



Sydney Light Rail Extension – Stage 1 Inner West Extension Product Definition Report

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1 Executive summary

1.1 Introduction & context

1.1.1 Introduction

In February 2010, the NSW Government announced, as part of the Metropolitan Transport Plan, a \$500M commitment to extend the existing Sydney light rail system in the Inner West along the Rozelle Goods line from Lilyfield to Dulwich Hill and in the CBD from Haymarket to Circular Quay via Barangaroo.

This comprises:

- Stage 1 - an Inner West extension of 5.6km along the Rozelle Goods Line from Lilyfield to Dulwich Hill
- Stage 2 - a CBD extension from Haymarket to Circular Quay via Barangaroo with consideration of a future light rail option from Circular Quay to Central via George Street.

Collectively these two stages are known as the Sydney Light Rail Extensions (SLRE).

In the 2010-11 Budget, \$55 million is allocated to start construction on the SLRE Stage 1 (the Inner West extension) following the environmental assessment process, as well as to undertake pre-construction work on Stage 2.

This report confirms the scope of work for the Inner West extension, following the completion of the draft Inner West Extension Study study by consultants GHD, a public consultation period and further analysis undertaken by the project team. The scope covers costs, analysis of the potential customer market, operational requirements, alignment and stop locations, associated structure and rolling stock, complementary uses of the corridor (including a pedestrian and cycle shared path and components of the GreenWay), and a delivery strategy for the extension.

1.1.2 Transport NSW

Transport NSW is the lead public transport agency of the NSW Government, with primary responsibility for transport policy, planning and coordination functions as well as oversight of infrastructure delivery and asset management.

Transport NSW has responsibility for consolidating strategic infrastructure services across the portfolio and for developing specific projects consistent with the Metropolitan Transport Plan, including light rail.

Transport NSW is the governing body responsible for the development and delivery of the Sydney Light Rail Extensions and the proponent for the purposes of the *Environment Planning and Assessment Act 1979*.

1.1.3 The process

This report should be read with an understanding of where it sits in the process leading towards planning approval and construction. In summary, the sequence of documents is:

- Draft Inner West Extension Study by GHD (May 2010) – the draft feasibility study
- Product Definition Report by Transport NSW (this report) – the project scope as proposed by Transport NSW
- Project Application and Preliminary Environmental Assessment - to be prepared by Transport NSW and lodged with the Department of Planning
- Environmental Assessment - to be prepared by Transport NSW and publicly exhibited
- Submissions Report – providing a response to issues raised.

1.1.4 The Steering Committee and light rail feasibility study

Transport NSW commissioned the transport engineering and planning services company GHD to complete a light rail study to assess the feasibility of extending the existing light rail along the Rozelle Goods Line from Lilyfield to Dulwich Hill, and through the central business district from Central to Circular Quay via Barangaroo, with consideration of a future light rail option from Circular Quay to Central via George Street.

A Steering Committee was formed in October 2009 to oversee the feasibility study.

The Steering Committee includes representatives of the Roads and Traffic Authority, RailCorp, Barangaroo Delivery Authority, the Department of Planning, and four councils which supported the light rail extensions for their communities (City of Sydney, Ashfield, Marrickville and Leichhardt) and contributed funding towards the study.

The Steering Committee is chaired by Transport NSW and there is a co-ordinated, whole of government approach to planning the extension and stakeholder consultation.

On 17 May 2010 the Premier announced that GHD's draft report on the Inner West Extension was available for public comment. The Government consulted with the community about the study seeking feedback on a range of matters, including light rail stop locations. GHD, and Aspect Studios landscape architects continues to conduct further design work for the Inner West extension project.

GHD is also conducting technical investigations for the SLRE Stage 2 CBD extension, with input from councils, government agencies and other key stakeholders. This study is expected to be ready in September 2010. In addition, Transport NSW will consider a range of factors, including traffic modelling, pedestrian movements and integration with other transport modes in the central business district.

1.1.5 Community consultation

The early consultation with key stakeholders and the wider public has indicated a high level of support and interest in the Inner West extension, pedestrian and cycle facilities, and the GreenWay.

Following public display of the GHD's report on the Inner West extension, close to 400 submissions were received from individual community members, members of parliament, councils and agencies, and interest groups. In addition, there have been more than 65,000 hits on the website accessing the GHD report.

Around 97 percent of the submissions supported and/or made suggestions about matters for further consideration, relating to the inclusion of a cycleway / GreenWay, provision of bike facilities, location of stops, ticketing and fares, and potential road traffic and parking impacts.

As part of the planning process for the Inner West extension regular consultation is taking place with the primary stakeholders through the Steering Committee, and with other key stakeholders through a series of meetings and workshops.

There have also been a series of meetings held on-site with interested groups including the GreenWay Sustainability Project Steering Committee, environmental volunteer groups, cycling groups and utilities providers.

In order to inform the wider public on the project and to obtain community feedback, the Transport NSW website (www.transport.nsw.gov.au) is regularly updated with the latest project information and a dedicated email address and telephone information line have been established.

The key themes raised during public consultation have been addressed in the development of the project scope, and are summarised in Table 1.1 along with Transport NSW's response and the sections within this report in which they are discussed.

Table 1.1 Key themes of the community consultation

Theme	Transport NSW response	Report section
Support for the project	Progress development of SLRE Stage 1 Inner West extension project	1.1.5
Cycle path and facilities	- Cycle parking to be provided at all light rail stops - Pedestrian and cycle shared path to be provided along the western side of the light rail corridor - Further design work underway to confirm detailed scope of shared path	3.1.2, 4.4
Provision of GreenWay	- Extension to be provided in conjunction with a pedestrian and cycle shared path, integrated within an enhanced and managed environmental corridor (the GreenWay) - Further design work underway to confirm detailed scope of GreenWay components	4.5
Integrated fares and ticketing	- Fare structure will be derived from current system - Integration with Sydney's future electronic ticketing system to be pursued.	4.6.3
Traffic and parking	- Off-street commuter car parking to be considered at Dulwich Hill Interchange and Leichhardt North stops - Further design work underway to confirm detailed scope of off-street parking - On-street commuter car parking near stops predicted to be low, but will be subject to further investigation - Consideration of traffic and parking impacts and mitigation measures within Environmental Assessment	4.4.3
Bushcare impacts	- Light rail (including stops and access points) and shared path designed to minimise impacts to existing vegetation - Further design work underway to confirm detailed scope of bushcare protection and enhancement measures - Consideration of bushcare impacts and mitigation measures within Environmental Assessment	4.5, 4.7

Theme	Transport NSW response	Report section
Safety and security	- Stops to include lighting, CCTV, emergency telephone/help point, railings, tactile paving, and warning signs - Appropriate safety fencing or separation of shared path and light rail operations will be provided - A risk management plan will be developed, to include safety and security components - Further design work underway to confirm detailed scope of stop and alignment safety and security elements	4.4.2, 7.2
Construction impacts	- Construction will occur along the line of the corridor and at its interfaces, including stop locations and access points - Consideration of construction impacts and mitigation measures within Environmental Assessment	6.2
Pedestrian access	- Stops designed for easy access for all users, including stair and lift, and ramped access where appropriate - Further design work underway to confirm detailed scope of stop design and pedestrian facilities	4.4, 4.5
Transport integration	- Access and interchange with other modes of travel provided for, including rail and bus where appropriate - Further design work underway to confirm detailed scope of transport access and interchange elements	4.4.3
Cost	Ongoing work to confirm project costs	6.4
Operations	- Similar service frequency to existing light rail - Detailed service requirements to be confirmed with operator	4.8

1.2 Objectives

In line with the Government's overarching objectives and directions, the key objectives of SLRE Stage 1 Inner West extension are defined as follows:

- Improve public transport access and connections between where people live, work and visit
- Improve the integration of public transport networks by linking existing radial corridors
- Enhance livability by improving local accessibility and amenity along the corridor
- Encourage sustainable and healthier travel options with greater use of active transport
- Make best use of a disused government asset
- Deliver a safe and reliable project in a sustainable and environmentally friendly way
- Deliver the project in an economically efficient and timely manner, in a close and cooperative manner with the local community, state and local government, contractors and other key stakeholders

1.3 Key findings

The Inner West extension will bring a range of social, environmental and economic benefits that supports the government's long term vision for Sydney.

The provision of additional and improved public transport means fewer cars on the road, less traffic and a more sustainable future. The extension will form part of a frequent and reliable service, unaffected by road traffic conditions.

The Inner West extension is more than another transport option for Inner West residents into the CBD. It will connect residents to regional centres and to popular trip destinations such as Pyrmont, Glebe and the Fish Markets. The extension will provide key benefits to local residents and to visitors by providing connections to significant destinations along the route.

Building on the studies undertaken to date and the feedback from the community, the key findings are that the Inner West extension project, in conjunction with a pedestrian and cycle path, integrated within an enhanced and managed environmental corridor (the GreenWay) will achieve the following outcomes:

- Creates a new orbital route through the Inner West, directly linking a series of neighbourhoods, tourist destinations and the CBD
- Makes best use of the corridor – unlocking the social, environmental and economic value of a disused transport corridor, whilst allowing integration and connectivity across the corridor
- Provides growing communities with a safe, clean, quiet and reliable service that is environmentally friendly, easy to access and unaffected by road traffic
- Improves the integration of public transport networks by linking existing radial corridors
- Will incorporate pedestrian and cycle shared paths, encouraging healthier lifestyles and more sustainable travel options

- Supports improved local amenity whilst preserving the green and arcadian character of the corridor
- Improves connections from the Inner West to regional centres and to popular tourist destinations such as Norton Street, Pyrmont, Glebe and the Fish Markets
- Encourages sustainable travel with greater use of public and active transport, which in turn reduces traffic congestion and carbon emissions.

The extension is also strongly supported by the local community.

1.4 Project definition and scope

Following the round of consultation, and the further analysis, this report confirms the scope of work for the Inner West extension. The following table provides a summary.

Table 1.2 SLRE Stage 1 Inner West extension – proposed transport product scope and associated infrastructure including GreenWay components

Description	Details
Light rail stops and service access	
Stops	• 9 new stops: Leichhardt North, Hawthorne, Marion, Taverners Hill, Lewisham West, Waratah Mills, Arlington, Dulwich Grove, Dulwich Hill Interchange • Minor modification to Lilyfield stop to accommodate track on each side of the platform • Distance between stops ranges from 350m to 980m (Average spacing is around 640m)
Rail interchange	• Inner West Line (Lewisham Station) • Bankstown Line (Dulwich Hill Station)
Bus interchange	• Interfaces with key bus routes at, or close to, Norton Street, Marion Street, Parramatta Road, New Canterbury Road, and to a lesser degree, Old Canterbury Road and Dulwich Hill Station
Typical stop elements	• Platforms - staggered or aligned platform arrangement (each platform is 30m long by 3m wide) with 4m wide rail crossing points • Wayfinding - stop name & location & direction of travel signage and totems, passenger information display, fare information, network map, locality plan with local public transport information, public address system • Urban furniture - canopy / weather protection, seating, rubbish bin, technical cabinets, and potential for advertising • Passenger access - fully accessible stops, access stairs and ramps or lifts (as required), passenger rail crossing point (one at each stop) • Security & safety - lighting, CCTV, emergency telephone/help point, railings, tactile paving, warning signs • Cycling – cycle parking at each stop
Fares and ticketing	• Vehicle conductor responsible for ticket sales and customer service • Fare structure derived from the current system • Integration with Sydney's future electronic ticketing system to be pursued

Description	Details
Operations	
Frequency of service	Every 10-15 minutes (similar service frequency to existing line) – frequency could be increased to cater for growing demand on different sections of the route and to minimise crowding
Hours of operation	6am to 11pm (Monday to Fridays) and around 12.30am (Fridays and Saturdays)
Operating speeds	- Average speed of approximately 25km/hr (including stopping time) - Maximum speed 80km/hr
Rail infrastructure	
Route length	5.6km (Lilyfield to Dulwich Hill Interchange)
Alignment	- Double track along whole length - Wholly within the existing rail corridor (apart from terminus at Dulwich Hill Interchange stop, where the light rail fringes the existing informal northern car park at Bedford Crescent) - Track gauge 1.435m
Catenery and power supply	- Single overhead catenary at 750V DC by pantograph mounted on vehicle roof - Catenary wire suspended approx. 5.5m above ground, supported at intervals of 40-50m
Rolling stock	
Light rail vehicle (LRV)	- Single deck air-conditioned cars, 29m long and a body width of 2.65m, low floor design, 3 doors per side, electric powered - Similar to ABB Variotram
Vehicle control	Vehicle driver
Vehicle capacity	Approximately 70 seated, 130 standing
Fleet size	10 LRVs (3 additional LRVs required to supplement existing fleet of 7)
Stabling and maintenance	- Existing facility located at east Pyrmont - Currently stables all 7 LRVs - additional works required at this site to stable 10 LRVs
Associated infrastructure including GreenWay components	
Pedestrian and cycle shared path	- Provision of a 3m wide pedestrian and cycle shared path from Cooks River to Sydney Harbour (Iron Cove) at Dobroyd Point: - located on the western side of the light rail corridor (separated from light rail operations) - allows pedestrian and cycle access along the light rail corridor (between Dulwich Hill Interchange and Marion) and adjacent to the Hawthorne Canal (north of Marion) - Shared path to be grade separated subject to local topography and access requirements - Appropriate safety fencing or separation of shared path and light rail operations
Integration with light rail stops	Pedestrian and cycle shared path provides access to light rail stops

Description	Details
Customer markets	Active transport customer segments e.g. walkers, runners, joggers, cyclists
Light rail crossing points	Pedestrian crossing point at each stop, and only at stops
Access and connectivity	- Access points and rail crossing points located at each light rail stop - New pedestrian/cycle bridges at Parramatta Road and at the Hawthorne Canal - New infrastructure to ensure accessibility and connectivity between the GreenWay, light rail stops, and local streets and public transport
Signage and wayfinding	Wayfinding and location signage
Lighting	- Appropriate lighting for the shared path: - low impact consistent with environmental requirements but acknowledging need for user safety - anticipated to be focused around rail crossings and stop locations
Bush care sites	- Vegetation and habitat protection and enhancement measures - Sites provided for bushcare activities in order to provide for existing and increase local habitat for fauna.
Interpretative and public art	Opportunities to integrate heritage items and indigenous and local community art

Consideration has been given to a number of alternative stop locations. Incorporating the community feedback, the assessment of the stop locations was based on a variety of factors, including potential catchments and existing retail areas, existing transport routes, urban connectivity, as well as constructability, operational constraints and visual impact.

