NORTHERN EXPRESSWAY

northern expressway
environmental report
executive summary

Australian Government

AUSLINK
Building our National Transport Future

Government of South Australia
Department for Transport, Energy and Infrastructure

Preface

The proposed Northern Expressway Project has been developed in response to the high level of congestion and freight traffic on the existing network, particularly Main North Road, Angle Vale Road and Heaslip Road. The increased congestion would result in increased traffic delays, higher crash rates, reduced amenity and reduced community access. The Northern Expressway will significantly alleviate the pressures on these roads.

Upgrading Main North Road to expressway standard is not a viable option. It would cost significantly more than the Northern Expressway and would result in a major impact to the adjacent residential areas due to the extensive infrastructure required.

The proposed route for the Northern Expressway has been carefully located so as to minimise adverse social and environmental effects on the broader community and to provide easy access to the major urban growth areas (benefiting commuters). It will support the rapidly expanding industrial, defence, wine and horticultural activities within the region and throughout South Australia.

executive summary contents

The proposed Northern Expressway Project consists of two components; the new Northern Expressway and the Port Wakefield Road Upgrade.

executive summary introduction

What is the Northern Expressway Project?

The proposed Northern Expressway Project consists of two components; the new Northern Expressway and the Port Wakefield Road Upgrade. The Northern Expressway will be a new 23 km road linking the Gawler Bypass with Port Wakefield Road at a point approximately 3 km north of the Waterloo Corner Road intersection. To meet the demand of increased traffic volumes generated by the new Expressway, Port Wakefield Road will be upgraded at key intersections between its intersection with the Northern Expressway and with the Salisbury Highway, with some service roads created and access restrictions imposed to improve safety.

The proposed Northern Expressway and Port Wakefield Road Upgrade is South Australia's largest and highest priority project under the Australian Government's current AusLink Investment Programme.

The proposed Expressway and Port Wakefield Road, between Gepps Cross and its intersection with the Northern Expressway, will become the new AusLink National Network road link (formerly known as the National Highway), taking over that role from the section of Main North Road between Gawler and Gepps Cross.

The Northern Expressway and the Port Wakefield Road Upgrade will result in an improved highway/freight connection through northern metropolitan Adelaide between the Sturt Highway at Gawler and the Port River Expressway. Figure I illustrates the study area for the project.

The proposed Northern Expressway and the Port Wakefield Road Upgrade is South Australia's largest and highest priority project under the Australian Government's current AusLink Investment Programme. The project is subject to the finalisation of agreed funding between the Australian and South Australian governments.

The environmental assessment process

The Environmental Report has been prepared by an integrated team of staff from Kellogg Brown & Root Pty Ltd, Sinclair Knight Merz Pty Ltd, QED Pty Ltd and the Department for Transport, Energy and Infrastructure (DTEI). The purpose of the Environmental Report is to:

- explain the project rationale
- discuss the alternatives that were considered
- describe the proposed works
- assess the social, economic and environmental effects of the project
- describe the environmental management measures that are proposed.

Based on detailed environmental investigations in accordance with the Australian Government's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Policy Statement 1.1 Significant Impact Guidelines (Department of the Environment and Heritage 2006) it has been determined that the project will not have a significant impact on any matter of national environmental significance and therefore no referral under the EPBC Act has been made.

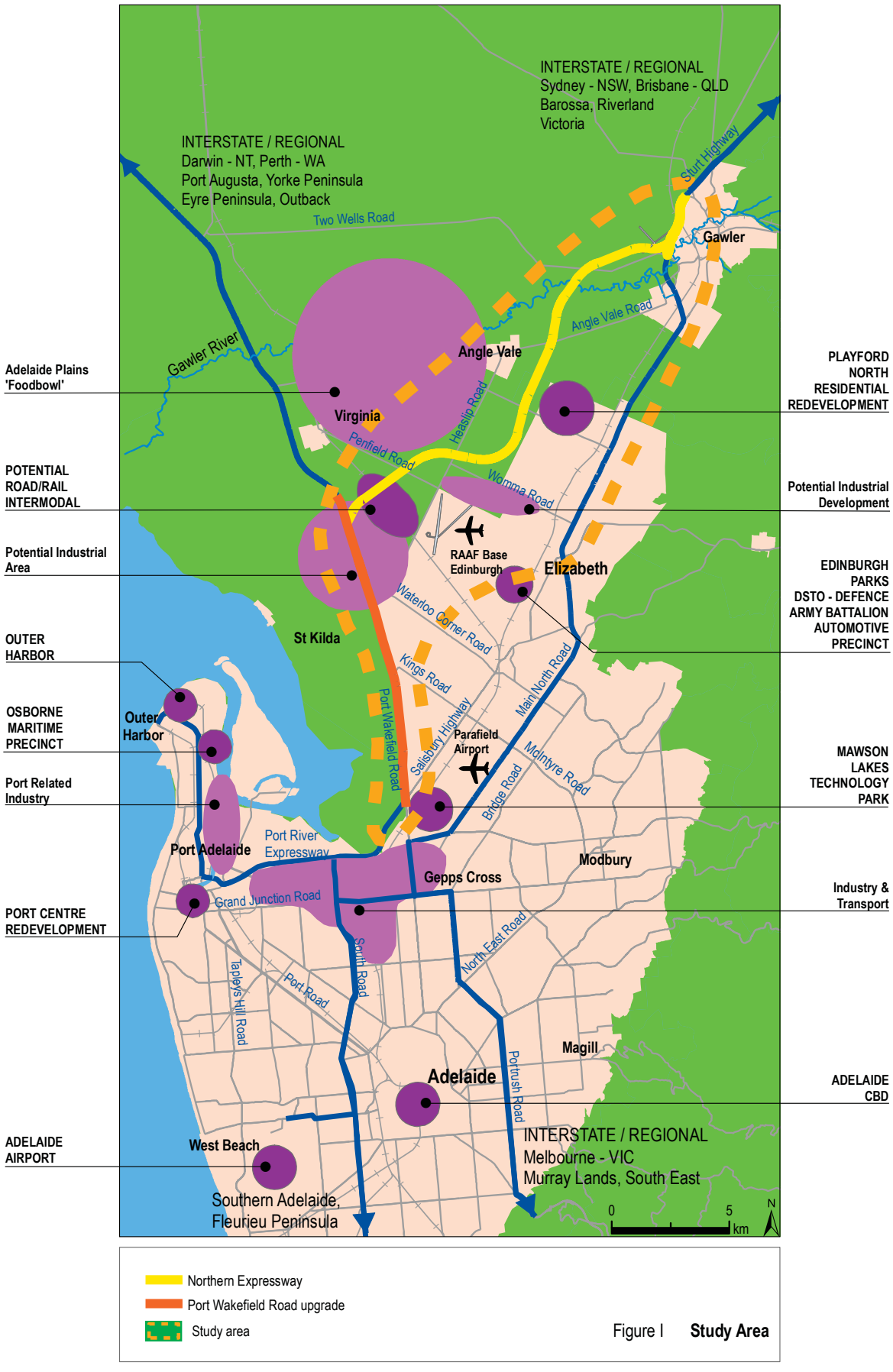

Figure I **Study Area**

Under State legislation, a number of approvals, permits or licenses may or will need to be obtained by DTEI and/or the construction contractor.

The Environmental Report is an important component of the assessment process. It provides for public involvement, releases supporting technical documents and encourages public submissions which will be considered prior to finalising the proposed route for approval by the South Australian Government.

The Environmental Report has been structured to be an easy-to-read document as follows:

Volume 1

Section	Description
Executive Summary	Provides a summary of the Environmental Report
Part A Introduction and background	Provides an overview of the project, describes the environmental assessment process, explains how it fits with the AusLink Network and provides details of the community and stakeholder engagement process
Part B Need for the proposal and consideration of alternatives	Provides the justification for the project, a description of the alternative routes considered and a summary of the economic assessment undertaken
Part C Description of the Northern Expressway Project	Provides a description of the proposed Northern Expressway and Port Wakefield Road Upgrade and information on how construction, operation and maintenance activities will occur

The Environmental Report and assessment process provides for public involvement, releases supporting technical documents and encourages public submissions.

Volume 2

Section	Description
Part D Effects of the Northern Expressway	Provides information on existing conditions, potential effects on the social, cultural, economic, physical and biological environment and measures to manage the effects
Part E Effects of the Port Wakefield Road Upgrade	Provides information on existing conditions, potential effects on the social, cultural, economic, physical and biological environment and measures to manage the effects
Part F Environmental Management	Provides information on sustainability and environmental management and monitoring relating to the project
Abbreviations and Glossary	Provides a list of abbreviations and definition of terms used in the Environmental Report
References and Acknowledgements	Provides a list of documents referenced in the Environmental Report and acknowledges people involved in preparing the report

A series of detailed Technical Papers containing specialist studies support the Environmental Report.

Community and stakeholder engagement

To date, a process of community engagement has been integral to the development of the Northern Expressway Project. Government and stakeholder reference groups were established during the route selection process to capture broad inputs and ensure concerns were identified. Following the announcement of the project on 14 November 2006, an extensive community engagement process commenced. Stakeholders, affected property owners and the community are important participants in this ongoing engagement.

