



Appendix A

Terms of Reference

South East Busway Extension Rochedale to Springwood Concept Design Study Terms of Reference

December, 2008

Queensland Transport



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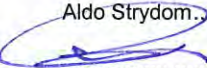
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Date: 9 December 2008

Distribution: Queensland Transport (pdf copy); PB Library, PB File

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Glossary of terms and abbreviations

CDS	Concept Design Study
IRTP	Integrated Regional Transport Plan
LCC	Logan City Council
SEBX2	South East Busway Extension — Rochedale to Springwood
SEQ	South East Queensland
SEQIPP	South East Queensland Infrastructure Plan and Program
SEQRP	South East Queensland Regional Plan
SPP	State Planning Policy
TOR	Terms of Reference

1. Purpose of the terms of reference

These draft terms of reference (TOR) details the methodology to guide the preparation of a concept design study (CDS) for the South East busway extension, Rochedale to Springwood (SEBX2) project. The overall aim of the CDS is to preserve a corridor for a future busway between Rochedale and Springwood.

1.1 Overview

The TOR will provide a guide for undertaking the CDS for SEBX2. It includes:

- the objectives of the CDS
- a description of the study area
- an overview of the role of community consultation in the CDS process
- an outline of the methodology
- guidelines to develop the content and structure of the CDS document
- a thorough list of investigation areas to consider in the process of developing a CDS. Not all investigation areas will be relevant or significant enough in the study area to warrant detailed investigation.

1.2 Objectives

The objectives of the CDS are to:

- develop a preferred concept design for the extension
- assess impacts and determine how they are able to be mitigated
- provide necessary information to support the strategic business case
- provide government with sufficient information to preserve the corridor
- provide the community with sufficient information to understand the project, aims, methodologies, impacts and typical mitigation measures.

1.3 Study area

CDS investigations will centre around a corridor in the general vicinity of the Pacific Motorway, between Underwood Road, Rochedale and near Fitzgerald Avenue, Springwood. Some topics of investigation will warrant analysis within a wider catchment to successfully identify impacts. A preferred alignment for the busway will be identified within the study area.

1.4 Community consultation

The community consultation program will be managed by the Queensland Transport project team with reference to Whole of Government community engagement guidelines. During the CDS process, the general community will be able to provide input into the preferred busway corridor and options.

1.5 Methodology

Conceptual design and technical studies that are to be carried out as part of the CDS process are discussed in detail in Chapter 3. A draft CDS report is to be prepared by PB, which will be used by Queensland Transport to prepare the In Brief document which in turn will be used to brief the Minister and for community consultation. A final CDS document is to be prepared once the consultation process has been completed and should take into account any necessary comments.

Both the draft CDS report and final CDS report will provide input into the Strategic Business Case.

Stage 1 — Gap analysis, detailed program of works and scope definition

PB have reviewed previous studies and related data — provided by Queensland Transport — and undertook a gap analysis in order to define a scope for the overall CDS process to meet the objectives as set out in Section 1.3 above. The scope is defined in these TOR. A detailed program of work has also been developed.

Stage 2 — Technical investigations, concept design and draft CDS report

A draft report will be developed by PB. This report will be made available for public comment. The draft report will:

- report on the (technical) investigations carried out as defined in Chapter 3
- report on the available corridor alignment options, preferred option and selection process
- include conceptual designs for the preferred option in an A3 report, showing horizontal layouts and longitudinal sections as well as typical cross-sections.

Stage 3 — Final CDS report

A final CDS report will be produced that:

- includes the outcomes from the investigations of the draft CDS report
- incorporates any necessary changes from the consultation outcomes
- includes conceptual designs for the preferred option in an A3 report, showing horizontal layouts and longitudinal sections as well as typical cross-sections.

2. CDS documentation

The CDS will document:

1. The need, outcomes and benefits of the busway extension.
2. Policies, standards and legislation that are relevant to each area of investigation.
3. The process used to develop and select an alignment for the busway extension.
4. Relevant aspects of the existing social and natural environment to be affected by the busway extension.
5. The likely environmental, economic and social impacts of the busway extension during construction and operational phases.

3. CDS investigations

The CDS investigations have been reviewed by the project team (including Queensland Transport) with respect to the appropriate depth required for each topic area. It is important to note that a number of mandatory technical inputs are required in order to provide input into the strategic business case. These have not changed e.g. traffic and transport assessment/modelling.

The CDS process will include appropriate levels of investigation for corridor preservation in the following areas:

- concept design and engineering
- alignment selection
- legislative and policy requirements
- land use and planning
- traffic and transport
- network integration strategies
- social environment
- economic environment
- noise and vibration
- cultural heritage
- urban design
- air quality (by Queensland Transport)
- water quality
- hydrogeology
- hydrology and hydraulics
- ecology
- soils, topography, geomorphology and geotechnical conditions.

Where possible, the CDS will draw as much as possible from previously completed studies of relevance.

For the relevant areas of investigation the CDS will:

- provide a description of the existing environment
- discuss relevant standards, policies and legislation
- list potential benefits and impacts and, where applicable, discuss any relevant mitigation strategies.

All investigations and assessments will take into consideration the Queensland Government's commitment to a sustainable growth management strategy for South East Queensland (SEQ). Sustainability will be a consistent theme throughout the report.

3.1 Concept design and engineering

The concept design and engineering component will require a description and analysis of the following areas:

- existing transport corridor
- design criteria
- proposed busway alignment(s)
- proposed busway station(s)
- alignment selection
- safety
- related infrastructure planning and works
- land requirements (property)
- public utility plant
- constructability
- staging
- operational engineering issues
- asset management and maintenance
- cost estimates.

These areas of investigation are described in more detail below.

3.1.1 The existing transport corridor

The CDS report will provide a brief description of the existing physical transport corridor and general background information. It will require engineering information from the following disciplines:

- geotechnical
- structural
- civil
- traffic
- hydrology / hydraulic.

3.1.2 Design criteria

Design criteria identified in the CDS will utilise, where appropriate, the busway network design criteria which were developed and established in previous similar projects. Relevant design criteria may include:

- design standards for all components of the busway, such as:
 - busway design speeds
 - typical cross sections of the busway

- ▶ vertical and horizontal geometry
- ▶ treatments for structures
- ▶ traffic control and management
- ▶ intelligent transport systems for passenger information and busway management strategies
- ▶ pavements
- ▶ drainage and stormwater management
- ▶ lighting
- ▶ signage and linemarking
- ▶ tunnel safety and services
- ▶ aesthetics and urban design
- ▶ noise amelioration
- ▶ cultural
- ▶ bus stations and associated facilities.
- pedestrian and cycle facilities to and at busway stations
- future public transport opportunities
- incorporation of sustainable design features such as rainwater and solar energy collection and use, Water Sensitive Urban Design, climate sensitive design, energy minimisation, waste minimisation and recycling facilities.

3.1.3 Proposed busway alignment(s)

The proposed SEBX2 alignment(s) will be presented as follows:

- key plan showing location of busway alignment(s) and sheet layouts
- standard typical cross sections detailing busway standards
- general arrangement plans showing busway layouts:
 - ▶ busway in plan (including stations) in sufficient detail and accuracy to clearly identify impacts to affected properties
 - ▶ type, location and extent of road carriageways, bridges, tunnels and earthworks for the busway and busway stations
 - ▶ physical impacts on local and/or state controlled roads, including any associated works such as service roads, minimum carriageway widths and facilities such as pedestrian and cycle access and paving
 - ▶ local road access control management and proposed busway access ramp locations and configurations
 - ▶ busway conflicts with existing and known future services
 - ▶ physical impacts on local watercourses and waterways (for example, piers or embankments)
 - ▶ major carriageway structures and other proposed works where relevant

- any supplementary emergency access locations and relevant safety features
- corresponding longitudinal section with natural ground and relevant design parameters (horizontal and vertical curve data, grades, etc).
- cross sections at key locations
- general arrangements for bridges and tunnels
- general arrangements for major retaining walls.

3.1.4 Proposed busway station(s)

The proposed SEBX2 station(s) will be presented as follows:

- standard typical cross sections detailing station standards
- general arrangement plans showing busway station layouts in sufficient detail to demonstrate that key components have been identified and considered.

3.1.5 Alignment selection

Alignment option development process

Alignment options will be developed and refined with consideration of the likely impacts and benefits during construction and operation. This includes the development of a methodology for evaluating and refining options, including evaluation criteria.

Alignment option evaluation

The evaluation process will be described including:

- methodology
- evaluation criteria
- results and sensitivity testing
- review of options for refinement opportunities.

Selected option

Description of options selected for more detailed evaluation in the draft CDS and the reasons for selection. Preferred option as outcome.

3.1.6 Safety

The CDS will include a description of safety issues, management strategies and design considerations, including:

- safety during the planning and design of the busway, including:
 - Crime Prevention Through Environmental Design analysis and recommendations, including local pedestrian and cycle access pathways
 - safety issues during the construction of the busway
 - safety requirements for operation of the busway (including safe access for maintenance)
 - incident identification and management strategies

- road safety review of the preferred busway alignment
- consideration of sightlines, speeds and braking distances (geometrical constraints) in design.

3.1.7 Related infrastructure planning and works

The CDS will include a description of the existing and planned infrastructure along the alignment corridor including pedestrian and cycle facilities. This will include recent plans of work by Queensland Transport, Main Roads, and Logan City Council (LCC).

3.1.8 Land requirements

The expected land requirements for SEBX2 will be identified and presented. This will include the extent and nature of land required.

3.1.9 Public utility plant

The CDS will investigate impacts on existing and proposed public utility plant and services, including:

- requirements for relocation or protection of existing services
- known future services
- disruptions and estimated costs of impacts on existing services in consultation with service providers
- opportunities for the provision of future service corridors following consultation with service providers
- provision for planned future services.

3.1.10 Constructability

Construction issues requiring consideration in the busway development include:

- likely construction techniques and equipment used
- likely activities associated with construction on and off site
- impacts on existing traffic (including pedestrian and cycle movements)
- potential sequencing of construction, including minimising impacts on residents, businesses, commuters and local traffic.

3.1.11 Staging

The CDS will investigate opportunities for staged delivery of the busway, including:

- impacts on busway operations
- impacts on public transport network integration
- impacts on the community.

3.1.12 Operational engineering issues

The CDS will include a description of the proposed busway operational issues, including:

- proposed hours of busway operations
- maintenance requirements
- location of busway operations facilities
- bus layover requirements and opportunity for provision
- diversion plans
- all likely on and off site activities associated with operation and maintenance of the busway.

3.1.13 Asset management and maintenance

Issues that will be discussed in the CDS that will relate to the construction and operation phases of the busway will involve:

- whole of life considerations in the optimisation of the design –
 - optimal material choices for maintenance minimisation
 - ease of maintenance and repair
 - standardisation and robustness of busway components
- strategies for managing and minimising vandalism.

3.1.14 Cost estimates

The cost estimating component of the CDS will include:

- a capital cost estimate, including reporting on the methodology used
- range and risk analysis.

The CDS will also include a value management workshop in particular to discuss the range for risk.

3.2 The social environment

This component of the CDS will investigate the following areas:

- legislative and policy requirements
- land use and planning
- traffic and transport
- social environment
- economic environment
- noise and vibration
- cultural heritage
- urban design, landscape and visual amenity
- sustainability.

3.2.1 Legislative and policy requirements

With reference to previous sections the CDS will:

- identify all the relevant Commonwealth, Queensland, regional or local legislative, policy and permitting requirements needed to protect a corridor for a future busway, including land tenure arrangements
- consider all relevant international conventions and Commonwealth and State legislation.

Relevant legislation may include:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Native Title (Queensland) Act 1993*
- *Aboriginal Cultural Heritage Act 2003*
- *Queensland Heritage Act 1992*
- *Environmental Protection Act 1994*
- *Integrated Planning Act 1997*
- *Transport Infrastructure Act 1994*
- *Water Act 2000*
- *Nature Conservation Act 1992*
- *State Development and Public Works Organisation Act 1971*
- Logan Planning Scheme 2006
- other relevant acts as listed in the Main Roads Environmental Legislation Register (2001).

The intent of this section is to highlight the approvals processes deemed appropriate and available to protect the future construction of a designated busway corridor. Furthermore, it is proposed that permits and issues arising from other legislation that may impact on the ability of this corridor to be protected will also be identified.

3.2.2 Land use and planning

Description of existing environment

The CDS will:

- identify current land use within and adjacent to the area of the proposed busway
- identify in broad terms how the existing and preferred regional patterns of development relate to the catchment area, and in particular, have regard for the South East Queensland Regional Plan (SEQRP) and related land use planning studies, including LCC's proposed Local Growth Management Strategy and master-planning processes in Springwood
- identify current planning designations within and adjacent to the area of proposed works as per the Logan City Council Planning Scheme
- determine compatibility of the busway with the desired intent of Logan 2026 City Directions and relevant Logan City Council Planning Scheme provisions

- determine compatibility with the South East Queensland Infrastructure Plan and Program 2005-2016 (SEQIPP) and SEQRP and other regional planning documents including the Integrated Regional Cycle Network Plan for SEQ, the Integrated Regional Transport Plan (IRTP) for SEQ and Transport 2007
- consider requirements of the project under relevant State Planning Policies (SPPs).

Potential benefits, impacts and mitigation measures

The CDS will:

- discuss the potential impacts of the busway on existing and likely future land use including compliance of the project with relevant planning policies and provisions including consistency with SEQRP, Logan City Planning Scheme and its associated local plans, policies and land use designations
- assess any impact on existing residential, commercial and other sensitive activities in the vicinity of the busway that will arise from the project's construction and operation
- assess any potential impacts on the busway from known development proposals or aspirations for land uses, including those under LCC responsibility.

3.2.3 Traffic and transport

The CDS will identify the existing and future cases for public transport and private vehicle modes of transport in the study area. This will be undertaken in the context of current plans and policies and known future plans and projects.

Description of existing transport network

The CDS will:

- describe existing transport operations in terms of:
 - traffic flows
 - public transport services
 - key intersections and congestion points
 - major travel trends.

Transport demand and traffic forecasting (*draft*)

The CDS will detail forecasts for:

- travel trends — existing and desired (i.e. IRTP targets)
- public transport trends — existing and desired (i.e. IRTP targets) including likely suppressed demand
- bus volumes — current and future
- public transport activity and distribution — current and future
- traffic volumes — current and future.

Potential transport impacts (*draft*)

The CDS will:

- inform planning for network integration strategies such as off and on ramps to the busway (including stations) to accommodate regional access requirements
- document likely traffic volumes on service and access roads and on secondary corridors
- make provision for public transport services and other special operating facilities along or across the study area/corridor during construction and operation
- assess impacts of the busway on existing and expected future traffic flows
- assess impacts of changed parking demand on residents and businesses and propose strategies for management of these impacts
- assess impacts of any changes to traffic conditions and configurations within the study area.

3.2.4 Pedestrian and cycle access

Description of existing network

The CDS will assess the existing pedestrian and cycle access arrangements in the study area. This includes:

- existing pedestrian and cycle facilities
- pedestrian and cycle volumes — current and future
- main trends and targets for pedestrian and cycle movements
- predicted future trends in pedestrian and cycle movements, and bicycle parking demand levels
- identify existing and future planned pedestrian and cycle networks and any benefits, impacts and opportunities.

Pedestrian and cycle strategy

Recommend strategies for accommodating projected pedestrian and cycle movements along and across the corridor. These will focus on:

- enhancing pedestrian and cycling infrastructure to improve connectivity within the busway study area, to meet existing and future needs
- protecting for planned pedestrian and cycle networks, including major cycle spines and local routes
- providing for pedestrian and cycle access to stations through integration into existing or planned networks
- identifying the need for pedestrian and cycle crossing points across bus priority infrastructure
- identification of supporting infrastructure required for promoting cycling and walking as preferred modes of access to the majority of stations — for example end of trip facilities.

Assessment of potential pedestrian and cycle impacts

The CDS will:

- assess potential impacts on pedestrian and cycle activity and facilities along or across the study area during busway construction and operation.

3.2.5 Network integration strategy

A network integration strategy will be developed in partnership with Queensland Transport. The aim will be to facilitate the efficient integration of a recommended busway concept design into the broader transport network. This strategy will outline and apply:

- busway station location and busway access location criteria (to be provided by Queensland Transport)
- need for supporting local bus priority measures near access locations
- criteria for developing inter-modal access and interchanges (kiss-and-ride and park-and-ride)
- bus operations and route planning
- bus priority staging.