Consideration has also been given to the names for the stops. The proposed names aim to reflect the history and context of the location, whilst providing a geographic or historic link with the communities served by each stop. Stop location assessment and names are discussed in Section 4.

It is proposed that Government proceed with the Inner West extension of the existing light rail network, with the stop locations, names, transport product and GreenWay components as described in this report.

2 Introduction

2.1 Background

2.1.1 History of the Rozelle Goods Line

The double track goods railway from Wardell Road Junction (Dulwich Hill) to Rozelle Bay was opened on 29 May 1916 as part of the planned network of Metropolitan Goods Lines developed during the early part of the twentieth century as a means of segregating goods trains from suburban passenger trains. In January 1922, the line was extended across the head of Rozelle Bay and through a tunnel under Glebe to join the Darling Harbour goods line at Darling Island at Pyrmont.

The line was electrified in 1967 as far as Rozelle Bay in order to facilitate access to White Bay by electrically-hauled goods (especially coal) trains. Between the Bankstown Line at Dulwich Hill and Rozelle Bay, the line passed through mainly established suburban areas, with some industrial uses appearing later, making use of direct rail access. These included the Mungo Scott (later Allied Mills) Flour Mill, built at Summer Hill around 1922, and the Great Western Milling Company operation (known as “Waratah Flour Mill”), established at Dulwich Hill around 1914.

Figure 2.1 Waratah Mill and goods line at Dulwich Hill (1948)



Photograph courtesy of Marrickville Council, from the publication ‘The Story of Petersham’, compiled by Allan Shepherd. Petersham Municipal Council, 1948

From the 1970s, the increased containerisation of freight and the shift of the majority of commercial shipping to Port Botany, led to the eventual closure of, first, the Darling Harbour Line in 1984 (prior to the redevelopment of Darling Harbour) and then the line between Rozelle Bay and Darling Harbour in 1996. This section of the line has since been brought back to use for the light rail line between Central and Lilyfield.

The remainder of the line between Rozelle Bay and Dulwich Hill continued to see use by goods trains for another 13 years until final closure of the Allied Flour Mill (former Mungo Scott Mill) at Summer Hill meant that all use of the line ceased in 2009. The line remains in the ownership of RailCorp.

Figure 2.2 Goods trains operated to Allied Mills (formerly Mungo Scott Ltd) at Summer Hill until 2009.



Photograph courtesy of Marrickville Council

2.1.2 History of the existing light rail system

The first stage of the Sydney Light Rail system from Central Station to Wentworth Park, Glebe was officially opened in August 1997 and a further 3km western extension between Wentworth Park and Catherine Street, Lilyfield was opened in August 2000.

The existing light rail system (with the monorail system) is owned by Metro Transport Sydney (MTS), which is a privately owned Australian company. Both the monorail and light rail are currently operated under contract to Metro Transport Sydney by Veolia Transport Sydney. The term of concession for operation of the whole light rail system expires on 10 February 2028, after which time ownership of the system reverts to the NSW Government. The monorail is subject to a different contract, managed by Sydney Harbour Foreshore Authority, expiring in 2038.

Under the terms of the concession agreement, the existing owner has the first right to tender for the construction, operation and maintenance and repair of any extension to the Sydney Light Rail system.

2.1.3 Previous proposals and studies

Since 1997 various Inner West extensions have been suggested including linking the current system to Leichhardt, Ashfield, Summer Hill and Burwood.

A number of past studies have investigated extensions to the light rail system, including:

- Ultimo Pyrmont Light Rail Transit Project Westward Extension Feasibility Study (GHD Transmark, 1994)
- Ultimo Pyrmont Light Rail Transit System Specification (Booz Allen & Hamilton, 1994)
- Inner West Sydney Light Rail Extension (Arup & TMG, 1998)
- Pre-feasibility Study to Extend the Light Rail from Lilyfield to Dulwich Hill (GHD, 2001)

These previous studies, while useful, are mostly over ten years old and do not reflect Government's recent land use and transport strategies.

In February 2008, Metro Transport Sydney proposed an extension using the existing Rozelle Goods Line to Summer Hill, south of the CityRail Inner West line. The extension would be 3.7km long (compared to the existing 7.2km length) and include four to five stops. The proposal was rejected by the Government, and the then Minister for Transport stated that the Rozelle Goods Line was being considered as a possible rail haulage route for spoil from construction of the then proposed North West Metro.

The Government has now excised the Rozelle Goods Line from the Metropolitan Freight Network. This change in use provides the potential for the corridor to be used for public transport and complementary purposes such as cycleway and footpaths, while maintaining habitats for biodiversity within the corridor.

2.1.4 GreenWay

The GreenWay Sustainability Project is a partnership between four Inner West Councils of Ashfield, Leichhardt, Marrickville and Canterbury. The GreenWay vision is to design and implement a best practice model for shared responsibility towards achieving a sustainable environmental, cultural and non motorised corridor that links the sub catchments of Cooks River and Iron Cove.

A key feature of the GreenWay project is protecting biodiversity and promoting non motorised transport.

The GreenWay proposed by the four councils is approximately 5km long, extending from the Cooks River at Earlwood in the south to Iron Cove in the north, passing through the four local Government areas, and following the line of the disused Rozelle freight corridor.

A number of GreenWay initiatives have already commenced. A Masterplan and Co-ordination strategy has been developed for the GreenWay initiative by a working group consisting of local councils, key agencies and community representatives through 2007 and 2008. This was placed on joint public exhibition by Ashfield, Leichhardt and Marrickville Councils during 2009. The Masterplan was approved by the Councils in October 2009.

The Inner West extension project seeks to activate a disused public asset for public transport purposes. Its objectives and sustainability principles are closely correlated with those of the GreenWay sustainability project. A key driver for the Sydney Light Rail extension from Lilyfield to Dulwich Hill is to integrate the GreenWay with the light rail project.

Based on the GreenWay Masterplan, the Transport NSW project team has investigated uses of the rail corridor that would complement the Inner West extension, covering both personal transport and environmental considerations.

3 Strategic context

3.1 Metropolitan planning

Sydney's population is expected to reach six million by 2036 – an increase of 1.7 million since the last census in 2006. That means 760,000 more jobs and 770,000 more homes are needed than in 2006. This growth brings significant implications for transport and infrastructure.

The NSW State Plan and the 2005 Metropolitan Strategy provide the framework to manage Sydney's growth and development to 2031. It provides a shared vision to guide the activities of State agencies and local government in the Metropolitan Region.

A review of the 2005 Metropolitan Strategy is now underway to ensure it is kept up to date and relevant, responsive to new events and challenges, maintaining a long term planning view.

3.1.1 Metropolitan Transport Plan

The 10 year Metropolitan Transport Plan was released in February 2010. The plan outlines the NSW Government's priorities for improving Sydney's transport network. The Metropolitan Transport Plan forms a key component of the revision of the Metropolitan Strategy to further strengthen the planning framework, and have a sustainable plan for meeting the housing and employment growth challenges.

The Metropolitan Transport Plan sets out the Government's direction on light rail in Sydney, based around providing a sustainable transport mode connecting to key destinations and interchange locations in the CBD and Inner West.

The Inner West extension will provide an alternative mode choice for accessing the Inner West, Pyrmont, Darling Harbour and the CBD. It will activate an orbital corridor thereby allowing movement between existing bus and rail corridors radiating from the CBD including the Inner West and Bankstown CityRail Lines.

In the CBD, the Stage 2 light rail extension is intended to link with the extensive development at Barangaroo, and enhance connectivity to the King Street Wharf precinct, the Walsh Bay entertainment precinct and The Rocks.

3.1.2 NSW Bike Plan

The NSW BikePlan was released in May 2010. The plan focuses on the delivery of new cycling infrastructure to transform cycling and to encourage people to ride more often and more safely in NSW. The plan prioritises a Dulwich Hill to Lilyfield cycleway as one of 13 major missing links within the Metro Bike network and has been identified as a Priority K. The existing freight corridor provides an opportunity to cater for active transport (walking and cycling) and recreation.

The pedestrian and cycle shared path component of the GreenWay as expressed in this report is consistent with the NSW Bike Plan proposal for a cycle link between Dulwich Hill and Lilyfield parallel to the light rail western extension corridor. A combined light rail and pedestrian and cycle corridor would support the NSW Bike Plan's target of 5% travel by bike for all trips in Sydney of less than 10 kilometres by 2016.

4 Product description

4.1 Overview

Light rail can best be described as a modern tram-style system operating typically in its own right-of-way. While tram (streetcar) systems have a long history going back well over a hundred years, the modern light rail system has its genesis in Europe and North America in the 1980s when a number of cities turned to electric light rail as a relatively low cost, efficient and environmentally-friendly mode of transport. Key to successful reintroduction of this form of transport was higher levels of segregation and traffic prioritisation than old-style trams.

Light rail's value as a transport mode lies in its versatility, combining relatively lower cost than heavy rail systems with the ability to operate successfully in a variety of environments, including on-street shared running, segregated on-street running, and in its own separate right-of-way.

The lighter construction of light rail means there are cost savings compared with heavy rail in terms of structures, stops and rolling stock, while the superior braking capabilities and lower speeds mean that the light rail tracks do not need to be fully grade-separated. Stops, while still having low platforms to give level access to Light Rail Vehicles (LRVs), are much closer to bus stops than rail stations in terms of design and are therefore referred to throughout this report as 'stops' rather than 'stations'.

4.2 Route alignment

The SLRE Stage 1 Inner West extension capitalises on the opportunity to use the disused freight railway line to extend the existing light rail system 5.6km from its current terminus at Catherine Street, Lilyfield to Dulwich Hill.

From Lilyfield the alignment goes west towards Haberfield before turning south to pass under the Main Western Rail Line between Lewisham and Summer Hill stations, and terminates adjacent to Dulwich Hill station on the Bankstown Line. The line will be double track throughout with a total of nine new stops, in addition to modifications to the existing Lilyfield stop.

A single track alternative was considered, but would introduce unacceptable operational performance risks to the whole network (not just the single track section). It would also constrain the maximum number of total movements along the line. The recent precedent on the CityRail suburban network has been to replace sections of single track with double track (e.g. Cronulla branch line) to improve service reliability and line capacity.

4.3 Stop locations

4.3.1 Assessment of stop locations

As part of the Sydney Light Rail Inner West Extension Study, GHD assessed a wide range of potential stop locations, considering factors such as:

- Integration with land use
- Integration with transport networks

- Construction costs (including constructability)
- Operational considerations.

This assessment resulted in a short list of eight stop locations as follows:

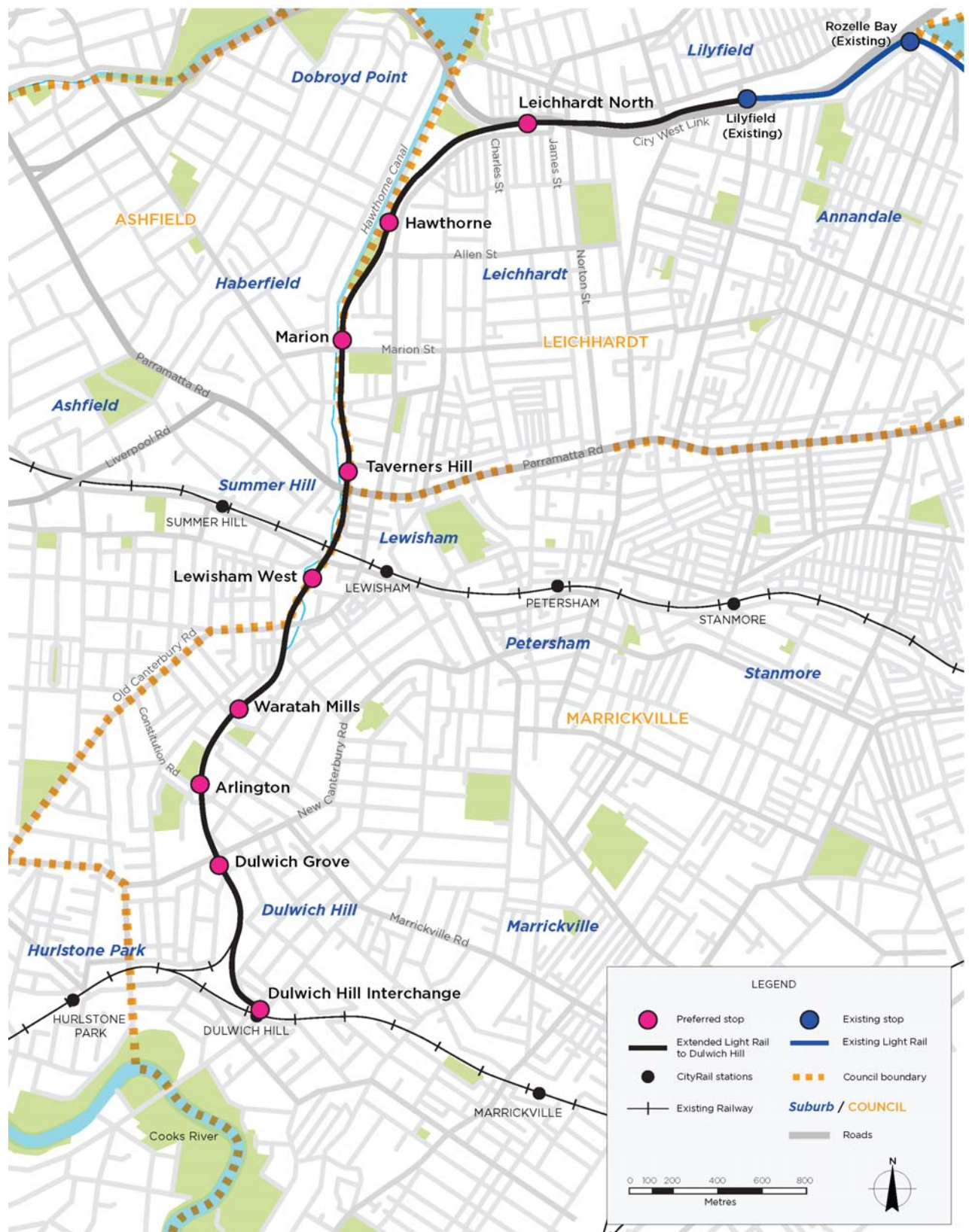
- Norton (James Street)
- Allen
- Marion (Southern option)
- Parramatta Road
- Lewisham Interchange (Northern option)
- Waratah Mills
- Dulwich Hill Shops
- Dulwich Hill Interchange