The community engagement process had a comprehensive communication and consultation strategy incorporating the following initiatives:

Communication	Consultation
Stakeholder letters to affected property owners	Initial appointments made and individual visits with affected property owners
Project postcard	Stakeholder briefings and workshops
Display panels about project	Council briefings and workshops
Eight page brochure describing proposed route	Angle Vale Open Day
Information folder and fact sheets on key topics Additional fact sheets as issues emerge	Displays staffed at busy times at Angle Vale, Virginia, Munno Para, Salisbury and Gawler Shopping Centres
Display poster promoting Open Day	Neighbourhood meetings on request at Macdonald Park and Gawler
Advertisements and editorials	Individual meetings with interested parties
Website with communications and feedback forms, DVD including aerial view along project area	Aboriginal involvement through the Heritage Survey and Tappa Iri Board and Business Centre
Feedback form to encourage and assist comments on the project	Ongoing contacts through 1300 telephone information line and SMS
Plans of route and particular areas	Email for easy two-way communications
Key locations for distribution of communications	Feedback and written submissions
Broadsheet distributed to 130,000 households	

The communication strategy has been successful in attracting a high level of interest in the project. An estimated 5000 people have been involved in a broad range of consultation activities. Public displays and open days staffed by members of the project team attracted approximately 4450 people at six different locations across the northern Adelaide region. Feedback has also been received via neighbourhood and stakeholder meetings, emails, phone calls to the project information line, SMS, letters and response forms.

Consultation outcomes demonstrating opposition or support for the project differed depending on the residential location of the respondent. There is a relatively high level of project support amongst Angle Vale residents and there were mixed levels of support (from positive to negative) from residents of Virginia, Penfield and Gawler. The majority of residents who have provided feedback from Macdonald Park oppose the proposed location of the Expressway.

The key issues of concern raised during the consultation include noise, access, visual amenity, route selection, community severance, property acquisition, adequacy of compensation, relocation and dislocation, property values, and quality of life.

Property owners affected by acquisition have been consulted and many who view relocation as an opportunity have begun negotiations for the sale of their property. Some owners have expressed concerns about acquisition requirements or the potential effects on their business. DTEI staff will continue to work with all owners to negotiate positive outcomes for affected property owners and tenants.

The majority of feedback comments received supported the need for the Expressway and were positive about the project. The community is encouraged to continue involvement in the project by making a submission commenting on the Environmental Report and by attending the project open days during March and April 2007.

Community involvement and engagement has been integral to the development of the Northern Expressway Project.

need for the proposal

The Strategic Infrastructure Plan for South Australia identified the completion of the link from the Sturt Highway to Port River Expressway and upgrade of Port Wakefield Road as one of the State's infrastructure priorities.

Justification and benefits of the Northern Expressway

The Northern Expressway has evolved from previous studies undertaken in response to increasing concern about the suitability of the existing National Network route into Adelaide via Main North Road which, between the Gawler Bypass and Gepps Cross, is struggling to meet the demands of a National Network link. Near capacity traffic volumes on Main North Road between Elizabeth and Montague Road, a high crash rate and 22 signalised junctions contribute to considerable delays and interruptions to traffic flow. As a result, long-distance freight vehicles are using Heaslip/Angle Vale Road as an alternative, which is a relatively low standard two-lane route not designed for such purposes.

The Expressway proposal is a key element of the joint Australian and South Australian Government strategy to improve transport links and ensure economic growth. The *Strategic Infrastructure Plan for South Australia* released in 2005 identified the completion of the link from the Sturt Highway to Port River Expressway and upgrade of Port Wakefield Road as one of the State's infrastructure priorities.

The proposed Expressway aims to improve access to Adelaide for freight transport via the Sturt Highway, including freight for export from key areas such as the Barossa Valley wine producing area and the Riverland wine and citrus producing area. Together with the Port River Expressway, it will provide a high standard link between the Sturt Highway at Gawler and the Port of Adelaide, South Australia's main shipping port.

The northern metropolitan area is one of the largest and fastest growing regions of South Australia, making a significant contribution to the State's economy. It has been identified by the Metropolitan Planning Strategy as Adelaide's main growth area, comprising approximately 20% of Adelaide's total population.

Future drivers for economic development are expected to come from the key industries already in the region, which range from manufacturing, defence and information technology to horticulture and viticulture. The Edinburgh Parks development and established major industries such as General Motors Holden form part of a major arc of industry extending from Salisbury/Elizabeth to Outer Harbor, through Cavan, Wingfield and Port Adelaide.

It is expected that industrial and agricultural activity will increase overall by 5% annually over the next 10 years and that all the major roads will experience a significant growth in traffic over the same period.

Without the proposed Expressway, the decrease in operating conditions is expected to result in:

- significant delays at the major intersections on Main North Road and Heaslip Road
- reduced travel times and speeds between signalised intersections on these roads. This is particularly important for commercial vehicle traffic, which is time sensitive. In addition, incidents such as a breakdown or crash are expected to result in significant queues and delays to traffic
- increased crash rates as traffic levels increase. Also, there is expected to be an increase in crashes at access points with vehicles trying to access the arterial roads even though sufficient gaps in the traffic may not occur
- increased use of local roads (rat running) to bypass the poor operating conditions on the major arterial roads. This is expected to primarily occur on the north-south roads (Andrews and Stebonheath roads) as well as on east-west roads such as Curtis and Petherton roads. This would result in reduced pedestrian safety, increased noise and reduced air quality as well as an increase in crashes, primarily at intersections. The deterioration of quality would be significantly worse for the local community than the effects of the proposed Northern Expressway.

The arterial road network within the study area is unlikely to change in the future except for the upgrading of Port Wakefield Road, south of Waterloo Corner Road. If the Northern Expressway is not provided, then Main North Road would require substantial upgrading and widening between Mawson Lakes and Gawler to cater for future traffic volumes. One of the key benefits of the location of the proposed route is that it provides for the maximum transfer of traffic from Main North Road to the Northern Expressway.

Without the Northern Expressway, upgrades of a number of arterial roads in the study area would also be needed to improve safety and access, including Womma Road between Heaslip Road and the Adelaide-Gawler/Barossa rail line, Waterloo Corner Road from Port Wakefield Road to Heaslip Road, and the access roads from the

Gawler Bypass into Gawler. In addition, Heaslip/Angle Vale Road would require upgrading and widening (including duplication) to improve safety and to cater for the expected traffic volumes.

The traffic modelling shows that a number of the arterial roads in the study area will have significant increases in traffic volumes in the future without the construction of the Northern Expressway. The predicted volume increases from 2006 to 2026 (2006 to 2016 for Port Wakefield Road) for the various major roads in the study area are indicated below:

- 17,300 vehicles per day (vpd) to 27,200 vpd on the Gawler Bypass south of Redbanks Road (57% increase)
- 34,000 vpd to 49,200 vpd on Main North Road south of the Gawler Bypass (45%)
- 35,900 vpd to 46,700 vpd on Main North Road at Munno Para north of Womma Road (30%)
- 40,700 vpd to 69,700 vpd on Main North Road at Elizabeth south of Philip Highway (71%)
- 41,300 vpd to 51,300 vpd on Main North Road at Salisbury north of Kings Road (24%)
- 5,700 vpd to 13,000 vpd on Angle Vale Road east of Angle Vale (128%)
- 8,800 vpd to 11,600 vpd on Heaslip Road north of Curtis Road (32%)
- 11,600 vpd to 27,600 vpd on Heaslip Road north of Waterloo Corner Road (138%)
- 14,000 vpd to 23,200 vpd on Port Wakefield Road south of Taylors Road (66%)
- 27,300 vpd to 34,900 vpd on Port Wakefield Road south of Waterloo Corner Road (28%)
- 47,600 vpd to 59,800 vpd on Port Wakefield Road south of Martins Road (26%).

Without the construction of the Expressway, it is predicted that noise, air quality and water quality effects are likely to increase along or adjacent to the National Network roads and urban arterial roads on the existing network due to the expected increases in traffic volumes.

Alternative routes considered and the selected route

A strategic corridor planning study was undertaken by consultants Sinclair Knight Merz (SKM) in 1998 that looked at a number of corridors for an upgraded or new National Network Link through northern Adelaide to link the Sturt Highway with Gepps Cross. These included Main North Road, Port Wakefield Road/Heaslip Road/Angle Vale Road, Port Wakefield Road/Taylors Road/Angle Vale Road, and Port Wakefield Road/Angle Vale Road. This study recommended the Heaslip Road/Angle Vale Road route as the preferred future corridor, because it provided a sound alternative route and greater travel choice in the network, had the lowest overall cost, and had the lowest environmental and social effects.

