Northern Link

21. Cumulative Impacts

Northern Link

Phase 2 – Detailed Feasibility Study

CHAPTER 21

CUMULATIVE IMPACTS

- September 2008

Contents

21. Cumulative Impacts

This chapter addresses Part B, Section 5.14 of the Terms of Reference (ToR). The interrelationship of the impacts of the Project are identified and discussed in the context of the overall effect of the Project. The cumulative impacts as they relate to particular issues are considered over time or in combination with other impacts due to the scale, intensity, duration or frequency of the effects. The chapter also considers the effect of the Project in combination with other known infrastructure projects relevant to the northern and western suburbs of Brisbane particularly in regard to traffic impacts arising form construction overlapping in time and/or location. The assessment includes impacts during construction on the regional road network, impacts on local communities, impacts on labour markets, and impacts of other projects emerging from existing transport plans, strategies and studies, including the SEQ Infrastructure Plan and Program.

21.1 Methodology

Cumulative impacts are normally associated with the compounding and synergistic interactions on the environment arising from other developments, occurring in the same area or over similar timeframes to the project being assessed. Many of the cumulative environmental effects associated with the project are derived from construction traffic and transport interactions.

A range of observed traffic and transport data was collected in order to develop and validate a strategic transport model (the *Northern Link Traffic Model*) for the Project. This model was in turn used to describe existing traffic and transport conditions relevant to construction impacts and the potential for cumulative effects. As discussed in Chapter 5, Traffic and Transport of the EIS, the traffic and transport data used covered the existing physical infrastructure and facilities as well as all modes and behaviour of travel within the transport network including car drivers and passengers, commercial vehicles, public transport and pedestrians and cyclists. Observed traffic volumes and travel speeds and public transport demands have been compared to modelled results by supplementing observed data with information extracted from a validated base year model for 2007.

Details of planned or potential future traffic and transport projects and their timing were compiled from anticipated capital works programs. This included the South East Queensland Infrastructure Plan and Program (SEQIPP) and an agreed list for network modelling projects for forecasting years of 2014, 2016, 2021 and 2026 developed in consultation with the Queensland Department of Main Roads (DMR) and Brisbane City Council (*Appendix C of Technical Report No. 1 – Traffic and Transport in Volume 3* of the EIS).

The data used for forecasting future years within the strategic traffic model includes descriptions and timing of future road infrastructure projects in consultation with Brisbane City Council, Department of Main Roads and Queensland Transport (QT), and incorporation of updated future demographic forecasts developed from the SEQ Economic and Employment Forecasting Study (PIFU and NIEIR, 2007).

21.2 Interrelationships of Overall Impacts within the Project

The Terms of Reference has requested information on the overall impacts of the Project and a discussion of the interrelationships of these impacts. Where appropriate, the cumulative impacts of the Project as they relate to particular issues are addressed in the relevant chapter of the EIS. The potential for interaction between the environmental aspects of the Project is identified in **Table 21-1**. The potential for cumulative impacts associated with interaction between and amongst these elements includes the potential for mitigation measures, identified to manage individual measures, having a cumulative impact on other aspects of the Project. This

interrelationship is considered and discussed below including the potential for further mitigation measures to address overlapping concerns.

- **Table 21-1 Environmental Impact Interaction Matrix**

	Traffic and Transport	Topography, Geology and Soils	Hydrology	Air Quality	Noise	Flora and Fauna	Land Use	Cultural Heritage	Social	Landscape and Urban Design	Hazard
Traffic and Transport											
Topography, Geology and Soils											
Hydrology											
Air Quality											
Noise											
Flora and Fauna											
Land Use											
Cultural Heritage											
Social											
Landscape and Urban Design											
Hazard											

21.2.1 Traffic and Transport

The identification of impacts during construction, on the regional road network, the arterial road network and the local road network is discussed in Chapter 5, Traffic and Transport of the EIS. The traffic and transport issues associated with the Project are the primary generator of the Project design and function, which in turn interact with the full range of issues and impacts addressed throughout other sections of the EIS. The Project design is a fine balance and sometimes a trade off between meeting design requirements, standards and statutory criteria for roads, fire and life safety, tunnel ventilation, design life, etc and protecting the environment or minimising the environmental and community consequences of retrofitting new traffic and transport infrastructure within a heavily developed urban environment. A range of these relationships between traffic and transport design and environmental effects is described below.

21.2.2 Topography, Geology and Soils

Potential impacts from soils including sedimentation and runoff from erodible soils and runoff from acid sulphate or contaminated soils exposed during construction works, are identified in Chapter 6, Geology and Soils. Surrounding receiving waters such as Toowong Creek or York's Hollow are already subject to runoff from other developments in their catchments. The relative potential contribution from Northern Link and its synergistic or cumulative effects in combination with numerous developments within the catchment is considered negligible in the context of the existing water quality and the mitigation measures to be applied through the environmental management process to the Project.

Topography, geology and soils are largely a design issue, in that collectively they are a major influence on the design of the Project and its method of construction. The Project design needs to provide tunnel depths which accommodated not only safe design gradients but also accommodated the extreme variance in topography throughout the study corridor. For example, the alignment of the Western Freeway connection was constrained by a number of topographic factors. The mainline driven tunnel was required to commence prior to the boundary of the Toowong Cemetery (directly east of Mt Coot-tha Roundabout) to avoid any physical impacts on the Cemetery. In achieving this, the driven tunnel portal control line was designed at approximately 20m below existing surface at the Toowong Cemetery boundary within competent rock for the commencement of the TBM and to avoid the alluvial channel running north to south under the Mt Coot-tha Roundabout. A maximum 5% vertical grade was provided to minimise the length of cut and cover and transition structure along the Western Freeway. However this design grade also matched the existing grade of the surrounding topography resulting in the requirement for longer ramps connecting to the Western Freeway. This also results in considerably deep cuttings for the entry ramp particularly in the transition structures.

The Bunya Phyllite and Neranleigh-Fernvale beds that are the dominant geological formations in the study corridor are relatively hard rock formations, which are ideal for tunnelling because of their structural strength and stability. This influences the method and speed of tunnel excavation, and together with local topography and tunnel depth, is a major factor in the levels of vibration and regenerated noise measured at the surface.

21.2.3 Hydrology

Flooding and stormwater management

The study corridor and surrounding environment have been highly modified with significant alterations to the natural drainage and flow regime. The corridor does not directly intersect any major waterways although several minor waterways do cross the study corridor throughout, particularly at the Western end in the upper Toowong Creek catchment. These waterways are conveyed in underground pipes for a large proportion of their length and are primarily intermittent in nature, flowing mainly during the wet season, essentially functioning as stormwater drains.

Existing flood risk in the study corridor around the western connections may be due to either local drainage via surface flow and small drains or regional flooding from the Brisbane River. Extreme floods in the Brisbane River may be of long duration, involve large volumes of water and present significant risk to the tunnel if the portals are overtopped. Another potential threat from regional flooding is from storm surge in the river. However, the topography of all portal areas is generally above 20m Australian Height Datum (AHD) and thus well clear of that threat.

The focus of design investigations at the eastern connections (Kelvin Grove and Inner City Bypass (ICB)) was on local drainage particularly with the ICB connection being near the lowest point of the local catchment. The EIS reference design highlights the need to balance the additional infrastructure required with the limited space

available beneath the Inner Northern Busway flyover, the provision for significant overland drainage flows and the need to minimise encroachment into Victoria Park. A tunnel ventilation fan station is proposed to be located immediately to the east of the busway embankment, and the associated ventilation connections to the mainline tunnel would also have to be configured into the available space. The existing pedestrian and bikeway would also been re-configured to fit within this space.