Transport NSW has undertaken a further detailed analysis of potential catchments that considers:

- Community feedback including interaction with the GreenWay proposals
- Existing transport routes (bus and rail)
- Retail areas and active streetscapes
- Local connectors and urban connectivity
- Accessibility
- Personal security and surveillance
- Visual impact.

The analysis undertaken by the project team has resulted in amendments to the stop locations and names. The updated recommended stop locations (nine in total) are shown in Figure 4.1.

Figure 4.1 SLRE Stage 1 Inner West extension - proposed stop locations and names



The description and rationale for each of the recommended stop locations is further outlined in the following table.

In addition to the nine proposed stops, a number of potential additional stops or alternative stop locations were considered.

Appendix A sets out the rationale for naming of stops.

Appendix B sets out the rationale for selection of the nine stops from all the potential locations considered.

Table 4.1 Summary of SLRE Stage 1 Inner West extension proposed stops

Name	Location	Description / Rationale
Leichhardt North	To the west of James Street and adjacent to Darley Road and the City West Link Road	- Serves the northern end of Leichhardt and western part of Lilyfield including Orange Grove - Provides potential for interchange with bus routes 440, 444, 445 on Norton Street with enhanced access via the southern side of Darley Road and the vacant parcel between James Street, City West Link Road and Norton Street - This location has a larger walk-up catchment than nearby alternatives and is closer to the main north-south pedestrian desire-line along James Street/Perry Street (to the north) and Norton Street (to the south) - Access would be to Darley Road, where a new pedestrian crossing is proposed at or close to Francis Street; an additional access from the western end of the 'up' platform (on the north side of the tracks) would link to the footbridge over City West Link Road giving access to the Arts NSW precinct, the northern part of Charles Street and Lilyfield Road; access to bus stops on Norton Street just south of City West Link Road would also be enhanced - There exists potential for modest commuter parking to the west of the stop between the rail line and Darley Road accessible from Darley Road from the south or from City West Link Road via Norton, William, Francis Streets
Hawthorne	Between Darley Road, close to Lyall Street, and Hawthorne Canal	- Serves the north western part of Leichhardt, currently not well served by public transport, as well as the eastern part of Haberfield via a new footbridge across the Hawthorne Canal linking to Waratah Street, Haberfield - The location is slightly to the north of previously considered options (approximately opposite Lyall Street), in order to optimise the spacing relative to the adjacent stops at Leichhardt North and Marion and to provide better connectivity to the west - For this stop to achieve its full potential, a new pedestrian connection across Hawthorne Canal is included in the project scope of works in order to maximise connectivity from the west

Name	Location	Description / Rationale
Marion	On the northern side of the overbridge crossing of Marion Street, close to Lambert Park	- Serves the western part of Leichhardt and eastern part of Haberfield as well as Lambert Park; Leichhardt Marketplace is approximately 7 mins walk to the east - Provides interchange with bus routes 436, L37, 438, L38, 439, L39 via new bus stops on Marion Street; consideration would be given to enhancement of bus services serving this stop - A signalised pedestrian crossing of Marion Street would be included at this location to facilitate access to and from outbound bus stop on the southern side of the road and the GreenWay crossing of Marion Street
Taverners Hill	On northern side of Parramatta Road overbridge, just east of 'Battle Bridge' over Hawthorne Canal	- Serves the Parramatta Road area of Taverners Hill to the east, and eastern part of Ashfield to the west - Provides interchange with bus routes 461, 480, 483 via new bus stops on Parramatta Road. Due to Parramatta Road having only two lanes in eastbound direction at this location, opportunities for accommodating a new eastbound bus stop which will not adversely impact traffic flow will be investigated. - Longer term urban renewal potential in association with revitalisation of Parramatta Road corridor, especially to the east and north of Parramatta Road - From a transport and land use viewpoint, a location close to and on the north side of Parramatta Road is preferred, with grade-separated access to both sides of Parramatta Road to facilitate interchange with bus services. The constraints imposed by the adjacent road overbridge on the eastern side limit the placement of the platform on the eastern side of the line to a point approximately opposite the corner of Hathern Street; platforms would be staggered with western platform located closer to Parramatta Road - A footbridge across Parramatta Road is proposed as part of the GreenWay, which would provide access from the light rail stop to the south of Parramatta Road (including westbound buses). - Further detailed design work is required to resolve the significant engineering issues at this location and allow determination of the most appropriate location of platforms and pedestrian access to Parramatta Road

Name	Location	Description / Rationale
Lewisham West	To the south of the Longport Street overbridge, to be integrated within future development sites either side of the line	- Serves the area between Lewisham and Summer Hill including two potential future developments: the former Mungo Scott Mills site on the western side of the line, and the McGill Street precinct on the eastern side of the line - The site provides the most practical balance between meeting the interchange opportunity with Lewisham Station and the opportunities of the catchment and its two known developments - The proposed site could offer improved interchange through appropriate masterplanning of any future development to enhance the experience and minimise the walk distances, and in association with future upgrading of the CityRail Lewisham Station - Patronage at this location is currently predicted to come approximately equally from walk-up catchment and from interchange. Future redevelopment will see this balance tip significantly in favour of catchment with the stop potentially becoming a focus of the local area - Provides potential interchange with route 413 buses on Old Canterbury Road - May require provision of temporary access to Longport Street until redevelopment of adjacent sites occurs
Waratah Mills	Immediately on the northern side of the Davis Street overbridge	- Serves the north western part of Dulwich Hill and southern part of Summer Hill, an area not currently served by public transport - Close to recent medium housing developments - Good pedestrian access from east via Davis Street and Hoskins Park and the west via Weston Street - By being to the north of the overbridge avoids direct impact on existing bushcare sites to the south of Davis Street - Further detailed design work is required to minimise any impacts on neighbouring residents on Weston and Davis Streets

Name	Location	Description / Rationale
Arlington	Adjacent to Johnson Park, just north of Constitution Road overbridge	- Serves the western part of Dulwich Hill and southern part of Summer Hill, an area not currently served by public transport - Close to recent medium housing developments - Adjacent to future development site at Grove Street - Would serve Arlington Reserve and Johnson Park recreation areas and provide access to Trinity Grammar School - Good pedestrian access from east and west via Constitution Road
Dulwich Grove	Between the New Canterbury Road and Hercules Street overbridges	- Serves the western part of Dulwich Hill along New Canterbury Road, to the west of Dulwich Hill shopping centre - Provides interchange with bus routes 418, 428, L28, 444, 445 via new bus stops on New Canterbury Road
Dulwich Hill Interchange	Between Bedford Crescent and the rail corridor, adjacent to Dulwich Hill railway station	- Serves the southern part of Dulwich Hill - Provides interchange with CityRail services on the Bankstown Line at Dulwich Hill Station and with bus route 412 on Wardell Road - Potential for expansion of commuter parking on southern side of Dulwich Hill Station to meet increased demand and off-set the small loss of parking on northern side in Bedford Crescent - Further detailed design work is required to determine the appropriate level for the stop relative to Bedford Crescent so as to minimise adverse impacts on neighbouring residents.

4.3.2 Stop names

The proposed names of the stops aim to reflect the historic nature and context of the location and maximise community ownership. The names aim to be geographically accurate, recognise any historic or iconic value of place, be consistent with CityRail's policy in this area, and be more interesting, relevant and precise than the name of a nearby road. An overview of the proposed names, compared to those put forward in the Metropolitan Transport Plan and the GHD feasibility study is given in Table 4.2.

Appendix A includes a further outline of the rationale for the proposed names. It should be noted that the names are yet to be endorsed by the NSW Geographical Names Board, following consultation with the local council or the government department that administers the area where the stop is located.

Table 4.2 Stop names

Proposed name	Name in Metropolitan Transport Plan	Name in GHD Study
Leichhardt North	Norton Street	Norton
Hawthorne	Allen Street	Allen
Marion	Market Town	Marion
Taverners Hill	-	Parramatta Road
Lewisham West	Lewisham Interchange	Lewisham Interchange
Waratah Mills	Waratah	Waratah Mills
Arlington	Constitution Road	Constitution Road
Dulwich Grove	Dulwich Hill Shops	Dulwich Hill Shops
Dulwich Hill Interchange	Dulwich Hill Interchange	Dulwich Hill Interchange

4.4 Stop principles

4.4.1 Reconnecting the community

When built in 1916 as a goods rail line, the corridor effectively split existing communities and created a significant barrier to movement. Through its conversion to light rail, integrated with cycle and pedestrian paths, there is an opportunity for significantly enhancing urban connectivity and for some of these connections to be re-established, in particular through well considered stop locations.

Consistent with the community feedback, urban connectivity has been a key factor in determining the proposed stops for the extension, together with other factors such as potential catchments, existing transport routes (bus and rail), retail areas and key local connectors, accessibility, personal security and surveillance, constructability, operational constraints (eg. desirability of locating platforms on straight track) and visual impact.

All recommended stops will be provided from the outset. Distances between stops will range from 350m to 830m, rising to 980m through the tunnel/cutting between Lilyfield and Leichhardt North.

4.4.2 Stop design

The typical stops configuration will be based upon a staggered or aligned platform arrangement (each platform is 30m long by 3m wide) with 4m wide pedestrian crossing point. For the staggered platform arrangement, the location of the crossing point between the adjacent ends of each platform, will ensure that pedestrians can always see an approaching LRV from either direction. They, in turn, can also be clearly seen by the driver of any approaching LRV.

Platform layouts will be similar to those of the existing light rail stop with appropriate upgrades to reflect any changes in legislation and standards such as improvements in provisions for people with disabilities and opportunities for sustainable design and construction techniques. A sketch of a typical stop is shown in Table 4.2.

Figure 4.2 Indicative stop layout showing stop access, crossing, and staggered platform arrangement (Hawthorne).



Source: GHD and Aspect Studios 2010

Typical stop components will include the following:

- Wayfinding - stop name & location & direction of travel signage, passenger information display, fare information, network map, locality plan with local public transport information
- Urban furniture - canopy / weather-protection, seating, rubbish bin, technical cabinets, potential for advertising
- Passenger access - fully accessible stops, access ramps or lifts (as required), passenger rail crossing point (one at each stop except Dulwich Hill Interchange)

- Security & safety - lighting, CCTV, emergency telephone/help point, railings, tactile paving, warning signs
- Cycling – bicycle parking at each stop

The exact location of each stop, and placement of the platforms, lifts, stairs and accessways, is subject to further detailed analysis including consideration of integration cycle and pedestrian paths, physical limitations within the corridor, and any other constraints that are identified during the detailed surveys and assessments.

4.4.3 Stop access and interchange with other modes

Convenient access and interchange is important to allow passengers to easily access the light rail extension, thereby integrating the light rail network with other transport modes and providing a customer focused service.

Each stop will be designed for easy access for all users, with connectivity to allow access to surrounding areas and interchange with rail and buses where appropriate. Stop design priority will be given to the most efficient and sustainable modes – with priority for access by pedestrian and cycle, followed by public transport, and then private vehicles. Conflict between pedestrians and cyclists and other stop access modes will be minimised. Bicycle parking facilities will also be provided at each new stop.

Access and interchange walk times and distances will be minimised where appropriate through the location and design of stop facilities.

The opportunity for off-street commuter car parking is being considered at Dulwich Hill Interchange (where it already exists for CityRail customers) and potentially at Leichhardt North. On-street commuter car parking is predicted to be low, but it is recognised as a potential concern for nearby residents. This will be subject to further investigation and mitigation if required.

Table 4.3 summarises proposed stop access and interchange options.

