



Final Report

Cherrybrook Station Bus & Vehicular Access Review

Transport for NSW

Prepared by:

MRCagney Pty Ltd

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Executive Summary

ES 1 Introduction

MRCagney Pty Ltd has been commissioned by Transport for NSW (TfNSW) to undertake a Bus and Vehicular Access Review for Cherrybrook Station. Cherrybrook Station is a component of the North West Rail Link (NWRL) which is a priority transport infrastructure project of the NSW Government.

The NWRL is proposed to comprise of eight new stations and a 23km rail line. The line will run from Epping in the east to Rouse Hill in north-west Sydney. Upon completion, it will connect with the Epping to Chatswood Rail Link and Sydney's wider metropolitan rail network. The NWRL is expected to be constructed and fully operational by 2019.

The Cherrybrook Station site is located on Castle Hill Road between Franklin Road and Robert Road and is proposed to comprise of the following components:

- 400 commuter "park and ride" car spaces;
- 4 taxi spaces;
- 14 "kiss and ride" spaces;
- 40 bicycle parking spaces; and
- 6 bus layover spaces.

ES 2 Existing Situation

SIDRA analysis has been undertaken using morning and evening peak-hour turning movement data from surveys undertaken on 3 April 2012 at the intersections Castle Hill Road with Robert Road and Franklin Road, and also others undertaken in November 2011 at the intersection of Castle Hill Road, County Drive and Highs Road.

The analysis indicates that the intersections Castle Hill Road with Robert Road and Franklin Road currently operate with a good LOS, while the intersection of Castle Hill Road, County Drive and Highs Road experiences significant delays during periods of peak activity.

Buses currently constitute the predominant public transport mode for north-west Sydney. These services include cross regional services and M2 Express Buses to key employment centres in the Sydney CBD, North Sydney and Macquarie Park. Additionally, there are bus services to regional centres such as Parramatta and Hornsby.

The bus routes currently providing all-day service in Cherrybrook and relevant to the Cherrybrook Station area catchment are as follows:

- Route 621 – Castle Hill, Cherrybrook, Macquarie Park and the Sydney CBD, currently operates along New Line Road to the north of the station site;
- Route 632 – Castle Hill, Cherrybrook and Pennant Hills Station, currently operates on John Road, Neale Avenue and Edward Bennett Drive to the north of the station site;
- Route 642 – Castle Hill, Cherrybrook, Lane Cove and Sydney CBD, currently operates on County Drive, John Road, Neale Avenue and Edward Bennett Drive to the north of the station site; and
- Route M60 – Hornsby, Normanhurst, Thornleigh, Pennant Hills, Cherrybrook, Castle Hill, Baulkham Hills and Parramatta, currently travels along County Drive to the west of the station site.

ES 3 Previous Planning

A number of traffic management works have been proposed in proximity to the Cherrybrook Station to facilitate the access and egress of all modes of travel, these include:

- The development of a two lane access road between Robert Road and Franklin Road that will provide access to park and ride facilities, kiss and ride facilities, bus bays and taxi ranks;

- The widening of the Station Access Road from approximately 7.5m to 14m between Castle Hill Road and Robert Road to provide two travel lanes in each direction;
- The signalisation of the intersection of Robert Road and Castle Hill Road;
- The widening of Franklin Road from approximately 7m to 11m between Kayla Way and Castle Hill Road to provide a short right turn lane into the access road, south of the access road Franklin Road will be provided with two northbound lanes and a single southbound lane;
- The introduction of a left in/left out priority controlled intersection at Franklin Road and Castle Hill Road, including a 60m left turn lane into Franklin Road from Castle Hill Road;
- The introduction of an unsignalised pedestrian crossing across Franklin Road at its intersection with Castle Hill Road;
- The introduction of traffic signals, including pedestrian facilities at the intersection of Glenhope Road and Castle Hill Road; and
- The potential reconfiguration of traffic lanes on Robert Road and Franklin Road to facilitate bus access from John Road to the station.

In addition to the introduction of signalised pedestrian crossings at the intersections of Castle Hill Road / Robert Road, and Castle Hill Road / Glenhope Road, the following improvements to enhance pedestrian and cycling activity to/from Cherrybrook Station are proposed:

- The introduction of resting points (benches) every 60m – 100m within the Cherrybrook Station walking catchment;
- Provision of a pedestrian and cycle path from the northern edge of the station, through to Blue Gum Drive; and
- The introduction of signage to assist pedestrian and cyclist way finding to and from Cherrybrook Station.

The North West Rail Link Corridor Strategy (2013) and the Cherrybrook Station Draft Structure Plan (2013) have been prepared to guide development of the land in proximity to the NWRL over the next 20 – 25 years. The key recommendations and observations the strategies make with respect to Cherrybrook Station are as follows:

- The NWRL provides opportunities to increase residential densities within walking distance to the station involving a variety of different housing types;
- To the north of Castle Hill Road over the long term, the future development of this area will comprise low to medium density residential dwellings, ranging in height from two storey town houses to six storey apartments, with higher density dwellings in closer proximity to the station;
- The areas south of Castle Hill Road within walking distance to the station are appropriate for the development of 3 – 6 storey apartments; and
- Employment opportunities in proximity to Cherrybrook Station will increase marginally and new jobs will primarily be associated with retail facilities expected to be developed at the station.

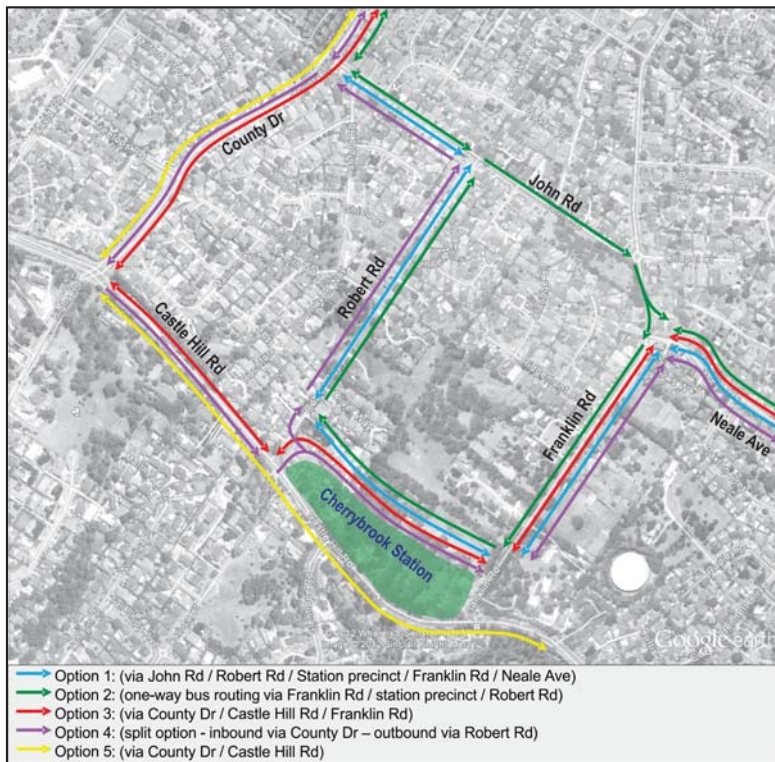
ES 4 Bus Access Options for Assessment

TfNSW have identified five options to alter the existing bus services in Cherrybrook, to provide bus connectivity to Cherrybrook Station, as follows:

- Option 1 involves the diversion of the bus services from John Road to Cherrybrook Station via Robert Road, Franklin Road and the Station Access Road;
- Option 2 involves the one-way circulation of buses on John Road, Franklin Road, the Station Access Road and Robert Road;
- Option 3 involves the diversion of buses from John Road via County Drive, Castle Hill Road, the Station Access Road and Franklin Road;
- Option 4 involves splitting eastbound and westbound bus movements so that they follow different routes; and
- Option 5 involves buses operating on County Drive and Castle Hill Road

Each of the five options is presented in the figure below.

Figure ES1 –Cherrybrook Station Bus Access Options



Source: Google Earth (Base Imagery)

ES 5 Assessment Criteria

TfNSW have identified 10 criteria to assess the bus and vehicular access options that have been developed for Cherrybrook Station, as follows:






- Transport Access Hierarchy – Ensure the Cherrybrook Station Access Plan gives the highest priority to the most efficient and sustainable modes of travel, namely pedestrians and cyclists followed by buses and taxis, kiss and ride and finally park and ride. The bus access options that provide bus zones adjacent to the station entrance(s) have been deemed to support the objectives associated with Transport Access Hierarchy.
- Customer Focus (bus catchment and servicing requirements) – Maximise the size of the passenger catchment provided by planned bus services. The bus access options that facilitate large passenger catchment have been deemed to support the objectives associated with Customer Focus – Bus Catchment and Servicing Requirements.
- Customer Focus (modal interchange) – Ensure the ease of interchange between public transport services provided at the station. The bus access options that provide bus zones adjacent to the station entrance(s) have been deemed to support the objectives associated with Customer Focus – Modal Interchange.
- Customer Focus (bus travel time) – Identify length of bus travel time for each option and minimise delays to passengers, including “through passengers” not using the station. The bus access options that facilitate short travel times have been deemed to support the objectives associated with Customer Focus – Bus Travel Time.
- Customer Focus (service legibility) – Ensure a functional and legible bus route structure. The bus access options that facilitate ease of understanding in their operation by infrequent bus users have been deemed to support the objectives associated with Customer Focus – Service Legibility.
- Loss of Parking – Identify any loss of parking associated with each access option. The bus access options that minimise the potential loss of parking on Robert Road and/or Franklin Road have been deemed to support the objectives associated with Amenity – Loss of Parking.
- Local Traffic – Forecast levels of traffic on the road network in proximity to Cherrybrook Station. The bus access options that avoid local roads have been deemed to support the objectives associated with Local Traffic.

- Safety and Amenity – Provide safe pedestrian and vehicular access to/from the station. The bus access options that provide bus zones within the Cherrybrook Station precinct and do not require pedestrians to cross Castle Hill Road have been deemed to support the objectives associated with Safety and Amenity.
- Environmental and Social Sustainability – Ensure an equitable balance of traffic changes across the local road network. The bus access options that operate predominately on arterial/sub arterial roads, distribute their impact over a wider road network and have shorter travel distances have been deemed to support the objectives associated with Environmental and Social Sustainability.
- Relative Costs – Identify the relative costs associated with the diversion of buses proposed to serve the station from their existing routes. The bus access options with the lowest costs associated with their diversion from the existing bus services have been deemed to support the objectives associated with Relative Costs. Additionally the Relative Cost analysis will account for any road upgrades required to support the bus access options.

ES 6 Assessment of Options

Each of the bus access options has been assessed using a graduated scoring system that indicates to what degree the option meets the objectives of a criteria, as displayed in the table below.

Table ES1 – Graduated Assessment System

Assessed Score	Meaning
	Strongly Support Objectives
	Partially Supports Objectives
	Neutral, or provides a combination of positive and negative outcomes
	Little Support for Objective
	No Support for Objective

A summary of the ranking of each bus access option for each of the assessment criteria is presented below.

Table ES2 – Summary of Assessment Outcomes

Criteria	Option1	Option2	Option3	Option4	Option5
Transport Access Hierarchy					
Customer Focus – Bus Catchment and Servicing Requirement					
Customer Focus – Modal Interchange					
Customer Focus – Bus Travel Time					
Customer Focus – Service Legibility					
Amenity – Loss of Parking					
Local Traffic					
Safety and Amenity					
Environmental and Social Sustainability					
Relative Cost					

ES 7 Community Consultation

TfNSW recently undertook a community consultation process for the proposed Cherrybrook Station. The process included obtaining feedback from local residents with respect to each of the five bus access options proposed for Cherrybrook Station. Residents were able to submit their feedback by e-mail, mail and in person at the NWRL Community Information Centre.

There was no set format for submissions for the community consultation process and interested parties were able to submit their comments via e-mail, post or in person at the NWRL Community Information centre. The community consultation process was ongoing during October 2013 during which period 76 comments were received.

Overall, the two most supported options were Options 1 and 3.

ES 8 Summary of Findings

The review has identified two viable access options for the Cherrybrook Station (Options 1 and 3) and has found that from a customer point of view, Option 1 performs better.

1 Introduction

1.1 Overview

MRCagney Pty Ltd has been commissioned by Transport for NSW (TfNSW) to undertake a Bus and Vehicular Access Study for Cherrybrook Station. Cherrybrook Station is a component of the North West Rail Link (NWRL) which is a priority transport infrastructure project of the NSW Government.

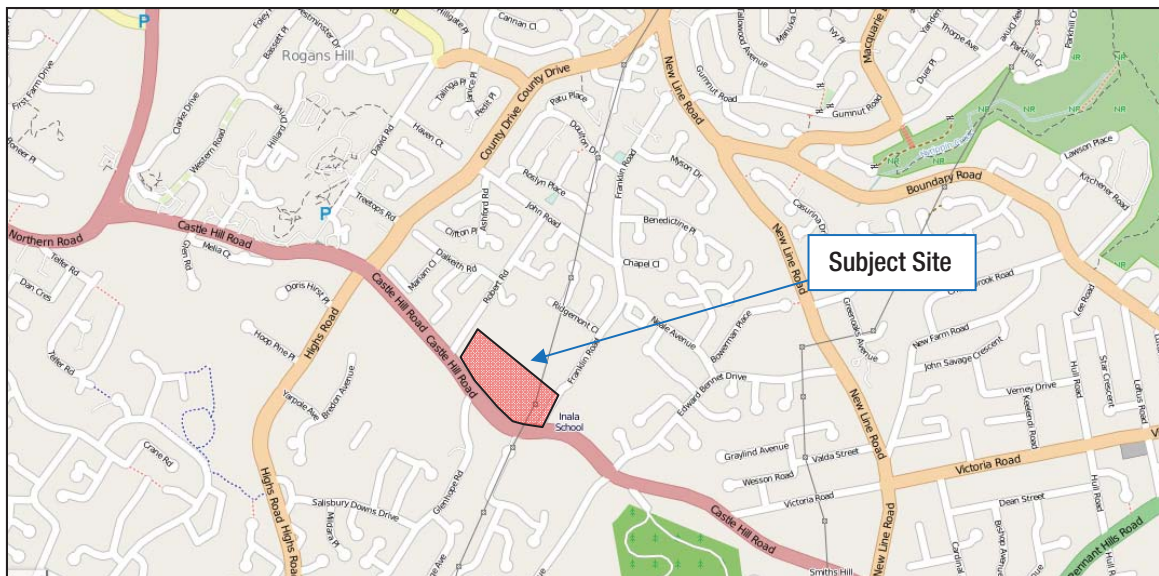
The NWRL is proposed to comprise of eight new stations and a 23km rail line. The line will run from Epping in the east to Rouse Hill in north-west Sydney. Upon completion, it will connect with the Epping to Chatswood Rail Link and Sydney's wider metropolitan rail network. The NWRL is expected to be constructed and fully operational by 2019.

The Cherrybrook Station site is located on Castle Hill Road between Franklin Road and Robert Road and is proposed to comprise of the following components:

- 400 commuter “park and ride” car spaces;
- 4 taxi spaces;
- 14 “kiss and ride” spaces;
- 40 bicycle parking spaces; and
- 6 bus layover spaces.

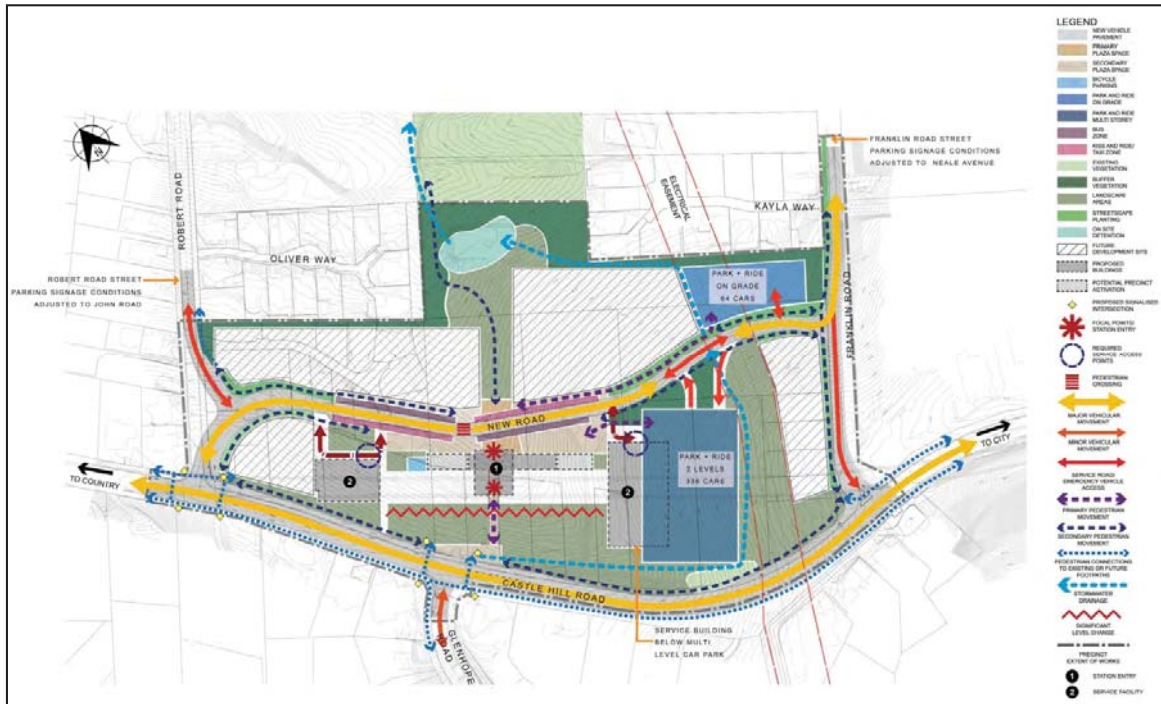
The location of the Cherrybrook Station site is displayed in Figure 1.1 and the preliminary site layout drawings are displayed in Figure 1.2.

Figure 1.1 - Locality Plan



Source: Open Street Map (Base Imagery)

Figure 1.2 - Site Layout Plan



Source: Environmental Impact Statement 2 – Stations, Rail Infrastructure and Systems (2012)

1.2 Project Scope

The scope of this current investigation is to review the bus and vehicular access options for Cherrybrook Station proposed by TfNSW against a set of specific criteria.

The ten criteria proposed for this assessment are as follows:

- Transport Access Hierarchy – Ensure the station precinct plan gives priority to sustainable modes of travel;
- Customer Focus (bus catchment and servicing requirements) – Maximise the size of the passenger catchment provided by planned bus services;
- Customer Focus (modal interchange) – Ensure the ease of interchange between public transport services provided at the station;
- Customer Focus (bus travel time) – Identify length of bus travel time for each option and minimise delays to passengers, including “through passengers” not using the station;
- Customer Focus (service legibility) – Ensure a functional and legible bus route structure;
- Loss of Parking – Identify any loss of parking associated with each access option.
- Local Traffic – Forecast levels of traffic on the road network in proximity to Cherrybrook Station;
- Safety and Amenity – Provide safe pedestrian and vehicular access to/from the station;
- Environmental and Social Sustainability – Ensure an equitable balance of traffic changes across the local road network and an efficient use of resources such as fuel during operation; and
- Relative Costs – Identify the relative costs associated with the diversion of buses proposed to serve the station from their existing routes.

1.3 North West Rail Link

1.3.1 Introduction

The NWRL has been identified as a priority railway infrastructure project by the NSW Government and is designed to be part of an integrated transport network for Greater Sydney.

The NWRL (Figure 1.3) would extend from Epping to Cudgong Road via Cherrybrook linking at Epping into the existing Epping to Chatswood Rail Line.

The NWRL is proposed to include the following components:

- 23km of rapid transit, bi-directional rail network;
- Eight new stations at Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville, Rouse Hill and Cudgong Road;
- A total of 4,000 park and ride spaces;
- Major bus interchange facilities at Rouse Hill and Castle Hill; and
- Bus, taxi, pedestrian, cycling and car access at all stations.

Figure 1.3 - NWRL Alignment



Source: Environmental Impact Statement 2 – Stations, Rail Infrastructure and Systems (2012)

The *Operational Traffic and Transport Management Plan: Technical Paper 2* from the *Environmental Impact Statement 2 – Stations, Rail Infrastructure and Systems (2012)* identifies the NWRL Project Objectives as follows:

- Ensure customer needs are met through the provision of a safe, high quality, integrated and affordable transport service;
- Link existing communities and new growth areas in north west Sydney with jobs and services in the Global Economic Corridor (Macquarie Park, Chatswood, North Sydney, Sydney CBD and Sydney Airport);
- Deliver Stage 3 (Rapid Transit System) of Sydney’s Rail future to improve transport network reliability by facilitating a shift from road to rail trips to and from the north-west and to reduce bus/road congestion and improve amenity in Sydney CBD;
- Deliver a transport service that has been informed by engagement with communities and stakeholders and demonstrates evidence based decision making;
- Support the Government’s challenge to accommodate population growth in the north-west by increasing the potential range of housing and employment opportunities ; and
- Contribute to environmental, social and economic sustainability by improving liveability and minimising the impacts on the environment and the community and delivering value for money.

1.3.2 Station Access

The principles of the NWRL station access hierarchy (Figure 1.4) gives priority to most sustainable forms of travel namely pedestrian and cyclists followed by buses and taxis, kiss and ride and finally park and ride.

Figure 1.4 - NWRL Station Access Hierarchy



Source: Environmental Impact Statement 2 – Stations, Rail Infrastructure and Systems (2012)

1.3.2.1 Pedestrians

A key design principle of the NWRL is that adjoining residential communities are provided good pedestrian access to stations via the provision of footpaths and pedestrian crossings, including the following components:

- Accessibility to/from major trip attractors;
- Adequate lighting;
- Passive surveillance; and
- At grade pedestrian facilities.

1.3.2.2 Buses and Taxis

Buses will have a critical role in supporting the operation of the NWRL as follows:

- Extending the passenger catchment for customers beyond walking distance; and
- Encouraging access to the station by modes other than private vehicle.

A key objective with respect to bus access to NWRL Stations is to ensure bus journeys from the surrounding suburbs are as short and direct as possible.

A key strategy to facilitate efficient and appealing bus facilities at stations is to provide zones that are clearly signposted and are supported by facilities that provide a comfortable environment for bus users including shelter, seating, lighting and timetable information.

Taxis will facilitate access to the station for mobility impaired and appropriate facilities will be provided at stations to ensure the safety and comfort of passengers.

1.3.2.3 Park and Ride

The provision of park and ride facilities at the NWRL Stations will expand their catchment areas and provide an opportunity to reduce private vehicle trips on Sydney's regional road network. However, the provision of park and ride and kiss and ride facilities is likely to result in the redistribution of traffic on the local road networks adjoining the proposed NWRL Stations.