Busway staging options will be investigated and recommendations made for implementation of staged bus priority measures leading to a full busway solution.

The assessment will identify the benefits and triggers for implementation options along the corridor.

3.2.6 Social environment

In order to identify the potential social benefits and impacts of the busway, a desktop assessment will be undertaken on a study area of primary interest to the assessment.

Description of existing environment

The existing social environment will be described in terms of:

- demography and social structure
- social infrastructure, including social facilities and services
- what the community values within the study area.

The CDS will also identify tenure patterns and specific tenures of the study area, including registered Native Title claims (addressed in cultural heritage section).

Existing desktop information (Australian Bureau of Statistics census data, council websites, etc.) will be gathered to prepare this basic demographic profile.

Potential benefits, impacts and mitigation measures

The CDS will contain a discussion of any social benefits and impacts, and their significance, of the busway on the study area. It will also contain a discussion of appropriate mitigation measures to minimise social impacts and facilitate positive outcomes. This assessment will include the analysis of existing information and will identify:

- potential societal changes

- social benefits and impacts resulting from the busway
- opportunities to facilitate beneficial, transport related social outcomes such as improved connectivity.

3.2.7 Economic environment

Description of existing environment

The CDS will describe the existing economic environment in terms of key economic drivers at the local and regional level. This may include but is not limited to:

- the mix of business and activity
- availability and cost of commercial and residential property
- employment and the availability of skills
- any access related barriers to economic growth and development in the study area.

Potential benefits, impacts and mitigation measures

At a broad level the CDS will identify economic benefits and impacts of the busway on the local and regional economies, and where relevant, recommend possible management strategies. This may include but not be limited to:

- direct user benefits (such as travel time savings, reduced private vehicle operating costs and road safety improvements)
- benefits and impacts on existing and potential businesses and commercial properties within the study area (catchment)
- impacts from construction activity
- socio-economic effects (employment, land use changes, etc.)
- environmental and amenity related economic impacts.

3.2.8 Noise and vibration

Description of existing environment

The existing noise and vibration environment will be assessed by:

- reviewing available data from any ambient noise monitoring in the study area.

Potential benefits, impacts and mitigation measures — construction

To assess construction impacts the following will be undertaken:

- identify and assess potential noise and vibration impacts which may arise from the construction of the project, including noise and vibration generated by tunnelling or excavation works and surface construction sites
- identify and assess potential noise and vibration impacts associated with potential spoil disposal haulage routes.

This assessment is to include noise and vibration impacts to or on critical areas e.g. educational facilities and health care facilities, and ground vibration effects on equipment within such facilities.

Potential benefits, impacts and mitigation measures — operational

To assess operational impacts the following will be undertaken:

- assess the likely direct noise impacts associated with busway operations
- if applicable, carry out calculations to assess operational phase vibration and reradiated noise impacts in critical shallow tunnel areas
- analyse and identify significant changes in traffic noise generation on the road network that may be associated with busway operation
- assess and document the noise predictions against relevant guidelines, legislation and standards and compare predicted noise levels with planning levels stated in the Environmental Protection (Noise) Policy 1997.

3.2.9 Cultural heritage

Description of existing environment

The existing cultural heritage environment will be assessed by:

- describing the existing values for indigenous and non-indigenous cultural heritage sites, places, and their values that may be affected by the busway in accordance with the Queensland *Aboriginal Cultural Heritage Act 2003* and the *Queensland Heritage Act 1992*.

Potential benefits, impacts and mitigation measures

The CDS will:

- provide a description of any likely impacts on sites of indigenous and non-indigenous cultural heritage
- provide a discussion of potential management strategies for mitigating any adverse impacts on indigenous and non-indigenous cultural heritage values and enhancing any positive impacts.

The CDS will also make recommendations for further studies, including the development of a historical Cultural Heritage Management Plan.

3.2.10 Urban design

Description of existing environment

The urban design analysis will consider relevant benefits and impacts associated with the introduction of the busway. To evaluate the urban design, landscape and visual elements of the busway extension, the CDS will:

- assess the existing urban design within the study area
- develop urban design strategies for the extension of busway as a whole and in terms of key locations.

Potential benefits, impacts and mitigation measures

Where relevant, the CDS will:

- seek to identify ways to preserve or enhance the existing landscape elements, including green space and built environments (structures & buildings)

- identify urban design opportunities, including surface landscaping, busway stations, and siting and design of surface structures including noise mitigation structures
- assess the overall urban design, landscape and visual outcomes of the busway
- develop urban design, landscape and visual concepts for the key locations identified, reflecting predicted changes to land use, public amenity and public access
- document changes to visual/physical character, amenity and setting.

3.2.11 Sustainability

While sustainability is an overarching theme that will be considered within each area of investigation in the CDS it is believed that the levels of sustainability are continually changing. For the purposes of corridor preservation it is necessary to note that time delays between planning and construction may be significant enough to mollify any sustainability factors considered due to new technologies. It is therefore recommended that for corridor preservation purposes, sustainability of design is not considered until prompted by design. The CDS will therefore document the approach to sustainability and identify potential sustainability outcomes including climate change and carbon outputs.

3.3 The natural environment

This component of the CDS will investigate the following areas:

- air quality (by Queensland Transport)
- water quality
- hydrogeology
- hydrology
- ecology
- soils, topography and geomorphology.

3.3.1 Air quality (by QT)

Description of existing environment

The aim of the air quality assessment is to:

- identify sensitive receptors near the recommended alignment
- describe any existing sources of dust, odours and particulate emissions influencing air quality within the study area
- review prevailing meteorology and analyse prevailing wind directions and threshold wind speeds (for dust and particulate generation)
- identify the main air quality issues associated with the proposed busway
- ascertain the potential for nuisance and amenity impacts associated with air emissions from the proposed works including dust, odours and particulates.

The scope includes:

- legislative and regulatory requirements for construction air emissions and establishing relevant construction air quality goals (Environmental Protection (Air) Policy)
- consistency with the SEQ Regional Air Quality Strategy.

To assess the air quality changes associated with the busway, the following tasks will be undertaken:

- detail climatic and meteorological factors affecting air quality impacts, including:
 - the effects of adverse conditions (for example inversions, mixing heights and sea breeze conditions) on air quality impacts
 - ambient air quality in areas likely to be affected by the project with information on those pollutants which are expected to be influenced by emissions from the proposal (particular attention should be given to photochemical smog (ozone), oxides of nitrogen, particulates including fine particulates, lead, carbon monoxide, volatile organic compounds, odour and dust)
 - likely future trends in ambient air pollutant levels given existing trends in emissions.
- include the above information in a public health risk assessment, including (but not restricted to):
 - estimating emission rates
 - estimating ambient concentrations using dispersion modelling, calibrated and based on existing monitoring data
 - identifying populations and estimating exposure levels, particularly for sensitive receptors.

Potential benefits, impacts and mitigation measures — construction

The CDS will describe environmental impacts of air borne emissions, including dust and odours, during construction (nuisance impacts), including:

- reviewing project details and likely construction activities (location of route, surface excavations, site compounds, stockpiles and proposed transport routes to spoil disposal sites etc)
- discussing the proximity of construction activities to nearest sensitive places
- outline requirements for heavy (construction) vehicles and machinery compliance with the Diesel Vehicle Emissions National Environmental Protection Measure
- identify any air quality issues associated with the preferred location for site compounds and construction works etc, and discussing the potential for air (dust and odour) emissions from these sources and the likely risk of nuisance impacts
- outline potential control methods for construction works (including during tunnelling if applicable)
- recommend impact management strategies which would minimise air emissions, including dust and odour impacts on adjacent and affected surrounding receivers during these works.

Potential benefits, impacts and mitigation measures — operational

Impacts on air quality during the operation of the busway will be assessed in accordance with the Environmental Protection (Air) Policy.

Based upon previous assessments for busways and necessary site specific information, the assessment will:

- identify likely impact of air emissions from the busway on air quality (pollution levels are to be compared with National Health and Medical Research Council and the Environmental Protection Agency guidelines. Reference should be made to the National Environmental Protection Measures guidelines and any relevant international guidelines and standards)
- identify and describe potential emission sources (including fugitive emissions) and detail source characteristics and emission characteristics (for example, concentration, mass emissions rate)
- predict ground level concentrations at areas surrounding the busway route and provide a comparison with accepted air quality criteria (includes considering the potential for interaction with plumes with existing and approved future sources in the vicinity of the route)
- assess the significance of the predicted ground level concentrations of each pollutant, including:
 - estimating the number of persons likely to be exposed to elevated concentrations and the likely frequency and times of occurrence
 - describing the likely consequences of elevated ground level concentrations (for example, health effects, vegetation damage, damage to structures)
 - describing appropriate management plans, where required, to assess the potential risk of exposure assessment to reduced indoor air quality during busway operations
- describe air pollution reduction strategies in both the local, sub-regional and regional context (for example, adjustable speed controls to ensure smooth flowing traffic, buffers, reduced trip times)
- describe the potential for increased or decreased photochemical smog formation and other regional air quality impacts resulting from changing emissions of NO_x or VOCs from the changes in motor vehicle use and the relocation of buses into an exclusive unimpeded two-way carriageway
- assess the capacity of the air environment to accept further emissions of air pollutants and discuss the impact of relevant strategies and agreements (for example, National Strategy for Greenhouse Gas Emissions)
- use a recognised road traffic pollution model to predict ground level concentrations
- describe the model(s) used and the meteorological conditions considered, including:
 - all assumptions used in the predictions
 - potential errors and limitations of any modelling conducted
 - consideration of these issues in the final predictions.

Impacts of greenhouse gas emissions

The CDS will:

- assess any greenhouse gas emission impacts of the busway during construction and operation
- calculate and present changes in the volume of greenhouse emissions resulting from the busway in the long-term
- propose options to mitigate any volume of greenhouse gas emissions attributable to the project.

3.3.2 Water quality

Description of existing environment — surface water

The CDS will:

- identify and describe the watercourses affected by the busway and outline the significance of these waters to the catchment system in which they occur
- provide a desktop assessment of existing water quality in surface waters and wetlands likely to be affected by the busway, to provide the basis for a long-term monitoring program, with sampling stations located upstream and downstream of the project
- describe water quality from available information, including seasonal variations or variations with flow, where applicable and data is available
- determine a relevant range of physical, chemical and biological parameters to gauge the potential for environmental impact on any affected watercourse or wetland system
- describe the environmental values of the waterways to the affected area in terms of:
 - values identified in the Environmental Protection (Water) Policy
 - sustainability, including ongoing maintenance of quality
 - comparability with any Water Resource Plans, the SEQ Regional Water Quality Management Strategy, Land and Water Management Plans including the Brisbane River Management Plan and other local government stream management initiatives relevant to the catchment, to the extent that any of the above are relevant
- describe the water quality objectives associated with environmental values for local catchments and watercourses where relevant, so that impacts from any proposed releases resulting from construction or operation of the busway can be determined.

Potential benefits, impacts and mitigation measures — surface water

Key surface water management strategy objectives include:

- measures to avoid or minimise any proposed release, including but not limited to source reduction and water recycling
- maintenance of sufficient quantity and quality of surface waters to protect existing beneficial downstream uses of those waters (including maintenance of in-stream biota and downstream wetlands)
- protection of important local groundwater aquifers

- measures proposed to avoid or minimise afflux (localised flooding) resulting from changes to drainage patterns.

Where relevant, the CDS will:

- define the potential impacts of the busway on the water quality
- outline how nominated quantitative standards and indicators may be achieved
- outline how the achievement of the objectives may be monitored and managed
- describe any potential for environmental harm to environmental values for water as expressed in the Environmental Protection (Water) Policy
- identify any potential for the busway to provide habitats for disease vectors and describe measures to control mosquito and biting midge breeding
- outline water management measures for construction and operational stages to address surface water quality, quantity, drainage patterns and sediment movements
- identify possible sources of releases from the proposed construction worksites and the construction works and characterise possible releases in terms of their location and the likely contaminants and describe options for managing such releases and mitigating any adverse impacts that might result
- consider the above factors in light of the potential implications of climate change
- discuss potential for impacts and options for mitigation (and the effectiveness of mitigation measures), with particular reference to sediment, acidity, salinity and other emissions of a hazardous or toxic nature to human health, flora or fauna.

Reference should be made to the Environmental Protection (Water) Policy, *Water Act 2000* and the Australian and New Zealand Environment and Conservation Council 2000 guidelines.

3.3.3 Hydrogeology

Description of existing environment — groundwater

The CDS will:

- review the significance of groundwater in the study area, together with groundwater use in neighbouring areas
- identify the depth to groundwater, as well as flow direction and users
- record all groundwater facilities within the influence of the project
- take into account the findings of the acid sulfate soil assessments
- identify any groundwater dependent ecosystems
- describe the environmental values of the groundwater in terms of:
 - values identified in the Environmental Protection (Water) Policy
 - sustainability, including both quality and quantity
 - physical integrity, fluvial processes and morphology of groundwater resources.

Potential benefits, impacts and mitigation measures — groundwater

The CDS will include an assessment of any groundwater resources affected by the busway. The assessment will, where relevant:

- consider the impacts of the busway on groundwater resources
- define the extent of the area within which groundwater resources are likely to be affected and the significance of the project to groundwater depletion or recharge
- take into account the potential impact of the busway on any affected groundwater regime caused by the altered porosity and permeability of any land disturbance
- identify any impacts on groundwater dependent ecosystems and outline the management options available to monitor and mitigate these impacts
- Reference should be made to the Environmental Protection (Water) Policy, *Water Act 2000* and the Australian and New Zealand Environment and Conservation Council 2000 guidelines.

3.3.4 Hydrology and hydraulics

Description of existing environment

The CDS will:

- describe existing significant hydraulic features including floodplains, creeks and local drainage crossed by the busway
- identify flooding, overland flow and storm surge characteristics, land subject to inundation as well as regulatory requirements of LCC.

Potential benefits, impacts and mitigation measures

The CDS will:

- determine the design measures required to provide an appropriate level of flood immunity considering issues of practicality, capital and ongoing costs and consequences of failure
- provide a discussion on design measures required to minimise hydraulic impacts and satisfy regulatory requirements.

3.3.5 Ecology — flora and fauna

Description of existing environment

The CDS will:

- identify likely habitat areas in the study area, including protected or significant habitat areas
- conduct a desktop study of terrestrial flora and fauna to identify the presence of species, communities and habitat that may be affected by direct and indirect activities associated with busway construction and/or operations
- identify the presence of significant fauna and flora species that may potentially be impacted by the proposed activities, including fauna and flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999*, *Nature Conservation*

Act 1992, Vegetation Management Act 1999 and the Logan City Council Planning Scheme and Schedules that may potentially be impacted by the proposed activities.

Potential benefits, impacts and mitigation measures

The CDS will define and describe the potential benefits and impacts of the busway on terrestrial flora and fauna and, where relevant, provide a discussion on mitigation measures to minimise or avoid adverse impacts and capture positive impacts.

The discussion may cover:

- all potential direct and indirect effects likely to lead to environmental harm on flora and fauna, including short-term and long-term effects and whether the effects would be reversible or irreversible
- strategies for protecting impacted rare and threatened communities, species or habitat should be described, including any obligations imposed by State or Commonwealth legislation or local government statutory instrument
- potential impacts on the ecological values of the affected area arising from construction, decommissioning the construction sites or operating the busway
- impacts on flora and fauna from any alterations to the surface and ground water environment with specific reference to potential impacts on riparian vegetation, wetlands and other sensitive vegetation communities
- the likelihood of whether mitigation measures to ameliorate any potential negative flora or fauna impacts needs to be considered.

3.3.6 Soils, topography, geomorphology, geotechnical issues and contaminated land

Description of existing environment

The CDS will include descriptions, including mapping, of the topographical, geomorphologic and geological features of the study area including:

- the topography of the site with contours shown at suitable increments, shown with respect to Australian Height Datum
- landforms of the study area and surrounding areas, including an analysis of subsurface and slope stability where ever appropriate. Landform patterns and elements should be described using the standardised classification of the Australian Soil and Land Survey Field Handbook, McDonald et al, (1990)
- the presence of potentially economically significant mineral, energy and extractive material resources
- the geology of the wider area, with particular reference to the physical and chemical properties of surface and sub-surface materials and geological structures likely to be intercepted during construction
- hazards such as geological faults and unstable areas and erosive soils.