Table 4.3 Stop access facilities and interchanges

Stop	Easy access	Walking and cycling	Rail	Bus	Park and ride
Leichhardt North	✓	✓		✓	✓ to be investigated
Hawthorne	✓	✓			
Marion	✓	✓		✓	
Taverners Hill	✓	✓		✓	
Lewisham West	✓	✓	✓ Inner West Line	✓	
Waratah Mills	✓	✓			
Arlington	✓	✓			
Dulwich Grove	✓	✓		✓	
Dulwich Hill Interchange	✓	✓	✓ Bankstown Line	✓	✓ existing

Figure 4.3 Indicative GreenWay and Light Rail corridor

4.5 GreenWay

4.5.1 GreenWay provision

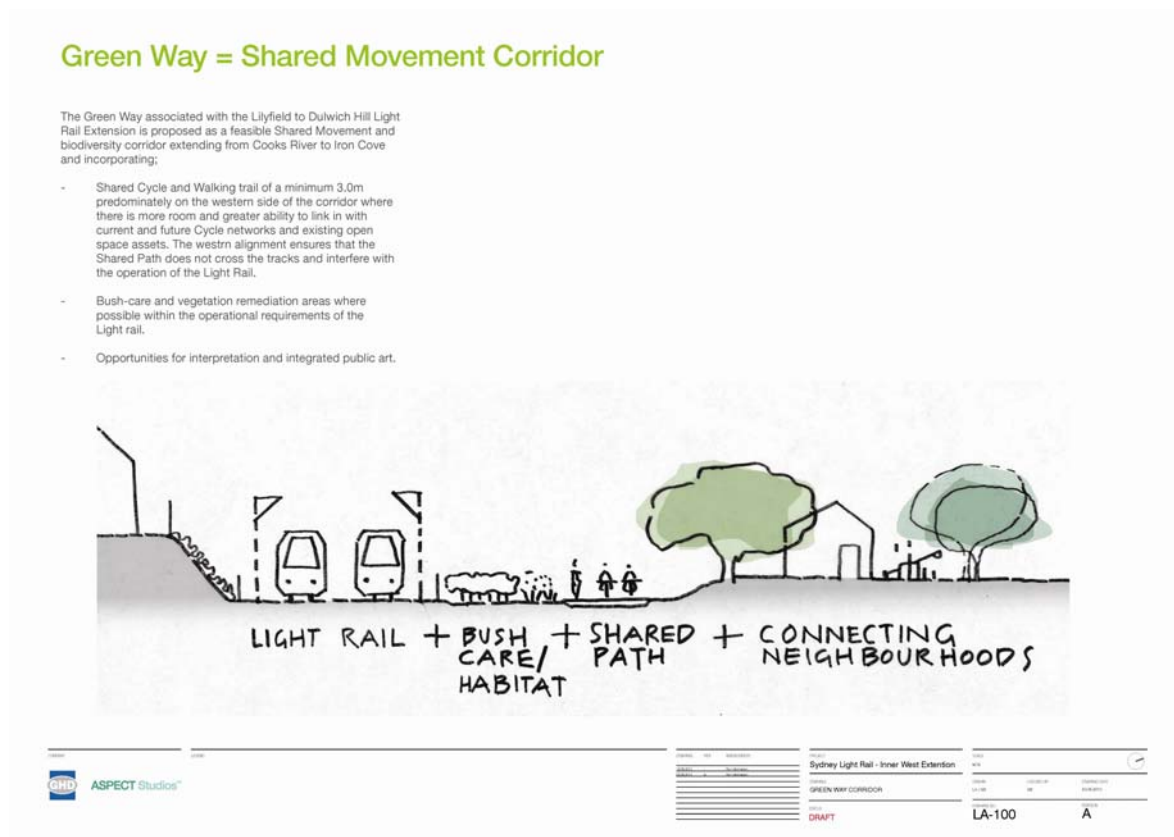
As part of the confirmation of the scope of the Inner West extension the project team has taken into account GreenWay project initiatives, including a new shared pedestrian and cycle shared path in an enhanced bushcare environment, and where practicable integrated these initiatives to enhance the sustainability outcomes of the light rail extension.

The GreenWay components that would be incorporated into the Inner West extension project is likely to include the following:

- Provision of a shared pedestrian and cycle path from Cooks River to Sydney Harbour at Dobroyd Point, including connections to the existing shared/cycle paths
- The shared path section from Dulwich Hill to Leichhardt would generally be within and adjacent to the light rail inner west corridor. The shared path would be at grade or elevated subject to local topography and access requirements
- New pedestrian/cycle bridges at Parramatta Road and at the Hawthorne Canal
- New infrastructure to ensure accessibility and connectivity between the shared path, local streets and the light rail stops
- Appropriate safety fencing or separation of the shared path and light rail operations
- Earthworks and drainage
- Appropriate lighting for the shared path
- Sites provided for bushcare activities in order to increase local habitat for fauna.

The light rail alignment and the pedestrian and cycle shared path will require a degree of segregation. There is no consistent world-practice in this area, and it should be risk-based, taking into consideration the safety of both shared path users and light rail users, but with a presumption of minimising visual and environmental impacts.

Figure 4.4 Indicative concept layout showing relationship of light rail and GreenWay within the corridor



An initial concept design for the GreenWay components scope of works is being developed (indicative plan and cross sections shown in Figures 4.5 and 4.6). Further work will be undertaken to confirm the final design in consultation with key stakeholders.

The ongoing maintenance of the GreenWay will transfer to the relevant local authorities and the detail of these arrangements is subject to current discussions.

4.5.2 Other scope considerations

The scope of the GreenWay in relation to this project currently excludes a new pedestrians/cycle bridge at Cooks River and any further upgrade of the pedestrian and cycle networks connecting to Iron Cove and Anzac Bridge.

Transport NSW will give further consideration to the timing of investments at these locations to maximise the outcomes of the project.

Figure 4.5 Indicative cross-sections within different sections of the corridor

Source: GHD and Aspect Studios 2010

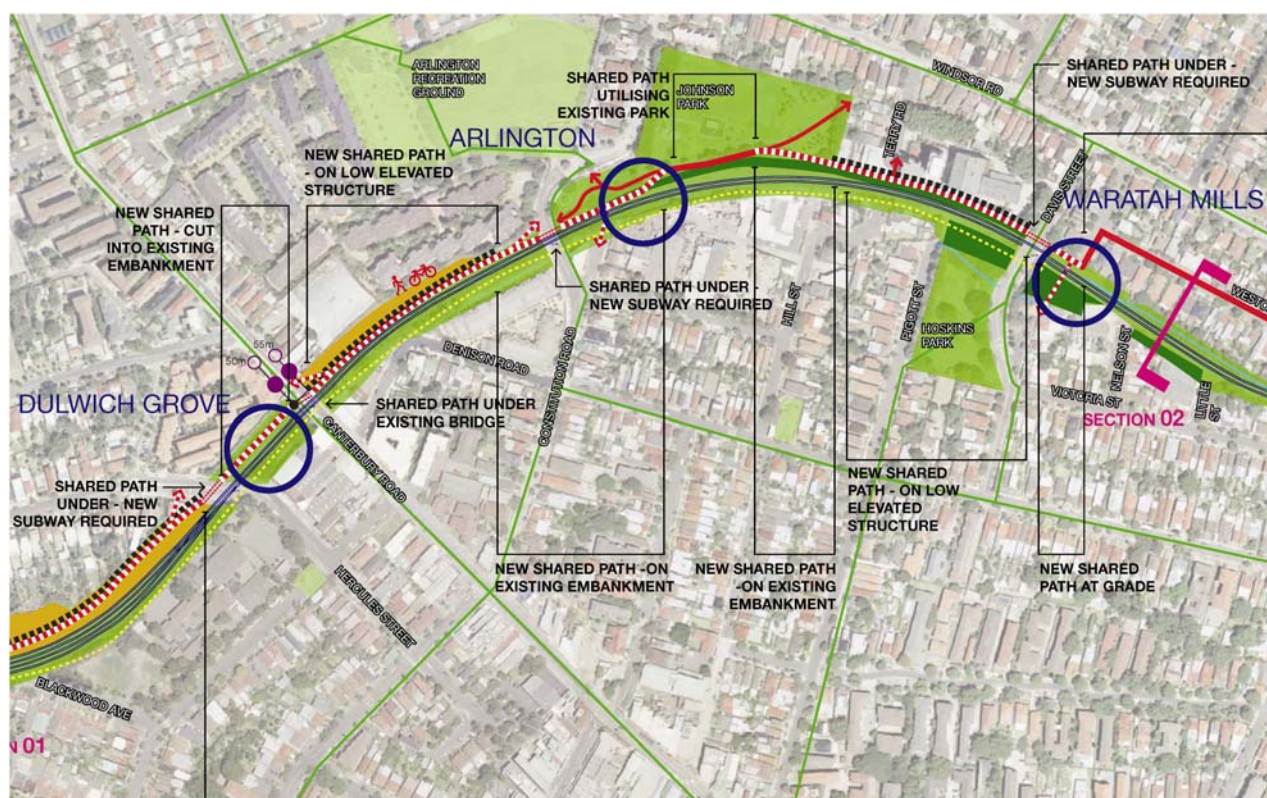
Figure 4.6 Indicative shared pedestrian and cycle path alignment and cross-sections