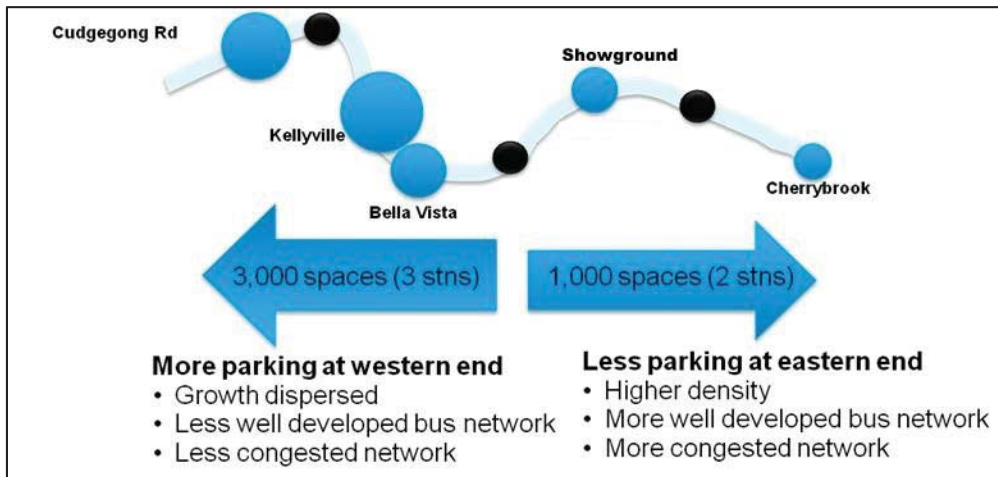
A key strategy with respect to park and ride facilities at NWRL Stations is to ensure that they are designed with suitable walking distances to stations with the provision of adequate lighting to provide safety and security in evening periods.

The provision of park and ride facilities at the stations on the NWRL has been planned based on a strategy that recognises the distinct land use and built form of the eastern portion (Cherrybrook Station to Norwest Station) and western portion (Bella Vista Station to Cudgegong Road Station) of the proposed rail line. The eastern stations are characterised by land use constraints, greater population densities, less capacity on the road network and better developed bus services. To the west, the proposed stations are characterised by less development around the stations and poorer bus services.

Accordingly, the proposed park and ride facilities for the NWRL will be concentrated at the western stations with a total 3,000 park and ride spaces located at Cudgegong Road, Kellyville and Bella Vista Stations, and a total of 1,000 park and ride spaces to the east at Showground and Cherrybrook Stations.

The NWRL park and ride strategy is displayed below in Figure 1.5.

Figure 1.5- NWRL Park and Ride Strategy



Source: North West Rail Link Operational Traffic and Transport Report (2012)

1.3.2.4 Kiss and Ride

Kiss and ride (passenger drop-off and pick-up) has been identified as an important car based mode of travel to access NWRL Stations and to provide an alternative to park and ride vehicle trips.

A key strategy with respect to the NWRL kiss and ride facilities is that they are designed to provide quick turnover with minimum dwell time, supported by signage to discourage extended dwell times.

1.3.3 Rail Servicing Strategy

The NWRL is proposed to initially operate between Cudgegong Road and Chatswood Stations. Passengers will be required to transfer trains at Chatswood Station in order to access the Lower North Shore and the Sydney CBD. Trains will operate with a peak frequency of 12 services per hour per direction, or approximately one every 5 minutes.

No express rail services are proposed and consequently all the stations on the NWRL will experience the same level of service in terms of train frequency and stopping pattern.

1.3.4 NWRL Customers

TfNSW have undertaken investigations with respect to the factors that will affect the potential NWRL customer base, as follows:

- The NWRL catchment area has the highest level of car ownership in Sydney with an average of 2.0 cars per household;
- The NWRL will provide access to a number of employment centres including Rouse Hill and Castle Hill. Home to work trips will comprise an important component of the NWRL market, including residents in proximity to Cherrybrook and Castle Hill;
- The global economic corridor, which consists of Macquarie Park, through the Lower North Shore and CBD will be the main destinations for NWRL customers;

- Use of public transport for journey to work trips in north-west Sydney is currently well below the Sydney average. Following the introduction of the NWRL public transport share in the catchment is expected to increase to rates similar to the locations in Sydney that currently have access to rail lines; and
- At present the level of public transport use in the NWRL catchment is highest in the east in the suburbs of Cherrybrook and West Pennant Hills, this provides an opportunity to encourage non-car access to Cherrybrook Station.

2 Existing Conditions

2.1 Road Network

The critical roads in terms of vehicular and pedestrian access to Cherrybrook Station are described below.

2.1.1 Castle Hill Road

Castle Hill Road is an arterial road that runs along the south-eastern boundary of the proposed Cherrybrook Station site. Castle Hill Road has been constructed as a single carriageway with no median, providing two travel lanes in each direction with short turning lanes at critical intersections. In the vicinity of the station site, it has a carriageway width of (approximately) 12m. Parking is not permitted on Castle Hill Road in the vicinity of the site.

The overall alignment of Castle Hill Road is generally satisfactory with relatively straight alignments offering good forward visibility. However, some sections of Castle Hill Road in proximity to the Cherrybrook Station site are curved, restricting visibility.

In the vicinity of the site, a footpath is provided on the north side of Castle Hill Road and grassed verges on the south in order to facilitate the movement of pedestrians. Signalised pedestrian crossings are provided at the intersections of Castle Hill Road with County Drive (approximately 700m to the west of the site) and Edward Bennett Drive (approximately 400m to the east of the site).

Roads and Maritime Services (RMS) is the authority for any works along this road.

Figure 2.1 - Castle Hill looking east from County Drive



2.1.2 Robert Road

Robert Road is a local road that runs along the north-western boundary of the proposed Cherrybrook Station site. Robert Road has a carriageway width of approximately 7m, has been constructed to a single carriageway standard and provides a single travel lane and parking lane in each direction. However, it is noted that due to the constrained width of Robert Road when two vehicles are parked opposite each other there is insufficient space for vehicles travelling in opposite directions to pass each other. Robert Road provides access to a number of low density residential dwellings.

Robert Road has a designated speed limit of 50km/h, however there is a 20km/h advisory speed sign at a chicane located immediately south of Dalkeith Road. A combination of footpaths and grassed verges are provided on Robert Road to facilitate the movement of pedestrians.

Robert Road intersects Castle Hill Road at a left in/left out priority-controlled intersection.

Hornsby Shire Council is the authority for any works along this road.

Figure 2-2: Robert Road looking south to Castle Hill Road



Figure 2-3: Robert Road looking south from Dalkeith Road



2.1.3 Franklin Road

Franklin Road is a local road that runs along the south-eastern boundary of the proposed Cherrybrook Station site. Franklin Road has been constructed to a single carriageway standard. It has a carriageway width ranging from approximately 9m and provides a travel lane and parking lane in each direction. However, south of Kayla Way it narrows to approximately 6m. Franklin Road provides access to a number of low-density residential dwellings and the Tangara School and Inala School educational facilities.

Franklin Road has a designated speed limit of 50km/h, with 40km/h restricted speed zones adjacent to the schools that operate between 8:00am – 9:30am and 2:30pm – 4:00pm on school days.

Footpaths are typically provided on both sides of Franklin Road, however south of Kayla Way only grassed verges are provided on the west side of Franklin Road to facilitate the movement of pedestrians.

Franklin Road intersects Castle Hill Road at left out only priority-controlled intersection.

The Hornsby Shire Council is the authority for any works along this road.

Figure 2-4: Franklin Road looking south to Castle Hill Road



2.1.4 County Drive

County Drive is a sub-arterial road that connects New Line Road to the north with Castle Hill Road to the south. It has been constructed to a median-divided dual carriageway standard and provides a parking lane and travel lane in each direction with short turning lanes at critical intersections. It includes a median of approximately 3.5m width and an overall carriageway width of approximately 17m.

The overall alignment of County Drive is good with relatively straight alignments offering good forward visibility.

Footpaths are generally provided on both sides of County Drive, though in proximity to Castle Hill Road grassed verges are provided on the west side of County Drive to facilitate the movement of pedestrians. Bus stops are provided on both sides of County Drive, though no formalised pedestrian crossings assists pedestrian access to them across County Drive.

County Drive intersects Castle Hill Road at a full movement signalised intersection.

Hornsby Shire Council is the authority for any works along this road.

Figure 2-5: County Drive looking north from Castle Hill Road



Figure 2-6: County Drive looking south towards Castle Hill Road



2.1.5 John Road

John Road is a local road to the north of the Cherrybrook Station site. John Road has been constructed to a single carriageway standard. It generally has a carriageway width of approximately 10m, providing a travel lane in each direction with sufficient room for kerbside parking without impeding traffic flow. However, to the east of Golden Grove it narrows to approximately 6m, disallowing parking. John Road provides access to a number of low-density residential dwellings

John Road has a designated speed limit of 50km/h. Footpaths and grassed verges are provided on John Road to facilitate the movement of pedestrians. Bus Routes 632 and 642 currently operate on John Road with bus stops located adjacent to the east of Robert Road.

The Hornsby Shire Council is the authority for any works along this road.

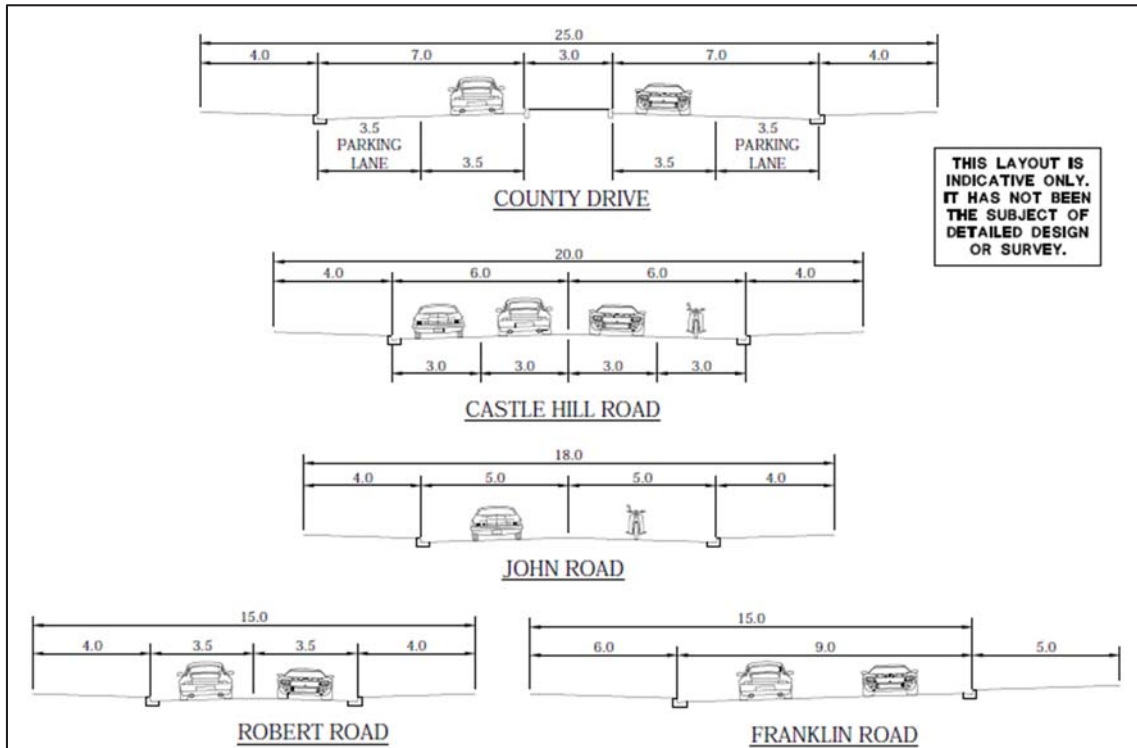
Figure 2-7: John Road looking east towards Franklin Road



2.1.6 Typical Road Cross-Sections

The road cross sections of the roads described above are displayed in Figure 2.8. It is noted that these layouts are indicative only and have not been subject to detailed design or survey.

Table 2.8 – Indicative Cross Sections



2.2 Road Width Assessment

The routing of buses to/from Cherrybrook Station along Robert Road and/or Franklin Road would potentially require the removal of on-street parking on one or both sides of these roads. This would ensure that adequate carriageway width was available in the road corridor for the increased number of vehicles, especially when heavy vehicles such as buses are present.

Robert Road and Franklin Road both consist of an unmarked local street formation, allowing parking on both sides of the road. The remaining space in the centre of the road allows traffic to flow, but vehicles may need to wait for oncoming traffic to pass before proceeding between two parked cars. Robert Road has a carriageway width of approximately 7m and including the footpaths and grassed verges a road reserve width of approximately 15m. Franklin Road has a carriageway width ranging from approximately 7m to 9m. Including footpaths and grassed verges, the road reserve width is approximately 20m.

The NSW Bus Infrastructure Guidelines – Issue 2 indicate that bus lanes should have a minimum width of 3.2m and a desirable lane width of 3.5m. Accordingly, the minimum combined lane widths for bi-directional bus movements on Robert Road and Franklin Road are 6.4m.

The Australian Standard *AS2890.5-1993 Parking Facilities – On Street Parking* specifies that on-street parallel parking bays should have minimum widths of 2.1m and desirable widths of 2.3m. Accordingly, to accommodate two-way bus movements and retain parallel parking on one side of a road a minimum carriageway width of 8.5m and a desirable carriageway width of 9.3m would be required.

At its widest points, Franklin Road's current carriageway width of (approximately) 9m is of sufficient width to accommodate two-way bus movements and potentially provide parking on one side of the road. In its narrower sections of 7m, widening and/or the removal of parking would be necessary. These sections are relatively short.

In order for Robert Road to accommodate two-way bus movements and retain parking on one side of the road, the carriageway would need to be widened by at least 1.5m, from 7.0m to 8.5m. The widening of Robert Road to accommodate bus movements and a single parking lane would reduce the existing space available for verges from 8m (approximately) to 6.5m (approximately).

Assuming 6.5m was equally distributed then there would be a width of approximately 3.25m to accommodate pedestrian activity on either side of Robert Road.

Austrroads Part 6A: Pedestrians and Cyclist Paths indicates that footpaths should have a minimum width of 1.2m. Additionally, a verge width of 2m is considered the minimum width to accommodate trees. It is therefore considered that a combined footpath/verge width of 3.25m could be acceptable. However, additional analysis would be required to ensure that the potential narrowing of the footpath/verge provided sufficient width to accommodate Hornsby Council's utility services.

An alternative to this is to provide indented parking bays on Robert Road whereby the footpath/verge widths would be narrowed at these locations but would be maintained at 4.0m at locations where indented parking would not be provided.

It is noted however that widening the travel lanes, providing a parking lane and realigning the road so that footpaths/verges of approximately the same width were provided on either side of the road would have a significant construction cost.

A cheaper alternative would be to provide parking on one side of Robert Road while maintaining the existing footpaths/verges on the other. However, this would significantly affect the verge width on the one side of the road that was widened.

2.3 Traffic Assessment

2.3.1 Traffic Volumes

The average daily and peak-hour traffic volumes for Castle Hill Road, Franklin Road and Robert as sourced from the RMS data and peak-hour traffic surveys undertaken in November/December 2011 by TfNSW included in the *North West Rail Link Operational Traffic and Transport Report (2012)* are displayed below in Table 2.1.

Table 2.1 - 2011 Traffic Volume Data

Road	Annual Average Daily Traffic (AADT)	Peak Hour Volumes
Castle Hill Road	43,331	Eastbound – AM 1,309 and PM 852 Westbound – AM 855 and PM 1,365
Franklin Road	400 (approx)	Southbound – AM 41 and PM 24
Robert Road	700 (approx)	Northbound – AM 20 and PM 16 Southbound – AM 54 and PM 27

The data in Table 2.1 indicates that Castle Hill Road experiences significant average daily and peak-hour traffic volumes while Robert Road and Franklin Road experience negligible traffic volumes. These volumes are consistent with the functional operation of these roads in accordance with the RMS road classification data, namely Castle Hill Road role as an arterial road and Robert Road and Franklin Road role as local roads.

2.3.2 Intersection Operation

The *Operational Traffic and Transport Management Plan: Technical Paper 2* from the *Environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012)* provides details of the peak-hour operation of some of the intersections in proximity to the Cherrybrook Station site. This analysis was undertaken using SIDRA traffic modelling software.

SIDRA calculates the amount of delay to vehicles using an intersection and gives a level of service rating which indicates the relative performance of the intersection control. Table 2.2 Intersection Level of Service Criteria presents the criteria generally applied to intersection performance. The level of service is defined in terms of delay, which is a measure of frustration, fuel consumption and lost travel time. There are six levels of service measures ranging from A (very low delay and very good operating conditions) to F (over saturation where arrival rates exceed intersection capacity). Typically, a level of service (LOS) D or better is considered to be acceptable.

Table 2.2 - Intersection Level of Service Criteria

Level of Service	Average Delay per Vehicle (sec)	Expected Delay
A	0-14	Little or no delay
B	15-28	Minimal delay
C	29-42	Satisfactory delays with spare capacity
D	43-56	Satisfactory but near capacity
E	57-70	At capacity
F	>70	Extremely delay, unsatisfactory

The SIDRA results included in the *Operational Traffic and Transport Management Plan: Technical Paper 2* from the *environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012)* are presented in Table 2.3.

Table 2.3 - SIDRA Results – NWRL Operational Traffic and Transport Report

Intersection	AM Peak		PM Peak	
	Delay (sec)	LOS	Delay (sec)	LOS
Castle Hill Rd/County Dr/Highs Rd	64	E	63	E

The results in Table 2.3 indicate the intersection of Castle Hill Road, County Drive and Highs Road operates with significant delays during periods of peak activity.

2.4 Bus Operation

Buses currently constitute the predominant public transport mode for north-west Sydney. These services include cross regional services and M2 Express Buses to key employment centres in the Sydney CBD, North Sydney and Macquarie Park. Additionally, there are bus services to regional centres such as Parramatta and Hornsby.

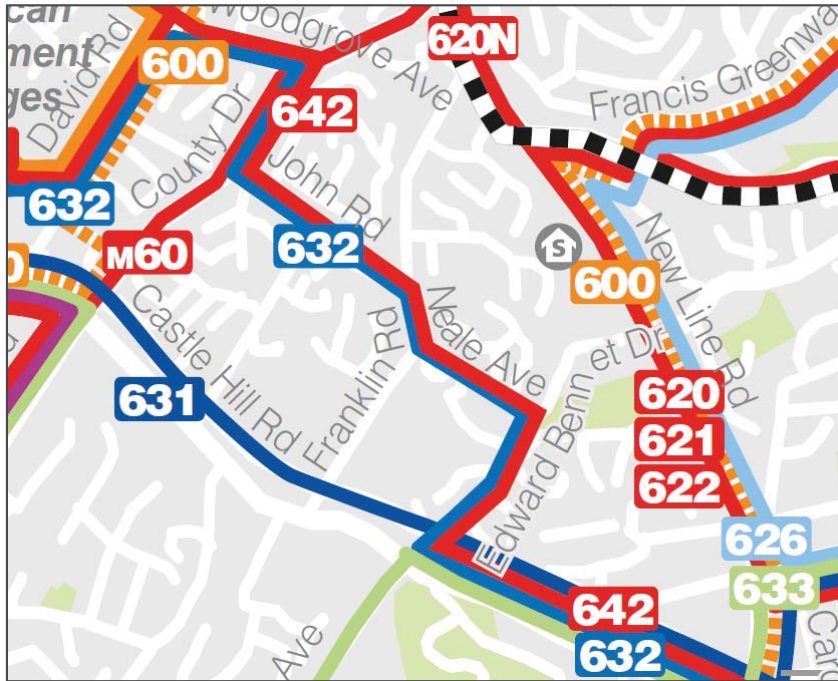
Comfort Delgro Cabcharge (CDC), operating as Hillbus, are the main provider of bus services in the NWRL catchment area. Hillbus currently provides the majority of services in and around the NWRL corridor, covering the suburbs in the vicinity of the Cherrybrook, Castle Hill, Showground, Norwest, Bella Vista, Kellyville and Rouse Hill station sites

The bus routes currently providing all-day service in Cherrybrook and relevant to the Cherrybrook Station area catchment are as follows:

- Route 621 – Castle Hill, Cherrybrook, Macquarie park and the Sydney CBD, currently operates along New Line Road to the north of the station site;
- Route 632 – Castle Hill, Cherrybrook and Pennant Hills Station, currently operates on John Road, Neale Avenue and Edward Bennett Drive to the north of the station site;
- Route 642 – Castle Hill, Cherrybrook, Lane Cove and Sydney CBD, currently operates on County Drive, John Road, Neale Avenue and Edward Bennett Drive to the north of the station site; and
- Route M60 - Hornsby, Normanhurst, Thornleigh, Pennant Hills, Cherrybrook, Castle Hill, Baulkham Hills and Parramatta, currently travels along County Drive to the west of the station site.

None of these services currently pass the station site. Only the AM Peak-only Route 631 passes the site (two journeys per day, eastbound only). The current routes are displayed below in Figure 2.9.

Figure 2.9 – Existing Bus Services in Proximity to Cherrybrook Station



Source: www.cdcbus.com.au (2013)

2.5 Access Arrangements

Castle Hill Road runs in an east/west direction and is the main arterial road and regional route for in proximity the site.

Accesses to the residential subdivisions in proximity to the Cherrybrook Station site are characterised by a large number of cul-de-sacs which do not connect to the adjoining collector and arterial roads.

Signalised intersections are located on Castle Hill Road at County Drive to the west of the station site and Edward Bennett (a collector road) to the east of the station site. It is noted that both these intersections experience significant congestion issues during morning and evening periods of peak activity. Along this 1.2km section of Castle Hill Road the only local roads that provide additional connectivity to Castle Hill Road are Glenhope Road to the south and Robert Road and Franklin Road to the north. It is noted that Glenhope Road operates as a cul-de-sac with extremely limited opportunities for additional local or regional connectivity.

Consequently, there is limited connectivity of the road network in proximity to the Cherrybrook Station site.

2.6 Land Use

The land use in the proximity of the station site predominantly consists of low-density residential dwellings. The Tangara School and Inala School are accessed from Franklin Road, adjacent to the east of the station site.

The IBM Global Financing Offices are located on Coonara Avenue approximately 350m to the south-east of the Cherrybrook Station site.

A small area of Blue Gum Forest, which has been identified as a critically endangered ecological community listed under the *Threatened Species Conservation Act 1995* and *Environmental Protection and Conservation Act (1999)* is located adjacent to the north of the Cherrybrook Station site.

2.7 Pedestrian and Cycling

Currently there is a low level of cycling activity in proximity to the Cherrybrook Station site. The nearby topography is undulating with some steep sections which are not conducive to a pleasant cycling environment. Castle Hill Road carries large volumes of traffic and contains no dedicated on or off street cycling facilities. Accordingly, Castle Hill Road represents a significant barrier to cycling in the Cherrybrook area.

There are no pedestrian crossing facilities on Castle Hill Road between County Drive and Edward Bennett Drive, and Castle Hill Road also acts as a barrier to pedestrian movements in proximity to the Cherrybrook Station site.

A combination of concrete footpaths and grassed verges are provided to facilitate pedestrian movement on County Drive, Robert Road and Franklin Road. It is noted that some of the footpaths are of substandard width and condition.

