3. Project Description

Return to Contents Page

3. Project Description

This section describes the Gateway Upgrade Project.

3.1 Description of GUP

TOR Requirement:
The objective of this section is to describe the project through its lifetime. This information is required to allow assessment of all aspects of the life of the Project including all phases of the Project from planning, construction, decommissioning of the construction site and long-term operation. A detailed description of the GUP is to be provided including:

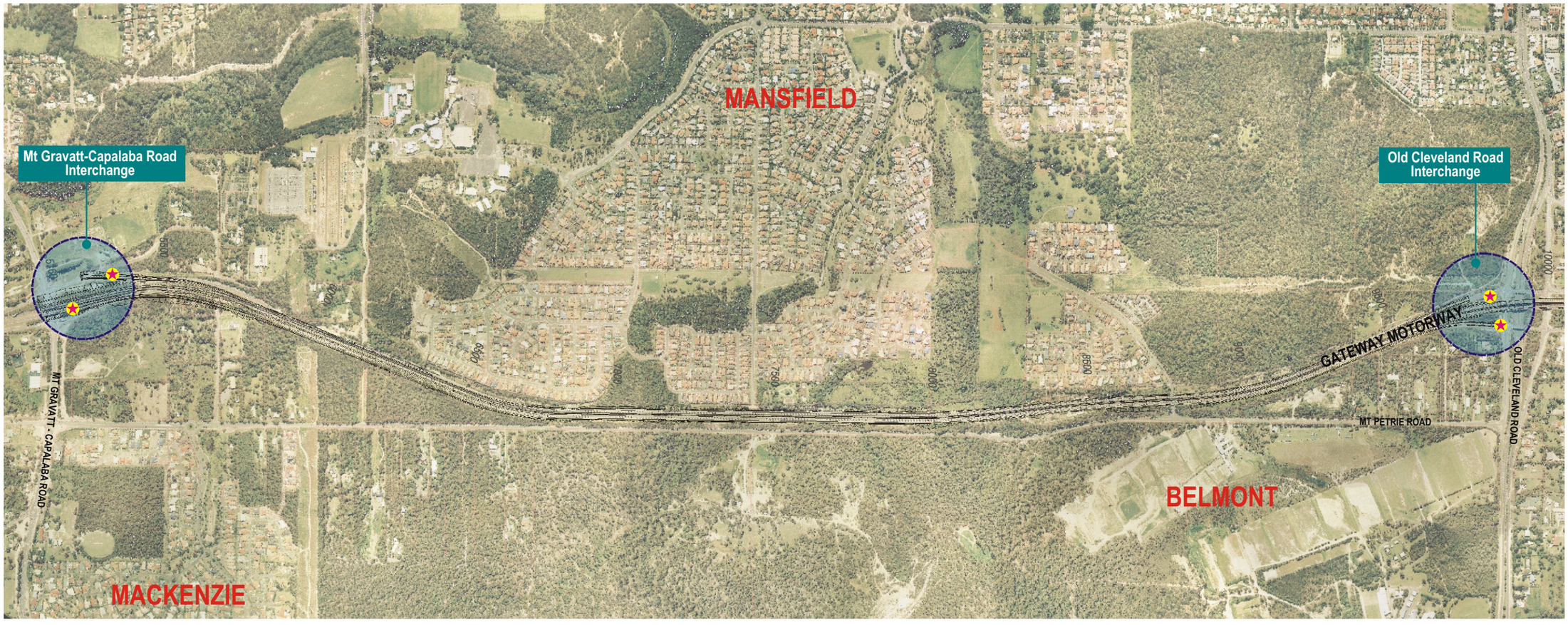
- a predictive program of activities relating to design, commissioning of contractors, construction period and operational activities. The description should also state the design life and the expected operating life of the Project;
- the preferred motorway alignment, with the aid of maps and diagrams, describing the location of:
  - on and off ramps, intersections and interchanges;
  - sections on embankments and bridged sections;
  - location of toll facilities; and
  - areas within and outside of the existing road reserve.
- design parameters including, horizontal and vertical alignment, representative cross-sections, pavement type and thickness, bridges, embankments, cuttings (if any), predicted traffic volumes/capacity and design life;
- details of the design criteria applied for road and bridges; and
- road reserve widths and access requirements along the alignment including the use of existing areas of disturbance for machinery access and future maintenance.

The physical works of the GUP involve the upgrading of the existing Gateway Motorway corridor between Mt Gravatt-Capalaba Road and Kingsford Smith Drive, including the duplication of the existing Gateway Bridge and construction of a new motorway and interchange through the sites of the old and new Brisbane Airport and across Kedron Brook Floodway to rejoin the existing Motorway just south of Nudgee Road.

The works shown in Figures 3.1a to 3.1d are further described below and are shown in more detail in the reference project concept design drawings contained within Volume 3.

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) Wynnum Road and Lytton Road. To improve river crossing capacity, a new six lane bridge across the Brisbane River to the east (downstream) of the existing Gateway Bridge will be constructed. The introduction of full electronic tolling collection (ETC) facilities for toll collection works at the Gateway Bridge will include the removal of the existing toll plaza from its current position north of Lytton Road.

To improve the alignment of the Gateway Motorway north of the river and to provide additional access to the Brisbane Airport, a new four lane Motorway "deviation" will be constructed. This deviation will run from the northern end of the Gateway Bridge/s (near Lavarack Avenue) through the old and new Brisbane Airport sites, across Kedron Brook Floodway to reconnect with the existing Gateway Motorway just to the south of Nudgee Road. Interchange connections at each end, called the Southern and Northern Bifurcations, will be required to provide for movements to and from the existing Gateway Motorway carriageways.



KEY

- Construction Access Locations
- Permanent Maintenance Access Locations (Excluding Interchanges)
- Permanent Maintenance Access Tracks

L:\graphics\jobs\379229\NY\fHGeneral Development Layout\ A June 2004

Queensland Government Department of Main Roads

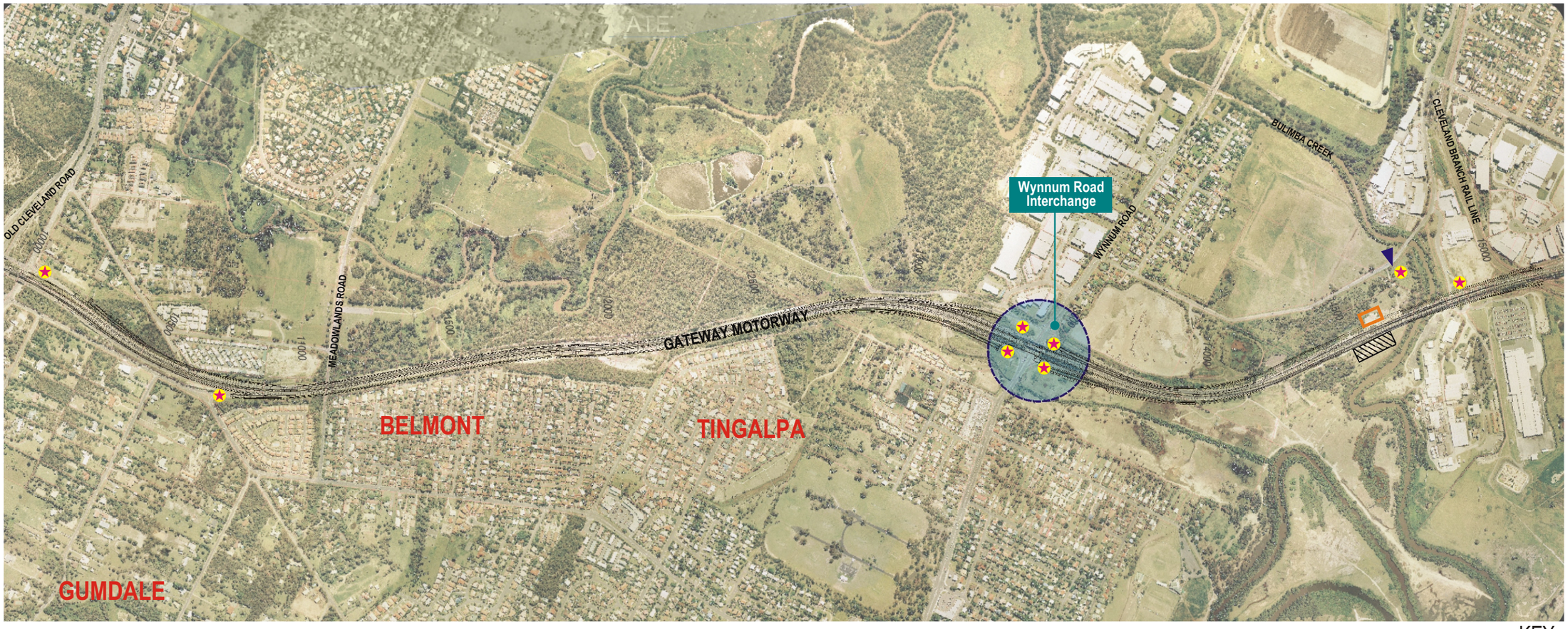
Australian Government Department of Transport and Regional Services

Connell Wagner

0 250 500m

SCALE

FIGURE 3.1a
General Project Layout
Mt Gravatt - Capalaba Road to Old Cleveland Road



