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Changes to Gateway Upgrade Project EIS Report Queensland Motorways Limited

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Executive Summary

Outline of Reference Project

The Gateway Upgrade Project (GUP) was declared a significant project for which an Environmental Impact Statement (EIS) was required. The EIS addressed the Terms of Reference (TOR) prepared under the *State Development and Public Works Organisation Act 1971*. The Department of State Development and Innovation (DSDI) was the authority responsible for coordinating the assessment of the EIS for the GUP. The TOR were issued by DSDI in April 2004 with the EIS subsequently completed by Queensland Motorways Limited (QML) in mid August 2004 and placed on public display between 23 August and 4 October 2004.

The proposed GUP Reference Project addressed in the EIS included:

- A two lane widening to six lanes of the existing Gateway Motorway between Mt Gravatt-Capalaba Road and Wynnum Road
- A four lane widening to eight lanes of the existing Gateway Motorway between Wynnum Road and Lytton Road
- A new six lane bridge crossing of the Brisbane River downstream of the existing bridge
- Introduction of electronic toll plazas, and associated infrastructure north of the existing bridge
- A new four lane Motorway through the old Brisbane Airport site across Airport Drive to reconnect with the existing Gateway Motorway south of Nudgee Road
- A new interchange for additional access to Brisbane Airport

Description of project changes

The proposed changes to the GUP Reference Project that were not foreshadowed in the GUP EIS (2004) are as follows:

- Northern extension of existing Gateway Motorway alterations
- Kingsford Smith Drive (KSD) on/off ramps

Effects of proposed changes to the project

Northern extension of existing Gateway Motorway alterations

There will be an overall improvement for traffic merging onto the Motorway from Nudgee Road at this location.

There will be minimal or no changes to the other potential environmental impacts addressed in the EIS.

KSD on/off ramps

There will be a beneficial redistribution of traffic towards the Gateway Motorway Deviation from the existing Gateway Motorway and the Fison/Links Avenue ramps.

There will be minimal or no changes to the other potential environmental impacts addressed in the EIS.

Conclusions

The potential environmental impacts resulting from the proposed changes to the GUP Reference Project assessed in the EIS represent improvements in traffic management and minimal and/or no change to the potential environmental impacts addressed in the EIS.

1. Introduction

1.1 Gateway Upgrade Project

The Gateway Motorway and the Gateway Bridge are vital to the South East Queensland (SEQ) region and the Australia TradeCoast (ATC) area, providing access to Brisbane Airport and the Port of Brisbane. The Gateway Bridge and sections of the Gateway Motorway are approaching capacity. Travellers are already experiencing significant delays in the morning and evening peaks north and south of the Gateway Bridge. The project has an estimated value of $1.88 billion dollars and is expected to generate significant investment and business opportunities to SEQ region and the State.

The Gateway Upgrade Project (GUP) was declared a significant project for which an Environmental Impact Statement (EIS) was required and which was to address the Terms of Reference (TOR) prepared under the *State Development and Public Works Organisation Act 1971*. The Department of State Development and Innovation (DSDI) was the authority responsible for coordinating the assessment of the EIS for the GUP. The TOR were issued by DSDI in April 2004 with the EIS subsequently completed by QML in mid August 2004 and placed on public display between 23 August and 4 October 2004.

The EIS addressed the Reference Project for the proposed duplication of the Gateway Bridge and upgrade of the Gateway Motorway between Mt Gravatt-Capalaba Road and Nudgee Golf Course.

A Supplementary EIS was prepared in early 2005 and given to agencies and individuals who submitted a submission on the EIS during the public display period.

The EIS and Supplementary EIS were approved by the Coordinator-General on 5 August 2005. The approval contains conditions pursuant to Section 39 of the *State Development and Public Works Organisation Act 1971* and the *Integrated Planning Act 1997* for the Environmentally Relevant Activities (ERAs) and tidal work (refer Appendix A).

With effective implementation of the Environmental Management Plan (EMP) (Chapter 23 of the Supplementary EIS) during detailed design, construction and operation, the EIS assessment identified no significant environmental impacts with all identified potential adverse impacts being manageable.

1.2 Project implementation and change

In September 2005, QML issued an Invitation to Tender to design, construct and maintain the GUP. The process encouraged innovation by the proponents building upon a foundation provided by the Reference Project design drawings and requirements. Tenderers were required to achieve the project objectives sought by QML and suggest innovation that delivered greater value for money and enhanced socio-environmental outcomes.

In March 2006 QML received three (3) tenders for consideration.

In September 2006, following evaluation of the tenders the Queensland Government announced the Leighton AbiGroup Joint Venture (LAJV) as the successful contractor to deliver the project.

As part of its tender, LAJV identified a range of enhancements to the original design of the Reference Project. As part of the tender evaluation QML accepted a number of enhancements for inclusion in the contract subject to stakeholder approval. QML itself also identified enhancements to the original design of the Reference Project.

1.3 Environmental assessment of changes

The enhancements from the original design of the Reference Project have been assessed against the GUP EIS and Supplementary EIS to identify potential environmental impact changes that need to be considered.

The potential environmental impact changes for the project enhancements are documented in this report. Each environmental aspect addresses the existing environment, potential impacts and mitigation measures.

The potential impact of the design change on some environmental aspects is the same as assessed in the EIS and Supplementary EIS. This is illustrated in the summary of potential impacts table as "No change".

1.4 Process for evaluation of change

The evaluation of the GUP Reference Project included in the EIS was carried out by the Coordinator-General under the *State Development and Public Works Organisation Act 1971* (Qld). The Act provides the process for the evaluation of changes to a significant project by the Coordinator-General.

Division 3A of Part 4 of the Act details the steps to be followed in identifying, assessing and reporting on proposed changes to a project. The steps include:

- Written notice given by the proponent to the Coordinator-General requesting evaluation of the proposed change. The written notice must include a description of the proposed change and its effects on the project, the reasons for the proposed change and information to allow the Coordinator-General to make an evaluation
- The Coordinator-General may then:
  - Refer the details of the proposed change to anyone the Coordinator-General considers may be able to assist in making the evaluation
  - Request further information from the proponent regarding the proposed change, its effects on the project or any other related matter
  - Require the proponent to publicly notify the proposed change and its effects on the project

The Coordinator-General must then evaluate the proposed change, considering all properly made submissions, the nature of the change and its effects on the project, the project as evaluated under the Coordinator-General's report for the EIS for the project, the environmental effects of the change and its effects on the project. The Coordinator-General's evaluation of the proposed change is to be detailed in a 'Change Report' which may include conditions necessary to address the impacts of the proposed changes. The Change Report must be given to the proponent and must be publicly notified.

The Coordinator-General's evaluation report for the EIS (refer Appendix A) and the Change Report both have effect for the project, however the Change Report prevails to the extent of any inconsistency.

2. Reference project

2.1 Description summary

The Reference Project proposed a range of road and bridge works (as stated within the GUP EIS (2004)), which in summary included:

- A two lane widening to six lanes of the existing Gateway Motorway between Mt Gravatt-Capalaba Road and Wynnum Road
- A four lane widening to eight lanes of the existing Gateway Motorway between Wynnum Road and Lytton Road
- A new six lane bridge crossing of the Brisbane River downstream of the existing bridge
- Introduction of electronic toll plazas, and associated infrastructure north of the existing bridge
- A new four lane Motorway through the old Brisbane Airport site across Airport Drive to reconnect with the existing Gateway Motorway south of Nudgee Road
- A new interchange for additional access to Brisbane Airport

A generalised representation of the EIS Reference Project is shown in Appendix B.

2.2 Proposed changes

As a result of design improvements offered by the LAJV, a series of changes to the EIS Reference Project design have been put forward for consideration. These project changes include improvements to traffic movement and inter-connectivity, improved and more efficient surface connections and the extension of works in specific areas. Project changes represent cost savings, enhanced access and safety onto the Motorway.

The proposed changes to the Reference Project alignment are as follows:

- Northern extension of existing Gateway Motorway alterations
- KSD on/off ramps

Further details of each change are provided in Section 3.

It is important to note all of the proposed changes are within the existing project corridor site boundaries assessed as part of the GUP EIS or within the existing GUP road reserve.

2.3 Consultation

Table 2.1 summarises the consultation activities undertaken by QML and/or LAJV in relation to the proposed changes.

Table 2.1 Completed consultation and communication activities

Consultation activities	Timing
State Government advised the community of the KSD value bid option at the announcement of the successful tenderer. Announcement and proposed ramps received coverage in local media	18 September 2006
GUP Newsletter (Issue 5) provided information regarding the enhanced ramps on KSD. Newsletter distributed to 153,000 residents and businesses in the vicinity of the project corridor	October 2006

Consultation activities	Timing
Discussions have been ongoing with three property owners directly adjacent to the proposed KSD on and off ramps. Property owners include: • G James Pty Ltd • Cavcorp Pty Ltd • Barro Concrete	October 2006 to present
Regular meetings with Brisbane City Council (BCC) regarding proposed KSD ramps	September 2006 to February 2007
A number of meetings have occurred with the Nudgee Golf Course, BCC and Brisbane Airport Corporation regarding the northern extension of the existing Gateway Motorway alterations	September 2006 to February 2007

Additional consultation on the proposed changes will be undertaken by LAJV as part of the detailed design process.

3. Effects of project changes

3.1 Northern extension of existing Gateway Motorway alterations

3.1.1 Effect on the project

The southbound entry ramp from Nudgee Road will be extended approximately 600m to become an added lane for southbound traffic.

Figure 3.1 illustrates the proposed design change.

3.1.2 Existing environment

Air quality

The existing ambient air quality environment is detailed in the EIS.

Noise and vibration

The existing noise and vibration environment is detailed in the EIS.

Terrestrial ecology

Methodology

The subject site, situated between an existing on ramp to the Gateway Motorway and the Nudgee Golf Course, was inspected by an experienced and qualified ecologist on 5 September 2006. The subject site was traversed and dominant plant species identified. Incidental fauna sightings were also noted and habitat values were assessed. Samples of plant specimens that were unable to be positively identified were forwarded to the Queensland Herbarium for further identification and verification.

It is important to note that due to seasonal limitations, all flora species on the subject site may not have been recorded. This could be attributed to, plants being unidentifiable due to lack of fertile material, or plants lying dormant (eg terrestrial orchids) at the time of the survey. Similarly, not all fauna utilising the subject site may have been recorded due to the season, the species being cryptic and because only diurnal surveys were done.

None of the species identified within the site are listed as “Endangered, Vulnerable or Rare” under the *Nature Conservation (Wildlife) Regulation 1994* of the *Nature Conservation Act 1992.* Appendix D provides a comprehensive list of flora and fauna species as identified on site.

Existing flora

The subject site is located approximately 750m south of the southern boundary of the Boondall Wetlands Reserve, which contains a mixture of forest types and tidal wetlands. Nudgee Waterholes Reserve, which mainly contains paperbark forest and an open freshwater lagoon is situated approximately 100m to the west (on the opposite side of the Gateway Motorway). Remnant patches of paperbark forest are also located in the grounds of the Australian Catholic University, 800m to the south west. Extensive areas of swamp oak plantation occur on the eastern side of Nudgee Golf Course within the boundaries of the Brisbane Airport. A mixture of regrowth and planted native trees and shrubs were observed on the road verge on the opposite side of the Motorway.

The vegetation on the subject site occurs as a narrow band approximately 10m wide (refer Photo 3.1). It consists of a canopy of planted, remnant and regrowth native trees with a small number of exotic trees (some planted, some self-seeded). The dominant planted species included the Swamp Oak (*Casuarina glauca*) to approximately 9m tall at the northern end and Bottlebrush (*Callistemon viminalis*) at the southern end. Remnant and regrowth trees are primarily the Forest Red Gum (*Eucalyptus tereticornis*) and the Paper Barked Tea Tree (*Melaleuca quinquenervia*) including one specimen approximately 10m tall with a diameter at breast height (dbh) of 1.5m.

Photo 3.1 Vegetation along Nudgee Road on ramp extension

The ground storey mainly contains maintained grass except along the unnamed drain that runs under the Motorway and through Nudgee Golf Course, the banks of which were dominated by exotic grasses, forbs and vines. Upon inspection of the channel of this drain, aquatic macrophytes, primarily Cumbungi (*Typha* sp), were observed.

A number of the species on site are "Declared" plants under the *Land Protection (Pest and Stock Route Management) Act 2002* and listed in the *Land Protection (Pest and Stock Route Management) Regulation 2003.* These are listed in Appendix D, including an outline of landowner responsibilities under the legislation is also included.

Existing fauna

Birds were the only fauna sighted during the survey and included common and widespread species. Striated pardalotes (*Pardalotus striatus*) appear to be using the banks of the drain for nesting as a characteristic small hole was sighted.

Markings of the Common brushtail possum (*Trichosurus vulpecula*) were identified on the trunk of a Forest Red Gum. It is also likely that Grey-headed flying fox (*Pteropus poliocephalus*) feed in the area when the melaleucas, callistemons, corymbias and eucalypts are in flower. This species is listed as "Vulnerable" under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* but "least concern" under Queensland's *Nature Conservation Act 1992.*

Habitat values

Structural diversity is a measure of the number of layers within the vegetation. The greater the number of layers the higher the structural diversity. Vegetation with high structural diversity has the potential to provide more niches for fauna. For example the presence of a well-developed understorey appears to be the single-most important vegetation-related factor for the persistence of small, forest/woodland dependent passerines in remnant patches (Lynch and Saunders 1991). The structural diversity for this area of habitat is low. There is also no coarse woody debris on the ground to provide cover for ground dwelling fauna or tree hollows to provide nesting or roosting hollows for hollow dependant fauna.

The unnamed drain provides habitat for water birds and wading birds, a number of which were noted during the survey. It may also provide breeding habitat for frogs although none were recorded during this survey.

Roads and the associated verges can act as a substantial barrier to fauna movement. Road construction results in the alteration of habitat due to clearing, mowing, spraying, grading or burning (Goosem 2001). Traffic noise and the visual disturbance by the movement and headlights of vehicles, as well as the associated pollutants, may cause some species of fauna to avoid the road and add to their affects as barriers once they are constructed (AMBS January 2001). The habitat in this area is immediately adjacent to the Gateway Motorway, which carries a heavy traffic load for almost 24 hours per day. This is likely to further diminish its value to many species of fauna.

Social environment

The existing social environment is detailed in the EIS.

Landscape and visual amenity

The subject site contains amenity planting, remnant and regrowth trees to approximately 10m tall with a maintained understorey along the side of the existing Gateway Motorway. There are also some rows of trees that have been recently planted along the boundary fence on the grounds of the Nudgee Golf Course but these are less than 60cm tall and as yet do not contribute to the visual amenity of the area. An unnamed drain flows into and through Nudgee Golf Course with weed species growing along its banks.

The mature trees provide some screening of the Motorway for patrons using the golf course. They also screen the 2m high mesh fence that runs along the boundary of the golf course from motorists travelling along the Motorway.

3.1.3 Potential impacts

Air quality

A slight increase in emissions to those highlighted in the EIS is expected during the construction period due to the extra period of time that the plant and equipment will be required to construct the on/off ramps and associated infrastructure.

Improved traffic flows is likely to improve the ambient air quality of the subject area during the operational phase.

Noise and vibration

A slight increase in noise and vibration during the construction phase is expected. This may have a temporary impact on golfers using the Nudgee Golf Course.

There is likely to be minimal change to the noise and vibration levels during the operational phase assessed as part of the EIS.

Terrestrial ecology

The proposed road works are likely to require the removal of the remnant and planted vegetation. However, the effect on fauna, including Grey-headed flying foxes is likely to be minimal given the amount of remnant vegetation in the vicinity. It is also likely that the batters will be revegetated as part of construction, which will mitigate the effects of clearing as the vegetation matures. In addition, some trees have been recently planted beside the existing fence on the grounds of the Nudgee Golf Course. These will provide an additional food source and habitat as they mature.

There may also be some reduction in the area of open water in the drain but given the size of the drain and the proximity of the Nudgee Waterholes the overall impact is likely to be minimal.

Social environment

A slight increase in impacts on the social environment for users of the Nudgee Golf Course may be experienced during construction due to the extra exhaust emissions, noise and vibration from plant and equipment. However, once construction is completed these impacts will cease.

Landscape and visual amenity

Removal of the trees along this section of road as part of the proposed upgrade would increase the visibility of the boundary fence and the golf course beyond. However, as the trees on the golf course mature they will provide some of the lost screening, but may take five (5) to ten (10) years to reach maturity. Revegetation of the batters as part of construction would mitigate the effects of clearing as the vegetation matures.

3.1.4 Mitigation measures

The mitigation measures identified in the EIS and Supplementary EIS are considered sufficient to alleviate environmental impacts outlined above.

3.1.5 Summary of environmental effects

Table 3.1 summarises the potential impacts of the proposed change from those detailed in the GUP EIS.

Table 3.1 Summary of potential risk impacts of design change

EIS aspect	Potential impact of design change
Land use planning	No change
Transportation	No change
Pedestrian and cycling	No change
Utility services	No change
Regulatory framework and planning	No change
Topography/Geomorphology/Geology	No change
Soils	No change
Hydrology/Hydraulics	No change
Surface water quality	No change

EIS aspect	Potential impact of design change
Groundwater	No change
Air quality	Minimal change (refer Section 3.1.3)
Noise and vibration	Minimal change (refer Section 3.1.3)
Terrestrial ecology	Minimal change (refer Section 3.1.3)
Aquatic biology	No change
Cultural heritage	No change
Social environment	Minimal change (refer Section 3.1.3)
Economic environment	No change
Hazard and risk	Reduced risk for merging traffic
Landscape and visual amenity	Minimal change (refer Section 3.1.3)

3.2 Kingsford Smith Drive on/off ramps

3.2.1 Effect on the project

Two south facing ramps will be constructed to KSD as shown in Figure 3.2a.

The Reference Design included provisions for north facing access ramps connecting Lavarack Avenue with the Gateway Motorway Deviation for maintenance and emergency vehicles only. The absence of ramps at this location for general traffic use results in a proposed tolling arrangement on the northside which sought to limit the number of entry/exits to the Motorway. The provision for this change altered the scope of the Reference Design as shown in Figure 3.2b.

With the decision to proceed with electronic tolling for the project in the next few years, the need to limit access at this location to the Motorway was removed.

Subsequent design development has provided the possibility of constructing south facing ramps without requiring further land resumption or impingement on adjacent buildings.

These south facing ramps provide alternative access for traffic currently exiting the Motorway at Fison Avenue, and for vehicles entering the Motorway at Links Avenue.

This change is likely to have no traffic impact on the operations of the network, whilst maintaining the functionality of the corridor.

3.2.2 Existing environment

Transportation

This section provides a summary of the Gateway Upgrade Project - Kingsford Smith Drive Precinct Traffic Modelling Report (September 2006) prepared by Masson, Wilson and Twiney (MWT) consultants (refer Appendix C).

The traffic analysis report describes the analysis undertaken to forecast the traffic changes arising from the modified Reference Design and details the benefits or otherwise derived from the changes.

With the decision to proceed to electronic tolling in the future, the need for additional lanes on the existing Gateway Motorway in the section between the Southern Bifurcation with the Gateway Deviation and KSD interchange, as allowed for in the Reference Design, was removed. Similarly the requirement to limit access to the Motorway in this vicinity was no longer relevant. These decisions have allowed for changes to the Reference Project to improve local traffic movements.

To adequately accommodate traffic entering and leaving the Motorway system a number of surface street works have been included as part of the GUP. For example, at KSD a new signalised intersection with right and left turn lanes at the intersection with Gateway Deviation Ramps, and at Links Avenue an additional lane northbound between Cullen Avenue and KSD to allow a continuous left turn lane is proposed.

Air quality

The existing ambient air quality environment is detailed in the EIS.

Noise and vibration

The existing ambient noise and vibration environment is detailed in the EIS.

Landscape and visual amenity

The EIS described the Gateway Deviation as causing a major visual contrast within the existing industrial landscape forming a significant component of the outlook from the surrounding landscape.

Inclusion of the ramps to the Reference Design will require the following additions to the Reference Design:

- Two (2) south facing ramps running from Lavarack Avenue to KSD
- A new signalised intersection at KSD with right and left turn lanes at the intersection with Gateway Deviation Ramps
- An additional lane northbound between Cullen Avenue and KSD on Links Avenue to allow a continuous left turn lane

3.2.3 Potential impacts

Transportation

Strategic modelling analysis

Strategic modelling analysis for traffic has been undertaken using the EMME/2 model which was previously used for the development of the "Reference Case" traffic model. This model is based on BSTM Version 4.

The model indicates the addition of the KSD Ramps has a significant effect on traffic distribution between Fison Avenue and the Gateway Motorway Deviation. The model output figures (refer Appendix C) show a shift in traffic flow from the existing Gateway Motorway and the Fison/Links Avenue ramps to the Gateway Motorway Deviation and the new KSD ramps.

Although not significant in an overall network sense, the addition of the KSD ramps does provide an improvement to the overall network Vehicle Kilometres of Travel (VKT) and Vehicle Hours of Travel (VHT). The model indicates that the change in traffic distribution caused by the addition of the KSD ramps is minor and localised to the area surrounding the new ramps.

Operational modelling

Operational modelling has been undertaken using the PARAMICS suite of microsimulation software. The operational assessment has been undertaken for the AM and PM peak periods under 2021 forecast traffic demands.

Operational issues that are evident under the Reference Project are significant queuing and extensive delays at a number of intersections and during peak hour flows. This queuing results in the Reference Project models reaching significant levels of congestion resulting in grid lock of the model in both the AM and PM peak periods.

The addition of the KSD ramps reduces the level of congestion in the modelled area although some operational issues still remain, including some queuing on KSD westbound and extensive delays on Wynnum and Lytton Roads in the vicinity of Gateway Interchange.

Air quality

During construction potential air quality impacts will be the same as outlined in the EIS.

The use of the KSD on and off ramps for general traffic use within the operational phase of the project is likely to have minimal additional operational impacts to the ambient air environment predicted within the EIS due to the following:

- Provision of KSD ramps will not significantly change the traffic volumes on KSD
- Proposed KSD ramps reduces level of congestion in the area potentially improving the air quality environment
- Industrial development adjacent to the proposed KSD ramps do not represent air quality sensitive receptors

However, businesses adjacent to the KSD ramps may be subjected to a slight increase in vehicle emissions due to the braking and accelerating of vehicles exiting and entering the Motorway via the proposed ramps. Vehicle emissions decrease with vehicles travelling at speed. The braking and accelerating on the ramps is likely to emit carbon monoxide and nitrogen dioxide. However, the emissions resulting from the KSD ramps are expected to be minimal compared to other sources within the area.