The CDS will also:

- describe soil profiles in areas likely to be affected by surface works, with reference to McDonald et al (1990) and Australian Soil Classification Isbell (1996)

- identify all sites on the Environmental Management Register within the study area, including clearly identifying sites above bedrock
- investigate the potential risk for intercepting acid sulfate soils and groundwater draw-down during construction. Preliminary assessment of acid sulfate soils will be undertaken consistent with SPP 2/02.
- conduct an overview of data on contaminated lands to identify sites likely to contain contaminated soils that require off-site disposal.
- Based on the collated geological and geomorphologic information, preliminary geotechnical design parameters and construction related issues should be assessed, including:
 - describe subsurface conditions likely to be affected by surface and cut and cover works
 - comment on earthwork issues and provide assessment on excavation characteristics of materials likely to be encountered within the study area.
 - make an assessment on soil and rock design parameters for the cut and cover sections
 - describe and provide engineering comments on existing pavement conditions
 - discuss possible construction difficulties
 - identify and recommend further geotechnical investigations for the next stage of the project.

Potential benefits, impacts and mitigation measures

The CDS will include descriptions of the potential impacts and mitigation measures on soils, including erosion risk, settlement risk, rehabilitation potential, acid sulfate soils and contaminated land.

The CDS will also:

- include a discussion on strategies for establishing and rehabilitating worksites
- recommend topsoil stripping, stockpiling and replacement procedures
- address the minimisation of topsoil storage times (to reduce fertility degradation).

The CDS will also include a discussion that outline strategies to manage acid sulfate soils, if applicable, based on assessment with references to the following:

- *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland* Ahern CR, Ahern MR and Powell B (1998)
- SPP 2/02 Guideline
- *Acid Sulfate Soils Laboratory Methods Guidelines in the Queensland Acid Sulfate Soils Technical Manual*. Ahern CR, McElnea AE and Sullivan LA (2004)
- *Soil Management Guidelines in the Queensland Acid Sulfate Soils Technical Manual*. Dear SE, Morre, NG, Dobos SK, Watling KM and Ahern CR (2002)
- *Legislation and Policy Guide in the Queensland Acid Sulfate Soils Technical Manual*. Dear SE, Moore NG, Watling KM, Fahl D and Dobos SK (2004).

The CDS will also:

- include a brief discussion on strategies to address the potential impacts associated with disturbance to any existing contaminated land and possible contamination of land from construction or operation of the busway
- include a brief discussion on strategies to prevent land contamination (within the meaning of the Environmental Protection Act 1994), including proposals for preventing, recording, containing and remediation of any contaminated land likely to be intercepted by construction works
- indicate how the busway would comply with existing Site Management Plans for sites located within proposed surface works areas
- include a brief discussion on appropriate emergency procedures for activities that have the potential to cause further soil contamination, including (but not limited to) emergency response actions to be taken in the event of:
 - fuel leaks from storage or during refuelling procedures
 - underground / above ground spills of contaminated soil
- include a brief description of the options for construction spoil haulage routes in relation to sensitive activities.

3.4 Consultation and communication (by QT)

3.4.1 Communication program

It is important to ensure people living in the study corridor have input to the planning process so the busway can best meet the needs of existing and future passengers.

In line with the Queensland Government's commitment to community engagement, better decision-making and optimum outcomes, a comprehensive communication program will be implemented. Queensland Transport will oversee the community engagement process and ensure opportunities for two-way exchange of information between the project team and the public.

The CDS will:

- outline the methodology adopted to consult and communicate with the community and stakeholders regarding the perceived benefits, impacts and impact mitigation measures that may arise from the project
- identify and provide information regarding consultation with affected persons and interested stakeholders (while respecting all individuals rights to privacy under the Queensland Government's privacy guidelines)
- report on the results of consultation with community members and other stakeholders throughout the study period, including a table of consultation findings that identifies:
 - all the groups, agencies, and people who have been consulted (individuals will not be publicly identified to protect their privacy)
 - the issues they raised
 - the strategies put into place to resolve these concerns and/or enhance particular positive impacts.

Appendix B

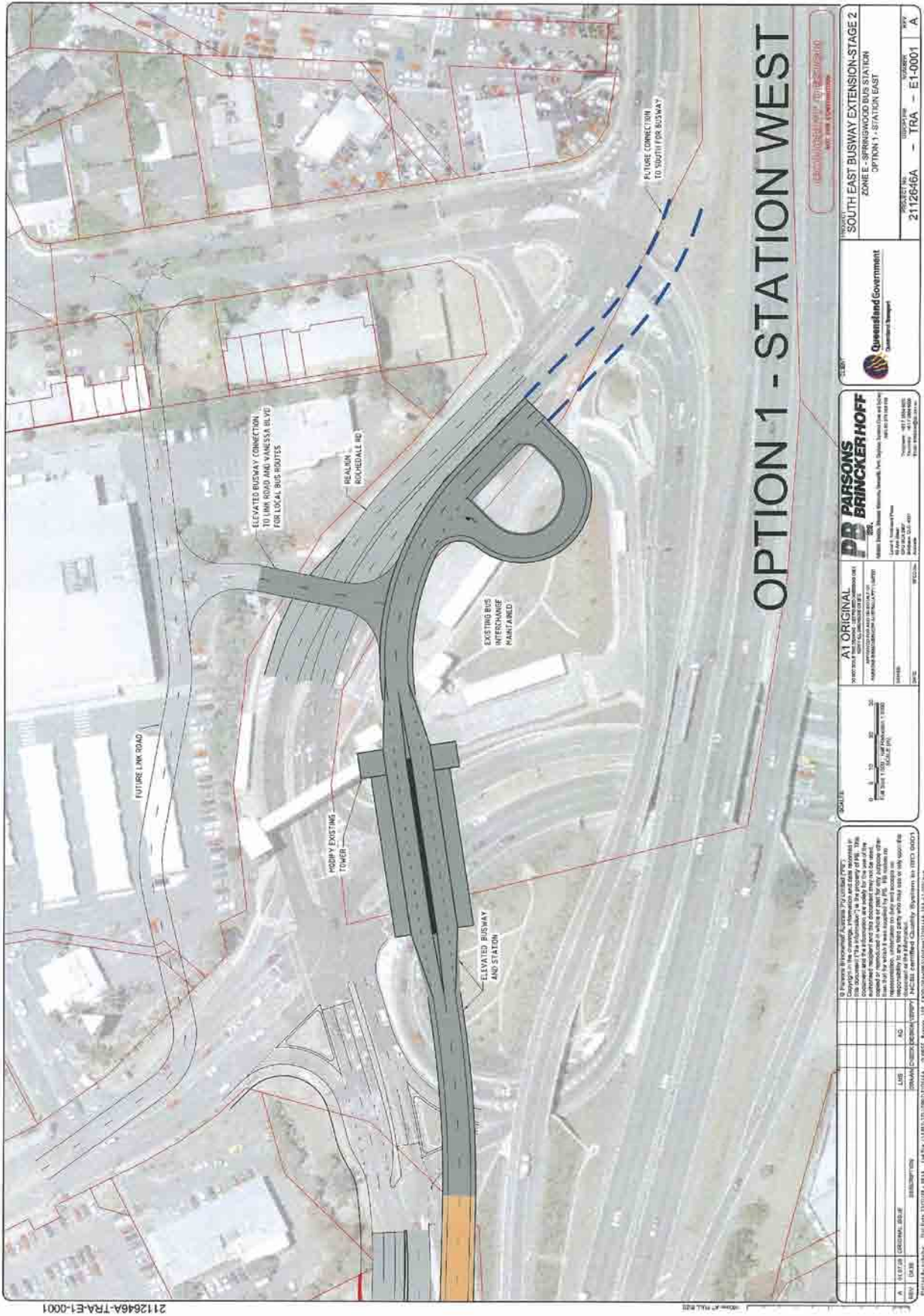
Consultation feedback

Table B-1: Benefits of busway extension (raised in consultation)

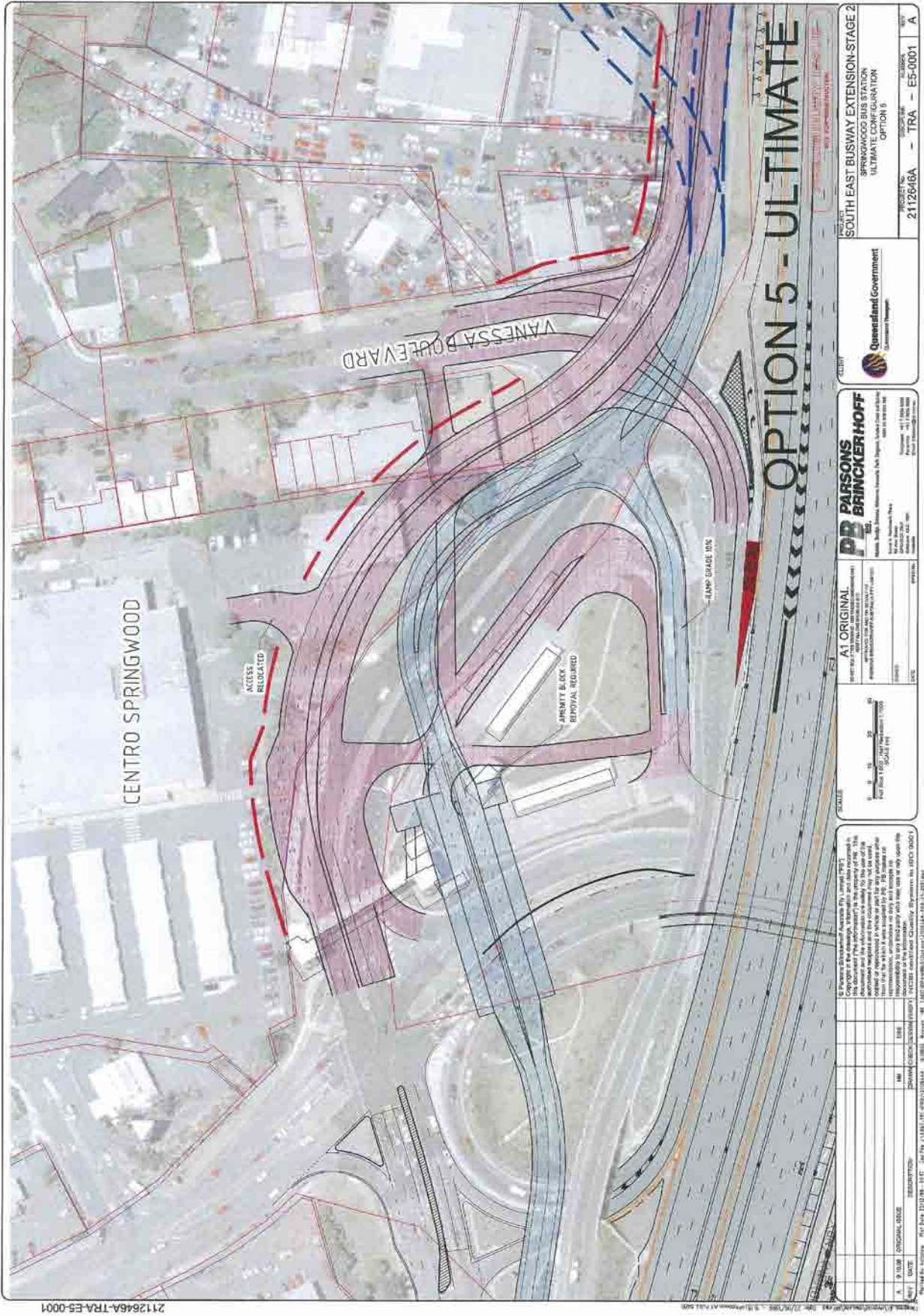
Benefit type	Summary of comments
Avoid congestion	<ul style="list-style-type: none"> ▪ buses will not get stuck on the freeway ▪ drivers will not have to seek alternative routes (when motorway is congested)
Time savings	<ul style="list-style-type: none"> ▪ saves time for commuters ▪ quicker travel time to city ▪ faster transit times from Hyperdome
Easing congestions	<ul style="list-style-type: none"> ▪ ease congestion at Eight Mile Plains ▪ less cars on the freeway
Improved bus service	<ul style="list-style-type: none"> ▪ better timetables ▪ better linkages with existing services ▪ the busway gives people a more direct route ▪ easy access and flexibility ▪ more express buses to major stops
Improved sustainability	<ul style="list-style-type: none"> ▪ reducing private car use leads to reduced noise and pollution, energy conservation, community development, behaviour modification ▪ environmentally friendly travel
Increased car parking	<ul style="list-style-type: none"> ▪ more car parking for local residences ▪ more park 'n' ride
Other benefits	<ul style="list-style-type: none"> ▪ making public transport more attractive ▪ better transport solution ▪ it will help the local area ▪ boost local economy.

Appendix C

Springwood busway station options



2112646A-TRA-E1-0001



2112646A-TRA-E5-0001

OPTION 5 - ULTIMATE

QUEENSLAND GOVERNMENT
 Queensland Transport

PARSONS BRINCKERHOFF
 CONSULTANTS

A1 ORIGINAL

DATE: 27/07/2015
 PROJECT: SOUTH EAST BUSWAY EXTENSION-STAGE 2
 SHEET: SPRINGWOOD BUS STATION
 CONFIGURATION: ULTIMATE CONFIGURATION
 OPTION: OPTION 5

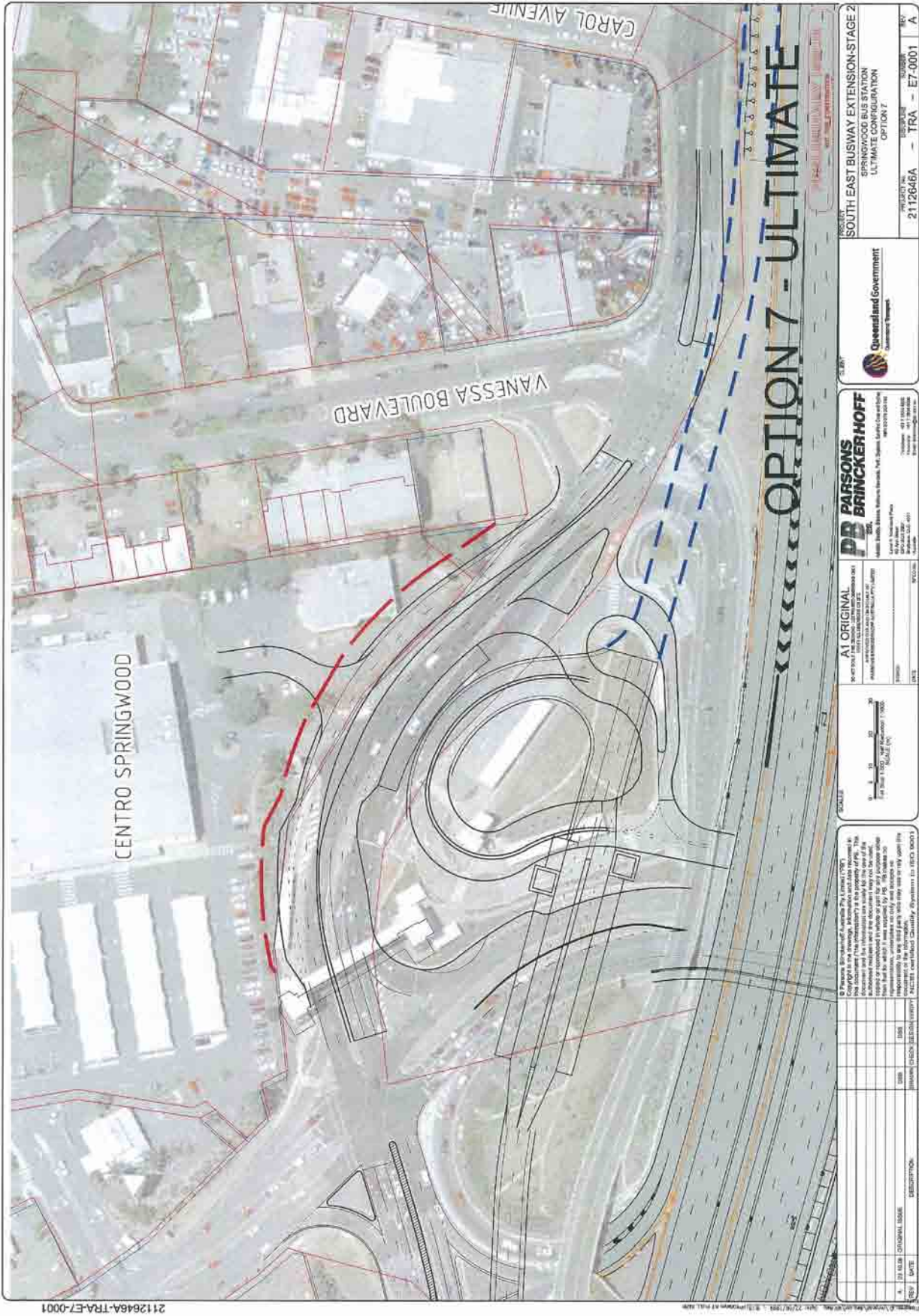
PROJECT NO: 2112646A - TRA - E5-0001

SCALE: 1:1000

DATE: 27/07/2015

PROJECT: SOUTH EAST BUSWAY EXTENSION-STAGE 2
 SHEET: SPRINGWOOD BUS STATION
 CONFIGURATION: ULTIMATE CONFIGURATION
 OPTION: OPTION 5