Water quality

Ground and surface water quality within the study corridor was found to be generally poor. Groundwater was shown to be saline, with high mineral content and potential for localised residual contamination from historical land uses. Surface waters in streams flowing through or fed by the study corridor exhibited high nutrient concentrations, especially dissolved oxygen and oxidised nitrogen.

Degraded stormwater runoff is considered the most likely risk to local waterways during both the construction and operational phases of the Project. Sediment is the most likely contaminant from the construction phase, while litter, hydrocarbons and heavy metals are likely to be the major operational phase contaminants.

Receiving waters, although themselves modified and disturbed ecosystems, would be sensitive to further impacts on the quality of stormwater received through increased sediment loads, nutrient runoff, hydrocarbons and other toxicants derived from construction or operation-related activities.

Potential water quality impacts would be mitigated by carefully considering the proposed construction sequencing, identifying potential risks prior to the commencement of construction works and ensuring that appropriate measures are considered and implemented. Development of a detailed Erosion and Sediment Control strategy, adoption of Water Sensitive Urban Design, and the use of Stormwater Quality Improvement Devices (SQIDs) for the operational phase, would be implemented to minimise any potential water quality impacts. It is unlikely that the erosion and sedimentation control structures would contribute cumulatively to the Project's overall impacts.

21.2.4 Air Quality

Technical study of the existing air quality in the study corridor and modelling of the effects of constructing the Northern Link tunnels and surface connections were described in Chapter 8, Air Quality and Greenhouse Gases. As well as assessing discharges of key pollutants from the ventilation outlets, the Project's contribution to changes in local and regional air quality were considered in terms of existing and predicted (future) background levels. The major contribution to existing air quality is from motor vehicles, and any future contributions to the regional air quality would be from changes in motor vehicle emissions. The study is therefore, effectively, a cumulative assessment report on the impacts of the proposed tunnel in the context of other air quality impacts caused by changes in motor vehicle emissions.

The cumulative air quality and health impacts of the Project with the Clem Jones Tunnel (CLEM7)[1], the Airport Link and the Northern Busway projects was assessed, using traffic forecasts for those projects and extrapolated results for the combined emissions from:

- both Northern Link ventilation outlets (Western Freeway and ICB);
- the southern ventilation outlet for Airport Link (Windsor); and

[1] Formerly known as the North-South Bypass Tunnel (NSBT).

- the northern ventilation outlet for CLEM7 (Bowen Hills).

The results, shown below in **Table 21-2**, show a small increase in the maximum ground-level concentrations of CO, NO_2, and PM_{10} in 2014. The health assessment documented in Chapter 8, Air Quality and Greenhouse Gases, has considered these results, and concluded that the likely health impacts of the predicted increases in ground level concentrations of pollutants would not effectively be measurable.

- **Table 21-2, Highest Ground Level Contricbutions due to Northern Link, Airport Link and CLEM7 Ventilation Outlets in 2014**

Pollutant and averaging time	Concentrations due to NL northern ventilation outlet	Predicted maximum ground-level concentrations due to cumulative emissions from three ventilation outlets	Background Concentration	Air quality goal
Maximum 8-hour average CO (mg/m^3)	0.1	0.1	2.5	10
Maximum 1-hour average NO_2 ($\mu g/m^3$)	3.1	4.5	94.3	246
Annual average NO_2 ($\mu g/m^3$)	0.3	1.06	18.5	62
Maximum 24-hour average PM_{10} ($\mu g/m^3$)	0.3	0.4	52.6	50
Annual average PM_{10} ($\mu g/m^3$)	0.02	0.05	16.7	25

21.2.5 Noise and Vibration

No cumulative noise and vibration impacts are anticipated for Northern Link, over and above the impacts discussed in Chapter 9, Noise and Vibration. Because of the distances between the projects, no cumulative noise and vibration impacts are anticipated with other projects, either currently under construction or proposed.

Spoil traffic would not increase average traffic noise levels at any residential sites by more than 0.2dBA. Changes in noise levels of 2dBA or less are considered undetectable to the human ear and therefore negligible. Spoil traffic would not be expected to impact significantly on the noise environment of residential locations.

The primary noise mitigation strategy would be the erection of noise barriers at key locations around the surface connections at Toowong, Kelvin Grove and the ICB. The noise barriers may in some places exceed 6m in height. Therefore, the barriers themselves would have a visual impact on the surrounding landscape and may in some locations impede existing views. Mitigation of visual impacts has been discussed in Chapter 14, Urban Design and Visual Environment, and includes integrated landscaping and providing urban design treatments such as the selection of the types of materials, including the use of clear acrylic noise barriers to minimise their visual impact.

In the long term, noise may also have an impact on land use in the study corridor. Due to the nature of tunnel portals changing the traffic environment in their location, providing immediate regional transport network connection, and also providing opportunities for redevelopment and urban mitigation of the construction areas, land uses surrounding the portals are also likely to change. In turn such changes are likely to be towards less noise sensitive uses or new residential designs incorporating treatments to better accommodate the local acoustic environment.

21.2.6 Flora and Fauna

As discussed in Chapter 10, Ecology, the Project has a relatively small permanent overall ecological footprint. Due to the small size of this footprint, the potential cumulative effect with projects currently in planning or construction is not likely to be significant.

Most of the ecological footprint required for the Project is remnant vegetation along the sides of the Western Freeway required for the connecting ramps and the worksite. The extent of land required for these connecting ramps is particularly extensive due to the design grade requirements of the ramps and the connecting portal locations within a topography that is sloping down towards the portals as discussed in section 21.2.2. The impact is also affected by the planned upgrading of the Western Freeway as discussed in Chapter 5, Traffic and Transport. The impact of the loss of this vegetation along the Western Freeway is mitigated to some extent by the colocation of these ramps with the existing Western Freeway as distinct from cutting a new corridor through existing bushland. The vegetation along this edge is also affected by runoff, weeds and waste generated from the existing road corridor. The Project would aim to minimise the loss of vegetation as well as provide better design to the edge conditions of the connections to maintain the integrity of the retained vegetation.

21.2.7 Land Use

Taking a regional perspective, the numerous transport projects that are either under construction, about to commence construction, or in the planning phase in South East Queensland, are likely to make a significant contribution to shifts in land use across the region. Improved transport connections would be likely to further promote and encourage regional development, in particular along the corridors to the west, the north and the south of Brisbane City, where road, rail and bus infrastructure projects are currently focused. Such changes are consistent with the aims and objectives of the SEQ Regional Plan (SEQRP), in particular the improved connection that the Project would provide between the Western Corridor and the Australia TradeCoast (ATC).

There is also a cumulative effect in terms of land use and economic development. As discussed in Chapter 15, Economics, the Project would provide regional economic benefits and an overall positive economic impact. Regional land use changes associated with the Project are likely to contribute to economic development in terms of helping to create employment opportunities. This too is an objective of the SEQRP.

At the local level however, established suburbs close to the city such as those within the Northern Link Study Corridor are unlikely to undergo any rapid or major land use changes as a result of regional transport initiatives. Cumulative land use changes with the Project are more likely where there is convergence of the Project with existing local strategies or plans. An example of this would be the Kelvin Grove Urban Village. The Kelvin Grove Urban Village master plan identifies significant future development in the area between Kelvin Road and Victoria Park Road over an area of approximately 18ha. The vision for the Kelvin Grove Urban Village Master Plan is for a diverse city fringe community, linking learning with enterprise, creative industry with community, creating a new part of Brisbane that offers unique living solutions. Northern Link would improve access and accessibility for the Kelvin Grove Urban Village and is likely to be a contributing factor in the future growth of the urban village.