Between 2003 and 2005, DTEI carried out extensive investigations for a number of alternative routes for the Northern Expressway. These routes were located in the broad area from Heaslip Road to

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The project will provide a faster, safer link between Adelaide and the Barossa Valley, the Riverland, northern Victoria and New South Wales.

west of Angle Vale township. Based on the earlier SKM study, Main North Road and the Port Wakefield Road/Angle Vale Road route (and routes further west) were not considered further. The alternatives were initially based on the alignment developed in the 1998 study, and then modified as constraints and issues were identified during the study.

Five routes were broadly assessed at the preliminary stage. One of these routes located west of Angle Vale provided reduced benefits compared to the other routes close to the existing urban areas. This was due to this route being far less attractive to traffic use. Proximity of the route to the urban areas is a key factor in providing accessibility for these areas, the further away the route, the less use will be made of it.

As a consequence, and given the need to address the congestion and safety issues for Main North Road and to position the route to maximise the advantage it will provide to future residential and industrial (Greater Edinburgh Parks) growth expectations for the northern Adelaide region, it was realised this option, given the considerable investment required, would not deliver a similar return as the other options close to the urban areas. The route west of Angle Vale would not meet the objectives of the project and would result in insufficient economic benefits, and it was therefore not pursued further.

The remaining four routes were developed to a sufficient level of engineering detail to enable them to be assessed under a broad range of parameters covering social, environmental and land use aspects. The four routes were presented at a workshop to select a preferred route for detailed investigation and assessment. The preferred route selected at this workshop broadly ran from Waterloo Corner on Port Wakefield Road, skirted north of the RAAF Base Edinburgh between Macdonald Park and Andrews Farm, and then crossed Curtis Road, Angle Vale Road, Two Wells Road and Gawler River before joining the Gawler Bypass at the Gawler Harness Racing Track.

This route was chosen on balance because it had the least overall adverse effect in terms of the number of residential properties affected by either noise, acquisition or severance whilst having the most non-monetised benefits.

This preferred route was then further developed and refined to optimise the route in terms of attributes, alignment, social and environmental effects and benefits, capital costs, and economic returns.

The proposed route was developed through further discussions with key stakeholders and was modified where it joins Port Wakefield Road just north of Taylors Road. The variation was adopted to allow for a future 500 m extension of the main runway in a northerly direction at the RAAF Base Edinburgh. In addition, this change reduces impact on any development of an intermodal facility to be located between Heaslip and Taylors roads at Waterloo Corner.

Upgrades are also required to Port Wakefield Road, particularly at major junctions, to cater for the substantial increase in traffic when the Northern Expressway is opened. The principles behind the Port Wakefield Road Upgrade are to:

- increase the capacity of signalised intersections to reduce queues and delays
- improve safety by eliminating (where possible) uncontrolled right-turn movements
- improve traffic efficiency and safety by removing (where possible) direct property access to Port Wakefield Road.

Economic and financial assessment

The project provides an important asset for the State and will greatly benefit the regional economy. It will provide a faster, safer link between Adelaide and the Barossa Valley, the Riverland, northern Victoria and New South Wales. By providing transport efficiencies for goods passing through Port Adelaide, it will assist in making exports more competitive.

The Planning Strategy for Metropolitan Adelaide has identified the northern suburbs as Adelaide's most important growth area, both in terms of residential and industrial growth. The highest levels of industrial growth will occur in the arc stretching from Port Adelaide to Gawler, building on the region's strengths in high technology manufacturing including defence, information technology, horticulture and viticulture. Particular opportunities which have been identified are the development of the Edinburgh Parks area for high technology industries and the proposed road/rail intermodal facility at Waterloo Corner.

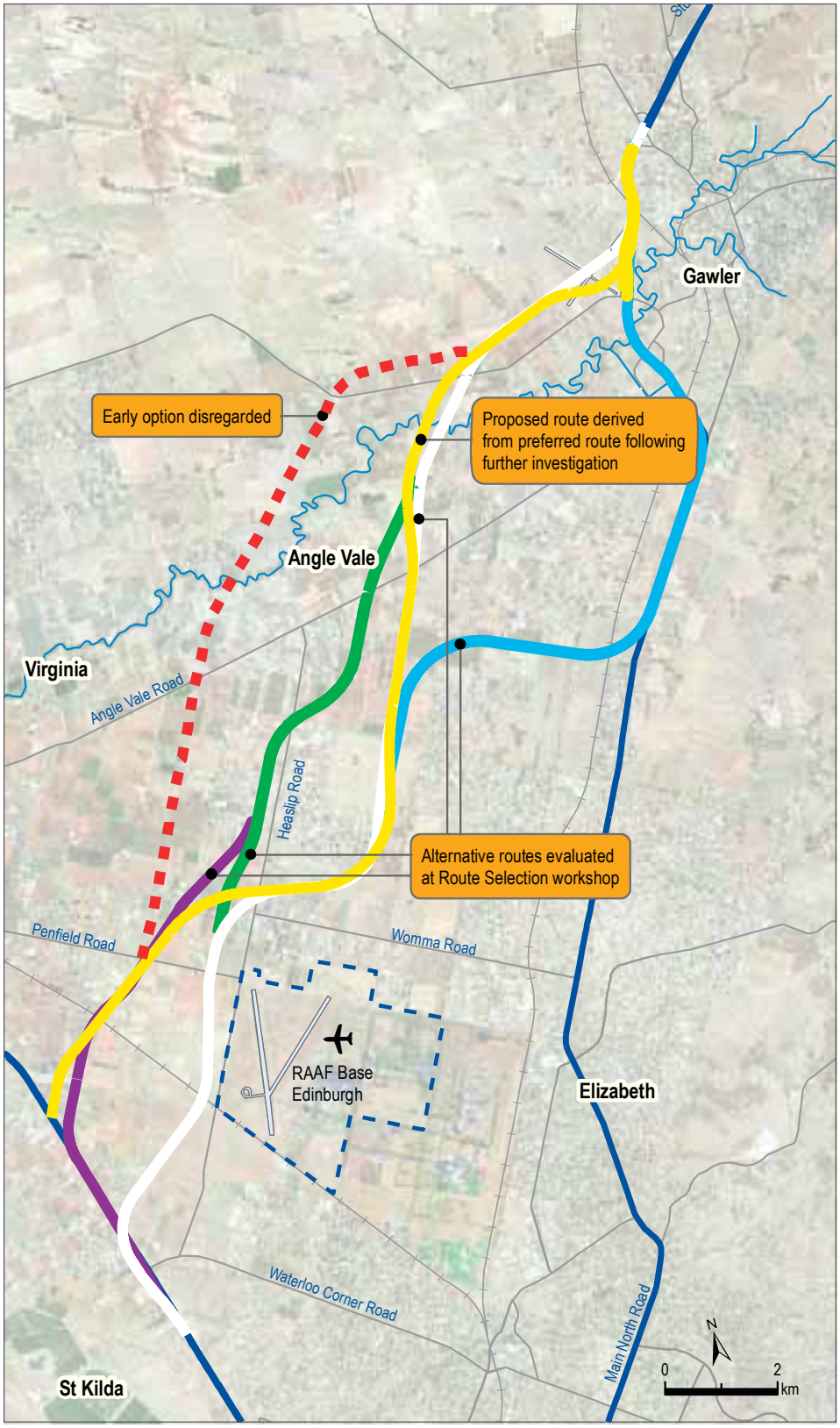
With growing levels of industrial output and significant freight transport growth, transport infrastructure needs to be upgraded.

An economic assessment has been made of those factors that can be reliably measured in monetary terms, so that a conclusion can be reached on whether investment in the project is sound. The factors that were monetised in terms of benefits were:

- travel time savings
- vehicle operating cost savings
- crash cost reductions
- minor residual value benefits (including environmental benefits).

The economic analysis shows that the project has a net present value of $339 million and a benefit cost ratio of 1.6. Maintenance costs for the first 10-year period of the project are estimated to be $24 million in 2006 dollars.

The costs and benefits of the upgrade of Port Wakefield Road are included in this evaluation of the Northern Expressway.



Proposed Northern Expressway route

Figure II **Alternative routes considered**

Note: Route paths maybe obscured by other routes

With growing levels of industrial output and significant freight transport growth, transport infrastructure in the northern suburbs needs to be upgraded.

description of the proposal

Northern Expressway

The proposed Northern Expressway will pass through the Gawler Landscaping Supplies Sports Park (Gawler Harness Racing Track) and the Gawler airfield (glider field), and will pass west of Hillier, east of Angle Vale and Macdonald Park, and west of Andrews Farm and RAAF Base Edinburgh. The length of the new Expressway between the Gawler Bypass and Port Wakefield Road is 23 km. It will be a four lane expressway with restricted access. Grade-separated interchanges will be located at the Gawler Bypass, Curtis Road and Heaslip-Womma roads, with overpasses located at Two Wells Road and Angle Vale Road. The Expressway will pass over the Adelaide-Perth/Darwin rail line at Taylors Road. The intersection with Port Wakefield Road would be signalised at-grade. The fold-out plan illustrates the route in detail.

By 2021, forecast daily traffic on the new road is expected to range from 19,600 vehicles at Gawler to 32,700 vehicles at Waterloo Corner.