PROJECT NO: 2112646A - TRA - E5-0001



Appendix D

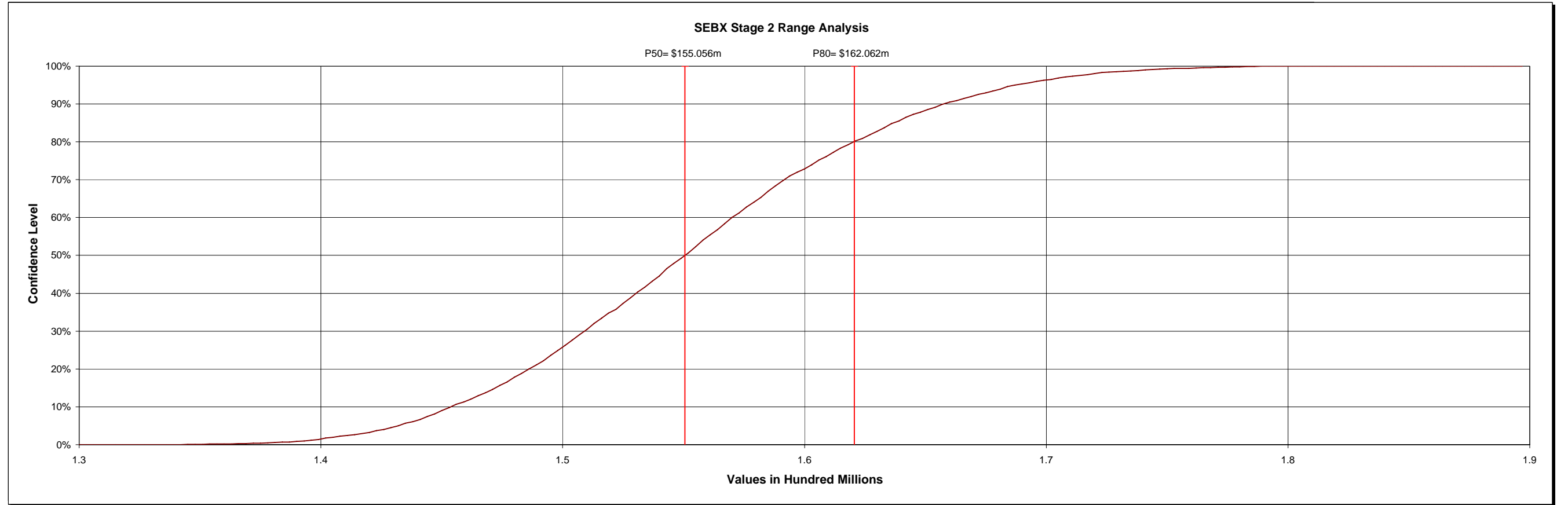
Cost estimate summary

Level	Item	Description	Unit	Bill Quantities						Nett Rate						Nett Amount			@RISK Analysis
				D/S	U/S	Min	Base	Max	D/S	U/S	Min	Base	Max	Min	Base	Max	P50		
53		Line Marking	m	20%	40%	488.00	610.00	854	10%	20%	\$ 6.38	\$ 7.09	\$ 8.51	\$ 3,113.93	\$ 4,324.90	\$ 7,265.83	\$ 4,545.38		
54		Busway Signage and furniture	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 127,611.00	\$ 141,790.00	\$ 170,148.00	\$ 102,088.80	\$ 141,790.00	\$ 238,207.20	\$ 170,143.00		
55		Supply and Install Concrete Barrie	m	20%	40%	976.00	1,220.00	1708	10%	20%	\$ 416.52	\$ 462.80	\$ 555.36	\$ 406,523.52	\$ 564,616.00	\$ 948,554.88	\$ 593,399.41		
56		Supply and install Ply sound barrie	m	20%	40%	976.00	1,220.00	1708	10%	20%	\$ 1,786.55	\$ 1,985.05	\$ 2,382.06	\$ 1,743,667.92	\$ 2,421,761.00	\$ 4,068,558.48	\$ 2,545,135.05		
57		Property Demolition Cos	day	20%	40%	24.00	30.00	42	10%	20%	\$ 12,359.46	\$ 13,732.73	\$ 16,479.28	\$ 296,626.97	\$ 411,981.90	\$ 692,129.59	\$ 432,989.51		
58	3	Electricals											\$ 221,572.01	\$ 307,738.90	\$ 517,001.35	\$ 323,423.23			
59		Road Lighting	m	20%	40%	488.00	610.00	854	10%	20%	\$ 454.04	\$ 504.49	\$ 605.39	\$ 221,572.01	\$ 307,738.90	\$ 517,001.35	\$ 323,423.23		
63						0.00					\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
64	2	Section 3 CH3560 - CH3735											\$ 5,948,790.46	\$ 8,623,603.35	\$ 13,366,975.71	\$ 8,958,818.51			
65	3	General Earthwork											\$ 6,980.40	\$ 9,695.00	\$ 14,750.40	\$ 10,047.80			
66		Clearing and Grubbing	m2	20%	20%	2,800.00	3,500.00	4200	10%	20%	\$ 1.65	\$ 1.83	\$ 2.20	\$ 4,611.60	\$ 6,405.00	\$ 9,223.20	\$ 6,535.41		
67		Strip off Topsoil 100mm	m3	20%	40%	280.00	350.00	490	10%	20%	\$ 8.46	\$ 9.40	\$ 11.28	\$ 2,368.80	\$ 3,290.00	\$ 5,527.20	\$ 3,457.62		
											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
72	3	Viaduct Structure											\$ 4,138,034.01	\$ 6,108,663.83	\$ 9,143,414.52	\$ 6,275,671.70			
73		Total Viaduct Structure piers & Footings	No	40%	40%	3.00	5.00	7	10%	20%	\$ 260,203.95	\$ 289,115.50	\$ 346,938.60	\$ 780,611.85	\$ 1,445,577.50	\$ 2,428,570.20	\$ 1,485,994.02		
74		Supply and Place girders for the viaduct 1500dee	ea	20%	20%	24.00	30.00	36	10%	20%	\$ 85,288.01	\$ 94,764.45	\$ 113,717.34	\$ 2,046,912.12	\$ 2,842,933.50	\$ 4,093,824.24	\$ 2,900,671.21		
75		Cast insitu bearings	No	20%	20%	24.00	30.00	36	10%	20%	\$ 1,276.10	\$ 1,417.89	\$ 1,701.47	\$ 30,626.42	\$ 42,536.70	\$ 61,252.85	\$ 43,402.31		
76		Viaduct Parapet pane	m³	20%	20%	208.00	260.00	312	10%	20%	\$ 729.23	\$ 810.25	\$ 972.30	\$ 151,678.80	\$ 210,665.00	\$ 303,357.60	\$ 214,948.05		
77		Cast Insitu Viaduct Slab 20c	m³	20%	20%	291.20	364.00	436.8	10%	20%	\$ 1,402.35	\$ 1,558.17	\$ 1,869.80	\$ 408,365.19	\$ 567,173.88	\$ 816,730.39	\$ 578,704.70		
78		Supply and install Ply sound barrie	m	20%	20%	280.00	350.00	420	10%	20%	\$ 1,786.55	\$ 1,985.05	\$ 2,382.06	\$ 500,232.60	\$ 694,767.50	\$ 1,000,465.20	\$ 708,895.59		
79		Line Marking	m	20%	20%	140.00	175.00	210	10%	20%	\$ 6.38	\$ 7.09	\$ 8.51	\$ 893.34	\$ 1,240.75	\$ 1,786.68	\$ 1,265.98		
80		Road Signage and furniture	LS	20%	20%	0.80	1.00	1.2	10%	20%	\$ 127,610.10	\$ 141,789.00	\$ 170,146.80	\$ 102,088.08	\$ 141,789.00	\$ 204,176.16	\$ 144,670.29		
		Supply and Install Concrete Barrie	m	20%	20%	280.00	350.00	420	10%	20%	\$ 416.52	\$ 462.80	\$ 555.36	\$ 116,625.60	\$ 161,980.00	\$ 233,251.20	\$ 165,277.63		
											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
82	3	Road Structure and Furnitures											\$ 494,378.28	\$ 686,636.50	\$ 1,153,549.32	\$ 721,601.23			
88		Property Demolition Daily Cos	day	20%	40%	40.00	50.00	70	10%	20%	\$ 12,359.46	\$ 13,732.73	\$ 16,479.28	\$ 494,378.28	\$ 686,636.50	\$ 1,153,549.32	\$ 721,601.23		
89	3	Electricals											\$ 62,971.02	\$ 87,459.75	\$ 146,932.38	\$ 91,918.01			
90		Road Lighting	m	20%	40%	140.00	175.00	245	10%	20%	\$ 449.79	\$ 499.77	\$ 599.72	\$ 62,971.02	\$ 87,459.75	\$ 146,932.38	\$ 91,918.01		
													\$ -	\$ -	\$ -	\$ -			
	3	Local Road Relocation											\$ 1,246,426.75	\$ 1,731,148.27	\$ 2,908,329.09	\$ 1,838,300.28			
		Removal of existing pavemer	m2	20%	40%	1,610.00	2,012.50	2817.5	10%	20%	\$ 18.02	\$ 20.02	\$ 24.02	\$ 29,008.98	\$ 40,290.25	\$ 67,687.62	\$ 42,341.77		
		relocate base and subbase	m3	20%	40%	483.00	603.75	845.25	10%	20%	\$ 35.65	\$ 39.61	\$ 47.53	\$ 17,218.47	\$ 23,914.54	\$ 40,176.42	\$ 25,132.51		
		Supply place and compact imported backfill 150mm CBR 4 material	m3	20%	40%	241.60	302.00	422.8	10%	20%	\$ 46.46	\$ 51.62	\$ 61.94	\$ 11,224.25	\$ 15,589.24	\$ 26,189.92	\$ 16,384.33		
		Supply and place AMCO as Prim	m2	20%	40%	1,610.00	2,012.50	2817.5	10%	20%	\$ 2.80	\$ 3.11	\$ 3.73	\$ 4,506.39	\$ 6,258.88	\$ 10,514.91	\$ 6,577.62		
		Supply place and compact imported backfill material 150mm Type 1.2 with 2% Cement	m3	20%	40%	241.60	302.00	422.8	10%	20%	\$ 102.69	\$ 114.10	\$ 136.92	\$ 24,809.90	\$ 34,458.20	\$ 57,889.78	\$ 36,212.91		
		10mm seal with class 170 binde	m2	20%	40%	1,610.00	2,012.50	2817.5	10%	20%	\$ 6.40	\$ 7.11	\$ 8.53	\$ 10,302.39	\$ 14,308.88	\$ 24,038.91	\$ 15,038.37		
		Supply and overlay DG20 with Class 320 Binder 150mm	m2	20%	40%	868.02	1,085.02	1519.028	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 193,842.73	\$ 269,226.01	\$ 452,299.70	\$ 282,953.92		
		Supply and overlay DG14 with A15E Binder 50mm	m2	20%	40%	197.64	247.05	345.87	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 44,136.37	\$ 61,300.52	\$ 102,984.87	\$ 64,424.39		
		14mm seal with S20E binder 1.5l/m²	m2	20%	40%	1,610.02	2,012.52	2817.528	10%	20%	\$ 7.48	\$ 8.31	\$ 9.97	\$ 12,041.31	\$ 16,724.04	\$ 28,096.39	\$ 17,576.60		
		Supply and overlay OG14 with A15E binder 45mm	m2	20%	40%	177.55	221.94	310.716	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 39,650.38	\$ 55,069.97	\$ 92,517.55	\$ 57,875.40		
		relocate road lighting:	m	20%	40%	140.00	175.00	245	10%	20%	\$ 449.79	\$ 499.77	\$ 599.72	\$ 62,971.02	\$ 87,459.75	\$ 146,932.38	\$ 91,917.27		
91		relocate services under the road	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 638,053.20	\$ 708,948.00	\$ 850,737.60	\$ 510,442.56	\$ 708,948.00	\$ 1,191,032.64	\$ 745,108.33		
		Supply and Install traffic signals including civil infrastructure for intersection at Kumbari St	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 357,840.00	\$ 397,600.00	\$ 477,120.00	\$ 286,272.00	\$ 397,600.00	\$ 667,968.00	\$ 417,879.72		
92	2	Section 4 CH3735 to CH4400											\$ 21,862,684.65	\$ 30,355,629.54	\$ 50,979,773.94	\$ 32,172,780.78			
93	3	General Earthwork											\$ 33,156.90	\$ 36,841.00	\$ 44,209.20	\$ 37,361.37			
94		Clearing and Grubbing	m2			13,300.00	13,300.00	13300	10%	20%	\$ 1.65	\$ 1.83	\$ 2.20	\$ 21,905.10	\$ 24,339.00	\$ 29,206.80	\$ 24,648.46		
95		Strip off Topsoil 100mm	m3			1,330.00	1,330.00	1330	10%	20%	\$ 8.46	\$ 9.40	\$ 11.28	\$ 11,251.80	\$ 12,502.00	\$ 15,002.40	\$ 12,661.16		
											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
96	3	Viaduct Structure											\$ 20,547,701.62	\$ 28,538,474.47	\$ 47,944,637.11	\$ 30,231,437.23			
97		Total Viaduct Structure piers & Footings:	No	20%	40%	18.40	23.00	32.2	10%	20%	\$ 321,858.18	\$ 357,620.20	\$ 429,144.24	\$ 5,922,190.51	\$ 8,225,264.60	\$ 13,818,444.53	\$ 8,644,722.11		
98		Supply and Place girders for the viaduct 1500dee	ea	20%	40%	110.40	138.00	193.2	10%	20%	\$ 85,288.01	\$ 94,764.45	\$ 113,717.34	\$ 9,415,795.75	\$ 13,077,494.10	\$ 21,970,190.09	\$ 13,744,247.37		
99		Cast insitu bearings	No	20%	40%	110.40	138.00	193.2	10%	20%	\$ 1,276.10	\$ 1,417.89	\$ 1,701.47	\$ 140,881.55	\$ 195,668.82	\$ 328,723.62	\$ 205,644.56		
100		Viaduct Parapet pane	m³	20%	40%	768.00	960.00	1344	10%	20%	\$ 729.23	\$ 810.25	\$ 972.30	\$ 560,044.80	\$ 777,840.00	\$ 1,306,771.20	\$ 817,493.07		
101		Casty Insitu Viaduct Slab 20c	m³	20%	40%	1,108.00	1,385.00	1939	10%	20%	\$ 1,412.33	\$ 1,569.26	\$ 1,883.11	\$ 1,564,866.07	\$ 2,173,425.10	\$ 3,651,354.17	\$ 2,284,083.70		
102		Supply and install Ply sound barrie	m	20%	40%	1,064.00	1,330.00	1862	10%	20%	\$ 1,786.55	\$ 1,985.05	\$ 2,382.06	\$ 1,900,883.88	\$ 2,640,116.50	\$ 4,435,395.72	\$ 2,774,527.81		
103		Line Marking	m	20%	40%	532.00	665.00	931	10%	20%	\$ 6.38	\$ 7.09	\$ 8.51	\$ 3,394.69	\$ 4,714.85	\$ 7,920.95	\$ 4,955.05		
104		Road Signage and furniture	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 127,611.00	\$ 141,790.00	\$ 170,148.00	\$ 102,088.80	\$ 141,790.00	\$ 238,207.20	\$ 149,015.67		
		Supply and Install Concrete Barrie	m	20%	40%	1,064.00	1,330.00	1862	10%	20%	\$ 416.52	\$ 462.80	\$ 555.36	\$ 443,177.28	\$ 615,524.00	\$ 1,034,080.32	\$ 646,918.10		
105		Property Demolition Daily Cos	day	20%	40%	40.00	50.00	70	10%	20%	\$ 12,359.46	\$ 13,732.73	\$ 16,479.28	\$ 494,378.28	\$ 686,636.50	\$ 1,153,549.32	\$ 721,635.39		
106	3	Electricals											\$ 241,827.52	\$ 335,871.55	\$ 564,264.20	\$ 352,986.16			
107		Road Lighting	m	20%	40%	532.00	665.00	931	10%	20%	\$ 454.56	\$ 505.07	\$ 606.08	\$ 241,827.52	\$ 335,871.55	\$ 564,264.20	\$ 352,986.16		
	3	Rochdale Road Relocation											\$ 1,039,998.61	\$ 1,444,442.52	\$ 2,426,663.43	\$ 1,530,417.35			