Similarly, the Project is likely to make a positive contribution to the development of the proposed transit-oriented development around Milton Railway Station. The forecast reductions in surface traffic volumes on local and higher order roads in the study corridor would improve amenity generally and would therefore create other opportunities for local development or changes in land use, or changes in the intensity of certain land uses. For example, with Northern Link in operation there may be opportunities for further increases in residential

density around transport nodes in or adjacent to the study corridor such as Auchenflower, Taringa and Toowong.

21.2.8 Social

There is a social dimension to many of the activities involved in construction and operation of the Project, largely measured in terms of changes to amenity. In the context of the Project and this EIS, amenity covers a broad range of issues relating to quality of life for residents in a changing urban environment. Noise, vibration, air quality, traffic, access and accessibility, visual quality, recreational opportunities, and the overall quality of the built environment, all contribute to an individual's assessment of their own quality of life. Each of these issues is triggered by a project such as Northern Link, and the assessment of social impact is an attempt to predict the Project's impact on the quality of life of all of the individuals in the study corridor. Equally, the mitigation measures applied to the Project would be designed to meet acceptable social outcomes as expressed through environmental (and social) protection goals, objectives and performance criteria for both construction and operation of the Project. An outline of the recommended environmental objectives and performance criteria is contained in the Draft EMP within Chapter 19, Environment Management Plan.

As discussed in Chapter 13, Social Environment, the Project is likely to have a significant social impact on the community living in the immediate vicinity of the proposed Toowong connection, where the overall changes to the urban environment, and hence to local amenity, would be greatest. The community around the Kelvin Grove Road connection would also experience some changes to amenity, although on a lesser scale. The social impact of the Western Freeway and ICB connections, by comparison would not be significant (Chapter 13, Social Environment).

21.2.9 Economic

Several major economic growth centres (Brisbane Airport, Australia TradeCoast, Port of Brisbane, Western Corridor) are projected as important future employment generators benefiting from improved access through Northern Link. The Project is expected to have a positive cumulative effect on employment during the construction phase and beyond and is also projected to contribute to rising property values through the study corridor and surrounding areas.

Economic activity in the Brisbane metropolitan area is forecast to continue to expand with the Western Corridor, Brisbane Airport, the Port of Brisbane and other major commercial and industrial development in the outer North area likely to be a catalyst for substantial economic growth.

In particular, annual growth in domestic airline passenger activity at Brisbane Airport averaged 5.7% annually over the past ten years. The international sector experienced average annual growth of 5.9%. The total number of passengers increased to more than 16 million in 2006, which represents a 6% increase on the 2005 data. Total passengers are forecast to grow to 35 million by 2025. This is the largest percentage increase of all major Australian airports. This increase in passenger movements at Brisbane Airport over the past decade has placed heightened pressure on the road network that feeds into the airport from the Brisbane CBD and the wider Brisbane metropolitan area. The continued implementation of the Brisbane Airport 2003 Master Plan and the ongoing development of the seven master planned aviation, commercial and industrial precincts will also be a significant generator of additional traffic and employment.

The annual air freight task in 2005-2006 was 85,154 tonnes (44,879 tonnes on incoming and 40,275 tonnes on outgoing flights). This represents an increase of 5.15% over 2004-2005.

The Port of Brisbane has experienced significant trade growth over the past decade, which is forecast to continue in the medium to long term. The Port is Australia's fastest-growing container port, generating an annual contribution to the Queensland economy of $770 million. During 2006-2007 more than 28 million tonnes of cargo were loaded or unloaded over the port's wharves. In that year import and export of containers through the port increased (by 14.2%) for the fifth consecutive year. Total container volumes are projected to reach around 1.9 million by 2025.

The Australia TradeCoast is SEQ's trade and industrial hub located at the mouth of the Brisbane River encompassing the Port of Brisbane and Brisbane Airport. Its industries include transport, logistics, aviation and aerospace. ATC covers about 8,000 ha, with over 1,300 ha for future development.

ATC is a major economic and employment driver in Brisbane and SEQ and is expected to provide up to 100,000 jobs in 2026. Between 2006 and 2007, investment in infrastructure and other developments exceeded $660 million.

The link between the ATC transport hub with its integrated air, sea, road and rail facilities, and the Western Corridor industrial hub and its interstate transport centre, would be strengthened by the Project.

The Western Corridor gains from the availability of residential and industrial land. Current growth patterns show that since 2001 Ipswich City has experienced a significant increase in population growth rates. Managing growth in the Western Corridor is a key feature of the South East Queensland Regional Plan 2005 – 2026 (SEQ Regional Plan) and will involve dealing with the increased demand for transportation of people and freight between the west, the Brisbane CBD and the ATC.

There is the opportunity to create a large number of jobs in the Western Corridor, through economic growth and investments in infrastructure and services. Aerospace, freight, training and education have been identified as industries with high growth potential due to the proximity to Amberley airbase and existing campuses.

By identifying the Western Corridor as a future urban development area, the SEQ Regional Plan's strategies give priority to infrastructure and services in the area aiming to facilitate an increasing proportion of the forecast population growth and economic activities to move to the Western Corridor.

The proposed increase in the region's and Brisbane's population and the projected expansion of economic activity has increased the need for new road infrastructure such as Northern Link to support the projected growth. Northern Link, the Airport Link, Northern Busway and CLEM7 all aim to provide greater road network capacity, reduce congestion, facilitate cross-city travel, particularly to and from the Western Corridor and the ATC and improve the public transport system. Northern Link, in conjunction with other traffic and transport initiatives would be a key influence on the future pattern and rate of economic development in the region and in Brisbane.

21.2.10 Landscape and Urban Design

The Project's potential cumulative landscape and urban design impacts, in conjunction with Airport Link, the Northern Busway and CLEM7, are considered overall to be positive. Each of these projects provides opportunities to improve the urban environment in which they are constructed, through integration of the new infrastructure into its surrounds, taking into account the local landforms, vegetation, land use and urban character. The cumulative effect of the proposed landscape and urban design initiatives for Northern Link would allow the Project to integrate with the locations where the tunnels meet the surface, and to contribute to the character of each of these localities. On a broader scale, the landscaping and urban design initiatives being

implemented, or proposed for all of the Trans Apex projects would provide a sense of renewal to those areas affected by surface works and tunnel connections.

21.3 Cumulative Construction Impacts

Existing infrastructure projects specifically identified in the ToR or otherwise overlapping in time or location within which cumulative construction impacts with Northern Link may arise are identified in **Table 21-3** and discussed below. The assessment includes the identification of:

- construction impacts of the projects on the regional, arterial and local road networks;
- the construction of the projects on the community (including through community consultation); and
- the construction of the projects on local and state labour markets.

Table 21-3 Known or Anticipated Infrastructure Projects and Timing

	Timing During Construction of Northern Link																					
Project	**2008**				**2009**				**2010**				**2011**				**2012**				**2013**	
Northern Link																						
CLEM7																						
Gateway Motorway Upgrade																						
Hale Street Link																						
Airport Link																						
Northern Busway																						
Airport Roundabout Upgrade																						
Ipswich Motorway Upgrade																						
Tank Street																						
Northbank																						

Cumulative effects of these major road projects, having their construction periods overlapping may be identified in several areas listed below.