SECTION 01



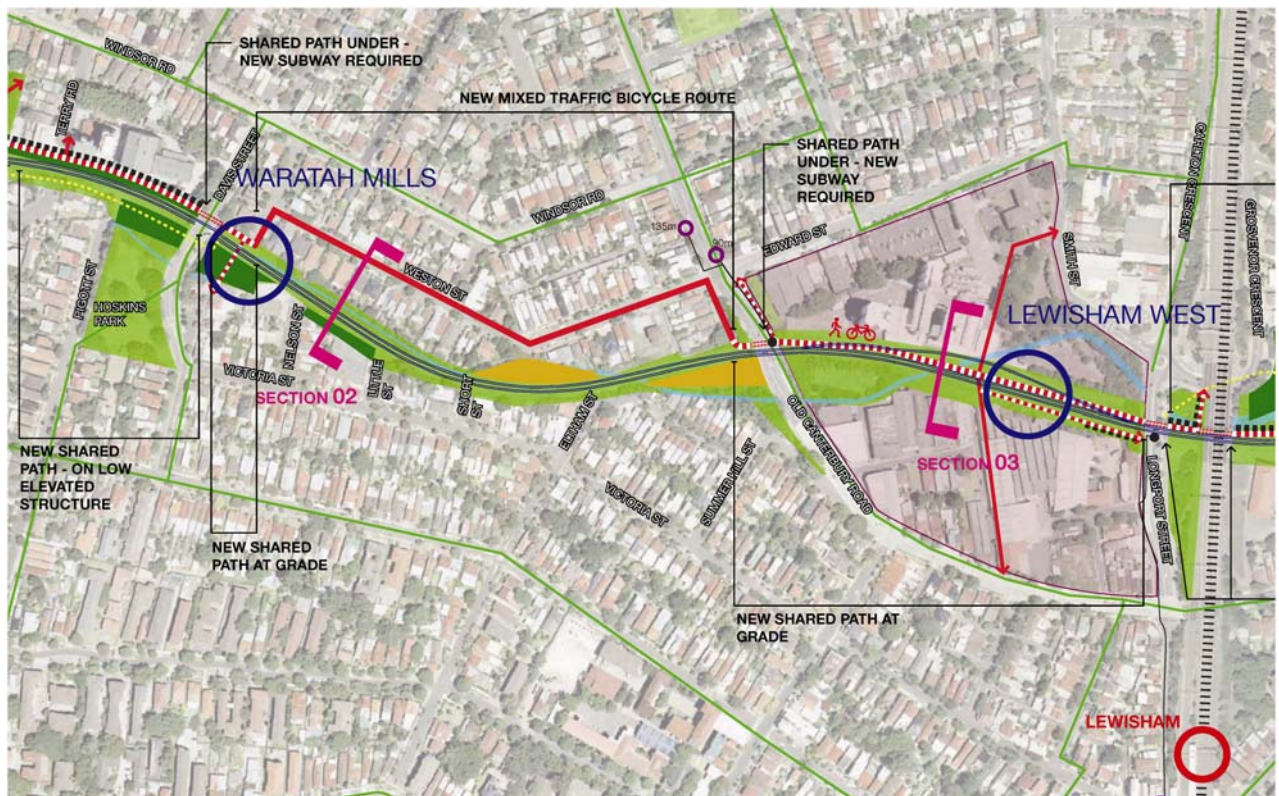
Source: GHD and Aspect Studios 2010



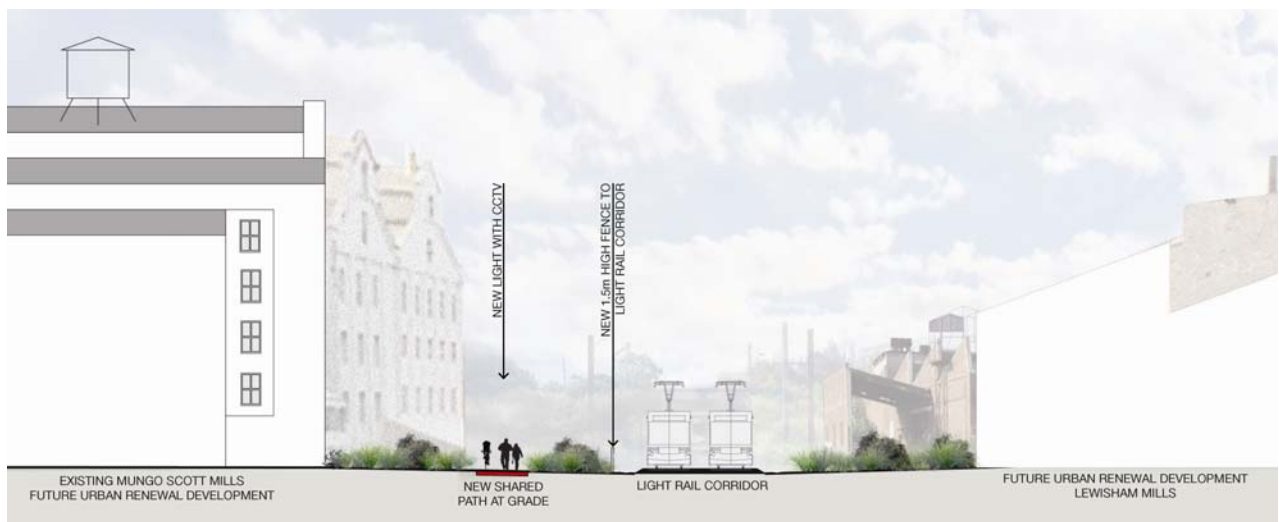
SECTION 02



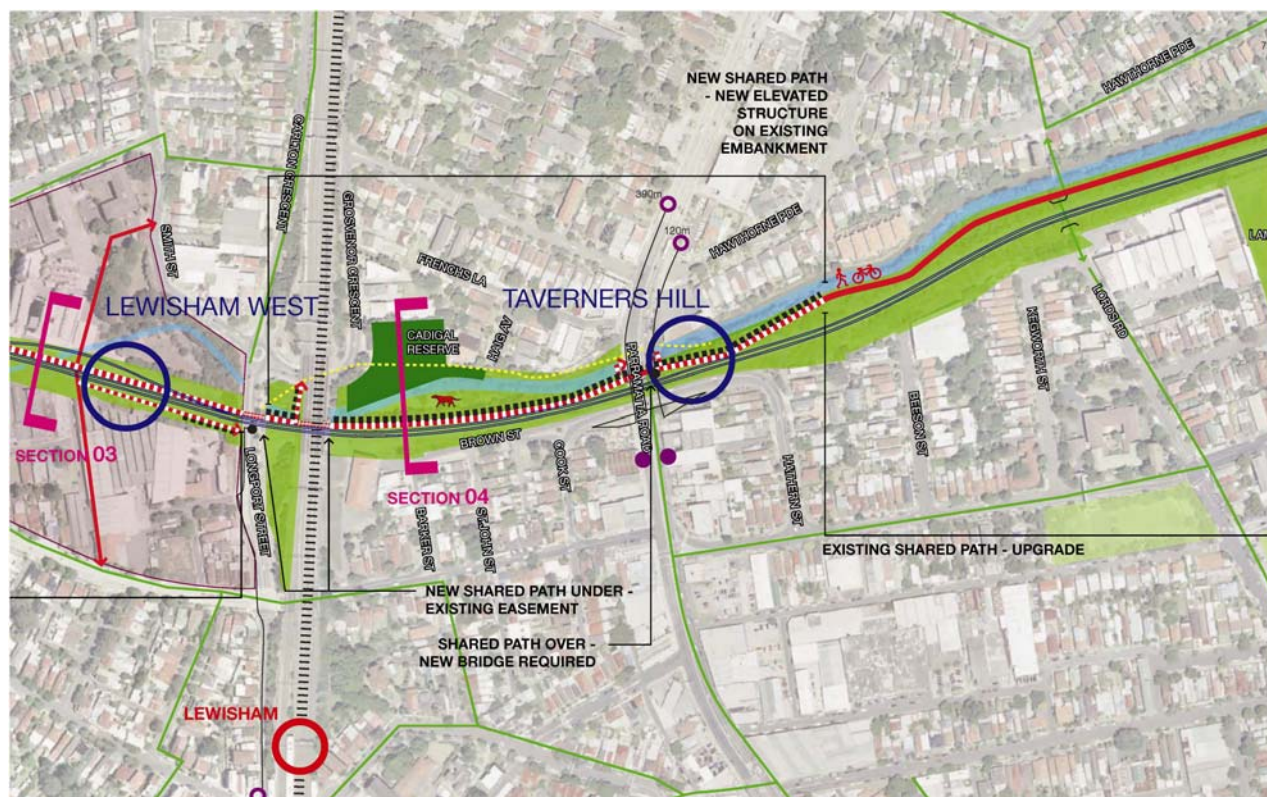
Source: GHD and Aspect Studios 2010



SECTION 03



Source: GHD and Aspect Studios 2010



SECTION 04



Source: GHD and Aspect Studios 2010



Source: GHD and Aspect Studios 2010

SECTION 05



Source: GHD and Aspect Studios 2010

4.6 Customer experience

4.6.1 Light rail travel experience

The light rail travel experience will cover the whole journey which includes:

- Pre-journey
- Accessing the light rail
- The light rail stop experience
- Traveling on the light rail; and
- Post-journey.

The light rail stops will be designed to integrate with their local communities to help foster the creation of walkable communities centred on a high quality light rail system. Stages of a light rail journey are described below.

Step 1 Pre-journey – Choosing the light rail

Pre-journey, the customer makes the fundamental decision of choosing light rail as a means of transport, either as the sole mode for a journey or as the mode for one part of a journey.

A number of factors influence this decision including:

- Ease of access to journey information (via the web, telephone or at the stop)

- Ease of access to the stop from the surrounding area, either by foot, cycle, other public transport mode such as bus or rail, or by car, through provision of clear signage and way finding as well as up-to-date service information; and facilities such as cycle parking, and in some instances, car parking.

The pre-journey step forms a key part of the transport product and the customer experience.

Step 2 Accessing the light rail – Getting to the light rail stop

The ability of the public to easily locate and access the stop is critical to the success of the light rail. Access to the light rail is based on an 'access for all philosophy' whereby the stop is designed around fundamental way-finding principles. A simple way-finding policy will deliver signage that is clear, easy to read and caters for all modes of arrival at the stop.

Step 3 The light rail stop experience – Facilities at the stop

To be a successful transport product, the stop experience must be attractive, clean and safe and accessible to all customers, whatever their level of mobility. Stairs and ramps and/or lifts will give easy access between street and platform. Stops will be well-lit, provide adequate shelter and seating, as well passenger information and a passenger Help Point.

Step 4 Travelling on the light rail – The light rail journey experience

Traditionally considered to be the starting point of the customer experience, the journey itself follows the decision to choose, access and use the light rail.

The existing operator will define the travel experience, with quality travel at the heart of the journey. Light rail vehicles will be a comfortable, efficient and pleasant way to travel, and, being unimpeded by road traffic, will give assurance as a reliable means of transport. They will be safe, clean and presentable at all times.

The location of wheelchair and pram/stroller entry points will be clearly marked on the platform, and spaces will be clearly marked inside the vehicles. Trained staff will be available to assist customers at all times through visual and audio links ('help points') provided on stop platforms and on LRVs.

Step 5 Post-journey

As with the existing light rail system, customers will be able to provide feedback to the light rail customer service centre either by phone, email, mail or in person.

4.6.2 GreenWay experience

The GreenWay will attract multiple users, including recreational walkers, runners and joggers, recreational cyclists and commuter cyclists. It will therefore need to be safe, legible and well signed. Particular attention will be paid to design of GreenWay crossing points to ensure safety for all users.

There will also be a need to balance the needs and expectations of the various users groups. Behavioural standards will be developed with community involvement.

4.6.3 Fares and ticketing

It is expected that the fares and ticketing system for the Inner West extension would be consistent with those offered on the existing light rail system.

Integration with Sydney's future electronic ticketing system will be pursued.

4.7 Sustainability

As an augmentation of an existing public transport initiative, Inner West extension represents an opportunity to improve the sustainability of Sydney's transport network. Key sustainability benefits of the extension, together with the integration of the GreenWay concept would include:

- Converting a disused freight line into an operational light rail system
- Enhancing access for all social groups between and within the City of Sydney, Leichhardt, Ashfield and Marrickville local government areas
- Providing an accessible, reliable and affordable public transport system catering to a range of socio-economic groups and enhancing social equity by improving access for people with disabilities, the elderly and for parents with young children
- Encouraging sustainable travel with greater use of active transport
- Maintaining habitats for biodiversity within the corridor.

The best-practice sustainability principles will be considered, assessed and where practicable incorporated in the project design. These include:

- Energy and climate change adaptation - passive design principles; carbon footprinting of concept and detailed designs; investigation of low carbon power supply at stops; and design initiatives to minimise risk from extreme weather events, such as increased storm intensity
- Materials and waste - Consideration of lifecycle impacts in selection of materials; assessment, classification, management and disposal of waste materials in accordance with Waste Classification guidelines; reuse of clean spoil material; and minimisation of materials used in structures
- Biodiversity and heritage - Opportunities to enhance biodiversity are investigated along the corridor; and items of heritage significance are protected and heritage interpretation is incorporated into signage and public art wherever appropriate
- Water conservation - Best practice environmental design principles to minimise water use; on-site water capture and retention for cleaning and irrigation where possible; and water efficient landscaping
- Pollution control - Avoid adverse effects from light spill in the neighbouring areas; stormwater management; minimising soil erosion and the discharge of sediment and other pollutants to land and/or waters during construction; and assessment of land for possible contamination, and where identified effectively managed
- Community benefit - Providing improved visual amenity through design of stops and landscaping; incorporating principles of crime prevention through environmental design into the siting and design of stops; accessible design; enhanced way-finding to and from stops as well as in the surrounding precinct; integration with bus stops and City Rail stations; Integration with Sydney's future electronic ticketing system will be pursued; and providing secure bicycle storage within stop precincts.

4.8 Operations

4.8.1 Service requirements

The Inner West extension would provide a service between Dulwich Hill Interchange and Central at a 10 to 15 minute frequency.

Indicative travel times between stops on the existing system and stops on the Inner West extension are given in Table 4.4.

The light rail would operate from 6am to around 11pm (Mondays to Thursdays) and around 12.30am (Fridays and Saturdays). These operating hours can be adjusted to cater for special events.

Table 4.4 Indicative travel times (minutes)

	Capitol Square	Paddys Market	Exhibition Centre	Convention	Pymont Bay	Star City	John Street Sq	Fish Market	Wentworth Park	Glebe	Jubilee Park	Rozelle Bay	Lilyfield	Leichhardt North	Hawthorne	Marion	Taverners Hill	Lewisham West	Waratah Mills	Arlington	Dulwich Grove	Dulwich Hill Int.
Central	3	5	7	9	11	12	13	15	16	18	19	20	22	24	26	27	28	30	32	33	34	36
Capitol Square		2	4	6	8	9	10	12	13	15	16	17	19	21	23	24	25	27	29	30	31	33
Paddys Market			2	4	6	7	8	10	11	13	14	15	17	19	21	22	23	25	27	28	29	31
Exhibition Centre				2	4	5	6	8	9	11	12	13	15	17	19	20	21	23	25	26	27	29
Convention					2	3	4	6	7	9	10	11	13	15	17	18	19	21	23	24	25	27
Pymont Bay						1	2	4	5	7	8	9	11	13	15	16	17	19	21	22	23	25
Star City							1	3	4	6	7	8	10	12	14	15	16	18	20	21	22	24
John Street Square								2	3	5	6	7	9	11	13	14	15	17	19	20	21	23
Fish Market									1	3	4	5	7	9	11	12	13	15	17	18	19	21
Wentworth Park										2	3	4	6	8	10	11	12	14	16	17	18	20
Glebe											1	2	4	6	8	9	10	12	14	15	16	18
Jubilee Park												1	3	5	7	8	9	11	13	14	15	17
Rozelle Bay													2	4	6	7	8	10	12	13	14	16
Lilyfield														2	4	5	6	8	10	11	12	14
Leichhardt North															2	3	4	6	8	9	10	12
Hawthorne																1	2	4	6	7	8	10
Marion																	1	3	5	6	7	9
Taverners Hill																		2	4	5	6	8
Lewisham West																			1	3	4	6
Waratah Mills																				2	3	5
Arlington																					1	3
Dulwich Grove																						2

With regard to service frequency, the aim is to maintain operational flexibility to respond to changes in demand on different sections of the route and minimise overcrowding, while providing a minimum service level of a LRV at least every 10-15 minutes.

These service levels could be met with a fleet of ten LRVs (three more than the current fleet).

Once the light rail system is extended into the CBD, operating patterns and frequencies would be reviewed to ensure that the service requirements for the busier Stage 2 (CBD) section and the Stage 1 Inner West extension are appropriate to meet demand.

4.8.2 Light Rail Vehicle operations

The principles of LRV operations shall be as present:

- Operated under Automatic Train Protection (ATP) with fixed block signaling
- Line of site driving for on street shared running sections
- The vehicles would be operated by a driver with provision for an on-board attendant with customer service duties
- LRV operational control functions and monitoring would be centralised at the Operations Control Centre (OCC), located in the maintenance depot
- In the event of a breakdown or an emergency in a tunnel, evacuation would in line with the existing tunnel evacuation strategy.

4.8.3 Stabling and maintenance operations

The existing stabling facility and maintenance depot will operate 24 hours a day to provide for the control and management of the light rail network, maintenance, repair, refurbishing, upgrading, stabling, cleaning and a base for infrastructure maintenance activities.

Track maintenance activities would be undertaken, whenever possible, during night time periods when regular services are not operating.

The types of activities would vary considerably throughout the day. For example, LRVs would depart the facility from about 5:30am and run every 10-15 minutes. After 12.00 midnight there is currently a reduced service from Central to Star City operating every 30mins, with LRVs not required for operations returning to stable at the depot by around midnight, when the infrastructure maintenance operations period would commence when required. The infrastructure maintenance period would finish before 5am. Rolling stock maintenance would be undertaken during the day but would not normally be undertaken on weekends.