3 Previous Planning

3.1 Bus Network

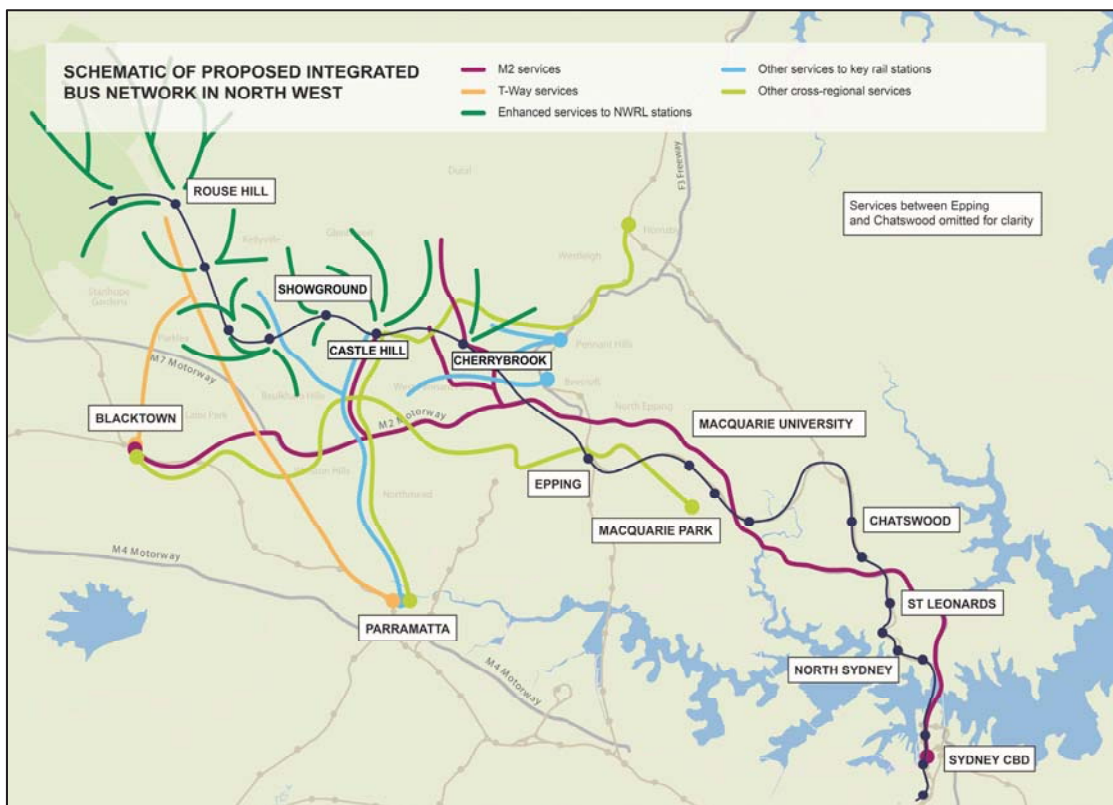
3.1.1 Introduction

It is anticipated that a number of M2 City Express bus services will be progressively reduced when the NWRL opens. These services currently provide the predominant means of public transport between North West Sydney and the Sydney CBD. These buses are planned to be redirected to function as high frequency feeder services to the NWRL Stations. This would reduce the volumes of M2 bus services entering the Sydney CBD, contributing to a reduction in congestion. The North-West T-way services are proposed to be retained.

It is proposed to preserve some of the existing M2 services particularly in the area of Cherrybrook, Dural and West Pennant Hills.

The integrated regional bus network that is proposed to operate in conjunction with the NWRL is displayed in Figure 3.1.

Figure 3.1 - Regional NWRL Integrated Bus Network Operation



Source: North West Rail Link Operational Traffic and Transport Report (2012)

As stated previously, the main bus catchment for Cherrybrook Station is expected to be from the north from Cherrybrook and Dural. Areas to the south of Castle Hill Road are constrained by a poorly connected local road network, featuring a large number of cul-de-sacs which create barriers to vehicle movements.

A separate series of bus services operate in Cherrybrook south of Castle Hill Road that connect to Castle Hill and M2 Busway trips to Macquarie Park, North Sydney and the Sydney CBD. The southern suburbs of Cherrybrook have been identified as part of the “core M2 bus market” and are unlikely to require an extensive feeder service to Cherrybrook Stations as the travel times on the M2 from Cherrybrook are expected to be faster than the corresponding times on the NWRL.

Accordingly, the retained M2 bus services are expected to be utilised preferentially to the NWRL by the residents of Cherrybrook residing to the south of Castle Hill Road. As specified in *The Operational Traffic and Transport Management*

Plan: Technical Paper 2 from the Environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012) the principle bus catchment areas for Cherrybrook Station are expected to be from suburbs to the north and west, such as Cherrybrook, Castle Hill and Dural.

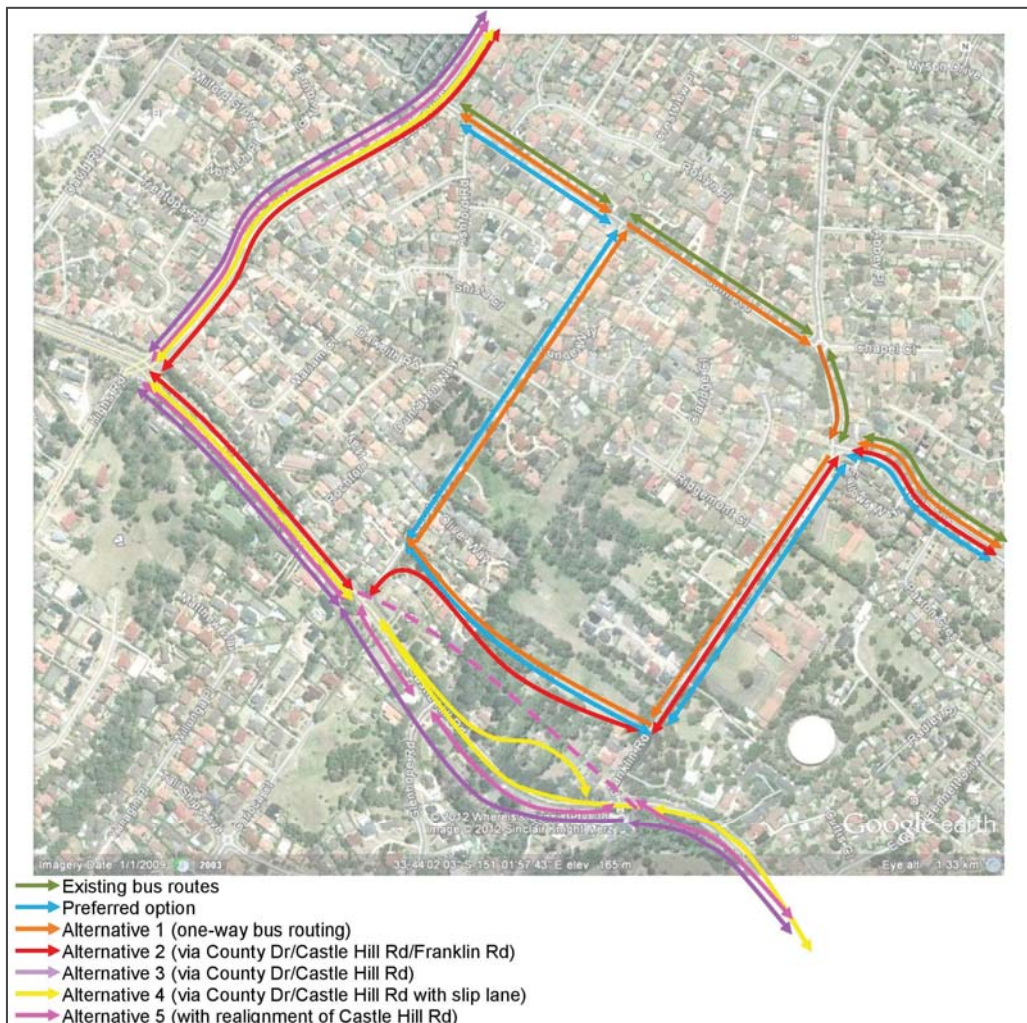
3.1.2 Preliminary Bus Access Options

As stated previously, the bus services 621, 632 and 642 currently operate through Cherrybrook on roads north of the station site, utilising New Line Road or John Road and Neale Avenue. Previous planning proposed that these existing bus routes be redirected to the south in order to provide access to Cherrybrook Station.

It is important to note that these are all-day services that operate throughout the day and will form the core services that local residents will rely upon for access to the station and other destinations. The planning of access to the station needs to be focussed on services of this type. Additional services in the form of short local feeder services could also be provided to offer extra capacity in peak periods.

The Operational Traffic and Transport Management Plan: Technical Paper 2 from the Environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012) previously identified a number of preliminary options to alter the existing bus services in Cherrybrook in order provide bus connectivity to Cherrybrook Station. The previously investigated Cherrybrook Station bus access options are displayed in Figure 3.2.

Figure 3.2 - Preliminary Cherrybrook Station Bus Access Options



Source: NWRL (2012)

A brief description of each of these routes is as follows:

- Preferred Option – This was the preferred identified in the NWRL Environmental Impact Statement 2 and includes the diversion of bus routes from John Road to provide station access via Robert Road and Franklin Road.

- Alternative 1 – Introduction of a one-way loop through the station access road via Robert Road, John Road and Franklin Road;
- Alternative 2 – The diversion of buses from John Road via County Drive, Castle Hill Road into the station access road and onto Franklin Road;
- Alternative 3 – The diversion of buses from John Road onto County Drive and Castle Hill Road, accordingly buses would not operate on John Road, Robert Road or Franklin Road;
- Alternative 4 – The diversion of buses from John Road onto County Drive and Castle Hill Road with the provision of a separate (eastbound only) slip lane off Castle Hill Road; and
- Alternative 5 – Under this alternative Castle Hill Road would be realigned in the vicinity of Cherrybrook Station to run along the northern side of the station access road.

In addition to these alternatives, the *Transport Management Plan* identifies the potential to provide a part time “feeder” bus service to the south of Castle Hill Road, serving the West Pennant Hills Valley via High Road and Castle Hill Road. However, as described above it is expected that much of the potential bus catchment south of Castle Hill Road will continue to use the M2 express bus services in preference to the NWRL to access key employment centres such as Macquarie Park and the Sydney CBD.

3.2 Road Network

A number of traffic management works have been proposed in proximity to the Cherrybrook Station to facilitate the access and egress of all modes of travel, these include:

- The development of a two lane access road between Robert Road and Franklin Road that will provide access to park and ride facilities, kiss and ride facilities, bus bays and taxi ranks;
- The widening of the Station Access Road from approximately 7.5m to 14m between Castle Hill Road and Robert Road to provide two travel lanes in each direction;
- The signalisation of the intersection of Robert Road and Castle Hill Road;
- The widening of Franklin Road from approximately 7m to 11m between Kayla Way and Castle Hill Road to provide a short right turn lane into the access road, south of the access road Franklin Road will be provided with two northbound lanes and a single southbound lane;
- The introduction of a left in/left out priority controlled intersection at Franklin Road and Castle Hill Road, including a 60m left turn lane into Franklin Road from Castle Hill Road;
- The introduction of an unsignalised pedestrian crossing across Franklin Road at its intersection with Castle Hill Road;
- The introduction of traffic signals, including pedestrian facilities at the intersection of Glenhope Road and Castle Hill Road; and
- The potential reconfiguration of traffic lanes on Robert Road and Franklin Road to facilitate bus access from John Road.

3.3 Car Access

Accounting for these schemes the options for cars to access Cherrybrook Station are as follows:

- Castle Hill Road (from the west), left into the Station Access Road;
- Castle Hill Road (from the east), right into the Station Access Road;
- From the north via John Road, into Robert Road and left into the station access road; and
- From the north via John Road, into Franklin Road and right into station access road.

Additionally there will be an option to turn left into Franklin Road from Castle Hill Road and then left into the station access road. However, it is expected that this route will not be highly trafficked and will be predominantly used by vehicles approaching from the south via Glenhope Road.

Car egress from Cherrybrook Station would be as follows:

- To the north via Robert Road or Franklin Road;
- To the south from the Station Access Road, left into Castle Hill Road and right into Glenhope Road;
- To the west from the Station Access Road and right into Castle Hill Road; and

- To the east from the Station Access Road or Franklin Road and left into Castle Hill Road.

While it is possible to restrict bus movements to specific routes, in the absence of additional local traffic management schemes, such as the banning of movements at intersections, cars will access and egress Cherrybrook Station in accordance with their point of origin/destination and their preferred route of travel.

3.4 Land Use

The North West Rail Link Corridor Strategy (2013) and the *Cherrybrook Station Draft Structure Plan (2013)* have been prepared to guide development of the land in proximity to the NWRL over the next 20 – 25 years. The key recommendations/observations the strategies make with respect to Cherrybrook Station are as follows:

- The NWRL provides opportunities to increase residential densities within walking distance to the station involving a variety of different housing types;
- To the north of Castle Hill Road over the long term, the future development of this area will comprise low to medium density residential dwellings, ranging in height from two storey town houses to six storey apartments, with higher density dwellings in closer proximity to the station;
- The areas south of Castle Hill Road within walking distance to the station are appropriate for the development of 3 – 6 storey apartments; and
- Employment opportunities in proximity to Cherrybrook Station will increase marginally and new jobs will primarily be associated with retail facilities expected to be developed at the station.

The residential projections for Cherrybrook Station as identified in the Corridor Strategy are displayed below in Table 3.1.

Table 3.1 – Cherrybrook Station Residential Projections

Dwelling Type	2012		2013	
	Total	%	Total	%
Single Detached	1,100	100%	750	17%
Town House	0	0%	400	10%
3-6 Storey Apartment	0	0%	3,150	73%
Total	1,100	100%	4,300	100%

Reinforcing this vision is the concept of Transit Orientated Developments (TOD). A TOD is a planned precinct, usually incorporating mixed-use residential and commercial areas, focussed on maximising travel mode share by public transport. The design of a TOD is critical to focus the development on the key public transport node(s) that it encompasses, and often incorporates features to encourage transit ridership. A TOD neighbourhood typically has a centre with a transit station or stop (train station, metro station, tram stop, or bus stop), surrounded by relatively high-density development with progressively lower-density development spreading outward from the centre. TODs generally are located within 400m – 800m of transit stop and are designed in a way to encourage sustainable modes of travel for the majority of trips.

It is noted that the land in proximity to the Cherrybrook Station site is classified “R2 Low Density Residential Development” in the *Hornsby Shire Council Local Environmental Plan (2011)*. Accordingly, the development of a TOD in proximity to Cherrybrook Station would require this land to be rezoned.

3.5 Intersection Operation

The Operational Traffic and Transport Management Plan: Technical Paper 2 from the *Environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012)* provides performance indicators for the intersections in proximity to the Cherrybrook Station subject site for the 2021 horizon year. The analysis was undertaken for the AM accounting for 2021 baseline traffic volumes (without NWRL) and the 2021 baseline traffic volumes and the bus and vehicular peak hour trips generated by Cherrybrook Station (with NWRL). The analysis accounts for the proposed upgrades at Robert Road and Franklin Road and the results are presented below in Table 3.2.

Table 3.2 – Cherrybrook Station AM Peak Hour Performance

Intersection	Without NWRL (LOS)	With NWRL (LOS)
Castle Hill Road and County Drive	F	F
Castle Hill Road and Robert Road	A	B
Castle Hill Road and Franklin Road	A	A

Table 3.2 indicates that in the 2021 horizon year, both with and without the NWRL, the intersection of Castle Hill Road and County Drive would operate with a poor LOS and the intersections of Castle Hill Road and Robert Road and Castle Hill Road and Franklin Road would operate with good LOS.

4 Bus Access Options for Assessment

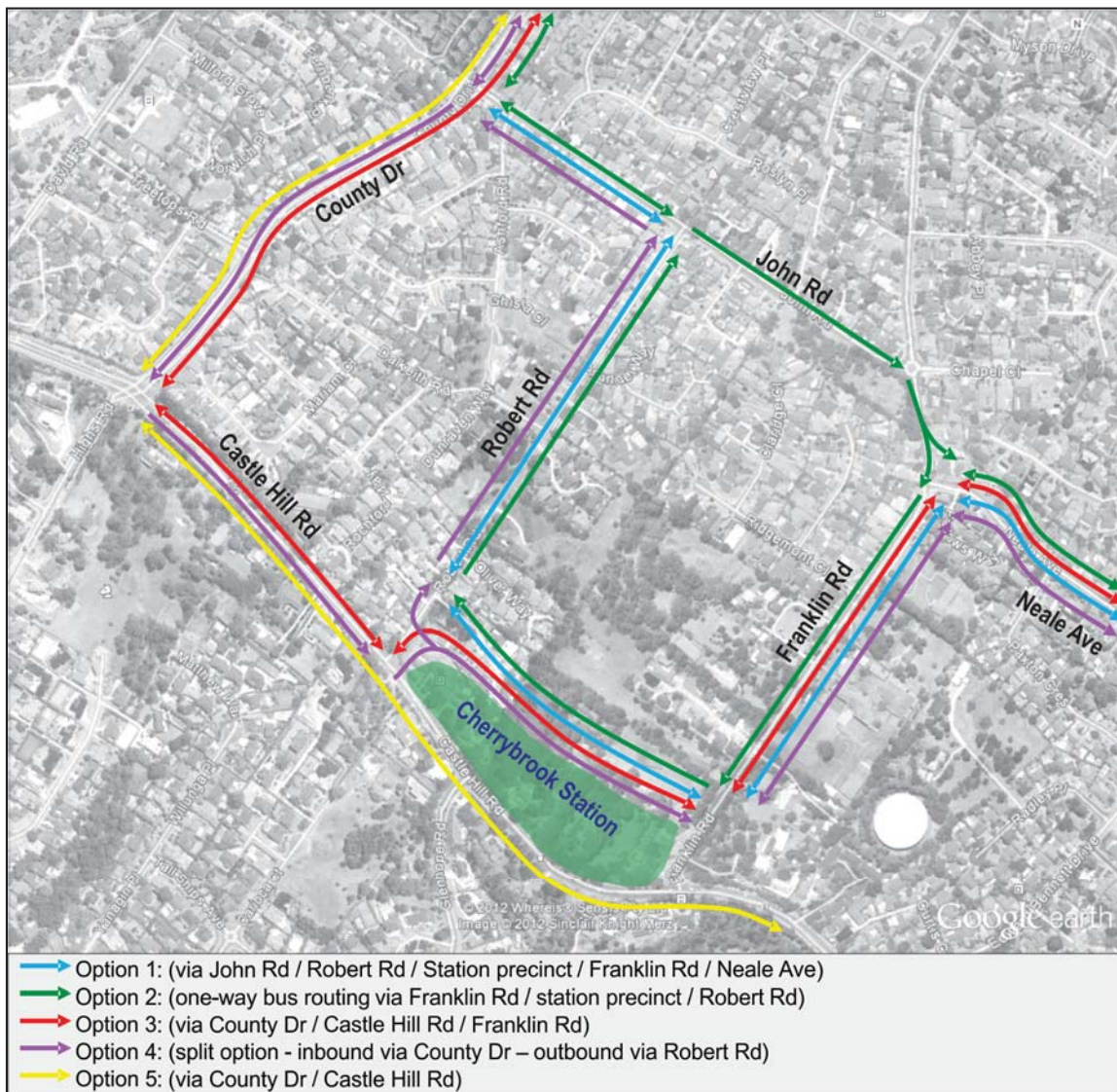
TfNSW have undertaken a review of the Cherrybrook Station bus and vehicular access options identified in the *NWRL Operational Traffic and Transport Report (2012)* and previously presented in Figure 3.2. Based on this review, the following changes have been made to the previous bus access options proposed for Cherrybrook Station:

- The previously proposed option associated with the introduction of a separate eastbound slip lane on Castle Hill Road has been removed;
- The previously proposed option associated with the realignment of Castle Hill Road has been removed; and
- A new option has been introduced that creates separate eastbound and westbound access paths to/from the west of the station.

It is noted that the two options associated with the introduction of a bus slip lane and the realignment of Castle Hill Road have been removed from consideration because they would have involved major changes to the station precinct and rail alignment, which would have contravened the NWRL planning approvals.

Figure 4.1 below presents the five bus access options to be assessed.

Figure 4.1 -Cherrybrook Station Bus Access Options



Source: Google Earth (base imagery)

A brief description of each of these routes, including their key advantages and disadvantages is presented below.

Option 1 involves the diversion of the bus services from John Road to Cherrybrook Station via Robert Road, Franklin Road and the Station Access Road. Key features of Option 1 include the following:

- Buses would run in both directions on Robert Road and Franklin Road as far as John Road and Neale Avenue;
- It would potentially result in the loss of parking on both sides of Robert Road and Franklin Road; and
- Buses would stop inside the station close to the station entrance.

Option 2 involves the one-way circulation of buses on John Road, Franklin Road, the Station Access Road and Robert Road. Key features of Option 2 include the following:

- Buses would travel eastbound along John Road, southbound along Franklin Road, westbound along the Station Access Road and northbound along Robert Road;
- Westbound buses would not traverse John Road between Robert Road and Franklin Road while eastbound buses would be required to traverse this section of road twice;
- The one-way routing of buses means buses would not be required to pass each other;
- Parking along one side of Robert Road and Franklin Road could therefore potentially be retained; and
- Buses would stop inside the station close to the station entrance.

Option 3 involves the diversion of buses from John Road via County Drive, Castle Hill Road, the Station Access Road and Franklin Road. Key features of Option 3 include:

- Buses would not be required to operate on Robert Road and parking on Robert Road could be retained;
- Buses would experience peak hour congestion at the County Drive and Castle Hill Road intersection; and
- Buses would stop inside the station close to the station entrance.

Option 4 involves splitting eastbound and westbound bus movements. Key features of Option 4 include the following:

- Eastbound buses would operate via County Drive, Castle Hill Road and the Station Access Road;
- Westbound buses would operate via Franklin Road, the Station Access Road, Robert Road and John Road;
- Buses would operate in both directions on Franklin Road and a single direction on Robert Road;
- Parking along one side of Robert Road could potentially be retained; and
- Buses would stop inside the station close to the station entrance.

Option 5 involves buses operating on County Drive and Castle Hill Road. Key features of Option 5 include the following:

- Buses would not operate on Robert Road or Franklin Road and parking on these roads could be retained;
- Buses would experience peak hour congestion at the County Drive and Castle Hill Road intersection;
- Bus stops would be located on Castle Hill Road, not within Cherrybrook Station; and
- Passengers arriving and departing by bus would be required to cross Castle Hill Road to access and egress the station.

5 Assessment Criteria

5.1 Required and Desired Outcomes

As discussed previously, TfNSW have identified 10 criteria to assess the bus and vehicular access options that have been developed for Cherrybrook Station, as follows:

- Transport Access Hierarchy – Ensure the station precinct plan gives priority to sustainable modes of travel;
- Customer Focus (bus catchment and servicing requirements) – Maximise the size of the passenger catchment provided by planned bus services;
- Customer Focus (modal interchange) – Ensure the ease of interchange between public transport services provided at the station;
- Customer Focus (bus travel time) – Identify length of bus travel time for each option and minimise delays to passengers, including “through passengers” not using the station;
- Customer Focus (service legibility) – Ensure a functional and legible bus route structure;
- Loss of Parking – Identify any loss of parking associated with each access option;
- Local Traffic – Forecast levels of traffic on the road network in proximity to Cherrybrook Station;
- Safety and Amenity – Provide safe pedestrian and vehicular access to/from the station;
- Environmental and Social Sustainability – Ensure an equitable balance of traffic changes across the local road network; and
- Relative Costs – Identify the relative costs associated with the diversion of buses proposed to serve the station from their existing routes.