- Road Traffic Management. Temporary changes to the local road network for short periods may form part of the detailed construction plans to be formulated in the detailed design phase for Northern Link. Coordination of such changes would be important to maintain functionality of the local road network. Arrangements for occasions when major public attendance is expected at the Suncorp Stadium would be particularly important.
- Construction Traffic Management. Each project involves transport to the respective worksites of large volumes of construction materials including steel and concrete elements for bridge structures and large machinery. Some coordination would be required to enable continuity of this process in conjunction with normal private and business transport expectations in the vicinity.

Broadly, and as identified in Chapter 5-Section 5.7.3 – Local Traffic Impacts during construction, the impact on traffic flow, journey times and public transport due to worksite construction activities for Northern Link would

be minimal. Any cumulative impact with other projects overlapping in construction timeframes, and sharing the same local or regional road network with Northern Link would consequently be minimal. Details of the routes to be used by delivery vehicles to the Western Freeway, Toowong connection, Kelvin Grove Road connection work sites and ICB work area are unknown at this stage of the planning process, however they would be confined to major roads. For general delivery, truck numbers are anticipated to be lower than that required for spoil haulage. The two proposed spoil haulage routes that have the potential to overlap with construction activities of other projects are summarised below.

- Haul route to spoil placement site(s) at Port of Brisbane - anticipated at 50 trucks per day to and from the Kelvin Grove Road connection worksite and the ICB work area between July 2010 and February 2012.
- Haul route to spoil placement site at Swanbank – anticipated at 90 trucks per day to and from the Western Freeway and Toowong connection work sites between April 2010 and June 2011.

21.3.1 CLEM7

Construction of CLEM7 commenced in the latter half of 2006 with the facility expected to be open for traffic use by 2010.

The potential common route for spoil haulage is the Port of Brisbane route; however haulage activity from CLEM7 is expected to be complete prior to commencement of use of this route by Northern Link haul traffic in July 2010.

21.3.2 The Gateway Motorway Upgrade

The Gateway Motorway Upgrade is a planned duplication of the tolled Gateway Bridge and upgrading of the Gateway Motorway on each side of the Brisbane River. This project would alleviate pressures on the road network to the east of the CBD and in the Gateway Corridor, providing improved access to the Port of Brisbane and Brisbane Airport. The project commenced in late 2006 and will be complete by 2011. Included within the upgrade of the Gateway is the Northern Access Road Project (NARP) from the Gateway to the Brisbane Airport. This is a project planned by the Brisbane Airport Corporation that provides a new access road to primarily serve the domestic and international terminals at Brisbane Airport. The new road links to a new Airport access interchange on the northern deviation of the Gateway Motorway, planned as part of the Gateway Motorway Upgrade. It will provide a more convenient, high quality route to the airport terminals. The new access road will alleviate traffic pressure on the existing Airport Drive link to the Gateway Motorway, particularly on the airport roundabout at the intersection of the East West arterial and the existing Gateway Motorway. The Northern Access Road is planned to be open by mid 2009, just prior to the commencement of Northern Link.

It is understood that the Gateway Motorway Upgrade project has been generating material haulage activities on the Western Freeway-Centenary Highway route to the western corridor. If these continue beyond April 2010 there would be overlap with Northern Link spoil haulage, however it is noted that the Northern Link haulage volumes (120 trucks per day two-way) would represent less than 0.2% of total traffic on this route, (which would be some 91,700 vpd in 2010), so cumulative effects would be minimal.

21.3.3 Hale Street Link

The Hale Street Link is proposed as a new four lane, two way bridge connection from the intersection of Hale Street/Coronation Drive in Milton to South Brisbane. The Hale Street Link provides traffic connections to the

existing transport network at Coronation Drive, Milton and to Merivale and Cordelia Streets in South Brisbane. Hale Street Link is assumed to open as a toll bridge by 2011.

The Hale Street Link has commenced construction with completion scheduled for mid 2010.

The proposed spoil haulage routes associated with Northern Link would not be likely to have any direct effects on the Hale Street Link construction activities as these movements are away from the respective worksites at either end of the Northern Link and are unlikely to impact on anticipated effects of the Hale Street Link construction.

Hale Street Link will still be under construction during the proposed commencement of the Northern Link Project with a potential construction overlap period of approximately just under one year from the last quarter of 2009 to mid 2010.

As identified in Chapter 5-Section 5.7.3 – Local Traffic Impacts during construction, the impact on traffic flow, journey times and public transport due to worksite construction activities for Northern Link would be minimal. Any cumulative impact with the Hale Street Link project would consequently also be minimal. Hale Street Link has identified their impacts as part of their detailed construction program. The risk of cumulative impacts arising from both projects would be linked to the overlapping construction period. Of this potential period identified above the most significant risk has been identified to occur from November 2009 to March 2010. This period corresponds with the preliminary works for Northern Link, predominantly focussed on site establishment and early works that do not require significant traffic management measures.

There may however, be a potential for beneficial synergies between the projects. The construction program associated with the Hale Street Link project incorporates a number of traffic management and diversion measures within the eastern end of the Coronation Drive and Milton Road corridors to facilitate the connection of Hale Street Link to Hale Street. Early works to upgrade the Milton Road/Croydon Street intersection within the Northern Link construction program (during 2010) may be able to assist in the management of traffic on diversion routes related to Hale Street Link construction.

21.3.4 Airport Link, Northern Busway and Airport Roundabout Upgrade Projects

The Airport Link project is a planned, approximately 6.7km long toll road, connecting CLEM7, Inner City Bypass and Lutwyche Road at Bowen Hills with Sandgate Road and the East West Arterial Road at Clayfield, with an intermediate link to Gympie Road and Stafford Road at Kedron. These projects include significant upgrades to the intersections of the East West Arterial Road with Nudgee Road and with the Gateway Motorway to provide efficient road access from the Airport Link toll road to the Australia Trade Coast precinct, including Brisbane Airport.

Most of the Airport Link will be in tunnel. It will form part of the TransApex strategic road connections intended to allow cross-city travel movements to bypass the Brisbane Central Business District (CBD) and inner suburbs. Construction is planned to begin in September 2008 with completion during 2012.

The Northern Busway is proposed to connect the Inner Northern Busway (INB) at the Royal Children's Hospital (RCH) at Herston with Windsor, Lutwyche, Kedron, Chermside, Aspley and Bracken Ridge. The First stage, which extends the existing busway from the Royal Children's Hospital to Enoggera Creek is currently being constructed. Two further sections of the Northern Busway project, from Windsor to Kedron, are being delivered together the Airport Link project.

The upgrade to the Airport roundabout would also be delivered with the Airport Link project. The construction of a grade separated interchange involving a flyover of the existing Gateway Motorway by the East-West Arterial and Airport Drive would be completed prior to the opening of Airport Link.

The potential common route for spoil haulage between Northern Link and these projects, primarily Airport Link, is on the ICB and Kingsford Smith Drive between July 2010 and April 2011. This coincides with the Airport Link southern haul route to the preferred placement site at the Brisbane Airport. The anticipated use of this route by the Airport Link Changed Project would be up to 110 trucks per day, which is significantly lower than that initially approved Airport Link Reference Project, due to the proposed use of the spoil conveyor, and alternative northern haul route with the Airport Link Changed Project. The spoil haulage from Northern Link during this period would generate an anticipated 100 trucks per day.