4.8.4 Track form

It is proposed that the existing goods rail track will be refurbished, with the cleaning of ballast, and new sleepers. The tracks will be located in the same position as the existing tracks and will be renewed to a standard acceptable for light rail vehicles in passenger operation.

4.9 Rolling stock

The existing light rail system currently operates with a total fleet of seven LRVs (including 'spares'). The existing seven LRVs used are ABB Variotrams, a European design adapted for use in Sydney. Key specifications are summarised in Table 4.5.

As outlined in Section 4.8, the proposed operating plan for the route to Dulwich Hill is expected to require three additional LRVs. The new vehicles would be procured using proven "off the shelf" type rolling stock technologies. The rolling stock would be standard full low floor design LRVs with overhead traction power similar to the existing fleet.

Subject to detailed design, the vehicles would have three exterior sliding doors per side, space for wheelchairs and an open full-width passageway (between cars or 'modular sections') to assist passenger movement and provide a clear, open environment.



Figure 4.7 An LRV departs Glebe stop on the existing system

The LRVs would be equipped with modern passenger surveillance and communication systems and have full disability access provisions.

Table 4.5 Existing rolling stock (LRV) specification

Element	Specification
Vehicle length	29m (approx)
Width	2.65m
Roof height	3.61
Floor height	350mm
Vehicle weight (empty)	36,000kg
Seating capacity	approx 70
Capacity (full load)	approx 200
Maximum speed	80 kph
Minimum radius curve	20m
Track gauge	1.435m
Low floor area	100%

4.10 Maintenance and stabling facilities

The extra three vehicles can be accommodated in the existing depot with some modifications.

The existing maintenance facility would be sufficient for the total number of rolling stock required for the Inner West extension (10 LRVs). Some minor works would be required to the Darling Harbour site for the accommodation and maintenance of the 10 LRVs. The existing maintenance and stabling facility would provide the following functions:

- Maintenance facility
- Stabling for the LRV fleet (up to 10 LRVs)
- Operation Control Centre (OCC) to manage the day-to-day operation of the light rail service

The maintenance facility would provide for the ongoing maintenance of the entire rolling stock fleet, including preventative and corrective maintenance, heavy lift and overhead work, general presentation area and associated office and storage facilities.

4.11 Ancillary facilities

The Inner West extension includes a number of ancillary facilities which are critical to the operation of the project as outlined in the following sections.

4.11.1 Crossovers and turnbacks

Crossovers and turnbacks are required for the reliable operation of the light rail network. The following crossovers and turnbacks are considered likely to be provided for the extension:

- A crossover at Lilyfield and/or Leichhardt North to allow for LRVs to turnback at these locations, as required
- A turn back at Dulwich Hill Interchange for terminating services
- Consideration of a further crossover at Lewisham West for out-of-course operations.

4.11.2 Power supply

As with the existing system, the Inner West extension would require electrical power for operations. The operational power system is made up of various components.

Traction supply substations will provide electrical power. An additional 2-3 substations will be required. The proposed number and locations of the traction supply substations will be determined following a power system study.

4.12 Land requirements

The proposed Inner West extension alignment is contained within the existing Rozelle Goods line corridor from Lilyfield to Dulwich Hill. The corridor is currently in the ownership of RailCorp. At the direction of the Minister, ownership can be vested in the Director General, an alternative rail authority or State-owned corporation.

Inner West extension

The only significant land requirements outside the corridor currently anticipated to be required for is summarised in Table 4.6:

Table 4.6 Land requirements

Stop	Public ownership	Private ownership
Leichhardt North	RailCorp site located adjacent to Darley Road	Lease
Dulwich Hill Interchange	Section of on-street carpark located north of existing station	None

The impact on property outside the existing corridor aims to be limited to public access (i.e. connections to existing footpaths) and vacant parcels of land for temporary worksite areas for the proposed stops.

GreenWay

As a principle, the shared pedestrian and bicycle path will be accessed at light rail stop locations. Additional access points to the path may be considered, in consultation with stakeholders.

The inclusion of the shared path may involve additional property requirements particularly where the route needs to break out of the existing corridor for continuity purposes at points where it cannot be accommodated with the light rail use. It is anticipated that the properties involved will be in the ownership of local councils or other government bodies. These additional properties will be identified as the design process progresses and will be secured by way of easements or rights of way where possible rather than acquisition of the freehold.

Transport NSW will be responsible for acquiring any lands and other land interests not in public ownership which may be needed for the light rail. Transport NSW will acquire property through a process of direct negotiation with affected landowners. Where negotiations are unsuccessful, Transport NSW will have the ability to compulsorily acquire requisite interests in land with the approval of the Executive Council. The mechanisms and procedures for compulsory acquisition are established under the *Land Acquisition (Just Terms Compensation) Act 1991*.

5 Customer markets and key benefits

5.1 Key customer markets & patronage

5.1.1 Origins and destinations

The dominant destination for the existing light rail line is Pyrmont, which attracts journeys to and from both the CBD and Lilyfield directions. This is supported by some access trips to the CBD, via both Pyrmont Bay (for trips across Pyrmont Bridge) and Central (potentially transferring to other modes).

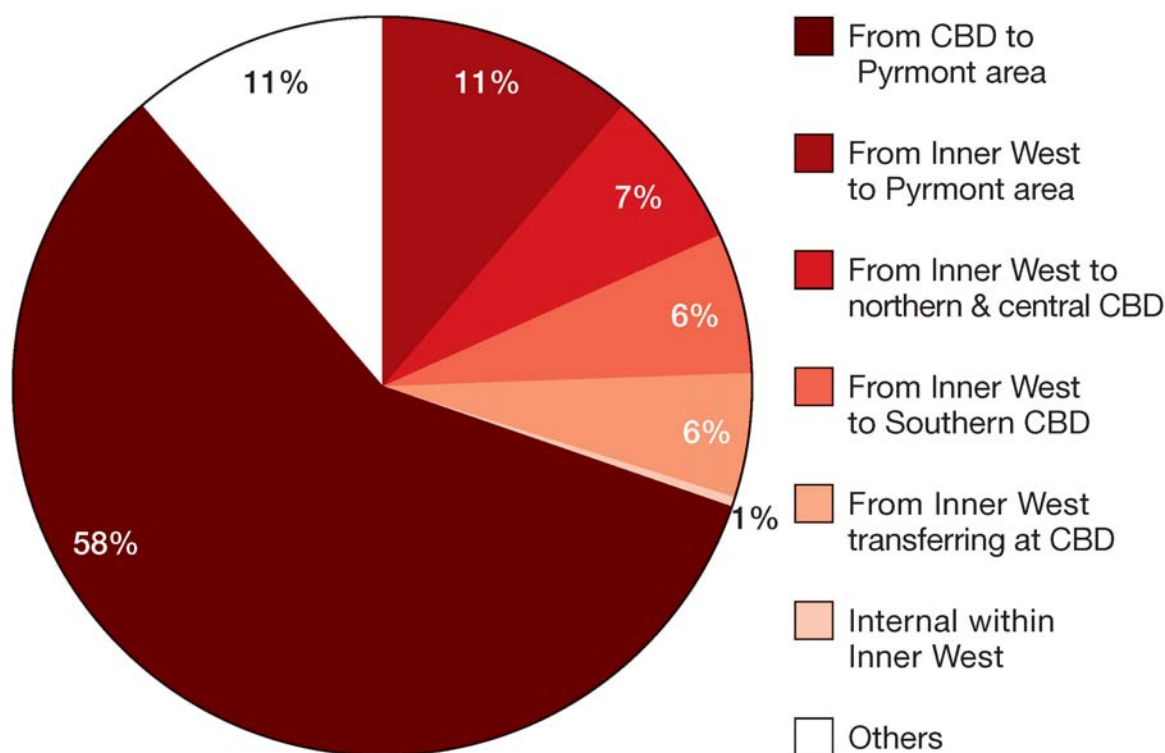
Therefore in terms of origins and destinations, the key customer markets of the existing light rail system are:

- Travel from Sydney CBD (Central) to Pyrmont (Convention – Wentworth Park) – accounting for approximately 58 percent of daily trips
- Travel from the Inner West (Lilyfield – Glebe) to Pyrmont and Sydney CBD – accounting for approximately 30 percent of daily trips

The existing market for travel from the Inner West can be further segmented by destinations as follows:

- Travel to the Pyrmont area (Wentworth Park – Convention)
- Travel to northern and central CBD (via Pyrmont Bridge and Darling Harbour)
- Travel to southern CBD (Exhibition – Central)
- Transfer to bus and rail at Capitol Square (George St) and Central Station
- Internal trips within the Inner West section (Lilyfield – Glebe)

Approximate proportions are illustrated in the Figure 5.1.

Figure 5.1 Existing light rail customer travel markets

The extension of the light rail system to Dulwich Hill will not affect the first component of the existing market (travel from Sydney CBD to Pyrmont). However, the extension is expected to increase the market for travel from the Inner West and provide opportunities for new internal trips within the Inner West section.

Based on the existing light rail travel markets, it could be expected that the major customer markets for the Inner West extension would include:

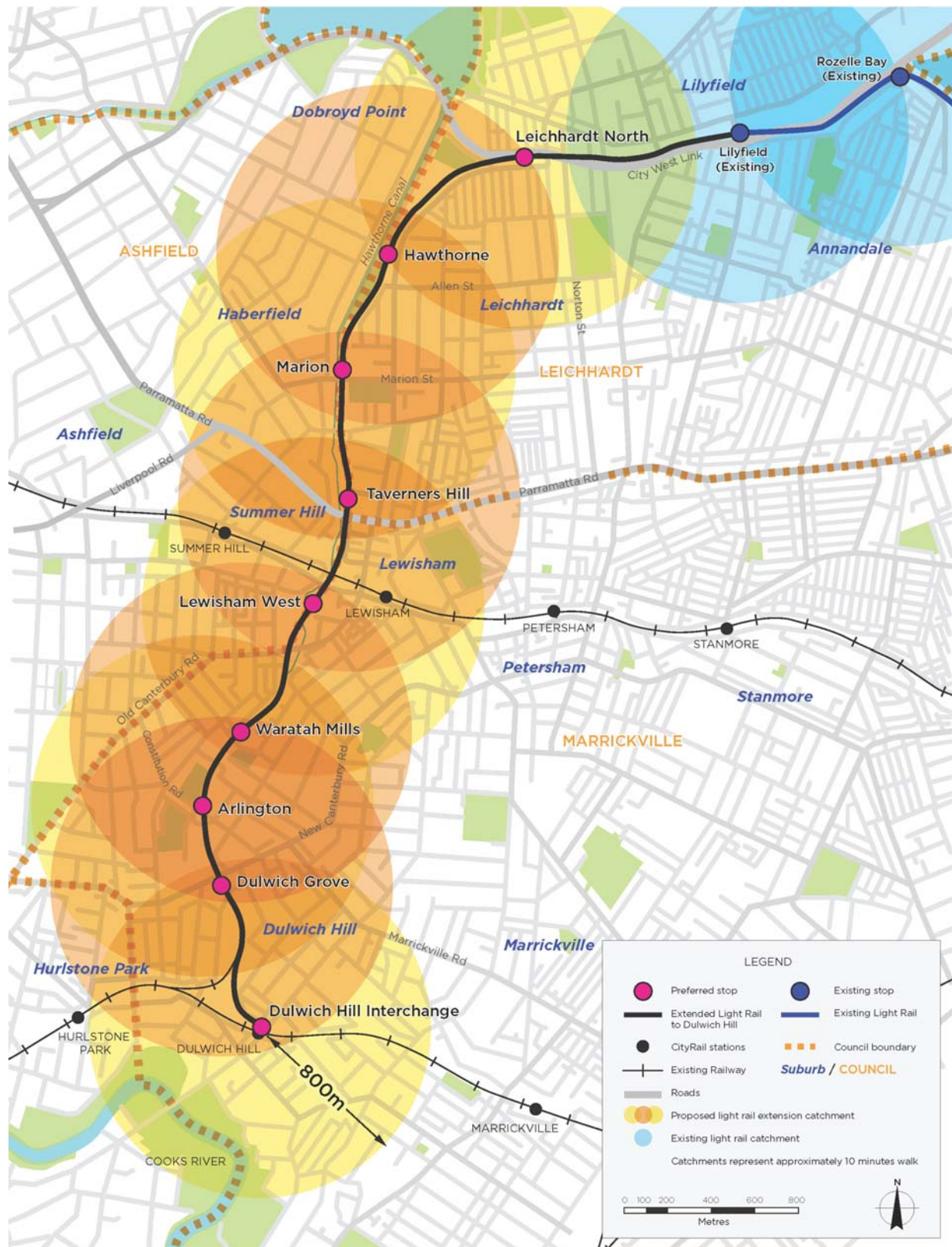
- Travel from the Inner West to Pyrmont and Sydney CBD - building on the existing market for employment, shopping, leisure and tertiary education trips
- Travel within the Inner West corridor (Dulwich Hill Interchange – Lilyfield) - building on existing market for shopping, leisure and primary / secondary education trips
- New connections to the CityRail network at Lewisham and Dulwich Hill railway stations - building on existing market for all trip purposes.

Stop catchments

The potential passenger walk-up catchments for each stop, based upon 800m radius catchments (or approximately ten minute walk) are shown in figure 5.2. It should be noted that actual walk distances are dependent upon the pedestrian network configuration. Walk-up markets around the new stops are similar in terms of population to those on the existing light rail stops west of Glebe.