The design of the road aims to complement and merge with existing landscape features.

The proposed Northern Expressway will be designed to freeway standard using appropriate Austroads and Australian Standards. It is designed to a speed of 120 km/h, based on an operating speed of 110 km/h. Among other things, this requires a minimum desirable curve radius of approximately 1000 m.

The design of the road aims to complement and merge with existing landscape features. The Urban and Landscape Design Strategy developed for the Northern Expressway seeks to highlight positive characteristics of the corridor and the Northern Adelaide Plains visual catchment while minimising any potential negative effects that the proposed Northern Expressway may have on the surrounding environment.

The width of the road corridor will vary between 70 m and 100 m. Apart from traffic lights at the junction with Port Wakefield Road, access to the proposed Northern Expressway will be restricted to grade-separated interchanges located between 4 km and 7 km apart. These interchanges will be supplemented by overpasses to maintain local connectivity. Other features of the Expressway include:

- parallel lane entry ramps rather than tapered entry ramps at interchanges to make traffic merges safer
- provision of lighting at interchanges
- design speed for ramps varying from 80 km/h up to 120 km/h for merging lanes.

Facilities for pedestrians and cyclists will not be provided along the Expressway corridor; however, facilities to cross the Expressway will be provided on the overpasses.

Bridges, culverts and noise barriers will be designed in accordance with Australian Standards.

The road pavement will be a heavy-duty pavement appropriate for a road of this standard. Likely solutions include full depth asphalt or concrete.

Drainage will be designed in accordance with *Austroads Urban Road Design – Guide to the Geometric Design of Major Urban Roads (2002)*, and DTEI Technical Guidelines. Drainage will be via a central drainage swale, along with other swales either side of the roadway. Water from the swales will flow into existing drainage systems, and detention basins will be provided where land is available within the corridor and at interchanges/overpasses.

The road network will be designed to provide the following flood immunity:

Northern Expressway (cross drainage)	1:100 years
Northern Expressway (longitudinal and road surface drainage)	1:20 years
other affected council distributor and local roads	1:10 years

In general, services will only be affected at the overpass sites where the Expressway crosses local roads. Most underground services will be unaffected by the Expressway as it is a shallow earthworks formation above existing ground level.

Port Wakefield Road Upgrade

The 12 km of Port Wakefield Road between Salisbury Highway and the proposed Northern Expressway intersection is currently a divided four-lane road. It is a controlled access facility; however, some properties currently have direct access to the roadway. The posted speed limit is 90 km/h and the corridor varies between 40 m and 70 m in width. There are three signalised intersections and a further fifteen unsignallised intersections.

The stretch of road is notable for the number of significant utility facilities that cross or use the roadway, including the Epic high pressure gas line, a 275 kV electricity line and the pipeline used to transport treated water from Bolivar to horticultural properties in the Virginia area. A number of utility facilities may need relocating.

The primary purpose of the Port Wakefield Road Upgrade is to increase its capacity to cater for traffic from the Northern Expressway. It will also improve safety, while retaining existing local and regional access. Measures designed to achieve these ends include:

- upgrading several intersections
- installing traffic lights at the intersections with Ryans Road, Martins Road, and with the Northern Expressway
- creating a third southbound traffic lane from Ryans Road to Salisbury Highway
- replacing existing direct access to Port Wakefield Road by access via service roads, where possible
- closing a number of uncontrolled right-turn access points through median closures, modification of connecting roads to provide left in/left out arrangements, and introduction of U-turn facilities
- lengthening acceleration and deceleration lanes
- improving sight distances
- shoulder sealing of 2.5 m where works are undertaken to improve safety.

The works will generally be contained within the current road reserve along Port Wakefield Road. However, in some locations road widening will affect private property and some property acquisition will be required.

The Port Wakefield Road Upgrade will improve safety, while retaining existing local and regional access.

Pedestrian crossings will be provided at the new signalised intersections. Lighting will be upgraded to suit the new intersection arrangements, and will be provided at points where cross-movements are facilitated.

It is expected that the stormwater works will be limited to the extension of existing culverts or pipes, relocation of pits, new sections of kerb and gutter, and regrading grassed swales.

Construction and maintenance

The following timetable is proposed for the project:

Event or activity	Date
Announcement of proposed route	November 2006
Concept design	November 2006 – July 2007
Detailed site survey	November 2006 – July 2007
Design and construct the Port Wakefield Road Upgrade	April 2007 – December 2008
Land acquisition	July 2007 – September 2008
Service relocations	July 2007 – July 2008
Design and construct Expressway and interchanges	September 2008 – December 2011
Open Northern Expressway	December 2011

Overpasses will be constructed early in the project construction period to minimise severance to the local road network.

The proposed construction hours are expected to be between 7 a.m. and 7 p.m. Monday to Saturday, and between 9 a.m. and 7 p.m. on Sunday and public holidays. When necessary, any works outside of these hours will be undertaken to minimise disturbance to local communities.

DTEI will be responsible for maintenance of the Expressway corridor.

A combination of semi-advanced tree planting, tubestock planting, hydro-seeding and direct seeding techniques will be used to establish vegetation along the Northern Expressway and Port Wakefield Road corridor. During the first two years, some watering will take place following planting to ensure high survival rates, after which plants will be reliant on local rainfall. Water will be sourced in accordance with water policy requirements. An extensive weed control program will be carried out prior to all planting or seeding works and on an ongoing basis during the first two years of establishment. Dryland grass areas will be regularly mowed to reduce the fire risk and to maintain an acceptable level of visual amenity.

Construction works will necessitate the removal of a limited number of both native and planted trees, shrubs and grasses. Vegetation within the corridor that is not directly affected by construction works will be retained and protected.

effects of the northern expressway

Social and demographic profile

The proposed Northern Expressway will pass through a significant part of the urban/rural fringe of metropolitan Adelaide and in doing so affects many different communities.

The social and demographic profile of the study area can be described as follows:

- There is a strong contrast between established suburban and rural areas and significant new areas of residential development.
- There are marked differences in ethnic composition across the area.
- Edinburgh stands out as a particular area generating significant employment and with a small and distinct residential component based on the defence services.
- Cars are the dominant mode of transport in the more affluent areas but this is reversed in the low socio-economic suburbs. Fewer people travelled to work by bus or train than the State average.
- The employment base of the study area is concentrated in the more affluent suburbs and the rural areas, with high levels of unemployment in Smithfield Plains, Davoren Park and areas close to Gawler.
- The occupational mix for the study area indicates agriculture and manufacturing/ transport-related activities being dominant along with clerical, sales and trades. Professional occupations have a low representation.

The study area has a significant and comprehensive social infrastructure with education, health, community, emergency and recreation facilities. However, much of this infrastructure is found on the eastern edge of the area in the centres of Gawler, Munno Para, Elizabeth and Salisbury. It therefore becomes important for the proposed Northern Expressway to allow east-west journeys at critical points along its alignment.

While the new Expressway will improve accessibility for many people living and working in the study area and beyond, there are localised concerns, particularly in the rural living areas west of Gawler and in Macdonald Park.

While access to Adelaide will be significantly improved by the new Expressway, initial consultation has revealed concern that the proposed route severs Petherton Road, which connects Macdonald Park with Andrews Farm (and beyond). Curtis Road is an alternative route, although it will involve a longer journey for most local residents, adding one to one and a half minutes to journey times.

There will be positive benefits for local communities. Most noticeably, there will be a large reduction in traffic using Angle Vale and Heaslip roads, particularly heavy vehicles, resulting in improved safety, reduced noise and improved amenity.

The overall improved accessibility will promote more development in the urban fringe area, including Angle Vale and beyond.

The construction of the Northern Expressway will affect local access patterns due to road closures and traffic management delays. A community engagement program will be developed to advise the community about any potential delays or access changes during construction.

Land use and zoning

The land uses along the proposed Northern Expressway can be characterised as follows: on the north-western side, horticulture and agriculture; on the south-eastern side, the northern edge of Adelaide's built-up area.

The 'Virginia Triangle' occupies the western end of the north-western side. It is one of the State's major horticultural districts producing 3% of South Australia's gross value of agricultural production per annum. The district produces a range of vegetable crops in greenhouse, hydroponic and field production systems. The area has the largest concentration of greenhouse structures in Australia, and is a major area of recycled water use. It is an important generator of employment in northern Adelaide.

The expansion of the metropolitan area has been undertaken in an orderly manner and there is generally a clear distinction between rural areas and the built-up area. The South Australian Government has introduced an Urban Boundary that generally follows

There will be positive benefits for local communities. Most noticeably, there will be a large reduction in traffic using Angle Vale and Heaslip roads, particularly heavy vehicles, resulting in improved safety, reduced noise and improved amenity.

Port Wakefield Road to Waterloo Corner and then heads in a north-easterly direction to the north of Munno Para, along the northern boundaries of RAAF Base Edinburgh and the Defence Science and Technology Organisation (DSTO) facility. The Gawler Urban Boundary creates a 3 km buffer between Gawler and Munno Para to the south.