The estimated peak combined haulage traffic associated with Airport Link and Northern Link (210 trucks per day) during 2010/11 would represent approximately 1.8% of the 2010 background truck traffic and approximately 0.3% of total traffic on this route. There are, however, several intersections along Kingsford Smith Drive operating at close to nominal capacity during peak periods. The impact on performance of key intersections during peak periods would need to be examined during the preparation of the CTMPs, and haulage operations managed accordingly (eg: being restricted to outside peak hours if necessary).

21.3.5 Ipswich Motorway Upgrade

The haul route to Swanbank, used by 60 trucks per day to and from the Western Freeway and Toowong connection work sites between April 2010 and June 2011, would pass through several construction projects planned on the Ipswich Motorway. The timing of construction activities on these projects is listed below.

- Ipswich Motorway Upgrade - Wacol to Darra (approximately 3km widening of the motorway to six lanes and upgrading of the Centenary Highway Interchange to a multi-level interchange): April 2008 to late 2010. Northern Link spoil haulage vehicles would be using this part of the network from April 2010. Northern Link haulage volumes (120 trucks per day two-way) would represent only 0.1% of traffic on this route, so cumulative effects would be minimal.
- Ipswich Motorway Upgrade - Ipswich/Logan Motorway Interchange (interchange upgrade and minimum six lane standard on the 2km section of Ipswich Motorway between Goodna and Gailes): February 2007 to Early 2009. This project would be completed prior to its use by spoil haulage vehicles associated with Northern Link.
- Ipswich Motorway Upgrade – Dinmore to Goodna (approximately 8km upgrading to minimum of six lanes including interchange upgrades): Early 2009 to 2012. Northern Link spoil haulage vehicles would be using this part of the network from April 2010 to June 2011. Northern Link haulage volumes (120 trucks per day two-way) would represent only 0.1% of traffic on this route, so cumulative effects would be minimal.

21.3.6 The Tank Street Bridge

The Tank Street Bridge is a pedestrian bridge from North Quay adjacent to its intersection with Tank Street over the Brisbane River to Kurilpa Point, West End adjacent to the Gallery of Modern Art. Construction of the bridge began early in 2008 and is scheduled for completion in the second half of 2009. Given that Northern Link construction is not expected to begin until the last quarter of 2009 it is unlikely that the projects will overlap and this assessment does not consider the Tank Street Bridge any further.

21.3.7 Northbank

The Northbank Project is a proposed retail/residential/commercial development along the CBD bank of the Brisbane River between the Victoria Bridge and Alice Street and extending out over the Brisbane River. Without a forward timetable or any assurance that Northbank would proceed no further consideration is given to its potential cumulative impacts with Northern Link.

21.3.8 Community Impacts

The potential cumulative impact of the construction of these multiple projects on the community is difficult to measure. The Northern Link construction areas and flow on effects are generally well removed from other projects. Construction spoil haulage and material delivery has the potential to share the same road network as other projects. As addressed above, there is nothing particularly significant concerning the contribution likely to the existing network and its community effects, however, from Northern Link.

The most significant local project to potentially aggravate the construction effects of Northern Link would be the Hale Street Link. The Hale Street Link project is located between the Northern Link construction worksites. Some impacts on local community accessibility relying on the use of Hale Street, Milton Road, Cribb Street, Park Road and Coronation Drive is possible, particularly during the final stage of the Hale Street Link construction. While Northern Link would maintain existing traffic flow capacity through or around its worksites some traffic delays generated by the Hale Street Link construction are expected to be experienced on key through routes, such as the ICB, Milton Road and Coronation Drive.

A comprehensive approach to the coordination of construction traffic management between the two projects should be implemented. Construction traffic management for both projects should plan for and take into account opportunities for coordinated management and integrated impact mitigation. The potential for integrated impact mitigation would include, for example, the potential for the Toowong worksite establishment to provide for the upgraded Milton Road/Croydon Street/Sylvan Road connection as possible early works to relieve constraints to these connections between Milton Road and Coronation Drive due to Hale Street Link.

A coordinated approach should be taken generally to the delivery and community impact mitigation of major transport projects to be undertaken within the western and inner western transport corridor of Brisbane. Brisbane City Council is already a participant on a Construction Liaison Committee comprising representatives from the Queensland Government including, Queensland Transport, Department of Main Roads, Emergency Services and the Department of Infrastructure and Planning. This committee should have a responsibility to the community to ensure that through shared information on all major transport projects affecting the community that cumulative effects are managed and impacts suitably mitigated.

21.3.9 Labour Market Effects

The construction and operation of Northern Link would generate additional demand and employment in the steel, concrete, tunnelling equipment, utilities, labour, and contractor sectors. The contribution to the region and the State is considered significant in value-added terms while still allowing for the potential leakage of inputs and expertise (eg: tunnelling equipment, contractor services) out of Queensland from interstate projects.

The envisaged procurement program for Northern Link takes into account the procurement timeframe of when other toll road PPPs[2] are likely to be put to the market in order to plan for a clear market window to create the most favourable market effects for the Project. Such other projects include:

- current approved projects that would overlap with Northern Link - CLEM7 and Airport Link;
- potential PPP projects going to the market at a similar time to Northern Link, such as the Toowoomba Bypass project; and
- interstate projects currently being planned such as the Sydney North-West Metro, the M4 East and the F3/M2 Link.

In regard to current and similar construction projects, Northern Link would come into the labour market at a similar time as CLEM7 is coming to completion providing an opportunity to sustain an existing workforce with experience and expertise in road tunnel design, engineering and construction.

The implications of Northern Link also go significantly beyond direct construction impacts. Northern Link would provide critical enabling infrastructure to support an effective transport system that can help the regional economy better respond to the function of labour markets. The broader effects of Northern Link include the enhancement to the economy's responsiveness to structural changes in regard to critical factors of production such as labour and materials. Traffic modelling undertaken by SKM/CW indicates that Northern Link would reduce travel times and traffic congestion on arterial and suburban roads across the Brisbane network. This improved accessibility would lead to broader benefits to the efficient functioning of the labour market and business productivity.

- For workers, the shorter commuting times would widen the employer market opportunities by reducing travel time related frictions in the job search process.
- For businesses, this can expand the size and diversity of the labour catchment, and support the better matching of workers and skills to jobs.
- For freight and export sectors, the efficient connection of parts of the network which are acting as hubs (eg: airport, freight distribution centres, mainline train station interchanges and port infrastructure) is extremely important for the flow of goods from source to destination markets.

21.4 Future Network Upgrade Projects

Key future projects identified in the SEQIPP with the potential to add materially to cumulative impacts with Northern Link post construction (from 2014) include:

- the proposed Centenary Highway and Western Freeway transit lane project identified within SEQIPP; and
- the Western Brisbane Transport Network Investigation (WBTNI).