The *North West Rail Link – Cherrybrook Station Bus and Vehicular Access Traffic and Transport Service Brief (2013)* identifies suitable measurements for each of the assessment as presented in Table 5.1 below.

Table 5.1 – NWRL Assessment Criteria Measurements

Criteria	Measure
Transport Access Hierarchy	
The access hierarchy aims to ensure that station precinct plans give highest priority to the most efficient and sustainable access modes. Pedestrians and cyclists are the highest priority access modes, followed by buses and taxis, kiss and ride, and lastly park and ride.	Bus and pedestrian/passenger priority over private vehicle access
Customer Focus – bus catchment and servicing requirements	
Size of passengers catchment provided by bus service.	Number of residents within 400m of a bus stop.
Customer Focus – modal interchange	
Positive and efficient interchange experience	Ease of interchanging between public transport services (distance to rail entrance, drop-off / pick-up environment, wayfinding, need to cross roads, exposure to sun/rain/wind, passive surveillance)
Customer Focus – bus travel time	
Travel time delays to passengers (including through passengers not using the station).	Length of bus travel time for each option considering distance, road capacity and constraints at key intersections.
Customer Focus – service legibility	
Easy to understand bus route structure	Consistent bus routeing with services operation the same way at all times of the day and pick up and set down stops close as practicable on opposite sides of the street.
Amenity – loss of parking	
Full or partial loss of parking	Number of parking spaces removed, noting that time-restricted parking is likely to be implemented under any options.

Local Traffic	
Traffic on local streets (Robert Road and Franklin Road)	Forecast traffic levels at peak and off peak times.
Safety and Amenity	
Provides safe pedestrian access to transport services	Avoids crossing of major roads to interchanges between services; or provides convenient access to signalised road crossings.
Safe traffic arrangements at intersections.	Does the route allow for adequate sight lines/turn bays etc?
Environmental and Social Sustainability	
Equitably balances traffic changes across the local road network.	Distribution of potential impacts
Environmental Impacts	Efficient use of resources (e.g., fuel use during operation)
Relative Costs	
Relative costs associated with diversion of bus services from existing routes.	Relative cost per additional kilometre

More details of the assessment criteria that have been utilised to assess each of the proposed bus access options are provided below.

5.1.1 Transport Access Hierarchy

The critical criteria with respect to Transport Access Hierarchy is to ensure that the *Cherrybrook Station Access Plan* gives the highest priority to the most efficient and sustainable modes of travel, namely pedestrians and cyclists followed by buses and taxis, kiss and ride and finally park and ride.

It is considered that the issues associated with access hierarchy primarily relate to the layout of Cherrybrook Station, this would include the following measures:

- The provision of suitable bicycle and pedestrians paths;
- The provision of suitable traffic control measures such as speed humps;
- The provision of suitable lighting levels;
- The provision of pedestrian crossings (both internal and external);
- The provision of bus stops, taxi zones and bicycle parking in proximity to the station entrance;
- The provision of bus shelters at bus stops;
- The introduction of low speed limits on the Cherrybrook Station access road; and
- The minimisation of any impedance or barriers to the efficient movement of cyclists and pedestrians (such as the requirement to cross Castle Hill Road).

The Cherrybrook Station site layout plan (as presented in Figure 1.2) does not provide sufficient detail to address each of these measures but it does indicate the following:

- A pedestrian crossing across the station access road at the station entry;
- Pedestrian paths along both sides of the station access road;
- A pedestrian only access from Castle Hill Road;
- Bus zone, taxi zones and bicycle parking adjacent to the station entry; and
- Plaza space adjacent to bus platforms to provide comfortable waiting areas for bus passengers.

Accordingly, the current Cherrybrook Station site layout plan adheres to the key principles of the NWRL Station Access Hierarchy.

As stated previously, cars will access and egress Cherrybrook Station in accordance with their point of origin/destination and their preferred route of travel. None of the proposed bus access options would affect the permission or restriction of the movement of cars to and from Cherrybrook Station.

However, it is noted that any works on Robert and Franklin Road designed to facilitate bus access/egress to and from Cherrybrook Station, such as the removal of parking, will increase the effective capacity and natural speed environment of these roads. This may increase the attraction for motorists to use these roads to access/egress Cherrybrook Station, instead

of alternative access options such as County Drive / Castle Hill Road. This will be dependent on the motorist's point of origin, their familiarity with the local road network and the level of congestion on other roads at a given time.

While the car and bus movements generated by Cherrybrook Station are independent of each other, they will share the road network and any proposed road upgrades will provide utility to both modes, providing no hierarchical advantage.

With respect to the five Cherrybrook Station bus access options, analysis for transport hierarchy has been undertaken based on whether the proposed bus platforms are located adjacent to the station entrances or whether there is a requirement for passengers to cross Castle Hill Road to access and egress the station. The latter would require pedestrians to give way to vehicles in order to access Cherrybrook Station which would be contrary to the hierarchical principles associated with NWRL Stations.

Looking beyond the immediate station precinct, the key consideration when comparing the options is the impact of each access path on pedestrian and bicycle access. The routing of buses along Franklin Road and Robert Road affects cyclist and pedestrian safety on those roads.

The bus access options that provide bus zones adjacent to the station entrance(s) have been deemed to support the objectives associated with Transport Access Hierarchy.

5.1.2 Customer Focus – Bus Catchment and Servicing Requirements

The bus access options prepared for Cherrybrook Station were developed in accordance with the following operational characteristics/limitations of the area:

- The main (bus) customer catchment for Cherrybrook Station is to the north, primarily from the northern areas of Cherrybrook and additionally from Castle Hill, Round Corner and Dural;
- Much of the potential bus catchment area south of Castle Hill Road is expected to continue to use the M2 express bus services, particularly in the first decade of operation prior to the construction of a new Sydney Harbour rail crossing (which will facilitate faster rail access into the Sydney CBD);
- The existing bus network serving the Cherrybrook area is indirect (hindered by the cul-de-sac street network and other road network access constraints); and
- The north/south vehicle movements in the vicinity of the station site are limited by direct road connections across Castle Hill Road.

When Cherrybrook Station opens, the existing bus services in proximity to the station site are planned to be deviated into the station so that they can provide access to the North West Rail Line train services. However, it should be remembered that they still need to serve their existing local access functions. Whilst some of the city-bound demand for the 642 services will transfer to the NWRL, this is notably less likely for the 632 as the provision of local access is its primary purpose.

The possible routing of buses along Robert Road and Franklin Road provides an opportunity to maximise the local bus catchment by providing new bus stops and services in well-developed urban areas. However, both Robert Road and Franklin Road are local roads and in their current form, are not considered ideal to accommodate large volumes of bus services accessing Cherrybrook Station. In order to allow buses to access Cherrybrook Station via these streets, the removal of parking on one or both sides of Robert Road and Franklin would potentially be required.

An alternative is to utilise County Drive as the main north/south bus route to/from Cherrybrook Station. While this would avoid the use of local roads, the County Drive and Castle Hill Road intersection currently experiences significant peak-hour congestion which additional volumes of buses would exacerbate. Furthermore, this would remove existing services from John Road and thus reduce the local bus service catchment by increasing the walking distance from the established residential precincts to the immediate north of the station site to the bus stops on the routes serving the station and further destinations.

Accordingly, there is a potential conflict between the use of roads that provide the greatest bus catchment for the proposed Cherrybrook Station and the capabilities of these roads to accommodate significant volumes of buses.

The *Operational Traffic and Transport Management Plan: Technical Paper 2* from the *Environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012)* identifies the potential to provide a part time shuttle bus service to the south, serving the area of High Road south of Taylor Street.

In accordance with the NSW Government's *Service Planning Guidelines (2006)*, the primary criteria for assessing bus catchment functionality is the number of residents that are within walking distance of a bus route (measured as 400m in a straight line), though the distance measured from individual bus stops has become the more commonly accepted practice. Where possible, bus stops should be placed at key locations where they can be accessed by pedestrians arriving from more than one direction, such as close to intersections or near intersecting off-road pedestrian paths.

The bus service and catchment requirement criteria have been assessed in accordance with the volumes of residents that are located within 400m walking distance to local bus stops that provide access to all-day services. The bus access options that facilitate large passenger catchment have been deemed to support the objectives associated with Customer Focus – Bus Catchment and Servicing Requirements.

5.1.2.1 Assessment

The comparative benefits of each of the bus access options for Cherrybrook Station have been assessed on the difference in existing population located within the potential patronage catchment of each stop in a defined local area. While this assessment uses historic (albeit recent) population data, it is not anticipated that the rates of population growth between the areas to significantly vary. Any intense population growth within the Cherrybrook area would likely occur in close proximity to the bus/rail stations and therefore would not alter the relative comparison of bus access options.

For the purposes of this study, the difference in the catchment of the bus network is unchanged between any of the options at a distance of more than 800m from the station. At distances this close to the station, it is expected that very few passengers would catch a bus only one or two stops to the station: by the time they walk to their local stop, wait for the bus and then travel to the station, they could have simply walked the distance to the station.

This means that the assessment of the impact of each bus access option on passenger catchment is not related to buses carrying passengers to Cherrybrook Station. Instead, it needs to be acknowledged that the travel needs of the local community are more diverse than this, and thus focus on the assessment needs to be on the impact of changes to bus routes for passengers travelling to destinations *other than the station*. In other words, whether passengers who currently use existing bus services to travel to other destinations, are still able to do so under each access option.

To enable assessment of these catchments, 2011 Census population data at the Mesh Block level was used to determine the number of dwellings and residents located within a 400m linear catchment of bus stops. The use of linear measurement is a standard assessment technique, but carries the inherent flaw of assuming residents can walk in a straight line to the nearest stop. This becomes an issue in areas with poor pedestrian connectivity, which is not a perceived problem in the local area.

A local area for assessment was chosen that included the Mesh Blocks that extended at least 400m from the roads where bus servicing may change under any given option, namely County Drive to the west, Castle Hill Road to the south, Edward Bennett Drive to the east and John Road to the north. This area is highlighted in Figure 5.1.

Figure 5.1 - Census Population Area Assessed for Service Coverage



Source: Open Street Map (Base Imagery)

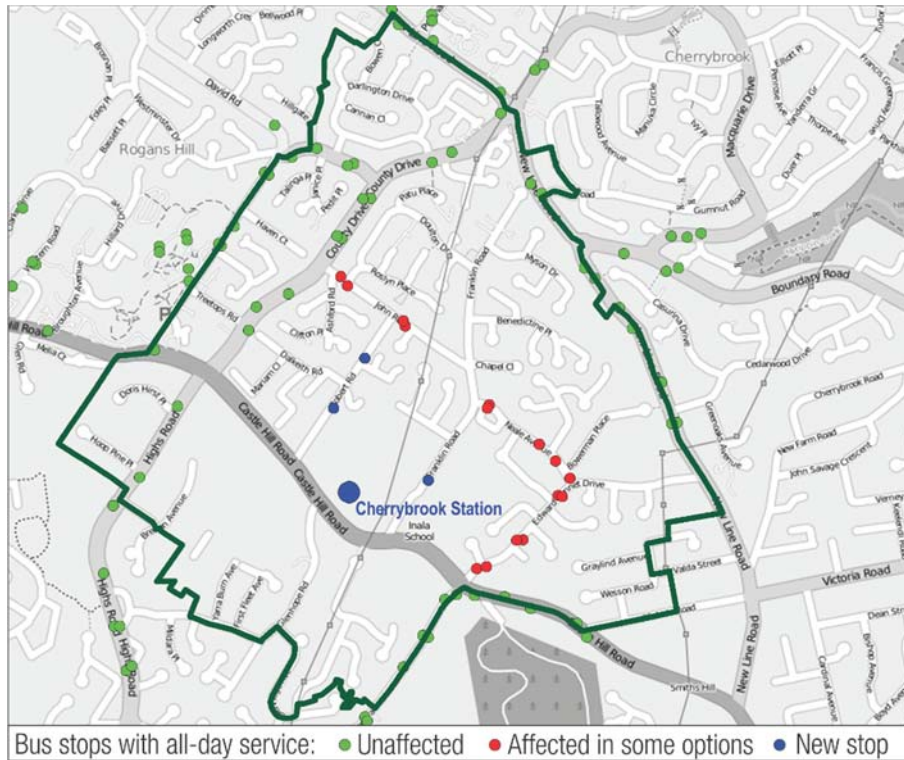
In determining which bus stops to include in the assessment, consideration was given to those that are served by all-day bus routes, namely any route that travels at least hourly in each direction from at least the start of the morning peak period, to the end of the evening peak period. This approach was used for the practical reason that the local area is served by a number of bus routes, including the Metrobus M60 route, and many residents have a variety of bus services from which to choose. Losing access to a rerouted 632 or 642 does not necessarily mean they are losing access to regular bus services. Because of this, options that relocate the existing bus routes from John Road to County Drive did not provide any additional coverage benefit to residents along County Drive (as they are already well served by the M60), but did cause a disbenefit to residents in the John Road catchment.

Within the assessment area, most stops did not experience any change in servicing under each option, or in comparison to the existing situation. The stops along John Road, Neale Avenue and Edward Bennett Drive were the most likely to be affected when the existing routes were relocated, and these are shown in red in Figure 5.2.

New stops, shown in blue, were added in two locations on Robert Road, one location on Franklin Road and at Cherrybrook Station, for consideration in the options that rerouted buses along those two roads. No new stops were positioned on Castle Hill Road due to the nature of traffic flow there and the inherent delays and safety risks such stops would create.

It is noted that there is existing bus stop infrastructure on Castle Hill Road, eastbound, immediately east of County Drive in the form of an indented bay and a bus shelter. This stop is not used for any existing scheduled urban services, and RMS have indicated that they would not support the stopping of buses on Castle Hill Road due to safety reasons. Consequently, this stop has been excluded from the analysis.

Figure 5.2 – Bus Stops within the Assessment Area



Source: Open Street Map (Base Imagery)

A ring of 400m radius was plotted around each bus stop to determine its catchment area. The proportion of population in each Mesh Block that fell within the combined bus stop catchment was then calculated.

In Option 4 (the split route), where only westbound buses can be caught at the stops in Robert Road, a check was made on the catchment using these stops as to what other access options were available. It was found that the stop catchment of the two proposed Robert Road stops were also completely covered by the catchment of other stops. Despite this, it is noted that one-way routing pairs such as this are sub-optimal for passenger access and network legibility.

The overall catchment populations (dwellings and persons) for each option were determined from the aggregated 2011 Census population data, and the results are presented in Table 5.2. The key statistic here is the change in number of persons covered by the stop catchments in comparison to the existing situation.

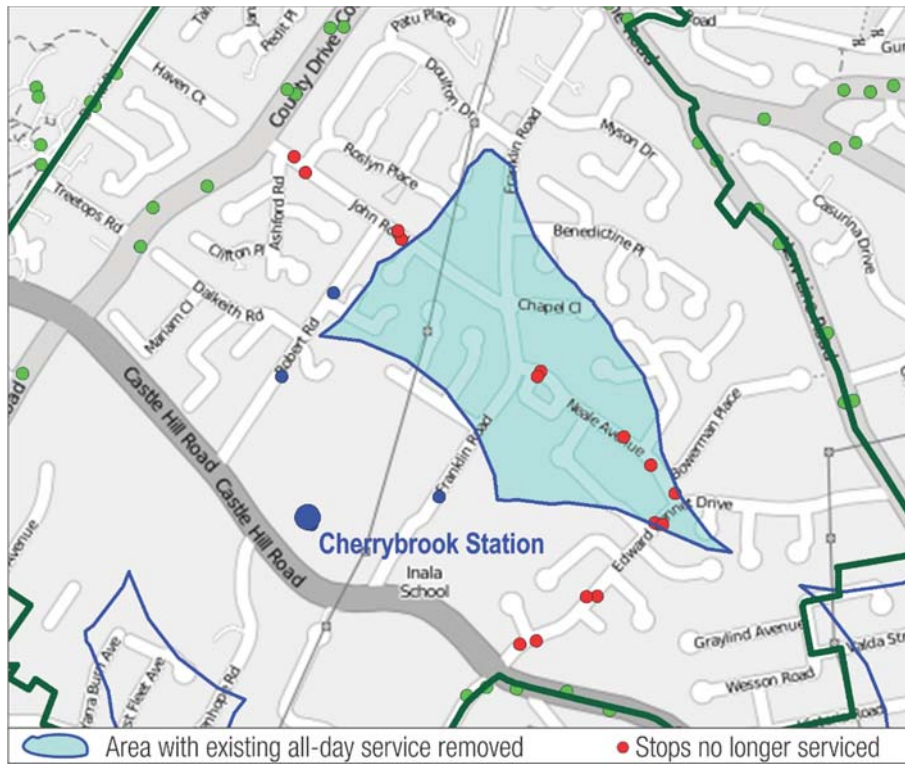
Table 5.2 - Calculated Number of Residents and Dwellings within Bus Stop Catchment

	Dwellings		Population	
Catchment Totals	2,699		8,525	
	Covered	Change on Existing	Covered	Change on Existing
Existing Services	2,542 (94.2%)		8,037 (94.3%)	
Option 1	2,654 (98.3%)	112	8,382 (98.3%)	345
Option 2	2,657 (98.4%)	115	8,394 (98.5%)	357
Option 3	2,651 (98.2%)	109	8,371 (98.2%)	334
Option 4	2,654 (98.3%)	112	8,382 (98.3%)	345
Option 5	2,365 (87.6%)	-177	7,516 (88.2%)	-522

The results show that Options 1, 2, 3 and 4 all yield nearly identical results, increasing the 400m coverage of the bus stops in the local area by around 330 to 360 persons. The results for Options 1, 2 and 3 are considered slightly preferable due to the one-way access path used in Option 4. It is noted that while Option 2 also uses one-way routing, services in either direction can be caught at the same stops.

Option 5 yields a significant reduction in service coverage of 522 persons in comparison to the existing situation. The reduction in coverage is due to the removal of service on John Road, Neale Avenue and Edward Bennett Drive and the coverage gap is highlighted in Figure 5. 3. An additional service could be routed through the area to service these streets, but it would bypass the station and the cost of providing this additional service would be substantial.

Figure 5. 3 - Coverage gap created by Option 5



Source: Open Street Map (Base Imagery)

5.1.3 Customer Focus – Modal Interchange

With respect to interaction between the proposed bus and rail services provided at Cherrybrook Station it is noted that the provision of efficient and effective modal interchanges are a key component of any successful multimodal system. International research into modal interchange and transfers indicate the following key priorities:

- Maximise system wide user benefits including system legibility and temporal connectivity;
- Maximise internal security, reliability and safety;
- Maximise the reliability of transfer and the efficiency of access and egress;
- Minimise waiting times and physical barriers to transfer.

It is noted that the NWRL is proposed to offer a high-frequency service, with trains operating with an average service time of 5 minutes during peak periods and 7-8 minutes during off peak periods. Accordingly, there will be no requirement to synchronise the timetables of connecting bus services with the rail service, as the high frequency of the rail services ensures passengers will only have to wait short periods of time for connecting trains. This will facilitate the overall seamless interaction of the public transport modes in operations at Cherrybrook Station.

Bus platforms at Cherrybrook Station need to be optimally placed in relation to the station entrance to:

- Provide safe and direct access to the station for bus passengers; and
- Minimise the walking distance and interchange times between the rail and bus facilities;
- Simplify wayfinding between the rail and bus facilities;
- Avoid the impedence to the efficient movement of bus passengers created by physical barriers (such as avoiding the requirement to cross Castle Hill Road).

It is noted that based on the current Cherrybrook Station site layout plan it is not possible to assess the proposed level of weather protection that will be provided for passengers interchanging between the bus and rail facilities.

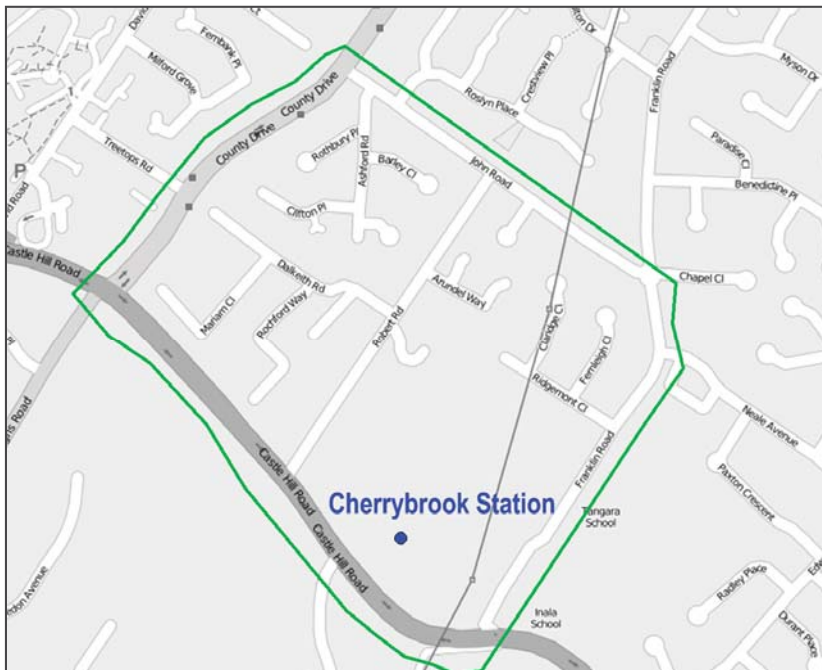
Similar to the transport hierarchy assessment, the modal interchange assessment for the five options has been primarily undertaken with respect to whether the proposed bus platforms are located adjacent to the station entrance(s) or whether there is a requirement for passengers to cross Castle Hill Road to access and egress the station.

The bus access options that provide bus zones adjacent to the station entrance(s) have been deemed to support the objectives associated with Customer Focus – Modal Interchange.

5.1.4 Customer Focus – Bus Travel Time

Bus travel times for each of the bus access options proposed for Cherrybrook Station have been undertaken on the roads in proximity to the station as detailed below in Figure 5.4. Travel times have been assessed based on the time taken for a bus to travel from one side of the cordon highlighted in green, visit the station and then pass through the other side of the cordon.

Figure 5.4 – Bus Travel Time Study Area



Source: Open Street Map (base imagery)

The assessment was undertaken in peak periods to account for worst-case conditions. Further, for Option 3, Option 4 and Option 5 an additional 30 second time penalty was included to account for the delays associated with the proposed signalisation of the intersection of Castle Hill Road and the Station Access Road. Additionally, it has been assumed that the east-west travel time on the station access road is forty five seconds (excluding stop time).