Noise and vibration

Potential construction noise and vibration impacts associated with the provision of KSD on and off ramps are considered to be the same as predicted in the EIS as the extent of embankment works is similar to the Reference Design and maintenance access ramps to Lavarack Avenue where included in the EIS.

The use of the KSD on and off ramps for general traffic use is likely to have minimal additional operational impacts to the noise and vibration environment predicted within the EIS due to the following:

- Existing high traffic volumes on KSD currently provide a high noise environment in this area
- Proposed KSD ramps reduces level of congestion in the area potentially reducing the noise environment
- Industrial development adjacent to the proposed KSD ramps do not represent noise and vibration sensitive receptors

However, businesses adjacent to the KSD ramps may be subjected to a slight increase in operational noise to that identified within the EIS due to the braking and accelerating of vehicles exiting and entering the Motorway via the proposed ramps.

Landscape and visual amenity

The visual impact associated with the provision of the KSD ramps is considered to have minimal additional construction and operational impacts on the visual amenity predicted in the EIS due to the following:

- EIS Reference Design included embankment works between Lavarack Avenue and KSD, including maintenance access ramps to Lavarack Avenue
- The nature and scale of the industrial development adjacent to the proposed KSD ramps

The KSD ramps require additional changes to the street network to provide connectivity between KSD and the Gateway Motorway. However, the visual impact from the inclusion of these ramps is expected to be minimal and similar to the visual impacts detailed in the EIS.

3.2.4 Mitigation measures

Transportation

The traffic analysis shows that the inclusion of south facing ramps on the Gateway Deviation at KSD into the Gateway Reference Project results in a beneficial redistribution of traffic on the adjacent road network. However, some operational issues still remain.

The analysis also shows effectively no change in the forecast level of service of the Gateway Motorway should it be retained in its current configuration after opening of the Deviation.

The mitigation measures identified in the EIS are considered sufficient, however additional measures may be required to mitigate the operational impacts identified by the model.

Air quality

The mitigation measures identified in the EIS are considered sufficient to alleviate the impacts on the ambient air quality as a result of the design change.

Noise and vibration

The mitigation measures identified in the EIS are considered sufficient to alleviate the impacts on the noise and vibration environment as a result of the design change.

Landscape and visual amenity

The mitigation measures identified in the EIS are considered sufficient to alleviate the impacts on the visual amenity as a result of the design change.

3.2.5 Summary of environmental effects

Table 3.2 summarises the potential impacts of the proposed change from those detailed in the GUP EIS.

Table 3.2 Summary of potential risk impacts of design change

EIS aspect	Potential impact of design change
Land use planning	No change
Transportation	Beneficial redistribution of traffic on the network (refer Section 3.2.3)
Pedestrian and cycling	No change
Utility services	No change
Regulatory framework and planning	No change
Topography/Geomorphology/Geology	No change
Soils	No change
Hydrology/Hydraulics	No change
Surface water quality	No change
Groundwater	No change
Air quality	Minimal change (refer Section 3.2.3)
Noise and vibration	Minimal change (refer Section 3.2.3)
Terrestrial ecology	No change
Aquatic biology	No change
Cultural heritage	No change
Social environment	No change
Economic environment	No change
Hazard and risk	No change
Landscape and visual amenity	Minimal change (refer Section 3.2.3)

4. Conclusions

The identified changes have been put forward as further enhancements to the original Reference Design proposed in the EIS.

The potential environmental impacts resulting from the proposed changes to the GUP Reference Project assessed in the EIS represent improvements in traffic management and minimal and/or no change to the potential environmental impacts addressed in the EIS.

5. References

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Appendix A

Coordinator-General's Report on the EIS for the Proposed GUP

Coordinator-General's Report

on the

Environmental Impact Statement

for the proposed

Gateway Upgrade Project

UNDER PART (4) OF THE QUEENSLAND
STATE DEVELOPMENT AND PUBLIC WORKS ORGANISATION ACT 1971

July 2005

Table of Contents

1.0 Introduction

This Report has been prepared pursuant to s.35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act) and provides an evaluation of the Environmental Impact Statement (EIS) process for the Gateway Upgrade Project (GUP). The EIS was conducted by the Queensland Department of Main Roads and prepared on its behalf by Connell Wagner Pty Ltd.

An Initial Advice Statement was lodged with the Department of State Development and Innovation (DSDI) on 16 December 2003 and I declared, on 22 December 2003, the GUP to be a "significant project for which an EIS is required", pursuant to s.26 of the SDPWO Act.

The project was referred to the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) in November 2003 (Department of Environment and Heritage reference number EPBC 2003/1297). On 12 February 2004, the Commonwealth Minister for the Environment and Heritage determined that the GUP did not constitute a controlled action pursuant to s.75 of the EPBC Act.

However, the section of the GUP that traverses Commonwealth land (being Brisbane Airport) triggers assessment and approval under the *Airports Act* 1996. The Brisbane Airport Corporation, on behalf of the Department of Main Roads, will be required to submit a Major Development Plan to the Commonwealth Department of Transport and Regional Services for this section of the project.

The objective of this report is to summarise the key issues associated with the potential impacts of the GUP on the physical, social and economic environments at the local, regional, state and national levels. It is not intended to record all the matters which were identified and subsequently settled. Instead, it concentrates on the substantive issues identified during the EIS process.

This report represents the end of the State impact assessment process. Essentially, it is an evaluation of the project, based on information contained in the EIS, Supplementary EIS (SEIS), submissions made on the EIS and information and advice from Advisory Agencies and other parties, and states conditions under which the project may proceed.

2.0 Project Description

2.1 The Proponent

The Proponent for the GUP is the Department of Main Roads (DMR). DMR is a Queensland Government organisation that manages approximately 34,000 kilometres of state controlled road network. This network carries 80% of Queensland's traffic and includes highways and other main connecting roads in Queensland.

2.2 The Project

The proposed works include a two lane widening (to six lanes) of the existing Gateway Motorway between Mt Gravatt-Capalaba Road and Wynnum Road and a four lane widening (to eight lanes) from Wynnum Road to Lytton Road. To

improve river crossing capacity, a new six lane bridge across the Brisbane River will be constructed downstream of the existing Gateway Bridge. A new four lane Motorway, including a new interchange for additional access to Brisbane Airport, will be constructed through TradeCoast Central and Brisbane Airport and across Airport Drive, Airtrain and Kedron Brook Floodway to rejoin the existing Gateway Motorway just south of Nudgee Road.

The following changes to the project were included in the SEIS:

- the new bridge would incorporate a shared pedestrian/bikeway facility;
- confirmation of the decision to introduce full electronic tolling collection facilities for toll collection works at the Gateway Bridge which will include the removal of the existing toll plaza from its current position north of Lytton Road;
- road improvement works on Wynnum Road in the vicinity of the Gateway Motorway, including the intersections with the Motorway ramps:
- alternative interchange options were being investigated for the Airport Northern Access Interchange; and
- the length of the Kedron Brook bridges would be increased by moving the southern abutments approximately 560m southward to avoid a significant zone of underlying soft alluvial deposits.

2.3 Project Rationale

The Gateway Motorway and Gateway Bridge is infrastructure that is vital to the South East Queensland Region and the Australia TradeCoast area, providing access to Brisbane Airport and the Port of Brisbane. The Gateway Bridge and sections of the Motorway are either at, or fast approaching, capacity. Travellers are already experiencing significant delays in the morning and evening peaks north and south of the Gateway Bridge.

The Proponent commissioned the 2003 Gateway Motorway and Second River Crossing Planning Study to investigate the provision of a second Gateway river crossing and upgrading of the Motorway between Nudgee Road and Mt Gravatt Capalaba Road. The investigation found an immediate need for additional approach capacity both north and south of the river, with augmentation of river crossing capacity to follow. The analysis for augmenting capacity on the north side indicated that a new deviation is preferred, rather than upgrading the existing Gateway Motorway alignment.

There is a clear need for the GUP to:

- alleviate future forecast traffic congestion;
- provide improved access to Port of Brisbane and Brisbane Airport;
- avoid increased congestion on alternative local roads through Brisbane City;
- enable and support continued growth of the local region; and
- stimulate economic growth of the Brisbane Region and SEQ.

3.0 Impact Assessment Analysis

3.1 Review and Refinement of the EIS Terms of Reference

An Initial Advice Statement was released for public information and Draft Terms of Reference (ToR) were advertised for public comment on 10 January 2004. Comments were accepted until close of business (cob) on 5 March 2004. A final

ToR was issued to the Proponent on 20 April 2004. Comments on the ToR were received from:

- Department of Aboriginal and Torres Strait Islander Policy
- Department of Emergency Services
- Department of Employment and Training
- Department of Communities
- Department of Housing
- Sport and Recreation Queensland
- Department of Local Government, Planning, Sport and Recreation
- Department of Natural Resources and Mines
- Department of Primary Industries & Fisheries
- Environmental Protection Agency
- Queensland Health
- Queensland Transport
- Queensland Treasury
- Department of Transport and Regional Services (Commonwealth)
- Brisbane City Council
- Brisbane Airport Corporation Limited
- Bicycle Queensland
- Royal Blind Foundation
- Public Transport Alliance

3.2 Public Review of the EIS

The EIS was approved for release and distributed to Advisory Agencies on 23 August 2004. An advertisement in *The Courier-Mail* on Saturday 21 August 2004 inviting submissions from the public until cob on Monday 4 October 2004. The four-volume print version could be purchased for $120 and the CD-ROM edition was available free of charge from the Proponent.

The EIS was displayed at:

- Gateway Upgrade Project Office, 196 Wharf Street, Spring Hill;
- Naturally Queensland Information Centre, 160 Ann Street, Brisbane;
- State Library of Queensland, Info Zone, South Bank, Brisbane; and
- John Oxley Library, 996 Wynnum Road, Cannon Hill.

Information on the project was available via the DSDI and DMR web sites and at public displays attended by DMR staff from 10.00am – 2.00pm at:

- Centro Toombul Shopping Centre from 23 to 28 August 2004;
- Brisbane Domestic Airport from 30 August to 4 September 2004;
- Carindale Shopping Centre from 6 to 11 September 2004;
- Cannon Hill Kmart Plaza from 13 to 18 September 2004; and
- Wynnum Plaza Shopping Centre from 20 to 25 September 2004.

The following Advisory Agencies were approached formally to conduct an evaluation of the EIS:

- Brisbane Airport Corporation Limited
- Brisbane City Council
- Department of Aboriginal and Torres Strait Islander Policy
- Department of Communities
- Department of Emergency Services

- Department of Employment and Training
- Department of Housing
- Department of Industrial Relations
- Department of Local Government, Planning, Sport and Recreation
- Department of Natural Resources and Mines
- Department of Primary Industries and Fisheries
- Department of the Premier and Cabinet
- Department of Public Works
- Department of Transport and Regional Services (Commonwealth)
- Environmental Protection Agency
- Office of Urban Management
- Queensland Health
- Queensland Police Service
- Queensland Transport
- Sport and Recreation Queensland
- Queensland Treasury

The EIS was also sent to the following community organisations:
- Bicycle Queensland
- Brisbane Region Environmental Council
- Public Transport Alliance

Following the six-week public review of the EIS a total of 24 submissions were received with the following distribution; 15 from Advisory Agencies, three from members of the public, two from community interest groups and four from private-sector companies as follows:
- Brisbane Airport Corporation Limited
- Brisbane City Council
- Department of Aboriginal and Torres Strait Islander Policy
- Department of Communities
- Department of Emergency Services
- Department of Employment and Training
- Department of Housing
- Department of Local Government, Planning, Sport and Recreation
- Department of Natural Resources and Mines
- Department of Primary Industries and Fisheries
- Department of the Premier and Cabinet
- Environmental Protection Agency
- Queensland Health
- Queensland Transport
- Sport and Recreation Queensland
- A. de Smidt
- Greg Sim
- Malcolm Wade
- Bicycle Queensland
- Public Transport Alliance
- New Products Development
- Port of Brisbane Corporation
- Powerlink Queensland
- Queensland Rail

The substantive issues raised in submissions were as follows:

- Impacts on Matchland Pty Ltd trading as New Products Development (NPD);
- GUP - Wynnum Road Interchange – congestion on local road network;
- Lack of pedestrian and cycle facilities on the new bridge;
- Impacts the GUP will have on Brisbane's road network, particularly, Kingsford Smith Drive/Fison Avenue/Links Avenue interchange and associated Australia Trade Coast (ATC) North Access; Mt Gravatt-Capalaba Road Interchange; Old Cleveland Road Interchange – Western Leg; Nudgee Road Interchange; and Bicentennial Road Interchange.
- Habitat Management;
- East-West fauna movement;
- Loss of Koala habitat; and
- Acid Sulfate Soils.

Submissions were forwarded to the Proponent and following discussions with the Proponent's representatives and its technical consultants it was determined that preparation of a Supplementary EIS was necessary to address issues raised.

3.3 Review of Supplementary EIS

On 1 April 2005, the Supplementary EIS (SEIS) was forwarded to Advisory Agencies and respondents to the EIS.

The following agencies advised that they were satisfied that all issues had been addressed:

- Department of Aboriginal and Torres Strait Islander Policy;
- Department of Emergency Services;
- Department of Housing;
- Department of Industrial Relations;
- Queensland Health;
- Queensland Police Service; and
- Sport and Recreation Queensland.

The following agencies made minor comment or provided advice, which has been subsequently addressed/noted by the Proponent:

- Brisbane City Council;
- Brisbane Airport Corporation;
- Department of Communities;
- Department of Employment and Training;
- Department of Local Government, Planning, Sport and Recreation (including Office of Urban Management);
- Department of Natural Resources and Mines; and
- Queensland Transport.

Comments on the SEIS were not received from the following agencies who either advised that no submission would be made or that its issues had been addressed by the EIS:

- Department of the Premier and Cabinet;
- Department of Primary Industries and Fisheries;
- Department of Public Works;
- Department of Transport and Regional Services; and
- Queensland Treasury.

The Environmental Protection Agency (EPA) provided comments presented as:

- Part A – Provisions that the EPA would normally have provided as a concurrence agency for a development permit pursuant to the *Integrated Planning Act 1997* (IPA); and
- Part B – Comments that the Agency would offer as advice.

The provisions in Part A have been included in this Report as Appendix 2. Comments in Part B have been discussed in section 4.0 of this Report.

Substantive issues raised in submissions are discussed individually in the following section.

4.0 Evaluation of Environmental Effects

4.1 Introduction

The *SDPWO Act* defines 'environment' to include:

a) ecosystems and their constituent parts, including people and communities;
b) all natural and physical resources; and
c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

'Environmental effects' means "the effects of development on the environment, whether beneficial or detrimental". These effects can be direct or indirect, of short, medium or long-term duration and cause local or regional impacts.

The following section outlines the major environmental effects identified during the EIS process, including those raised in the EIS, SEIS, in submissions on the EIS and in consultation with Advisory Agencies and other key stakeholders. I have provided comments on these matters and, where necessary, set conditions or made recommendations to mitigate adverse impacts.

This Report states conditions, collated in Appendix 1, which must attach to any Development Approval issued pursuant to IPA. The Environmental Protection Agency will be the Assessment Manager for development approval for the following:

- works within tidal waters pursuant to the *Coastal Protection and Management Act 1995*; and
- undertaking Environmentally Relevant Activities (ERA's) pursuant to the *Environmental Protection Act 1994*.

These approvals are obtained through the Integrated Development Assessment System (IDAS) in the *Integrated Planning Act 1997* (IPA).

I also recommend that the Proponent implements other specific actions (collated in Appendix 3 – Coordinator General's Recommendations), in accord with best practice environmental management, to mitigate particular impacts of the project. These recommendations, which cannot be attached as a condition to any statutory approval, reflect the objectives stated in the EIS documentation.

4.2 Impacts on New Products Development

EIS Findings and/or Key Points

A comprehensive submission was received from New Products Development (NPD) about the likely effect of the proposed GUP on its manufacturing facility at 286 Fison Avenue, Eagle Farm where it manufactures goods under the Codes and Regulations enforced by the Therapeutic Goods Association. In response, DMR undertook a number of monitoring and modelling studies at NPD's premises. Following a series of meetings between NPD, DMR and their respective specialist technical consultants, NPD subsequently advised that the only area remaining at issue related to air quality, specifically assumptions made during modelling that may/may not eventuate.

Conclusions

NPD advised that it felt that these issues could be resolved with DMR as long as it was afforded the opportunity to raise them if it became necessary. DMR has formally agreed to this request by letter to NPD.

4.3 Wynnum Road – GUP Interchange

EIS Findings and/or Key Points

Currently, access to Wynnum Road on/off ramps causes significant congestion on the local road network during the morning and afternoon peak hours. Brisbane City Council advised that it would not accept sole responsibility for resolving this issue. To address this issue DMR has included road improvement works on Wynnum Road in the vicinity of the Gateway Motorway, including the intersections with the Motorway ramps, within the scope of the GUP.

Conclusions

Brisbane City Council acknowledged inclusion of these works within the GUP scope and will continue to work with the GUP project team to refine layouts and design issues.

4.4 Shared Pedestrian/Cycle Facility

EIS Findings and/or Key Points

Concern was raised by a number of organisations about the lack of cross-river pedestrian/cycle facilities down-river from the Story Bridge and the consequent large gap in both the local and regional cycle networks.

Conclusions

DMR has included the provision of a shared pedestrian/bicycle facility on the duplicated Gateway Bridge in the GUP scope of works. The facility will have provision for use of the pathway by emergency service vehicles.

4.5 Impacts on Brisbane's Road Network

EIS Findings and/or Key Points

The EIS states that the proposed GUP will provide additional road capacity in areas where it is needed, relieve congestion, increase accessibility to the Brisbane Airport and Australia TradeCoast (ATC), improve the connectivity of the arterial road network and remove traffic from lower order roads forming a critical element of the transport system in Brisbane City for many years to come. Reductions in daily traffic on lower order roads and regional routes are forecast to

be up to five percent in 2011 and up to ten percent by 2021 when compared to the no GUP case.

Currently the existing intersections associated with the Motorway interchanges suffer delays as a result of inadequate Motorway capacity and poor on and off-ramp operations. By providing increased traffic capacity on the Motorway with:

- the introduction of Electronic Tolling;
- the removal of the Lytton Road Toll Plaza; and
- improving the operational characteristics of the ramps,

the GUP will reduce the traffic congestion associated with the Motorway that currently impacts upon adjacent intersections, thereby extending the design life of the intersections to that more aligned with the connecting arterial roads.

The ramps and merge areas of the Gateway Motorway proposed in the design of the GUP are projected to be well-used. They are however expected to operate at satisfactory levels of service beyond 2021 with no modifications required.

Brisbane City Council (BCC), while recognising that improving the operational characteristics of the Motorway will help ease congestion experienced on the Motorway itself and reduce the potential for congested motorway traffic queuing back and impacting on connecting arterial road through-traffic, remains concerned with how the Motorway connects to the surrounding road network and the impacts associated with certain locations. Locations of particular concern to BCC are Kingsford Smith Drive/Fison Avenue/Links Avenue interchange and associated ATC North Access; Mt Gravatt-Capalaba Road Interchange; Old Cleveland Road Interchange – Western Leg; Nudgee Road Interchange; and Bicentennial Road Interchange.

Conclusions

There are significant potential benefits of the GUP, particularly in comparison to the "do nothing" case, as is stated in section 5.4 of the SEIS. However, the GUP is forecast to result in a significant increase in traffic using the Gateway Bridge and Motorway sections and further, the distributional effect of this change to the transport network is complex.

The Proponent has advised DSDI that it intends to develop an Interface Agreement with BCC. The Agreement is anticipated to include all the project related interfaces with the BCC road network as well as potential issues in the surrounding area (i.e. access to TradeCoast Central from the existing Motorway). I am satisfied that the process of developing the Interface Agreement will afford BCC the opportunity to resolve issues of concern on how the Motorway connects to the surrounding road network and impacts associated with particular locations. I therefore make the following recommendation:

Recommendation 1

The Proponent should develop an Interface Agreement with the BCC, prior to the commencement of construction, which addresses the project related interfaces with the BCC road network as well as potential project related issues in the surrounding area.

4.6 Habitat Management

EIS Findings and/or Key Points

The Proponent's stated objectives in relation to terrestrial ecology are to minimise the loss of terrestrial and wetland vegetation and habitat; and minimise the impact of runoff waters on adjoining wetlands, watercourses, Bulimba Creek, Kedron Brook Floodway, Brisbane River and Moreton Bay.

Mitigation measures proposed include:

- preparation of a Vegetation Management Plan during the design phase to minimise the impact of the project on existing vegetation and fauna habitat;
- minimising the loss or disturbance of estuarine or freshwater wetland vegetation;
- minimising the area of disturbance along the banks of Bulimba Creek, Brisbane River and Kedron Brook Floodway and implementing stormwater management plans to minimise the entry of sediment into Bulimba Creek;
- minimising habitat loss for migratory birds, especially the Lewin's Rail habitat;
- drainage design to continue the function of Kedron Brook Floodway and other tidal channels as ecological corridors and low tide feeding areas for waders;
- retaining existing grassland/freshwater wetland corridor potential and the eastern edge of Kedron Brook Floodway; and
- minimising disturbance to the habitat on the southern side of the Kedron Brook Floodplain and allow to regenerate once construction is completed.

The environmental value of the Kedron Brook Floodplain area is notable in terms of Raptor species usage. The existing environment provides habitat and shelter for many grassland species including rodents and grass associated bird species such as quails and pigeons, all in the common diet of Raptor species. Raptor species, including the Black-shouldered Kite, Brahminy Kite, Whistling Kite, White-bellied sea eagle and Swamp Harriers are known to feed in the area with all but the Swamp Harriers nesting in the area as well.

Proposed mitigation measures for this area also include:

- maintaining sufficient distance between the Motorway (and associated works) and the active White-bellied sea eagle nest (located just outside GUP corridor on Brisbane Airport Corporation land);
- adoption of a minimum footprint design for bridges over Kedron Brook Floodway with supporting structures a sufficient distance from the banks to ensure mangrove communities can survive; and
- rehabilitation of the Lewin's Rail Habitat located within and near the Kedron Brook Floodplain.