21.4.1 Centenary Highway and Western Freeway Transit Lane Project

A preliminary planning study is in progress by DMR. Although this investigation has not been finalised the project has been included, based upon advice provided by DMR, as an upgrading from four to six lanes

[2] Public Private Partnerships

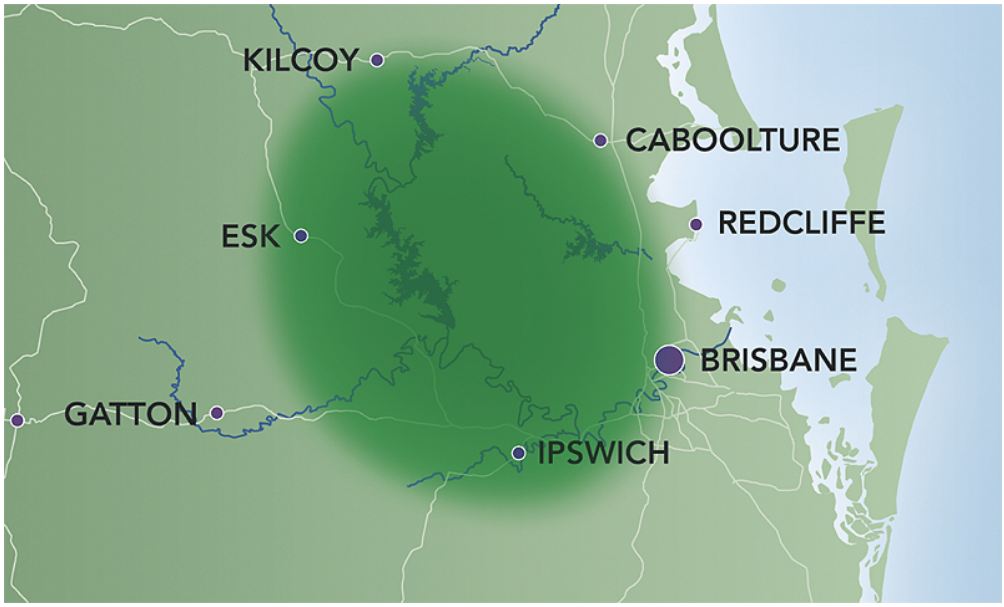
inclusive of a single T2 lane each way between Mt Coot-tha Road and (approximately) Warrender Street, Darra. No upgrading over the Centenary Bridge has been assumed.

This project, assumed to be operational by 2016, is still in the planning phase by DMR so details of the proposed construction staging and timing are unknown. It is likely that use of the Centenary Highway and Western Freeway by Northern Link haulage vehicles would be finished prior to the start of substantial construction activities on this project.

21.4.2 WBTNI

The key contemporary study in progress during the time of preparation of the Northern Link EIS is the State Government's Western Brisbane Transport Network Investigation (WBTNI), examining transport planning issues for the western Brisbane area. The WBTNI study area extends from west of the Brisbane CBD, south to Ipswich, north to Caboolture, and west to the region of the Brisbane Valley Highway. The study area is shown in **Figure 21-1**.

- **Figure 21-1 WBTNI Study Area**



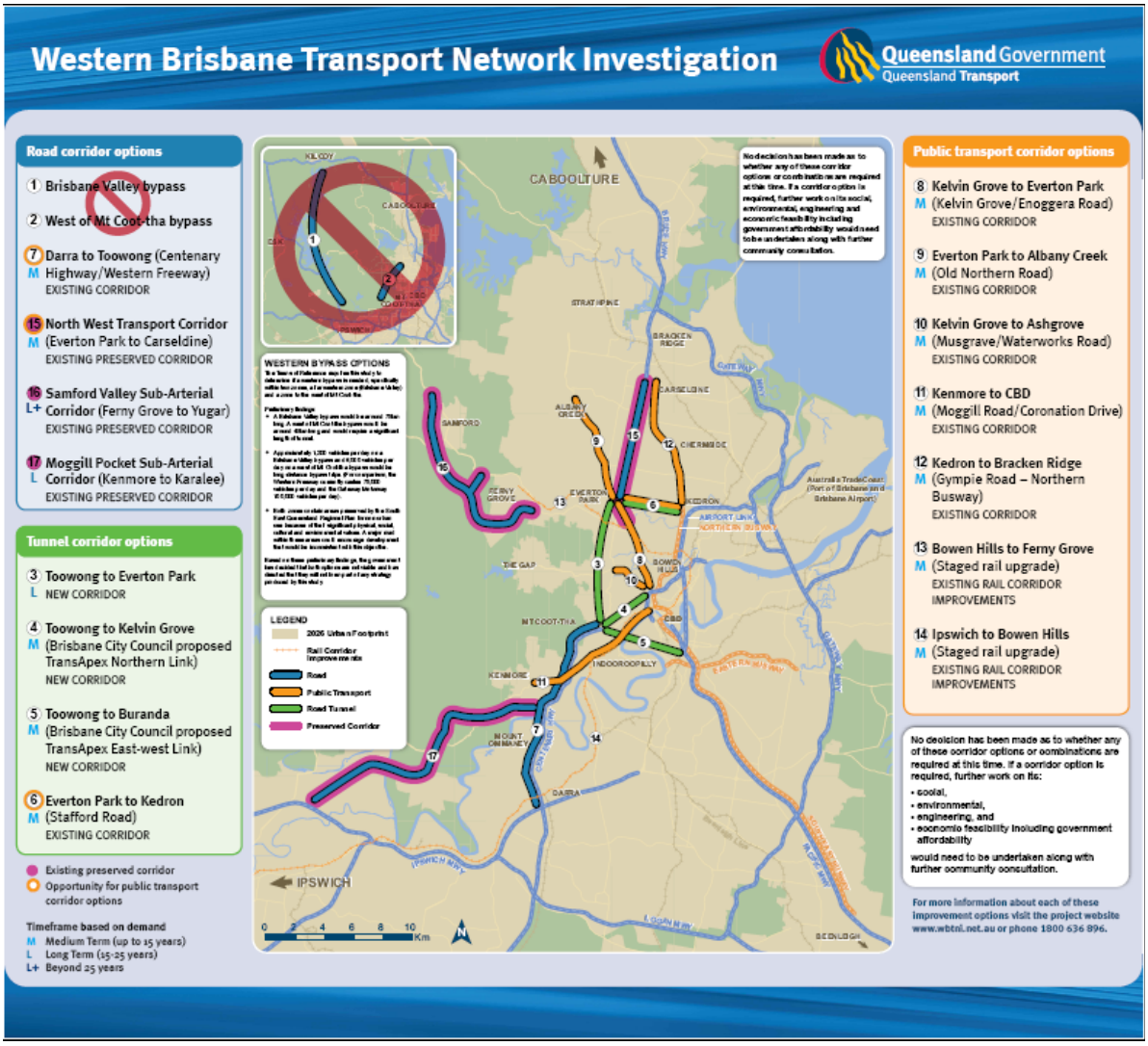
Source: Queensland Transport (2007), Western Brisbane Transport Network Investigation

The WBTNI is looking at the growth in demand for travel, including freight, and will determine the need for infrastructure improvements for the transport network in western Brisbane over the next 20 years. It will investigate all transport options - public transport, roads, freight, walking and cycling - and how these will be integrated with other transport initiatives of the South East Queensland Regional Plan.

A range of other transport investigations are feeding into the WBTNI process including considerations regarding the Australia TradeCoast Transport Study, Centenary Highway bus priority/transit lanes investigations, Gateway Motorway North Planning Study, Inner City Rail Capacity Study, Inner City Bus Access Capacity Study, Kenmore Bypass Study, North Moreton Transport Network Study, Northern Busway (Royal Children's Hospital to Kedron to Bracken Ridge), Petrie to Redcliffe multi-modal corridor and Northern Link itself.

In April 2008 WBTNI released a range of options of possible corridors for public comment. These included active transport infrastructure for walking and cycling, bus improvements (bus lanes, bus priority and busways), rail upgrades and road improvements. These options (not including the active transport network improvement options) are shown in **Figure 21-2**. In early August 2008 WBTNI had not been finalised, although reporting to the State Government during the later half of 2008 was anticipated.