Level	Item	Description	Unit	Bill Quantities						Nett Rate						Nett Amount			@RISK Analysis P50
				D/S	U/S	Min	Base	Max	D/S	U/S	Min	Base	Max	Min	Base	Max			
		relocate base and subbase	m3	20%	40%	565.80	707.25	990.15	10%	20%	\$ 35.65	\$ 39.61	\$ 47.53	\$ 20,170.20	\$ 28,014.17	\$ 47,063.81	\$ 29,442.02		
		Supply place and compact imported backfill 150mm CBR material	m3	20%	40%	282.90	353.63	495.075	10%	20%	\$ 46.46	\$ 51.62	\$ 61.94	\$ 13,142.97	\$ 18,254.12	\$ 30,666.93	\$ 19,184.75		
		Supply and place AMCO as Prime	m2	20%	40%	1,886.00	2,357.50	3300.5	10%	20%	\$ 2.80	\$ 3.11	\$ 3.73	\$ 5,278.91	\$ 7,331.83	\$ 12,317.47	\$ 7,705.32		
		Supply place and compact imported backfill material 150mm Type 1.2 with 2% Cement	m3	20%	40%	282.90	353.63	495.075	10%	20%	\$ 102.69	\$ 114.10	\$ 136.92	\$ 29,051.00	\$ 40,348.61	\$ 67,785.67	\$ 42,403.50		
		10mm seal with class 170 binder	m2	20%	40%	1,886.00	2,357.50	3300.5	10%	20%	\$ 6.40	\$ 7.11	\$ 8.53	\$ 12,068.51	\$ 16,761.83	\$ 28,159.87	\$ 17,616.12		
		Supply and overlay DG20 with Class 320 Binder 150mm	m2	20%	40%	1,016.82	1,271.02	1779.428	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 227,072.30	\$ 315,378.19	\$ 529,835.36	\$ 331,446.88		
		Supply and overlay DG14 with A15E Binder 50mm	m2	20%	40%	231.53	289.41	405.174	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 51,704.14	\$ 71,811.30	\$ 120,642.99	\$ 75,472.22		
		14mm seal with S20E binder 1.5l/m²	m2	20%	40%	1,886.00	2,357.50	3300.5	10%	20%	\$ 7.48	\$ 8.31	\$ 9.97	\$ 14,105.39	\$ 19,590.83	\$ 32,912.59	\$ 20,588.33		
		Supply and overlay OG14 with A15E binder 45mm	m2	20%	40%	207.98	259.98	363.972	10%	20%	\$ 223.32	\$ 248.13	\$ 297.76	\$ 46,446.36	\$ 64,508.84	\$ 108,374.85	\$ 67,798.16		
		relocate road lighting	m	20%	40%	164.00	205.00	287	10%	20%	\$ 466.68	\$ 518.53	\$ 622.24	\$ 76,535.03	\$ 106,298.65	\$ 178,581.73	\$ 111,713.31		
91		relocate services under the road	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 638,052.30	\$ 708,947.00	\$ 850,736.40	\$ 510,441.84	\$ 708,947.00	\$ 1,191,030.96	\$ 745,086.12		
108											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
109	2	Drainage											\$ 10,245,072.10	\$ 13,804,679.59	\$ 23,191,861.71	\$ 14,679,950.72			
110	3	Excavate supply lay backfill drainlines											\$ 1,226,508.44	\$ 1,362,787.16	\$ 2,289,482.43	\$ 1,489,313.01			
111		375 RCP	m	0%	40%	690.00	690.00	966	10%	20%	\$ 426.85	\$ 474.28	\$ 569.14	\$ 294,527.88	\$ 327,253.20	\$ 549,785.38	\$ 351,561.17		
112		450 RCP	m	0%	40%	385.00	385.00	539	10%	20%	\$ 606.26	\$ 673.62	\$ 808.34	\$ 233,409.33	\$ 259,343.70	\$ 435,697.42	\$ 278,604.18		
113		525 RCP	m	0%	40%	45.00	45.00	63	10%	20%	\$ 770.19	\$ 855.77	\$ 1,026.92	\$ 34,658.69	\$ 38,509.65	\$ 64,696.21	\$ 41,370.84		
		600 RCP	m	0%	40%	60.00	60.00	84	10%	20%	\$ 1,154.17	\$ 1,282.41	\$ 1,538.89	\$ 69,250.14	\$ 76,944.60	\$ 129,266.93	\$ 82,660.09		
114		675 RCP	m	0%	40%	60.00	60.00	84	10%	20%	\$ 1,284.82	\$ 1,427.58	\$ 1,713.10	\$ 77,089.32	\$ 85,654.80	\$ 143,900.06	\$ 92,016.73		
115		900 RCP	m	0%	40%	45.00	45.00	63	10%	20%	\$ 930.81	\$ 1,034.23	\$ 1,241.08	\$ 41,886.32	\$ 46,540.35	\$ 78,187.79	\$ 49,997.36		
116		1050 RCP	m	0%	40%	70.00	70.00	98	10%	20%	\$ 1,332.66	\$ 1,480.73	\$ 1,776.88	\$ 93,285.99	\$ 103,651.10	\$ 174,133.85	\$ 111,354.30		
117		1350 RCP	m	0%	40%	130.00	130.00	182	10%	20%	\$ 2,041.50	\$ 2,268.33	\$ 2,722.00	\$ 265,394.61	\$ 294,882.90	\$ 495,403.27	\$ 316,797.62		
118		1500 CIP	m	0%	40%	17.00	17.00	23.8	10%	20%	\$ 1,106.91	\$ 1,229.90	\$ 1,475.88	\$ 18,817.47	\$ 20,908.30	\$ 35,125.94	\$ 22,461.83		
119		3/1800 CIP	m	0%	40%	32.00	32.00	44.8	10%	20%	\$ 3,068.40	\$ 3,409.33	\$ 4,091.20	\$ 98,188.70	\$ 109,098.56	\$ 183,285.58	\$ 117,201.31		
120											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
121	3	Structures											\$ 302,005.51	\$ 335,561.68	\$ 563,743.62	\$ 432,488.39			
122		Side entry gully pits	No	0%	40%	58.00	58.00	81.2	10%	20%	\$ 1,807.34	\$ 2,008.16	\$ 2,409.79	\$ 104,825.95	\$ 116,473.28	\$ 195,675.11	\$ 150,239.76		
123		1050 dia manhole	No	0%	40%	7.00	7.00	9.8	10%	20%	\$ 2,878.38	\$ 3,198.20	\$ 3,837.84	\$ 20,148.66	\$ 22,387.40	\$ 37,610.83	\$ 28,879.03		
124		1500 dia manhole	No	0%	40%	3.00	3.00	4.2	10%	20%	\$ 5,615.10	\$ 6,239.00	\$ 7,486.80	\$ 16,845.30	\$ 18,717.00	\$ 31,444.56	\$ 24,144.85		
125		Outlet headwalls to RCP<600 dia	No	0%	40%	3.00	3.00	4.2	10%	20%	\$ 14,553.90	\$ 16,171.00	\$ 19,405.20	\$ 43,661.70	\$ 48,513.00	\$ 81,501.84	\$ 62,577.51		
126		Outlet headwalls to RCP 600 - 1200 dia	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 20,915.10	\$ 23,239.00	\$ 27,886.80	\$ 20,915.10	\$ 23,239.00	\$ 39,041.52	\$ 29,978.15		
127		Junction chamber 3/1500 - 3/1800	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 17,144.10	\$ 19,049.00	\$ 22,858.80	\$ 17,144.10	\$ 19,049.00	\$ 32,002.32	\$ 24,573.14		
128		Junction chamber/inlet headwall for 1500 RCP inlet/outlet	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 16,612.20	\$ 18,458.00	\$ 22,149.60	\$ 16,612.20	\$ 18,458.00	\$ 31,009.44	\$ 23,808.75		
129		Inlet headwall to 1500 Dia	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 8,067.60	\$ 8,964.00	\$ 10,756.80	\$ 8,067.60	\$ 8,964.00	\$ 15,059.52	\$ 11,563.06		
130		Inlet headwall to 3/1800 Dia	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 31,993.20	\$ 35,548.00	\$ 42,657.60	\$ 31,993.20	\$ 35,548.00	\$ 59,720.64	\$ 45,853.43		
131		Combined Outlet headwall for 3/1350	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 15,521.40	\$ 17,246.00	\$ 20,695.20	\$ 15,521.40	\$ 17,246.00	\$ 28,973.28	\$ 22,246.99		
132		375 RCP Headwall	No	0%	40%	1.00	1.00	1.4	10%	20%	\$ 6,270.30	\$ 6,967.00	\$ 8,360.40	\$ 6,270.30	\$ 6,967.00	\$ 11,704.56	\$ 8,987.05		
133											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
134	3	Take up existing drainlines											\$ 44,862.16	\$ 62,308.55	\$ 104,678.36	\$ 69,025.53			
135		1500 RCP	m	20%	40%	16.00	20.00	28	10%	20%	\$ 629.82	\$ 699.80	\$ 839.76	\$ 10,077.12	\$ 13,996.00	\$ 23,513.28	\$ 14,708.82		
136		1050 RCP	m	20%	40%	16.00	20.00	28	10%	20%	\$ 370.62	\$ 411.80	\$ 494.16	\$ 5,929.92	\$ 8,236.00	\$ 13,836.48	\$ 8,655.89		
137		750 RCP	m	20%	40%	44.00	55.00	77	10%	20%	\$ 249.17	\$ 276.85	\$ 332.22	\$ 10,963.26	\$ 15,226.75	\$ 25,580.94	\$ 16,002.04		
138		450 RCP	m	20%	40%	24.00	30.00	42	10%	20%	\$ 168.71	\$ 187.46	\$ 224.95	\$ 4,049.14	\$ 5,623.80	\$ 9,447.98	\$ 5,910.15		
139		Demolish existing structures (MH or Gully pits)	No	20%	40%	16.00	20.00	28	10%	20%	\$ 865.17	\$ 961.30	\$ 1,153.56	\$ 13,842.72	\$ 19,226.00	\$ 32,299.68	\$ 23,069.66		
140											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
141	3	Demolish existing headwalls											\$ 2,917.44	\$ 4,052.00	\$ 6,807.36	\$ 4,870.72			
142		1500 CIP	No	20%	40%	0.80	1.00	1.4	10%	20%	\$ 864.00	\$ 960.00	\$ 1,152.00	\$ 691.20	\$ 960.00	\$ 1,612.80	\$ 1,151.82		
143		3/1500 CIP	No	20%	40%	0.80	1.00	1.4	10%	20%	\$ 1,656.00	\$ 1,840.00	\$ 2,208.00	\$ 1,324.80	\$ 1,840.00	\$ 3,091.20	\$ 2,207.86		
144		2/1350 RCP	No	20%	40%	0.80	1.00	1.4	10%	20%	\$ 1,126.80	\$ 1,252.00	\$ 1,502.40	\$ 901.44	\$ 1,252.00	\$ 2,103.36	\$ 1,502.21		
											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
145	3	Existing Rochedale Rd Drainlines (Remove)											\$ 213,546.96	\$ 296,593.00	\$ 498,276.24	\$ 321,221.76			
146		300 RCP	m	20%	40%	56.00	70.00	98	10%	20%	\$ 148.41	\$ 164.90	\$ 197.88	\$ 8,310.96	\$ 11,543.00	\$ 19,392.24	\$ 12,131.53		
147		450 RCP	m	20%	40%	200.00	250.00	350	10%	20%	\$ 171.07	\$ 190.08	\$ 228.10	\$ 34,214.40	\$ 47,520.00	\$ 79,833.60	\$ 49,940.97		
148		375 RCP	m	20%	40%	216.00	270.00	378	10%	20%	\$ 323.81	\$ 359.79	\$ 431.75	\$ 69,943.18	\$ 97,143.30	\$ 163,200.74	\$ 102,096.56		
149		900 RCP	m	20%	40%	20.00	25.00	35	10%	20%	\$ 296.35	\$ 329.28	\$ 395.14	\$ 5,927.04	\$ 8,232.00	\$ 13,829.76	\$ 8,651.38		
150		1050 RCP	m	20%	40%	56.00	70.00	98	10%	20%	\$ 354.03	\$ 393.37	\$ 472.04	\$ 19,825.85	\$ 27,535.90	\$ 46,260.31	\$ 28,939.20		
151		1350 RCP	m	20%	40%	88.00	110.00	154	10%	20%	\$ 507.94	\$ 564.38	\$ 677.26	\$ 44,698.90	\$ 62,081.80	\$ 104,297.42	\$ 65,243.97		
152		Stormwater Quality Improvement Devices for diameter <600mm (Rock Downstream Defender)	No	20%	40%	4.00	5.00	7	10%	20%	\$ 7,656.66	\$ 8,507.40	\$ 10,208.88	\$ 30,626.64	\$ 42,537.00	\$ 71,462.16	\$ 51,041.14		
152											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		
154	3	Traffic Management											\$ 8,455,231.58	\$ 11,743,377.20	\$ 19,728,873.70	\$ 12,352,204.60			
155		Traffic Controlers	Week	20%	40%	41.60	52.00	72.8	10%	20%	\$ 196,009.74	\$ 217,788.60	\$ 261,346.32	\$ 8,154,005.18	\$ 11,325,007.20	\$ 19,026,012.10	\$ 11,901,629.02		
156		Supply and install Temporary Road Barriers	m	20%	40%	800.00	1,000.00	1400	10%	20%	\$ 376.53	\$ 418.37	\$ 502.04	\$ 301,226.40	\$ 418,370.00	\$ 702,861.60	\$ 439,669.46		