Stop catchments are further enhanced through access by bicycle and connections with the existing rail and bus networks.

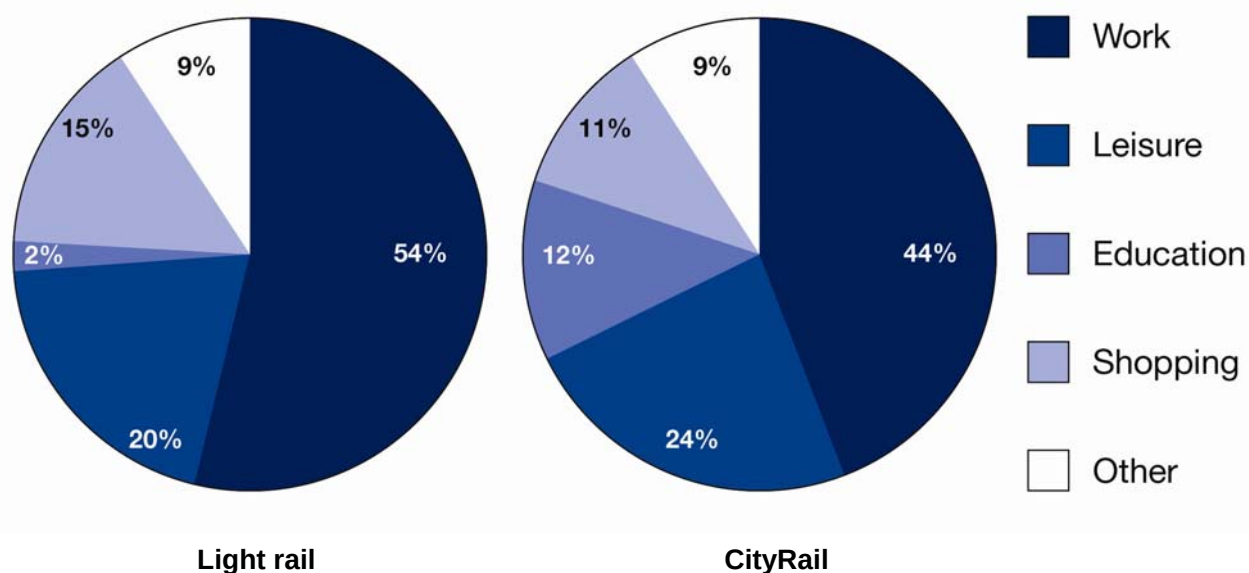
Figure 5.2 SLRE Stage 1 Inner West extension – stop walk catchments



5.1.2 Reasons for travel

The main reason for customers to travel on the existing light rail system between Central Station and Lilyfield is for travel to work (46 per cent), with leisure and shopping trips also making up a large portion of the trips (35 per cent). This is similar to the breakdown of trip purposes of the existing CityRail travel markets, as illustrated in figure 5.3.

Figure 5.3 Existing light rail and CityRail travel markets by trip purpose



Source: MTS (2009) and CityRail (2008)

Based upon the existing reasons for travel on light rail, it would be expected that the major reasons to travel on the Inner West extension would be similar.

5.1.3 Patronage

Preliminary patronage forecast

Preliminary patronage modelling has been undertaken by GHD as part of the Sydney Light Rail Inner West Extension Study to develop indicative patronage estimates to inform the feasibility assessment of the extension.

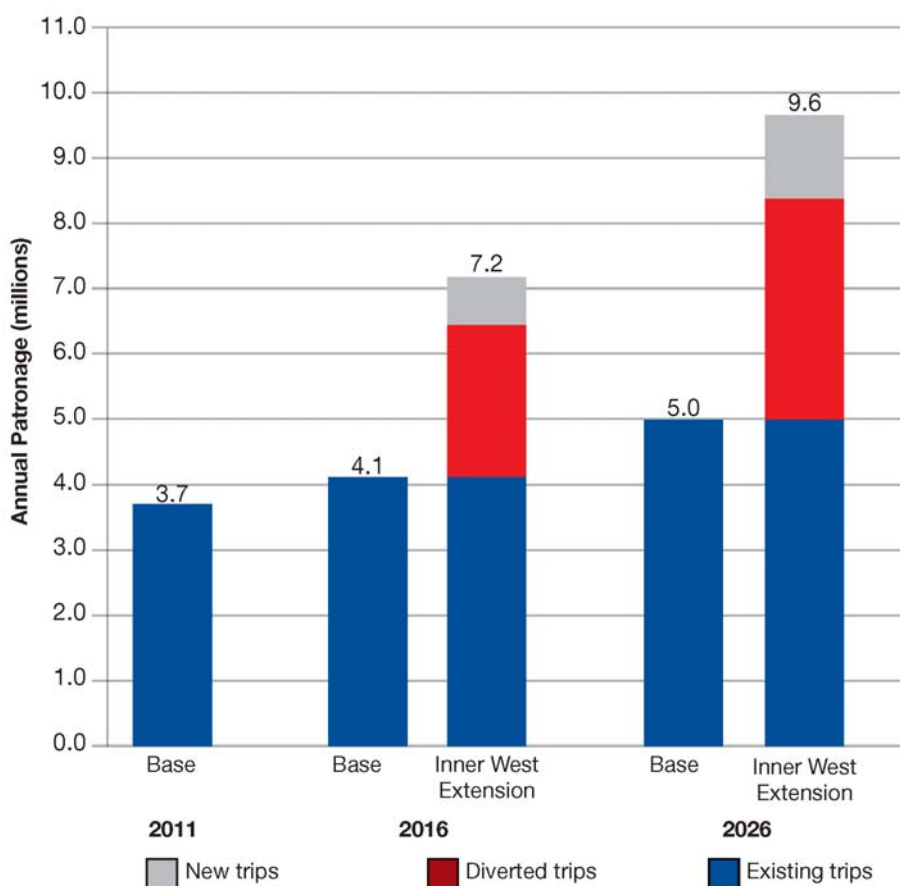
The preliminary forecast are based on outputs from the NSW Government's Strategic Travel Model (STM), along with 2009 light rail patronage data provided by Metro Transport Sydney.

Three scenarios were assessed, for which 2011, 2016 and 2026 forecasts were generated:

- Base – Existing Sydney Light Rail system with no extensions
- Scenario A – Base plus existing trips that would be diverted to light rail with the extension
- Scenario B – Scenario A plus new trips that could be generated by new travel or land use opportunities

The preliminary forecasts generated by GHD are presented in figure 5.4.

Figure 5.4 SLRE Stage 1 - preliminary patronage forecast (annual, million trips)



Source: GHD – Sydney Light Rail Extension Study (2010)

Under Scenario A, the extension is estimated to increase the light rail patronage by approximately 70% by 2026 compared to the base demand without an extension.

The estimates under Scenario A are considered more realistic for the short to medium term, whereas the preliminary forecasts under Scenario B which includes trips associated with new travel and land use opportunities, could be considered a longer term upside forecast.

Sensitivity analysis

GHD performed a number of sensitivity analyses to understand the potential impact of different assumptions regarding the operational characteristics, demand characteristics and enhanced access to Sydney CBD, on the potential patronage for the Lilyfield to Dulwich Hill Interchange extension.

The analysis showed an overall upside potential for the patronage forecast, based on the potential for future increases in car user costs, potential for bus speeds to slow over time with increasing road congestion, local urban renewal within the corridor and further enhancements to the integration of public transport in Sydney.

It could also be expected that patronage would increase with an extension of the existing light rail system into the CBD.

Subsequent analysis

Further work will be undertaken to refine the preliminary forecasts, to inform the environmental assessment process and the negotiation process with the current owner.

5.2 Key benefits & economic analysis to date

5.2.1 Key benefits

The disused freight rail corridor between Lilyfield and Dulwich Hill provides a unique opportunity for light rail to provide a new, high quality public transport link that crosses traditional radial routes from the CBD, integrating with existing heavy rail and bus services. The light rail line would provide a new reliable public transport link between the Bankstown Line (Dulwich Hill Station) and the Inner West Line (Lewisham Station) as well as connecting to Central Station.

The light rail line has the potential to interface with a number of key bus routes at, or close to, Norton Street, Marion Street, Parramatta Road, New Canterbury Road, and to a lesser degree, Old Canterbury Road and Dulwich Hill Station.

By providing a reliable public transport service, the light rail would provide alternative transport choices to travellers, including:

- Inner West suburbs such as Haberfield, Leichhardt, Glebe and Pyrmont will be much more closely and directly connected. For example – taking public transport from Leichhardt to Pyrmont in today's peak requires two buses and over 35 minutes – assuming average traffic. On the light rail the trip will take around 15 minutes direct.
- Residents of the Inner West will find it easier to reach nearby regional centres such as Burwood, Bankstown and the CBD. For example – a current journey from Lilyfield to Burwood involves two buses and takes around 40 minutes. With light rail, a transfer at Lewisham will mean Burwood is reached in less than 30 minutes and more reliably. A journey today from Lilyfield to Bankstown involves bus and rail trips and takes more than 50 minutes travel time. With light rail, a transfer at Dulwich Hill will mean Bankstown is reached in just over 40 minutes with greater reliability.
- A trip from popular recreational destinations such as Norton Street, Pyrmont, Glebe and the Fish Market will be easier to get to from the Inner West. For example – a trip from Dulwich Hill Interchange to the Fish Market will take just over 20 minutes – a saving of around 10 minutes or more compared with a trip today involving a train to Central and then a transfer to light rail.

The project also provides opportunity to reorient land use around a transport mode that has proved attractive to travellers and an effective catalyst for urban renewal in many other situations. This brings the potential to improve local community connections, public transport access and decrease car use.

As the corridor has previously been used as a freight railway, light rail can be introduced at a lower cost and construction impact than may be the case elsewhere in Sydney. Reasons for this include:

- Rail infrastructure is already a feature of the Inner West extension neighbourhoods
- The existing track and ballast can be used with some reconditioning, reducing the construction timeframe and materials consumption
- Reduced materials consumption has associated environmental benefits, including reduced noise, waste, traffic and carbon emissions
- Minimal additional land take as the light rail will operate largely within the existing corridor

5.2.2 Economic analysis

indicative Benefit Cost Analysis (BCA) has been undertaken by GHD as part of the Sydney Light Rail Inner West Extension Study to assess whether the proposed light rail extension would deliver

value for money for society as a whole. The BCA was undertaken in accordance with the approaches outlined by the Australian Transport Council (ATC) and Infrastructure Australia (IA) .

The project economic benefits that were assessed in the BCA were reductions in vehicle kilometres travelled and travel time savings for public transport users. Project costs include investment costs (comprising all fixed capital and project development costs), regular and periodic maintenance, vehicle investment costs and operation costs.

Although an extension to Lewisham West appears to perform better in economic terms than an extension to Dulwich Hill Interchange, GHD concluded that both extension options (to Lewisham West or to Dulwich Hill Interchange) are expected to deliver net economic benefits to the community with Benefit Cost Ratios (BCR) of 1 or more.

GHD has noted that the results of the economic analysis are highly sensitive to the input data on patronage forecasts and project costs.

The underlying assumptions and results of this preliminary economic analysis will be tested as project planning progresses.

6 Project delivery

6.1 Staging and delivery strategy

6.1.1 Staging of Inner West extension

To fully gain the benefit of utilising the existing corridor it is proposed that the extension should run from Lilyfield to Dulwich Hill Interchange and not be terminated at Lewisham West. The advantage of this is that it will provide a full service through the Inner West and more fully meets the overall project objectives.

6.1.2 Delivery strategy

A Project Deed, dated 2 December 1994, and with various subsequent amendments, sets out the contractual arrangements between the owner/operator of the existing light rail system - Sydney Light Rail Company (now Metro Transport Sydney), Pyrmont Light Rail Company (a wholly owned subsidiary of Metro Transport Sydney) - and the Department of Transport, now Transport NSW. The Director General of Transport NSW is the Principal under the Deed.

Both the light rail and monorail are currently operated under contract to Metro Transport Sydney by Veolia Transport Sydney (formerly Connex Group Australia). The parent company, Veolia Transport, is a division of French-based Veolia Environment.

The term of the concession for ownership of the light rail system expires on 10th February 2028, after which time ownership of the system reverts to the NSW Government.

Within the Deed the existing owner has the first right to negotiate terms and conditions for any extension of the light rail.

Recognising these provisions the proposed strategy, subject to achieving a value for money outcome for Government, is to negotiate and reach agreement with the existing owner for them to undertake the design, construction and operation of the Inner West extension.

It is proposed that there will be separate negotiation processes for Inner West extension and CBD extension to take account of the different times, nature and characteristics of the two project stages.

Initial negotiations have commenced with the existing owner for the Inner West extension. Subject to reaching agreement on the commercial and financial principles for the extension, it is envisaged that agreement can be reached by Q4 2010 which would allow construction to commence in early 2011. Allowing a 12 month construction period, this would enable operation of the light rail to commence in the first quarter of 2012.

6.1.3 Project governance

The existing light rail project was delivered as a Privately Financed Project (PFP) and therefore it is proposed that the negotiation process will follow the principles outlined in the Working with Government Guidelines on Privately Financed Projects.

Following the guidelines, it is proposed that a Light Rail Steering Committee be formed with representatives from Transport NSW, Premiers and Cabinet, Treasury and RailCorp to oversee the project.