During construction the Proponent will, among other measures, ensure a suitably qualified animal spotter/catcher is present during the initial clearing to relocate any fauna that is disturbed; inspect site works such as trenches and culverts each morning and after periods of activity; clearly define limits of clearing required for construction; and revegetate disturbed areas and maintain to ensure establishment.

Conclusions

Section 23.4.11 of the SEIS proposes mitigation measures to minimise the potential of the GUP to impact on terrestrial ecology values. By implementing

these proposed mitigation measures during the design, construction and operation phases of the GUP, I am satisfied that the potential for the GUP to impact on terrestrial ecology values will be minimised. I therefore make the following recommendation:

Recommendation 2

The Proponent should include, as a minimum, the mitigation measures in relation to terrestrial ecology which appear in section 23.4.11 of the SEIS in the Environmental Management Plan referred to in Condition 8 during the design, construction and operation phases of the GUP.

The EPA in providing its comments on the EIS offered the following advice:

- riparian vegetation removal should be minimised to the smallest clearance area to undertake bridge works at Bulimba Creek, Brisbane River and Kedron Brook Floodway; and
- habitat areas for the Lewin's Rail located within and near the Kedron Brook Floodplain should be rehabilitated after construction.

The Proponent has proposed such mitigation measures in the EIS documents. I therefore make the following recommendations:

Recommendation 3

Riparian vegetation removal should be minimised to the smallest clearance area required to undertake bridge works at Bulimba Creek, Brisbane River and Kedron Brook Floodway.

Recommendation 4

The Environmental Management Plan referred to in Condition 8 should include measures for the rehabilitation after construction of any habitat areas for the Lewin's Rail located within and near the Kedron Brook Floodplain which are impacted by construction of the GUP.

The EPA has also offered advice that first flush runoff from the roadway (particularly the new Gateway Bridge and sections discharging to Bulimba Creek, Brisbane River and Kedron Brook should be treated prior to discharge. As noted above, part of the Proponent's stated objective for terrestrial ecology is to minimise the impact of runoff waters on adjoining wetlands, watercourses, Bulimba Creek, Kedron Brook Floodway, Brisbane River and Moreton Bay. I therefore state the following condition:

Condition 1

The Proponent shall include in the Environmental Management Plan referred to in Condition 8 measures that will ensure treatment of first flush runoff from the roadway prior to discharge (particularly from the new Gateway Bridge and sections discharging directly to Bulimba Creek, Brisbane River and Kedron Brook).

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

4.7 East-West Fauna Movement

EIS Findings and/or Key Points

Ecosystem connectivity between the lands adjoining the Motorway to the east and west has generally been severed as a result of construction of the Motorway. Some ecosystem connectivity has been maintained in the area of the Motorway viaduct over Bulimba Creek and at Greendale Way Road Bridge.

A principal concern is the potential for further obstruction to east-west fauna movement by the construction of additional lanes and median barriers, particularly between Mt Gravatt-Capalaba Road and Old Cleveland Road.

Koalas were observed directly and indirectly (via scratches, scats etc.) within the GUP corridor during the study and are known to live adjacent to the corridor and to cross the Motorway. The existing Motorway contains no formal koala crossings. However, koalas are known to move between the Koala Coast Area and Mackenzie, crossing the Motorway between chainages 5160 and 6000; and between the Belmont Hills habitat and the adjacent Koala Coast Area between chainages 8000 and 10000.

The Motorway has been the site of a number of koala fatalities over recent times. The EIS states that this is likely to be exacerbated by the construction of the extra lanes and the installation of a median barrier, which will block koalas attempting to cross the carriageway. In the relatively small Belmont Hills Bushland area, the road forms a barrier to the dispersal of juvenile koalas between the two areas. This may prevent re-colonisation following a catastrophic event such as disease or a bushfire.

Mitigation measures suggested for consideration in the EIS include the installation of fauna underpasses at Wecker Road (CH6100) and the culvert east of Coventry Court (CH7100); use of “arbour tunnels” (specially built for koalas and other animals using logs suspended off the ground); and installation of fauna exclusion fencing on both sides of the Motorway between Mt Gravatt-Capalaba Road (CH1500) and Old Cleveland Road (CH9900).

Conclusions

The EIS has suggested that mitigation measures such as exclusion fencing; fauna underpasses and culverts (including “arbour tunnels”); changes to the median strip structures; as well as promoting more awareness, will help reduce the loss of connectivity for animals moving between eastern and western habitats.

With respect to changes to the median strip structures, EPA has, in providing its comments on the EIS, offered advice that “high-tension wire safety fencing be used in preference to cement barriers to separate carriageways”.
I therefore make the following recommendation and state the following condition:

Recommendation 5

Where carriageway separation requires the installation of barriers, high-tension safety wire fencing type barriers should be installed, as opposed to solid barriers, in an attempt to facilitate fauna movement except where, for reasons of safety for road users, solid barriers are preferred.

Condition 2

The provisions for Koalas and other fauna in Appendix 2 - Schedule I of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

4.8 Loss of Koala Habitat

EIS Findings and/or Key Points

The GUP abuts the Koala Coast Conservation Area and the Belmont Hills Bushland. The Koala Coast Conservation Area extends from north of Old Cleveland Road and to the east of the GUP corridor encompassing Mt Petrie Bushland. The bushland within the Koala Coast Conservation Area is significant at a regional level due to its relatively undisturbed koala habitat. It includes numerous species that are utilised as a food source by koalas and is estimated to contain 3,000 to 5,000 koalas. Belmont Hills Bushland on the western side of the Motorway is listed under Brisbane City Council's Natural Assets Register because of a number of attributes including its wildlife habitat values. It also includes numerous species that are used as a food source by koalas and has an approximate population of 18 koalas.

The EIS states that the removal of habitat (approx. 1.6 hectares within the Koala Coast Conservation Area) within the GUP corridor is likely to be insignificant when compared with the area of similar habitat reserved in the adjacent Belmont Hills Bushland and the Koala Coast Area.

Conclusions

In providing its advice on the GUP, the EPA is required to consider the "Standard Criteria", s.73A 1 (b)(1) of the *Environmental Protection Act 1994* including any planning or management documents. The key document in this regard is the draft *Nature Conservation (Koala) Conservation Plan 2005 and Management Program 2005-2015*. *State Planning Policy 1/97* (focused on habitat protection in Redlands and Brisbane areas) and the *Nature Conservation Act 1992*, which lists koalas as 'vulnerable' in the South East Queensland Bioregion, should also be considered.

The general aim of the Conservation Plan is no net loss of habitat. Where 'major habitat' is involved, the goal is a substantial net benefit for koalas. The Koala Coast Conservation Area is considered 'major habitat'. DMR has indicated that the required area of Koala Habitat Restoration is possible within the road corridor in the Koala Coast Conservation Area, but outside the carriageway, and can be undertaken as part of general landscaping works. I therefore state the following condition:

Condition 3

The provisions for Koala Habitat Restoration in Appendix 2 – Schedules I7-1 to I7-3 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

4.9 Acid Sulfate Soils

EIS Findings and/or Key Points

Acid sulfate soils (ASS) are a characteristic feature of low lying coastal environments in Queensland, particularly where landform elevations are below 5m AHD and have the potential when disturbed to result in mortality of aquatic flora and fauna and deterioration in ecosystem health as well as impacting on structures and existing infrastructure.

The hydraulic connection between the project corridor and the Brisbane River/Kedron Brook Floodway and Moreton Bay is likely to be the primary pathway by which impacts from ASS disturbance may be transmitted. The total volume of ASS affected material likely to be disturbed as a direct result of the GUP is estimated to range between 100,000 to 150,000 cubic metres.

The SEIS presented the findings of a preliminary acid sulfate soil investigation undertaken by the Department of Natural Resources & Mines' Queensland Acid Sulfate Soils Investigation Team (QASSIT) for the GUP in low lying areas (<5m AHD). The aim of the investigation was to identify the depth and net acidity of ASS at five sites along the GUP corridor, where disturbance of acid sulfate soils is likely to occur during construction. ASS was identified at three of the five sites.

Conclusions

Queensland legislation requires adequate containment, treatment and management of runoff/leachate generated during the disturbance of ASS affected material in order to ensure the protection of coastal ecosystems, particularly wetlands, waterways and in this case, Moreton Bay downstream of the GUP.

It will be necessary to adequately quantify the presence/absence of ASS affected material underlying the project corridor prior to disturbance in order to plan for appropriate management of the ASS affected material. I therefore state the following conditions:

Condition 4

The provisions for Possible Acid Sulfate Soils (PASS) – Investigation in Appendix 2 – Schedules F1-1 to F1-4 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 5

The provisions for Possible Acid Sulfate Soils (PASS) – Management in Appendix 2 – Schedules F2-1 and F2-2 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

4.10 Traffic Management Plan

EIS Findings and/or Key Points

The EIS states that construction of the GUP will be undertaken so as to minimise impacts on the travelling public; shipping and aviation; the surrounding

environment; local residences and business; and existing utility services. Detailed Traffic Management Plans and Environmental Management Plans will be developed during the design phases of the project so as to mitigate any potential impacts.

The estimated average daily volume of heavy vehicles during construction of all sections of the project is 250 vehicles. Light vehicle volume associated with the construction workforce travelling to and from construction sites is estimated at 1750 vehicles per day.

Materials requiring road transportation include embankment and pavement materials, concrete, asphalt, reinforcing steel, precast concrete products, topsoil and plants, will all be sourced from local suppliers. The main transport route for supply of materials and equipment will be the existing Gateway Motorway, interconnecting highways and the adjacent road network.

Conclusions

As stated in the EIS, the likely sources for bulk earthworks material are to the north and south of Brisbane. At the time of preparation of this report, transportation routes for this and other necessary construction materials are unknown, as are the transportation impacts. I therefore state the following condition:

Condition 6

A Traffic Management Plan (TMP) must be prepared and implemented for construction phase traffic management. The TMP must be prepared in consultation with the Department of Main Roads Metropolitan District Office and Brisbane City Council prior to the commencement of construction. Preparation of the TMP will include undertaking assessment of the likely traffic impacts. The TMP will contain measures designed to minimise traffic impacts (during construction) attributable to the GUP on local authority and state controlled roads.

Pursuant to s.41 of the SDPWO Act, I nominate the Department of Main Roads as the concurrence agency for this condition.

4.11 Construction Impacts

EIS Findings and/or Key Points

Construction of the GUP is expected to take approximately four years. The GUP includes approximately 9.2 kilometres of bridge/elevated construction and 10.5 kilometres of roadway embankments. Construction activities include extensive earthworks operations including dredging; bored and driven piling for bridge foundations; placement of paving materials; placement of asphaltic concrete surfacing, and reinforced and precast concrete construction.

Conclusions

The principal impacts of this activity will be in the areas of air emissions including dust generation; water quality; noise and vibration; and the generation of waste material. Construction of the GUP will require approvals for the following aspects of developments:

Environmentally Relevant Activity (ERA) 19(c) Dredging material

ERA 20(c) Extracting rock or other material
ERA 22(c) Screening etc
ERA 62 Concrete batching
Operational work that is tidal work

The EPA has nominated provisions that will apply to these aspects of development. These provisions, listed in Appendix 2, are designed to control and limit potential impacts on the land, surface water, ground waters and air environments from contaminants that may result from construction activities. I therefore state the following condition:

Condition 7

The provisions in Appendix 2 of this Report, which relate to the following aspects of development, must be attached to the development approval granted by the Assessment Manager:

ERA 19(c) Dredging material
ERA 20(c) Extracting rock or other material
ERA 22(c) Screening etc
ERA 62 Concrete batching
Operational work that is tidal work

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

5.0 Environmental Management Plan

Introduction

A preliminary Environmental Management Plan (EMP) (included in the SEIS) has been prepared by the Proponent.

The project delivery method for the GUP will be via government finance using a design, construct and maintain (DCM) type delivery. The EMP management structure and responsibility determination will be developed in the next phase of the project by DMR in consultation with Queensland Motorways Limited and Queensland Treasury. Once the management structure has been finalised, the preliminary EMP will be amended to reflect the GUP DCM management structure.

Aim of the EMP

The aim of an EMP is to detail the actions and procedures to be carried out during the design, construction and operational phases of the project in order to mitigate adverse impacts and enhance beneficial environmental and social impacts. It addresses the proposed mitigation measures, records environmental commitments and establishes the framework to ensure they are implemented during each stage of the project. It will also serve as the benchmark for measuring the effectiveness of environmental protection and management, and makes provision, as appropriate, for unforseen events by outlining corrective actions which may be implemented in these situations.

Format of the EMP

The preliminary EMP has been prepared as a stand alone document and is structured as follows:

- relevant statutory obligations and regulatory framework within which the project will be required to progress;
- management structure and general project responsibilities for staff involved in the project;
- environmental management strategies for particular environmental aspects; and
- subsequent stage of the environmental management process during the detailed design, construction and operational phases of the project.

Environmental Management Strategies
The following table summarises the elements and phase of the project for which Environmental Management Strategies have been prepared.

Project Element	Design	Construction	Operation
Land Use & Emergency Management Services	X	X	
Transportation	X	X	X
Geotechnical	X	X	X
Soils	X	X	X
Hydrology/Hydraulics	X	X	X
Water Quality	X	X	X
Groundwater	X	X	X
Air Quality	X	X	
Noise & Vibration	X	X	X
Terrestrial Ecology	X	X	X
Aquatic Biology	X	X	X
Social Environment		X	X
Waste Management	X	X	X
Landscape & Visual Amenity	X		

In summary, implementation of the EMP will ensure the effective management of environmental impacts of the GUP. Furthermore the monitoring measures proposed within the document will gauge the success of that effectiveness. I therefore state the following condition:

Condition 8

A draft Environmental Management Plan (EMP) must be prepared to address the design, construction and operational phases of the project. The draft EMP must be submitted to the EPA for comment at least 28 days prior to the commencement of construction activities. Any comments from the EPA received within 21 days of the draft EMP being received, should be considered when preparing and implementing the final EMP. The final EMP must be generally consistent with the findings, recommendations and conditions of the Coordinator-General's Report and the findings of the EIS.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

6.0 Statement Pursuant to s.39 of the SDPWO Act

Pursuant to s.35 of the SDPWO Act I have evaluated the environmental effects of the Project and state conditions as set out in this report.

Pursuant to s.39(1)(a) of the SDPWO Act I state for the Assessment Manager the conditions, collated in *Appendix 1 – Conditions pursuant to Section 39 of the SDPWO Act 1971*, that must attach to the development approval.

6.1 Evidence or Other Material Relied Upon

In forming my decision, I had regard to the following materials:

a) Gateway Upgrade Project Environmental Impact Statement Volumes 1, 2a, 2b, & 3 – Connell Wagner, 16 August 2004;
b) Gateway Upgrade Project Supplementary Environmental Impact Statement – Connell Wagner, 29 March 2005;
c) properly made submissions on the EIS and Supplementary EIS received from persons and Advisory Agencies; and
d) relevant Queensland legislation.

6.2 Findings on Material Questions of Fact

Discussed in Section 4.0 – Evaluation of Environmental Effects.

6.3 Reasons for Conditions

The conditions and recommendations contained in this report establish the environmental requirements to enable construction of the project. The conditions and recommendations are designed to control and limit potential impacts on the land, surface water, ground waters and air environment that may result from construction activities. These conditions and recommendations apply to the whole of the development site for the proposed road and bridge works.

These conditions and recommendations ensure that the project is undertaken by the Proponent in the manner described in the EIS and that the Proponent fulfils the commitments made in the EIS and SEIS. They are consistent with information provided in the Gateway Upgrade Project Environmental Impact Statement Volumes 1, 2a, 2b, & 3 August 2004 and the Gateway Upgrade Project Supplementary Environmental Impact Statement March 2005.

7.0 Conclusion

The documentation provided during the EIS process is considered to have satisfied the requirements of the Queensland Government for impact assessment in accordance with the *State Development and Public Works Organisation Act 1971*. It has provided sufficient information to government and to the community to allow an informed evaluation of potential environmental impacts which could be attributed to the GUP. Careful management of the key construction and operational activities should ensure that any potential environmental impacts will be reduced or avoided.

I consider that on balance there are substantial public benefits which would accrue as a result of construction of the GUP. Therefore, I recommend that approval of the project, as described in detail in the EIS and SEIS and summarised in Section 2 of this report, be granted and that the conditions, contained in *Appendix 1 – Conditions pursuant to Section 39 of the SDPWO Act 1971*, must be attached to the development approval by the Assessment Manager.

The Department of Main Roads and its agents, lessees, successors and assigns, as the case may be, must implement the conditions and recommendations in this Report and all commitments presented in the EIS and SEIS and subsequent discussions. In the event of any inconsistencies between the EIS documents and the conditions and recommendations in this Report, the conditions and recommendations in this Report prevail.

Copies of this Report will be issued to the:

- Proponent, pursuant to s.35(5)(a) of *the State Development and Public Works Organisation Act 1971* (Qld) {This Report should then comprise part of the Proponent's application for development approval pursuant to the *Integrated Planning Act 1997* (Qld)}; and
- Assessment Manager (i.e. the Environmental Protection Agency), pursuant to s.40 of *the State Development and Public Works Organisation Act 1971* (Qld);

A copy of this Report will also be made publicly available on the Department of State Development and Innovation's web site.

Ross Rolfe
Coordinator-General
Date 5 August 2005

APPENDIX 1

CONDITIONS PURSUANT TO SECTION 39 OF THE STATE DEVELOPMENT AND PUBLIC WORKS ORGANISATION ACT 1971.

Conditions provided by the Coordinator-General to be attached to the development approval granted by the Assessment Manager under the *Integrated Planning Act 1997.*

Condition 1

The Proponent shall include in the Environmental Management Plan referred to in Condition 8 measures that will ensure treatment of first flush runoff from the roadway prior to discharge (particularly from the new Gateway Bridge and sections discharging directly to Bulimba Creek, Brisbane River and Kedron Brook).

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 2

The provisions for Koalas and other fauna in Appendix 2 - Schedule I of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 3

The provisions for Koala Habitat Restoration in Appendix 2 – Schedules I7-1 to I7-3 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 4

The provisions for Possible Acid Sulfate Soils (PASS) – Investigation in Appendix 2 – Schedules F1-1 to F1-4 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 5

The provisions for Possible Acid Sulfate Soils (PASS) – Management in Appendix 2 – Schedules F2-1 and F2-2 of this Report must be attached to the development approval granted by the Assessment Manager.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 6

A Traffic Management Plan (TMP) must be prepared and implemented for construction phase traffic management. The TMP must be prepared in consultation with the Department of Main Roads Metropolitan District Office and Brisbane City Council prior to the commencement of construction. Preparation of the TMP will include undertaking assessment of the likely traffic impacts. The TMP will contain measures designed to minimise traffic impacts (during construction) attributable to the GUP on local authority and state controlled roads.

Pursuant to s.41 of the SDPWO Act, I nominate the Department of Main Roads as the concurrence agency for this condition.

Condition 7

The provisions in Appendix 2 of this Report, which relate to the following aspects of development, must be attached to the development approval granted by the Assessment Manager:

ERA 19(c) Dredging material
ERA 20(c) Extracting rock or other material
ERA 22(c) Screening etc
ERA 62 Concrete batching
Operational work that is tidal work

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

Condition 8

A draft Environmental Management Plan (EMP) must be prepared to address the design, construction and operational phases of the project. The draft EMP must be submitted to the EPA for comment at least 28 days prior to the commencement of construction activities. Any comments from the EPA received within 21 days of the draft EMP being received, should be considered when preparing and implementing the final EMP. The final EMP must be generally consistent with the findings, recommendations and conditions of the Coordinator-General's Report and the findings of the EIS.

Pursuant to s.41 of the SDPWO Act, I nominate the Environmental Protection Agency as the concurrence agency for this condition.

APPENDIX 2

PROVISIONS THAT THE ENVIRONMENTAL PROTECTION AGENCY WOULD NORMALLY HAVE PROVIDED AS A CONCURRENCE AGENCY FOR A DEVELOPMENT PERMIT PURSUANT TO THE *INTEGRATED PLANNING ACT 1997*

Aspects of Development:

ERA 19(c) Dredging material - dredging material from the bed of any waters (other than dredging by a port authority of material for which a royalty or similar charge is not payable) using plant or equipment having a design capacity of 100,000 tonnes or more a year.

ERA 20(c) - Extracting rock or other material - extracting rock (other than rock mined in block or slab form for building purposes), sand (other than foundry sand), clay (other than clay used for its ceramic properties, kaolin or bentonite), gravel, loam or other material (other than gravel, loam or other material under a mining authority) from a pit or quarry using plant or equipment having a design capacity of 100,000 tonnes or more a year.

ERA 22(c)- Screening etc. materials - screening, washing, crushing, grinding, milling, sizing or separating material extracted from the earth (other than under a mining authority) or by dredging using plant or equipment having a design capacity of 100,000 tonnes or more a year.

ERA 62 Concrete batching - producing concrete or a concrete product by mixing cement, sand, rock, aggregate or other similar materials in works (including mobile works) having a design production capacity of more than 100 tonne per year.

Operational work that is tidal work - s123 Development Permits, *Coastal Protection and Management Act 1995*

Schedule A - Activity

Prevent and /or minimise likelihood of environmental harm

(A1-1) In carrying out the activities, reasonable and practicable measures must be taken to prevent or minimise the likelihood of environmental harm being caused.

Maintenance of measures, plant and equipment

(A2-1) Ensure that:

(a) all measures, plant and equipment necessary to ensure compliance with the conditions of this approval are installed;
(b) such measures, plant and equipment are maintained in a proper and efficient condition; and
(c) such measures, plant and equipment are operated in a proper manner.

Integrated Environmental Management System (IEMS)

(A3-1) Prior to the commencement of any environmentally relevant activity ('the activities') under this integrated authority, the following is required:

- develop an Integrated Environmental Management System (IEMS) which provides for the effective management of the actual and potential environmental impacts resulting from the carrying out of the activities; and
- implement and maintain the IEMS from the commencement of carrying out the activities.