Level	Item	Description	Unit	Bill Quantities						Nett Rate						Nett Amount			@RISK Analysis P50	
				D/S	U/S	Min	Base	Max	D/S	U/S	Min	Base	Max	Min	Base	Max				
157																				
	2	Section 5 CH4400 to CH4700															\$ 54,602,705.05	\$ 73,378,571.30	\$ 122,951,175.55	\$ 80,116,114.06
65	3	General Earthwork															\$ 6,581.52	\$ 9,141.00	\$ 13,907.52	\$ 9,474.70
66		Clearing and Grubbing	m2	20%	20%	2,640.00	3,300.00	3960	10%	20%	\$ 1.65	\$ 1.83	\$ 2.20	\$ 4,348.08	\$ 6,039.00	\$ 8,696.16	\$ 6,161.80	\$ 6,161.80	\$ 6,161.80	
67		Strip off Topsoil 100mm	m3	20%	40%	264.00	330.00	462	10%	20%	\$ 8.46	\$ 9.40	\$ 11.28	\$ 2,233.44	\$ 3,102.00	\$ 5,211.36	\$ 3,260.04	\$ 3,260.04	\$ 3,260.04	
72	3	Decking Unit Structure															\$ 35,829,393.93	\$ 49,763,047.12	\$ 83,601,919.16	\$ 52,515,816.45
		Total Decking Unit Structure piers & Footing:	No	20%	40%	28.80	36.00	50.4	10%	20%	\$ 321,858.19	\$ 357,620.21	\$ 429,144.25	\$ 9,269,515.84	\$ 12,874,327.56	\$ 21,628,870.30	\$ 13,530,329.94	\$ 13,530,329.94	\$ 13,530,329.94	
		Cast insitu bearings	No	20%	40%	220.80	276.00	386.4	10%	20%	\$ 1,276.10	\$ 1,417.89	\$ 1,701.47	\$ 281,763.10	\$ 391,337.64	\$ 657,447.24	\$ 411,284.25	\$ 411,284.25	\$ 411,284.25	
		Supply and Place Decking Uni	ea	20%	40%	220.80	276.00	386.4	10%	20%	\$ 112,990.42	\$ 125,544.91	\$ 150,653.89	\$ 24,948,284.52	\$ 34,650,395.16	\$ 58,212,663.87	\$ 36,415,591.82	\$ 36,415,591.82	\$ 36,415,591.82	
		Decking Unit Parapet pane	m³	20%	40%	240.80	301.00	421.4	10%	20%	\$ 729.22	\$ 810.24	\$ 972.29	\$ 175,595.21	\$ 243,882.24	\$ 409,722.16	\$ 256,300.96	\$ 256,300.96	\$ 256,300.96	
		Casty Insitu Decking Slab 18C	m³	20%	40%	585.60	732.00	1024.8	10%	20%	\$ 1,391.27	\$ 1,545.86	\$ 1,855.03	\$ 814,730.05	\$ 1,131,569.52	\$ 1,901,036.79	\$ 1,189,274.52	\$ 1,189,274.52	\$ 1,189,274.52	
		Supply and Install Concrete Barrie	m	20%	40%	320.00	400.00	560	10%	20%	\$ 416.52	\$ 462.80	\$ 555.36	\$ 133,286.40	\$ 185,120.00	\$ 311,001.60	\$ 194,550.44	\$ 194,550.44	\$ 194,550.44	
		Line Marking	m	20%	40%	320.00	400.00	560	10%	20%	\$ 6.38	\$ 7.09	\$ 8.51	\$ 2,041.92	\$ 2,836.00	\$ 4,764.48	\$ 2,980.57	\$ 2,980.57	\$ 2,980.57	
		Road Signage and furniture	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 255,221.10	\$ 283,579.00	\$ 340,294.80	\$ 204,176.88	\$ 283,579.00	\$ 476,412.72	\$ 298,016.05	\$ 298,016.05	\$ 298,016.05	
72	3	Down Ramps															\$ 3,466,829.76	\$ 4,815,041.33	\$ 8,089,269.43	\$ 5,100,170.14
		Clearing and Grubbing	m2	20%	40%	5,120.00	6,400.00	8960	10%	20%	\$ 1.65	\$ 1.83	\$ 2.20	\$ 8,432.64	\$ 11,712.00	\$ 19,676.16	\$ 12,308.71	\$ 12,308.71	\$ 12,308.71	
		Strip off Topsoil 100mm	m3	20%	40%	512.00	640.00	896	10%	20%	\$ 8.46	\$ 9.40	\$ 11.28	\$ 4,331.52	\$ 6,016.00	\$ 10,106.88	\$ 6,322.44	\$ 6,322.44	\$ 6,322.44	
		Total Decking Unit Structure piers & Footing:	No	20%	40%	6.40	8.00	11.2	10%	20%	\$ 321,858.19	\$ 357,620.21	\$ 429,144.24	\$ 2,059,892.35	\$ 2,860,961.60	\$ 4,806,415.49	\$ 3,006,644.57	\$ 3,006,644.57	\$ 3,006,644.57	
		Cast insitu bearings	No	20%	40%	8.80	11.00	15.4	10%	20%	\$ 1,276.11	\$ 1,417.90	\$ 1,701.48	\$ 11,229.77	\$ 15,596.90	\$ 26,202.79	\$ 16,391.34	\$ 16,391.34	\$ 16,391.34	
		Supply and Place Decking Uni	ea	20%	40%	8.80	11.00	15.4	10%	20%	\$ 112,990.41	\$ 125,544.90	\$ 150,653.88	\$ 994,315.61	\$ 1,380,993.90	\$ 2,320,069.75	\$ 1,451,372.55	\$ 1,451,372.55	\$ 1,451,372.55	
		Decking Unit Parapet pane	m³	20%	40%	12.67	15.84	22.176	10%	20%	\$ 729.18	\$ 810.20	\$ 972.24	\$ 9,240.17	\$ 12,833.57	\$ 21,560.39	\$ 13,486.92	\$ 13,486.92	\$ 13,486.92	
		Casty Insitu Decking Slab 20C	m³	20%	40%	36.80	46.00	64.4	10%	20%	\$ 1,417.19	\$ 1,574.66	\$ 1,889.59	\$ 52,152.74	\$ 72,434.36	\$ 121,689.72	\$ 76,122.97	\$ 76,122.97	\$ 76,122.97	
		Retaining Wall	m2	20%	40%	224.00	280.00	392	10%	20%	\$ 473.90	\$ 526.55	\$ 631.86	\$ 106,152.48	\$ 147,434.00	\$ 247,689.12	\$ 154,945.45	\$ 154,945.45	\$ 154,945.45	
		Transport & dump material from Boxcut/Borro	m³	20%	40%	1,440.00	1,800.00	2520	10%	20%	\$ 4.71	\$ 5.23	\$ 6.28	\$ 6,778.08	\$ 9,414.00	\$ 15,815.52	\$ 9,893.69	\$ 9,893.69	\$ 9,893.69	
		Cut to fill or spoil - Exc/trucks for Detentation Basi	m³	20%	40%	2,400.00	3,000.00	4200	10%	20%	\$ 41.90	\$ 46.56	\$ 55.87	\$ 100,569.60	\$ 139,680.00	\$ 234,662.40	\$ 146,803.49	\$ 146,803.49	\$ 146,803.49	
		Retaining Wall in detention basi	m2	20%	40%	240.00	300.00	420	10%	20%	\$ 473.90	\$ 526.55	\$ 631.86	\$ 113,734.80	\$ 157,965.00	\$ 265,381.20	\$ 166,008.68	\$ 166,008.68	\$ 166,008.68	
72	3	Ramps at Grade															\$ 805,829.32	\$ 1,119,207.39	\$ 1,880,268.41	\$ 1,185,930.66
		Clearing and Grubbing	m2	20%	40%	2,400.00	3,000.00	4200	10%	20%	\$ 1.65	\$ 1.83	\$ 2.20	\$ 3,952.80	\$ 5,490.00	\$ 9,223.20	\$ 5,769.83	\$ 5,769.83	\$ 5,769.83	
		Strip off Topsoil 100mm	m3	20%	40%	240.00	300.00	420	10%	20%	\$ 8.46	\$ 9.40	\$ 11.28	\$ 2,030.40	\$ 2,820.00	\$ 4,737.60	\$ 2,963.70	\$ 2,963.70	\$ 2,963.70	
		Bulk Excavator	m3	20%	40%	192.00	240.00	336	10%	20%	\$ 13.56	\$ 15.07	\$ 18.08	\$ 2,604.10	\$ 3,616.80	\$ 6,076.22	\$ 3,800.99	\$ 3,800.99	\$ 3,800.99	
		Trim and Compact of Subgrade	m2	20%	40%	960.00	1,200.00	1680	10%	20%	\$ 4.37	\$ 4.86	\$ 5.83	\$ 4,199.04	\$ 5,832.00	\$ 9,797.76	\$ 6,129.06	\$ 6,129.06	\$ 6,129.06	
		Supply place and compact imported backfill 150mm CBR 8 material	m3	20%	40%	144.00	180.00	252	10%	20%	\$ 46.46	\$ 51.62	\$ 61.94	\$ 6,689.95	\$ 9,291.60	\$ 15,609.89	\$ 9,765.26	\$ 9,765.26	\$ 9,765.26	
		Supply and place AMC0 as Prim	m2	20%	40%	960.00	1,200.00	1680	10%	20%	\$ 2.80	\$ 3.11	\$ 3.73	\$ 2,687.04	\$ 3,732.00	\$ 6,269.76	\$ 3,922.31	\$ 3,922.31	\$ 3,922.31	
		Supply place and compact imported backfill material 150mm Type 1.2 with 2% Cement	m3	20%	40%	144.00	180.00	252	10%	20%	\$ 102.69	\$ 114.10	\$ 136.92	\$ 14,787.36	\$ 20,538.00	\$ 34,503.84	\$ 21,585.54	\$ 21,585.54	\$ 21,585.54	
		10mm seal with class 170 binde	m2	20%	40%	960.00	1,200.00	1680	10%	20%	\$ 6.40	\$ 7.11	\$ 8.53	\$ 6,143.04	\$ 8,532.00	\$ 14,333.76	\$ 8,967.14	\$ 8,967.14	\$ 8,967.14	
		Supply and overlay DG20 with Class 320 Binder 220mr	tonne	20%	40%	517.58	646.97	905.758	10%	20%	\$ 228.91	\$ 254.34	\$ 305.21	\$ 118,476.25	\$ 164,550.35	\$ 276,444.59	\$ 172,933.07	\$ 172,933.07	\$ 172,933.07	
		Supply and overlay DG14 with A15E Binder 50mr	tonne	20%	40%	117.85	147.31	206.234	10%	20%	\$ 228.91	\$ 254.34	\$ 305.21	\$ 26,976.11	\$ 37,466.83	\$ 62,944.27	\$ 39,376.34	\$ 39,376.34	\$ 39,376.34	
		14mm seal with S20E binder 1.5l/m²	m2	20%	40%	960.00	1,200.00	1680	10%	20%	\$ 7.48	\$ 8.31	\$ 9.97	\$ 7,179.84	\$ 9,972.00	\$ 16,752.96	\$ 10,480.52	\$ 10,480.52	\$ 10,480.52	
		Supply and overlay OG14 with A15E binder 45mr	tonne	20%	40%	105.86	132.33	185.262	10%	20%	\$ 228.91	\$ 254.34	\$ 305.21	\$ 24,232.90	\$ 33,656.81	\$ 56,543.44	\$ 35,372.99	\$ 35,372.99	\$ 35,372.99	
		relocate road lighting:	m	20%	40%	160.00	200.00	280	10%	20%	\$ 471.43	\$ 523.81	\$ 628.57	\$ 75,428.64	\$ 104,762.00	\$ 176,000.16	\$ 110,101.79	\$ 110,101.79	\$ 110,101.79	
		relocate services under the roa	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 638,052.30	\$ 708,947.00	\$ 850,736.40	\$ 510,441.84	\$ 708,947.00	\$ 1,191,030.96	\$ 745,091.13	\$ 745,091.13	\$ 745,091.13	
											\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
72	3	Rochdale Road Relocation															\$ 1,019,364.92	\$ 1,438,581.06	\$ 2,093,441.32	\$ 1,475,390.32
		Removal of existing pavement	m2	40%	40%	1,380.00	2,300.00	3220	10%	20%	\$ 18.02	\$ 20.02	\$ 24.02	\$ 24,864.84	\$ 46,046.00	\$ 77,357.28	\$ 47,334.74	\$ 47,334.74	\$ 47,334.74	
		relocate base and subbase	m3	40%	40%	414.00	690.00	966	10%	20%	\$ 35.65	\$ 39.61	\$ 47.53	\$ 14,758.69	\$ 27,330.90	\$ 45,915.91	\$ 28,093.54	\$ 28,093.54	\$ 28,093.54	
73		Supply place and compact imported backfill 150mm CBR 8 material	m3	40%	40%	207.00	345.00	483	10%	20%	\$ 46.46	\$ 51.62	\$ 61.94	\$ 9,616.81	\$ 17,808.90	\$ 29,918.95	\$ 18,306.97	\$ 18,306.97	\$ 18,306.97	
74		Supply and place AMC0 as Prim	m2	20%	20%	1,840.00	2,300.00	2760	10%	20%	\$ 2.80	\$ 3.11	\$ 3.73	\$ 5,150.16	\$ 7,153.00	\$ 10,300.32	\$ 7,298.70	\$ 7,298.70	\$ 7,298.70	
75		Supply place and compact imported backfill material 150mm Type 1.2 with 2% Cement	m3	20%	20%	276.00	345.00	414	10%	20%	\$ 102.69	\$ 114.10	\$ 136.92	\$ 28,342.44	\$ 39,364.50	\$ 56,684.88	\$ 40,164.93	\$ 40,164.93	\$ 40,164.93	
76		10mm seal with class 170 binde	m2	20%	20%	1,840.00	2,300.00	2760	10%	20%	\$ 6.40	\$ 7.11	\$ 8.53	\$ 11,774.16	\$ 16,353.00	\$ 23,548.32	\$ 16,685.84	\$ 16,685.84	\$ 16,685.84	
77		Supply and overlay DG20 with Class 320 Binder 220mr	tonne	20%	20%	992.00	1,240.00	1488	10%	20%	\$ 228.91	\$ 254.34	\$ 305.21	\$ 227,074.75	\$ 315,381.60	\$ 454,149.50	\$ 321,805.13	\$ 321,805.13	\$ 321,805.13	
78		Supply and overlay DG14 with A15E Binder 50mr	tonne	20%	20%	225.88	282.35	338.82	10%	20%	\$ 228.91	\$ 254.34	\$ 305.21	\$ 51,705.29	\$ 71,812.90	\$ 103,410.57	\$ 73,275.51	\$ 73,275.51	\$ 73,275.51	
79		14mm seal with S20E binder 1.5l/m²	m2	20%	20%	1,840.00	2,300.00	2760	10%	20%	\$ 7.48	\$ 8.31	\$ 9.97	\$ 13,761.36	\$ 19,113.00	\$ 27,522.72	\$ 19,501.32	\$ 19,501.32	\$ 19,501.32	
80		Supply and overlay OG14 with A15E binder 45mr	tonne	20%	20%	202.91	253.64	304.368	10											

Level	Item	Description	Unit	Bill Quantities			Nett Rate			Nett Amount			@RISK Analysis				
				D/S	U/S	Min	Base	Max	D/S	U/S	Min	Base		Max	Min	Base	Max
85		Busway Signage and furniture	LS	20%	40%	0.80	1.00	1.4	10%	20%	\$ 255,221.10	\$ 283,579.00	\$ 340,294.80	\$ 204,176.88	\$ 283,579.00	\$ 476,412.72	\$ 340,275.08
88		Property Demolition Daily Cos	day	20%	40%	16.00	20.00	28	10%	20%	\$ 12,359.43	\$ 13,732.70	\$ 16,479.24	\$ 197,750.88	\$ 274,654.00	\$ 461,418.72	\$ 288,637.60
89	3	Electricals															
90		Road Lighting	m	20%	40%	160.00	200.00	280	10%	20%	\$ 471.43	\$ 523.81	\$ 628.57	\$ 75,428.64	\$ 104,762.00	\$ 176,000.16	\$ 110,103.46
89	3	Bus Station															
90		Bus Station inc Lifts	LS	20%	40%	1.00	1.00	1.4	10%	20%	\$ 8,932,735.80	\$ 9,925,262.00	\$ 11,910,314.40	\$ 8,932,735.80	\$ 9,925,262.00	\$ 16,674,440.16	\$ 12,803,449.32