The Northern Expressway route passes through rural land to the north of the built-up area and has been located to minimise severance of communities. The route passes to the south of Virginia and Angle Vale, the only two townships in the vicinity. However, the route does pass between the rural living communities of Macdonald Park/Penfield Gardens and the built-up area of Andrews Farm.

The proposed Northern Expressway route follows a north-east/south-west route that is roughly parallel with the Urban Boundary. The area to the immediate north of RAAF Base Edinburgh should be protected against further development as it is under the flight path of planes using the north-south runway.

It is not envisaged that the Expressway will have any adverse effect on property values in the region. Similar road projects undertaken both locally and interstate show substantial positive demand for properties in proximity to new transport corridors.

Property

Approximately 85 properties will be directly affected by acquisition. This includes properties developed for horticultural and agricultural use, residential properties, the Gawler airfield and the Gawler Harness Racing Track. Either the whole or part of these properties will need to be acquired to create the Northern Expressway corridor. In some cases, a number of facilities on these properties will also need to be relocated or demolished.

The severity of the effect of acquisition on any individual property will be dependent on the current property size, the amount of land proposed to be acquired and the owner's current and intended use for that property.

Where an area of land considerably larger than is necessary for actual road construction is acquired, the residual land will either be offered in exchange to dispossessed owners or sold at a future time. Small otherwise unsaleable parcels of land will be retained and rehabilitated as part of the landscape or drainage components of the Expressway.

It is not envisaged that the Expressway will have any adverse effect on property values in the region. Similar road projects undertaken both locally and interstate show substantial positive demand for properties in proximity to new transport corridors.

Transport

The proposed Northern Expressway will link Port Wakefield Road with Main North Road at the Gawler Bypass. The road network between these two major roads forms a grid oriented on a north-east/south-west and north-west/south-east basis. The exception is Angle Vale Road, in the northern part of the study area, which is oriented in a more east-west direction.

Port Wakefield Road currently carries approximately 15,000 vehicles per day (vpd) at the point where the proposed Northern Expressway would begin. The Gawler Bypass carries approximately 17,000 vpd. By contrast, the most heavily used route between these two (Heaslip Road/Angle Vale Road) has volumes that vary between only 6,000 and 12,000 vpd. Other roads in the study area have less than 5,000 vpd. The Heaslip Road/ Angle Vale Road route is popular for heavy vehicles, which comprise between 16% and 22% of the traffic.

There are many local roads in the area, most of which are sealed but carry fewer than 1000 vpd. The proposed Northern Expressway crosses 16 roads. Access points to the Expressway will be provided at Womma and Heaslip roads and Curtis Road with overpasses at Angle Vale Road and Two Wells Road. In addition, the Expressway will pass over the Adelaide-Perth/Darwin rail line and there will be a bridge over the Gawler River. Eleven roads will be severed as the low traffic volumes and existence of alternative routes do not justify the additional expense of further crossing points. The most significant roads that will be severed are Fradd Road and Petherton Road, both of which carry more than 1000 vpd. Service roads will be provided to maintain access where no alternative property access is available.

Traffic volumes have been predicted, using DTEI MASTEM modelling, for 2011 and 2026, both with and without the proposed Northern Expressway. Without the new Expressway, the expected increases in traffic on Main North

Road by 2011 vary at different points, from 15% increase just south of the Gawler Bypass to over 50% at Elizabeth. Traffic on Angle Vale Road would grow by almost a third, and on Curtis Road near Heaslip Road by about 16%. The 2026 increases are expected to be 45% on Main North Road south of the Gawler Bypass and 71% on Main North Road at Elizabeth and 128% on Angle Vale Road. These increases would have a severe effect on traffic conditions on Main North Road, with traffic levels beyond capacity.

By contrast, the opening of the Northern Expressway is likely to result in these roads experiencing significant decreases in traffic. Angle Vale Road in particular should revert to a quieter rural road with traffic more than halving, especially heavy vehicles. Curtis Road would see an increase just south of the proposed Northern Expressway as it would become an access point to the new road. Also, although traffic on Main North Road south of Elizabeth would not be as heavy as it would have been without the Expressway, it would still increase by up to 50% over 20 years.

Heaslip Road will continue to be the over-dimension vehicle route. The overpasses for minor roads over the Expressway will restrict its use by over-dimension vehicles.

It is also expected that the crash rate will be reduced significantly as at-grade four-way intersections on existing routes are replaced with a freeway with no at-grade intersections.

There are no Adelaide Metro services beyond the built-up area in this region, so the proposed Northern Expressway will have no direct effect on bus or train services.

For safety reasons, cyclists and pedestrians will not be permitted to travel on the Expressway, and no dedicated facilities such as shared-use paths are currently proposed. Cyclists and pedestrians will continue to have access to the local and arterial road network. Where arterial and local roads cross the Expressway, the overpasses will be of sufficient width to accommodate cyclist and pedestrian movements. Local councils will be consulted to ensure that local cycling and pedestrian strategies are suitably accommodated.

The proposed Northern Expressway is considered a significant link in the National Network. The Expressway will improve travel times for all vehicle and truck commuters and reduce delays within the existing road network. Network crash rates are expected to decrease overall with most commercial vehicles being directed away from the adjacent local road network to the high standard freeway with a reduced number of intersections.

This expectation is based on the provision of the Port Wakefield Road Upgrade.

Noise

Noise is a key issue for the Northern Expressway Project. The study area is generally characterised by very quiet background levels due to its predominantly rural setting. There are some areas with higher noise levels, particularly adjacent to the existing road network.

The proposed Northern Expressway will alter the noise environment. There will be increased traffic noise exposure adjacent to the Northern Expressway, and a reduction in noise along parts of the existing network, such as Angle Vale Road, Heaslip Road and Main North Road.

A number of route options were considered as part of the route selection process. The proposed route affects the least number of dwellings within the study area when compared with the other viable options. In addition, it is proposed that the Expressway be built within a 70 m to 100 m road reserve, providing a buffer to existing properties and future developments.

Noise monitoring has been carried out within the study area to identify the existing noise levels and to calibrate the noise model. Detailed noise modelling has been carried out to determine the future noise levels and develop noise treatment measures.

Without the new Expressway, the expected increases in traffic on Main North Road would have a severe effect on traffic conditions, with traffic levels beyond capacity.

Specific target noise criteria have been set and a range of noise treatment measures are proposed to reduce the traffic noise levels. These measures include:

- the targeted use of stone mastic asphalt, which is one of the quietest road surfaces available
- the provision of noise barriers at specific locations along the Expressway
- the provision of individual treatment measures for some isolated houses exposed to high noise levels.

Individual noise treatment packages will be designed for each dwelling that does not meet the specific noise criteria target. The level of treatment will depend on the amount of noise reduction that is required to achieve the noise criteria. Specific noise treatment measures will be developed during the detailed design phase of the project.

The project will not affect any known Aboriginal sites. Aboriginal cultural heritage issues will continue to be managed in consultation with the Kaurna community.

Construction noise will be managed through the development of a Noise and Vibration Management Plan.

Vibration

Vibration effects may cause concern to some residents, primarily during the construction phase of the project. Structural damage is not likely during the construction phase due to the set-back distances of the existing buildings.

A Noise and Vibration Management Plan will be developed prior to construction. Possible measures to reduce vibration effects include:

- vibration monitoring at selected residences less than 25 m from construction activities
- regular community updates advising where and when construction activities may generate perceptible levels of vibration
- minimisation of piling energy (i.e. reduced hammer drop distance) as necessary depending upon receptor distance.

In addition, building condition inspections may be carried out at specific properties within set distances from specific construction activities, such as pile driving and vibration compaction.

Aboriginal heritage

The proposed Northern Expressway is located within the traditional lands of the Kaurna Aboriginal community. An Aboriginal cultural heritage assessment was undertaken to determine the effect of the Expressway on Aboriginal cultural heritage. The assessment involved desktop investigations and a field survey with an archaeologist and members of the Kaurna community.

Six Aboriginal sites previously recorded on the Central Archive of the Aboriginal Affairs and Reconciliation Division of the Department of the Premier and Cabinet, and a further two sites yet to be registered, were identified to exist in the region. The field survey identified and recorded an Aboriginal campsite located on a raised terrace adjacent to the Gawler River and the presence of isolated stone artefacts along the proposed route.

The project will not affect any of the previously registered sites or the site discovered during the field survey. The scattered artefacts will be managed in consultation with the Kaurna community prior to earthworks being carried out, and sensitive archaeological areas will be monitored by Kaurna representatives during construction.

Aboriginal cultural heritage issues will continue to be managed in consultation with the Kaurna community in a way that recognises the

significance of the heritage issues and ensures the appropriate level of conservation.

Non-Aboriginal heritage

The Northern Adelaide Plains were first inhabited by early European settlers in the 1840s. Land in the study area was generally used for agriculture until the 1960s when horticulture was displaced from metropolitan Adelaide by urban development. An assessment has been undertaken to determine the effects of the Expressway on the non-Aboriginal heritage of the region.