(A3-2) The IEMS must provide for at least the following functions:

Training staff in the awareness of environmental issues related to carrying out the activities, which must include at least:

- all persons that carry out the activities are aware of all relevant commitments to environmental management; and
- any relevant environmental objectives and targets, so that all staff are aware of the relevant performance objectives and can work towards these; and
- control procedures to be implemented for routine operations for day to day activities to minimise likelihood of environmental harm, however occasioned or caused; and
- contingency plans and emergency procedures to be implemented for non-routine situations to deal with foreseeable risks and hazards including corrective responses to prevent and mitigate environmental harm (including any necessary site rehabilitation); and
- organisational structure and responsibility to ensure that roles, responsibilities and authorities are appropriately defined to manage environmental issues effectively; and
- effective communication to ensure two-way communication on environmental matters between operational staff and higher management;
- their obligations in respect of monitoring, notification and record keeping obligations under the IEMS and relevant environmental authorities and/or development approvals;

- monitoring of the release of contaminants into the environment including procedures, methods, record keeping and notification of results;
- conducting assessment of the environmental impact of any release of contaminants into the environment;
- waste prevention, treatment and disposal; and
- a program for continuous improvement.

Records

(A4-1) Records must be compiled and kept for a minimum of five years including all monitoring results or other information required by or under this approval and made available for inspection upon request by the administering authority.

(A4-2) Where monitoring is required by or under this approval, it must be conducted by t a competent person.

Activity specific information

(A5-1) This approval authorises dredging for the removal of material from the bed of the Brisbane River, Kedron Brook and Bulimba Creek for the sole purpose of the works associated with the Gateway Upgrade Project.

END OF PROVISIONS FOR SCHEDULE A

Schedule B - Air

(B1-1) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activities must not cause a nuisance at any sensitive place.

Dust nuisance

(B2-1) The release of dust or other particulate matter resulting from the activities must not cause an environmental nuisance at any sensitive place.

(B2-2) For the purposes of Provision (B2-1) and without limiting the applicability of other criteria relevant in particular circumstances, the activities would cause environmental nuisance where dust or other particulate matter resulting from the activities exceeds the following limits when measured at a relevant sensitive place:

(a) dust deposition of 120 milligrams per square metre per day or 4 grams per square metre per month when monitored in accordance with Australian Standard 3580.10.1 Methods for sampling and analysis of ambient air – Determination of particulates – Deposited matter – Gravimetric method ; or

(b) a concentration of suspended particulate matter with an aerodynamic diameter of less than 10 micrometres (µm) (PM10) of 150 micrograms per cubic metre over a 24 hour averaging time at a sensitive place downwind, when monitored in accordance with:

(i) Australian Standard AS 3580.9.6 Methods for sampling and analysis of ambient air – Determination of particulate matter – PM (sub) 10 high-volume sampler with size-selective inlet - Gravimetric method; or

(ii) any alternative method of monitoring PM10 which may be permitted by the 'Air Quality Sampling Manual' as published from time to time by the administering authority.

(B2-3) Dust or other particulate monitoring must be undertaken as directed by the administering authority to investigate any complaint about dust nuisance being caused by the activities, which complaint in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof notified to the administering authority within 14 days following completion of monitoring. For the purposes of this provision, dust monitoring must be carried out by a competent person at a site relevant to the potentially affected sensitive place and at upwind control site(s) and must include:

(a) for a complaint alleging dust nuisance, dust deposition rate; and

(b) for a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of suspended PM10 over a 24hr averaging time.

(B2-4) If an authorised person's opinion is that monitoring results indicate environmental nuisance is being caused by dust or other particulate matter from the activities, the holder must:

(a) address the complaint including the use of appropriate dispute resolution if required; or

(b) immediately implement abatement measures so that emission of dust or other particulate matter from the activities does not result in further environmental nuisance.

Dust Control

(B3-1) Take reasonable and practicable measures necessary to prevent release of windblown dust from vehicles used for transporting aggregates extracted from the site. Reasonable and practicable measures may include but are not limited to:

(a) wetting down the load prior to transport;

(b) having the entire load covered with a tarpaulin or similar material for the duration of transport; and

(c) clearing of spillages from side rails, tail gates and draw bars of vehicles prior to and after delivery.

(B3-2) Trafficable areas must be maintained using reasonable and practicable measures necessary to minimise the release of wind blown or traffic generated dust to the atmosphere. Reasonable and practicable measures may include but are not limited to:

(a) keeping surfaces clean;

(b) sealing with bitumen or other suitable material;

(c) using water sprays;

(d) installing an effective truck body and wheel wash facility

(e) using dust suppressants and wind breaks.

(B3-3) Take reasonable and practicable measures necessary to minimise the release of dust to the atmosphere from crushing and screening equipment and material conveyor systems. Reasonable and practicable measures may include but are not limited to:

(a) installation of windshields or barriers;

(b) water spays; and

(c) keeping material moist.

(B3-4) Stockpiles must be maintained using reasonable and practicable measures necessary to minimise the release of wind blown dust to the atmosphere. Reasonable and practicable measures may include but are not limited to:

(a) use of water sprays as required during winds likely to generate dust release;

(b) shielding and/or covering; and

(c) storage in enclosures.

END OF PROVISIONS FOR SCHEDULE B

Schedule C – Water

(C1-1) A surface water monitoring program must be prepared and implemented which must be able to detect any exceedance of the release limits in Schedule C Table 1 and Schedule C Table 2. The program must include:

(a) the requirements of Provision C1-2;

(b) detail monitoring locations and any proposed discharge locations where surface waters will be released from the authorised site into a watercourse;

(c) requirements of Provision (F2-1) relating to monitoring for Acid Sulfate Soil contaminants; and

(d) describe corrective actions to be taken should water quality limits be exceeded.

(C1-2) Monitoring must be undertaken at locations representative of background and receiving waters for water quality. Monitoring must be:

(a) done by a competent person in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and

(b) carried out on representative samples.

(C1-3) The monitoring program must be submitted to the administering authority at least 28 days prior to the commencement of the activities. If the administering authority provides any comment on the monitoring program within 21 days of receiving the document, those comments must be considered when implementing the monitoring program.

Schedule C Table 1 - Water Quality Monitoring for Perennial Watercourses

Monitoring location	Quality characteristics	Release limits		Monitoring frequency[1]
		Minimum	Maximum	
Background Water[2]	Dissolved Oxygen (mg/L) Turbidity (NTU) pH Suspended Solids (mg/L)	-	-	At least three replicate samples to obtain a mean value
Impacted Water[3]	Dissolved Oxygen (mg/L)	6mg/L	-	At least three replicate samples to obtain a mean value daily during conduct of the activities.
	Turbidity (NTU)	-	110% of Background value	
	pH	6.5	8.5	
	Suspended Solids (mg/L)[5]	-	110% of background value	At least three replicate samples to obtain a mean value twice weekly during conduct of the activities.
	Oil, grease, floating scum or litter	-	Not visible or otherwise noticeable	Daily during conduct of the activities
Discharge Water[4] from any sediment control dam into a watercourse	Dissolved Oxygen (mg/L)	6.0mg/L	-	At least three replicate samples to obtain a mean value daily when water is being discharged to watercourse
	Turbidity (NTU)		110% of Background value	
	pH	6.5	8.5	
	Suspended Solids (mg/L)[5]	-	110% of Background value	
	Oil, grease, floating scum or litter	-	Not visible or otherwise noticeable	

[1]Samples of background water and impacted water to be taken within half an hour of each other for each quality characteristic (i.e. sample background water turbidity within half an hour of sampling impacted water turbidity).

[2]**Background Water** – Samples to be taken at a location up current of the activities that is not affected by activities.

[3] **Impacted Water** – Samples to be taken at a location of up to 30 metres down current from where material is being excavated.

[4]**Discharge water –**Samples to be representative of water being discharged from sediment dam into any adjacent watercourse.

[5]Suspended solids testing may be replaced with turbidity testing only after a statistically significant correlation of r2= or >0.8 is demonstrated.

Schedule C Table 2 - Water Quality Monitoring for Ephemeral Watercourses

When watercourse is flowing[1]				
Monitoring location	**Quality characteristics**	**Release limits**		**Monitoring frequency[2]**
		Minimum	**Maximum**	
Background Water upstream of any sites potentially affected by the activities	Dissolved Oxygen (mg/L) pH Turbidity (NTU) Suspended Solids (mg/L)	-	-	At least three replicate samples taken to obtain a mean values first flush, then daily for three days, then weekly when watercourse is flowing weekly during the conduct of activities
Impacted Water Up to 30 metres downstream of activities	Dissolved Oxygen	6mg/L	-	At least three replicate samples to obtain a mean value first flush, then daily for three days, then weekly when watercourse is flowing weekly during conduct of activities.
	Turbidity		110% of background value	
	pH	6.5	8.5	
	Suspended Solids (mg/L)[3]	-	110% of background value	
	Oil, grease, floating scum or litter	-	Not visible or otherwise noticeable	Daily while watercourse is flowing daily during conduct of activities
When watercourse is not flowing and consists of disconnected pools				
Monitoring location	**Quality characteristics**	**Minimum**	**Maximum**	**Monitoring frequency[2]**
Background water All disconnected pools adjacent to or surrounding the activities	Dissolved Oxygen (mg/L) pH Turbidity (NTU) Suspended Solids (mg/L)[3]	**-**	**-**	At least three replicate samples to obtain a mean value to be taken within 48 hours prior to commencement of activities
Impacted Water All disconnected pools adjacent to or surrounding the activities	Dissolved Oxygen (mg/L)	6.0 mg/L	-	At least three replicate samples to obtain a mean value daily during conduct of activities
	Turbidity (NTU)	**-**	110% of background value	
	pH	6.5	8.5	
	Suspended Solids (mg/L) ***	-	110% of background value	At least three replicate samples to obtain a mean value twice weekly during the conduct of activities
	Oil, grease, floating scum or litter	-	Not visible or otherwise noticeable	Daily during conduct of activities

[1]Water must be flowing at a volume sufficient to allow for disconnected pools upstream and downstream of works to become connected and for a sample capable of relevant analysis to be taken

[2]Samples of background water and impacted water to be taken within half an hour of each other for each quality characteristic (i.e. sample background water turbidity within half an hour of sampling impacted water turbidity).

[3]Suspended solids testing may be replaced with turbidity testing only after a statistically significant correlation of r2= or >0.8 is demonstrated.

(C1-3) Should any of the criteria for the water quality characteristics stated in Schedule C - Table 1 and Table 2 be exceeded, immediately notify the administering authority and take reasonable and practical remedial measures, including any directed by the administering authority, to rectify the exceedance.

(C1-4) Contaminants must not be released by the conduct or as a consequence of the activities to any waters or to the bed and banks of any waters.

(C1-5) Hazardous contaminants must not be released from the site to any waters or to the bed and banks of any waters.

(C1-6) Spillage of any chemicals including hydrocarbon liquids must be contained within the site and rectified so that environmental harm is not caused.

(C1-7) Storage of flammable or combustible liquids shall accord with Australian Standard 1940 - Storage and Handling of Flammable and Combustible Liquids.

Sediment

(C2-1) All reasonable and practicable erosion protection measures and sediment control measures must be implemented and maintained to minimise erosion and the release of sediment.

(C2-2) Subject to Provision C2-1, the design of sediment control structures is to be consistent with the 'Soil Erosion and Sediment Control Guidelines for Queensland Construction Sites' 1996 published by the Institute of Engineers, Australia.

END OF PROVISIONS FOR SCHEDULE C

Schedule D - Noise

Noise nuisance

(D1-1) Noise from the activities must not cause an environmental nuisance at any sensitive place.

(D1-2) Noise monitoring must be undertaken as directed by the administering authority to investigate any complaint about noise nuisance being caused by the activities, which complaint in the opinion of an authorised person is not frivolous, vexatious nor based on mistaken belief, and the results thereof notified to the administering authority within 14 days following completion of monitoring. For the purposes of this provision, noise monitoring must be done by a competent person in accordance with the latest edition of the Environmental Protection Agency Noise Measurement Manual and include:

(a) LAmax, adj, 15min;

(b) relevant background sound level;

(c) the level and rate of occurrence of impulsive or tonal noise;

(d) the sounds comprising the background sound;

(e) atmospheric conditions including wind speed and direction; and

(f) location, date and time of measurements.

(D1-3) For the purposes of Provision (D1-1), the activities will not cause environmental nuisance where noise from the activities does not exceed the criteria specified in Schedule D Table 1 - Noise criteria.

(D1-4) If an authorised person's opinion is that monitoring results indicate environmental nuisance is being caused by noise from the activities, the holder must:

(a) address the complaint including the use of appropriate dispute resolution if required; or

(b) immediately implement noise abatement measures so that emissions of noise from the activities do not result in further environmental nuisance.

Schedule D - Table 1 Noise criteria *

Sound pressure level dB(A) measured as	***Monday to Friday***		***Saturday***		***Sundays and public holidays***
	6pm - 10pm	***10pm - 7am***	***1pm – 10pm***	***10pm – 7am***	
	Noise measured at a 'Noise sensitive place'				
$L_{Amax, adj,15min}$	Background + 10 dB(A) as L_{Amax}, adj, 15 min	50 dB(A)L_{Amax}, Internal	Background + 10 dB(A) as L_{Amax}, adj, 15 min	50 dB(A)L_{Amax}, Internal	50 dB(A)L_{Amax}, Internal
	Noise measured at a 'Commercial place'				
$L_{Amax, adj,15min}$	Background + 10 dB(A) as L_{Amax}, adj, 15 min	50 dB(A)L_{Amax}, Internal	Background + 10 dB(A) as L_{Amax}, adj, 15 min	50 dB(A)L_{Amax}, Internal	50 dB(A)L_{Amax}, Internal

"Background" means background sound pressure level measured in accordance with the latest edition of the Environmental Protection Agency *Noise Measurement Manual*.

***** Schedule D Table 2 does not purport to set operating hours for the activities.

Vibration nuisance

(D2-1) Vibration from the activity must not cause an environmental nuisance, at any sensitive or commercial place.

(D2-2) When requested by the administering authority, vibration monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

END OF PROVISIONS FOR SCHEDULE D

Schedule E – Waste

General

(E1-1) All regulated waste removed from the site must be by a person who holds a current authority to do so under the *Environmental Protection Act 1994*.

(E1-2) Effective procedures must be implemented to ensure that wastes generated on the site are minimised, recycled, stored, handled and transferred in a proper and efficient manner, and so that disposal of such waste is at a facility lawfully able to do so.

(E1-3) The holder must not:

(a) burn waste on the site;

(b) allow waste to be burned on the site; or

(c) remove waste from the site for burning elsewhere.

Cement or Concrete Waste

(E2-1) Cement or concrete waste in solution, slurry or liquid form, or water affected thereby (stormwater or washing water), shall be contained in a pit or receptacle whereby it cannot be released to any waters.

(E2-2) Any cement or concrete waste in solution, slurry or liquid form shall be disposed of at a waste disposal facility licensed under the *Environmental Protection Act 1994* for disposal of that waste.

END OF PROVISIONS FOR SCHEDULE E

Schedule F – Land

Possible Acid sulfate soils (PASS) – Investigation

(F1-1) Acid Sulfate Soil investigations must be undertaken of all land, seabed, soil and sediment at or below 5 metres Australian Height Datum (AHD) where the natural ground level is less than 20 metres AHD and where:

a) excavating is proposed; or

b) filling of land involving more than 500 m^3 of material at greater than an average depth of 0.5 of a metre is proposed.

(F1-2) The Acid Sulfate Soil investigations must be in accordance with the methods prescribed in the "Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland, 1998", Revision 4.0, or more recent additions/supplements or replacements to that document as such become available and the Queensland Acid Sulfate Soil Technical Manual—Laboratory Guidelines. Soil and/or sediment profiles should be mapped at a suitable scale and described according to the Australian Soil and Land Survey Field Handbook (McDonald et al, 1990) and Australian Soil Classification (Isbell, 1996).

(F1-3) The Acid Sulfate Soil investigations must be conducted and prepared by an experience and appropriately qualified person such as a Certified Professional Soil Scientist.

(F1-4) The Acid Sulfate Soil investigation reports are is to be provided to the administering authority 28 days prior to the start of the conduct of any

activity. If the administering authority gives the holder any comment on the reports within 21 days of receiving the reports, the holder must have due regard to those comments.

Possible Acid sulfate soils (PASS) – Management

(F2-1) Acid Sulfate Soil management plans must be prepared for all Acid Sulfate Soils that may be directly or indirectly disturbed by activities at the site. The plans must:

(a) be in accordance with State Planning Policy (SPP) 2/02: Planning and Managing Development Involving Acid Sulfate Soils, the SPP 2/02 Guideline: Acid Sulfate Soils with the latest edition of the Instructions for the Treatment of Acid Sulfate Soils, EPA 2001;

(b) identify the actual and potential release of all contaminants associated with the disturbance of any Acid Sulfate Soils, their environmental impacts and what actions that are proposed to prevent the likelihood of environmental harm; and

(c) detail a proposed monitoring program that addresses the release of contaminants and provides for the review and "continual improvement" in the overall environmental performance of the activities associated with the management of the Acid Sulfate Soils prior to the commencement of the activities.

(F2-2) The Acid Sulfate Soil Management plans are to be provided to the administering authority 28 days prior to the start of the conduct of any activity. If the administering authority provides any comment on the plans within 21 days of receiving the plans, those responsible for the plans must have due regard to those comments in the implementation of the plans.

Preventing contaminant release to land

(F3-1) Contaminants must not be released thereby causing contamination of land.

(F3-2) Spillage of any chemicals, flammable or combustible liquids must be contained on the site and rectified whereby material or serious environmental harm is not caused.

(F3-3) All petroleum product storage must be designed, constructed and maintained in accordance with Australian Standard 1940 - Storage and Handling of Flammable or Combustible Liquids.

Land rehabilitation

(F4-1) Any site must be rehabilitated (including all disturbed areas such as slopes, borrow pits, stormwater or waste water collection pits, stockpile and screening areas) in a manner such that:

(a) if practical, suitable native species of vegetation are planted and established;

(b) potential for erosion of the site is minimised;

(c) the quality of stormwater, water and seepage released from the site is such that releases of contaminants such as suspended solids, turbidity, total dissolved salts, pH, total iron, total aluminium, and total manganese are not likely to cause environmental harm;

(d) environmental nuisance caused by release of dust is avoided;

(e) the water quality of any residual water bodies meets current ANZEEC criteria for subsequent uses and does not have potential to cause environmental harm; and

(f) the final landform is stable and not subject to slumping.

END OF PROVISIONS FOR SCHEDULE F

Schedule G - Community

Complaint response

(G1-1) All complaints received must be recorded including investigations undertaken, conclusions formed and action taken. This information must be made available to the administering authority on request.

(G1-2) In conjunction with the administering authority, cooperate with and participate in any community environmental organisation established specifically in respect of the site.

END OF PROVISIONS FOR SCHEDULE G

Schedule H - Coastal

(H1) If tenure over the site of the works is required by the relevant Harbour Board (Port Authority) or the Department of Natural Resources and Mines, the holder shall, before using the works for any purpose, obtain a lease, licence or permit to occupy over the site of the works from the relevant Harbour Board (Port Authority) or the Department of Natural Resources and Mines.

(H2) Any material that is deposited outside the alignment of the works shown on the approved plans; or any debris that falls or is deposited on tidal lands or into tidal waters; during the construction of the works, must be removed.

(H3) No CCA treated timber is to be used until external surfaces are dry from the CCA treatment process. All treated timber is to be sawn or drilled over a catchment sheet and all off-cuts are be disposed of to an approved landfill site.

(H4) It is required that:

(a) the disturbance to the bed and banks of any waterway is kept to a minimum;

(b) restoration of the bank to its former condition and take such other action as is necessary to ensure the stability of the bank, if as a result of carrying out the works, or any other cause attributable to the holder, any bank is displaced or affected by erosion; and

(c) within three (3) months of the date of practical completion of the works, a letter from a Registered Professional Engineer of Queensland must be submitted to the administering authority certifying that:-

(i) the works (including any other associated works) has been constructed in accordance with the approved drawings and these provisions; and

(ii) the works:-

- are structurally adequate for anticipated usage; and
- comply with all relevant codes – including the EPA's operational policy, *Building and engineering standards for tidal works*.

(H5) The bed and banks of the waterway for a distance of 15 metres around the site of the works are clear of all debris.

END OF PROVISIONS FOR SCHEDULE H

Schedule I – Koalas and other fauna

(I1-1) A detailed Koala and Other Fauna Management Plan is to be prepared and implemented. The plan must include measures to mitigate impact on koalas and other fauna from the project, including, but not limited to, those described in the EIS documents, and specifically address Provisions I2-1 to I5-3.

(I1-2) The koala and other fauna management plan is to be provided to the administering authority 28 days prior to the start of construction. If the administering authority gives the holder any comment on the plan within 21 days of receiving the plan, the holder must have due regard to those comments when undertaking the plan.

Exclusion fencing

(I2-1) Fauna exclusion fencing must be installed on both sides of the motorway between the Mt Gravatt-Capalaba Road and Old Cleveland Road interchanges except where sound barriers are installed. Fencing is to extend east for 150m along Mt Gravatt-Capalaba Road towards Mt Petrie Road with a return at the end of the fence to the north of 50m.

(I2-2) Fencing should be suitable to prevent crossing of the key fauna species in the area (koalas and wallabies) and be made of chain wire with a 600mm wide strip of sheet metal or plastic attached to the upper part of the fence on the side away from the carriageway.

Measures to facilitate movement of fauna across the motorway and associated areas

(I3-1) Structures required to facilitate the movement of fauna (koalas, wallabies, etc) across the motorway are to be designed and installed as outlined in Schedule I – Table 1.

Schedule I – Table 1. Fauna movement structures

Approximate location	Structure required*
CH6000 (near Wecker Road)	fauna underpass (Cross Section: 3m by 3m).
CH7200 (near Coventry Crt)	fauna underpass (Cross Section: 3m by 3m).
CH8000 (near Kenilworth Crt)	fauna underpass (Cross Section: 3m by 3m).
CH8800 (Greendale Wy)	(a) Construct and modify fencing to facilitate fauna movement through underpass and movement into adjacent habitat. (b) Signage and other control measures installed to slow traffic.
CH11500 (near Ambara St)	Install works to slow bicycle traffic, signage.
CH13100 (near Stanton Rd West)	Outer culverts to be fitted with fauna ledges above standing water level.

* All structures should be capable of allowing the movement of fauna during low and no-flow water conditions.

(I3-2) Details of the design of the structures described in Schedule I – Table 1 including any modifications to facilitate fauna movement, as well as works required in the vicinity of the structures to enhance fauna movement, is to be included in the koala and other fauna management plan, Provision (I1-1).

(I3-3) The structures described in Schedule I – Table 1, as well as the existing structures suitable for fauna movement are to be maintained and kept clear of debris, sediment and other matter that may affect their use by fauna.