6.2 Construction strategy

6.2.1 Construction activity

Consistent with a corridor project, construction will occur along the line of the corridor and at its interfaces, including stop locations and access points. Types of construction activity are outlined below:

Early Works – Track Renewal

RailCorp has been engaged to recondition the existing track with replacement of the sleepers and rail and associated ballast replacements and cleaning. This work will commence in August 2010, subject to environmental assessment, and be complete by October 2010.

This early work will allow a meaningful start to be undertaken on the project and assist in completing a major portion of the works in advance of the Stop and Rail Systems construction works.

Stops and Rail Systems

As part of the negotiations with the existing owner, it is envisaged that they will undertake a competitive tender process for the construction of all capital works. These will include stops, bulk power supply and overhead traction power. The current timetable is to issue design and construct tenders in the third quarter of 2010 which would allow contract award in the first quarter of 2011.

Bridge across Parramatta Road

Based on the outcome of risk workshops with the various stakeholders, it is anticipated that the existing bridge over Parramatta Road will be either strengthened, raised or crash protected as required.

GreenWay components

It is anticipated that the timing for GreenWay works would run in parallel with light rail stop and rail system works.

The Preliminary Environment Assessment (PEA) gives further details on possible construction sites, impacts and mitigation measures.

6.3 Project program

The proposed delivery strategy allows for the commencement of construction in early 2011 and the commencement of operations in the first quarter of 2012.

Key milestone dates are given in Table 6.1.

Table 6.1 Project program – key events and milestones

Event or Milestone	Date
Initial discussions with Owner	Underway
Community consultation commencement	Underway and ongoing
Complete Inner West Extension Study for Stage 1 (GHD feasibility study)	Complete
Submission of project application and Preliminary Environment Assessment	Mid 2010
Commencement of early works – track maintenance and renewal	August 2010
Environmental Assessment Exhibition and community consultation	4 th Quarter 2010
Execute Agreement with the Owner for SLRE Stage 1	4 th Quarter 2010
Planning Approval	1 st Quarter 2011
Award of construction contract by Owner	1 st Quarter 2011
Construction commences	1 st Quarter 2011
Construction complete	4 th Quarter 2011
Start operation of SLRE Stage 1	1 st Quarter 2012

6.4 Project costs

Preliminary cost estimation has been undertaken by GHD as part of the Sydney Light Rail Inner West Extension Study to develop indicative capital and operational costs to inform the feasibility assessment of the SLRE Stage 1 Inner West extension.

6.4.1 Capital costs

Capital costs were calculated at a pre-feasibility level based upon a limited design, with inclusion of a 50% contingency to cater for variability. The GHD assessment also excluded any costs associated with the GreenWay, and a number of other exclusions.

The cost of delivering the product scope has been updated from GHD's initial work and is estimated at approximately \$150m for the light rail extension between Lilyfield and Dulwich Hill, including the GreenWay components, with an appropriate level of contingency for the level of design completed.

The costs for the GreenWay reflect the level of engineering required to provide grade separated underpasses of road crossings as well as some short elevated sections at different points along the corridor.

These initial costs will be refined as concept designs are completed.

6.4.2 Operational and maintenance costs

The GHD feasibility study provided estimates of operating costs based upon preliminary service and operational planning assumptions, including a frequency of 5 LRVs per hour and a fleet requirement of 10 LRVs, summarised in Table 6.2:

Table 6.2 Cost estimated (operational)

Extension	Annual operating cost	Opex (per pax km*)	Fleet utilisation
Existing (Central – Lilyfield)	\$5.3 million	\$0.53	7
SLRE Stage 1 (Central – Dulwich Hill Interchange)	\$3.3 million (extra)	\$0.46	10

Source: GHD Study (2010). *Based on 20 passengers average per vehicle.

Operating costs will be further defined by the operator.

GHD also estimated maintenance costs of approximately \$1.5M per year. The additional cost of extra LRVs is assumed to be approximately \$4 million per unit.

7 Ongoing activities

7.1 Planning process

7.1.1 Planning approvals

On 19 March 2010, the Minister for Planning declared that “development for the purposes of the Light Rail Extension, generally between Lilyfield and Dulwich Hill” is of State and regional environmental planning significance, and would be a critical infrastructure project under Section 75C of the *Environment Planning and Assessment Act 1979*.

An order was also gazetted declaring that “priority developments for the delivery of the Metropolitan Transport Plan 2010” are projects to which Part 3A applies. The Sydney Light Rail Extension projects are therefore considered to be a project to which Part 3A applies under Section 75B of the EP&A Act.

Part 3A of the EP&A Act establishes the environmental assessment and approval process for the SLRE Stage 1 Inner West extension project.

Transport NSW, as the project proponent, is planning to submit the Project Application to the Department of Planning, supported by a Preliminary Environmental Assessment for project in mid 2010.

The indicative project approval and environmental assessment process milestones are outlined below:

- | | |
|--|------------------------|
| • Initial community feedback | 2nd Quarter 2010 |
| • Project application (including PEA) | 3rd Quarter 2010 |
| • Director General's requirements | 3rd Quarter 2010 |
| • Prepare detailed environmental assessment | 3rd & 4th Quarter 2010 |
| • Exhibit environmental assessment | 4th Quarter 2010 |
| • Community feedback | 4th Quarter 2010 |
| • Submissions report | 4th Quarter 2010 |
| • Director General's report and Project Approval | 1st Quarter 2011 |

7.1.2 Key environmental issues

As part of the Preliminary Environmental Assessment an environmental risk analysis has been undertaken. The analysis has identified several significant environmental issues in relation to the construction and operation of the project that will need to be addressed, but none are likely to prevent planning approval to be obtained.

The key environmental issues to be addressed in the Environmental Assessment are summarised in Table 7.1.

Table 7.1 Summary of key environmental issues

Key environmental issues	Construction	Operation
Ecology	✓	✓
Visual impacts		✓
Noise and Vibration		✓
Land use and property		✓
Non-Indigenous heritage	✓	
Traffic, transport, parking and access		✓

7.2 Risk management

The Light Rail project team is currently developing a risk management plan based on the principles in Australian Standard AS/NZS ISO 31000: 2009. Its purpose is to ensure risks and opportunities associated with the product and delivery objectives of the project and whole-of-life outcomes have been considered and incorporated.

The Light Rail Project risk management framework will also consider NSW Government guidance in relation to risk management, contained in such documents as the NSW Treasury "Internal Audit and Risk Management Policy for the NSW Public Sector (tpp 09-05 (August 09))" .

The formalised risk management approach will consist of components addressing:

- Technical Safety Design - which provides an assurance to establish an acceptable level of safety for personnel, community, environment and asset from the proposed technical design solution
- Project Risk - which in addition to safety, considers the broader range of risks, and involves not just an initial project risk workshop to identify and manage safety, environmental, commercial, political and implementation issues that may prevent the success of the project, but also the implementation of a risk management plan for the entire project phase, to ensure a "chronic risk unease" is maintained and directed at further identification and management of project risks
- Commercial Risk - involving the development of a risk based contingency as part of the Cost Estimate (TCE) using Monte-Carlo methods, to determine a monetary allowance commensurate with the existence of risk, opportunity and uncertainty associated with a project, and then using this model to assist with monitoring the contingency cost during the project phase.

Preliminary risk identification has commenced within the Project. The current key project risks are:

- Timely procurement of the additional light rail rolling stock and other long-lead items
- Timely provision of the required power at the electrical sub-stations
- An agreement with the existing operator in sufficient relevant detail to allow the timely delivery of the project.

7.3 Ongoing stakeholder consultation

As the project progresses, consultation with key stakeholders and community groups will remain a high priority.

In order to keep the wider public informed and to provide opportunities for feedback and discussion, Transport NSW will use a range of methods, including:

- Website - www.transport.nsw.gov.au
- E-newsletters
- Product Update newsletters
- Community Information Sessions
- 1800 phone line (1800 636 910)
- Email – lightrail@transport.nsw.gov.au

It is anticipated that the Environmental Assessment will be placed on public exhibition towards the end of the year. During the exhibition period, the public will be able to make written submissions to the Director-General, Department of Planning.

All community engagement activities and feedback opportunities will be advertised in local community newspapers, via local Members of Parliament, councils, and the Transport NSW website.

Appendix A Stop Names

A variety of names have been considered for the nine proposed stops for the Inner West extension. The proposed names outlined below aim to:

- Reflect of the iconic nature of the location
- Maximise community ownership
- Be geographically accurate
- Recognise the historic value of the place
- Be more interesting and defining than simply the name of the road

It should be noted that the names are yet to be endorsed by the NSW Geographical Names Board, following consultation with the local council or the government department that administers the area where the stop is located.

Proposed name	Alternative names - previously used or considered	Rationale for choice of proposed name
Leichhardt North	• Norton • Norton Street • Orange Grove • James	• Norton is potentially misleading due to the significant distance from the restaurant/ shopping strip towards the southern end of Norton Street • Leichhardt North provides link to the suburb of Leichhardt without implying a central location as others do • It is also an interchange point for bus access to the commercial centre of Leichhardt
Hawthorne	• Allen • Allen Street	• Allen Street as a name relates to the Leichhardt side only whereas Hawthorne Canal is the boundary between Leichhardt and Haberfield (Ashfield council) and therefore extends the “reach” of the stop to the west consistent with the canal pedestrian bridge proposals • The proposed stop location is no longer opposite Allen Street • Hawthorne Canal is named after John Hawthorne one time MLA for Leichhardt • Transport NSW and its predecessors has a long standing policy to avoid street names for rail stations as narrow and confusing

Proposed name	Alternative names - previously used or considered	Rationale for choice of proposed name
Marion	- Market Town (sic) - Lambert Park - Lambert - West Leichhardt	- Marion Street is a well-known local thoroughfare and important bus (and former tram) route linking Leichhardt and Haberfield - Marion was the name of the second wife of early landowner, James Norton MLC
Taverners Hill	- Parramatta Road - Battle Bridge	- Well known locality name for area immediately to east along Parramatta Road and extending up to Norton Street near the top of the hill - Historical link with the former Miller's Brewery on Parramatta Road (now the orange Millers Storage building) although name actually commemorates a Mr Tave(r)ner owner of an early inn in this locality
Lewisham West	- Lewisham Interchange - Lewisham Lower - Lewisham Mills - Lewisham - Mungo Scott	Retains Lewisham in name but, being at the western edge of the suburb, conveys a more accurate geographic indication of the stop's location
Waratah Mills	- Waratah - Hoskins (Park)	- Link with industrial past: former Great Western Milling Company's Waratah Flour Mill (now redeveloped as apartments) - The name Waratah is already in use as a CityRail station in Newcastle
Arlington	- Constitution Road - Johnson Park - Abergeldie (Estate)	- Named after Arlington Oval to the north, formerly large brick pits which were filled in in 1932 to form the park - Oval was used for womens' athletic events for the British Empire Games in 1938
Dulwich Grove	- Dulwich Hill Shops - Fern Hill - New Canterbury Road	Dulwich Grove was the name of one of the area's two earliest land releases and first use of the name 'Dulwich'
Dulwich Hill Interchange	Dulwich Hill Station	Reinforces stop as key interchange point with CityRail network

Appendix B Stop locations not recommended

In addition to the nine proposed stops for the Inner West extension, a number of potential additional stops or alternative stop locations have been considered. The table below sets out the rationale for not pursuing these locations.

Name	Location	Rationale for not being proposed
Norton 3 (Charles Street)	Adjacent to Darley Road and the City West Link Road, opposite Charles Street	- Identified by Inner West Extension Study (GHD) as potential alternative location to Norton 2 (James Street) - While easier to construct than the preferred option closer to James Street, this option has more limited catchment to the west and north and is further from bus services operating on Norton Street
William Street	Adjacent to Darley Road, opposite William Street	- Identified by Inner West Extension Study (GHD) as potential future station in conjunction with future urban renewal - Adjacent sites to north have limited potential for future development due to being flood prone; catchment is therefore limited - Less than ideal access from western side - Very close (270m) to Hawthorne stop
Marion 1 (South)	South of the overbridge over Marion Street	- Identified by Inner West Extension Study (GHD) as potential alternative location to Marion 2 (North) - The site to the north side of Marion Street overbridge is preferred because of longer term urban renewal opportunities and a possibly slightly lesser impact on existing vegetation

Name	Location	Rationale for not being proposed
Lewisham Interchange 1 (North)	Between the Main Western rail corridor and Longport Street overbridge	- Identified by Inner West Extension Study (GHD) as potential alternative location to Lewisham Interchange 2 - Although at the closest point to the Main Western rail corridor, it is still 330m from the station entrance. - The location below and between the elevated rail corridor and Longport Street road overbridge is considered to have security and surveillance issues for passengers and is physically separated from future development to the south, and have poor access from surrounding areas - The narrowness of Railway Terrace and absence of a footpath on the northern side east of Old Canterbury Road would require a lengthy elevated pedestrian walkway of approximately 200m length to access Lewisham Station platform (note this in itself is undesirable since it bypasses the ticket office)
Old Canterbury Road	On the northern side of Old Canterbury Road	- Identified in Inner West Extension Study (GHD) as potential deferred (future) stop - Relatively limited catchment and poor access from south - Very close (150m) to Lewisham West stop - Interchange with bus route 413 could also occur at Lewisham West stop - By providing access at this location to the GreenWay, direct pedestrian access can be provided to the Lewisham West stop from Old Canterbury Road and the area to the west
Dulwich Hill Interchange 2		- Identified in Inner West Extension Study (GHD) as potential alternative to Dulwich Hill Interchange 1 - This location would require grade separated access across the existing freight lines to Dulwich Hill Station and would not relate well to the surrounding area.

Figure 7.1 SLRE Stage 1 Inner West extension - proposed and considered/alternative stop locations