KEY

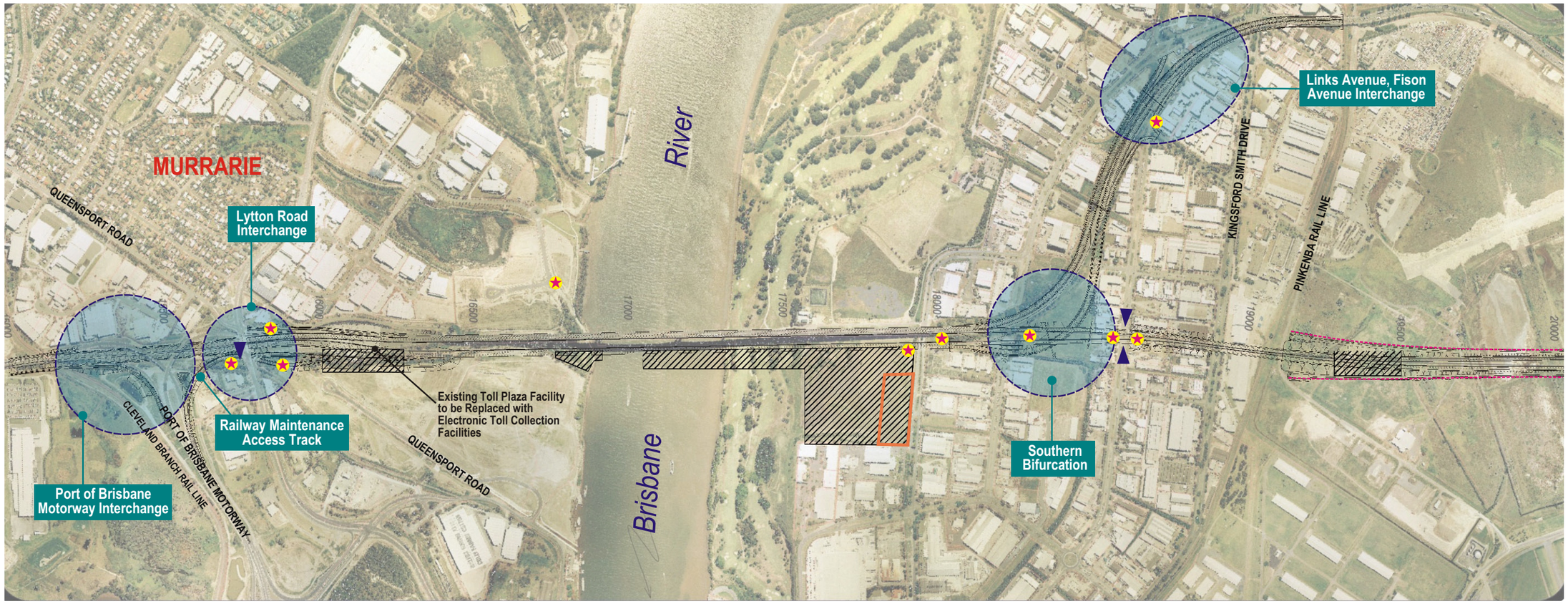
- Construction Access Locations
- Permanent Maintenance Access Locations (Excluding Interchanges)
- Possible Construction Laydown Areas / Casting Yards
- Permanent Maintenance Access Tracks
- Potential Acid Sulphate Soil Treatment Area

0 250 500m
SCALE

Queensland Government Department of Main Roads
Australian Government Department of Transport and Regional Services
Connell Wagner

FIGURE 3.1b
General Project Layout
Old Cleveland Road to Cleveland Branch Rail Line

L:\graphics\jobs\379229\NY\General Development Project Layout. June 2004



KEY

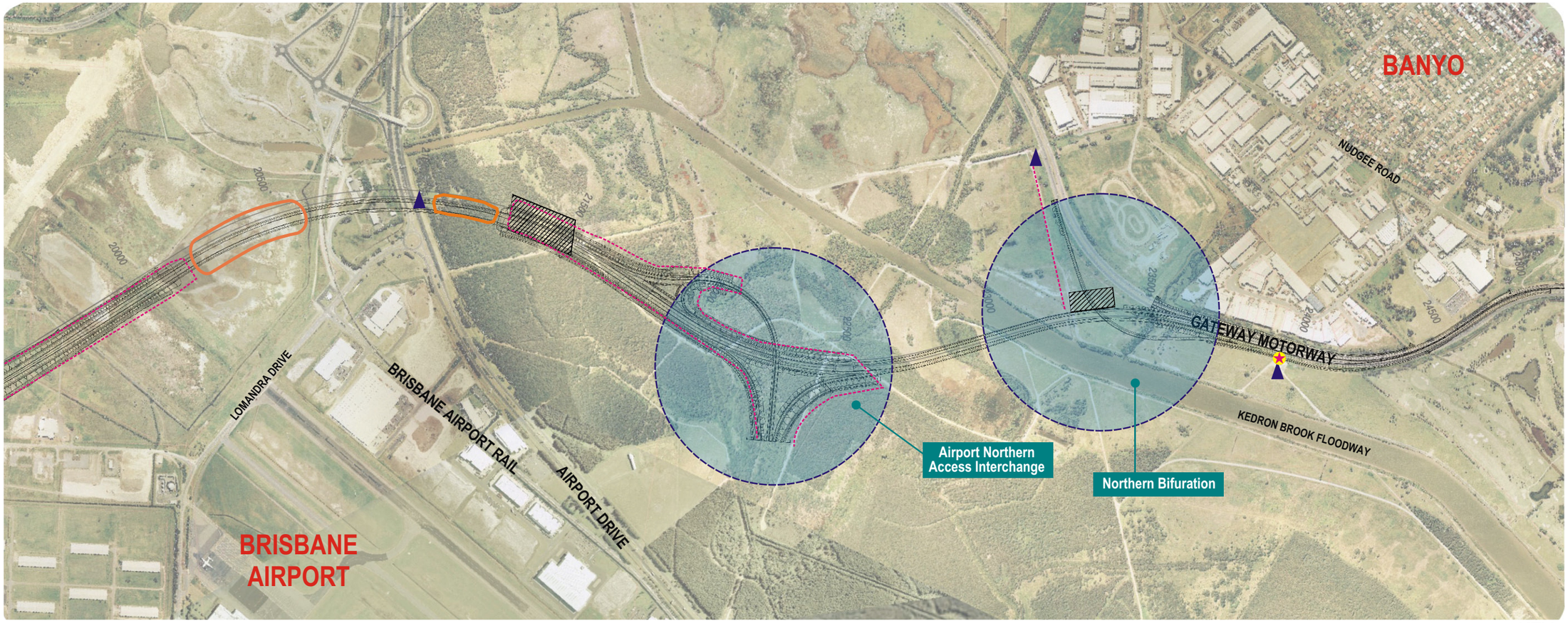
- Construction Access Locations
- Permanent Maintenance Access Locations (Excluding Interchanges)
- Possible Construction Laydown Areas / Casting Yards
- Permanent Maintenance Access Tracks
- Potential Acid Sulphate Soil Treatment Area

0 250 500m
SCALE

Queensland Government Department of Main Roads
Australian Government Department of Transport and Regional Services
Connell Wagner

FIGURE 3.1c
General Project Layout
Cleveland Branch Rail Line to Pinkenba Rail Line

L:\graphics\jobs\37922\NY\ General Development Project Layout C June 2004



KEY

- Construction Access Locations
- Permanent Maintenance Access Locations (Excluding Interchanges)
- Possible Construction Laydown Areas / Casting Yards
- Permanent Maintenance Access Tracks
- Potential Acid Sulphate Soil Treatment Area

Queensland Government Department of Main Roads

Australian Government Department of Transport and Regional Services

Connell Wagner

0 250 500m

SCALE

FIGURE 3.1d
General Project Layout
Airport Drive to Nudgee Road

L:\graphics\jobs\37922\1NY\ General Development Project Layout D June 2004

A new interchange to provide a northern access to the Brisbane Airport will be constructed, just to the south of the proposed Kedron Brook Floodway crossing and north of Airport Drive.

Modifications and improvements to existing on and off ramps will also be undertaken as part of the works.

3.2 Major Features of the GUP

The major physical features of the proposed GUP are discussed below. The works are shown in more detail in the reference project concept design drawings contained within Volume 3.

3.2.1 Mt Gravatt – Capalaba Road to Cleveland Branch Rail Line

- Widening of the existing Motorway between Mt Gravatt-Capalaba Road and Wynnum Road to six lanes;
- Widening of the existing Motorway between Wynnum Road and Lytton Road to eight lanes;
- Provision of a 3m outside shoulder for the full extent of the motorway, except at bridges, for the north and southbound carriageway;
- Widening of the Motorway will generally be within the existing median and will include the introduction of a central median barrier for the full extent of the Motorway;
- Provision of additional emergency breakdown bays;
- Improving the alignment of the Motorway north of Mt Gravatt-Capalaba Road at Chainage (CH) 5200-6400 (refer to drawings in Volume 3) on both carriageways to provide higher standard;
- Removal of the existing "truck stop" bay areas on south and northbound carriageways at CH11800-12200;
- Widening or modifications to existing bridges at:
  - Greendale Way;
  - Old Cleveland Road and adjacent service road;
  - Wynnum Road; and
  - Bulimba Creek to form the northbound carriageway.
- New bridges/structures:
  - Over the western and eastern end of the existing Minimum Energy Loss (MEL) culvert at CH13100 top to allow for the relocated Motorway ramps;
  - Over the eastern end of the existing MEL culvert at CH14260 to provide for the southbound carriageway; and
  - At Bulimba Creek to form the southbound carriageway.
- Possible extension of the existing pedestrian underpass at CH11500;
- Hydraulic mitigation measures for Bulimba Creek;
- Retaining structures in cut or fill situations to contain the new works within the existing corridor; and
- Services relocations along corridor where affected by the works.

3.2.2 Cleveland Branch Rail Line to Pinkenba Rail Line

- Duplication of the Gateway Bridge;
- Removal of the existing toll plaza and all existing administration buildings adjacent to the toll plaza;
- Widening of the existing Motorway between Wynnum Road and Lytton Road to eight lanes;
- Provision of a 3m outside shoulder for the full extent of the Motorway, except at bridges, for the north and southbound carriageway;

- Widening of the Motorway will include the introduction of a central median barrier for the full extent of the Motorway;
- Provision of emergency breakdown bays;
- Provision of a southbound off ramp from the Gateway Motorway to the Port of Brisbane Motorway under Lytton Road;
- Realignment of the existing northbound on ramp from Lytton Road to the Gateway Motorway;
- Widening or modifications to existing bridges:
  - Removal of the existing spill-through abutment to the Lytton Road bridge over the Motorway.
- New bridges:
  - Over the Cleveland Branch Rail Line to form the southbound carriageway;
  - Over the Incitec Rail Line for the southbound on ramp from the Port of Brisbane Motorway;
  - Over the Incitec Rail Line for the southbound off ramp to the Port of Brisbane Motorway; and
  - At Lytton Road to allow the southbound off ramp to the Port of Brisbane Motorway to pass under Lytton Road.
- Realignment of the existing southbound on ramp from the Port of Brisbane Motorway to align with the new southbound carriageway;
- Relocation of Incitec rail line and its turnout connection at the Cleveland Branch Rail Line;
- Retaining structures in cut or fill situations to contain the new works within the existing corridor;
- Provision of a shared pedestrian/bicycle pathway (if approved) between Lytton Road, across the Gateway Bridge to Kingsford Smith Drive including connections to Administration Drive, the existing pathway adjacent to Queensport Road and to Lavarack Avenue;
- Provision of a 6 lane motorway deviation for the Gateway Motorway between Lavarack Avenue and the Pinkenba Rail Line;
- Bifurcation of the Gateway Motorway at the northern abutment of the Gateway Bridge, including underpasses for the (realigned) southbound carriageway of the existing Gateway Motorway;
- Provision of ETC facilities for the collection of the toll for crossing the bridges. Exact positions of the necessary infrastructure is yet to be determined and could be located in this section;
- New bridges are required at the following locations:
  - The duplicate bridge across the Brisbane River;
  - Over the realigned southbound carriageway of the existing Gateway Motorway and Lavarack Avenue at the southern bifurcation;
  - Over Kingsford Smith Drive, the existing G James Glass site, the Pinkenba Rail line and Terminal Drive; and
  - Widening of the existing bridge over Kingsford Smith Drive.
- Services relocations along corridor where affected by the works.