(I3-4) Permanent signage must be installed to increase motorway users awareness of koalas and other fauna in the Koala Coast Area and provide contact details of wildlife rescue groups for animals injured crossing the motorway. Temporary signs or mobile electronic displays are to be utilised during construction.

(I3-5) Lighting installed to assist drivers with the detection of animals on the road.

Fauna monitoring

(I4-1) A fauna monitoring program must be prepared and implemented within 6 months of the completion of the upgrade of the section of the motorway from the Brisbane River to the Mt Gravatt Capalaba Road interchange. The program must be designed to:

(a) assess the effectiveness of the fauna barrier works;

(b) determine the usage by fauna of the fauna underpasses and other cross motorway drainage facilities;

(c) record the presence and fate of fauna entering the motorway and interchange areas; and

(d) assess and make recommendations on how fauna management facilities could be improved.

(I4-2) The fauna monitoring program must be submitted to the administering authority and if the administering authority gives the holder any comment on the plan within 21 days of receiving the plan, the holder must have due regard to those comments when implementing the plan.

Construction sites

(I5-1) Barriers and fencing around active construction sites, storage areas and disturbed areas must be configured to exclude fauna and but allow any fauna that may enter these sites to exit the site.

(I5-2) Trenches and pits capable of trapping animals should be temporarily fenced or structures provided for escape.

(I5-3) Disorientated animals entering or found at construction sites must be removed only by authorised handlers and released at sites nominated in the Koala and Other Fauna Management Plan.

Management of fauna during clearing

(I6-1) Prior to clearing any sites, the affected area is to be surveyed for the presence of koalas and other fauna. A suitable qualified person, who can demonstrate to the satisfaction of the EPA their expertise in the identification and location of koalas in their natural habitat (this can be done through issuing of a rehabilitation permit endorsed for spotter/catching), must inspect all habitat in the area to be cleared prior to the commencement of clearing using the methodology in the attached Koala Survey Guideline (Attachment 1). Any koala identified in the target area is to be left alone with their tree intact and allowed to move from the site under their own volition. The strategic retention of some habitat near this tree may be required to avoid isolating the animal and to encourage it to move to another area.

(I6-2) Clearing of koala habitat must be undertaken between the months of January and June to avoid the peak in koala movements except where a survey of the area demonstrated that there are no koalas in the trees to be removed. If during clearing operations a koala is found, the tree is not to be cleared and a corridor of vegetation should be left to allow the animal to leave the area. Clearing can resume once the animal has left the area.

(I6-3) Clearing of vegetation must be sequential and result in habitat being progressively removed in a direction away from the Gateway Motorway and towards adjacent habitat to avoid isolating habitat and koalas.

(I6-4) During any clearing operation, an authorised spotter catcher must be on site to inspect hollows and manage any fauna that needs relocating.

Koala habitat restoration

(I7-1) An area of 4.8 ha is to be rehabilitated as koala habitat. This may be achieved by any or all of the following:

(a) replanting of areas adjacent to the fauna underpasses to facilitate their use by koalas;

(b) replanting of areas to link existing habitat to areas adjacent to the culverts and fauna underpasses;

(c) rehabilitation/replanting of local areas near the road works; and

(d) regeneration of koala habitat on other lands within or contiguous with the Koala Management Area A1 (State Planning Policy 1/05).

(I7-2) Areas for regeneration or rehabilitation as koala habitat should be identified and a plan prepared and implemented to achieve to rehabilitation of these areas.

(I7-3) The rehabilitation and regeneration of koala habitat must be consistent with the requirements of the draft Nature Conservation (Koala) Conservation Plan 2005 and later versions.

END OF PROVISIONS FOR SCHEDULE I

Schedule J - Definitions

Words and phrases used throughout this permit are defined below. Where a definition for a term used in this permit is sought and the term is not defined herein the definitions provided in the *Environmental Protection Act 1994*, *Coastal Protection and Management Act 1995*, regulations made under those Acts, Environmental Protection Policies or ordinary meaning shall be used.

Word Definitions

"administering authority" means the Environmental Protection Agency or its successor.

"annual return" means the return required by the annual notice (under section 316 of the *Environment Protection Act, 1994*) for the section 86(2) licence that applies to a permit.

"authorised person" means a person holding office as an authorised person under an appointment under the Environment Protection Act, 1994 by the chief executive.

"authorised place" means the place, premises or land authorised under this authority or permit for the carrying out of the specified environmentally relevant activities.

"authority" means level 1 licence (with or without development approval), provisional licence, level 1 approval (with or without development approval), level 2 approval, environmental authority (mining activities) or a constituent part of an integrated authority under the *Environmental Protection Act 1994*.

"CCA" means copper chrome arsenate

"commercial place" means a place used as an office or for business or commercial purposes.

"dredge spoil" means material taken from the bed or banks of waters by using dredging equipment or other equipment designed for use in extraction of earthen material.

"dwelling" means any of the following structures or vehicles that is principally used as a place for human habitation-

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land; and
- a water craft in a marina.

"intrusive noise" means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration -

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

  In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be had to Australian Standard 1055.2 - 1997 Acoustics - Description and Measurement of Environmental Noise Part 2 - Application to Specific Situations.

"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"$L_{Amax, adj, 15min}$" means the average maximum A-weighted sound pressure level, adjusted for tonal or impulsive noise character, and measured over any 15 minute period, using Fast response.

"L_{Amax} " means the maximum instantaneous A-weighted sound pressure level, measured on Fast response.

"mg/L" means milligrams per litre.

"noise sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential premises;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; and
- a park or gardens;

  and includes that part of the curtilage of a building or structure used for purposes usually or reasonably associated with the building or structure.

"noxious" means harmful or injurious to health or physical well being.

"permit" means development permit decision notice or referral agency response under the *Integrated Planning Act 1997.*

"Potential Acid Sulfate Soils" (PASS) means soils or sediments containing iron sulfides or sulfidic material, which have not been exposed to air and oxidised. These soils may include both self-neutralising ASS (SNASS) and non-neutralising ASS (NNASS). The field pH of these soils or sediments in their undisturbed state is usually >4, and may be neutral or slightly alkaline. These soils or sediments are saturated with water in their natural state.

"sensitive place" includes -

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area;

- a public thoroughfare, park or gardens; and
- a place used as a workplace, an office or for business or commercial purposes;

  and includes that part of the curtilage of a building or structure used for purposes usually or reasonably associated with the building or structure.

"offensive" means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

"site" means the place or premises to which this authority or permit relates.

"waters" includes any watercourse, lake, lagoon, pond, swamp, wetland, bed and bank of any waters, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off or groundwater.

"holder" means the holder of an authority or permit or person acting under an authority or permit.

"**the activities**" means the ERAs and works described as 'aspects of development' is this permit.

"the project" means the Gateway Upgrade Project as described in the Environmental Impact Statement Volumes 1, 2 and 3, August 2004, and the Gateway Upgrade Project Supplementary Environmental Impact Statement March 2005

END OF SCHEDULE J

Attachment 1

KOALA SURVEY GUIDELINE

A. Physical Location and Description of Survey Site

1. Provide an accurate, clear description of the location of the site, using:
    a. an AMG description of the site for use in GIS based data systems; and
    b. a lot on plan description of the site.
2. Provide a description of the site in the broader context of the surrounding environment to identify the significance of the site on a regional basis. An assessment of the site is to include mapped data indicating proximity to:
    a. any adjacent EPA protected areas (such as national park, conservation park, environmental park, nature refuge);
    b. areas zoned for conservation purposes on any Local Government planning scheme;
    c. vegetation/habitat buffers, links or corridors (eg. which intersect with the site);
    d. areas subject to Voluntary Conservation Agreements or vegetation protection orders; and
    e. areas of known conservation significance as identified under Commonwealth or Queensland legislation.
3. The time of year that the survey was conducted is to be indicated.

B. Koala Survey Methodology

1. Koala presence at a site is to be determined by indirect (e.g. faecal pellets or scratch markings) or direct (searches for koalas) survey methods.
2. If indirect methods are to be used:
    i. a minimum of 100 trees are to be sampled by searching under canopies and at the base of trunks for faecal pellets; and
    ii. tree trunks are to be inspected for scratch markings.
3. When koala presence is confirmed, koala surveys are to be conducted to determine koala density at the site. Koala density (number of koalas per hectare of habitat searched) can be estimated from:
    i. total counts, if the site contains less than 30ha of koala habitat; or
    ii. sampled counts, if the site contains 30ha or more of koala habitat.
4. A total count must ensure that every tree on the site is searched for koalas. The method to be used for a total count must include:
    i. arranging strip transects of equal width perpindicular to creek and ridge lines over the entire site;
    ii. using koala spotters spaced approximately 15m apart to search each transect by walking a fixed compass bearing and maintaining the same pace as adjacent spotters; and
    iii. koala spotters are to be equipped with binoculars, compass and site map.
5. A sampled count uses a sampling strategy that searches a proportion of the trees on the site for koalas. The method to be used for a sampled count must include:
    i. arranging strip transects of equal width and equal distances apart perpendicular to creek and ridge lines to sample a minimum of 30% of the habitat on the site;

ii. using koala spotters spaced approximately 15m apart to search each transect by walking a fixed compass bearing and maintaining the same pace as adjacent spotters; and
iii. koala spotters are to be equipped with binoculars, compass and site map.

6. When a koala is detected during a survey, a note is to be made of its location on the site, health (ie. overt signs of disease) and reproductive status (ie. presence of young).

C. Reporting

1. A report of the results of a koala survey is to be provided and must include:
    a. a description of the site as detailed in section A; and
    b. a description of the survey method as detailed in section B including:
        i. an account of the presence or absence of koalas;
        ii. an estimate of koala density (if present);
        iii. the proportion of koalas with visible indications of disease; and
        iv. the proportion of females with young.

APPENDIX 3

COORDINATOR-GENERAL'S RECOMMENDATIONS

These recommendations, which cannot be attached as a condition to any statutory approval, reflect the objectives stated in the EIS documentation.

Recommendation 1

The Proponent should develop an Interface Agreement with the BCC, prior to the commencement of construction, which addresses the project related interfaces with the BCC road network as well as potential project related issues in the surrounding area.

Recommendation 2

The Proponent should include, as a minimum, the mitigation measures in relation to terrestrial ecology which appear in section 23.4.11 of the SEIS in the Environmental Management Plan referred to in Condition 8 during the design, construction and operation phases of the GUP.

Recommendation 3

Riparian vegetation removal should be minimised to the smallest clearance area required to undertake bridge works at Bulimba Creek, Brisbane River and Kedron Brook Floodway.

Recommendation 4

The Environmental Management Plan referred to in Condition 8 should include measures for the rehabilitation after construction of any habitat areas for the Lewin's Rail located within and near the Kedron Brook Floodplain which are impacted by construction of the GUP.

Recommendation 5

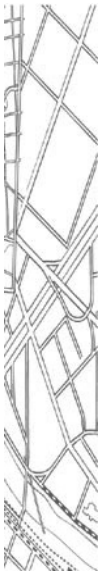
Where carriageway separation requires the installation of barriers, high-tension safety wire fencing type barriers should be installed, as opposed to solid barriers, in an attempt to facilitate fauna movement except where, for reasons of safety for road users, solid barriers are preferred.

Appendix B

GUP Reference Design

Appendix C

Traffic Modelling Report for Kingsford Smith Drive Precinct



Traffic Modelling Report

Gateway Upgrade Project - Kingsford Smith Drive Precinct

8 September 2006

Prepared for

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TRAFFIC AND TRANSPORT CONSULTANTS

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Contents

1. Introduction

This report investigates proposed changes to the Gateway Upgrade Project (GUP) as a modification to the Reference Project.

Proposed changes to the reference project are summarised as follows:

- Addition of south facing ramps at Kingsford Smith Drive on the Gateway Motorway Deviation
- De-scoping of widening works on existing Gateway Motorway between the Southern Bifurcation and Kingsford Smith Drive
- Removal of southbound off ramp to Lytton Road from Gateway Motorway
- Local surface street improvements in the vicinity of the Gateway Motorway and its interchanges with Kingsford Smith Drive

Traffic impacts of the changes south of the Brisbane River (removal of the Lytton Road off ramp) are assessed in a separate report.

The "Reference Project" included widening of the existing Gateway Motorway between the Southern Bifurcation and Kingsford Smith Drive.

The widening of the existing motorway at this location was identified due to a number of factors including;

- addition of lanes to facilitate the construction of a new toll collection plaza
- Geometric design constraints; and
- Proposed tolling arrangements which sought to limit the number of entry/exits to the Motorway.

With the decision to proceed with GUP that retained the existing tolling location, (i.e. toll plaza remaining at the southern approach to the Gateway Bridge) the need for additional lanes on the existing Gateway Motorway and the requirement to limit access to the Motorway was removed.

Subsequent design development has provided the possibility of constructing south facing ramps without requiring further land take or impinging upon adjacent buildings.

Traffic modelling has been undertaken using the EMME/2 model previously used for the development of the "Reference Case" traffic model. This model is based on BSTM Version 4. However, it is expected modelling of the proposed changes will be undertaken in the latest version to validate the findings of this report.

Although not using the latest version of the BSTM, using the previous version allows for a ready comparison to the previous analysis undertaken for the Reference Project.

The following chapters describe the analysis undertaken to forecast the traffic changes arising from the modified reference project and details the benefits or otherwise derived from the changes.

2. Changes to the Reference Project

Several options were developed in an incremental manner to enhance the reference project.

2.1 Reference Project

The Reference Project for the Gateway Upgrade Project allows generally for the addition of one traffic lane in each direction on the existing Gateway Motorway in the section between Kingsford Smith Drive and the southern bifurcation of the Gateway Deviation. Figure 2-1 shows the general traffic lane layout on the Gateway Motorway north of the Gateway Bridge for the Reference Project.

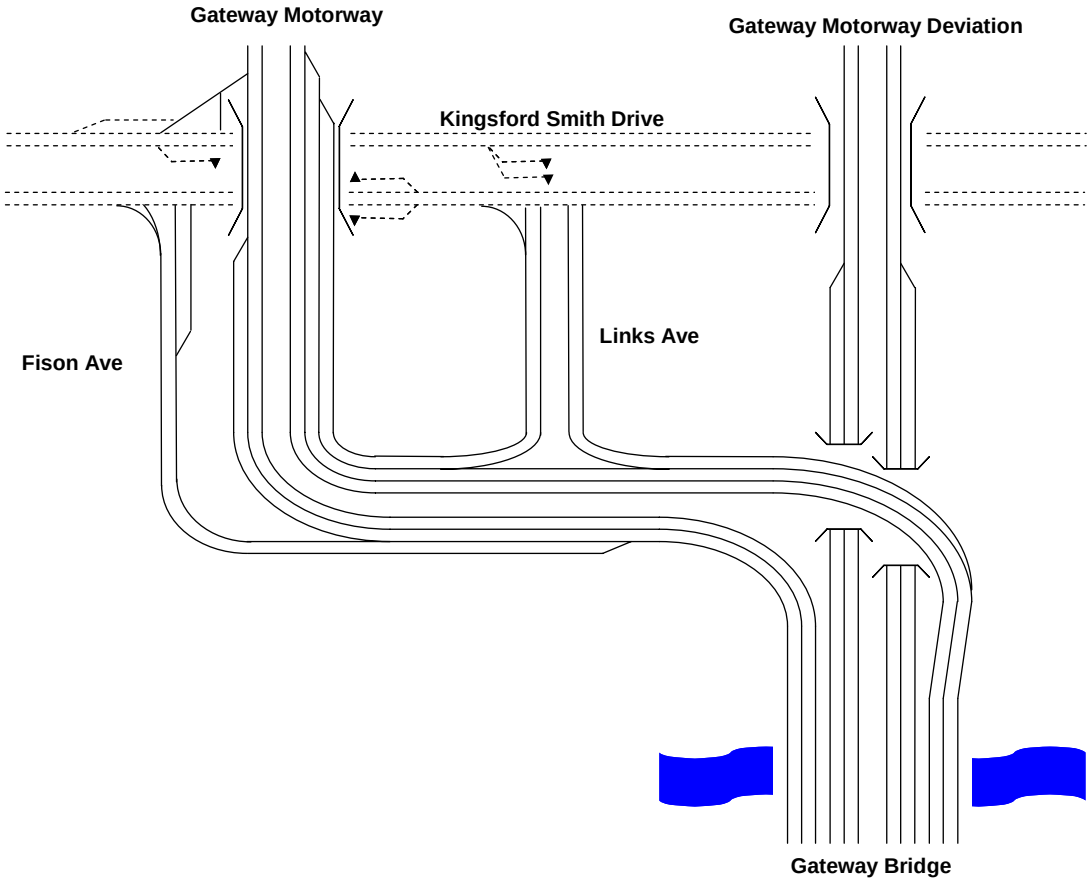


Figure 2-1 – Reference Project Road Network Schematic

In general terms, this shows the development of an additional south bound lane near the Links Avenue off ramp through to the merge with the proposed Gateway Motorway Deviation. In the north bound direction, an additional lane is developed from the Fison Avenue off ramp though to the Kingsford Smith Drive overpass where it merges back to form two lanes.

The pertinent point to note in this layout is the existing lane arrangements north of Kingsford Smith Drive are retained and as such no additional traffic capacity is provided in the section north to the Airport Drive interchange.

2.2 Modified Project

To provide a better value solution for the Gateway Upgrade Project several design changes were made to the Reference Project.

2.2.1 De-scoping of Works on Existing Gateway Motorway

The development of the lane layout adopted for the "Reference Project" that went to tender for the Gateway Motorway Upgrade included the addition of a number of lanes in the section between the southern bifurcation with the Gateway Deviation and the Kingsford Smith Drive interchange.

The addition of lanes in this section was to facilitate the construction of a new toll collection plaza in this location.

With the decision to proceed with a project that deleted this plaza and retained the existing tolling location (i.e. toll plaza remaining at the southern approach to the Gateway Bridge), the need for the additional lanes was removed.

The de-scoping of the widening works on the Existing Gateway Motorway essentially retain the motorway in its current configuration. Some minor changes are recommended around the interchanges with Links Avenue and Fison Avenue.

De-scoping works include:

- No southbound widening of motorway between Kingsford Smith Drive and the Links Avenue Southbound on ramp
- Change in southbound exit arrangement for Links Avenue to allow shared through/off lane
- No northbound widening between Southern Bifurcation and Kingsford Smith Drive.

2.2.2 Kingsford Smith Drive South Facing Ramps

During the GUP tender submission the opportunity to introduce south facing ramps from Kingsford Smith Drive to the Gateway Motorway Deviation was identified.

The "Reference Project" did not include an interchange at Kingsford Smith Drive and the Gateway Motorway Deviation. The absence of ramps at this location resulted from number of factors including;

- Lack of available land and the close proximity of buildings in the vicinity of Kingsford Smith Drive;
- Geometric design constraints; and
- Proposed tolling arrangements which sought to limit the number of entry/exits to the Motorway.

With the decision to proceed with a project that retained the existing tolling location (i.e. toll plaza remaining at the southern approach to the Gateway Bridge), the need to limit access to the Motorway was removed.

Additionally, subsequent design development has provided the possibility of constructing south facing ramps without requiring further land take or impinging upon adjacent buildings.

These south facing ramps provide alternative access for vehicles currently exiting the motorway at Fison Avenue, and for vehicles entering at Links Avenue.

2.2.3 Surface Street Works

To adequately accommodate traffic entering and leaving the motorway system a number of surface street works have been included as part of the Gateway Upgrade Project:

- Kingsford Smith Drive (KSD)
  - Reconfigure lane arrangements at intersection with Fison Avenue westbound to left/through, through, right, right and extend right turn bays
  - New signalised intersection with right and left turn lanes at the intersection with Gateway Deviation Ramps
  - Minor alteration at Gateway Motorway northbound on ramp from KSD to allow for two right turn lanes from KSD
- Fison Avenue
  - Reconfiguration of existing lane arrangements on Fison Avenue between Eagle View Place and KSD (linemarking changes only)
- Links Avenue
  - Additional lane northbound between Cullen Ave and KSD to allow continuous left turn lane

The lane arrangements for this option are shown in Figure 2-2.

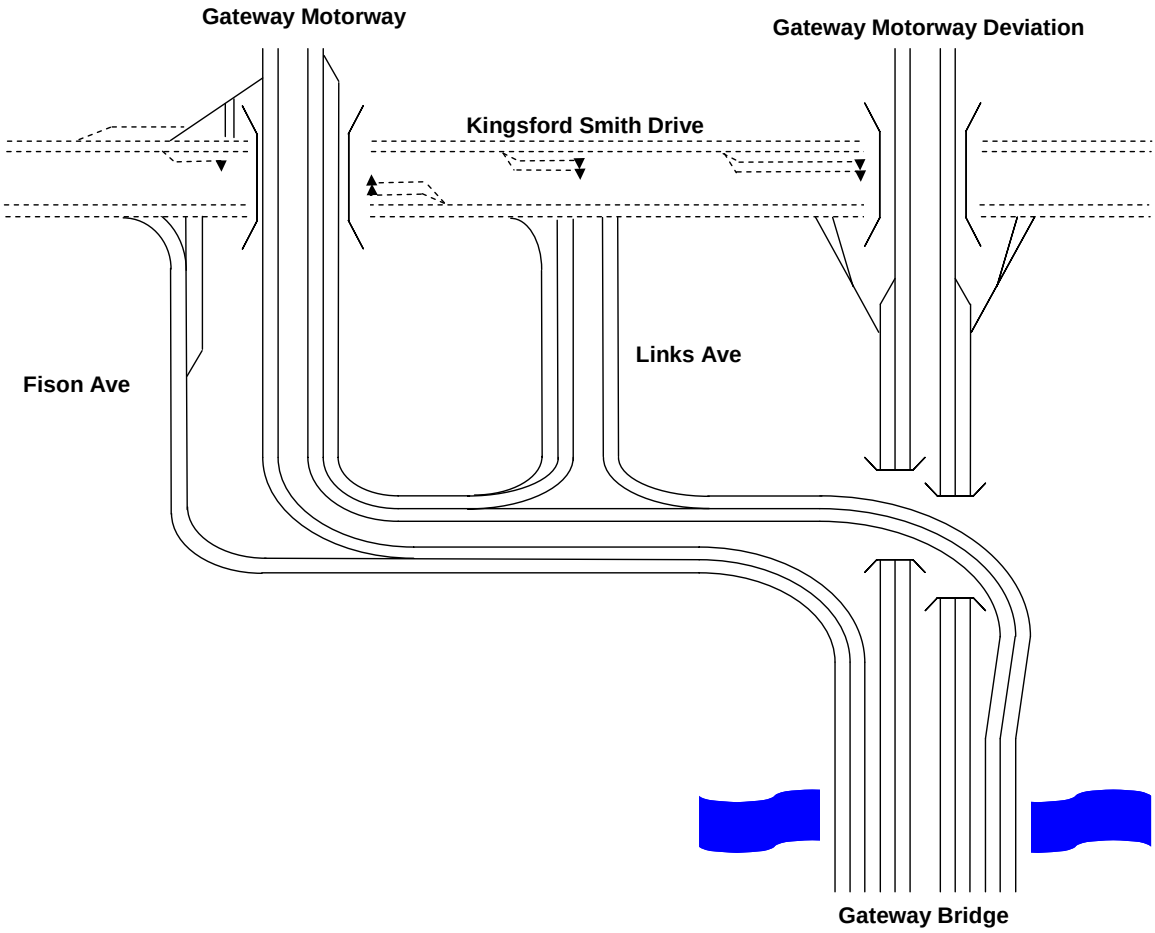


Figure 2-2 – Modified Project Road Network Schematic

The intersection of Kingsford Smith Drive and Fison Avenue and intersections further to the west provide a constraint to traffic travelling east along Kingsford Smith Drive. With this constraint in place retaining KSD at two lanes is appropriate. However, if KSD was to be widened to the west of Fison Avenue, investigations into widening KSD between Fison Avenue and the new KSD Ramps would be required.