The assessment identified that a number of heritage listed places within 500 m of the Expressway were likely to be affected. The level of effect on the majority of the places is considered to be negligible or minor. Seven of the heritage listed places may be affected in a more significant way. While the Expressway is expected to affect some of these heritage places the effects will be managed through the development and implementation of heritage management plans.

Visual effects

The land through which the proposed route passes is very flat, with consistent views of the Mount Lofty Ranges to the east. Some diversity of views is provided by the varying forms of vegetation – the tree-lined Gawler River, windbreaks, the patchwork of horticultural produce and the broad fields of grain. Apart from isolated precincts within western Gawler, Angle Vale and Macdonald Park, built form is not a significant contributor to the character setting of the proposed Northern Expressway, particularly at the western end of the corridor.

Given these conditions, the overpasses and interchanges will become prominent landscape features. The overpasses themselves will provide access points for broader views that would otherwise not be available. There are also opportunities for natural or cultural heritage artwork installations to be located at key locations.

The overpasses at Angle Vale Road and Two Wells Road will be highly visible from the surrounding area, particularly for local residents living in close proximity. Aesthetic considerations will be integral to the design of the bridges which, together with landscape plantings, will minimise the visual effect of the overpasses.

Mounding within the Expressway corridor on the southern side of Macdonald Park will be densely vegetated to provide a visual screen between the road and rural residential area, and to reduce the visual effect of the proposed noise barrier.

A variety of measures will be adopted to mitigate the visual effect of the Northern Expressway. These measures include the following: revegetating the land between the Expressway and ramps; retaining existing trees where possible; planting landmark trees at key locations to provide improved visual amenity; and designing lighting to be sensitive to the effect on residential properties.

Geology, soils and site contamination

Soil and geological conditions along the proposed Northern Expressway corridor vary, but generally consist of fine-grained materials prone to a number of issues including erosion, dust, loss of strength when saturated, and shrinking and swelling with changes in moisture content. These are issues which are readily managed through effective planning and design, and the implementation of environmental management procedures during construction and operation.

A preliminary site contamination investigation will be undertaken during the design phase of the project. Site history investigations will be prepared for sites likely to be contaminated and a Contamination Management Plan will be prepared to manage risks during construction.

The risk of encountering acid sulphate soils on the new Expressway route is considered low. Mitigation and management measures for controlling impacts associated with acid sulphate soils will be developed, should any issues be encountered.

The storage and handling of hazardous substances and dangerous goods associated with project construction issues will comply with relevant Australian Standards, which provide guidance on these issues.

Surface water and groundwater

The area is a natural drainage basin between the Gawler and Little Para rivers. This factor, coupled with the flat nature of the landscape, causes it to be traditionally prone to flooding. Drains were created in the 1970s to mitigate the flood risk; however, flooding occurs on average once every 10 years and is still a regular feature of the landscape. More recent methods to deal with the risk combine flood warnings, physical works and land use planning measures. Significant flood control measures are being undertaken in the catchment and these will greatly reduce the frequency of flooding in the area. These measures will be in place prior to construction of the Expressway.

The area is underlain by a series of aquifers, ranging in depth from 3 m to 10 m, to between 60 m and 100 m. These are heavily drawn upon by local irrigators.

The overpasses will provide access points for broader views that would otherwise not be available. There are also opportunities for natural or cultural heritage artwork installations to be located at key locations.

The air quality modelling indicated that no National Environment Protection Measure limits will be exceeded at the nearest sensitive receptor.

The Expressway crosses the Gawler River and the Smith Creek outfall, the latter being a major drain created in the 1970s.

Road construction projects have the potential to affect drainage and water quality during two distinct phases; the construction phase and the operational phase. The three primary effects include physical changes to drainage infrastructure, changes in hydrological characteristics, and additional pollution loads in local drainage systems and receiving waters.

The Northern Expressway has the potential to cause effects associated with all three of the above aspects during both the construction and operational phases. Primary effects will be associated with the construction of a new road embankment which intercepts the natural migration of flows across the plains, and the creation of a new impervious surface which generates additional stormwater flows and additional stormwater pollution.

Effects during the construction phase will be predominantly associated with erosion and sedimentation, and nuisance drainage problems. These effects will be managed through the implementation of a Soil Erosion and Drainage Management Plan (SEDMP) during the construction phase which will form part of the Construction Environmental Management Plan (CEMP). The SEDMP will address stormwater management during construction and document erosion control measures such as hay bales and silt fences to be used during construction.

Longer term effects associated with day-to-day operation of the Expressway will be related to the disruption to natural flows across the plains, additional stormwater generated from the road surface and any associated pollutants caused by use of the road.

Natural stormwater flow paths will be maintained as much as possible through the provision of culvert openings through the road embankment which will allow surface waters from upstream catchments to continue flowing in the current general direction. The Gawler River crossing will consist of a bridge spanning the full width of the river channel, while the Smith Creek crossing will be designed to minimise any upstream hydraulic effects during the 100 year Average Recurrence Interval (ARI) event.

The extremely flat topography of the area means that drainage across the plains is already challenging, with existing drains often unable to cope with local stormwater flows, although the flood mitigation measures that will be undertaken prior to the Expressway opening will reduce this risk. Drainage infrastructure within the Expressway corridor will consist of a combination of swales, pits and pipes, and detention basins to ensure any local drainage problems are not exacerbated. Stormwater treatment devices and spill containment measures will be provided prior to the discharge of any flows to the Gawler River and Smith Creek. The sizes and locations of structures and treatments will be determined during the detailed design phase of the project and will be integrated with the landscape design treatments.

It is not expected that the project will have a significant effect on groundwater, due to the depth of the groundwater and the shallowness of excavation. The project is not expected to cause any changes to groundwater levels.

Air quality

The existing air quality levels in the study area are influenced by the regional land uses such as urban development, agriculture and commercial industry.

An air quality assessment was undertaken to determine the effects of the proposed Northern Expressway on the existing air quality of the study area and to determine if any air quality criteria would be exceeded in the future at any sensitive receptors, such as houses and schools.

Specific air quality limits have been adopted from the relevant National Environment Protection Measures (NEPM). The air quality modelling indicated that no NEPM limits will be exceeded in 2011 and 2021 at the nearest sensitive receptor.

Construction of the road has the potential to generate dust, which will be controlled through the use of a range of best practice measures including:

- the provision of a temporary gravel surface or temporary seal on haul roads
- watering areas that are a source of dust
- construction of wind fences to restrict dust generation at particularly sensitive areas.

Greenhouse gases

A detailed assessment of greenhouse gases from vehicle emissions will be undertaken and will be reported in the Supplement document.

The Northern Expressway will attract some of the vehicles travelling on the surrounding roads and provide them with a more direct and efficient travel route.

The greenhouse gas emissions generated during construction can only be calculated once the construction methodology has been determined. Emissions will be generated by a variety of activities including haulage of materials and the construction of structures. These emissions will be minimised through measures such as adherence to efficient maintenance schedules.

Flora

Native vegetation has been extensively cleared within the study area. Therefore remnant areas and species of native vegetation that still remain in the region are extremely valuable, both intrinsically and as examples of the past biodiversity of the region. Some of the best quality remnant vegetation exists along the Gawler River corridor, with other remnant patches occurring within road reserves and private properties.

A small amount of native vegetation will require removal during the construction of the Northern Expressway. A detailed vegetation survey will be carried out during the design phase to determine the exact removals required.

There is a large number of introduced plant species in the region. As part of the Environmental Management Plan for the Expressway, a Weed Management Plan will be prepared for the construction phase to minimise the spread of weeds throughout the study area.

A Vegetation Management Plan will be prepared detailing the proposed revegetation program to offset the removals.

Fauna

Habitat for fauna species within the study area is highly degraded and is dominated by modified agricultural and horticultural lands. Small areas of river red gum woodland associated with riparian zones around the Gawler River, and some areas of open grassland still exist. The river red gum woodlands along the Gawler River provide critical habitats for birds, bats and reptiles, with hollows in mature trees important for breeding. Revegetated areas along road reserves and within private properties provide further habitat.

The lack of fauna habitat within the study area places a high importance on protecting the integrity of remaining habitats. Disturbance of all habitats will be avoided if possible. Management measures will be undertaken in accordance with the project's Environmental Management Plan if disturbance cannot be avoided.

Given that the survey area and surrounding region is already a highly disturbed and degraded environment, no significant adverse effect on fauna in the region is anticipated as a result of the project.

Summary of Northern Expressway effects

The key features to note regarding the proposed Northern Expressway are:

- provision of a new freeway standard freight and commuter link servicing the northern metropolitan region and beyond, connecting the National Network to the Port of Adelaide, thereby supporting continued high levels of growth and activity
- modification of local access arrangements, improving convenience and accessibility for many, whilst reducing accessibility and convenience for others (including residents of Ward Belt and Macdonald Park). Congestion on Main North Road and Heaslip Road will be improved, as will safety
- increased noise will affect those residential properties close to the Expressway. Noise management measures will be put in place for those properties affected, based on a range of mitigation measures. The number of properties affected has been kept to a minimum by locating the Expressway away from the more intensely settled areas
- minimal effect on flora, fauna and cultural heritage. No referral under the EPBC Act is proposed given the low possibility of affecting any flora or fauna species or communities listed under the Act
- establishment of landscaping at entry points and key locations along the Expressway to improve visual amenity, and integration of landscaping with stormwater management
- it will facilitate and enable change in the region.