3.2.3 Existing Gateway Motorway – Bridge to Kingsford Smith Drive

Works along the corridor of the existing Gateway Motorway between the Gateway Bridge and Kingsford Smith Drive are required. These include:

- Provision of ETC facilities for the collection of the toll for crossing the bridges. Exact positions of the necessary infrastructure is yet to be determined and could be located in this section;
- Realignment and widening of the southbound carriageway;
- Realignment and widening of the northbound carriageway;
- Realignment of the Fison Avenue off ramp;
- Realignment of the Links Avenue on ramp;
- Closure of the access to the southbound on ramp to the Gateway Motorway from Cullen Avenue;
- Widening of the existing bridge over Kingsford Smith Drive;
- Realignment of the intersection of Bunya Street and Kingsford Smith Drive;
- Retaining structures in cut or fill situations to contain the new works;
- Modifications to the existing drain between Lavarack Avenue and Curtin Avenue;
- Modifications to the existing drain between Cullen Avenue and Fison Avenue; and
- Services relocations along corridor and on the local road network where affected by the works.

3.2.4 Pinkenba Rail Line to Nudgee Road

- Provision of a 4/6 lane motorway deviation for the Gateway Motorway (between Pinkenba Rail Line to the south of Nudgee Road) through the old and new Brisbane airport sites, over Airport Drive and across Kedron Brook Floodway;
- Provision of ETC facilities for the collection of the toll for crossing the bridges. Exact positions of the necessary infrastructure is yet to be determined and could be located in this section;
- Provision of an interchange (just south of Kedron Brook Floodway) on the deviation to access the Brisbane Airport;
- Widening of the existing Gateway Motorway to the south of Nudgee Road to accommodate the lane merge/diverges associated with the Northern Bifurcation of the Motorway;
- New bridges are required at the following locations:
  - Over the realigned southbound carriageway of the existing Gateway Motorway and Lavarack Avenue at the southern bifurcation;
  - A bridge passing over Kingsford Smith Drive, the existing G James site, the Pinkenba Rail line and Terminal Drive;
  - A bridge for the northbound and southbound carriageway passing over the Brisbane Airport Rail Line and Airport Drive;
  - A bridge for the northbound access into the Brisbane Airport at the new interchange passing over both the north and southbound carriageways;
  - A bridge for the northbound and southbound carriageway passing over Kedron Brook Floodway; and
  - A new bridge for the southbound traffic on the existing Gateway Motorway to pass over the deviation just to north of Kedron Brook Floodway.
- Retaining structures in cut or fill situations to contain the new works; and
- Services relocations along corridor and on the local road network where affected by the works.

3.3 Project Program

The current GUP program is shown in Figure 3.2. However, this program is subject to changes following the outcomes of the final Business Case.

The key features of the program are:

- Finalisation of the EIS process in early 2005;
- Completion of the Business Case by the end of August 2004;
- Procurement of a contractor/s to deliver the works; and
- Design and construction; and
- Commissioning of the project.

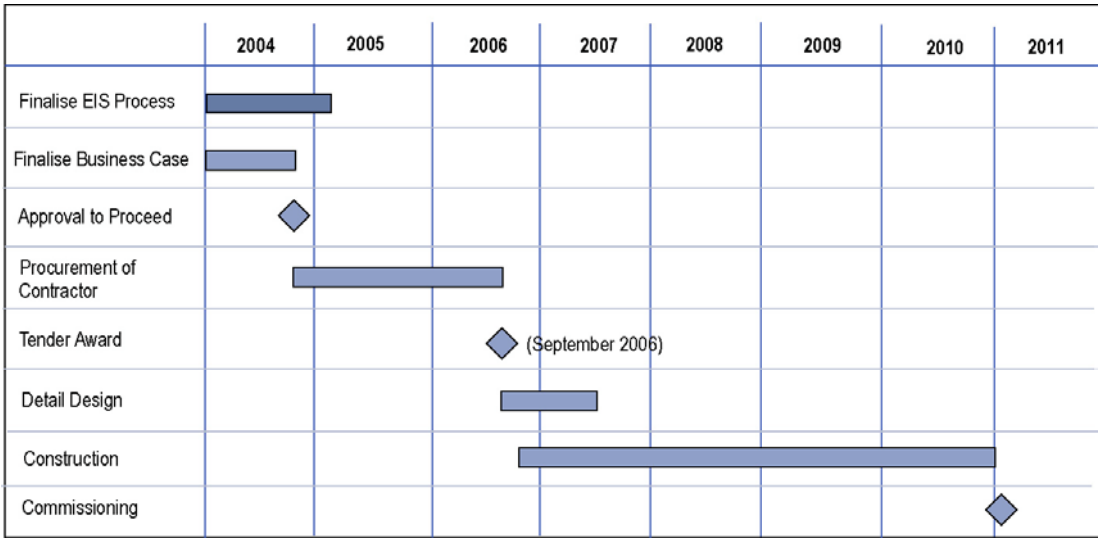


Figure 3.2 Project Program

3.3.1 Project Delivery

The development of the Business Case for the GUP is currently proceeding. The potential for the project to be delivered through a Private Public Partnership (PPP) process is being explored within the Business Case as part of the value for money assessment. The PPP process is a mechanism to provide public infrastructure through appropriate risk sharing between public and private sector parties. The purpose of the PPP Business Case development stage is to:

- Identify the project delivery options most likely to provide the best value for money outcome;
- Provide information regarding the available project delivery options, sufficient to enable Government to determine the preferred project delivery option; and
- Make commitments regarding funding of the potential project.

3.3.2 GUP Design Life

The design life for physical works elements for the GUP will be a minimum of 20 years, except for the elements below.

Physical Work Element	Design Life
Duplicate Gateway Bridge	300 years
Other Bridges, Retaining Walls and Reinforced Soil Structures	100 years
Underground Drainage Structures	100 years
Pavements	40 years
Temporary Works	2 years

Final design lives for the various elements within the GUP will be specified within the GUP Output Specification. The minimum design life specifically relates to the "hard" infrastructure and not to traffic or operational capacity design life.

3.3.3 Operational Life

The Gateway Motorway corridor will remain as an operating transport corridor indefinitely.

3.4 Preferred GUP Motorway Alignment

The preferred alignment for the GUP is as shown in Figures 3.1a to 3.1d and is shown in more detail in the reference project concept design drawings contained within Volume 3.

3.4.1 Interchanges

Existing interchanges with the Gateway Motorway at the following locations will be maintained with minimal modifications except as noted in Section 3.2:

- Mt Gravatt-Capalaba Road;
- Old Cleveland Road;
- Wynnum Road;
- Port of Brisbane Motorway;
- Lytton Road; and
- Fison Avenue/Cullen Avenue/Kingsford Smith Drive.

New Motorway interchanges and associated ramps will be provided at the following locations:

- At the "Southern Bifurcation" (CH18400) of the existing Gateway Motorway and the proposed Motorway deviation;
- For a new northern access to the Brisbane Airport (CH22100); and
- At the "Northern Bifurcation" (CH23400) of the existing Gateway Motorway and the proposed Motorway deviation.

3.4.2 On and Off Ramps

Existing on and off ramps along the GUP will be modified as required as a result of the widening or realignment of the existing Motorway.

The existing southbound on ramp from Cullen Avenue will be closed. Access to the Motorway in a southbound direction will be provided via the existing ramp at Links Avenue.

New ramps will be provided at the following locations:

- Southbound to eastbound ramp from the Gateway Motorway to the Port of Brisbane Motorway;
- Southbound to eastbound ramp to the future access road to the Brisbane Airport;
- Northbound to eastbound ramp to the future access road to the Brisbane Airport;
- Westbound to northbound from the future access road from the Brisbane Airport; and
- Westbound to southbound from the future access road from the Brisbane Airport.

3.4.3 Embankments

New embankments are required for the GUP in the following locations:

- Where the existing Motorway is widened on the outside of existing Motorway embankments;
- At the southern and northern approaches to the new bridge over Bulimba Creek
- For the new southbound to eastbound ramp from the Gateway Motorway to the Port of Brisbane Motorway;
- At the southern and northern approach to the new Gateway Bridge;
- For the widening of the existing Kingsford Smith Drive bridge on the northern and southern approaches;
- Between Lavarack Avenue and Kingsford Smith Drive for the new deviation;
- Between the Pinkenba Rail line and the proposed bridge over Airport Drive;
- For the proposed Northern Access Interchange for the Brisbane Airport and approach embankments to bridges; and
- Where the existing Gateway Motorway is widened to accommodate the Northern Bifurcation between CH23550 – 24550.

Significant settlements are expected under the embankments within the northern extent of the GUP. Ground improvement techniques such as the following will be used during the design and construction of the embankments:

- Preloading with surcharge materials for pre-determined times;
- Use of piled raft supports for the embankments;
- Use of wick drains to expedite settlements; and
- The use of lightweight fills within the embankment materials.

3.4.4 Toll Facilities

It is proposed to replace the existing manual and automatic toll plaza, currently located immediately to the north of Lytton Road with a high speed, automatic ETC system. The ETC system will contain no toll booths, coin baskets or boom gates. The existing toll plaza and adjacent administration building to the north of Lytton Road will be removed. All regular users of the Gateway Bridges will be encouraged to use vehicle-mounted tags, called “E-tags”, electronically linked to toll accounts. Casual users without E-tag facilities will be catered for by the introduction of day passes, sold either via internet, telephone or vending type machines. The need for off-motorway cash payment facilities (ie automatic system with no change given) is also being considered. The products, systems and processes for casual users will be further refined during future stages of the project.

Exact positions of the necessary infrastructure is yet to be determined, but is likely to be located in the area to the north of the Bridges. As a tagged vehicle passes the tollpoint, the E-tag will be detected by a scanner on an overhead gantry and the toll automatically deducted from the user's account.

The tolling system will be designed to operate at motorway speeds, eliminating the need for slowing down or stopping, and helping to create free-flow traffic conditions, even during peak periods. The main benefits will be a reduction in congestion associated with the toll plaza, improved safety and a reduction in travel times.

The ETC system will require overhead gantries to accommodate the hardware complying with European Committee for Standardisation (Comité Européen de Normalisation - CEN) Standards for Direct Short Range Communication Systems (DSRC), vehicle detection and classification hardware and for communication with the in-vehicle E-tag systems. CEN compliant ETC hardware will be used to ensure system interoperability between toll collection systems throughout Australia (eg Sydney Harbour Tunnel, Melbourne's City Link project etc).

3.5 Design Parameters

3.5.1 Horizontal and Vertical Alignment

The horizontal and vertical alignment of the GUP works is shown within the concept design drawings contained in Volume 3.

