The successful implementation and ultimate expansion of a light rail system in Perth will be governed by the ability to implement the proposed core route and in developing and funding resolution to the following significant physical constraints:

1) Crossing of the Mitchell Freeway and commuter rail reserve in the Leederville area
2) Crossing of the Mitchell Freeway and commuter rail reserve in the East Perth area
3) Crossing the Swan River via the Causeway in East Perth

Overall Benefit

Cities all over the world are investigating light rail opportunities, technological options and system types to suit their individual requirements. Given its planned growth, Perth has good reason to explore the benefits that light rail could bring to both the mobility and accessibility of the City, the QEIIMC and other medical facilities, UWA and other educational institutions, and major sports and entertainment stadia. Even more critically, light rail can provide the economic regeneration support that permanent public transport infrastructure can bring to local and regional growth areas.

Way Forward

There are a number of issues that require further investigation, such as the:

- Position and impacts of the light rail within a one-way vehicular environment
- Detailed position of light rail stops to fulfil Disabled Discrimination Act, 1992 (DDA) requirements and permit access to minor roads
- Provision of numerous property access points through the central area
- Net impact on local business due to the removal of on-street car parking on the route through activity centres and corridors

To progress the findings of this study to implementation, further actions will be required:

- Detailed micro-simulation modelling
- Planning and consultation
- Patronage forecasting
- Economic Analysis