There will be positive benefits for local communities. Most noticeably, there will be a large reduction in traffic using Angle Vale and Heaslip roads, particularly heavy vehicles, resulting in improved safety, reduced noise and improved amenity.

effects of the Port Wakefield Road upgrade

Social and demographic profile

With land use divided so markedly by Port Wakefield Road, the social and demographic profiles of each side of the road also vary. The social and demographic profile of the study area can be described as follows:

- There are a range of age groups with a significant proportion of children aged 0–4 years.
- The area as a whole has a lower educational attainment level than the rest of South Australia.
- There is a higher proportion of home ownership within horticultural areas.
- There is a higher proportion of households purchasing a home in the newer suburbs such as Paralowie and Mawson Lakes.
- Cars are the dominant mode of transport. There is a large percentage of households with two cars.
- The occupational mix for the study area indicates manufacturing and agricultural activities being dominant.
- The horticultural areas have a relatively large number of people for whom English is not their first language. This has implications for consultation strategies for the Port Wakefield Road Upgrade.

The effects of the Port Wakefield Road Upgrade on communities and individuals are characterised by:

- minimal effect on land and house acquisition with the main changes being some minor land acquisition to improve sections of the road alignment
- accessibility effects mainly caused by the creation of a new service road at Globe Derby Park, restrictions involving median closures, and left-turn only access on and off Port Wakefield Road
- minimal effects on commercial areas along Port Wakefield Road, particularly the Bolivar area, where current operations of the hotel, caravan park and petrol-filling station are sensitive to changes in access
- improvements to the intersections at Waterloo Corner Road, Bolivar Road, Martins Road and Ryans Road improving the overall capacity and safety of Port Wakefield Road
- improvement in accessibility for communities and more convenient and time-saving access to the northern suburbs employment market and the CBD.

The Port Wakefield Road Upgrade will result in improvement in accessibility for communities and more convenient and time-saving access to the northern suburbs employment market and the CBD.

The traffic arrangements that will result from the Port Wakefield Road Upgrade will improve access to the road at some points and require change at others. There will be improvements to safety throughout.

Port Wakefield Road Upgrade will require specific management measures at the construction and post-construction phases to keep the community well informed about access disruptions.

Land use and zoning

The coastal areas to the west of Port Wakefield Road are non-urban, but the land use varies significantly. Land use policies in the St Kilda area are designed to protect the local coastal environment while enhancing the area's attractiveness to visitors. Most of the 7 km between Port Wakefield Road (Waterloo Corner) and St Kilda is zoned for horticultural use. Further to the south, the Bolivar area is dominated by the Bolivar Wastewater Treatment Plant, with land to its east used as a buffer.

To the west and south are approximately 4000 ha zoned as extractive industry for the Dry Creek salt fields. Globe Derby Park (with its trotting track) lies between the treatment works and Dry Creek, alongside Port Wakefield Road. Some of the rural living and horticultural allotments nearby have direct access only onto Port Wakefield Road, and so their access needs to be considered in the upgrading of the road.

Part of Port Wakefield Road forms part of the Urban Boundary, and to the immediate east of the road are the suburbs of Green Fields, Parafield Gardens, Paralowie and Burton.

There is also a light industrial area adjacent to Port Wakefield Road, between Ryans Road and Shepherdson Road. This area also has two major electricity transmission lines from the Torrens Island Power Station. Wetlands, the result of the City of Salisbury's vigorous policies in this regard, feature at several points.

The course of the Little Para River between Salisbury and Globe Derby Park has been developed as a linear park. This area is subject to localised flooding, and land use zoning sets aside land to avoid properties being inundated.

To the north of Burton is Waterloo Corner, which is zoned as industry and deferred industry. Currently, the land adjacent to Port Wakefield Road has a variety of light industrial and commercial uses, most of which are designed to take advantage of the low cost land and passing commercial vehicle traffic. Most have access from service and other adjacent roads, but some enterprises are directly accessed from Port Wakefield Road.

Changes in access to and from Port Wakefield Road are likely to lead to some minor to medium effects on land use in the commercial, industrial and horticultural areas adjacent to the road and minimal effects on the residential areas within the study area adjacent to Port Wakefield Road.

Property

The majority of the proposed upgrade works to Port Wakefield Road will be accommodated within the existing road reserve; however, some portions of land will need to be acquired from private owners.

Transport

Port Wakefield Road is an important link in the National Network, being both Adelaide's principal means of access to Western Australia and the Northern Territory and designated to take B-doubles, double road trains, and over-dimension and articulated vehicles. Along with Heaslip and Angle Vale roads, it has also emerged as a faster, more convenient alternative to Main North Road for vehicles travelling from Adelaide en route through regional South Australia to New South Wales.

Port Wakefield Road also provides a critical role in the road network of northern metropolitan Adelaide. Arterial roads linking with the southern section of Port Wakefield Road include Salisbury Highway, Bolivar Road and Waterloo Corner Road. Salisbury Highway provides a direct link from Port Wakefield Road to the Port River Expressway. It helps to structure the local road network of the built-up area to the east of the road by forming a grid pattern at 45° to the road. Port Wakefield Road is also the only means of access for people living to the west of the road, as well as for Adelaide's main wastewater treatment plant at Bolivar.

Port Wakefield Road is a significant freight route for South Australia forming an essential link in the National Network. The local road network connects with primary freight routes, secondary freight routes, primary social access routes and primary tourism routes.

Existing traffic volumes along Port Wakefield Road are currently in the range of 14,000 vpd (northern) and up to 48,000 vpd (southern). The proportion of commercial vehicles is approximately 15%. It is anticipated that this proportion of commercial vehicles is likely to remain unchanged throughout the operational lifespan of the Port Wakefield Road Upgrade.

Traffic volumes along Port Wakefield Road are expected to increase as a result of the proposed Northern Expressway.

Intersections along Port Wakefield Road will require significant upgrading to accommodate the increased levels of traffic. This includes the junctions of Port Wakefield Road with Waterloo Corner Road, Bolivar Road, Ryans Road, Martins Road, Globe Derby Drive and, to a lesser extent, with Salisbury Highway. As a result of the proposed Northern Expressway, the number of access points along Port Wakefield Road will be reduced as a safety measure. However, service roads alongside Port Wakefield Road will be provided where possible to uphold direct access to local roads and abutting properties reducing the impacts on local road users. Alternative routes for motorists, pedestrians, cyclists and equestrians will be determined prior to local road closures.

With the Expressway, there will be a slight worsening of conditions north of Waterloo Corner Road but still within acceptable conditions. South of Waterloo Corner Road, particularly at intersections, the conditions may be slightly worse. It is anticipated that the proposed improvements will provide sufficient capacity to 2016. A planning study will be carried out to determine the future needs of Port Wakefield Road beyond 2016.

Public transport along Port Wakefield Road consists only of bus services. Bus services may be affected where two bus stops located at Symes Road and Taylors Road will be merged into a single bus stop.

The proposed upgrade is expected to reduce the number of crashes along Port Wakefield Road initially. However, this will be offset by the increase in traffic generated by the Northern Expressway. All traffic will be monitored as a result of local road closures, ensuring the safe and efficient flow of traffic

…a safe and efficient roadway with minimal adverse impacts on the local surrounding community and road commuters.

along and surrounding Port Wakefield Road Upgrade, both prior to construction and post-construction.

With the proposed Northern Expressway, the Port Wakefield Road Upgrade will accommodate increased levels of traffic, providing a safe and efficient roadway with minimal adverse impacts on the local surrounding community and road commuters.

The Port Wakefield Road Upgrade will result in a reduction of direct access to Port Wakefield Road from some local roads and abutting properties. Service roads will be provided wherever possible to reduce the effect upon local road users.

Noise

The residential areas adjacent to Port Wakefield Road currently experience high noise levels, due to the existing traffic volumes. These residential areas will experience some increases in traffic noise due to the additional traffic from the Northern Expressway. The targeted use of low noise surface treatment such as stonemastic asphalt will be considered for new road surfacing. A planning study will be carried out to determine the future needs of Port Wakefield Road beyond 2016. A comprehensive noise assessment will be carried out as part of the planning study to determine the appropriate level of noise treatments required.

Noise during construction of the Port Wakefield Road Upgrade will be managed through the development of a Noise and Vibration Management Plan.

Vibration

The effects of vibration for the Northern Expressway apply equally to the Port Wakefield Road Upgrade and are not repeated here. (Refer page 16).

Aboriginal heritage

Port Wakefield Road is located within the traditional lands of the Kaurna Aboriginal community. The proposed Port Wakefield Road Upgrade will avoid all currently known and recorded Aboriginal sites. The upgrade will be constructed almost entirely within the existing road reserve, and as the road reserve is highly disturbed, there is a low probability that any surface Aboriginal sites would be found.