Design parameters for the vertical and horizontal alignment of the GUP will typically be consistent with the MR "*Road Planning and Design Manual (RPDM)".*

Where appropriate, particularly between Mt Gravatt – Capalaba Road and Lytton Road, the design parameters within the RPDM have been reviewed using Main Road's "*Fitness for Purpose and Extended Design Domain (EDD*)" principles to provide optimum road infrastructure within engineering, financial and economic constraints. A report detailing the analysis of the Gateway Motorway between Mt Gravatt-Capalaba Road and Lytton Road following the EDD principles is included in Appendix C. The recommendations within this report have been accepted by MR and incorporated into the alignment of the reference project concept design shown on the drawings in Volume 3.

3.5.2 Design Speed

The minimum design speeds to be adopted for the project are shown below.

Design Element	Minimum Design Speeds
Existing Gateway Motorway upgrade	100km/h*
Gateway Bridge	80km/h at crest (to match existing bridge crest curve) 100 km/h at sag curves at each end
Gateway Motorway – Northern Deviation (including ETC facilities)	110km/h
Gateway Motorway – Bridge to Kingsford Smith Drive (including ETC facilities)	80 km/h
Southern Bifurcation horizontal curves (northbound and southbound)	80 km/h

Design Element	Minimum Design Speeds
Southbound Ramp to Port of Brisbane Motorway	80km/h
Northern Bifurcation Ramp (southbound) to existing Gateway Motorway	80km/h
Motorway on/off ramps	minimum 100km/h taper design speed at merge or diverge point
Other Roads	Highest standard achievable within road reserve.

Table Notes:
* Some design parameters for 100km/h are subject to EDD Principles

The actual posted speed for the Gateway Motorway may differ to the design speed as required by specific localised safety requirements.

3.5.3 Typical Cross Section

The typical cross sections to be used throughout the reference project are shown in the engineering drawings provided in Volume 3.

Dimensions for road elements not shown in the Typical Cross Sections such as lanes, shoulders, on/off ramps, verges and footpaths as required will be consistent with the relevant MR or BCC standards (for local roads).

3.5.4 Right of Way

The project requires the acquisition of land from both public and private ownership. Wherever possible, requirements have been limited by minimising the property requirements of the facility including the adoption of EDD principles within the design consistent with the functional requirements of the project.

Features of the project have been intentionally developed to minimise the extent of land required for the project. Typical examples include:

- minimising the number of traffic lanes required whilst maintaining the required level of service for the Motorway;
- widening of the carriageway in the southern sections of the project within the existing median;
- retaining walls, in cut or fill embankments, to minimise overall carriageway embankment width requirements; and
- adoption of a rigid concrete barrier in lieu of a wider landscaped median.

3.5.5 Pavements

Heavy duty flexible pavements are proposed to be used on the Motorway and associated ramps throughout the GUP. Where possible, existing pavements particularly between Mt Gravatt – Capalaba Road and Lytton Road will be strengthened as necessary with a structural overlay to provide the necessary pavement life, to minimise impacts on traffic during construction and to provide an economical solution.

Significant settlements are expected under earthworks embankments in the northern extent of the project, which will preclude the use of rigid pavements. Pavements will be designed to MR and Austroads standards and practices. A low noise pavement wearing course is proposed on the Motorway to reduce noise impacts on the surrounding community.

Final pavement design and materials may vary depending on construction efficiency and whole of life maintenance performance. A minimum overall design life of 40 years is proposed. The low noise pavement wearing course may require reconstruction during the life of the pavement to maintain water runoff and noise characteristics. Shoulder surfacing and other road surfaces may be conventional dense graded asphalt.

Where existing pavements become redundant consideration will be given to reusing the pavement and embankment materials within the new works to minimise material waste from the project.

3.5.6 Structures

Bridges

All new bridgeworks within the project will be designed and constructed in accordance with the Australian Standard AS5100: 2004 *Bridge Design* and all published amendments.

The design of all new bridge structures, or where existing bridges are modified, and associated elements will incorporate acceptable urban design features as appropriate to enhance their visual impact.

The Motorway bridges will be designed for the design loading as required by Australian Standard AS5100: 2004 including the Heavy Load Platform ("HLP") 400 loading.

First flush surface runoff from new bridge decks will not be discharged onto any roadway below or into any stream or water course, but will be diverted to the end of the structure, collected and treated to conform with the requirements of the water quality objectives of the GUP.

Retaining Structures

Structures for retaining soil or earthworks, in either a cut or fill situation, will be designed in accordance with the relevant standards, sound engineering and structural principles.

Types of permanent retaining structures that are likely to be utilised include:

- Reinforced soil structure or interlocking block retaining walls in fill situations; and
- Cantilever bored pile or soil nail retaining walls in cut situations. Supporting cable stays to bored piles, either horizontal or inclined will not be used if they extend beyond the proposed road reserve; and
- Cast insitu concrete retaining walls, in either cut or fill situations.

All visible finished surfaces of any retaining structures will incorporate appropriate urban design elements and anti-graffiti to enhance the visual appearance of the structures.

Drainage Structures

Major drainage provisions will include large reinforced concrete drainage structures, primarily in the area of the old airport site and the area between Airport Drive and Kedron Brook Floodway. Final sizes and locations will be determined following further design and consultation with BCC and BAC.

A large culvert is required to convey the flow that currently runs in the open drain between Curtin Avenue and Lavarck Avenue (CH18100 – CH18400).

All culvert drains will be designed to allow for the possibility of siltation and for ease of maintenance access.

Anti-Graffiti Coating on Structures

An anti-graffiti coating will be applied to exposed concrete surfaces of structures accessible to pedestrian traffic, such as:

- Bridge piers;
- The faces of abutments;
- The faces of parapets;
- The faces of retaining walls; and
- Any other surface which is likely to be vulnerable to graffiti.

The anti-graffiti coating will blend in and harmonise with the treated surface in accordance with good urban design practice.

3.5.7 Predicted Traffic Volumes

Predicted traffic volumes on the Motorway and changes in traffic flows on the local road network are discussed in Section 5.

3.5.8 Design Aspects to be Resolved

Design issues requiring resolution as a result of further investigation include:

- Geotechnical investigation at the northern end of the existing bridge to identify the location of the underlying soft foundation material;
- Geotechnical investigation of the compressibility of the alluvial material located in the area of the old airport site and Kedron Brook Floodway;
- Drainage paths in the old Brisbane airport site and in the area to the south of Kedron Brook Floodway;
- Locations of ETC infrastructure;
- Vertical alignment of lowering Incitec rail line and the Cleveland Branch Rail Line, including the crossover, to allow for future double stacked freight containers;
- Flooding immunity for the existing Gateway Motorway between Mt Gravatt – Capalaba Road for minor drainage structures (refer to Section 3.5.5); and
- Provision of rest facilities and associated rest furniture for the shared pedestrian/bicycle pathway (if approved) on the Gateway Bridge.

3.6 Description of Major Structures

Following is a description of the design solutions derived for the bridges within the GUP. This section should be read in conjunction with the reference project concept design drawings provided in Volume 3.

3.6.1 Mt Gravatt-Capalaba Road to Cleveland Branch Rail Line

Motorway Bridges over Greendale Way

The existing bridges over Greendale Way are to be widened to accommodate the additional lane and shoulder widening. The existing bridges are a single span bridge of traditional deck unit construction. Prestressed concrete deck units will be used to match the existing bridge. Transverse stressing of the bridge deck will be undertaken by coupling to the existing bridge stressing.

Widening of the bridges will be into the existing median space. Modifications to the two inside bridge parapets will be required.

In order to minimise construction noise impacts on the adjacent residents, bored pile foundations will be used to support the widened headstock.

Motorway Bridges over Old Cleveland Road and Service Road

The existing bridges over Old Cleveland Road and the adjacent service road are to be widened into the median to accommodate the additional lane and shoulder widening. The existing abutments and piers have been designed and constructed to allow for widening however, localised narrowing of the motorway shoulders, both inside and outside, will be required.

The existing bridges over Old Cleveland Road are four spans of prestressed I-girder general arrangement. Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab will be used to form the widening of the deck.

Widening of the bridges will be into the existing median space. Modifications to the two inside bridge parapets will be required.

The existing bridges over the adjacent service road are a single span bridge of traditional deck unit construction. The existing abutments have been designed and constructed to allow for widening. Prestressed concrete deck units will be used to match the existing bridge. Transverse stressing of the bridge deck will be undertaken by coupling to the existing bridge stressing.

Minimum Energy Loss (MEL) Culvert at CH 13100

Widening of the existing structure of the Minimum Energy Loss (MEL) culvert at CH13100 will be required to allow for the realignment of the on and off ramps to Wynnum Road.

Widening of the culvert to the west to allow for the northbound off ramp is proposed by spanning a bridge structure over the existing culvert approach walls to abutments located behind the existing walls. Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab will be used to form the new bridge.

The approach wing walls and culvert cells of the existing MEL culvert will not be modified under this configuration and the soffit of the new bridge girders will be above the soffit of the adjacent culvert so as not to impact on flood flows.

The longitudinal joint between the new bridge and the adjacent flexible pavement will be located in the gore area of the off ramp and not within trafficable lanes.

Widening of the culvert to the east to allow for the southbound on ramp is proposed by spanning a cast insitu reinforced concrete slab between extensions of the walls of the MEL culverts. If modifications are required, the final concrete profile will be reinstated to match the existing departure wall geometry so as not to change hydraulic performance of the MEL culvert.

Motorway Bridges over Wynnum Road

The existing bridges over Wynnum Road are to be widened into the median to accommodate the additional lane and shoulder widening. The existing abutments have been designed and constructed to allow for widening but the existing piers have not and will require widening within this project. Localised narrowing of the motorway shoulders, both inside and outside, will be required.

The existing bridges over Wynnum Road are four spans of prestressed deck unit general arrangement. Prestressed deck units will be used to form the widening of the deck. Transverse stressing of the bridge deck will be undertaken by coupling to the existing bridge stressing.

Minimum Energy Loss (MEL) Culvert at CH 14260

Widening of the existing structure of the MEL culvert at CH14260 will be required to allow for the widening of the Motorway for the new Bulimba Creek viaduct.

Widening of the culvert to the east to allow for the southbound carriageway is proposed by spanning a bridge structure over the existing culvert approach walls to abutments located behind the existing walls. Prestressed concrete deck units with a cast insitu reinforced concrete slab will be used to form the new bridge.

The approach wing walls and culvert cells of the existing MEL culvert will not be modified under this configuration and the soffit of the new bridge girders will be above the soffit of the adjacent culvert so as not to impact on flood flows.

The longitudinal joint between the new bridge and the adjacent flexible pavement will be located in the median area of the Motorway and not within trafficable lanes.