- **Figure 21-2 WBTNI - Possible Transport Corridor Options**



Source: Queensland Transport (2008), Western Brisbane Transport Network Investigation,

It is noted that Northern Link (WBTNI Tunnel Corridor Option 4) is incorporated in the listing of potential strategy elements displayed in April 2008. Based on the WBTNI preliminary findings, the State Government decided that two Western Bypass options, one in a far western zone (Brisbane Valley Bypass) and the other in a zone to the west of Mt Coot-tha, are not viable and directed that they will not form part of any strategy produced by the WBTNI.

Whilst a range of corridor options were identified by the WBTNI in the April 2008 consultation round, it was identified in the display material that no decision has been made as to whether any of the options or combinations are required at this time and that if a corridor option is required, further work on its social,

environmental, engineering, and economic feasibility including government affordability, would need to be undertaken along with community consultation.

21.4.3 Assessment of Cumulative Effects with WBTNI options

To assess the cumulative effects of the relevant key WBTNI corridor options as displayed in April 2008, traffic modelling was undertaken using the Northern Link Traffic model. In consultation with the State Government's WBTNI project team, a 2026 time horizon was identified as the appropriate time horizon for indicative assessment. The following WBTNI corridor options were identified as the most relevant for cumulative effect review for Northern Link. Project coding for these options was supplied by the WBTNI project team in MapInfo format, and converted for use in the Northern Link Traffic model:

Option 3: Toowong to Everton Park (New Corridor)

A proposed 10km tunnel with a minimum of four lanes between the Western Freeway at Toowong and Stafford Road at Everton Park. In combination with the Everton Park to Kedron (Stafford Road - Option 6) and North West Transport Corridor (Option 15) this would link to form part of a western ring road which would support a north/south link for longer distance traffic to the west of Brisbane. This initiative is being considered by WBTNI as it would:

- complete a ring road link west of the city centre;
- relieve congestion at the Toowong roundabout and Western Freeway;
- reduce north-south traffic on existing roads in western Brisbane;
- enable improvements to public transport and walk/cycle movements;
- take long distance freight and private vehicles off the suburban network; and
- provide alternative access to the ATC via Stafford Road.

Option 6: Everton Park to Kedron (Stafford Road corridor)

This proposal within the existing four kilometre Stafford Road corridor between South Pine Road at Everton Part and Gympie Road at Kedron would incorporate an upgrade to the existing arterial road, including bus lanes and/or a new road in a tunnel with a minimum of four lanes to reduce congestion on Stafford Road and provide the opportunity for an east west public transport link from Mitchelton/Enoggera to the Northern Busway at Kedron. This option is being considered by WBTNI as it would:

- link the eastern suburbs and the ATC via the planned Airport Link;
- improve public transport from western suburbs to the east, including to the ATC; and
- provide access to the Northern Busway from the west.

Option 15: North West Transport Corridor (Everton Park to Carseldine – existing preserved corridor)

This option is located within the existing 8km of preserved transport corridor between Gympie Road at Carseldine and Stafford Road at Everton Park. This option would work in combination with the Everton Park to Kedron (Option 6) and Toowong to Everton Park (Option 3) to complete a motorway ring road and north/south link for longer distance traffic to the west of Brisbane. This initiative is being considered by WBTNI as it would:

- assist transport movement between the northern suburbs, city and inner-western suburbs;
- improve the frequency and reliability of public transport between Strathpine and the city;
- reduce traffic on the local road network, for example Old Northern Road and Webster Road; and
- provide for long distance north-south movement of freight and private vehicles.

Option 5: TransApex East-West Link (Toowong to Buranda)

This option was also included in the testing of cumulative effects with the other potential WBTNI initiatives. The network coding representing the East-West Link was based on the TransApex Pre-feasibility study (2005).

All WBTNI links have been tested as tolled links operational in 2026. Demand matrices were established based on the inclusion of the WBTNI project infrastructure within the network. With the inclusion of several major tolled links branching from the Western Freeway in 2026 (ie: Option 3 - Toowong to Everton Park , Option 5 - E-W Link and Option 4 - Northern Link), it was assumed that the Western Freeway and Centenary Motorway, including the Centenary Bridge, would operate as three general purpose lanes in each direction for this assessment.

Table 21-4 presents the findings of the cumulative effects test of the WBTNI corridor options (as described above) with Northern Link for 2026 based on preliminary modelling.

- **Table 21-4 Cumulative Effect with WBTNI Options**

Network Scenario	2026 Northern Link Average Weekday Traffic	Change in Northern Link Forecast Average Weekday Traffic	% Reduction in Forecast Traffic Volume on Northern Link
Northern Link Only	75,900	-	-
Northern Link plus WBTNI Options 3, 6, 15 and 5	66,500	-9,470	-12.4%

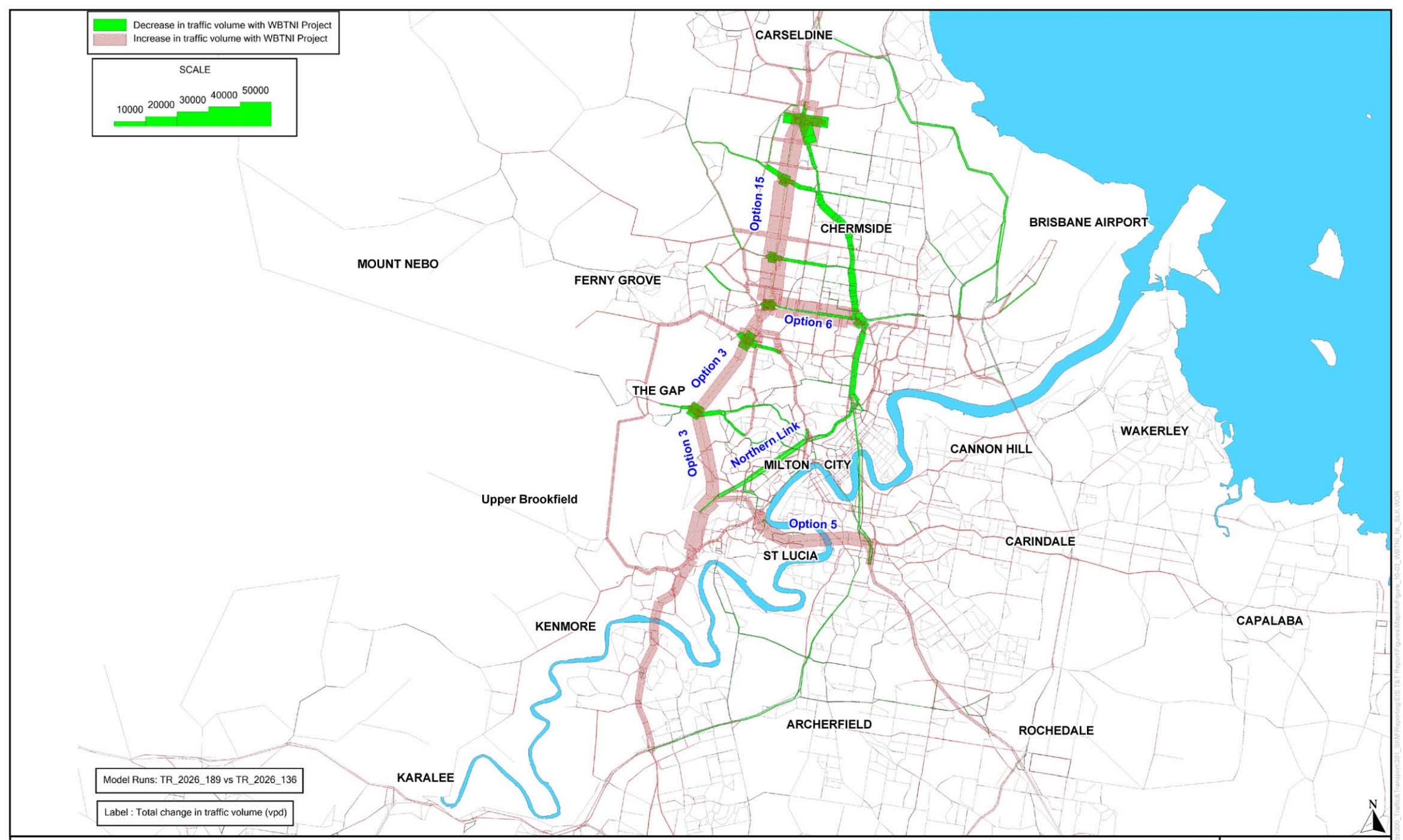
Table Notes:

(1) The WBTNI project representations are based on MapInfo coding provided by the State for use within Council's Northern Link transport model.