Traffic modelling outputs received from NWRL indicates that the average delay for right turning vehicles from Castle Hill Road into County Drive is three minutes twenty seconds in the AM peak and six minutes in the PM. For the purpose of analysis an average of the two peaks (four minutes forty seconds) has been used in the travel time analysis. Additional peak hour travel time data has been identified using Google Earth to account for bus activity within the area detailed in Figure 5.4.

It is noted that the purpose of this analysis is to identify the relative travel times for each of the bus access options and to rank them accordingly. Therefore, the time associated with the boarding and alighting of passengers and bus idling times have been excluded from the analysis as this is expected to be approximately consistent for each of the five bus access options.

The results of the travel time analysis are presented below in Table 5.3.

Table 5.3 – Bus Travel Time Data

Bus Access Option	Travel Time (m:ss)			Rank
	Eastbound	Westbound	Average	
Option 1	2:30	2:30	2:30	1
Option 2	4:30	2:30	3:30	2
Option 3	4:50	7:55	6:22	5
Option 4	4:50	2:30	3:40	3
Option 5	3:20	6:25	4:52	4

The results of the analysis indicate that the bus access options which travel through the congested intersection of Castle Hill Road and County Drive are expected to have significantly longer travel times than those that operate on the local road network including John Road, Robert Road and Franklin Road.

The bus access options that facilitate short travel times have been deemed to support the objectives associated with Customer Focus – Bus Travel Time.

5.1.5 Customer Focus – Service Legibility

A key function of the diverting existing bus routes to serve Cherrybrook Station is to provide local and regional connectivity to adjoining areas. Accordingly, a critical component of the bus services proposed for Cherrybrook Station is service legibility, namely the ability of infrequent bus users to easily identify how to get to their desired location by bus.

The key criteria for service legibility relate to the consistency and simplicity of bus services. It is considered that “split” routes or routes with inconsistent operation detract from service legibility.

The bus access options that facilitate ease of understanding in their operation by infrequent bus users have been deemed to support the objectives associated with Customer Focus – Service Legibility.

5.1.6 Amenity - Loss of Parking

Given the constrained widths of Robert Road and Franklin Road, their use by buses travelling to/from Cherrybrook Station will require the removal of some or all of the on-street parking on those streets. For bus routes requiring bi-directional contraflows on these roads, then the removal on-street parking on both sides of the roads may be required. The introduction of a “loop service” or “split service” which would operate in a single direction on these roads would negate the requirement for buses to pass each other thereby reducing the potential on street displacement and the parking on one side of these roads could potentially be retained.

Franklin Road's carriageway varies in width from 7m to 9m. In the wider sections, parking could potentially be retained on one side of the street if two-way bus movements were to be required. In the narrower 7m sections, parking would need to be restricted on both sides of the street for two-way bus movement.

The use of County Drive and potentially Edward Bennet Drive as the primary north/south bus access and egress routes to/from Cherrybrook Station would minimise the potential loss of parking associated with the Cherrybrook Station bus services. However, as stated previously, it would also reduce the catchment associated with these bus services.

With respect to the available parking on Robert Road and Franklin Road, analysis indicates that:

- 580m of kerbside parking (approximately) is available on the east side of Robert Road;
- 500m of kerbside parking (approximately) is available on the west side of Robert Road;
- 490m of kerbside parking (approximately) is available on the east side of Franklin Road between Castle Hill Road and John Road; and
- 570m of kerbside parking (approximately) is available on the west side of Franklin Road between Castle Hill Road and John Road.

It is noted that the east side of Franklin Road has an indented area adjacent to Tangara School of approximately 60m length that operates as a bus pick up and drop off zone 8:00am – 9:00am and 2:30pm – 4:00pm on school days. Additionally on the east side of Franklin Road in proximity to the Inala School there is a school pick up and drop off zone and a “No Parking”

area that is in operation between 8:00am – 4:00pm on school days. These areas are included in the kerbside values identified above.

The bus access options that minimise the potential loss of parking on Robert Road and/or Franklin Road have been deemed to best support the objectives associated with Amenity – Loss of Parking.

It is noted that Option 3, Option 4 and Option 5 include County Drive as part of their route. As described previously, County Drive is a sub-arterial road with a carriageway width of approximately 17m and currently accommodates significant bus volumes. Therefore, in accordance with its functional classification and available carriageway width, any potential routing of buses on County Drive is not expected to necessitate the loss of any on-street parking.

5.1.7 Local Traffic

The modelling work previously undertaken in *The Operational Traffic and Transport Management Plan: Technical Paper 2* from the *environmental Impact Statement Stage 2 – Stations, Rail, Infrastructure and Systems (2012)* forecast the future local traffic on Robert Road and Franklin Road. Additionally it provides analysis, which indicates that in the 2021 horizon years the intersections of Castle Hill Road and Robert Road and Castle Hill Road and Franklin Road, will operate with a good LOS, both with and without the bus and vehicular trips generated by Cherrybrook Station.

For those options that route buses along Robert Road and/or Franklin Road, the removal of parking to create an environment suitable for bus access will increase the capacity of the road (the parking acts to calm the street, reducing prevalent speeds and lessening demand to travel on those streets).

As discussed in Section 5.1.1, a possible side-effect of removing parking is an increase in attraction for some motorists to use these roads to access Cherrybrook Station as an alternative to the congested intersection of Castle Hill Road and County Drive. Additionally, it would potentially induce additional traffic to access Castle Hill Road via Robert Road and/or Franklin Road.

Bus volumes serving Cherrybrook Station will consist of an average of 16 buses per hour in the peak direction, 12 buses per hour in the counter peak direction plus 4 buses per hour from West Pennant Hills (*North West Rail Link, Operational Traffic and Transport Report, 16 Oct 2012*).

Passenger Car Equivalent (PCE) is a measure of impact assessment that is used to represent the varying effects of mixed vehicle types by converting traffic streams comprising of a variety of vehicular types into an equivalent traffic stream consisting entirely of passenger cars. A PCE of 3 is typically used for large buses, accordingly during peak periods the bus activity associated with Cherrybrook Station will be the equivalent of up to 50 cars.

Table 2.1 indicates that during peak periods Robert Road and Franklin Road currently experience very low traffic volumes in the order of 16 – 54 vehicles per hour. Accordingly, these roads could accommodate the (approximately) 50 PCEs associated with the Cherrybrook Station connecting buses while operating within the mid-block capacities for urban roads and the environmental capacities for residential streets as specified in the *RTA Guide to Traffic Generating Developments (2002)*.

For assessment, the number of buses per hour on Robert Road and Franklin Road has been used to compare each option, as traffic volumes are likely to be same with the exception of:

- the number of buses; and
- mild increases in traffic accessing the station and Castle Hill Road due to the improved traffic environment created by removing the parking needed to enable safe bus movement.

As described previously, a number of the proposed bus access options utilise County Drive (a sub-arterial road) and Castle Hill Road (an arterial road) as part of their route. The Roads and Maritime Services functional classification criteria identifies sub-arterial and arterial roads as operating with high AADT and carrying through traffic from one region to another.

Accordingly, the bus options that utilise County Drive and Castle Hill Road would be expected to represent a very small proportion of the vehicles that use these roads, to have a marginal impact on local conditions and have been deemed to support the objectives associated with Local Traffic.

Additionally it is noted that John Road currently accommodates bus movements associated with Route 632 and Route 642. As displayed in Figure 4.1 the majority of bus access options (with the exception of Option 2) remove buses from John Road

between Robert Road and Franklin Road. Therefore, in accordance with its current operation and routes associated with the proposed bus access options, the impact of the Cherrybrook Station buses on John Road is expected to be negligible.

5.1.8 Safety and Amenity

Safety and amenity are considered by the most critical criteria with respect to the operation of stations, interchanges and other public transport facilities.

In accordance with the expected volumes of bus and car movements on the station's internal access road the provision of traffic controls measures and pedestrian/cyclist facilities within the Cherrybrook Station precinct will be required to facilitate the safety and amenity of all station users. Key design principles in this respect safety and amenity are as follows:

- Pedestrian paths should be separated from vehicle traffic paths;
- Pedestrian crossings should be located conspicuously ;
- Public transport, walking and cycling routes should connect to the “heart” of the public transport facility;
- Pedestrian and cyclist access to public transport should be direct, as should be the access between different modes of public transport provided at the station; and
- Access roads should be well lit with low speed limits.

The Cherrybrook Station site layout plan does not provide sufficient details to address each of the above issue but it does indicate that pedestrian paths will be provided on the internal access road, a pedestrian only path will be provided from Castle Hill Road and bicycle parking and bus zones will be located adjacent to the station entrance. Accordingly, key principles with respect to safety and amenity have been incorporated into the design of the Cherrybrook Station precinct.

Due to its high peak-hour traffic volumes, Castle Hill Road potentially acts as a barrier to the safe movement of interchange users. With respect to the five bus options, analysis for safety and amenity has been undertaken based on whether the proposed bus zones are located within the Cherrybrook Station precinct or whether there is a requirement for passengers to cross Castle Hill Road to access and egress the station.

It is considered that the existing and proposed pedestrian and cycling facilities within and in proximity to the Cherrybrook Station subject site will provide a safe environment for sustainable modes of travel.

The bus access options that are proposed to utilise County Drive as part of their route would likely require a bus stop on County Drive between John Road and Castle Hill Road to maximise their service catchment. Given the high volume of vehicles on County Drive and the limited pedestrian facilities, to ensure pedestrian safety mid-block crossing points would be required on County Drive for these bus access options.

Additionally a number of bus access options utilise Franklin Road as part of their route. As stated previously the Tangara and Inala Schools are located on Franklin Road. Currently a school zone is in operation on Franklin Road to reduce vehicle speeds during morning and evening periods of school peak activity. However, additional facilities such as the use of crossing supervisors or “Children Crossing” signage may be required for these access options to ensure the safety of students, teachers and parents.

A site line assessment indicates that the majority of roads in proximity to Cherrybrook Station site are straight, offering good forward visibility. It is noted however that Castle Hill Road in proximity to its intersection with Robert Road has curvature that restricts sight lines and therefore would potentially impact the safe operation of bus services utilising it as part of their route.

Where buses would be required to stop on Castle Hill Road (rather than within the Cherrybrook Station precinct) to pick up and drop off passengers, there would be safety concerns associated with the interaction of buses, passengers and large volumes of cars. Indented bus bays would be needed to prevent stopped buses from impeding traffic flow, but indented bays have safety ramifications and based on advice received from RMS are unpopular with bus drivers.

The bus access options that provide bus zones within the Cherrybrook Station precinct and do not require pedestrians to cross Castle Hill Road will therefore be deemed to support the objectives associated with Safety and Amenity.

5.1.9 Environmental and Social Sustainability

Public transport can provide a viable and preferable alternative to travel by car and achieve a more sustainable transport outcome. Key criteria with respect to the provision of environmental/social sustainable transport are as follows:

- Allows the basic access and development needs of individuals, companies and societies to be met safely in a manner consistent with human and ecosystem health;
- Is affordable, operates fairly and efficiently, offers a choice of transport modes and supports a competitive economy; and
- Limits emissions and waste within the environments ability to absorb them.

A key goal of the NWRL is to:

Contribute to environmental and social sustainability by improving liveability and minimising impacts on the environment, stakeholders and the community.

As the NWRL will provide a safe and affordable transport service that will replace significant volumes of car trips and provide access to key employment centres it is considered that it will meet the key goals associated with sustainability.

With respect to social sustainability as it applies to each of the five options, the use of arterial roads/sub arterial road as the primary route of travel for buses servicing Cherrybrook Station would have the lowest impact on local residential amenity and would offer greater social sustainability than buses that utilised local roads as part of their route.

Additionally, in the options where buses are proposed to operate on local roads, an assessment has been undertaken on the distribution of bus services on the local road network to identify if bus services would be socially sustainable in their operation or whether particular roads would be subject to a disproportional impact.

With respect to environmental sustainability, an analysis has been undertaken of the average travel distances of buses for each of the five options, within the study area displayed in Figure 5.4. Bus travel distance relates directly to vehicle emissions (air and noise), and the longer the bus travel path is, the higher the total emissions. The results of the analysis are displayed in Table 5.4.

Table 5.4 – Bus Travel Distance Data (Diversion from Existing Route)

Bus Access Options	Travel Distance (km)			Rank
	Eastbound	Westbound	Total	
Option 1	1.65	1.65	1.65	2
Option 2	2.65	1.65	2.15	5
Option 3	1.85	1.85	1.85	4
Option 4	1.85	1.65	1.75	3
Option 5	1.45	1.45	1.45	1

It is considered that Table 5.4 provides a comparative basis for assessing the some of the environmental impacts associated with each of the five bus options.

Additionally it is further noted that due to the congestion issues at the intersection of Castle Hill Road and County Drive, buses services utilising this intersection would experience stopping and starting at this location, increasing environmental impact associated with the additional consumption of fuel on congested road networks.

Accordingly, the bus access options that operate predominately on arterial/sub arterial roads, distribute their impact over a wider road network and have shorter travel distances have been deemed to support the objectives associated with Environmental and Social Sustainability.

5.1.10 Relative Costs

An analysis has been undertaken to identify the relative cost associated with the diversion of 632 and 642 bus services from their existing routes along John Road in accordance with the travel distances for each of the bus access options identified in Table 5.4. These two routes are the best indicator of relative cost as they are existing local routes whose travel paths are proposed to be deviated from John Road to serve the station. The proposed changes to Route 621 are more significant and don't provide a good point of comparison.

The daily volumes of 632 and 642 currently in operation during weekdays, Saturdays, Sundays and public holidays are presented below in Table 5.5.

Table 5.5 – Current Daily Bus Volumes in Proximity to the Cherrybrook Station Site (2012 data)

	Weekday	Saturday	Sunday	Public Holiday
Inbound / Eastbound				
632	26	13	13	12
642	7	0	0	0
642X	14	0	0	0
Sub-Total	47	13	13	12
Outbound / Westbound				
632	28	13	12	12
642	6	0	0	0
642X	16	0	0	0
Sub-Total	50	13	12	12
TOTAL	97	26	25	24

The data in Table 5.5 indicates that during weekdays that there are nearly 100 (two-way) weekday bus services and on Saturdays, Sundays and Public Holidays there are approximately 25 (two-way) bus services. The corresponding annual volumes of 632 and 642 bus services are presented below in Table 5.6.

Table 5.6 – Current Annual Bus Volumes in Proximity to the Cherrybrook Station Site

	Weekday	Saturday	Sunday	Public Holiday	Total
Days in Year	252	52	52	9	365
Inbound / Eastbound					
632	6,552	676	676	108	8,012
642	1,764	0	0	0	1,764
642X	3,528	0	0	0	3,528
Sub-Total	11,844	676	676	108	13,304
Outbound / Westbound					
632	7,056	676	624	108	8,464
642	1,512	0	0	0	1,512
642X	4,032	0	0	0	4,032
Sub-Total	12,600	676	624	108	14,008
Total	24,444	1352	1300	216	27,312

The data in Table 5.6 indicates that there are approximately 27,000 bus services each calendar year that operate in proximity to the Cherrybrook Station site.

Additional analysis has been undertaken to identify the annual cost associated with the diversion from the existing route for each of the proposed five bus access options. For the purpose of comparative analysis, operational cost is measured in travel distance – the application of a dollar cost per kilometre would yield the same result. As described previously the “diversion” analysis has been assessed using the average travel distances of buses for each of the five options, within the study area displayed in Figure 5.4. The results of the analysis are presented below in Table 5.7.

Table 5.7 – Bus Access Option Diversion Cost

	Services	Diversion (km)	Total (km)
Option 1			
Eastbound	13,304	1.65	21,952
Westbound	14,008	1.65	23,113
Total	27,312		45,065
Option 2			
Eastbound	13,304	2.65	35,256
Westbound	14,008	1.65	23,113
Total	27,312		58,369
Option 3			
Eastbound	13,304	1.85	24,612
Westbound	14,008	1.85	25,915
Total	27,312		50,527
Option 4			
Eastbound	13,304	1.85	24,612
Westbound	14,008	1.65	23,113
Total	27,312		47,726
Option 5			
Eastbound	13,304	1.45	19,291
Westbound	14,008	1.45	20,312
Total	27,312		39,602

The values displayed in Table 5.7 provide an assessment of the order of magnitude of the costs associated with each bus access option, in terms of their diversion from the existing bus routes that currently operate along John Street to the north of the Cherrybrook Station site.






The bus access options with the lowest costs associated with their diversion from the existing bus services have been deemed to support the objectives associated with Relative Costs. Additionally the Relative Cost analysis will account for any road upgrades required to support the bus access options.

6 Assessment of Options

6.1 List of Assessment Criteria and Scoring

Each of the bus access options has been assessed using a graduated scoring system that indicates to what degree the option meets the objectives of a criteria. This is displayed below in Table 6.1.

Table 6.1- Graduated Assessment System

Ass	Meaning
	Strongly Support Objectives
	Partially Supports Objectives
	Neutral, or provides a combination of positive and negative outcomes
	Little Support for Objective
	No Support for Objective

The results of the assessment for each of the proposed Cherrybrook Station bus access options are presented below.

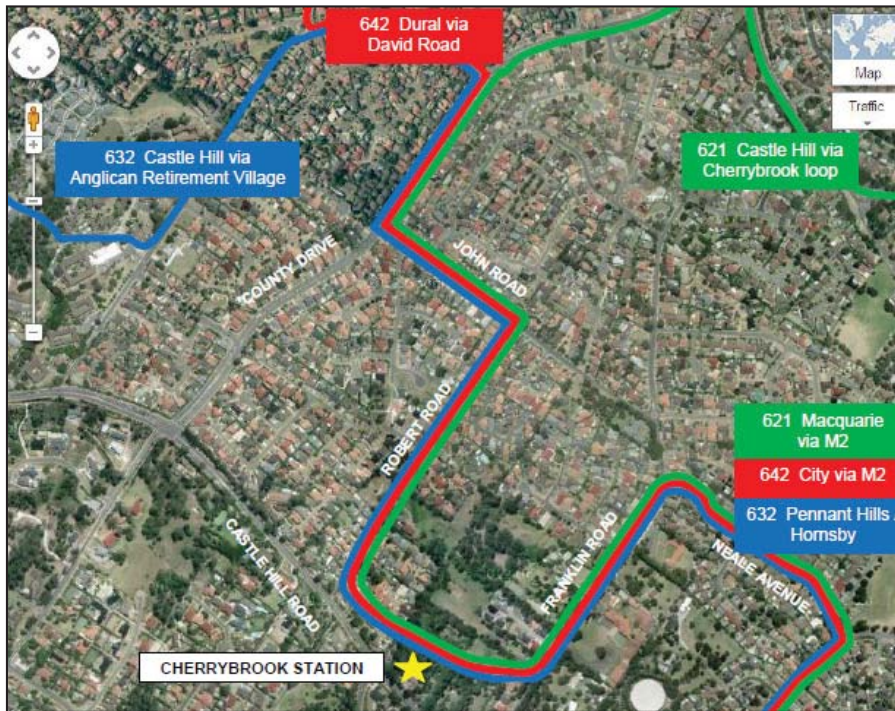
6.2 Option 1 – Station Access via Franklin and Robert Road

Key features of Option 1 are as follows:

- Buses that currently use John Road would divert to Cherrybrook Station via Robert Road and Franklin Road;
- Buses would stop inside the station area close to the station entrance; and
- Buses would run in both directions on Robert Road and Franklin Road as far as John Road and Neale Avenue.

The proposed bus access arrangements associated with Option 1 are displayed below in Figure 6.1.

Figure 6.1- Option 1 Bus Access Strategy



Source: Community Information Access options review Cherrybrook Railway Station (2013)

6.2.1 Transport Access Hierarchy

The proposed bus platforms for Option 1 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance. Additionally, this would provide an environment for passengers that would contribute to the transport hierarchy principles incorporated into the design of the NWRL and its stations.

The two-way operation of buses on Robert Road and Franklin Road is a poor outcome for cyclists leaving no access path from the north to the station where cyclists can travel separate from buses.

6.2.2 Customer Focus – Bus Catchment and Servicing Requirements

Analysis indicates that for Option 1, the catchment of the bus stops in the local area that provide access to all-day bus services would increase by approximately 345 persons. With the exception of Option 5, this result is consistent with the other bus access options.

6.2.3 Customer Focus – Modal Interchange

The proposed bus platforms for Option 1 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance, facilitating a safe and efficient modal interchange between the bus and rail services

6.2.4 Customer Focus – Bus Travel Time

For Option 1, average bus travel times through the Cherrybrook Station site would rank fastest of the five options.

It is noted that due to the 40km/h school zone which operates 8:00am – 9:30am and 2:30pm – 4:00pm on schooldays, that during these periods bus movements on Franklin Road will be slightly slower than usual.

6.2.5 Customer Focus – Service Legibility

The bus services associated with Option 1 is proposed to operate with the same route at all times. Accordingly, the Option 1 bus services would present consistency and simplicity of use for frequent and infrequent bus users alike and offer good service legibility.

6.2.6 Loss of Parking

The implementation of the routes associated with Option 1 would result in bi-directional bus travel on Robert Road and Franklin Road.

It is noted that at its widest points, Franklin Road's current carriageway width is (approximately) 9m. Based on Austroads Guidelines and Australian Standards this is of sufficient width to potentially accommodate two-way bus movements and provide parking on one side of the Franklin Road. In the short, narrow sections where carriageway width is 7m, parking would need to be restricted on both sides of the road.

Therefore, in accordance with the restricted carriageway width of these roads, Option 1 would potentially require the removal of on-street parking on both sides of Robert Road and one side of most of the length of Franklin Road (both sides in the sections of 7m carriageway width).

6.2.7 Local Traffic

The removal of parking from either Robert Road or Franklin Road to facilitate bus movements has the potential to create an environment that appeals to drivers accessing the station, or potentially induce additional traffic through to Castle Hill Road. This is particularly true for drivers who would otherwise access the station via County Drive and Castle Hill Road.

Drivers traveling from the north-east would most likely use Franklin Road to access the station anyway, but may be encouraged to travel via an upgraded Franklin Road in the southerly direction to access Castle Hill Road, rather than use Neale Avenue and Edward Bennett Drive.

Of all the options, Option 1 has the greatest likelihood of inducing additional traffic on both Robert Road and Franklin Road as each needs to be provided at a standard suitable for two-way bus movements, which means the removal of parking on one or both sides of these roads.

6.2.8 Safety and Amenity

The proposed bus platforms for Option 1 are located within the Cherrybrook Station site which would facilitate safe bus passenger movements to and from the bus zones and the station entrance. Additionally this option negates any requirement for bus passengers to cross Castle Hill Road to access the station.

It is noted that Option 1 would require buses to travel along Franklin Road at the frontage of Tangara School. However, the presence of a school zone on Franklin Road will assist in encouraging low vehicle speeds that will facilitate the safety of school children and other school users. However, additional facilities such as the use of crossing supervisors or “Children Crossing” signage may be required for Option 1 to ensure the safety of students, teachers and parents.

6.2.9 Environmental and Social Sustainability

With respect to social sustainability within the Cherrybrook Station site, the bus services associated with Option 1 would be required to traverse local roads which would have a greater impact on local residential amenity than it would if they used arterial roads.