Existing Motorway Bridge over Bulimba Creek

The existing bridges over Bulimba Creek will be widened in the median to become the northbound carriageway of the GUP. The southbound carriageway will be located on a new bridge immediately to the east of the existing bridge.

The existing bridges are a combination of prestressed deck units and I-girder construction. Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab will be used to form the widening of the deck.

The abutment and piers of the deck unit spans have been designed to allow for the bridge widening. The existing piers and headstock within the I-girder part of the bridge will need to be strengthened to allow for the additional loading of the bridge. The strengthening will take the

form of the addition of a reinforced concrete blade of tapering profile to the existing piers. Analysis of the existing foundation has shown that the existing piles and pile cap is able to sustain the additional loading.

New Southbound Bridge over Bulimba Creek

A new 11 span bridge, approximately 390m long, over Bulimba Creek will be provided to allow for the southbound carriageway. The new bridge is to be located immediately to the east of the existing bridge and will be of varying span length with the bridge piers aligning with the piers of the existing bridge where they are within the flood flow of Bulimba Creek. The piers outside the flood flow will be constructed in a more traditional perpendicular direction to the roadway.

The northern abutment of the new bridge will be located approximately 90m to the south of the existing bridge abutment. The existing bridge was designed to have some additional spans at its northern end, beyond the extent of the Bulimba Creek floodplain, to allow for access underneath for an old rail spur line and access road. The spur line and the access road no longer exist. As a result the northern abutment of the new bridge can be located immediately to the north of Ingham Court.

Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab will be used to form the new bridge. Concealed headstocks are to be adopted to ensure that they do not lie within the flood flows and to improve the general appearance of the long bridge.

3.6.2 Cleveland Branch Rail Line – Pinkenba Rail Line

New Southbound Bridge over the Cleveland Branch Rail Line

A two span bridge, approximately 55m long is proposed over the existing Cleveland Branch Rail Line, for the southbound carriageway. The new bridge will be located immediately to the east of the existing bridge.

The central pier of the bridge will be aligned with the pier of the existing bridge. However, the abutments of the new bridge will be setback from the alignment of the existing abutment to allow for the possibility of relocating the existing rail tracks to provide increased clearance to structures.

The northern abutment of the bridge is skewed relative to the southern abutment due to the alignment of the relocated Incitec rail line.

The abutments and pier foundations will be designed to allow for the possible future lowering of the existing rail tracks to allow for the passage of double stacked freight containers along the rail line.

Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab can be used to form the new bridge.

Lytton Road Bridge Modifications

Modifications to the existing Lytton Road bridge to allow the four lane motorway carriageways in each direction involves excavation of the abutment spill-through and underpinning works to the abutments to provide the required horizontal clearance under the existing bridge.

The level of the existing pavement under Lytton Road is to be lowered to allow for 6.1m vertical clearance for both carriageways.

Lytton Road Underpass for Port of Brisbane Motorway Off Ramp

The new underpass for the southbound off ramp to the Port of Brisbane Motorway, under Lytton Road, can be constructed using contiguous bored piles with cast in situ headstocks and precast prestressed deck units using top down construction techniques.

Prestressed concrete deck units with a cast insitu reinforced concrete slab will be used to form the new bridge.

Concrete bored piles with ground anchor tie-back supports can be used to form the approach retaining walls, either side of Lytton Road and the bridge abutments. On the eastern side of the Motorway, some walls can be formed by rockbolting the cut back batter.

Precast decorative panels are required to face all retaining walls and stabilised slopes.

Incitec Rail Line Overbridges

Two bridges are required to pass over the Incitec rail line, being:

- A new bridge over the rail line for the southbound off ramp to the Port of Brisbane Motorway; and
- Reconstruction of the existing southbound on ramp from the Port of Brisbane Motorway to the Gateway Motorway.

Both bridges are to be constructed using prestressed deck units, cast insitu abutments supported by prestressed concrete driven piles, with reinforced soil structure retaining walls retaining the abutment embankments.

Clearance to the rail line in the first instance is to be 5.7m with allowance in the design of the foundations for future lowering of the rail line to provide 7.4m clearance for double stacked container rail traffic. The actual final clearance for the bridges for the double stacked containers will be determined by the alignment of the lowered nearby Cleveland Branch Rail Line.

Allowance for an access track on the eastern side of the rail line has been made in the width of the bridges.

Temporary closure of the Incitec rail line will be required during the reconstruction of the bridge for the southbound on ramp from the Port of Brisbane Motorway and the realignment of the rail line.

Duplicate Gateway Bridge

The new Gateway Bridge will be of similar form to the existing Gateway Bridge with a few minor modifications. The new bridge is proposed to be located 52.475m (centreline to centreline) downstream (to the east) of the existing bridge. The horizontal spacing of the new bridge has been determined following an investigation of bridge foundation clearances and construction issues associated with constructing the new bridge foundations. This spacing results in an air gap of approximately 28m between the bridges.

The length of the new bridge is proposed to be longer than the existing bridge due to the need to add an extra span at the northern end to avoid a potential soft foundation area. The new bridge is proposed to be a 1,698m long structure consisting of:

- a 260m main river span;
- two 145m side spans;
- a 60m span at the southern abutment with 3 - 71m spans and an 88m last span on the southern approach structure ; and
- a 60m span at the northern abutment with 9 - 71m spans and an 88m last span on the northern approach structure.

The vertical alignment of the new bridge is very similar to the existing bridge. The new bridge has approach grades of approximately 5.3% on both sides and a vertical curve of 2,457m radius at the crest, with a pavement crest level of approximately 64.52m. The form of the bridge maintains the existing shipping clearances of 236m horizontally and 55m vertically at the centre of the bridge. However, some reduction in clearances will be required during construction of the new bridge.

The new bridge as with the existing bridge, penetrates the Obstacle Limitation Surface (OLS) of the nearby Brisbane Airport. The penetration is of the order of 19.9m (at the top of the light poles) on the new bridge. Penetrations into the OLS may be tolerated by aviation authorities if deemed not to unduly interfere with safe aircraft operations. The existing bridge penetrates approximately 18.5m into the OLS and is currently lit with aviation warning lights at the crest of the bridge (OLS Obstruction 1910 and 1911). Approval for the penetration of the OLS requires a formal assessment by the Department of Transport and Regional Services (DoTaRS) under the *Airports Act 1996* and the Airports (Protection of Airspace) Regulations. Intrusions into the OLS may be permitted following approval by DoTaRS.

The new bridge consists of six general traffic lanes and an adjacent shared pedestrian/bicycle pathway (if approved). The pedestrian/bicycle pathway (if approved) is to be located on the eastern side of the new bridge and will be separated from the general traffic lanes by a rigid concrete barrier and anti-trash screen. The new bridge is to be 26.95m in width between external barriers. Refer to the engineering drawing contained in Volume 3 for details. The cross section consists of a concrete traffic barrier on the western side of the bridge, 22.0m between traffic barriers for the 6 – 3.5m wide traffic lanes and 0.5m shoulders, a 0.5m wide concrete traffic barrier separating the traffic lanes and the pedestrian/bicycle pathway (if approved) and a 4.45m wide (including handrails) shared pathway, complete with a security barrier on the eastern side of the bridge.

The main bridge span is to be constructed using a varying depth, balanced cantilever, cast insitu, prestressed concrete, single cell box girder supported on reinforced concrete piers and pile caps located within the river. Each pile cap is to supported by cast insitu bored piles socketed into the underlying rock at approximately RL –50.0m (at Pier P7). The pile cap is to incorporate impact protection from shipping traffic.

The approach spans are proposed to be continuous precast, segmental, prestressed concrete box girders of depths varying from 3.1 to 4.5m depth. Spans are either 60m, 71m or 88m. These spans are supported by reinforced concrete piers supported by pad footings founded on high level rock on the southern approach and on precast, prestressed, driven concrete piles on the north side. The piles on the northern side are expected to be founded at approximately RL–27.0m, although this is subject to further geotechnical investigations.

Southern Bifurcation Underpass and Bridge over Lavarack Avenue

The geometric setout of the bridge structure is dictated by the alignment of the relocated southbound carriageway as it approaches the new Gateway Bridge. The proposed structure/s

utilise a combination of cast insitu, post tensioned voided box deck or deck unit construction, concrete piers, reinforced soil structure abutment walls with the piers and abutments supported on bored pile foundations. Where necessary bored piles have been detailed to reduce vibration disturbance.

A clear span of up to 47m is required to carry the deviation southbound carriageway over the existing Gateway Motorway southbound carriageway. A lesser span, of 35m is required to carry the northbound carriageway. For each structure an additional span to the north is required to reduce the overall depth of the voided box over the southbound carriageway due to the structural continuity of the structure. The bridges continue to the north to pass over Lavarack Avenue.

Pier 5 of the northbound bridge and Pier 6 of the southbound bridge are located in the existing median of Lavarack Avenue. These piers are positioned offset from the centerline of the Lavarack Avenue median to eliminate the need to move the existing Telstra Remote Switching Unit (RSU) and Ampol oil line. Abutments would consist of cast in-situ bored piles behind reinforced soil structure retaining walls.

Clearances to the Gateway Motorway southbound carriageway and Lavarack Avenue will be 6.1m.

Where possible the bridge can be traditional deck unit construction utilising shorter spans.

The voided box spans can be readily constructed insitu using falsework and formwork where the bridge is “off-line” from the existing carriageway. Precast elements are proposed where the bridges cross Lavarack Avenue to minimise traffic impacts.

Bluestone pitching is proposed at the base of Piers 4, 5 and the northern abutment of the northbound bridge and Piers 5, 6 and the northern abutment of the southbound bridge to improve urban design aspects of the structures.

New Bridges over Kingsford Smith Drive and the Pinkenba Rail Line

The new Gateway deviation will pass over Kingsford Smith Drive, the existing G James Glass factory, the Pinkenba Rail Line and Terminal Drive on a seven span bridge structure. The bridge structure is to be a combination of prestressed, precast, concrete voided box structure and precast super-tee girders.

Pier positions have been defined to avoid services in the central median of Kingsford Smith Drive, to minimise impacts on the operation of the G James factory and to provide adequate clearances to the Pinkenba Rail Line and Terminal Drive.

The superstructure will consist of a prestressed, concrete voided box girder deck from the southern abutment with five spans of up to 44m span. The bridge continues to the north over the rail line and Terminal Drive using two spans of super-tee girders with spans of 32m. The change in super-structure allows for adequate clearance for Pinkenba Rail Line and Terminal Drive. Foundations for these piers will consist of precast driven concrete piles. Abutments would consist of cast in situ bored piles behind reinforced soil retaining walls.

The voided box sections of the bridge will be able to be launched from the southern abutment embankment so as to minimise construction impacts on traffic utilising Kingsford Smith Drive.