3. Strategic Modelling Analysis

Traffic modelling has been undertaken using the EMME/2 model previously used for the development of the "Reference Case" traffic model. This model is based on BSTM Version 4. However, it is expected modelling of the proposed changes will be undertaken in the latest version to validate the findings of this report.

Although not using the latest version of the BSTM, using the previous version allows for a ready comparison to the previous analysis undertaken for the Reference Project.

Model calibration was undertaken during the development of the Reference Case for the Gateway Upgrade Project and at this stage no further model calibration has been undertaken. When the latest version of the BSTM is used to test the Modified Project, detailed model calibration will be carried out.

The modelling indicates that the de-scoping of the works on the Existing Gateway Motorway will have little impact on the overall operation of the Gateway Motorway, as the motorway flows are less than the nominal capacity of the de-scoped motorway.

The surface street works included as part of the project modifications are not significant at the strategic level and are therefore not included as part of the strategic modelling.

The addition of the Kingsford Smith Drive Ramps has a significant effect on traffic distribution between Fison Avenue and the Gateway Motorway Deviation. Figure 3-1 and Figure 3-2 shows the changes in traffic flow patterns for the 2021 AM and PM peak hours as a result of the changes outlined in Section 2.

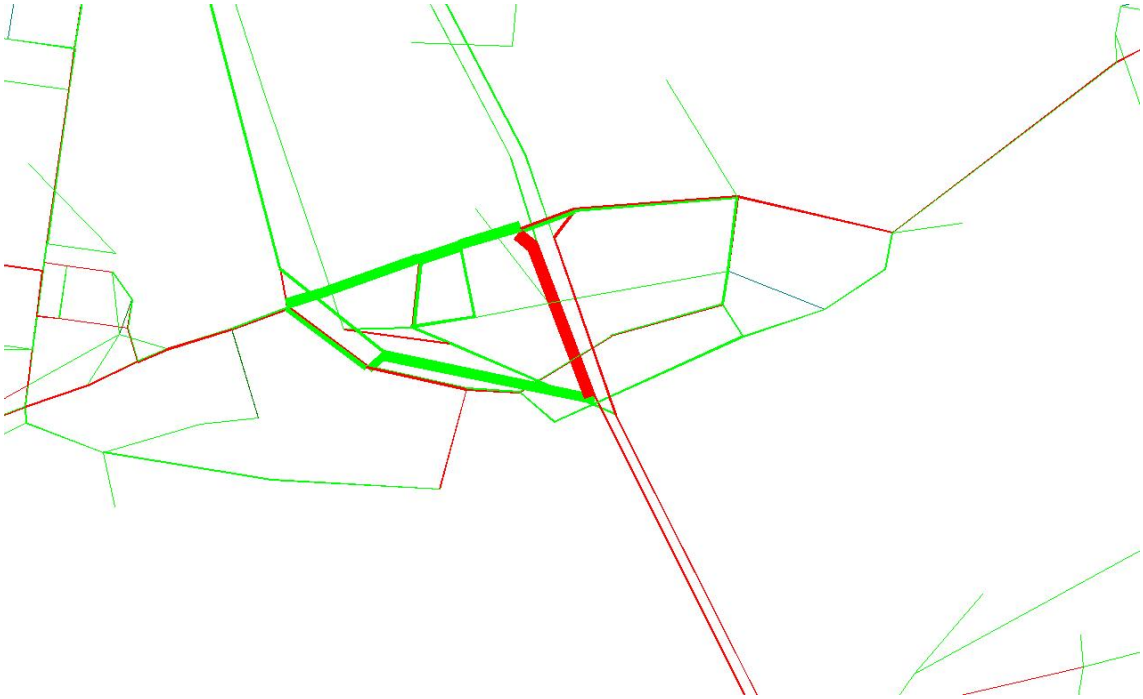


Figure 3-1 – 2021 AM Peak Hour Traffic Flow Changes as a result of Modified Reference Project

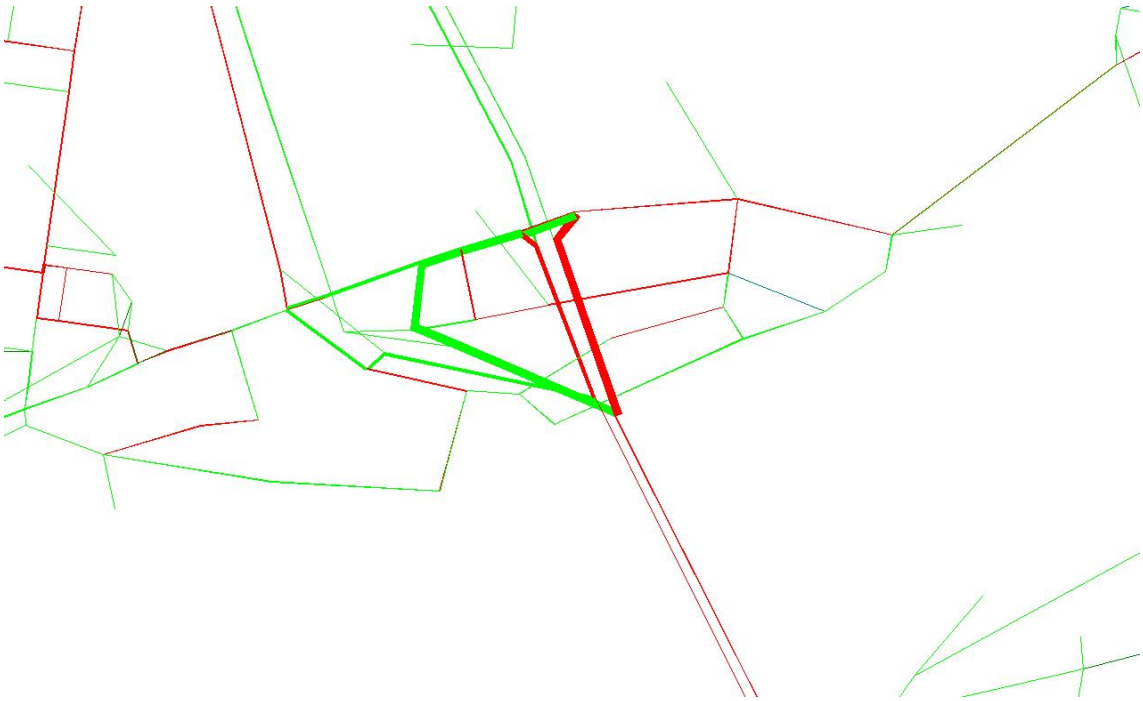


Figure 3-2 – 2021 PM Peak Hour Traffic Flow Changes as a result of Modified Reference Project

The figures show a shift in traffic from the Existing Gateway Motorway and the Fison/Links Avenue Ramps to the Gateway Motorway Deviation and new Kingsford Smith Drive Ramps. Outside the area bounded by Fison Avenue and the Gateway Motorway Deviation, only minor change in traffic flow is noted. Further details of peak traffic flows on the network are provided in Appendix A.

Although not significant in an overall network sense, the addition of the Kingsford Smith Drive Ramps does provide an improvement to the overall network Vehicle Kilometres of Travel (VKT) and Vehicle Hours of Travel (VHT) as shown in Table 3.1 and Table 3.2.

Table 3.1 – 2021 AM Peak Hour Metropolitan Brisbane Network Operation

	VKT	VHT	Average Speed (km/h)
Reference Project	5394500	123200	44
Modified Project	5392000	123000	44

Table 3.2 – 2021 PM Peak Hour Metropolitan Brisbane Network Operation

	VKT	VHT	Average Speed (km/h)
Reference Project	5057000	105200	48
Modified Project	5056500	105150	48

Table 3.1 and Table 3.2 indicate that the changes in traffic distribution caused by the addition of the Kingsford Smith Drive Ramps is minor and localised to the area surrounding the new ramps.

4. Results of Operational Modelling

Operational modelling has been undertaken using the PARAMICS suite of micro-simulation software. The operational assessment has been undertaken for the AM and PM peak periods under 2021 forecast traffic demands. This provides a comparative analysis between the operation of the Reference Project and the Modified Project. It should be noted that a detailed model calibration has not been undertaken in this area. As such, the results of the assessment should therefore be seen as comparative and not absolute at this stage. More detailed calibration will be undertaken following the updating of the BSTM travel demands.

The extent of the micro-simulation modelled area is shown in Figure 4-1.

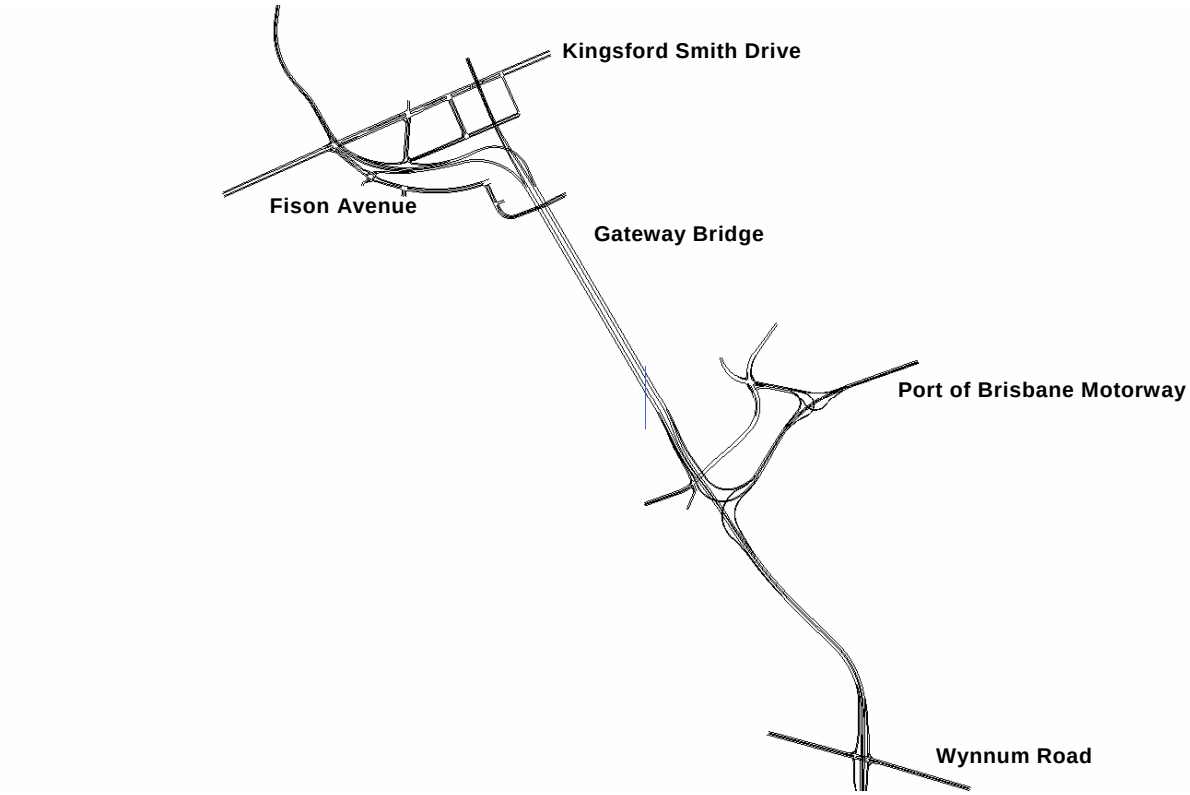


Figure 4-1 – PARAMICS Model Extents

It should be noted that the same trip demands have been used for both scenarios. This allows a direct comparison between scenarios. EMME/2 modelling of the

scenarios shows that there is some minor changes to overall traffic demands as a result of the changes noted above. Further testing is in PARAMICS is recommended to ensure the road network can accommodate these demand changes. This modelling could be undertaken during the proposed re-modelling using the latest version of the BSTM.

Five seed runs of the micro-simulation model have been run for each scenario to ensure model stability. The results of these runs are shown in Appendix B and show the model is relatively stable. The results for an overage seed run have then been used for the operational analysis.

4.1 Reference Project

Operational issues that are evident under the Reference Project are:

- Significant queuing on existing Gateway Motorway northbound in AM peak due to Fison Avenue exit and Fison Avenue/Kingsford Smith Drive intersection, with queues extending beyond Port of Brisbane Motorway
- Queuing from Links Avenue/Kingsford Smith Drive intersection extend onto the motorway's southbound carriageway with queues extending north to model extent (beyond Airport Drive)
- Long queues on Kingsford Smith Drive eastbound in PM peak period caused by congestion at the Fison Avenue intersection
- Long queues on Kingsford Smith Drive westbound in PM peak period caused by congestion at the Links Avenue intersection
- Extensive delays on Wynnum Road in vicinity of Gateway Interchange
- Extensive delays on Lytton Road /Queensport Road in vicinity of Gateway Interchange

This queuing results in the Reference Project models reaching significant levels of congestion resulting in gridlock of the model in both the AM and PM peak periods. Once the models reach this level of congestion, there is limited value continuing model analysis.

4.2 Modified Project

The addition of the Kingsford Smith Drive Ramps reduces the level of congestion in the modelled area. Some operational issues still remain:

- Extensive queues on Kingsford Smith Drive eastbound in PM peak period caused by Fison Avenue intersection
- Some queuing on Kingsford Smith Drive westbound in PM peak caused by congestion at the Gateway Deviation Ramps intersection
- Extensive delays on Wynnum Road in vicinity of Gateway Interchange
- Extensive delays on Lytton Road /Queensport Road in vicinity of Gateway Interchange

With the addition of the Kingsford Smith Drive Ramps and the surface street improvements outlined in Section 2, both the AM and PM peak models run through the

modelled period without reaching a "gridlocked" state. Queuing is limited only to those areas described above.

With the existing constraint at the intersection of Kingsford Smith Drive and Fison Avenue retained, Kingsford Smith Drive between Fison Avenue and French Avenue continues to operate satisfactorily. However, it should be noted that any improvement to the capacity of this intersection beyond that described in this report will result in significant delays on Kingsford Smith Drive east of Fison Avenue.

4.3 Operational Results

To provide an assessment of the relative operation of the two options a network evaluation has been undertaken in PARAMICS. This assessment has been carried out using the "Network Evaluation Plugin" developed in PARAMICS for the NSW Roads and Traffic Authority.

The results of the operational assessment are shown in Table 4.1 and Table 4.2.

It should again be noted that the operational assessments has been undertaken based on flows from Version 4 of the BSTM. At this stage the latest version of the BSTM is still not available however, it is expected modelling of the proposed changes will be undertaken in the latest version to validate the findings of this report.

Table 4.1 – 2021 AM Peak Micro-Simulation Model Operational Assessment

		Total Travel Distance (km)	Total Travel Time (hours)	Average Speed (km/h)	Average Number of Stops per Vehicle
0700-0800	Reference Project	99500	6130	16	10.4
	Modified Project	128600	2500	51	2.1
0800-0900	Reference Project	N/A	N/A	N/A	N/A
	Modified Project	121550	2850	42	3.0

Note: N/A for Reference Project is due to excessive queuing causing the model to gridlock

Table 4.2 – 2021 PM Peak Micro-Simulation Model Operational Assessment

		Total Travel Distance (km)	Total Travel Time (hours)	Average Speed (km/h)	Average Number of Stops per Vehicle
1500-1600	Reference Project	8900	3700	24	3.1
	Modified Project	119000	2500	48	2.3
1600-1700	Reference Project	N/A	N/A	N/A	N/A
	Modified Project	119250	2950	41	2.7

Note: N/A for Reference Project is due to excessive queuing causing the model to gridlock

Table 4.1 and Table 4.2 shows significant improvements in network performance as a result of the addition of the Kingsford Smith Drive Ramps and the surface street improvements outline in Section 2.

5. Conclusions

The foregoing analysis shows the inclusion of south facing ramps on the Gateway Deviation at Kingsford Smith Drive into the Gateway Reference Project results in a beneficial redistribution of traffic on the adjacent road network.

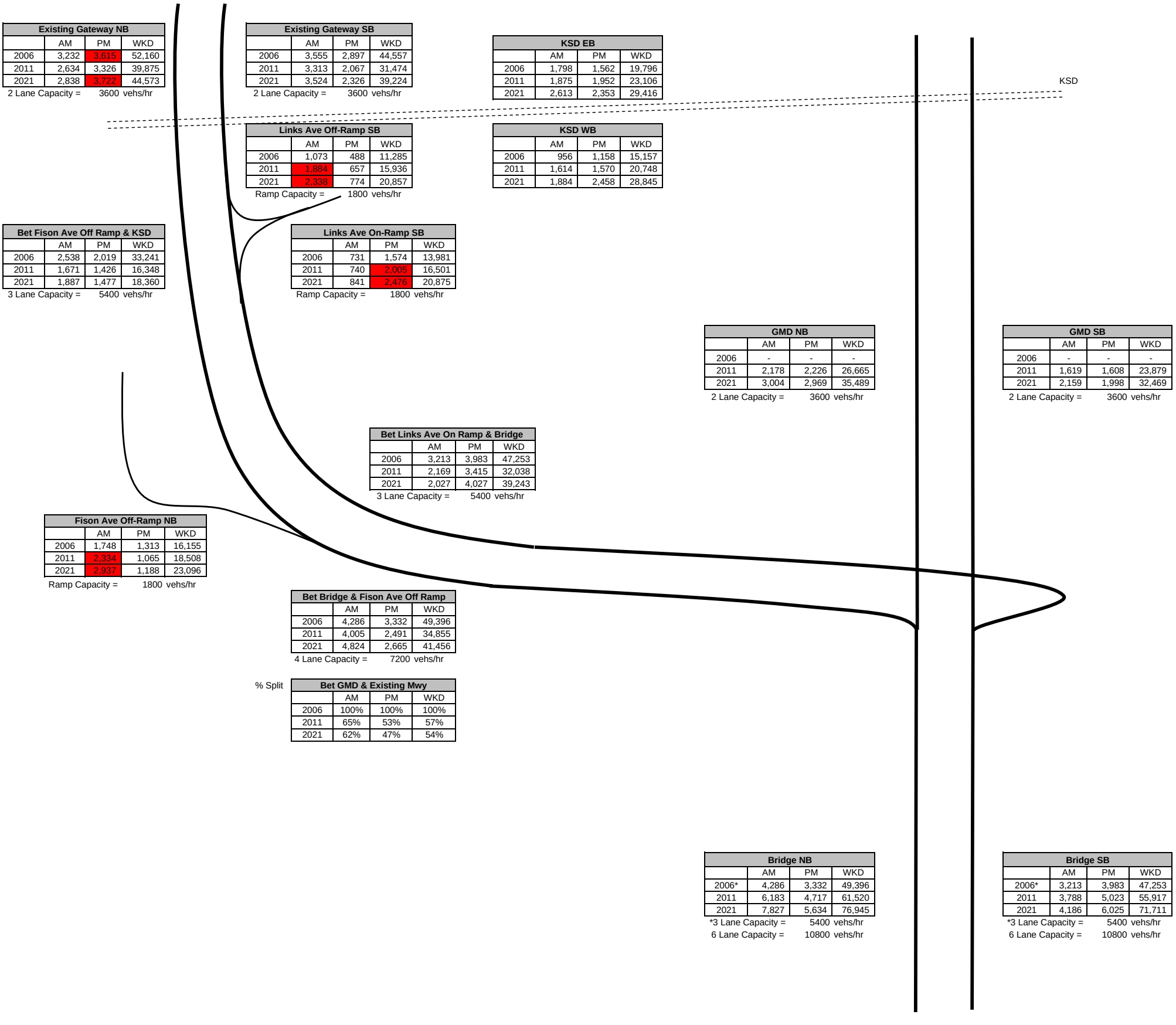
The analysis also shows effectively no change in the forecast level of service of the Gateway Motorway should it be retained in its current configuration after opening of the deviation.

The inclusion of surface works as part of the Gateway Upgrade Project forms a crucial part of the project as it limits the effects of surface street queues on the operation of the Gateway Motorway.

Further, the proposed surface works are based on no significant upgrade of the regional road network beyond that included in the Gateway Upgrade Project. Should the situation be otherwise, then the conclusions drawn in this analysis may be invalid.