These services would operate on John Road (which currently accommodates bus services) as well as Robert Road and Franklin Road. Accordingly, the impact of the bus services, which during peak times are expected to be in the order of 50 PCEs, would be distributed equitably across the local road network within the Cherrybrook Station site.

With respect to environmental sustainability, the average increase in travel distance for existing bus services for Option 1 the second shortest of the five options.











6.2.10 Relative Costs

The relative cost associated with the diversion of the existing bus routes to service the station under Option 1 is the second lowest of the five options.

6.2.11 Summary

Based on the response to the criteria identified above, the corresponding graduated scoring for Option 1 is displayed in Table 6.2.

Table 6.2 – Option 1 Assessment Summary

Criteria	Score	Comment
Transport Access Hierarchy		The proposed bus platforms for Option 1 are located within Cherrybrook Station which would facilitate bus passengers being picked up and dropped off near the station entrance. Buses operating on both Robert Road and Franklin Road is a poor outcome for cyclists accessing the station via those streets.
Customer Focus – Bus Catchment and Servicing Requirement		For Option 1, the catchment of local bus-stops providing access to all-day service would increase by approximately 345 persons.
Customer Focus – Modal Interchange		The proposed bus platforms for Option 1 are located adjacent to the station entrance which would facilitate efficient interchange between the bus and rail services.
Customer Focus – Bus Travel Time		The average bus travel time within Cherrybrook Station for Option 1 is the fastest of the five options
Customer Focus – Service Legibility		Option 1 is proposed to operate with the same route at all times facilitating good service legibility.
Amenity – Loss of Parking		Option 1 potentially requires loss of parking on both sides of Robert Road and one side of Franklin Road.
Local Traffic		Option 1 would require buses to operate on Robert Road and Franklin Road in both directions, and has the greatest likelihood of encouraging additional local traffic to use both of these streets.
Safety and Amenity		Option 1 would facilitate safe passenger interchange between bus and rail services and would not require passengers to cross Castle Hill Road.
Environmental and Social Sustainability		The traffic impacts associated with Option 1 would be equally distributed onto Robert Road and Franklin Road. The average increase in bus travel distance is the second lowest of the five options.
Relative Cost		The relative cost associated with the diversion of the existing bus routes to those associated with Option 1 are the second lowest of the five options.

6.3 Option 2 - One Way Routing via Robert Road, Station Access Road and Franklin Road

Key features of Option 2 are as follows:

- Diverting buses from John Road via a one-way route using Robert Road, the station access road and Franklin Road;
- Buses would use bus stops inside the station area, close to the station entrance; and
- Buses would run in single direction (northbound) on Robert Road and (southbound) on Franklin Road.

The proposed bus access arrangements associated with Option 2 are displayed below in Figure 6.2.

It is noted that the current Cherrybrook Station site layout plan indicates that bus zone will be located on both sides of the Station Access Road adjacent to the station entry. As Option 2 proposes a one-way route through the station in a westbound direction, the bus zone on the northern side of the Station Access Road would not be required as this has been designed to accommodate eastbound buses. Additionally as the bus zone on the southern side of the Station Access road would be required to accommodate all bus activity, it would need to be expanded from 3 to 6 bus lengths. Accordingly the implementation of Option 2 would have significant implications with respect to the layout and operation of Cherrybrook Station.

Figure 6.2- Option 2 Bus Access Strategy



Source: Community Information Access options review Cherrybrook Railway Station (2013)

6.3.1 Transport Access Hierarchy

The proposed bus platforms for Option 2 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance. Additionally, this would provide an environment for passengers that would contribute to the transport hierarchy principles incorporated into the design of the NWRL and its stations.

The one-way operation of buses on Robert Road and Franklin Road is a poor outcome for cyclists, though is better than Option 1 which has two-way buses on both streets.

6.3.2 Customer Focus – Bus Catchment and Servicing Requirement

Analysis indicates that for Option 2, the catchment of the bus stops in the local area that provide access to all-day bus services would increase by approximately 357 persons. With the exception of Option 5, this result is consistent with the other bus access options.

6.3.3 Customer Focus – Modal Interchange

The proposed bus platforms for Option 2 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance, facilitating a safe and efficient modal interchange between the bus and rail services

6.3.4 Customer Focus – Bus Travel Time

For Option 2, average bus travel times through the Cherrybrook Station site would rank second fastest of the five options.

It is noted that westbound buses would experience a travel time approximately two minutes faster than for eastbound buses which are required to travel in a loop.

It is noted that due to the 40km/h school zone which operates 8:00am – 9:30am and 2:30pm – 4:00pm on schooldays, that during these periods bus movements on Franklin Road will be slightly slower than usual.

6.3.5 Customer Focus – Service Legibility

As stated previously Option 2 is proposed to operate as a one-way loop. Eastbound buses would be required to use sections of John Road between Robert Road and Franklin Road twice and westbound buses would not be required to use this section of John Road. Accordingly, there would be inconsistency in bus operation for Option 2 within the Cherrybrook Station site. Local stops on these streets would have both eastbound and westbound services arriving at the same stop, causing confusion for some passengers.

Accordingly, within the Cherrybrook Station site the service legibility for Option 2 is considered to be poor.

6.3.6 Loss of Parking

The implementation of the routes associated with Option 2 would result in uni-directional bus travel on Robert Road and Franklin Road. In accordance with the restricted carriageway width of these roads, Option 2 would require the removal of on-street parking on one side of Robert Road and one side of Franklin Road.

6.3.7 Local Traffic

The removal of parking from only one side of each of Robert Road and Franklin Road to facilitate bus movements will encourage additional local traffic to use these roads to a lesser degree than in Option 1.

The number of buses per hour on these streets is the same as in Option 1, but they travel in a single direction rather than being split between the two directions.

6.3.8 Safety and Amenity

The proposed bus platforms for Option 2 are located within the Cherrybrook Station site which would facilitate safe bus passenger movements to and from the bus zones and the station entrance. Additionally, this option negates any requirement for bus passengers to cross Castle Hill Road to access the station.

It is noted that Option 2 would require buses to travel along Franklin Road at the frontage of Tangara School. However, the presence of a school zone on Franklin Road will assist in encouraging low vehicle speeds that will facilitate the safety of school children and other school users. However, additional facilities such as the use of crossing supervisors or “Children Crossing” signage may be required for Option 2 to ensure the safety of students, teachers and parents.

6.3.9 Environmental and Social Sustainability

With respect to social sustainability within the Cherrybrook Station site the bus routes associated with Option 2 would traverse local roads which would have a greater impact on local residential amenity than it would if they used arterial roads.

These services would operate on John Road (which currently accommodates bus services) as well as Robert Road and Franklin Road. Accordingly, the impact of the bus services, which during peak times are expected to be in the order of 50 PCEs, would be distributed equitably across the local road network within the Cherrybrook Station site.

With respect to environmental sustainability, the average increase in travel distance for existing bus services for Option 2 is the highest of the five options.











6.3.10 Relative Costs

The relative cost associated with the diversion of the existing bus routes to service the station under Option 2 is the highest of the five options and is indicative of the inefficiencies associated with the loop required for eastbound services.

6.3.11 Summary

Based on the response to the criteria identified above, the corresponding graduated scoring for Option 2 is displayed in Table 6.3.

Table 6.3 - Option 2 Assessment Summary

Criteria	Score	Comment
Transport Access Hierarchy		The proposed bus platforms for Option 2 are located within Cherrybrook Station which would facilitate bus passengers being picked up and dropped off near the station entrance. Buses operating on both Robert Road and Franklin Road is a poor outcome for cyclists accessing the station via those streets.
Customer Focus – Bus Catchment and Servicing Requirement		For Option 2, the catchment of local bus-stops providing access to all-day service would increase by approximately 357 persons.
Customer Focus – Modal Interchange		The proposed bus platforms for Option 2 are located adjacent to the station entrance which would facilitate efficient interchange between the bus and rail services.
Customer Focus – Bus Travel Time		The average bus travel time within Cherrybrook Station for Option 2 is the second fastest of the five options.
Customer Focus – Service Legibility		Option 2 is proposed to operate with a loop system that would detract from its legibility for infrequent bus users.
Amenity – Loss of Parking		Option 2 would potentially require the removal of parking on one side of Robert Road and one side of Franklin Road.
Local Traffic		Option 2 would require buses to operate on Robert Road and Franklin Road, though in only one direction. Induced additional traffic would be less than in Option 1.
Safety and Amenity		Option 2 would facilitate safe passenger interchange between bus and rail services and would not require passengers to cross Castle Hill Road.
Environmental and Social Sustainability		The traffic impacts associated with Option 2 would be distributed onto Robert Road and Franklin Road. The average increase in bus travel distance is the highest of the five options.
Relative Cost		The relative cost associated with the diversion of the existing bus routes to those associated with Option 2 are the highest of the five options.

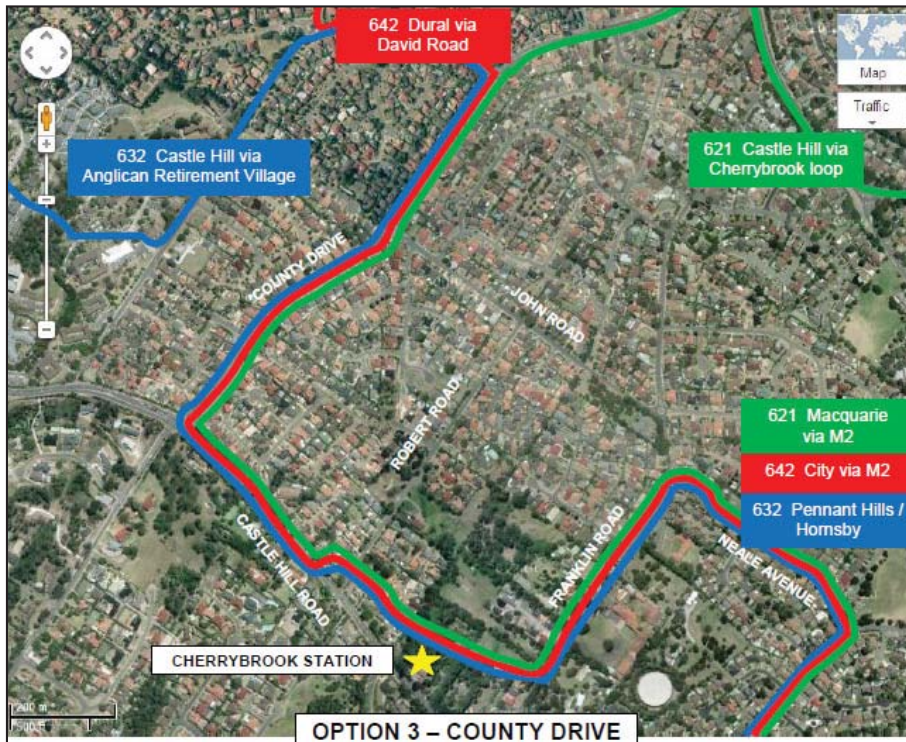
6.4 Option 3 – County Drive, Castle Hill Road and Franklin Road

Key features of Option 3 are as follows:

- Diverting buses from John Road via a County Drive, Castle Hill Road, the station access road and Franklin Road;
- Buses would use bus stops inside the station area, close to the station entrance; and
- Buses would run in both directions on Franklins Road but would not operate on Robert Road.

The proposed bus access arrangements associated with Option 3 are displayed in Figure 6.3.

Figure 6.3- Option 3 Bus Access Strategy



Source: Community Information Access options review Cherrybrook Railway Station (2013)

6.4.1 Transport Access Hierarchy

The proposed bus platforms for Option 3 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance. Additionally this would provide an environment for passengers that would contribute to the transport hierarchy principles incorporated into the design of the NWRL and its stations.

The two-way operation of buses Franklin Road is a poor outcome for cyclists using the latter street, though is better than Option 1 which operates buses two-way on both streets.

6.4.2 Customer Focus – Bus Catchment and Servicing Requirement

Analysis indicates that for Option 3, the catchment of the bus stops in the local area that provide access to all-day bus services would increase by approximately 334 persons. With the exception of Option 5, this result is consistent with the other bus access options.

6.4.3 Customer Focus – Modal Interchange

The proposed bus platforms for Option 3 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance, facilitating a safe and efficient modal interchange between the bus and rail services

6.4.4 Customer Focus – Bus Travel Time

For Option 3, average bus travel times through the Cherrybrook Station site would rank slowest of the five options.

It is noted that for Option 3, both eastbound and westbound buses are required to traverse the congested intersection of Castle Hill Road and County Drive, resulting in extended travel times.

It is noted that due to the 40km/h school zone which operates 8:00am – 9:30am and 2:30pm – 4:00pm on schooldays, that during these periods bus movements on Franklin Road will be slightly slower than usual.

6.4.5 Customer Focus – Service Legibility

The bus services associated with Option 3 is proposed to operate with the same route at all times. Accordingly, the Option 3 bus services would present consistency and simplicity of use for frequent and infrequent bus users alike and offer good service legibility.

6.4.6 Loss of Parking

The implementation of the routes associated with Option 3 would result in bi-directional bus travel on Franklin Road.

It is noted that at its widest points, Franklin Road's current carriageway width is (approximately) 9m. Based on Austroads Guidelines and Australian Standards this is of sufficient width to potentially accommodate two-way bus movements and provide parking on one side of the Franklin Road. In the short, narrow sections where carriageway width is 7m, parking would need to be restricted on both sides of the road.

Option 3 would therefore require the removal of on-street parking on one side of most of the length of Franklin Road (both sides in the sections of 7m carriageway width).

6.4.7 Local Traffic

The removal of parking from Franklin Road to facilitate bus movements will encourage additional local traffic to this road. Robert Road would not experience this.

The number of buses per hour on Franklin Road is the same as in Option 1, but no buses would travel on Robert Road.

6.4.8 Safety and Amenity

The proposed bus platforms for Option 3 are located within the Cherrybrook Station site which would facilitate safe bus passenger movements to and from the bus zones and the station entrance. Additionally this option negates any requirement for bus passengers to cross Castle Hill Road to access the station.

It is noted that Option 3 would require buses to travel along Franklin Road at the frontage of Tangara School. However, the presence of a school zone on Franklin Road will assist in encouraging low vehicle speeds that will facilitate the safety of school children and other school users. However, additional facilities such as the use of crossing supervisors or "Children Crossing" signage may be required for Option 3 to ensure the safety of students, teachers and parents.

Additionally it is noted however that Option 3 would likely require the introduction of bus stops on County Drive between John Road and Castle Hill Road to maximise the catchment of the bus services. Signalised pedestrian crossings are located on County Drive at its intersections with Castle Hill Road and John Road, however there are no pedestrian facilities between these points. As stated previously, County Drive is a sub-arterial road that experiences large daily and peak-hour traffic volumes.

Given the limited pedestrian facilities on County Drive, particularly in locations near bus stop locations, there would be a potential negative impact on pedestrian safety with respect to passengers being required to cross County Drive to access bus services associated with Option 3. Accordingly, to ensure pedestrian safety and amenity the introduction of a pedestrian crossing on County Drive would be required for Option 3. This could potentially include the introduction of a signalised mid-block pedestrian crossing on County Drive or the signalisation of County Drive and Treetops Road, (which currently operates as a priority controlled intersection) with signalised pedestrian crossings included in each leg of the intersection.

6.4.9 Environmental and Social Sustainability

With respect to social sustainability within the Cherrybrook Station site the bus routes associated with Option 3 would traverse some local roads, however it would also operate on sub-arterial roads (County Drive) and arterial roads (Castle Hill Road). Accordingly, its impact on local residential amenity would be less than if it operated only on local roads.

For Option 3 Franklin Road would experience bi-directional bus activity associated with eastbound and westbound bus activity, while Robert Road would not accommodate any bus activity.

Accordingly, the impact of the connecting bus services, which during peak times are expected to be in the order of 50 PCEs, would not be distributed equitably across the local road network within the Cherrybrook Station site.

With respect to environmental sustainability, the average increase in travel distance for existing bus services for Option 3 is the second highest of the five options.

Additionally due to the congestion issues at the intersection of Castle Hill Road and County Drive, buses would experience stopping and starting at this location, increasing environmental impact associated with the additional consumption of fuel on congested road networks.

6.4.10 Relative Costs

The relative cost associated with the diversion of the existing bus routes to service the station under Option 3 is the second highest of the five options.

Additionally as stated above Option 3 would likely require the introduction of additional pedestrian facilities on County Drive. Preliminary cost analysis indicates:






- The introduction of traffic signals at the intersection of County Drive and Treetops Road would be in the order of \$500,000 - \$700,000 which would include traffic signals, amendments to street lighting and channelization works at the intersection; and
- The introduction of mid-block signals on County Drive would be in the order of \$300,000 - \$500,000, which would include traffic signals, amendments to street lighting and median works.

As Option 3 routes buses through the County Road / Castle Hill intersection, this might necessitate the future need for implementing some form of bus priority treatment at this intersection. Neither the definitive need for such treatments, nor the cost of implementing them, have been determined at this stage.

6.4.11 Summary

Based on the response to the criteria identified above, the corresponding graduated scoring for Option 3 is displayed in Table 6.4.

Table 6.4 - Option 3 Assessment Summary

Criteria	Score	Comment
Transport Access Hierarchy		The proposed bus platforms for Option 3 are located within Cherrybrook Station which would facilitate bus passengers being picked up and dropped off near the station entrance. Buses operating on Franklin Road is a poor outcome for cyclists accessing the station that direction.
Customer Focus – Bus Catchment and Servicing Requirement		For Option 3, the catchment of local bus-stops providing access to all-day service would increase by approximately 334 persons.
Customer Focus – Modal Interchange		The proposed bus platforms for Option 3 are located adjacent to the station entrance facilitating efficient interchange between the bus and rail services.
Customer Focus – Bus Travel Time		The average bus travel time within Cherrybrook Station for Option 3 is the slowest of the five options.
Customer Focus – Service Legibility		Option 3 is proposed to operate with the same route at all times facilitating good service legibility.

Amenity – Loss of Parking	●	Option 3 potentially would require loss of parking on one side of Franklin Road.
Local Traffic	●	Option 3 would require buses to operate on Franklin Road in both directions and could encourage additional local traffic.
Safety and Amenity	●	Option 3 would facilitate safe passenger interchange between bus and rail services and would not require passengers to cross Castle Hill Road. However, Option 3 would result in additional pedestrian activity on County Drive and a mid-block pedestrian crossing would be required.
Environmental and Social Sustainability	●	The traffic impacts associated with Option 3 would be distributed onto Franklin Road but not Robert Road. The average increase in bus travel distance is the second highest of the five options.
Relative Cost	●	The relative cost associated with the diversion of the existing bus routes to those associated with Option 3 are the second highest of the five options. Additionally Option 3 would likely require the introduction of signalised pedestrian facilities on County Drive.

6.5 Option 4 – Split Bus Routes

Key features of Option 4 are as follows:

- Splitting the eastbound and westbound movements;
- Eastbound buses would operate via County Drive, Castle Hill Road and the station access road;
- Westbound buses would operate via Franklin Road, the station access road, Robert Road and John Road; and
- Buses would run in both directions on Franklin Road but would operate in a single direction on Robert Road and John Road.

The proposed bus access arrangements associated with Option 4 are displayed below in Figure 6.4.

Figure 6.4- Option 4 Bus Access Strategy



Source: Community Information Access options review Cherrybrook Railway Station (2013)

6.5.1 Transport Access Hierarchy

The proposed bus platforms for Option 4 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance. Additionally this would provide an environment for passengers that would contribute to the transport hierarchy principles incorporated into the design of the NWRL and its stations.

The one-way operation of buses on Robert Road and two-way operation on Franklin Road is a poor outcome for cyclists, and is only slightly better than Option 1 which has two-way buses on both streets.

6.5.2 Customer Focus – Bus Catchment and Servicing Requirements

Analysis indicates that for Option 4, the catchment of the bus stops in the local area that provide access to all-day bus services would increase by approximately 345 persons. With the exception of Option 5, this result is consistent with the other bus access options.

6.5.3 Customer Focus - Modal Interchange

The proposed bus platforms for Option 4 are located within Cherrybrook Station and would facilitate bus passengers being picked up and dropped off close to the station entrance, facilitating a safe and efficient modal interchange between the bus and rail services.

6.5.4 Customer Focus – Bus Travel Time

For Option 4, average bus travel times through the Cherrybrook Station site would rank in the middle of the five options.

It is noted for Option 4 that eastbound buses would be required to traverse the congested intersection of Castle Hill Road and County Drive, while the westbound buses would operate on local roads. Accordingly, bus travel times for eastbound buses (approximately four minutes fifty seconds) would be longer than those for westbound buses (approximately two minutes thirty seconds).

It is noted that due to the 40km/h school zone which operates 8:00am – 9:30am and 2:30pm – 4:00pm on schooldays, that during these periods bus movements on Franklin Road will be slightly slower than usual.

6.5.5 Customer Focus – Service Legibility

As stated previously Option 4 is proposed to operate with a split route, eastbound buses would be required to use the intersections of Castle Hill Road and County Drive and westbound would be required to use Robert Road and John Road. Whilst bus stops can be accessed on each of these roads, they would not act as a legible pair – if a passenger used a stop County Drive to travel westbound, they would need to use a stop on Robert Road when returning.

Split routes can cause confusion in their use, particularly for infrequent bus users. Accordingly, service legibility for Option 4 is considered to be substandard.

6.5.6 Loss of Parking

The implementation of the routes associated with Option 4 would result in bi-directional bus travel on Franklin Road and one directional (northbound) travel on Robert Road.

It is noted that at its widest points, Franklin Road's current carriageway width is (approximately) 9m. Based on Austroads Guidelines and Australian Standards this is of sufficient width to potentially accommodate two-way bus movements and provide parking on one side of the Franklin Road. In the short, narrow sections where carriageway width is 7m, parking would need to be restricted on both sides of the road.

In accordance with the restricted carriageway width of these roads, Option 4 would therefore potentially require the removal of on-street parking on one side of Robert Road and one side of most of the length of Franklin Road (both sides in the sections of 7m carriageway width).

6.5.7 Local Traffic

The removal of parking from only one side of each of Robert Road and both sides of Franklin Road to facilitate bus movements will encourage additional local traffic to use these roads to a slightly lesser degree than in Option 1.

The number of buses per hour on Franklin Road is the same as in Option 1, but only half of the buses would travel along Robert Road, all in the northbound direction.

6.5.8 Safety and Amenity

The proposed bus platforms for Option 4 are located within the Cherrybrook Station site which would facilitate safe bus passenger movements to and from the bus zones and the station entrance. Additionally this option negates any requirement for bus passengers to cross Castle Hill Road to access the station.

It is noted that Option 4 would require buses to travel along Franklin Road at the frontage of Tangara School. However, the presence of a school zone on Franklin Road will assist in encouraging low vehicle speeds that will facilitate the safety of school children and other school users. However, additional facilities such as the use of crossing supervisors or “Children Crossing” signage may be required for Option 4 to ensure the safety of students, teachers and parents.