Kingsford Smith Drive Bridge Widening

Widening of the existing bridges over Kingsford Smith Drive is required as a result of the widening of the Gateway Bridge northern approaches. The existing bridge over Kingsford Smith Drive consists of two northbound lanes and three southbound lanes. The extra southbound lane is a dedicated lane for the off ramp to Links Avenue.

The existing bridges are to be widened eastwards to allow for the wider bridge deck necessary to carry the wider carriageways. The abutment and median pier are to align with the existing abutment and piers in Kingsford Smith Drive.

An additional span is to be added at the northern end of the bridge widening so as to maintain vehicular access from the adjacent Bunya Street. The intersection of Bunya Street with Kingsford Smith Drive is to be realigned to accommodate the northern abutment location. Significant sewer and underground electrical services are present in the area and the design of the piers and abutments avoids these.

Existing clearance of 5.3m over Kingsford Smith Drive are to be maintained. To maintain this clearance shallower (than the existing) super-tee girders with a cast insitu concrete deck slab is proposed. These shallower super-tee girders will require additional strengthening within their design and construction.

The new piers and abutments should be supported by bored piles to as to minimise vibration impacts on surrounding buildings and services. The approach walls and abutments are to be retained using reinforced soil structure retaining walls.

3.6.3 Pinkenba Rail Line to Nudgee Road

New Bridges over Brisbane Airport Rail Line and Airport Drive

The bridges over the Brisbane Airport Rail Line and Airport Drive are to be approximately 1120m long with 25 spans. The bridge structure would be a combination of prestressed, precast, concrete voided box structure and precast super-tee girders.

At the southern and northern ends of the bridges, 35m spans are proposed. This facilitates the use of the super-tee girders. Whereas over the Brisbane Airport rail line and Airport Drive, due to the height of the bridge above the natural ground and the need to reduce the visual impact of the bridge, larger 70m spans are proposed necessitating the use of the voided box construction.

The voided box sections of the bridge will be launched or erected via a truss over the completed piers.

At each end of the bridge, where the height of the super-structure is less visually intrusive, the form of structure is proposed to be of precast super-tee construction. 12-35m spans are proposed at the southern end and 6–35m spans are proposed at the northern end of each bridge. The use of super-tee construction is consistent with other bridges on the project for reasons of economy.

Each bridge will have 2–3.5m traffic lanes with 3m outside shoulder and a 1.5m inside (median) shoulder. The design of the bridges will allow for the future widening to 3–3.5m traffic lanes with a 3m outside shoulder and a 2.5m inside shoulder.

Northern Airport Access Interchange Bridge

A 19 span bridge, approximately 554m long, is proposed over the northbound and southbound carriageways of the new deviation for access for northbound traffic to the Brisbane Airport and for northbound traffic from the airport to access the Gateway Motorway. The southern abutment has been located so as to minimise the impacts on the existing mangroves along the remnants of Schultz Canal.

The off ramp to the airport will have two lanes with the on ramp to the Gateway Motorway deviation (northbound) a single lane. A median island 2m wide will separate the two carriageways.

Precast concrete super tee bridge girders with a cast insitu reinforced concrete slab will be used to form the new bridge. Spans are typically 30m with abutment spans of 22m. Clearance to the deviation carriageways will be a minimum of 6.1m.

Piers are to consist of cast insitu elongated circular columns supported by precast prestressed driven concrete piles. Urban design features are proposed to those piers located in the immediate vicinity of the northbound and southbound carriageways.

New Bridges across Kedron Brook Floodway

The bridges for this crossing can be post tensioned segmental concrete box girder incrementally launched or constructed via an erection truss. This form of construction has been selected elsewhere on the project and it is envisaged that box segment forms and erection trusses could be reused between this structure, the Brisbane Airport Rail Line/Airport Drive bridge and the Kingsford Smith Drive bridge.

The soffit of the bridge is above the level of the 1 in a 100 year flood event within Kedron Brook Floodway.

Each bridge will have 2–3.5m traffic lanes with 3m outside shoulder and a 1.5m inside (median) shoulder. The southbound bridge is wider at its southern end to allow for the off ramp lane to the Brisbane Airport. The design of the bridges will allow for the future widening to 3–3.5m traffic lanes (in addition to the southbound off ramp lane) with a 3m outside shoulder and a 2.5m inside shoulder.

Piers would be taped, single stem, elongated circular columns supported on precast prestressed driven concrete piles.

Northern Bifurcation Bridge

A 22 span, 670m long bridge is proposed for this structure. This structure allows southbound traffic on the existing Gateway Motorway to pass over the new northern deviation to continue along the existing Gateway Motorway towards Toombul Road.

The bridge structure can be precast concrete super-tee girders with a cast insitu concrete deck, supported by circular piers. Single piers are proposed to minimise hydraulic impacts of the piers located within the flood regulation line and to improve the appearance of the bridge. The piers are to be supported by precast prestressed driven concrete piles.

3.7 Drainage

The GUP traverses major drainage channels such as:

- Bulimba Creek;
- The Brisbane River; and
- Kedron Brook.

In addition, the proposed works cross the sites of the old and new Brisbane Airport and the area of the original course of Schultz Canal to the south of Kedron Brook Floodway. Final drainage flow paths in these areas are to be finalised following further design and consultation with BCC regarding the development of the TradeCoast Central (TCC) site (old Brisbane airport) and with BAC for the development of Brisbane Airport.

Other minor drainage paths are traversed particularly in the section between Mt Gravatt – Capalaba Road and Lytton Road and the area between Curtin Avenue and Lavarack Avenue.

3.7.1 Bulimba Creek

The proposed Gateway Motorway duplication crosses Bulimba Creek downstream (ie to the east) of the existing Gateway Motorway overbridge. The existing northbound and southbound carriageway is supported by a single bridge sub-structure. The existing bridge is proposed to be widened between the existing carriageways to become the northbound carriageway.

The new southbound bridge will be an 11 span bridge, however only spans 1-7 are located within the 100 year ARI flood flow. The additional spans are required for clearance over the adjacent Goodman Court.

The introduction of the bridge piers and the encroachment of the new southbound embankments within the flood regulation lines results in minor increases in upstream flood levels for a 100 year Annual Recurrence Interval (ARI) event and needs to be mitigated.

The preferred mitigation option involves skewing the new bridge piers (relative to the existing bridge piers), compensatory earthworks upstream of the existing bridge and removal of the existing fill either side of the existing motorway crossing on the southern bank of Bulimba Creek.

These works reduce the impacts of the proposed crossing to an overall decrease in flood levels of 3mm at the proposed crossing point.

Further discussion is presented in Section 11.

3.7.2 Brisbane River

Hydraulic modeling of the Brisbane River has not been undertaken as part of this EIS.

3.7.3 Kedron Brook Floodway

The proposed Gateway deviation crosses Kedron Brook Floodway downstream (ie to the east) of the existing Gateway Motorway overbridges and is almost entirely on a bridge structure with only minor encroachment of approach embankments and abutments within the Flood Regulation Line (FRL).

The introduction of the bridge piers and the minor encroachment of the embankments within the flood regulation lines results in minor increases in upstream flood levels for a 100 year ARI event and needs to be mitigated.

The preferred mitigation option involves compensatory earthworks downstream of the proposed motorway crossing on the northern bank of Kedron Brook Floodway. Various options of depth of excavation from 0.3 – 1.0m, along with varying extent of earthworks, were investigated. The preferred option is to excavate approximately 0.5m over an area of 10.5ha between the existing Gateway Motorway embankment and Kedron Brook Floodway.

These works reduce the impacts of the proposed crossing to a decrease in flood levels of between 1-5mm at the proposed crossing point.

Further discussion is presented in Section 11.

3.7.4 Other Drainage

Motorway – Minor Cross Drainage

Existing minor cross drains cross the Gateway Motorway at numerous locations. The locations of the existing culverts are shown on the drawings in Volume 3. The existing minor drainage structures under the existing Gateway Motorway were designed for 1 in 50 year storm events in accordance with the design parameters at the time. Since the original design of the Gateway Motorway the design standards related to intensity of events, frequency of events and the duration of a rainfall event have been revised. As a result some of the existing cross drainage may not satisfy the existing requirement for 1 in 100 year ARI flood immunity for pavement inundation.

Investigations undertaken by GHD during the Planning Study identified the following:

- The 900 diameter Reinforced Concrete Pipe (RCP) at CH10925 is under capacity in the 100 year event;
- The 1200 diameter RCP at CH11404 is under capacity in the 100 year event;
- The 1050 diameter RCP at CH11524 is under capacity in the 100 year event; and
- The 750 diameter RCP at CH12460 is under capacity in the 100 year event.

Further investigation of the capacity of these drainage systems is required to determine the actual capacity, taking into account any proposed culvert extension required for the carriageway widening. Actual immunities will need to be agreed with MR considering the time of inundation, Motorway operational issues and associated risks.

Water Quality Management

The extent of the new drainage works involves the extension of the existing cross drainage structures and providing pavement drainage along the median on superelevated curves.

The runoff from the Motorway is proposed to be collected in grass table drains on the edge of the road formation and grass V drains in the median where possible.

The existing Bulimba Creek Viaduct and the existing Gateway Bridge have scupper drains with no collection provision to prevent runoff flowing directly into the waterways. No modifications to these existing bridges are proposed for water quality management. First flush surface runoff from new bridge decks will not be discharged onto any roadway below or into any stream or water course, but will be diverted to the end of the structure, collected and treated to conform with the requirements of the water quality objectives of the GUP.

The use of table drains at the base of new embankments for collection and treatment of surface runoff from the pavements is proposed. Where possible the use of water treatment ponds or stormwater quality improvements devices is proposed.

Refer to Section 12 for further discussion.

Cross Drainage Across Old Airport Site

The proposed Deviation will be located on fill embankments through part of the old airport site (CH19150 – CH20150). This area is owned by BCC and planning is currently in progress to re-develop this site into the TCC industrial area. It is understood that approximately 50ha of this site to the west of the proposed deviation is planned to drain to the east of the Motorway and

into Army Drain. This flow is able to cross the deviation by extending to the west the existing deeper part of Army Drain, located immediately to the south of Terminal Drive, adjacent to the Pinkenba Rail Line.

Culverts complete with an upstream detention pond may be required under Terminal Drive to divert the flow into Army Drain.

Cross Drainage Across the Northern Interchange Area

The deviation and the northern interchange to the airport, located on the southern bank of Kedron Brook Floodway will be on constructed on fill embankments and will cross Landers Pocket Drain. This drain runs parallel to the Kedron Brook Floodway and will be filled in by the construction of the proposed second runway of the Brisbane Airport. The area surrounding the interchange is also proposed for development and can be drained to either Battery Drain to the west, or to Kedron Brook Floodway to the north and east without the need for cross drainage through the Motorway embankment.

For these reasons, no allowance has been made for cross drainage through the Motorway in the vicinity of the Airport interchange.