Appendix E

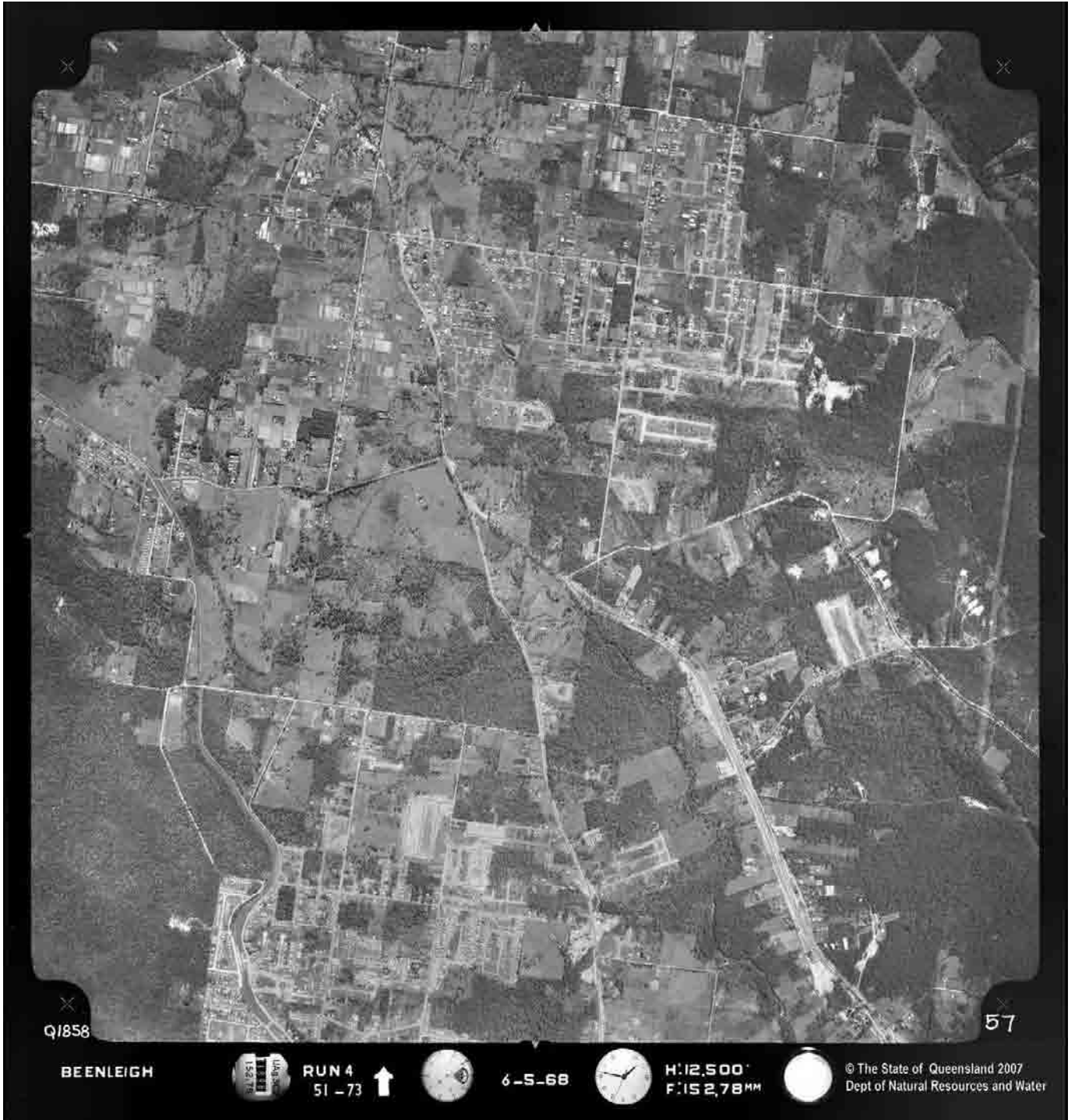
Contaminated land searches —
aerial photographs



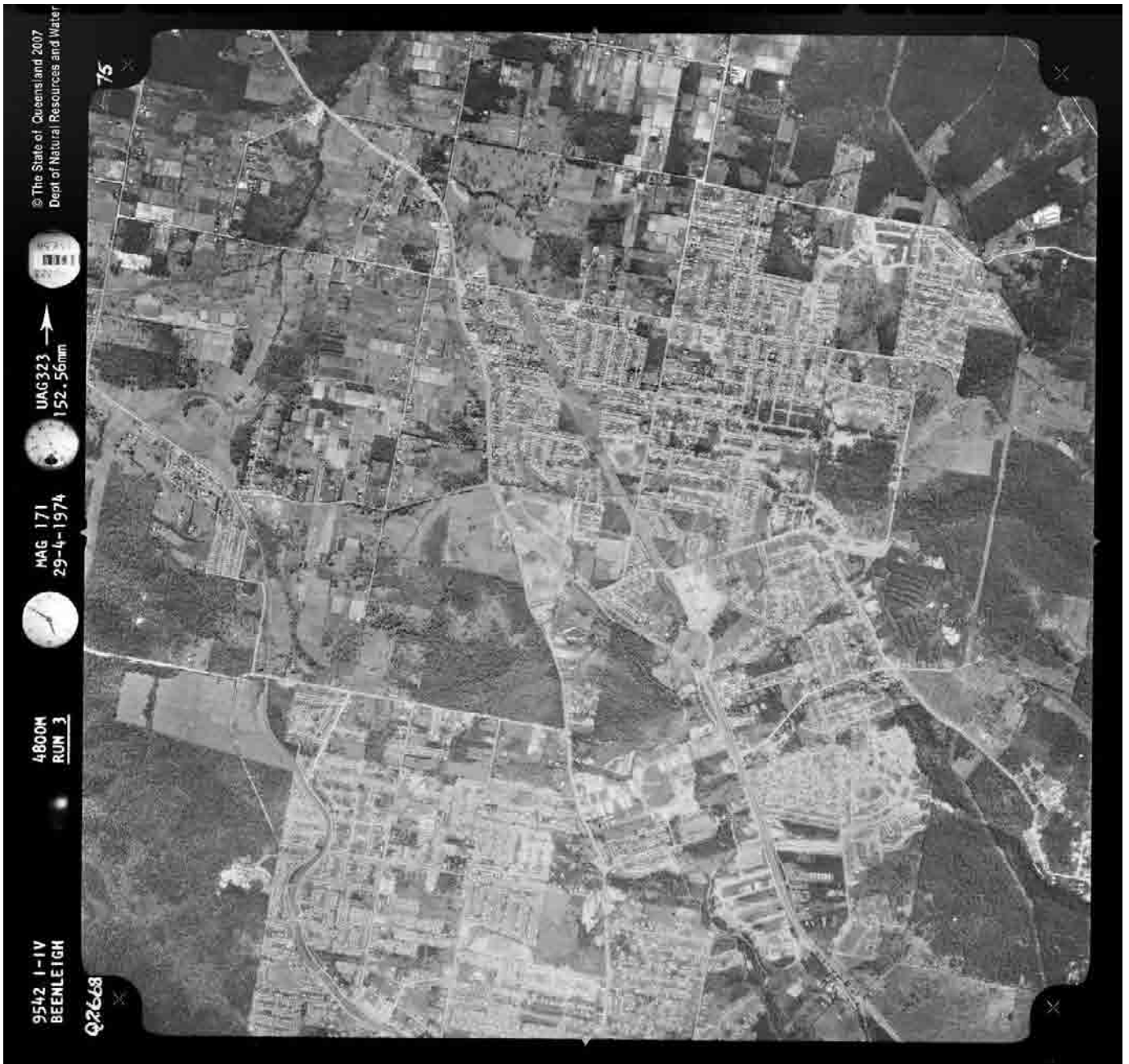
Aerial photograph 1 taken on 27 July 1955



Aerial photograph 2 taken on 27 July 1955



Aerial photograph 3 taken on 6 May 1968



Aerial photograph 4 taken on 29 April 1974



Aerial photograph 5 taken on 28 August 1983



Aerial photograph 6 taken on 9 August 1993



Aerial photograph 7 taken on 9 August 1993



Aerial photograph 8 taken on 11 February 2002

Appendix F

Ecology — Database searches

Table F-1: Review of rare and threatened fauna known to occur or potentially occurring within the specified grid search area

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Bosistoa selwynii</i>	heart-leaved bosistoa	C	V	EPB C	Lowland rainforest (Stanley and Ross 1995).	Low: no records from local area; no suitable habitat in local area.
<i>Bosistoa transversa</i>	three-leaved bosistoa	C	V	EPB C	Lowland rainforest (Stanley and Ross 1995).	Low: no records from local area; no suitable habitat in local area.
<i>Cryptocarya foetida</i>	stinky cryptocarya	V	V	EPB C	Tall to very tall subtropical rainforest in association with hoop pine or coastal (littoral) rainforest on steep duneslopes, usually within one kilometre of the coastline (Maroochy Shire Council, 2001).	Low: no records from local area; no suitable habitat in local area.
<i>Cryptostylis hunteriana</i>	leafless tongue-orchid	C	V	EPB C	Moist conditions, possibly swamps or eucalypt open forests (Stanley and Ross 1995).	Low: no records from local area; no suitable habitat in local area.
<i>Cupaniopsis shirleyana</i>	wedge-leaf tuckeroo	V	V	EPB C	Depauperate rainforest from Brisbane to Bundaberg (Stanley & Ross 1986)	Low: no records from local area; no suitable habitat in local area.
<i>Fontainea venosa</i>	no common name	V	V	EPB C	Rainforest in Gympie district (Harden, McDonald, Williams 2006)	Low: no records from local area; no suitable habitat in local area.
<i>Hydrocharis dubia</i>	frogbit	C	V	EPB C	Small shallow freshwater bodies or swamps (Harden 2002).	Low: no records from local area; no suitable habitat in local area.
<i>Macadamia integrifolia</i>	macadamia nut	V	V	EPB C	Closed forest and rainforests of coastal lowlands and ranges on fertile soils of volcanic origin (Maroochy Shire Council, 2001).	Low: no records from local area; no suitable habitat in local area.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Marsdenia coronata</i>	slender milkvine	V	V	EPB C	Rocky hillsides and ridges (Logan River Branch SGAP 2002). Rocky outcrops and scrublands (Queensland Herbarium pers. comm. 2005).	Low: no records from local area; no suitable habitat in local area.
<i>Marsdenia longiloba</i>	clear milkvine	V	V	EPB C	Mixed Eucalypt open forest and woodlands or rainforest edges in semi-shade, mostly on hill tops (Maroochy Shire Council 2001).	Low: no records from local area; no suitable habitat in local area.
<i>Taeniophyllum muelleri</i>	minute orchid	C	V	EPB C	Grows on outer branches and branchlets of rainforest trees; coast and coastal ranges (PlantNET).	Low: no records from local area; no suitable habitat in local area.

C = common; V = vulnerable; E = endangered; NL = not listed

Table F-2: Review of rare and threatened fauna known to occur or potentially occurring within the specified grid search area

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Coeranoscincus reticulatus</i>	three-toed snake-toothed skink	R	V	DEWHA	Rainforest and adjacent wet sclerophyll forest on coast and adjacent ranges of north-eastern NSW and south-east QLD (Cogger, 2000).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Chalinolobus dwyeri</i>	large-eared pied bat	R	V	DEWHA	Dry and wet eucalypt forests from Blackdown Tableland to near Wollongong (Menkhorst and Knight, 2001). Primarily a cave rooster, this species inhabits sclerophyll forests and woodlands (Churchill, 1998; Strahan 1995).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's fig parrot	E	E	DEWHA	Lowland subtropical rainforest, dry rainforest, littoral and developing rainforest, riparian areas in woodland and cleared areas with fig trees. It feeds on figs but also eats the fruit of other native and exotic trees and insect larvae. In Queensland it now appears to be largely restricted to the greater Bundaberg area, Main Range National Park, Blackall Range and the western side of Lamington National Park (Garnett & Crowley 2000).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Dasyurus maculatus maculatus</i>	spot-tailed quoll (south-east mainland)	V	E	DEWHA	Wide range of habitats including rainforest, open forest, woodlands, coastal heathland and inland riparian forest (Strahan 1995). Found from sea level to sub alps in many habitats – rainforest, wet and dry sclerophyll forests, coastal heath and scrub, sometimes red gum forest along inland rivers (Menkhorst and Knight 2001).	Low: no records from search area; no suitable habitat for species along corridor.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Delma torquata</i>	collared delma	V	V	DEWHA	Rocky areas associated with dry open forests, and from brigalow associations (Wilson & Swan 2003). Recorded from a number of disturbed habitats in south-east Queensland, found under rocks, logs and other ground cover (Cogger 2000).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Ephippiorhynchus asiaticus</i>	black-necked stork	R	NL	Literature review	Coastal wetlands, mangroves, tidal mud flats, floodplains, open woodlands, irrigated lands, bore drains, sub-artesian pools, farm dams, sewage ponds (Pizzey & Knight 2005).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Erythrotriorchis radiatus</i>	red goshawk	C	V	DEWHA	Open woodland, the edges of rainforest, and in dense riverine vegetation of coastal and sub-coastal forests (Marchant & Higgins 1993). This species is known to have a large home range but nest in tall trees usually within 1 km of a waterway or wetland (Garnett and Crowley 2000).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Geophaps scripta scripta</i>	squatter pigeon (southern)	V	V	DEWHA	Tropical dry, open sclerophyll woodlands and sometimes savannas (Higgins and Davies 1996).	Low: no records from search area; no suitable habitat for species along corridor.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Lathamus discolor</i>	swift parrot	E	E	DEWHA	Breeds in Tasmania and migrates to the mainland to feed each year mainly on the inland slopes of the Great Dividing Range, particularly in Victoria and NSW, with a small number of birds reaching as far as south-east Queensland (Garnett & Crowley 2000). In south-east Queensland the birds are usually associated with high nectar producing areas such as Queensland blue gum (<i>Eucalyptus tereticornis</i>) on alluvial soils (Garnett & Crowley 2000, Birds Queensland records).	Low: no records from search area; possible foraging habitat along corridor.
<i>Lophoictinia isura</i>	square-tailed kite	R	NL	Literature review	Hunts primarily over open forest, woodlands and mallee vegetation types that are rich in passerines, as well as adjacent low scrubby areas and wooded towns. Prefer a structurally diverse landscape (Garnett & Crowley 2000).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Melithreptus gularis</i>	black-chinned honeyeater	R	NL	Wildnet	Dry eucalypt woodlands with an annual rainfall of 400 – 700 mm usually on the inland slopes of the Great Divide but extending to the coast between Brisbane and Rockhampton. Favours vegetation associations with box and ironbark (Garnett and Crowley 2000).	Low: no records from search area; no suitable habitat for species along corridor.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Mixophyes iterates</i>	giant barred frog	E	E	DEWHA	Terrestrial inhabitant of rain-, Antarctic beech or wet sclerophyll forests (Cogger 2000). Occurs in uplands and lowlands in rainforest and wet sclerophyll forest, including farmland. Populations have been found in disturbed areas with vegetated riparian strips in cattle farms and regenerating logged areas (DEW 2005).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Phascolarctos cinereus</i>	Koala (SEQ bioregion)	V	NL	Wildnet	Widespread in Sclerophyll forest and woodlands on foothills and plains on both sides of the Great Dividing Range from about Chillagoe, Queensland to Mt Lofty ranges in South Australia (Menkhorst and Knight 2001).	Moderate: records from local area; potential habitat along corridor.
<i>Potorous tridactylus tridactylus</i>	long-nosed potoroo (south east mainland)	V	V	DEWHA	Patchily distributed on the mainland from Victoria to south--east Queensland. In the north of its range it is found in rainforest adjacent to wet sclerophyll forest and coastal wallum. It requires dense cover for refuge with more open feeding habitat available nearby (Menkhorst and Knight 2001).	Low: no records from search area; no suitable habitat for species along corridor.
<i>Pteropus poliocephalus</i>	grey-headed flying-fox	C	V	Wildnet, DEWHA	Coastal belt from Rockhampton to Melbourne roosting in camps commonly formed in gullies, typically not far from water and usually in vegetation with dense canopy (Strahan 1995). Various habitats that include eucalyptus, angophoras, tea-trees and banksias (Strahan 1995).	High: records from local area; potential foraging habitat along corridor.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Rallus pectoralis</i>	Lewin's Rail	R	NL	Literature review	Permanent to ephemeral fresh to saline wetlands that have dense emergent or fringing vegetation including artificial wetlands with similar habitat characteristics (Garnett & Crowley 2000).	Low: no records from search area; little suitable habitat for species along corridor.
<i>Rostratula australis</i>	Australian painted snipe	V	V	DEW	Most records of Australian Painted Snipe are from temporary or infrequently filled freshwater wetlands and although they have occurred at many sites, no site can be identified in which they are resident or regular in occurrence. This may suggest the species is nomadic but the extent to which its cryptic behaviour may contribute to this belief is uncertain. Most records in Queensland are from the Channel Country, south-east Queensland and the Fitzroy Basin of central Queensland (Birds Australia species profile, http://www.birdsaustralia.com.au/birds/painted.html).	Low: no records from local area; no suitable habitat for species along corridor.
<i>Turnix melanogaster</i>	black-breasted button-quail	V	V	DEW	Commonly associated with vine thicket rainforest with greater than 800 mm rainfall, deep leaf litter and a closed canopy but also occur in softwood scrubs in the Brigalow Belt, vine scrub regrowth and mature hoop pine (<i>Araucaria cunninghamii</i>) particularly with a lantana understorey. They also occur in dry sclerophyll forest adjacent to rainforest and <i>Acacia</i> and <i>Austromyrtus</i> scrubs on sandy coastal soils (Inskip Point) (Garnett & Crowley 2000).	Low: no records from local area; no suitable habitat for species along corridor.