Additionally it is noted however that Option 4 would likely require the introduction of bus stops on County Drive between John Road and Castle Hill Road to maximise the catchment of the eastbound bus services. Signalised pedestrian crossings are located on County Drive at its intersections with Castle Hill Road and John Road, however there are no pedestrian facilities between these points. As stated previously County Drive is a sub-arterial road that experiences large daily and peak-hour traffic volumes.

Given the limited pedestrian facilities on County Drive, particularly near bus stop locations, there would be a potential negative impact on pedestrian safety with respect to passengers being required to cross County Drive to access bus services associated with Option 4. To ensure pedestrian safety and amenity, the introduction of a pedestrian crossing on County Drive would likely be required for Option 4. This could potentially include the introduction of a signalised mid-block pedestrian crossing on County Drive or the signalisation of County Drive and Treetops Road, (which currently operates as a priority controlled intersection) with signalised pedestrian crossings included in each leg of the intersection.

6.5.9 Environmental and Social Sustainability

With respect to social sustainability within the Cherrybrook Station site the bus routes associated with Option 4 would traverse some local roads, however it would also operate on sub-arterial roads (County Drive) and arterial roads (Castle Hill Road). Accordingly, its impact on local residential amenity would be less than if it operated only on local roads.

For Option 4, Franklin Road would experience bus activity associated with eastbound and westbound bus activity, while Robert Road would only experience westbound bus activity. Accordingly, the impact of the bus services, which during peak times are expected to be in the order of 50 PCEs, would not be distributed equitably across the local road network within the Cherrybrook Station site.

With respect to environmental sustainability, the average increase in travel distance for existing bus services for Option 4 is the middle ranked of the five options.

Additionally due to the congestion issues at the intersection of Castle Hill Road and County Drive, eastbound buses would experience stopping and starting at this location, increasing environmental impact associated with the additional consumption of fuel on congested road networks.

6.5.10 Relative Costs

The relative cost associated with the diversion of the existing bus routes to service the station under Option 4 is the middle ranked of the five options.

As stated above, Option 4 would likely require the introduction of additional pedestrian facilities on County Drive. This could be achieved either by signalising the intersection of County Drive and Treetops Road, or by installing a standard signalised pedestrian crossing further to the north. Preliminary cost analysis indicates:











- The introduction of traffic signals at the intersection of County Drive and Treetops Road would be in the order of \$500,000 - \$700,000 which would include traffic signals, amendments to street lighting and channelization works at the intersection; and
- The introduction of mid-block signals on County Drive would be in the order of \$300,000 - \$500,000, which would include traffic signals, amendments to street lighting and median works.

As Option 4 routes buses through the County Road / Castle Hill intersection, this might necessitate the future need for implementing some form of bus priority treatment at this intersection. Neither the definitive need for such treatments, nor the cost of implementing them, have been determined at this stage.

6.5.11 Summary

Based on the response to the criteria identified above, the corresponding graduated scoring for Option 4 is displayed in Table 6.5.

Table 6.5 - Option 4 Assessment Summary

Criteria	Score	Comment
Transport Access Hierarchy		The proposed bus platforms for Option 4 are located within Cherrybrook Station which would facilitate bus passengers being picked up and dropped off near the station entrance. Buses operating on both Robert Road and Franklin Road is a poor outcome for cyclists accessing the station via those streets.
Customer Focus – Bus Catchment and Servicing Requirement		For Option 4, the catchment of local bus-stops providing access to all-day service would increase by approximately 345 persons.
Customer Focus – Modal Interchange		The proposed bus platforms for Option 4 are located adjacent to the station entrance facilitating efficient interchange between the bus and rail services.
Customer Focus – Bus Travel Time		The average bus travel time within Cherrybrook Station for Option 4 is the middle ranked of the five options.
Customer Focus – Service Legibility		Option 4 operates with a split route, which can be confusing for some passengers.
Amenity – Loss of Parking		Option 4 potentially would potentially require the loss of parking on one side of Robert Road and one side of Franklin Road.
Local Traffic		Option 4 would require buses to operate on Robert Road and Franklin Road and would encourage additional local traffic to a degree slightly less than in Option 1.
Safety and Amenity		Option 4 would facilitate safe passenger interchange between bus and rail services and would not require passengers to cross Castle Hill Road. However, Option 4 would result in additional pedestrian activity on County Drive and a mid-block pedestrian crossing would be required.
Environmental and Social Sustainability		The traffic impacts associated with Option 4 would not be distributed equitably between Robert Road and Franklin Road. The average increase in bus travel distance is the third highest of the five options.
Relative Cost		The relative costs associated with the diversion of the existing bus routes to those associated with Option 4 are the middle ranked of the five options. Additionally Option 4 would likely require the introduction of signalised pedestrian facilities on County Drive.

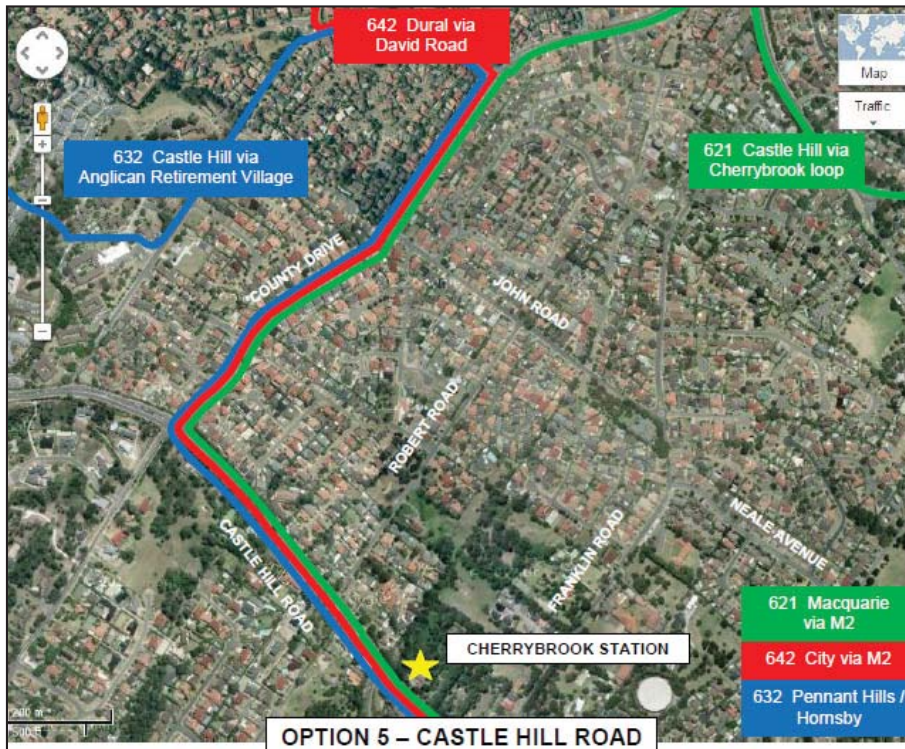
6.6 Option 5 – County Drive and Castle Hill Road

Key features of Option 5 are as follows:

- Buses would access and egress Cherrybrook Station using County Drive and Castle Hill Road;
- Bus stops would be located on Castle Hill Road not within the station precinct; and
- Buses would not operate on Robert Road and Franklin Road.

The proposed bus access arrangements associated with Option 5 are displayed below in Figure 6.5.

Figure 6.5- Option 5 Bus Access Strategy



Source: Community Information Access options review Cherrybrook Railway Station (2013)

6.6.1 Transport Access Hierarchy

In Option 5, the proposed bus platforms are located on Castle Hill Road, not within the Cherrybrook Station site.

Accordingly, Castle Hill Road would be a barrier to for bus passengers accessing and egressing Cherrybrook Station This would have significant implications with respect to safety as large volumes of passengers would be required to cross Castle Hill Road, particularly during peak periods when vehicle activity is at its highest.

Accordingly, Option 5 would not provide an environment for passengers that will contribute to the transport hierarchy principles incorporated into the design of the NWRL and its stations.

Keeping Robert Road and Franklin Road free of buses is an excellent outcome for cyclists and pedestrians accessing the station on those streets.

6.6.2 Customer Focus - Bus Catchment and Servicing Requirement

Analysis indicates that for Option 5, the catchment of the bus stops in the local area that provide access to all-day bus services would decrease by approximately 522 persons. The reduction in coverage is due to the removal of bus service on John Road, Neale Avenue and Edward Bennett Drive.

An additional service could be routed through the area to service these streets, but it would bypass the station. The cost of providing this additional service would be substantial.

6.6.3 Customer Focus – Modal Interchange

As discussed previously, there are significant advantages associated with including the bus stops for Cherrybrook Station within the station, these include issues relating to wayfinding, safety, passive surveillance and exposure to the elements.

However, Option 5 would require passengers to cross Castle Hill Road in order to access Cherrybrook Station when using the westbound bus stop. Consequently, the advantages associated with the proximity of rail and bus facilities would not be realised for Option 5.

6.6.4 Customer Focus – Bus Travel Time

For Option 5, average bus travel times through the Cherrybrook Station site would rank second slowest of the five options.

It is noted that for Option 5 both eastbound and westbound buses would be required to traverse the congested intersection of Castle Hill Road and County Drive, resulting in extended travel times.

6.6.5 Customer Focus – Service Legibility

The bus services associated with Option 5 is proposed to operate with the same route at all times. Accordingly, the Option 5 bus services would present consistency and simplicity of use for frequent and infrequent bus users alike and offer good service legibility.

6.6.6 Loss of Parking

Option 5 would not require buses to operate on Robert Road and Franklin Road, accordingly there would be no corresponding loss of parking.

6.6.7 Local Traffic

Option 5 would not result in the loss of parking on Robert Road or Franklin Road and would not result in an environment that would provide increased capacity for through vehicles. Additional traffic compared to the existing situation will use these roads to access the station, but the calming effect of the current road formations will provide less attraction.

Accordingly, it is considered that Option 5 would have the least effect on local traffic in proximity to the Cherrybrook Station site.

6.6.8 Safety and Amenity

The proposed bus platforms for Option 5 would be located on Castle Hill Road which would have significant implications with respect to large volumes of passengers required to cross an arterial road to access and egress Cherrybrook Station. It is noted that signalised pedestrian crossings are proposed on Castle Hill Road at its intersection with Robert Road and Glenhope Road. However, it is noted that pedestrian-motor vehicle accidents have the highest amount of occurrences in intersections and other areas with the large volumes of pedestrian and vehicular traffic. Additionally, as typically occurs at signalised junctions, it is likely there will be some degree of illegal pedestrian activity.

Buses would be required to interact with the large volumes of vehicles on Castle Hill Road. During discussions with Roads and Maritime Services (RMS) they indicated that they would not support any access option for Cherrybrook Station that resulted in buses stopping to pick up/drop off passengers blocking the through movement of traffic. Additionally they indicated that drivers typically do not like operating with indented bus stops on arterial roads, accordingly they would not support indented bus bays on Castle Hill Road in proximity to entry to Cherrybrook Station.

It is also noted that Option 5 would likely require the introduction of bus stops on County Drive between John Road and Castle Hill Road to maximise the catchment of the bus services. Signalised pedestrian crossings are located on County Drive at its intersections with Castle Hill Road and John Road, however there are no pedestrian facilities between these points. As stated previously, County Drive is a sub-arterial road that experiences large daily and peak-hour traffic volumes.

Given the limited pedestrian facilities on County Drive, particularly near bus stop locations, there would be a potential negative impact on pedestrian safety with respect to passengers being required to cross County Drive to access bus services associated with Option 5. To ensure pedestrian safety and amenity the introduction of a pedestrian crossing on County Drive would likely be required for Option 5. This could potentially include the introduction of a signalised mid-block

pedestrian crossing on County Drive or the signalisation of County Drive and Treetops Road, (which currently operates as a priority controlled intersection) with signalised pedestrian crossings included in each leg of the intersection.

Additionally it is noted that the curvature of Castle Hill Road between Robert Road and Franklin Road restricts sight lines and therefore potentially affects the safe operation of bus services on Castle Hill Road. Straightening sightlines on Castle Hill Road would require significant capital costs as well as the potential expropriation of properties abutting Castle Hill Road, which is not desirable or financially viable.

6.6.9 Environmental and Social Sustainability

With respect to social sustainability, within the Cherrybrook Station site the bus routes associated with Option 5 would not traverse any local roads and would have minimal impact with respect to the local residential amenity.

Given Castle Hill Roads function as an arterial road and the corresponding large volumes of traffic it accommodates, the impact of the bus services, which during peak times are expected to be in the order of 50 PCEs, would be negligible. It is noted that during peak periods, buses would be subject to significant delays associated with the poor operation of the Castle Hill Road and County Drive intersection.

With respect to environmental sustainability, the average increase in travel distance for existing bus services for Option 5 is the lowest of the five options.

However, due to the congestion issues at the intersection of Castle Hill Road and County Drive, buses would experience stopping and starting at this location, increasing environmental impact associated with the additional consumption of fuel on congested road networks.

6.6.10 Relative Costs

The relative cost associated with the diversion of the existing bus routes to service the station under Option 5 is the lowest of the five options. It is noted that this relative cost is associated with the short travel distances and poor catchment coverage offered by Option 5.

Additionally as stated above Option 5 would likely require the introduction of additional pedestrian facilities on County Drive. Preliminary cost analysis indicates:











- The introduction of traffic signals at the intersection of County Drive and Treetops Road would be in the order of \$500,000 - \$700,000 which would include traffic signals, amendments to street lighting and channelization works at the intersection; and
- The introduction of mid-block signals on County Drive would be in the order of \$300,000 - \$500,000, which would include traffic signals, amendments to street lighting and median works.

As Option 5 routes buses through the County Road / Castle Hill intersection, this might necessitate the future need for implementing some form of bus priority treatment at this intersection. Neither the definitive need for such treatments, nor the cost of implementing them, have been determined at this stage.

6.6.11 Summary

Based on the response to the criteria identified above, the corresponding graduated scoring for Option 5 is displayed in Table 6.6.

Table 6.6 - Option 5 Assessment Summaries

Criteria	Score	Comment
Transport Access Hierarchy		The proposed bus platforms for Option 5 are located on Castle Hill Road which would be a barrier for bus passengers accessing and egressing Cherrybrook Station. The lack of buses operating on both Robert Road and Franklin Road is an excellent outcome for cyclists accessing the station via those streets.
Customer Focus – Bus Catchment and Servicing Requirement		Option 5 yields a significant reduction in service coverage of 522 persons in comparison to the existing situation.
Customer Focus – Modal Interchange		The proposed bus platforms for Option 5 are located on Castle Hill Road and would provide poor modal interchange between the bus and rail services, particularly for passengers using the bus stops on the southern side of Castle Hill Road, who would be required to cross this busy road.
Customer Focus – Bus Travel Time		The average bus travel time within Cherrybrook Station for Option 5 is the second slowest of the five options.
Customer Focus – Service Legibility		Option 5 is proposed to operate with the same route at all times facilitating good service legibility.
Amenity – Loss of Parking		No potential loss of parking on Robert Street or Franklin Road is associated with Option 5.
Local Traffic		Option 5 would not require buses to operate on Robert Road and Franklin Road and would be the least likely option to encourage additional traffic onto these roads.
Safety and Amenity		The proposed bus platforms for Option 5 would be located on Castle Hill Road which would have significant implications with respect to large volumes of passengers required to cross an arterial road to access and egress Cherrybrook Station. Additionally a mid-block pedestrian crossing would be required on County Drive.
Environmental and Social Sustainability		The average increase in bus travel distance is the lowest of the five options.
Relative Cost		The relative costs associated with the diversion of the existing bus routes to those associated with Option 5 are the lowest of the five options. However, Option 5 would likely require the introduction of signalised pedestrian facilities on County Drive.

6.7 Outcomes of Assessment

A summary of each of the bus access options, including their key advantages and disadvantages are presented below in Table 6.7.

Table 6.7 – Bus Access Option Assessment

Option	Advantages	Disadvantages
Option 1 – Circulation via John Road, Robert Road, Station Precinct and Franklin Road – This would involve a diversion of the existing bus services on John Street via Robert Road and Franklin Road.	<ul style="list-style-type: none"> ➤ Minimises the impacts to the existing bus routes in the Cherrybrook area. ➤ Increases the catchment of the existing services and enhances general accessibility. ➤ Provides safe and convenient passenger access to the station. ➤ Avoids congestion at the intersection of Castle Hill Road and County Drive. 	<ul style="list-style-type: none"> ➤ Increased noise impacts for the residents Robert Road and Franklin Road. ➤ Significant removal of parking on Robert Road and Franklin Road.

Option	Advantages	Disadvantages
<p>Option 2: One-way circulation via Franklin and Robert Road</p> <p>For eastbound buses, this would involve buses travelling eastbound along John Road, southbound along Franklin Road, westbound along the station access road and northbound along Robert Road. For westbound buses the section of John Road between Robert and Franklin Road would not be serviced, however for eastbound buses this section of road would be traversed twice.</p>	<ul style="list-style-type: none"> ➤ Buses travel only in one direction on Robert Road, allowing some on street parking to be retained. ➤ Provides safe and convenient passenger access to the station. ➤ Avoids congestion at the intersection of Castle Hill Road and County Drive. 	<ul style="list-style-type: none"> ➤ Requires the inefficient and costly looping of bus services in the eastbound direction. ➤ Increased noise impacts for the residents Robert Road and Franklin Road. ➤ Reduction of parking on Robert Road and Franklin Road. ➤ Other vehicles accessing the station will still use Franklin and Robert Roads in both directions.
<p>Option 3: Routing buses via County Drive, Castle Hill Road and Franklin Drive</p> <p>This would route buses through the Castle Hill Road / County Drive intersection.</p>	<ul style="list-style-type: none"> ➤ Avoids Robert Road, negating the requirement to remove on-street parking. ➤ Provides safe and convenient passenger access to the station. 	<ul style="list-style-type: none"> ➤ Reduces bus service catchment and reduces accessibility to station and other destinations. ➤ Longer bus travel times and greater likelihood of delays. ➤ Other vehicles accessing the station will still use Franklin and Robert Roads. ➤ Increases congestion on Castle Hill Road and County Drive Intersection. ➤ Reduction of parking on Franklin Road. ➤ Increased noise impacts for the residents on Franklin Road.
<p>Option 4: A split route</p> <p>This would involve eastbound buses accessing the station via the Castle Hill Road and County Drive Intersection. Westbound buses would operate via Franklin Road, Robert Road and John Road.</p>	<ul style="list-style-type: none"> ➤ Eastbound buses avoid Robert Road, allowing some on street parking to be retained. ➤ Outbound buses avoid the congested Castle Hill Road and County Drive Intersection. ➤ Provides safe and convenient passenger access to the station. 	<ul style="list-style-type: none"> ➤ The split route is unintuitive infrequent bus users, with stops on Robert Road and County Drive effectively unpaired from each other. ➤ Weakens catchment and accessibility to the station and other destinations. ➤ Increased noise impacts for the residents of Robert and Franklin Road. ➤ Increases congestion on the Castle Hill Road and County Drive Intersection. ➤ Reduction of parking on Robert Road and Franklin Road. ➤ Other vehicles accessing the station will still use Franklin and Robert Roads in both directions.

Option	Advantages	Disadvantages
<p>Option 5: Routing buses via County Drive and Castle Hill Road (bus stops on street)</p> <p>This would route buses through the Castle Hill Road / County Drive intersection. Passengers travelling between westbound bus services and the station would need to cross Castle Hill Road.</p>	<p>↳ Avoids both Robert Road and Franklin Road, negating the requirement to remove on-street parking.</p>	<p>↳ Removes bus services from a large residential catchment and reduces accessibility to the station.</p> <p>↳ Reduced pedestrian safety for bus users (passengers required to cross Castle Hill Road).</p> <p>↳ Other vehicles accessing the station will still use Franklin & Robert Roads.</p> <p>↳ Increases congestion on Castle Hill Road and County Drive Intersection.</p> <p>↳ There are safety issues associated with the curvature of Castle Hill Road restricts sight lines and there would be high capital costs associated with its realignment.</p>

A summary of the ranking of each of the assessment criteria is presented below in Table 6.8.

Table 6.8 – Summary of Assessment Outcomes

Criteria	Option1	Option2	Option3	Option4	Option5
Transport Access Hierarchy					
Customer Focus – Bus Catchment and Servicing Requirement					
Customer Focus – Modal Interchange					
Customer Focus – Bus Travel Time					
Customer Focus – Service Legibility					
Amenity – Loss of Parking					
Local Traffic					
Safety and Amenity					
Environmental and Social Sustainability					
Relative Cost					

7 Community Consultation

TfNSW recently undertook a community consultation process for the proposed Cherrybrook Station. The process included obtaining feedback from local residents with respect to each of the five bus access options proposed for Cherrybrook Station. Residents were able to submit their feedback by e-mail, mail and in person at the NWRL Community Information Centre.

A copy of the *Community Information Access options review Cherrybrook Railway Station* brochure is included in Appendix A.

There was no set format for submissions for the community consultation process and interested parties were able to submit their comments via e-mail, post or in person at the NWRL Community Information centre. The community consultation process was ongoing during October 2013 during which 68 responses were received. In some instances, these responses comprised petitions with multiple signatories.

The respondents primarily consisted of individuals residing in proximity to the Cherrybrook Station subject site but also included groups/organisations as the Tangara School for Girls and The County Drive Residents Group.

The responses received represented a variety of opinions with some respondents opposing the routing of buses on Robert Road, Franklin Road and County Drive and other respondents supporting it. As would be naturally expected, the strongest opposition to any given option were those most negatively affected by it, and in the case of the options presented, those that routed buses along Robert Road received the strongest objections. Overall, the two most supported options were Options 1 and 3.

A summary of some of the comments received during the community consultation process, and how those issues have been considered during this study, are presented in Table 7-1 below.

Table 7-1: Consultation Comments Received

Comment Received	Consideration
Robert Road and Franklin Road are of insufficient width to accommodate the routing of bus services to/from Cherrybrook Station.	At a technical level, given the current formation and parking permissions of these roads, this is true. Routing buses along these roads would require either partial or full removal of parking (depending on the option). Parking could possibly be retained by widening the road and/or indenting parking bays (Section 2.2).
The use of Robert Road and Franklin Road for bus services provides the best utility for the whole Cherrybrook Community.	At a technical level, it is considered that Robert Road and Franklin Road would provide a direct and efficient route of travel for buses servicing Cherrybrook Station.
The intersection of Castle Hill Road, County Drive and High Street does not experience congestion issues and buses utilising it as part of their route would not be subject to significant additional delays.	Data included in the <i>Operational Traffic and Transport Management Plan: Technical Paper 2</i> and SIDRA analysis based on survey data collected in November 2011 indicate that the intersection of Castle Hill Road, County Drive and High Street experiences significant delays during periods of peak activity (Section 2.3).
The use of Robert Road and Franklin Road for bus services would adversely affect pedestrian safety.	A combination of footpaths and grassed verges are provided on Robert Road to facilitate the safe movement of pedestrians (Section 2.1). A number of traffic management works are proposed in proximity to Cherrybrook Station to facilitate the access and egress of all modes of travel. This includes the introduction of traffic signals (including pedestrian phasing at the intersection of Castle Hill Road and Robert Road (Section 3.2)). At a technical level, it is considered that the existing and proposed pedestrian facilities on Robert Road will facilitate the safe movement of pedestrians.