3.8 Operating Features

The Gateway Motorway will function as a grade separated unrestrained facility with a designed operating speed for through traffic of generally 100km/h. To maintain the required performance levels of service, the Motorway will require effective traffic management and incident management procedures to be developed and implemented throughout the life of the project. The final traffic and incident management procedures will be developed to comply with MR's policies and will be integrated with MR's existing traffic management facilities.

3.8.1 Traffic Management

A traffic management system will be installed to monitor the operations of the through carriageway and entry and exits. The backbone of the traffic management system will be a state-of-the-art Intelligent Transport System (ITS) utilising latest traffic management hardware and software. The ITS hardware will be connected along the length of the Motorway and to the traffic management centre via fibre optic cables ensuring high reliability of the data transfer.

Proposed features of the ITS system include:

- Variable speed limit signs;
- Closed circuit television (CCTV) cameras with tilt, pan, zoom (TPZ) operations;
- Emergency telephones located at breakdown bays for use by motorists;
- Vehicle detection loop systems;
- Stopped vehicle detection systems;
- Direct communication protocols with emergency services ie. police, fire services, and ambulance;
- Variable Message Signs (VMS) to warn drivers of events such as traffic congestion, accidents etc;
- Vehicle counting sites;
- Dynamic Weigh in Motion (WIM) sites; and
- Traveller information systems.

3.8.2 Emergency Services Vehicles

Emergency Services vehicles, such as fire and rescue, ambulance and police vehicles, may use the Gateway Motorway in responding to normal emergency operations or indeed may be required to respond to incidents/emergencies on the Motorway. Ready access to and along the length of the Motorway is critical in minimising emergency response times.

The design of the GUP incorporates the following features to facilitate access for emergency services vehicles:

- Reduced traffic congestion on the Motorway and adjacent road network by maintaining minimum service levels;
- Provision of 3.0m outside shoulder along the full length of both carriageways (except at some bridges) to allow for the storage of broken down vehicles or those involved in an accident, or for the passage of emergency service vehicles in the event of a congested motorway carriageway;
- Emergency vehicle crossing locations by strategically positioned locations within the solid concrete median or landscaped medians to allow emergency service vehicles to undertake "U" turns on the through carriageways;
- Ability of the traffic management centre to control traffic signals to provide priority to emergency services vehicles wishing to enter the Motorway via the adjacent road network; and
- Fire hydrants to be located where possible including the provision of a fire main and hydrants along the full length of both Gateway Bridges.

3.8.3 Vehicle Breakdown/Crashes

The strategic importance of the project will require urgent response to minimise disruption to operations and the risk of "flow on" crashes.

Features to minimise disruption include:

- ready access to emergency telephones;
- road shoulder to provide vehicle breakdown space; and
- quick response to events through the traffic management facility.

3.8.4 Hazardous Goods

In principle, the design and operation of the Gateway Motorway will provide a safe and reliable route for the transportation of hazardous goods. The existing Gateway Motorway is used regularly in the transportation of hazardous goods.

Issues to address in the design and operation of the upgrade works include:

- Public safety;
- Incident control and management;
- User control and management; and
- User safety.

For further discussion refer to Section 21.

3.8.5 Maintenance Minimisation

To minimise ongoing maintenance costs and particularly the safety of maintenance personnel, the requirements for future maintenance should be minimised.

Principles that can be adopted include:

- Careful selection of vegetation adjacent to through carriageways;
- Selection of natural finishes;
- Create a low risk environment for road pavements;
- Provide special access provision for maintenance personnel and equipment;
- Select long life materials particularly for all facilities within an adjacent to the through carriageways and ramps; and
- Adherence to relevant standards and guidelines.

3.8.6 Over Height Vehicles

All structures over the Gateway Motorway will be designed to provide a minimum vertical clearance of 6.1m above the pavement surface. Structures include:

- Lytton Road overbridge, by lowering the existing Motorway pavement levels;
- Port of Brisbane Motorway ramps;
- Southbound Gateway Motorway underpass (at southern bifurcation);
- Northern Interchange access bridge;
- Southbound Gateway overpass bridge at the northern bifurcation;
- Sign gantries; and
- Tolling gantries.

The existing clearance (<6.1m) under the Meadowlands Road overbridge is to be maintained under the GUP.

3.8.7 Lighting

The existing Gateway Motorway, and associated interchanges, is currently lit with road lighting, usually located within the median of the carriageways. However, the existing Gateway bridge has road lighting poles located on each edge of the bridge.

Within the GUP, lighting will be provided for the full extent of the Motorway and all associated ramps and interchanges, the new Bridge and the shared pedestrian/bicycle pathway (if approved). The lighting will be upgraded to comply with the current MR standards. Lighting will be maintained during construction works.

3.8.8 Signage

Directional signage and regulatory signage will be provided in accordance with MR's Road Planning and Design Manual and the Manual of Uniform Traffic Control Devices (MUTCD). Where practical, existing signs will be reused under the new works. Fixed signage prior to each interchange will display correct lane indication for motorists and any relevant tourist/destination for the exit or where the Motorway bifurcates.

Where possible, overhead gantry signs will be used to mount the signs directly over the Motorway lanes.

3.9 Construction

Construction of the GUP works will be undertaken so as to minimise impacts on:

- The travelling public;
- Shipping and aviation traffic;
- The surrounding environment;
- Local residents and businesses; 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.

Refer to Section 23 for further discussion.

3.10 Construction and Operational Transport Requirements

TOR Requirement:
The EIS should clearly and fully describe all transport requirements for the construction and operational phases. This should include:

- the likely types of vehicles to be used;
- estimates of material quantities and likely sources for this material. This should include but not be limited to bridges, culverts, fill material, pavement (concrete, bitumen, etc);
- likely scenarios for origin and destination of inputs/supply source and likely transport routes;
- an assessment of the likely impacts on the adjacent road network;
- hazardous or dangerous material that maybe transported to or from the site both during construction and operation;
- potential access requirements;
- criteria to be used to locate any access for machinery, transport etc. in the vicinity of a waterway or wetland (e.g. construction of causeways, bridges, culvert crossings etc.) and any permanent access points, roads or sidetracks for maintenance purposes, in particular where they are adjacent to waterways or wetlands. Describe the nature of any permanent access points; and
- construction lay-down areas, off site/on-site prefabrication areas including casting facilities, vehicle/construction equipment storage/workshops, and parking facilities for the construction workforce.

3.10.1 Type and Volume of Construction Vehicles

The types of construction vehicles likely to be used during the construction works will include:

- Excavators and scrapers for earthworks operations;
- Rollers for earthworks operations;
- Backhoes for general civil works;
- Bored pile driving rigs for foundations;
- Driven pile driving rigs for foundations;
- Paving machines for road pavement construction;
- Semi-tippers and trailers for material delivery;
- Cranes for lifting of materials and precast elements;
- Concrete trucks and concrete pumps;

- Compressors;
- Temporary light stands and generators;
- Water trucks for dust control and compaction requirements; and
- Graders for earthworks and pavements.

Most equipment will be able to be sourced from within the existing construction industry within SEQ. However, specialist equipment, such as drilling rigs for the main Gateway Bridge, may be sourced internationally.

Average daily volumes of heavy vehicles estimated to be used during the concurrent construction of all sections are 250 vehicles. Light vehicle volumes associated with workers travelling to and from the sites are estimated at 1750 vehicles per day.

Typical daily activities for construction vehicles include:

- Transportation of bulk material to and from the site, including:
  - Earthworks and pavement materials;
  - Delivery of reinforcing steel;
  - Ready-mixed concrete or precast concrete elements; or
  - Delivery of road furniture, landscaping materials; and
- Transportation for workers to and from the site.

3.10.2 Type and Volume of Operational Vehicles

For volume of vehicles anticipated within the operational phase of the GUP, refer to Section 5.

Vehicle types expected to utilise the Gateway Motorway include all vehicle classifications authorised to use public roads.

3.10.3 Quantities of Materials within the GUP

Overall the GUP includes the following items:

- 9.2 km of bridges; and
- 10.5 km of roadway embankments (including existing Motorway).

Material estimates for the GUP include:

- Embankment materials 1,400,000 cubic metres;
- Concrete (precast or ready mixed) 245,000 cubic metres;
- Asphalt materials 500,000 tonnes;
- Reinforcing steel 17,000 tonnes;
- Prestressing strand 6,500 tonnes;
- Precast concrete piles 62,000 metres; and
- Precast concrete beams and pipes 110,000 tonnes.

3.10.4 Origin of Materials

The main materials to be utilised during the construction include:

- Embankment and pavement gravels;
- Topsoils and plants for landscaping;
- Asphaltic concrete for pavements;

- Ready mix concrete, either from remote batch plants or an on-site batch plant;
- Reinforcing strand and steel for the bridge and retaining structures;
- Light-weight fill; and
- Precast concrete structural units.

The likely type of materials and source is predicted to be:

- Gravels for embankments or pavements – from local suppliers;
- Cement or concrete elements – from local suppliers;
- Asphaltic concrete – from local suppliers;
- Reinforcing steels – from local suppliers; and
- Water – from local mains systems.

3.10.5 Transport Routes Likely to be Used During Construction

The main transport route for the supply of materials and equipment for works along the existing Gateway Motorway corridor will be the existing Gateway Motorway, interconnecting highways and the adjacent road network.

Materials and equipment necessary to construct the works between the Pinkenba Rail Line and Airport Drive will access the site via Kingsford Smith Drive. For the works between Airport Drive and Kedron Brook Floodway access to the site will be via a temporary access road from the existing southbound carriageway of the Gateway Motorway including a temporary floating bridge crossing Kedron Brook Floodway, or other arrangements as negotiated with relevant stakeholders.

If materials to be supplied to the GUP originate from the Mt Cotton area, the predicted route will be via Mt Cotton Road, Mt Gravatt-Capalaba Road and the Gateway Motorway. Mount Petrie Road could also be used as a haul route. If from areas further to the south, the anticipated route is via the Pacific Motorway and the Gateway Motorway.

If the materials are to be sourced from quarries to the north of Brisbane, the anticipate route is via the Bruce Highway and the existing Gateway Motorway.

3.10.6 Impacts on the Existing Road Network

Impacts on the existing local road network are discussed in Section 5.

3.10.7 Hazardous Goods

Risk relating to the transportation of hazardous goods are discussed in Section 21.

3.10.8 Access Requirements

Access to the site of works will primarily be via the existing road networks, including the existing Gateway Motorway and existing interchanges. Access locations, either temporary or permanent, are shown in Figures 3.1a to 3.1d.

All access tracks, whether temporary or permanent will be unsealed gravel tracks.

Particular access requirements will be required for the following sections of the project:

Mt Gravatt-Capalaba Road to Cleveland Branch Rail Line

The existing local road network will be utilised to access the corridor along the length of the section. Side/access tracks will be used to connect at local access points where available and will run parallel with the existing Motorway where practical. Where bridges are widened, the additional lanes upon a bridge will be used for construction movements prior to opening to general traffic.