(2) Preliminary modelling is based on an indicative 50c/km toll rate (in 2008 dollars) for WBTNI Options 3, 6 and 15, and a toll of $3.93 on E-W link and Northern Link.

Figure 21-3 presents the indicative traffic flow changes within the network in the cumulative scenario with Northern Link and WBTNI options 3, 6, 15 and 5; compared to the Northern Link only project case.

Figure 21-4 shows the indicative daily travel patterns that would be expected for use of Northern Link in the cumulative scenario.



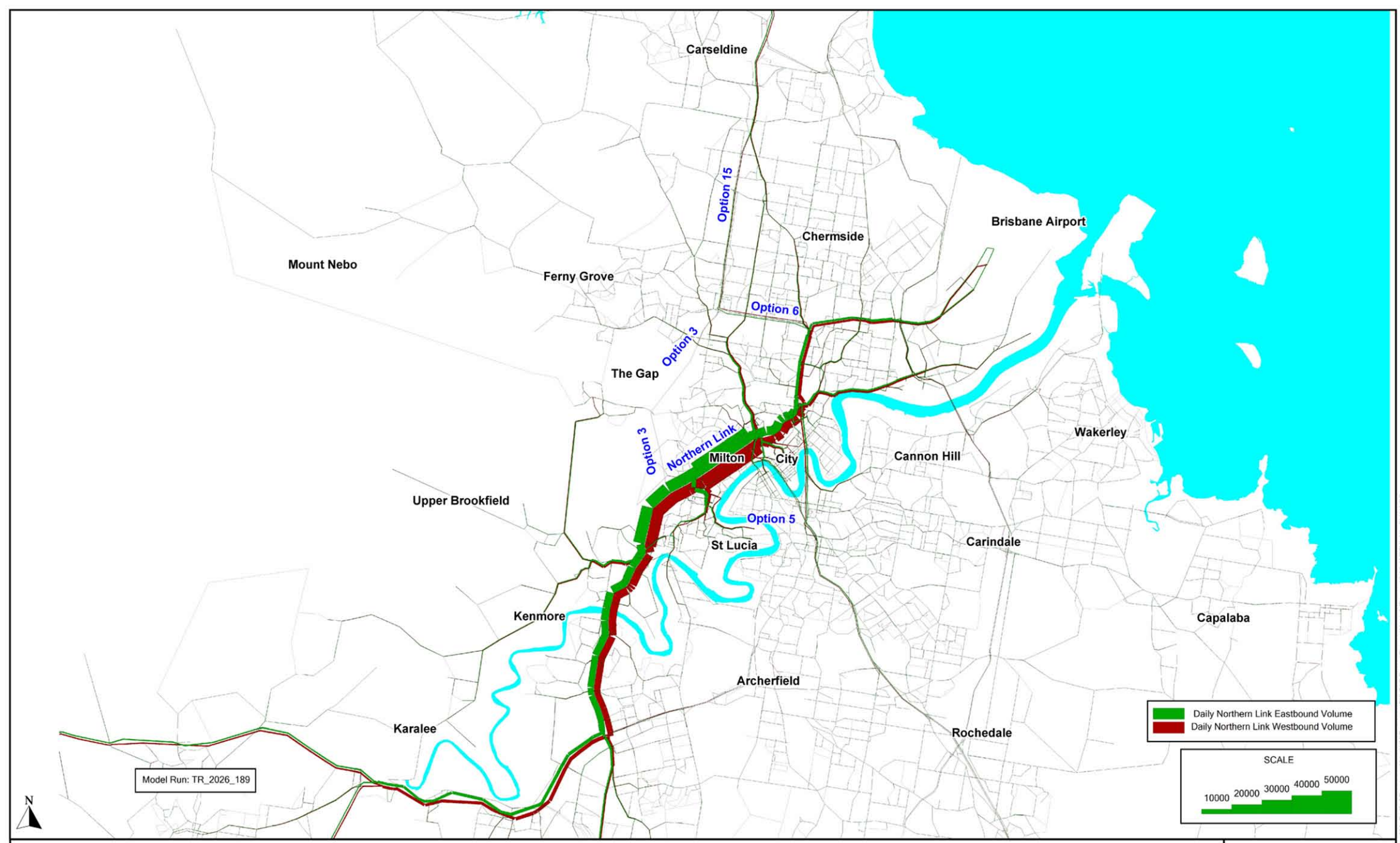
Northern Link
Environmental Impact Statement

Figure 21-3

Indicative Effect of WBTNI Options on Network including Northern Link (2026)

Northern Link

SKM Connell Wagner JOINT VENTURE



NORTHERN LINK
ENVIRONMENTAL IMPACT STATEMENT

Figure 21-4

Indicative 2026 Travel Patterns for Northern Link with WBTNI Options

Northern Link

SKM Connell Wagner JOINT VENTURE

Key findings for this cumulative effects assessment are listed below.

- As there is some overlap of the cross-city functions (west-east, west-north and west-south) performed by the WBTNI Options and Northern Link, a small reduction in traffic use of Northern Link is forecast. This preliminary modelling indicates that the average weekday Northern Link traffic volume would reduce by 12.4%, from 75,900 vehicles per day in 2026 to 66,500 vehicles per day. It is noted that the proposed toll rates for these other facilities have not been published to date, so preliminary assumptions only have been applied.
- Northern Link as illustrated in **Figure 21-4** would continue to cater for similar strong, east-west travel patterns between the Western Corridor and the ATC in the cumulative scenario (compare with **Figure 5-39** in chapter 5). Northern Link (**Figure 21-4**) would also function as a feeder within a west to north travel route via ICB, Airport Link, WBTNI Option 6 (Stafford Road upgrade) and WBTNI Option 15 (North-West Transport Corridor). Overall the predominant cross-city function provided by Northern Link between the west, east and north would be maintained.
- Traffic reductions in the cumulative scenario would result with key roads such as ICB, Gympie Road, and Gateway Motorway north, likely to benefit from congestion relief. Increased traffic volumes are forecast for the Western Freeway and Centenary Highway (in line with the capacity upgrades that would be implemented on these corridors to feed a combination of Northern Link and WBTNI Project 3).
- The detailed surface road impacts in the north-west suburbs would need to be examined further when connection details are established for the WBTNI options. This preliminary testing of cumulative effects indicates minimal change to the local streets and city distributors in the Inner West with the combination of Northern Link and the WBTNI projects.