Appendix A - Forecast Traffic Flows

Gateway Upgrade Project
Traffic Analysis - Southern Bifurcation & KSD M341 (Reference Project)



Existing Gateway NB			
	AM	PM	WKD
2006	3,232	3,615	52,160
2011	2,634	3,326	39,875
2021	2,838	3,722	44,573

2 Lane Capacity = 3600 vehs/hr

Existing Gateway SB			
	AM	PM	WKD
2006	3,555	2,897	44,557
2011	3,313	2,067	31,474
2021	3,524	2,326	39,224

2 Lane Capacity = 3600 vehs/hr

KSD EB			
	AM	PM	WKD
2006	1,798	1,562	19,796
2011	1,875	1,952	23,106
2021	2,613	2,353	29,416

KSD WB			
	AM	PM	WKD
2006	956	1,158	15,157
2011	1,614	1,570	20,748
2021	1,884	2,458	28,845

Links Ave Off-Ramp SB			
	AM	PM	WKD
2006	1,073	488	11,285
2011	1,884	657	15,936
2021	2,338	774	20,857

Ramp Capacity = 1800 vehs/hr

Bet Fison Ave Off Ramp & KSD			
	AM	PM	WKD
2006	2,538	2,019	33,241
2011	1,671	1,426	16,348
2021	1,887	1,477	18,360

3 Lane Capacity = 5400 vehs/hr

Links Ave On-Ramp SB			
	AM	PM	WKD
2006	731	1,574	13,981
2011	740	2,005	16,501
2021	841	2,476	20,875

Ramp Capacity = 1800 vehs/hr

GMD NB			
	AM	PM	WKD
2006	-	-	-
2011	2,178	2,226	26,665
2021	3,004	2,969	35,489

2 Lane Capacity = 3600 vehs/hr

GMD SB			
	AM	PM	WKD
2006	-	-	-
2011	1,619	1,608	23,879
2021	2,159	1,998	32,469

2 Lane Capacity = 3600 vehs/hr

Bet Links Ave On Ramp & Bridge			
	AM	PM	WKD
2006	3,213	3,983	47,253
2011	2,169	3,415	32,038
2021	2,027	4,027	39,243

3 Lane Capacity = 5400 vehs/hr

Fison Ave Off-Ramp NB			
	AM	PM	WKD
2006	1,748	1,313	16,155
2011	2,334	1,065	18,508
2021	2,937	1,188	23,096

Ramp Capacity = 1800 vehs/hr

Bet Bridge & Fison Ave Off Ramp			
	AM	PM	WKD
2006	4,286	3,332	49,396
2011	4,005	2,491	34,855
2021	4,824	2,665	41,456

4 Lane Capacity = 7200 vehs/hr

% Split

Bet GMD & Existing Mwy			
	AM	PM	WKD
2006	100%	100%	100%
2011	65%	53%	57%
2021	62%	47%	54%

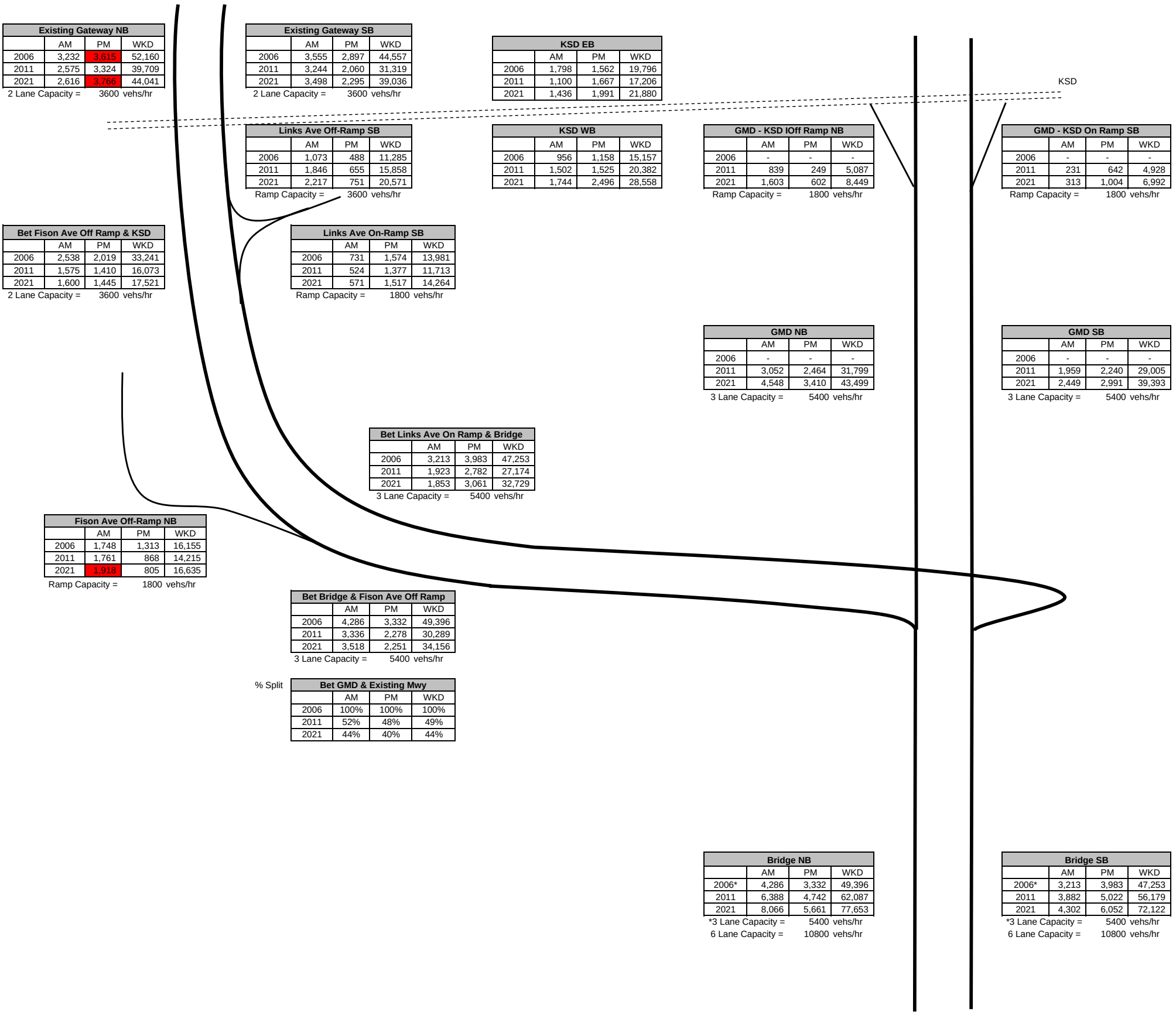
Bridge NB			
	AM	PM	WKD
2006*	4,286	3,332	49,396
2011	6,183	4,717	61,520
2021	7,827	5,634	76,945

*3 Lane Capacity = 5400 vehs/hr
6 Lane Capacity = 10800 vehs/hr

Bridge SB			
	AM	PM	WKD
2006*	3,213	3,983	47,253
2011	3,788	5,023	55,917
2021	4,186	6,025	71,711

*3 Lane Capacity = 5400 vehs/hr
6 Lane Capacity = 10800 vehs/hr

Gateway Upgrade Project
Traffic Analysis - Southern Bifurcation & KSD M342 (Modified Project)
(no northbound widening Bridge to KSD and South facing Ramps on GMD at KSD + Surface Works)



Existing Gateway NB

	AM	PM	WKD
2006	3,232	3,615	52,160
2011	2,575	3,324	39,709
2021	2,616	3,766	44,041

2 Lane Capacity = 3600 vehs/hr

Existing Gateway SB

	AM	PM	WKD
2006	3,555	2,897	44,557
2011	3,244	2,060	31,319
2021	3,498	2,295	39,036

2 Lane Capacity = 3600 vehs/hr

KSD EB

	AM	PM	WKD
2006	1,798	1,562	19,796
2011	1,100	1,667	17,206
2021	1,436	1,991	21,880

Links Ave Off-Ramp SB

	AM	PM	WKD
2006	1,073	488	11,285
2011	1,846	655	15,858
2021	2,217	751	20,571

Ramp Capacity = 3600 vehs/hr

KSD WB

	AM	PM	WKD
2006	956	1,158	15,157
2011	1,502	1,525	20,382
2021	1,744	2,496	28,558

GMD - KSD IOff Ramp NB

	AM	PM	WKD
2006	-	-	-
2011	839	249	5,087
2021	1,603	602	8,449

Ramp Capacity = 1800 vehs/hr

GMD - KSD On Ramp SB

	AM	PM	WKD
2006	-	-	-
2011	231	642	4,928
2021	313	1,004	6,992

Ramp Capacity = 1800 vehs/hr

Bet Fison Ave Off Ramp & KSD

	AM	PM	WKD
2006	2,538	2,019	33,241
2011	1,575	1,410	16,073
2021	1,600	1,445	17,521

2 Lane Capacity = 3600 vehs/hr

Links Ave On-Ramp SB

	AM	PM	WKD
2006	731	1,574	13,981
2011	524	1,377	11,713
2021	571	1,517	14,264

Ramp Capacity = 1800 vehs/hr

GMD NB

	AM	PM	WKD
2006	-	-	-
2011	3,052	2,464	31,799
2021	4,548	3,410	43,499

3 Lane Capacity = 5400 vehs/hr

GMD SB

	AM	PM	WKD
2006	-	-	-
2011	1,959	2,240	29,005
2021	2,449	2,991	39,393

3 Lane Capacity = 5400 vehs/hr

Bet Links Ave On Ramp & Bridge

	AM	PM	WKD
2006	3,213	3,983	47,253
2011	1,923	2,782	27,174
2021	1,853	3,061	32,729

3 Lane Capacity = 5400 vehs/hr

Fison Ave Off-Ramp NB

	AM	PM	WKD
2006	1,748	1,313	16,155
2011	1,761	868	14,215
2021	1,918	805	16,635

Ramp Capacity = 1800 vehs/hr

Bet Bridge & Fison Ave Off Ramp

	AM	PM	WKD
2006	4,286	3,332	49,396
2011	3,336	2,278	30,289
2021	3,518	2,251	34,156

3 Lane Capacity = 5400 vehs/hr

% Split

Bet GMD & Existing Mwy

	AM	PM	WKD
2006	100%	100%	100%
2011	52%	48%	49%
2021	44%	40%	44%

Bridge NB

	AM	PM	WKD
2006*	4,286	3,332	49,396
2011	6,388	4,742	62,087
2021	8,066	5,661	77,653

*3 Lane Capacity = 5400 vehs/hr
6 Lane Capacity = 10800 vehs/hr

Bridge SB

	AM	PM	WKD
2006*	3,213	3,983	47,253
2011	3,882	5,022	56,179
2021	4,302	6,052	72,122

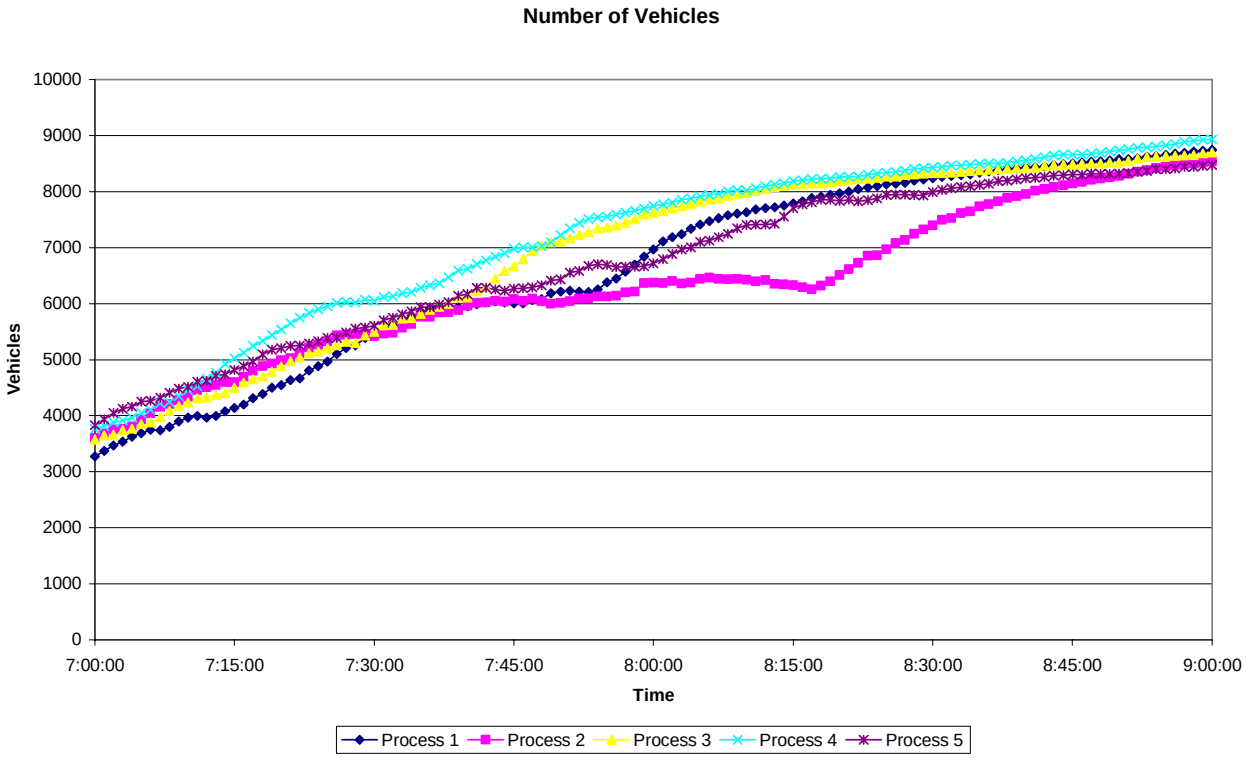
*3 Lane Capacity = 5400 vehs/hr
6 Lane Capacity = 10800 vehs/hr

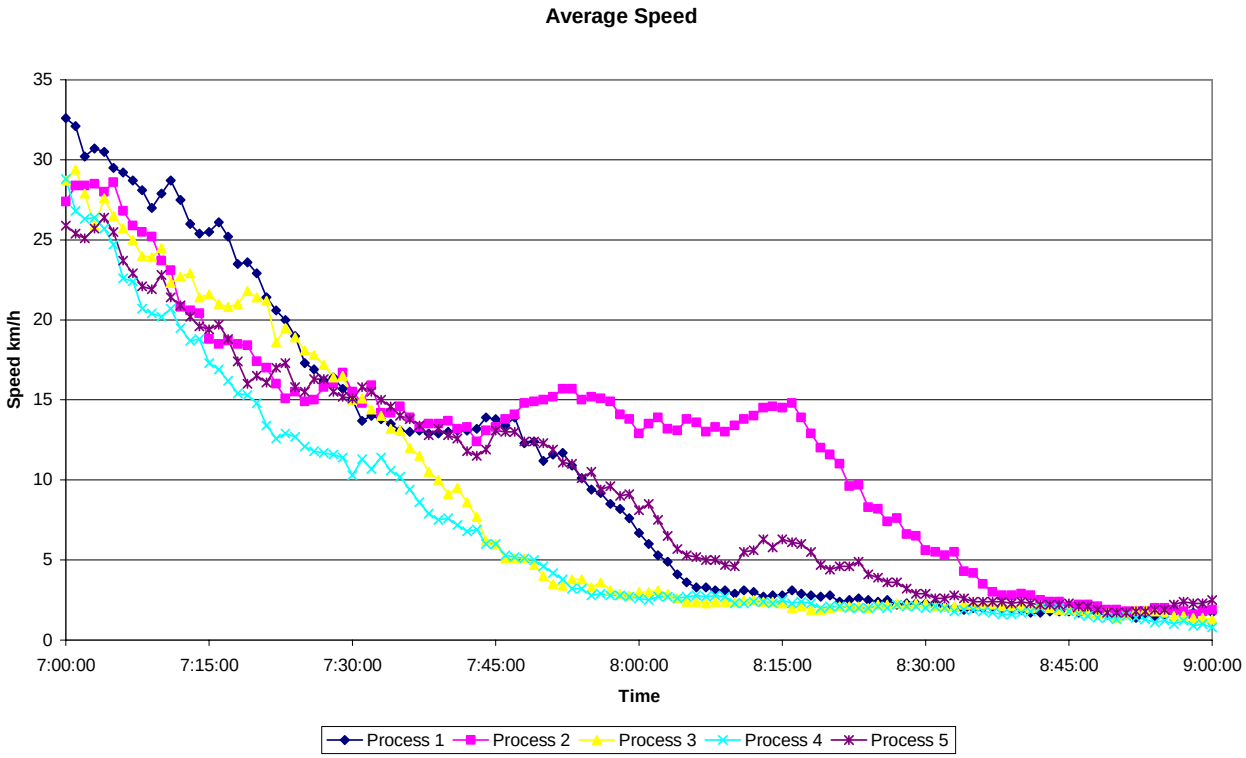
Appendix B - Micro-Simulation Model Runs

Summary

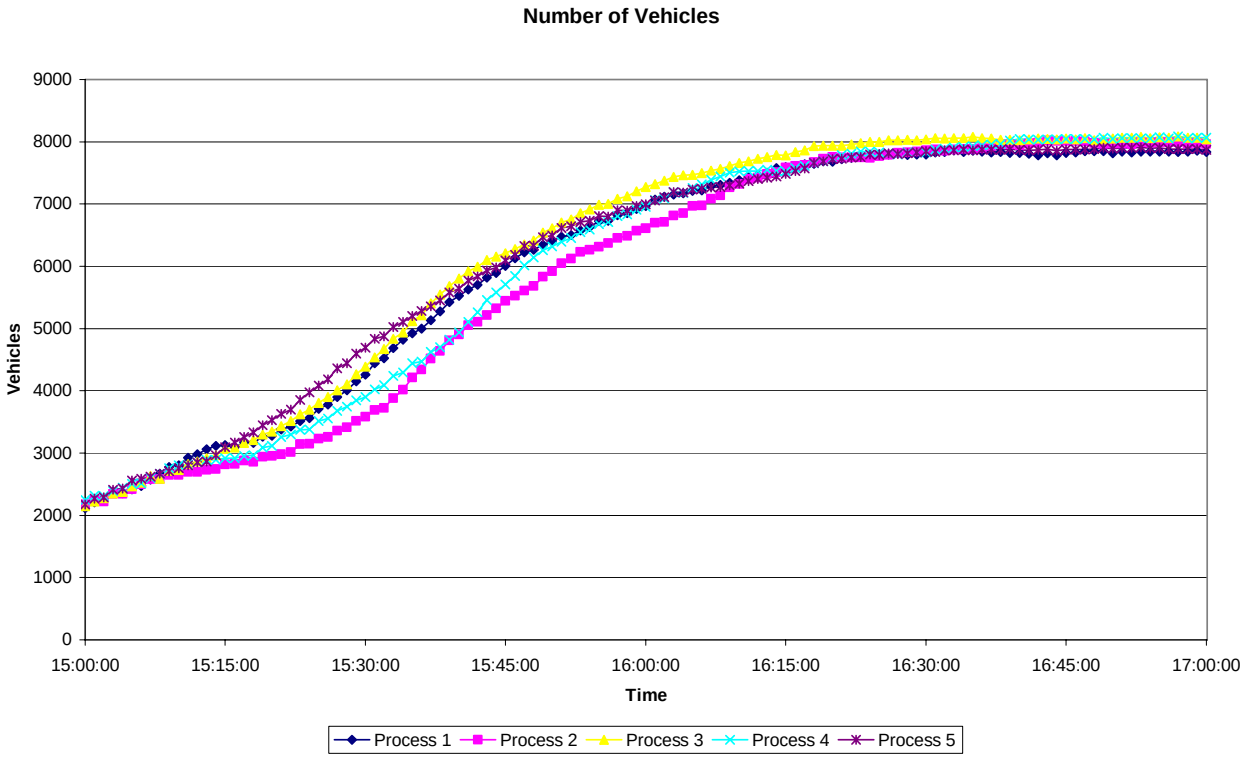
The following tables demonstrate the stability of the micro-simulation models under five random seed number values. The models generally show all five seed values yielding similar results except for the 2021 AM Reference Project, where the increasing level of congestion leading to gridlock is treated differently under different seed values. By the end of the modelled period however, the results have returned to being similar.

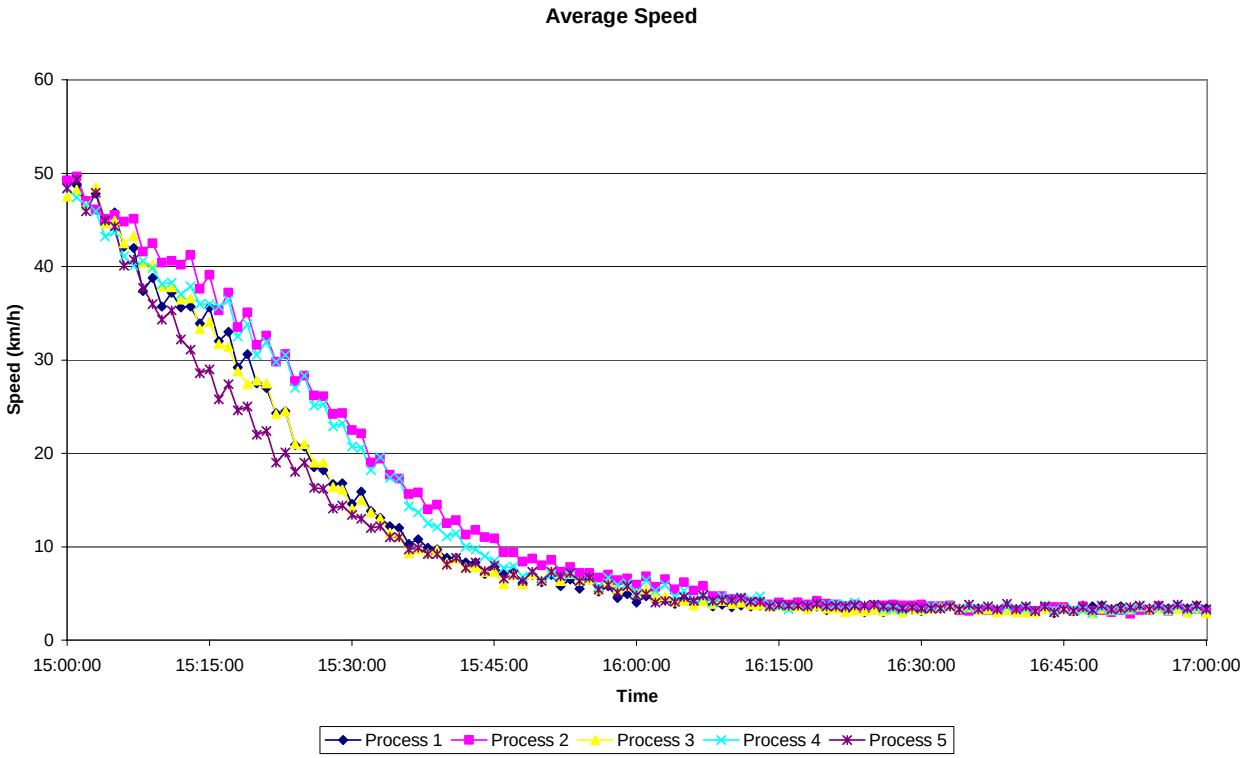
With several seed values yielding the same results, a representative seed value has been used to determine overall network performance.