Species name	Common name	NC Act Status	EPBC Act Status	Source	Preferred habitat	Likelihood of occurrence within extension corridor
<i>Xanthomyza Phrygia</i>	regent honeyeater	E	E	DEW	Associated with box-ironbark vegetation types and the wetter more fertile sites within these associations such as creek flats, broad valleys and foothills. The species has undergone a significant range contraction and is now rarely sighted in Queensland (Garnett and Crowley 2000).	Low: no records from local area; no suitable habitat for species along corridor.

C = common; V = vulnerable; E = endangered; NL = not listed

Table F-3: Review of non-threatened migratory species known to occur or potentially occurring within the specified grid search area

Species	Common name	EPBC Act Status	DEWHA Search Tool notes	Likelihood of occurrence within busway extension corridor
<i>Apus pacificus</i>	fork-tailed swift	Migratory	Species or species habitat may occur within area	Low: no records from local area; rarely recorded in Brisbane.
<i>Ardea alba</i>	great egret	Migratory	Species or species habitat may occur within area	Low: no records from local area; little suitable habitat along corridor.
<i>Ardea ibis</i>	cattle egret	Migratory	Breeding likely to occur within area	Moderate: records from local area; little suitable habitat along corridor.
<i>Gallinago hardwickii</i>	Latham's snipe	Migratory	Species or species habitat may occur within area	Moderate: no records from local area; little suitable habitat along corridor.
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	Migratory	Species or species habitat likely to occur within area	Low: no records from local area; no suitable foraging or nesting habitat along corridor.
<i>Hirundapus caudacutus</i>	white-throated needletail	Migratory	Species or species habitat may occur within area	High: records from local area; likely to forage over site.
<i>Merops ornatus</i>	rainbow bee-eater	Migratory	Species or species habitat may occur within area	High: records from local area; habitat along corridor may occasionally be used for foraging.
<i>Monarcha melanopsis</i>	black-faced monarch	Migratory	Breeding may occur within area	Low: no records from local area; little suitable habitat along corridor.
<i>Monarcha trivirgatus</i>	spectacled monarch	Migratory	Breeding likely to occur within area	Low: no records from local area; little suitable habitat along corridor.
<i>Myiagra cyanoleuca</i>	satin flycatcher	Migratory	Breeding likely to occur within area	Low: no records from local area; little suitable habitat along corridor.

Species	Common name	EPBC Act Status	DEWHA Search Tool notes	Likelihood of occurrence within busway extension corridor
<i>Nettapus coromandelianus albipennis</i>	Australian cotton pygmy-goose	Migratory	Species or species habitat may occur within area	Low: no records from local area; little suitable habitat along corridor.
<i>Rhipidura rufifrons</i>	rufous fantail	Migratory	Breeding may occur within area	Moderate: records from local area; marginal habitat along corridor.

C = common; V = vulnerable; E = endangered; M =migratory; NL = not listed.

Appendix G

Demographic profile of study area

APPENDIX G — Demographic profile of study area

Age groups	Rochedale 4123	Springwood 4127	Study Area	Study Area %	Logan	Logan %	Greater Brisbane
0-4 years	1,096	1,290	2,386	6.4%	13,321	7.7%	59,503
5-14 years	2,231	3,028	5,259	14.1%	28,203	16.3%	113,480
15-19 years	1,217	1,664	2,881	7.7%	14,200	8.2%	65,102
20-24 years	1,089	1,647	2,736	7.3%	13,235	7.6%	85,762
25-34 years	2,379	3,014	5,393	14.4%	24,743	14.3%	154,232
35-44 years	2,273	2,846	5,119	13.7%	24,736	14.3%	144,659
45-54 years	2,211	3,089	5,300	14.2%	23,631	13.6%	125,500
55-64 years	2,164	2,895	5,059	13.5%	18,526	10.7%	95,362
65-74 years	849	1,039	1,888	5.1%	7,849	4.5%	54,529
75-84 years	461	526	987	2.6%	3,687	2.1%	41,835
85 years and over	128	213	341	0.9%	1,133	0.7%	16,164

Marital Status	Rochedale 4123	Rochedale %	Springwood 4127	Springwood %	Study Area	Study Area %	Logan	Logan %	Greater Brisbane	Greater Brisbane %
Married	6,690	52.4%	8,194	48.4%	14,884	50.1%	62,292	47.30%	675,715	48.1%
Never Married	4,065	31.8%	5,800	34.3%	9,865	33.2%	46,553	35.30%	492,162	35.0%
Separated or Divorced	1,484	11.6%	2,223	13.1%	3,707	12.5%	17,909	13.60%	165,032	11.8%
Widowed	526	4.1%	717	4.2%	1,243	4.2%	4,984	3.80%	71,478	5.1%

Labour Force	Study Area %	Logan %	Greater Brisbane %
Total labour force (includes employed and unemployed persons)			
Employed full time	63.6%	62.90%	62.7%
Employed part time	26.9%	25.20%	27.2%
Employed away from work	2.9%	3.00%	3.3%
Employed hours not stated	2.6%	3.10%	2.5%
Unemployed	4.0%	5.80%	4.4%

Labour Force	Study Area %	Logan %	Greater Brisbane %
Professionals	16.2%	11.20%	20.7%
Clerical and Administrative	18.3%	16.20%	16.6%
Technicians and Trades Workers	16.9%	17.40%	14.1%
Managers	10.5%	9.00%	11.3%
Sales Workers	11.4%	10.80%	10.2%
Labourers	11.1%	14.20%	10.1%
Community and Personal Service Workers	8.3%	8.50%	8.8%
Machinery Operators and Drivers	7.4%	10.90%	6.5%

Income	Rochedale 4123	Springwood 4127	Logan	Greater Brisbane
Median individual income (\$/weekly)	531	523	476	516
Median household income (\$/weekly)	1,133	1,102	1,049	1,111
Median family income (\$/weekly)	1,249	1,212	1,125	1,262

Family Characteristics	Rochedale 4123	Rochedale %	Springwood 4127	Springwood %	Study Area	Study Area %	Logan	Logan %	Greater Brisbane	Greater Brisbane %
Total families	4,534		5,895		10,429		46,555		466,038	
Couple families with children	2,135	47.1%	2,626	44.5%	4,761	45.7%	21,826	46.90%	211,700	45.4%
Couple families without children	1,605	35.4%	2,042	34.6%	3,647	35.0%	14,301	30.70%	169,765	36.4%
One parent families	743	16.4%	1,138	19.3%	1,881	18.0%	9,740	20.90%	75,145	16.1%
Other families	51	1.1%	89	1.5%	140	1.3%	688	1.50%	9,428	2.0%

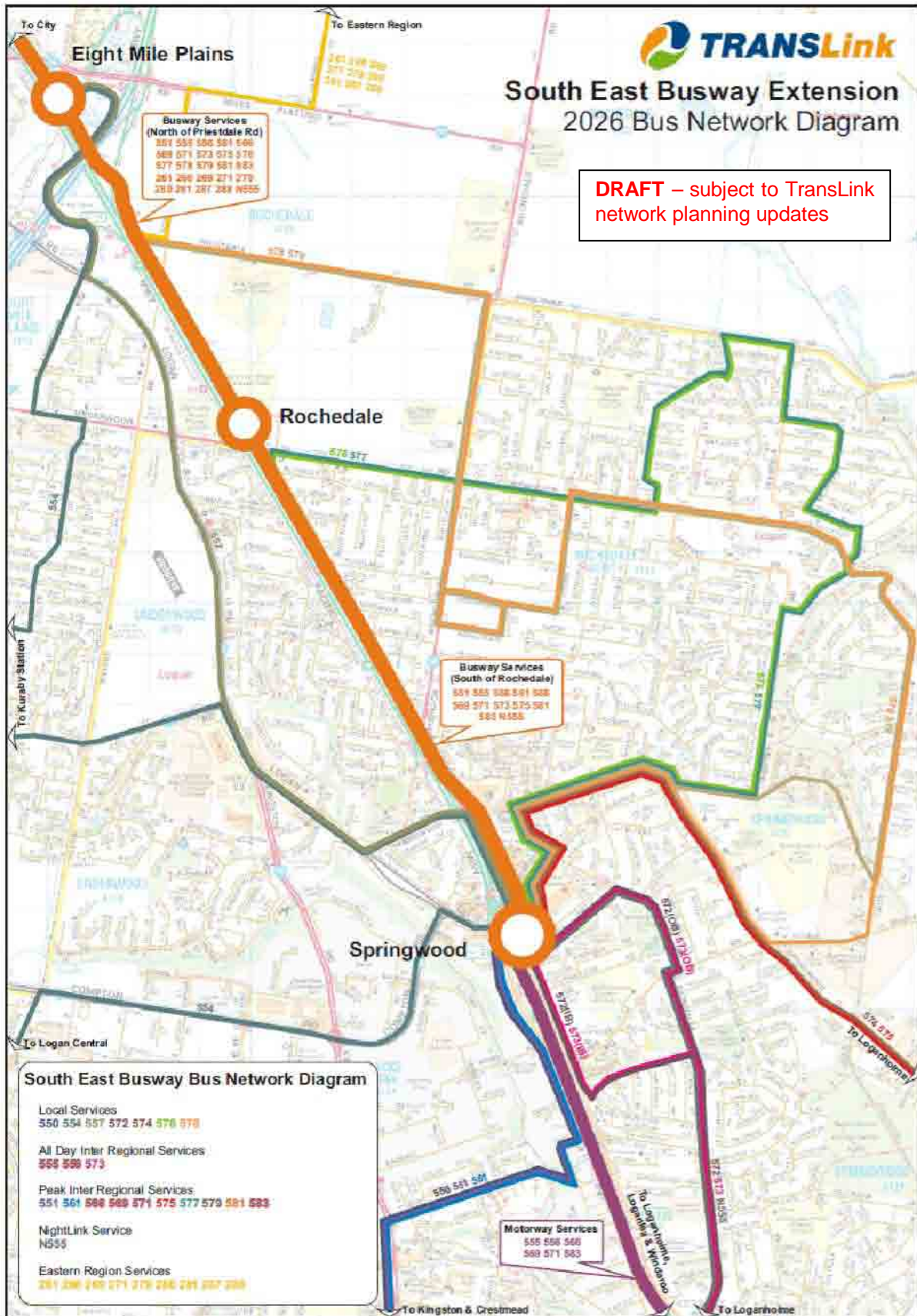
Dwelling Characteristics	Study Area %	Logan %	Greater Brisbane %
Occupied private dwellings:			
Separate house	83.8%	85.80%	78.8%
Semi-detached, row or terrace house	12.5%	9.80%	7.3%
Flat, unit or apartment	1.7%	3.60%	12.9%
Other dwellings	1.9%	0.90%	1.0%

Number of Motor Vehicles per dwelling	Study Area %	Logan %	Greater Brisbane %
None	5.3%	6.7%	8.7%
1 motor vehicle	33.2%	33.8%	36.4%
2 motor vehicles	38.9%	37.4%	36.4%
3 motor vehicles	13.3%	12.6%	10.6%
4 or more	6.5%	6.1%	4.7%
Not stated	2.7%	3.4%	3.2%

Appendix H

Reference network

Possible future bus network



Possible bus frequencies and stopping patterns

2026					Commencing	AM peak (1 hour)	PM peak (1 hour)	Daily inbound	Daily outbound	Daily two way	Eight Mile Plains	Priestdale Rd	Rochedale South	Bus loop	Repton Cr	Springwood	Springwood Interchange	Flaxton Ave/Vanessa Blvd	Loganholme
Busway																			
Route	From	To	Service type																
551	Crestmead	Brisbane City	All stops/peak	5	5	8	8	16			551	551			551				
555	Loganholme bus station	Brisbane City	All day service	13	10	68	70	138			555	555			555				555
556	Griffith University	Loganlea Rail station	All stops	0	2	25	25	50			556	556			556				556
561	Crestmead	Brisbane City	All stops/peak	5	5	8	8	16			561	561			561				
566	Windsor	Brisbane City	All stops	13	7	10	10	20			566	566			566				566
569	Loganholme bus station	Brisbane City	All stops/peak	13	5	12	12	24			569	569			569				569
571	Cornubia	Brisbane City	All stops/peak	13	7	12	12	24			571	571			571				571
573	Loganholme bus station	Brisbane City	All stops/peak	12	12	14	14	28			573	573			573				573
575	Loganholme bus station	Brisbane City	All stops/peak	7	7	10	10	20			575	575			575				575
581	Springwood	Brisbane City	Express/peak	2008	10	5	10	10	20		581	581			581				
582	Rochedale	Brisbane City	Express/peak	2016	8	8	12	10	22		582	582	Y						
583	Hyndalwood bus station	Brisbane City	Express/peak	2026	4	4	20	20	40		583	583		Y		583			583
				Total	93	78	205	209	413										
Springwood interchange																			
Route	From	To	Service type																
550	Browns Plains	Springwood	All stops	2	4	59	62	121											550
554	Garden Central Plaza	Garden City	All stops	5	5	18	18	36			554	554							554
557	Garden City	Springwood	All stops	0	0	8	8	16			557	557							557
572	Loganholme bus station	Springwood	All stops	0	0	36	37	73											572
574	Loganholme bus station	Springwood	All stops	0	0	17	17	34											574
576	Springwood	Garden City	All stops	0	0	16	16	32			576	576	Y						576
577	Springwood	Richbane City	All stops/peak	7	5	10	10	20			577	577	Y						577
578	Springwood	Garden City	All stops	0	0	10	10	20			578	578	Y						578
579	Springwood	Brisbane City	All stops/peak	5	5	8	8	16			579	579	Y						579
				Total	19	19	202	206	408										
Priestdale Rd																			
Route	From	To	Service type																
261	Mackenzie	Brisbane City	limited stops	7	5	7	7	15			261	Y							
268	Carindale	Garden City	All day service	2016	5	5	34	37	71		268	Y							
269	Carindale	Garden City	All day service	2016	5	5	34	37	71		269	Y							
271	Victoria Pt	Richbane City (via EMP)	limited stops	7	7	7	5	12			271	Y							
279	Victoria Pt	Brisbane City (via EMP)	limited stops	4	4	7	5	12			279	Y							
280	Pt Tauburpin	Garden City & Griffith Uni	All stops	2	2	34	37	71			280	Y							
281	Pt Tauburpin	Brisbane City via Garden city	limited stops	5	5	10	7	17			281	Y							
287	Rochedale Urban Village	Garden City	Express/off peak	2016	0	0	17	17	34		287	Y							
288	Rochedale Urban Village	Brisbane City	Express/peak	2016	6	6	18	18	36		288	Y							
				Total	35	35	170	170	340										
Loganholme																			
Route	From	To	Service type																
282	Redland Bay	Loganholme bus station	All stops	2	2	17	17	34											282
283	Redland Bay	Loganholme bus station	All stops	0	0	17	17	34											283
548	Park Ridge	Loganholme bus station	All stops	2016	7	7	29	29	58										548
552	Loganholme bus station	Kingston	All stops	5	5	29	29	58											552
553	Beenleigh	Trinder Park	All stops	2	2	17	17	34											553
560	Loganholme bus station	Browns Plains	All stops	6	6	68	68	135											560
562	Loganholme bus station	Beenleigh	All stops	0	2	15	15	30											562
563	Loganholme bus station	Bethania	All stops	2	2	17	17	34											563
565	Windsor	Loganholme bus station	All stops	2	2	15	11	26											565
570	Cornubia	Loganholme bus station	All stops	0	0	14	14	28											570
				Total	28	30	238	234	472										

****NB - DRAFT developed for the purposes of this Concept Design Study (based on indicative 2026 timeframe)**

- Background notes**
- 1 - 2026 future operating scenario with Rochedale Station and two Springwood stations (local interchange and busway station)
 - 2 - AM peak = inbound; PM peak = outbound
 - 3 - AM & PM peak based on 4.4% growth p.a. from 2016 (formula = 2016 value * 1.044ⁿ)
 - 4 - services shown in white run express through the station
 - 5 - bus numbers and stopping patterns subject to TransLink future network planning forecasts