Comment Received	Consideration
The removal of parking on Robert Road and Franklin Road would present a significant issue for local residences.	All the properties on Robert Road and Franklin Road have driveways and typically garages where residents can park their private vehicles. It is recognised that the loss of parking on Franklin Road and/or Robert Road would reduce parking opportunities for visitors.
The implementation of time-restricted parking on Robert Road and Franklin Road would be preferable to the loss of parking on these roads.	While bus activity is expected to be highest during morning and evening periods of peak activity, buses will also be required to serve Cherrybrook Station over the course of a typical day. If Robert Road and/or Franklin Road are used by buses accessing the station, and in the absence of road widening, there would be safety implications with respect to buses and parked vehicles sharing the carriageway. Additionally, based on discussions with TfNSW, it is understood that Hornsby Shire Council may be unwilling to support the implementation of resident parking permit schemes on Robert Road and Franklin Road.
The use of Franklin Road for bus services has safety implications with respect to the safety of teachers and students at the Tangara and Inala Schools.	Currently a school zone is in operation on Franklin Road to reduce vehicle speeds during morning and evening periods of school peak activity. However, additional facilities such as the use of crossing supervisors or "Children Crossing" signage may be required for these access options to ensure the safety of students, teachers and parents. (Section 6.1).
During school pick up and drop off times Franklin Road becomes congested, the introduction of bus services on Franklin Road would exacerbate these congestion issues.	Local road networks in urban areas adjacent to schools typically become congested during periods of morning and afternoon peak school activity. These delays are regularly accounted for in bus timetables. Additionally the school afternoon peak period typically occurs between 2:30pm – 3:30pm and precedes the road network afternoon peak period, which typically occurs between 5:00pm – 6:30pm.
County Drive and Castle Hill Road are 'major' roads and thus best suited to accommodate bus services accessing Cherrybrook Station.	Several of the proposed bus access options utilise County Drive (a sub-arterial road) and Castle Hill Road (an arterial road) as part of their route. Roads and Maritime Services' functional classification criteria identifies sub-arterial and arterial roads as operating with high traffic volumes and carrying through-traffic from one region to another. (Section 6.1) Additionally, it is noted that buses currently operate on County Drive. Accordingly, Castle Hill Road and County Drive are functionally and geometrically suited to accommodate bus activity. It is further noted however that analysis indicates that the intersection of Castle Hill Road and County Drive currently experiences delays during periods of peak activity and will continue to do so in the 2021 horizon year of analysis.
Additional bus services should not be directed along County Drive.	As described above, given County Drive's functionality and geometry, and the existing operation of bus services along this major road, County Drive is considered suitable to accommodate additional bus movements associated with demand generated by Cherrybrook Station.

8 Summary of Findings

The NWRL is proposed to comprise of eight new stations and a 23km rail line. The line will run from Epping in the east to Cudgegong in north-west Sydney. Upon completion, it will connect with the Epping to Chatswood Rail Link and Sydney's wider metropolitan rail network. The NWRL is expected to be constructed and fully operational by 2019. It is proposed to operate between Cudgegong Road and Chatswood Stations. Trains will operate with a peak frequency of 12 services per hour per direction, or approximately every 5 minutes.

The principles of the NWRL station access hierarchy gives priority to most sustainable forms of travel namely pedestrian and cyclists followed by buses and taxis, kiss and ride and finally park and ride.

Buses will have a critical role in supporting the operation of the NWRL by extending the catchment for customers beyond walking distance and encouraging access to the station by modes other than private vehicle.

The provision of park and ride facilities at the NWRL Stations will expand their catchment areas and provide an opportunity to reduce private vehicle trips on Sydney's regional road network. It is noted that the provision of park and ride facilities will result in the redistribution of traffic on the local road networks adjoining the proposed stations.

A number of traffic management works have been proposed in proximity to the Cherrybrook Station to facilitate the access and egress of all modes of travel, these include:

- The development of a two lane access road between Robert Road and Franklin Road that will provide access to park and ride facilities, kiss and ride facilities, bus bays and taxi ranks;
- The widening of the Station Access from approximately 7.5m to 14m between Castle Hill Road and Robert Road to provide two travel lanes in each direction;
- The signalisation of the intersection of Robert Road and Castle Hill Road; and
- The widening of Franklin Road from approximately 7m to 11m between Kayla Way and Castle Hill Road.

Analysis indicates that the intersection of Castle Hill Road and County Drive currently experiences congestion and operates with a poor level of service during periods of peak activity. The intersections of Castle Hill Road and Robert Road and Castle Hill Road and Franklin Road currently operate with good levels of service and minimal peak-hour delays.

TfNSW have prepared five bus access options for review, as follows:






- Option 1: Station access via Robert Road and Franklin Road – Buses would be diverted from John Street via Robert Road and Franklin Road;
- Option 2: One-way loop via Robert Road and Franklin Road – Eastbound buses would operate on a one-way loop through the station access via Robert Road and Franklin Road. Westbound buses would follow the access path described for Option 1;
- Option 3: County Drive, Castle Hill Road and Franklin Road – Buses would operate bi-directionally on County Drive, Castle Hill Road, the station access road and Franklin Road;
- Option 4: Split Route – Eastbound buses would operate via County Drive, Castle Hill Road, the station access road and Franklin Road. Westbound buses would operate via Franklin Road, the station access road, Robert Road and John Road; and
- Option 5: County Drive and Castle Hill Road: Under this option, buses would operate bi-directionally via County Drive and castle Hill Road with buses stopping on Castle Hill Road.

TfNSW identified ten criteria to assess the bus and vehicular access options, as follows:

- Transport Access Hierarchy – Ensure the station precinct plan gives priority to sustainable modes of travel;
- Customer Focus (bus catchment and servicing requirements) – Maximise the size of the passenger catchment provide by planned bus services;
- Customer Focus (modal interchange) – Ensure the ease of interchange between public transport services provided at the station;
- Customer Focus (bus travel time) – Identify length of bus travel time for each option and minimise delays to passengers, including “through passengers” not using the station;
- Customer Focus (service legibility) – Ensure a functional and legible bus route structure;

- Loss of Parking – Identify any loss of parking associated with each access option.
- Local Traffic – Forecast levels of traffic on the road network in proximity to Cherrybrook Station;
- Safety and Amenity – Provide safe pedestrian and vehicular access to/from the station;
- Environmental and Social Sustainability – Ensure an equitable balance of traffic changes across the local road network; and
- Relative Costs – Identify the relative costs associated with the diversion of buses proposed to serve the station from their existing routes.

In accordance with instruction received from Transport for NSW each of the bus access options was assessed in accordance with a graduated scoring system, as displayed in the table below.

Assessed Score	Meaning
	Strongly Support Objectives
	Partially Supports Objectives
	Neutral, or provides a combination of positive and negative outcomes
	Little Support for Objective
	No Support for Objective

A summary of the assessment outcomes for each option is presented below.

Criteria	Option1	Option2	Option3	Option4	Option5
Transport Access Hierarchy					
Customer Focus – Bus Catchment and Servicing Requirement					
Customer Focus – Modal Interchange					
Customer Focus – Bus Travel Time					
Customer Focus – Service Legibility					
Amenity – Loss of Parking					
Local Traffic					
Safety and Amenity					
Environmental and Social Sustainability					
Relative Cost					

During the course of this study, TfNSW undertook a community consultation process regarding the bus and vehicular access options for Cherrybrook Station. The responses received represented a variety of opinions with some respondents opposing the routing of buses on Robert Road, Franklin Road and County Drive and other respondents supporting it. Overall, the two most supported options were Options 1 and 3.

The review has identified two viable access options for the Cherrybrook Station (Options 1 and 3) and has found that from a customer point of view, Option 1 performs better.

Appendix A

Community Consultation Materials

Have
your
say

Community Information

Access options review

Cherrybrook Railway Station



Artist's impression: Cherrybrook Station aerial view

About the North West Rail Link

Over coming decades, an extra 200,000 people will move into Sydney's North West, lifting the region's population above 600,000.

The North West Rail Link will deliver a reliable rapid transit public transport service to an area with the highest car ownership levels per household in Australia.

A priority transport infrastructure project for the NSW Government, it is Australia's largest public transport infrastructure task - the biggest single transport infrastructure challenge for Sydney since the Harbour Bridge.

And, just like the bridge, the coming of new rail to Sydney's North West will bring about substantial improvements to the quality of life in the region.

It will be the first fully-automated rapid transit rail system in Australia.

There will be eight new railway stations, including one at Cherrybrook, and a total of 4,000 commuter car parking spaces along the new route.

Customers will benefit from a train at least every five minutes in the peak - a turn up and go service which means there is no need for a timetable.

Sydney's new generation of fast, safe and reliable single deck trains will be rolled out on the North West Rail Link first, with high levels of customer safety including constant CCTV monitoring and platform screen doors to improve safety.

The project includes the construction of twin 15km tunnels from Bella Vista to Epping - Australia's longest rail tunnels. This contract was awarded in late June 2013.

The North West Rail Link is expected to be open to customers by the end of 2019. The North West Rail Link project team was established in April 2011 to fast track its planning, procurement and delivery.

Major planning work has now been completed to allow major construction contracts to commence. Early construction work including site preparation, road works and providing construction site power was carried out during 2013 to pave the way for the construction works to follow.

Traffic Flow Options Review

Transport for NSW is reviewing options for car, pedestrian and bus access to and from Cherrybrook Station.

The review is part of the approval of the two major environmental impact statements (EIS) which have already been conducted and approved by the NSW Government.

The review will address these topics:

- Overall transport access;
- Bus operations;
- Interchange between key transport modes;
- Safety and public amenity;
- Local traffic impacts; and
- Parking impacts.

Transport for NSW has now appointed consultants MR Cagney to conduct an independent review.

About the new Cherrybrook Station



Artist's impression: Cherrybrook Station area

Cherrybrook Railway Station will be beside Castle Hill Road between Franklin Road and Robert Road and will be visible from Castle Hill Road.

Designed to reflect the area's character, the station features a six-metre deep "open cut" design which allows for maximum daylight and natural ventilation.

The station will provide easy access to rapid transit for people from the Cherrybrook, West Pennant Hills and Dural areas and will be convenient to walk and cycle to.

It will also serve schools and other facilities nearby.

Building a major public transport facility at the site also presents the opportunity to improve pedestrian and road safety along and across Castle Hill Road.

Planning approval has been granted for commuter car parking for 400 cars.

Planning approval for the station includes:

- Public space/plaza areas at station entry points.
- Retail space – such as a cafe, newsagency, etc.
- Local bus interchange for up to six buses.
- 14 kiss-and-ride spaces.
- 4 taxi spaces.
- Bicycle parking and storage for 45 bicycles.
- New pedestrian and bicycle links.

Bus access options

The following material summarises the bus access options which Transport for NSW is considering, together with an analysis of each option which is included in the "Implications" section for each option.

The Independent Reviewer will do their own analysis of each option taking into account overall transport access; bus operations; interchange between key transport modes; safety and public amenity; local traffic impacts; and parking impacts.

The Independent reviewer will also consider community comment as part of the process.

EIS 2, which was exhibited late in 2012 and approved in May 2013, proposed Cherrybrook Station be served by diverting existing bus services which already pass nearby along John Road - north of the station.

These buses come from the areas of Cherrybrook, Dural, Round Corner and the eastern parts of Castle Hill and go to Macquarie Centre and the City via the M2, as well as to Pennant Hills/Hornsby.

The bus diversions would be part of a Transport for NSW West/East bus strategy where buses to Cherrybrook Station are on their way to other destinations beyond.

Apart from a potential West Pennant Hills Valley shuttle service, most buses would call in at Cherrybrook Station, rather than terminate there.

This would allow for more efficient and higher frequency services than having buses which only serve the station. It would also allow for higher frequency services at all times of the day and at night.

Five options for review

As part of the review, local people are being asked for their feedback and input into five access options which have now been identified and refined by Transport for NSW for Cherrybrook.

All five options are detailed in this document.

Two other options, which were previously considered and reported in EIS 2, have been further considered and subsequently ruled out by Transport for NSW.

These two options would have involved major changes to the overall design of the station and the rail alignment. These changes would have contravened the planning approval which has already been granted for the station.

Please see the information box on the back page of this document to find out more about how to have your say.

The review will be conducted during October and a final report will be provided to Transport for NSW by November 30, 2013.

Following this, Transport for NSW will further consider access options for Cherrybrook Station and report back to the community before the end of the year.

This work will be fed into a broader review of cross-regional bus operations which Transport for NSW will conduct before the North West Rail Link begins running.

This broader review will assess bus operations across Sydney's north west once the North West Rail Link is running, and how to best integrate the two systems.

It will also be used for station access plans which will be developed by the successful tenderer to operate the North West Rail Link trains and stations.

Expected traffic demand, Cherrybrook Station

Traffic and pedestrian activity will increase around the station once North West Rail Link rapid transit services start operating, notably during the morning and afternoon peaks.

Most of the catchment for Cherrybrook Station lies to the north and there will be a strong demand for local commuters to reach the station via the most direct route.

As most rapid transit customers will arrive by bus (as opposed to cars), extra attention needs to be given to identifying the best bus routes for the future to minimise congestion.

The majority of car traffic generated by the station is expected to come from the suburbs to the north and west of the station, such as Cherrybrook, Dural and Glenhaven as well as the eastern parts of Castle Hill.

A smaller volume of traffic is expected to come from the West Pennant Hills Valley to the south of the site, and would approach the station along Castle Hill Road from Coonara Avenue, Glenhope Road or Highs Road.



Road access

Safety considerations around the new Cherrybrook Railway Station must take account of the constrained alignment of Castle Hill Road, a busy four-lane main road with multiple curves and difficult sight lines that compound safety risks.

Road access to the station is also constrained by the design of housing sub-divisions in the area (with cul-de-sacs restricting direct access), limited north-south link roads (particularly across New Line Road) and substantial peak hour congestion on main roads.

The key roads adjacent to the station are:

- Castle Hill Road – A major 4-lane road which is a State Road and under the control of Roads and Maritime Services. Castle Hill Road between Old Northern Road and County Drive is part of a strategic bus corridor between Hornsby and Castle Hill. Traffic data provided by Roads and Maritime Services and 2011 traffic counts indicates Castle Hill Road carries an annual average daily traffic of 43,331 vehicles, with eastbound flows highest in the morning peak between 6am and 7am and westbound flows highest in the evening peak between 5pm and 6pm.
- Franklin Road – a two-way, two-lane local road that carries about 400 vehicles per day and is maintained by Hornsby Shire Council.
- Robert Road – a two-way, two-lane local road that carries about 700 vehicles a day and is maintained by Hornsby Shire Council.
- Glenhope Road – This road is a two-way, two-lane local road. This road is maintained by The Hills Shire Council. Glenhope Road carries about 2,000 vehicles a day.

Parking restrictions on Franklin, Robert and Glenhope Roads are controlled by local councils.

Option 1. Station access via Franklin and Robert Roads



Option 1 was the TfNSW preferred option exhibited as part of EIS 2.

Under this option, buses that currently use John Road would go to the station via the shortest and most direct route – via Robert Road and Franklin Road.

Buses would use bus stops inside the station area – close to the station entrance.

Buses would run in both directions in both Robert and Franklin Roads as far as John Road and Neale Avenue.

Implications of Option 1.

- Provides the most direct route for existing buses from John Road to the station. This ensures bus passengers have the most efficient access to trains with minimal delays, and avoids extra journey time for people travelling on buses to other destinations.
- Avoids buses on Castle Hill Road which is congested during peak periods. Placing buses on Castle Hill Road will potentially delay bus services, add to existing congestion, and add additional journey time.
- Increases the catchment of existing buses, meaning more people would have better access to more destinations. By diverting buses via Robert and Franklin Roads, more local people would be within walking distance to bus stops for through-services.
- Ensures buses drop their passengers at the entrance to the station, providing safe pedestrian access directly to the station and minimising interchange times between bus and rail services. The station area will provide a safe, pleasant and protected environment for interchanging between services, avoiding the need for people to cross Castle Hill Road.
- Provides the most direct and efficient access to Cherrybrook Station
- To allow for safe bus operation, no parking would be permitted along Robert and Franklin Roads.

Option 2. One-way loop (via Franklin and Robert Roads)



Option 2 involves diverting buses from John Road via a one-way clockwise loop through the station area via Franklin and Robert Roads.

Eastbound buses would travel east along John Road, south along Franklin Road, west through the station area and then north on Robert Road and right into John Road.

Westbound buses would travel south on Franklin Road, west through the station area, north on Robert Road and then left into John Road.

A further sub-option for terminating buses to operate in a single clockwise direction via John Road (eastbound), Franklin Road, the station area, Robert Road and back along John Road (westbound) rather than diverting existing services, was also considered as an alternative.

Implications of Option 2.

- This one-way route would mean buses would not pass one another - lessening on-street parking impacts. Parking along one side of Robert and Franklin Roads could potentially be retained.
- For westbound buses, John Road between Robert and Franklin Roads would not be serviced. However, when travelling east, buses would be forced to traverse the same section of John Road twice.

- Avoids buses on Castle Hill Road which is congested during peak periods. Placing buses on Castle Hill Road will potentially delay bus services, add to existing congestion, and add additional journey time.
- Ensures buses drop their passengers at the entrance to the station, providing safe pedestrian access directly to the station and minimising interchange times between bus and rail services. The station area will provide a safe, pleasant and protected environment for interchanging between services, avoiding the need for people to cross Castle Hill Road.
- This option would increase bus kilometres and create inefficient bus operations.
- People continuing on eastbound buses would experience longer journey times.

Implication of Sub Option

- Requires significant duplication of buses in the Cherrybrook and Dural areas to serve a similar catchment as currently exists, but at significant ongoing cost, and would reduce the viability of services in off-peak periods.

Option 3. County Drive, Castle Hill Road and Franklin Road



Under this option, buses on John Road would be diverted via County Drive, Castle Hill Road, into the station area and onto Franklin Road. Buses would operate along this route in both directions. This option would avoid buses on John and Robert Roads.

Implications of Option 3.

- Avoids buses on John and Robert Roads, meaning on-street parking would not need to be removed on Robert Road as a result of bus movements.
- Diverting buses this way would reduce services to key areas immediately north of the station.
- This option would result in longer journey times, for people travelling to or from the station as well as continuing on to other destinations.
- The diversion of buses from John Road would reduce the number of people within walking distance of a bus stop.
- Buses could be caught up in congestion leading to increased travel times on County Drive and Castle Hill Road, especially in the afternoon peak.
- Additional buses on County Drive and Castle Hill Road would increase traffic congestion, especially at the intersection of Castle Hill Road/Highs Road/County Drive.
- There would be a negative impact on pedestrian safety, especially where people have to cross County Drive to access bus services.

Option 4. Split bus routes (Eastbound via John Road and Robert Road and westbound via Castle Hill Road and County Drive).



Option 4 involves buses operating via different routes east and west-bound to reduce the number of buses on Robert Road and avoid them running both ways on that street.

Under this option, eastbound services would operate via County Drive, Castle Hill Road, the station area and Franklin Road, while westbound services would operate via Franklin Road, the station area, Robert Road and John Road.

This would mean that buses would only operate in one direction (north) on Robert Road and John Road (west).

Implications of Option 4.

- Avoids two-way bus operation on Robert Road.
- Potentially allows parking along one side of Robert Road to be retained.
- Allows buses travelling in the westbound direction to avoid congestion at the intersection of Castle Hill Road/Highs Road/County Drive, especially during peak periods.

- Splitting routes in different directions weakens the overall level of customer service and effectively reduces the catchment.
- Could lead to customer confusion about where to catch buses with people having to board buses on one street and get off buses on their return on a different street.
- Increases overall journey times for some people by making them walk further when going to or from bus stops. People catching existing services from John Road would have to walk to County Drive to catch these buses.
- Reduces pedestrian safety, especially where people have to cross County Drive for buses.

Option 5. Buses via County Drive and Castle Hill Road (bus stops on-street)



Option 5 involves buses using County Drive and Castle Hill Road to potentially reduce impacts on Franklin and Robert Roads. These buses would either be diversions of existing routes or totally new services.

This option avoids buses using Robert and Franklin Roads, and, if operated by diverting the existing routes, would also remove existing services from John Road, Neale Avenue and Edward Bennett Drive.

Implications of Option 5.

- Avoids buses on Robert and Franklin Roads
- On-street parking would not need to be removed on Robert Road as a result of bus movements.
- Reduces pedestrian safety, especially where people have to cross County Drive and Castle Hill Road to catch a bus or to transfer from a bus to the train.
- Buses stopping on Castle Hill Road would add to traffic congestion.
- If existing services were diverted, a large residential area currently served by buses would be left with no bus services (including John Road, Neale Avenue and Edward Bennett Drive).
- If new services are provided, rather than existing services diverted, the need for extra buses in the Cherrybrook and Dural areas would result in significant ongoing costs and reduce the viability of services.
- The addition of buses on County Drive and Castle Hill Road would be impacted by traffic congestion, especially at the intersection of Castle Hill Road/Highs Road/County Drive, leading to longer travel times.

Tunnel contractor moving in

The \$1.15 billion contract to build the 15 km twin tunnels for the North West Rail Link has been awarded to the Thiess John Holland Dragados joint venture.

The joint venture will now progressively take possession of the major tunnelling work sites for the project, including the Cherrybrook Station site.

Four massive tunnel boring machines have now been ordered and are being manufactured.

The NSW Government remains on target to have tunnel boring machines in the ground by the end of next year.

Other options previously considered and rejected

Two other options, which were previously considered and reported in EIS 2, were rejected and have not been considered further as they involve major changes to the station precinct design and the rail alignment which would contravene the planning approval.

They were:

1. An option to realign Castle Hill Road to the north with buses using a separate alignment on the southern side of Castle Hill Road; and
2. An option involving constructing an eastbound bus slip lane on the northern side of Castle Hill Road

Have your say

There is no set format for submissions. Comments close by October 30, 2013 and should be addressed to:

North West Rail Link
Cherrybrook Options Study

Your comments can be lodged by:

- **Email:** Info@northwestrail.com.au
- **Post:** PO Box K659 Haymarket, NSW 1240
- **In person:** North West Rail Link Community Information Centre, 299 Old Northern Road, Castle Hill (Opposite Castle Towers)

Establishment works now underway



Cherrybrook residents are reminded that establishment works associated with the new Cherrybrook Railway Station are now underway.

These works include:

- Upgrades to the intersection of Castle Hill Road and Glenhope Road;
- Construction of a "slip lane" for construction vehicles to enter the construction site from Castle Hill Road just east of Robert Road; and

- Relocation of important utilities including gas, power, water and Telstra services in the area.

Residents are asked to observe all temporary traffic direction and road safety signs.

Other establishment works are underway in the Epping and Castle Hills areas.

The project team asks for your patience and understanding during these works.

Find out more about the Cherrybrook Options Study

- Visit the project **Community Information Centre** at Castle Hill, North West Rail Link Community Information Centre, 299 Old Northern Road, Castle Hill (Opposite Castle Towers)
- Visit www.northwestrail.com.au and follow the links to the Cherrybrook Options study page
- Call **1800 019 989**
- Email info@northwestrail.com.au