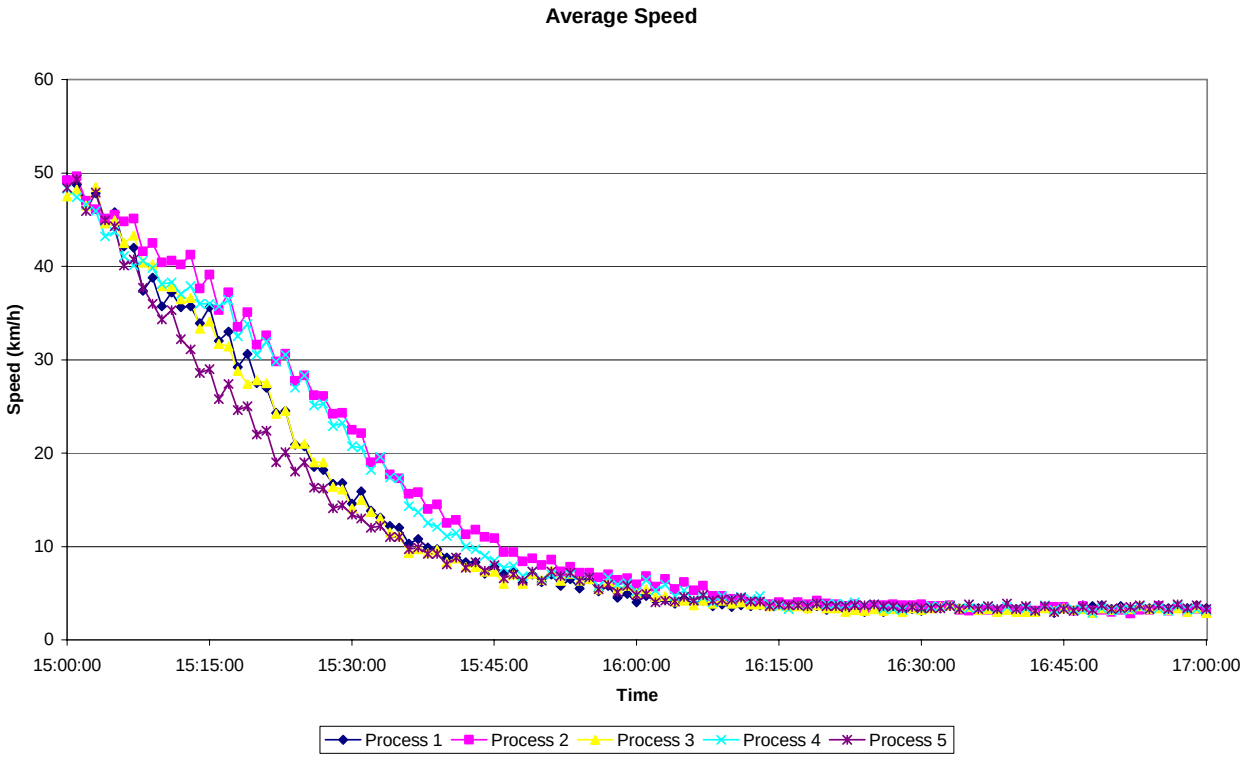


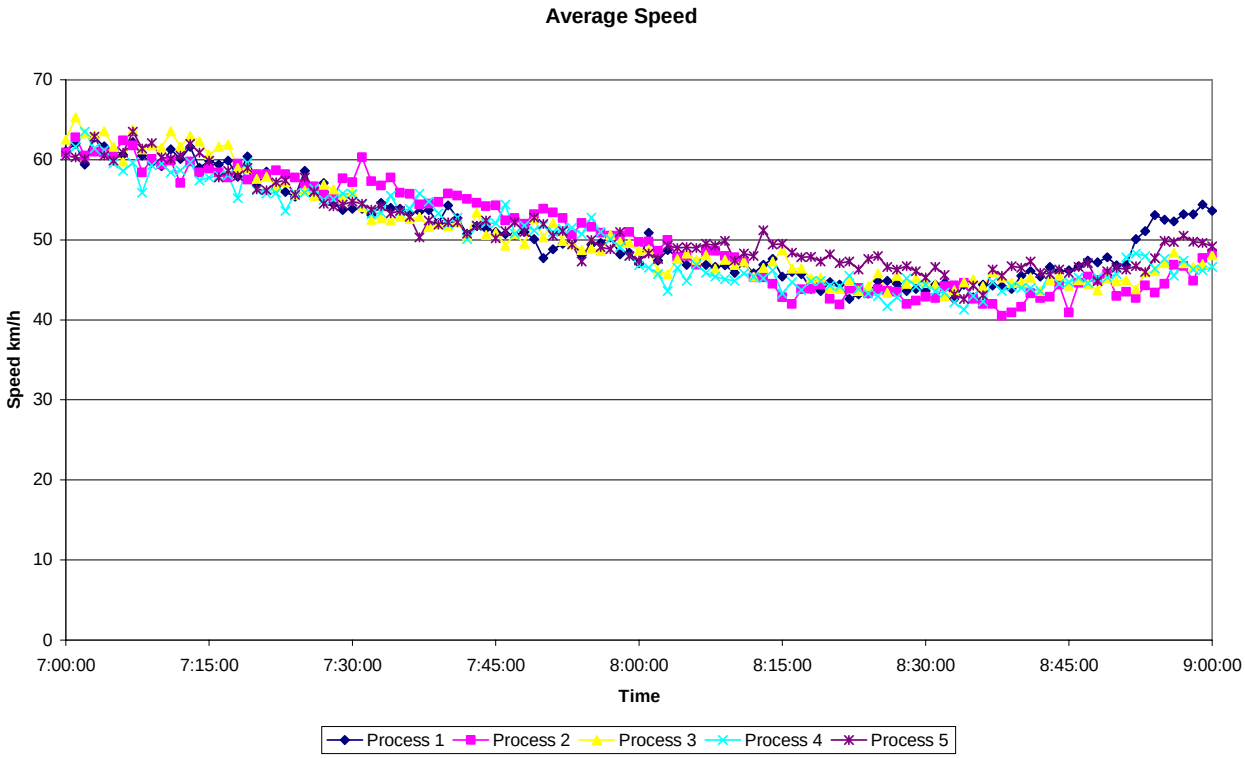
2021 PM Reference Project



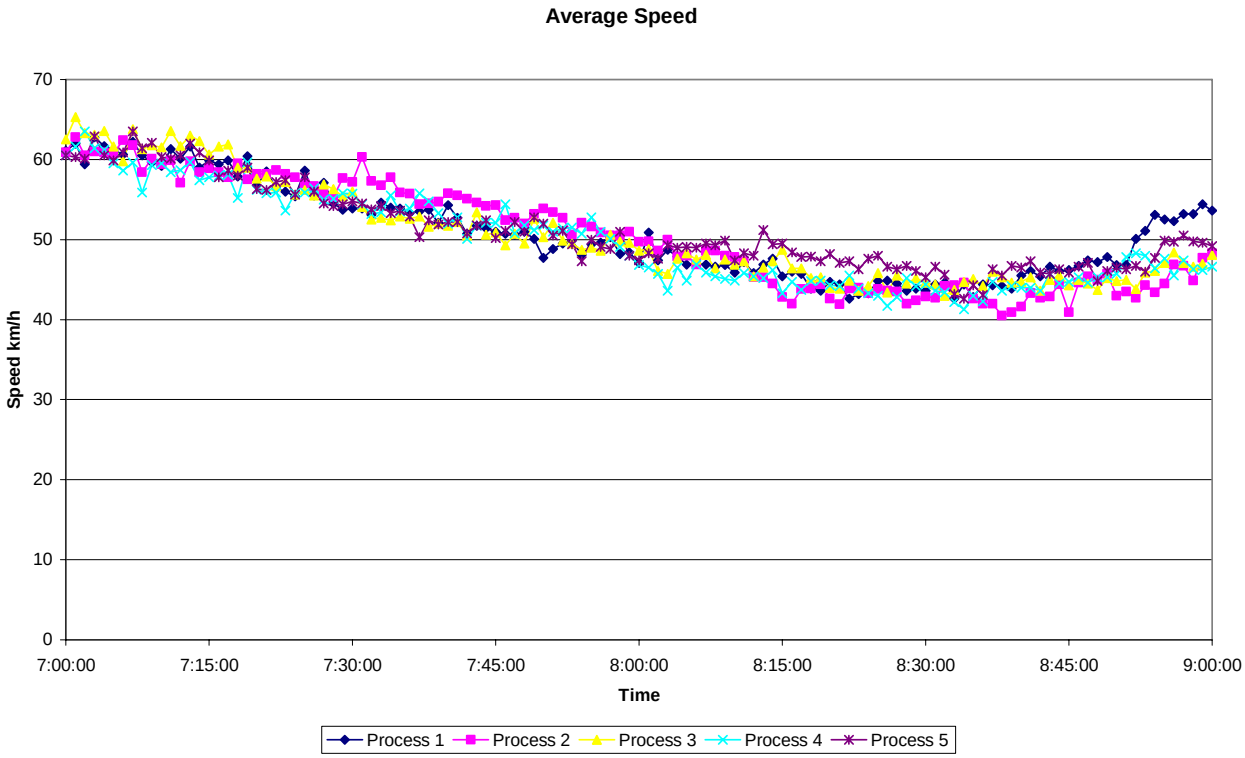


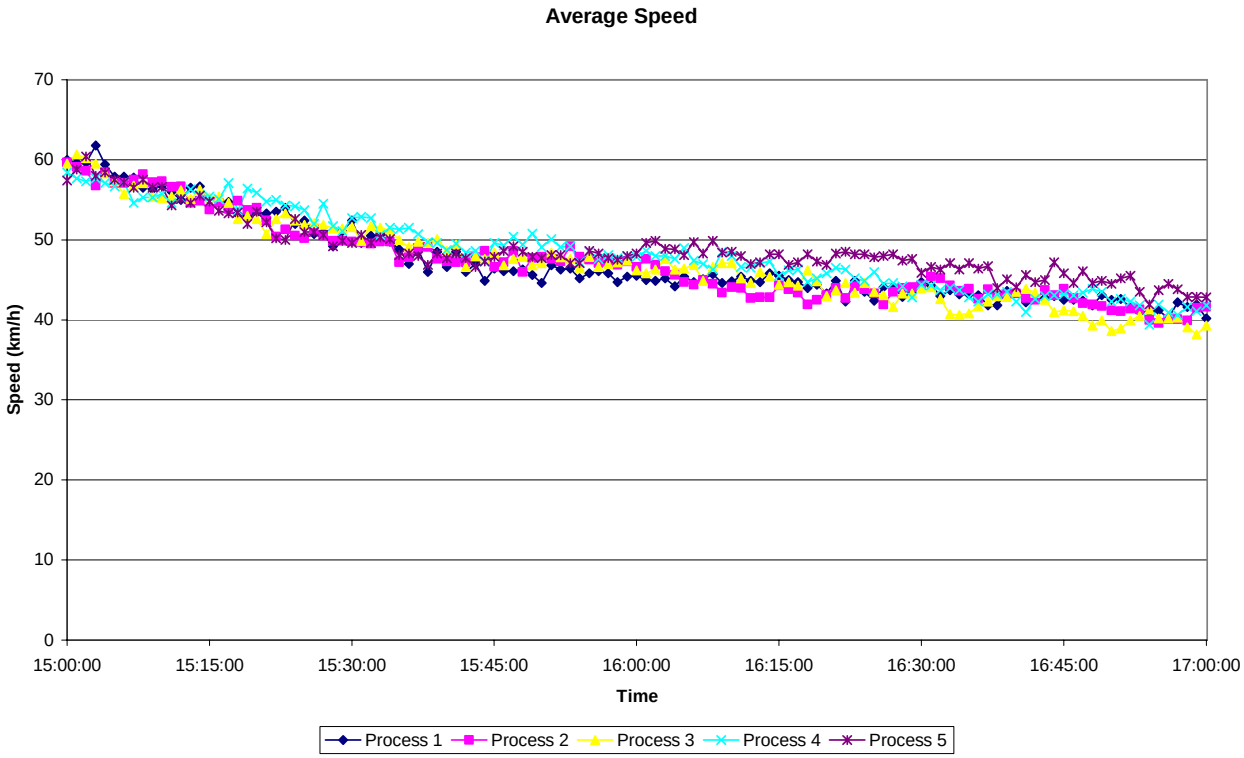
2021 AM Modified Project





2021 PM Modified Project





Appendix D

Flora and Fauna Species Lists

Flora Species List

Botanical Name	Common Name	Form	Status	Nudgee Road On-ramp Extension
Agathis robusta	Kauri Pine	T	LC(Q)	
Acacia disparrima	Hickory Wattle	T	LC(Q)	
Acacia concurrens	Black Wattle	T	LC(Q)	✓
Acacia falcata	Sickle Wattle	T	LC(Q)	
Acacia fimbriata	Fringed Wattle	T	LC(Q)	
Acacia leiocalyx	Black Wattle	T	LC(Q)	
Acacia loroloba		T	LC(Q)	
Acacia maidenii	Maiden's Wattle	T	LC(Q)	
Acacia podalyriifolia	Qld silver wattle	T	LC(Q)	
Aegiceras corniculatum	River Mangrove	T	LC(Q); F	
Alphitonia excelsa	Red Ash	T	LC(Q)	✓
Ageratum houstonianum	Blue Billygoat Weed	H	Intro	
Anagallis arvensis	Scarlet Pimpernel	H	Intro	✓
Araucaria cunninghamii	Hoop Pine	T	LC(Q)	
Aster subulatus	Wild Aster	H	Intro	
Avicennia marina var australasica	Grey Mangrove	T	LC(Q); F	
Baccharis halimifolia	Groundsel Bush	S	Intro; C2	
Bambusa sp	Bamboo	G	Intro	
Bidens pilosa	Cobbler's Pegs	H	Intro	✓
Bolboschoenus caldwellii		Se	LC(Q)	
Brachiaria decumbens	Signal Grass	G	Intro	
Brachiaria mutica	Para Grass	G	Intro	✓
Bromus unioloides	Prairie Grass	G	Intro	✓
Calliandra surinamensis	Pink Tassel-flower	S	Intro	
Callistemon viminalis	Bottle Brush	T	LC(Q)	✓
Casuarina glauca	Swamp Oak	T	LC(Q)	✓
Chloris gayana	Rhodes Grass	G	Intro	✓
Chloris barbata	Purpletop Chloris	G	Intro	✓
Cirsium vulgare	Spear Thistle	H	Intro	✓
Commelina diffusa	Wandering Jew	H	LC(Q)	✓
Conyza bonariensis	Fleabane	H	Intro	✓
Corymbia intermedia	Pink Bloodwood	T	LC(Q)	
Corymbia ptychocarpa	Swamp Bloodwood	T	LC(Q)	✓
Corymbia tesselaris	Moreton Bay Ash	T	C(Q)	
Corymbia torelliana	*Cadaghi	T	C(Q)	
Crotalaria lanceolata		H	Intro	
Cupaniopsis anacardioides	Tuckeroo	T	LC(Q)	✓
Cynodon dactylon	Green Couch	G	Intro	✓
Cyperus polystachyos	Bunchy Sedge	Se	LC(Q)	
Desmodium uncinatum	Silverleaf Desmodium	H	Intro	
Emilia sonchifolia	Emilia	H	Intro	✓
Eragrostis tenuifolia	Elastic Grass	G	Intro	✓
Eucalyptus curtisii	Plunket Mallee	T	R(Q)	
Eucalyptus robusta	Swamp Mahogany	T	LC(Q)	✓
Eucalyptus siderophloia	Grey Ironbark	T	LC(Q)	
Eucalyptus tereticornis	Forest Red Gum	T	LC(Q)	✓
Euphorbia hirta	Asthma Plant	H	Intro	✓

Botanical Name	Common Name	Form	Status	Nudgee Road On-ramp Extension
Euphorbia prostrata		H	Intro	✓
Ficus macrophylla	Moreton Bay Fig	T	LC(Q)	
Ficus rubiginosa	Rock Fig	T	LC(Q)	✓
Fimbristylis dichotoma	Common Fringerush	Se	LC(Q)	
Glycine tabacina	Glycine Pea	V	LC(Q)	
Hypericum gramineum	Small St John's Wort	H	LC(Q)	
Ipomoea cairica	Coast Morning Glory	V	Intro	
Juncus continuus		Se	LC(Q)	
Lantana camara	Lantana	S	Intro (C3)	
Leucaena leucocephala	Leucaena	S	Intro	
Lophostemon confertus	Brush Box	T	LC(Q)	
Ludwigia octovalvis	Willow Primrose	H	LC(Q)	
Macroptilium atropurpureum	Siratro	V	Intro	✓
Macroptilium lathyroides	Phasey Bean	H	Intro	
Megathyrsus maximus	Guinea Grass	G	Intro	✓
Melaleuca bracteata	Black Tea Tree	T	LC(Q)	
Melaleuca leucadendron		T	LC(Q)	✓
Melaleuca linariifolia	Flaxleaf Paperbark	T	LC(Q)	✓
Melaleuca quinquenervia	Paperbarked Tea Tree	T	LC(Q)	✓
Mimosa pudica	Common Sensitive Plant	H	Intro	
Neonotonia wightii		V	Intro	
Opuntia sp.	Prickly Pear	S	Intro; C2	
Parsonsia straminea	Monkey Rope Vine	V	LC(Q)	
Persicaria sp		H	LC(Q)	✓
Pinus eliottii	Slash pine	T	Intro	✓
Plantago lanceolata	Plantain	H	Intro	✓
Ricinus communis	Castor Oil Bush	S	Intro	✓
Rumex brownii	Swamp Dock	H	LC(Q)	✓
Schinus terebinthifolia	Broadleaf Pepper Tree	T	Intro C3	
Senna pendula	Easter Cassia	S	Intro	
Sida cordifolia	Flannel weed	H	LC(Q)	
Sida rhombifolia	Common Sida	H	LC(Q)	
Solanum americanum	Glossy Nightshade	H	Intro	✓
Solanum mauritianum	Wild Tobacco Tree	S	Intro	✓
Sonchus oleraceus	Common Sow Thistle	H	Intro	✓
Sorgum halapense	Johnson Grass	G	Intro	✓
Sphagneticola trilobata	Singapore Daisy	H	LC(Q)	
Stenotaphrum secundatum	Buffalo Grass	G	Intro	
Tagetes minuta	Stinking Roger	H	Intro	✓
Tetragonia tetragonoides	Warrigal Greens	H	LC(Q); F	
Tipuana tipu	Pride of Bolivia	T	Intro	✓
Typha sp	Cumbungi	Se	LC(Q)	✓
Verbena litoralis	Verbena	H	Intro	

Table Notes:

* This species is native to Queensland but considered weed in south-east Queensland

Scientific name:

(NF) = uncertain identification due to non-fertile material

Form:

T	= tree	H	= herb
P	= palm	AQH	= aquatic herb
S	= shrub	V	= vine
F	= fern	TO	=terrestrial orchid
G	= grass	GE	= a non- local native plant which is a garden escapee
Se	= sedge		

Status:

E	= Endangered	(Q)	= *Nature Conservation (Wildlife) Regulation 1994* of the *Nature Conservation Act 1992* (Queensland Government)
V	= Vulnerable		
R	= Rare	(A)	= *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia)
LC	= Least concern		
CV	= Cultivated Variety	Intro	= introduced species
NA = Not applicable - not a Queensland endemic		F	= subject to the *Fisheries Act 1994*
N = Not native to Qld		BCC 1	= species whose distribution is poorly known within Brisbane City
		BCC 2	= species that have restricted distribution within Brisbane City

Categories of Declared plants under the *Land Protection (Pest and Stock Route Management) Act 2002* and listed in the *Land Protection (Pest and Stock Route Management) Regulation 2003.*

C1 = Class 1 Pest Plants
C2 = Class 2 Pest Plants
C3 = Class 3 Pest Plants

A landowner must take reasonable steps to keep the following land free of class 1 and class 2 pests, unless the owner holds a declared pest permit allowing the pests to be kept on the land.

a) the owner's land;
b) unfenced land comprising part of a road or stock route that adjoins or is within the owner's land;
c) other land that is fenced within the owner's land;
d) the bed, banks and water of a watercourse on the owner's land;
e) the bed, banks and water to the centre-line of a watercourse forming a boundary, or part of a boundary, of the owners land.

A person must not, without reasonable excuse, introduce a declared pest other than under a declared pest permit.

Fauna Species List

Species Name	Common Name	Status	Nudgee Road On-ramp Extension
Mammals			
Isoodon macrourus	Northern Brown Bandicoot	LC(Q)	
Lepus capensis	Brown Hare	Intro	
Trichosurus vulpecula	Common Brushtail Possum	LC(Q)	✓
Birds			
Cacatua galerita	Sulphur-crested Cockatoo	LC(Q)	✓
Chenonetta jubata	Australian Wood Duck	LC(Q)	✓
Cisticola exilis	Golden-headed Cisticola	LC(Q)	
Coracina novaehollandiae	Black-faced Cuckoo Shrike	LC(Q)	
Gallinula tenebrosa	Dusky Moorhen	LC(Q)	✓
Geophaps lophotes	Crested Pigeon	LC(Q)	
Hirundo neoxena	Welcome Swallow	LC(Q)	✓
Lichmera indistincta	Brown Honeyeater	LC(Q)	
Malurus melanocephala	Red-backed Fairy-wren	LC(Q)	
Manorina melanocephala	Noisy Miner	LC(Q)	
Megalurus timoriensis	Tawny Grassbird	LC(Q)	
Pardalotus striatus	Striated Pardalote	LC(Q)	✓
Threskiornis molucca	Australian White Ibis	LC(Q)	
Todiramphus sancta	Sacred Kingfisher	LC(Q)	
Amphibians			
Bufo marinus	Cane Toad	Intro	

Table Notes:

Status:
E = Endangered
V = Vulnerable
R = Rare
LC = Least Concern
(Q) = *Nature Conservation (Wildlife) Regulation 1994* of the *Nature Conservation Act 1992* (Queensland Government)
(A) = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia)
Intro = introduced species
F = subject to the *Fisheries Act 1994*