A permanent access track from Lytton Road on the eastern side of the relocated Incitec rail line can be provided.

Bulimba Creek

Access to the works in the Bulimba Creek area will be from the existing maintenance access track off Murarrie Road and via Ingham Court.

The permanent access track off Murarrie Road can be maintained.

Cleveland Branch Rail Line to Nudgee Road

Temporary side tracks, both sides of the existing Motorway will run the full length of project where practical. Impassable points along this track would include Brisbane River, Lavarack Ave, Kingsford Smith Drive, Airport Drive and Kedron Brook Floodway. Temporary access locations from the adjacent road network to the side track include:

- Lavarack Avenue;
- Kingsford Smith Drive; and
- The existing southbound carriageway of the Gateway Motorway near the northern bifurcation.

Permanent access tracks can be provided at the following locations:

- Off Lavarack Avenue to access the northern deviation at the southern end;
- Off Terminal Drive to access the embankment to the north of the Pinkenba Rail Line;
- From the southbound carriageway of the existing Gateway Motorway, south of Nudgee Road; and
- Off the existing Gateway Motorway in the vicinity of the northern bifurcation.

Brisbane River

The following temporary access to the Brisbane River for the construction of Piers 6 and 7 of the Gateway Bridge is required:

- Construction of temporary jetties and landings within the river;
- Pier 6 – Construct a temporary jetty to Pier 6 with access from the adjacent Metroplex Complex; and
- Pier 7 – Construct a temporary jetty to Pier 7 off the northern embankment of the river with access from Curtin Avenue.

3.10.9 Construction Laydown Areas

Temporary construction sites will be required during the construction for the following activities:

- Construction site offices and staff areas;
- Stockpiling of embankment materials;

- Laydown areas;
- Precast concrete yards, including on site batching, fabrication and storage of elements;
- Vehicle maintenance and storage yards; and for
- Workers carparking.

Proposed sites are shown in Figure 3.1a to 3.1d and include:

- On the southern bank of Bulimba Creek, to the west of the existing Motorway;
- To the south of the existing toll plaza buildings on the eastern side of the existing Motorway;
- Immediately under the Gateway Bridge on the southern embankment of the Brisbane River;
- On the site of the Royal Queensland Golf Course on the northern embankment of the Brisbane River;
- On the site of the proposed embankment to the north of the Pinkenba Rail Line;
- On the site of the proposed northern access interchange to the Brisbane Airport; and
- On the northern bank of Kedron Brook Floodway.

3.11 Workforce and Other Infrastructure

TOR Requirement:
The EIS should provide information on the likely size of the workforce required during construction and the infrastructure required to accommodate this workforce. The information should show anticipated periods of peak construction activity and downtimes with corresponding workforce numbers.

The GUP has the potential to create many new jobs during the construction phase. The number of manhours required to construct the physical works has been estimated at 4.3 million manhours, over a construction period of 4 - 5 years. The labour force required equates to the equivalent of 1034 full time employees over the construction period.

With the project being wholly located within the greater Brisbane area, additional infrastructure to accommodate the expected workforce is not required.

Whilst the construction may require significant periods of embankment preloading in some locations (eg northern airport access interchange embankments), construction works are anticipated to be fairly constant throughout the period of construction. Works on many sections of the project are expected to be occurring concurrently.

3.12 Waste Management

TOR Requirement:
Having regard for best practice waste management strategies and the Environmental Protection (Waste) Policy, details of application of the principles of waste avoidance, reuse, recycling, treatment and disposal should be described for the construction, operation and maintenance phases of the project.

3.12.1 Potential Waste Generation

The wastes generated from the GUP will be distinctly different during the construction, operation, and maintenance phases. During construction of the project, significant quantities of waste with varying compositions could be generated from activities including clearing and stripping, bulk earthworks, pavement and surface preparation, miscellaneous structures, maintenance of construction equipment, and construction site/amenities.

During actual operation of the Gateway Motorway, typical wastes could be generated from indiscriminate roadside dumping, operation of substandard vehicles, roadside vehicle repairs and vehicle accidents.

If not properly managed the construction, operation, and maintenance activities could potentially generate a range of different waste streams and quantities, which potentially could cause adverse environmental impacts. Potential environmental impacts could include:

- Reduction in landfill space from waste materials generated during construction, operation and maintenance that are unable to be reused (at or within) the project (eg contaminated materials);
- Contamination of surface soils, surface water and groundwater within the project during construction from accidental spillage/leakage of hydrocarbon based wastes and other contaminated materials (ie ASS disturbance, disturbance of insitu soil contaminants);
- Contamination of downstream environments, waterbodies, and sensitive habitats from uncontrolled runoff resulting from spillage/leakage of hydrocarbon based wastes and contaminated materials; and
- Reduced visual amenity within and surrounding the Motorway corridor resulting from inadequate waste management systems and indiscriminate dumping of wastes.

Potential waste generated by the GUP during construction, operation and maintenance is shown within Table 3.1.

Table 3.1 Potential Waste Generation

Environmental Activity, Service, Process	Description of Activity	Possible By-product/Waste Type
Construction Phase		
Earthworks	Clearing	Vegetation/timber/weeds
Special ground treatment	Removal and/or treatment of contaminated soil from external sources and accidental spills.	Contaminated soils (including ASS material) contaminated leachate (including acid)
Earthworks	Cut and Fill.	Soil/excavated material.
Demolition and removal of existing structures.	General construction activities.	Timber, concrete formwork, scrap steel, concrete, and insulation materials.
Pavement	Pavement construction including formation, lower sub-base, and base.	Pavement materials including soils, gravels, cement stabilised gravels, asphalt prime and bitumen.

Environmental Activity, Service, Process	Description of Activity	Possible By-product/Waste Type
Drainage structures	Construction of culverts and drains.	Concrete, soil, and excavated materials.
Bridge structures	Construction of bridge piers, footings, and abutments.	Concrete, soil, and excavated materials.
Construction site office, storage of construction materials and supporting amenities.	Daily operation of construction site office and supporting amenities.	General waste (including paper, food scraps, etc) and general unused construction materials.
Construction stockpiles	Storage of pavement materials and soils for embankments.	Contaminated soils (including ASS material and weed matter) and pavement materials.
	Storage of pavement materials and soils for embankments.	Contaminated runoff from storage areas/ stockpiles (including acidified leachate).
	Storage of pavement materials and soils for embankments.	Dust from storage areas/stockpiles.
Material and hazardous goods storage and handling	Petroleum or oil product storage	Spills and residues to be contained and treated or collected and disposed.
	Chemical storage	Spills and residues to be contained and treated or collected and disposed.
	Storage of waste materials prior to reuse, recycling or disposal	Hazardous materials/dangerous goods residues, containers, fumes/dusts. General wastes (including paper, food scraps, etc) and general unused construction materials.
Operational Phase		
Normal operating conditions	Leakage of oils, grease into downstream environments and waterbodies external to the road corridor from vehicles. Inadequate waste management systems and indiscriminate dumping of wastes within the road reserve.	Contaminated runoff from hydrocarbon based pollutants (oils and grease). General waste (including paper, food scraps, motor vehicle parts including tyres and batteries).
Emergency situation	Spillage of oils, grease, dangerous goods into downstream environments and waterbdies external to the road corridor from vehicles and dangerous goods vehicles involved in an accident.	Contaminated runoff from hydrocarbon based pollutants (oils and grease) and hazardous materials.
Maintenance Phase		
Maintenance of pavement	Pavement maintenance and repairing damaged pavement sections including formation, lower sub-base, and base.	Pavement materials including soils, gravels, and cement stabilised gravels.

Environmental Activity, Service, Process	Description of Activity	Possible By-product/Waste Type
Maintenance of surface	Resurfacing and repair damaged surface.	Bitumen, asphalt, and contaminated surfacing materials
Maintenance of drainage structure	Removing sediment from drainage structures and disposing off site.	Contaminated sediment from hydrocarbon based pollutants (oils and grease).

Proposed waste storage, treatment and containment areas will be located at each construction laydown area and are indicated on Figures 3.1a to 3.1d. Waste containment facilities will be designed and constructed in accordance with the requirements of relevant standards and guidelines.

3.12.2 Legislative Requirements

In Queensland, legislation, regulations and guidelines for waste management include the following:

- *Environmental Protection Act 1994*;
- *Environmental Protection Regulation 1998*;
- *Environmental Protection (Waste Management) Policy 2000*;
- *Environmental Protection (Waste Management) Regulation 2000*; and
- *Waste Management Strategy for Queensland 1998*.

The *Environmental Protection Regulation 1998* is subordinate legislation to the *Environmental Protection Act 1994*. The *Environmental Protection (Waste Management) Policy 2000* (EPP(Waste)) and *Environmental Protection (Waste Management) Regulation 2000* aim to achieve the objectives of the *Environmental Protection Act 1994*. The policy sets the legislative framework outlined within the waste management strategy. This framework includes:

- adoption of the waste management hierarchy;
- assigning responsibility for waste management;
- outlining specific mechanisms for waste management planning;
- outlining state government responsibilities for waste management; and
- implementing a review system for the policy.

The objective of the EPP (Waste) is to protect Queensland's environment according to the principles of ecologically sustainable development identified in the *Environmental Protection Act 1994*.

3.12.3 Waste Minimisation Strategies

Waste generation during the construction and operation phases of the GUP will be distinctly different. The GUP will be designed to take into account waste minimisation, reuse and cleaner production principles and philosophies. The GUP will reuse wastes to the maximum extent possible and will engage waste management contractors, which will reuse and/or recycle wastes where possible.

Waste minimisation strategies to be adopted for the GUP include the following:

- The efficient use of resources in the design, construction and operation of the works;
- Reuse of the existing Gateway Motorway corridor, including:
  - Existing pavements by strengthening rather than replacing wherever possible;
  - Reuse of existing bridges and structures; and
  - Reuse of existing road furniture where possible.
- Recycling of materials where possible. Possible materials include:
  - Pavements materials where there are redundant pavements;
  - Steels from existing road furniture or where steel becomes scrap material during the course of the works (eg steel liners, casings); and
  - Reuse of portable concrete barriers used during construction as permanent barriers in the final works.
- Efficient lighting and electrical design throughout to minimise energy usage; and
- Adoption of a Construction Waste Management Plan;
- Containment of contaminated soils within the works rather that off-site disposal to landfills; and
- Adoption of an Operational Waste Management Plan.

3.13 Permits, Licences and Environmental Authorities

The permits, licenses and Environmental Authorities relevant to the project are identified in Section 8.

3.14 Rehabilitation of Construction Site

The strategies and methods for progressive and final rehabilitation of the environment disturbed during construction are included in Section 22.