Aboriginal cultural heritage issues will continue to be managed in consultation with the Kaurna community in a way that recognises the significance of the heritage issues and ensures the appropriate level of conservation.

Port Wakefield Road is an important link in the National Highway network, being both Adelaide's principal means of access to Western Australia and the Northern Territory and designated to take B-doubles, double road trains, and over-dimension and articulated vehicles.

Visual effects

The quality of the existing visual environment along Port Wakefield Road is generally poor. Distant views of the Mount Lofty Ranges, the Greenfields wetlands and the landscape of Dry Creek salt fields are the most interesting features. Land use varies from horticultural and agricultural, to residential, light industrial and retail. This diverse mix of land use contributes to a landscape which is visually cluttered.

The proposed upgrade would have little effect on the existing visual environment. The local topography is flat and as all the proposed changes are to remain

The formalisation of service roads, verges and other edge treatments will improve the appearance of the traffic infrastructure. Where lighting is proposed to improve safety at intersections, directional lighting will be used to minimise the possible spill of light into residential areas.

at-grade, the visual effect of the changes would be negligible. The landscape works would not significantly change the visual environment as the primary focus is on replacing vegetation removed to accommodate the upgrade works and on remediating the site to its existing condition.

The formalisation of service roads, verges and other edge treatments will improve the appearance of the traffic infrastructure. Where lighting is proposed to improve safety at intersections, directional lighting will be used to minimise the possible spill of light into residential areas.

Geology, soils and site contamination

The soil profile consists of a sandy topsoil horizon overlying brown and red brown silty and sandy clays of medium and high plasticity. This poses possible problems during construction including dust, wind erosion and water erosion of silts. Other issues concern possible contamination of the soil by hydrocarbons (oil, petrol, etc.) during construction and operation. The assessed risks, effects and management approaches identified for the Northern Expressway also apply for the Port Wakefield Road Upgrade.

Surface water and groundwater

Drainage conditions within the study area are characterised by Dry Creek and Little Para River to the south, the Helps Road drain to the north and a series of smaller, local drainage systems, some of which discharge to the major drainage systems to the west of Port Wakefield Road and some of which have separate outfalls. All the major drainage systems are currently at 100 year ARI event capacity in the vicinity of Port Wakefield Road, as are the crossings of Port Wakefield Road.

Port Wakefield Road passes through the area known as the Northern Adelaide Plains Prescribed Wells Area. The area contains relatively fertile soils underlain by a series of water-bearing beds of sand, gravels and limestone aquifers. Over-extraction of the Tertiary aquifers of the plains has led to the creation of pronounced cones of depression centred around Waterloo Corner and Virginia. Salinity of groundwater within the study area is currently considered fair, but is at risk of becoming unacceptable with increased over-extraction.

The surface watercourses along Port Wakefield Road are of variable quality. A number of water quality improvement

facilities such as Greenfields wetlands, the Paddocks wetlands, Kaurna Park wetlands and numerous other small stormwater wetlands have been constructed throughout the catchment in an effort to reduce the load of stormwater pollutants reaching Barker Inlet.

The proximity of Port Wakefield Road to the marine environment (Barker Inlet) means that efforts will need to focus on preventing any increased stormwater pollution leaving the corridor, particularly during construction.

As for the Northern Expressway, Port Wakefield Road Upgrade has the potential to affect water resources during two distinct phases, construction and to a lesser extent, operation.

The Soil Erosion and Drainage Management Plan prepared during the design phase will be implemented, addressing stormwater management and documenting erosion control measures.

Air quality

The existing air quality levels in the study area are influenced by regional land uses such as urban development, agriculture and commercial industry.

An air quality assessment was undertaken to determine the effects of the Port Wakefield Road Upgrade on the existing air quality of the study area and to determine if any air quality criteria would be exceeded in the future at any sensitive receptors, such as houses and schools.

Specific air quality limits have been adopted from the relevant National Environment Protection Measures. Based on the air quality modelling predictions, all NEPM limits will be met at the nearest sensitive receptor.

Greenhouse gases

A detailed assessment of greenhouse gases from vehicle emissions will be undertaken and reported in the Supplement document.

Flora

Port Wakefield Road passes through a disturbed and degraded area with relatively little native vegetation still remaining. Most of the roadside corridors are weed-infested or contain areas of planted native vegetation.

An area of remnant mature river red gum woodland associated with the Little Para River flood plain may be affected by the removal of a small number of mature river red gums from the central median area and roadsides from Bolivar Road south to the Little Para River crossing. Mature planted sugar gums may also be removed from this area. The areas of wetlands and remnant samphire shrubland are unlikely to be adversely affected.

A number of proclaimed and environmental weed species exist within the study area. A Weed Management Plan will be prepared as part of the project's Environmental Management Plan to manage these weeds and to ensure they are not introduced to private properties or spread throughout the construction corridor.

The effect of the Port Wakefield Road Upgrade on vegetation along the corridor is considered to be minor. Vegetation removed will be replaced with appropriate species in a nearby location.

The Soil Erosion and Drainage Management Plan prepared during the design phase will be implemented, addressing stormwater management and documenting erosion control measures.

Fauna

Fauna habitat along Port Wakefield Road is dominated by highly modified and degraded agricultural and horticultural land, but also includes artificial wetlands (Barker Inlet wetlands and Greenfields wetlands), samphire shrubland, mangrove woodlands, and river red gum woodlands associated with riparian zones along watercourses. Revegetation areas also exist, primarily as woodlands and tall shrublands associated with landscaping and amenity plantings.

Some minor habitat fragmentation may be associated with the upgrade. Given the highly disturbed nature of the region and the minimal works associated with the upgrade of Port Wakefield Road, effects on native fauna are expected to be minimal. Disturbance of all habitats will be avoided if possible. Management measures will be undertaken in accordance with the project's Environmental Management Plan if disturbance cannot be avoided.

Given the highly disturbed nature of the region and the minimal works associated with the upgrade of Port Wakefield Road, effects on native fauna are expected to be minimal. Disturbance of all habitats will be avoided if possible.

Summary of Port Wakefield Road Upgrade effects

The key features to note regarding the proposed upgrade of Port Wakefield Road are:

- there will be no change to the existing alignment
- most of the roadworks will be contained within the existing road reserve, meaning that property acquisition will be minimal
- all intersections will remain at-grade, thereby avoiding issues of visual intrusion, higher noise levels and significantly reduced access to adjacent properties.

The land through which Port Wakefield Road runs is already highly disturbed, with the upgrade providing the potential to remediate some aspects, particularly those of a visual nature.

The most significant effects will be in terms of accessibility for those joining, leaving and crossing Port Wakefield Road in the study area. Intersection upgrades and the introduction of controlled access for safety reasons will limit such movements by:

- channelling traffic onto local and arterial roads, to access Port Wakefield Road at safe points
- removing direct frontage onto the roadway where possible
- imposing some right-turn bans, requiring slightly more circuitous travel, including U-turns.

The effects will vary at different points on the route, with some access being made more convenient as well as safer at some points. However, the access to the road will be a sensitive issue, particularly during construction. This should be handled through clear and early information regarding the effects of the upgrade on accessibility, including during construction, with careful design used to minimise negative effects on accessibility.

environmental management

In accordance with the Government's commitment to a variety of sustainability strategies, a number of sustainability principles have been defined for the Northern Expressway project. These project-specific principles have guided the development of the concept design and will continue to guide the development during the design, construction and operational phases of the project.

The key environmental objectives for the next phases of the project include:

- minimising the effects on community accessibility
- minimising the effects on existing land uses
- minimising the effects on properties to be acquired
- minimising adverse effects on the transport network
- minimising the effects of noise on the local community
- minimising the effects of vibration on structures and the local community
- preventing or minimising disturbance to significant cultural heritage sites
- minimising negative visual effects and enhancing visual opportunities
- avoiding contamination of soils and managing contaminated sites affected
- preventing pollution of water and maintaining existing natural surface water flow
- minimising the effects of air quality on the community
- reducing greenhouse gases associated with the construction and use of the road
- preventing or minimising disturbance to native vegetation and the spread of weeds and disease
- preventing or minimising disturbance to native fauna and their habitat.

The construction of a major road infrastructure project will have effects on the community and the environment. The assessments undertaken as part of the Environmental Report have identified a number of environmental management and monitoring measures to help achieve the environmental objectives and to ensure that DTEI is meeting its legislative responsibilities.

An Environmental Management Plan (EMP) will be developed for the project. The EMP is a project-specific source document detailing the environmental protection requirements to mitigate and minimise environmental effects. The EMP's primary purpose is to ensure that the environmental requirements and commitments associated with the project are carried forward into the construction and post-construction phases of the project and are effectively managed.

The EMP will form part of the construction contract. It provides the basis for the construction contractor to develop and document how the environmental management requirements will be implemented on site through the production of a Construction Environmental Management Plan (CEMP).

A number of sustainability principles have been defined for the Northern Expressway project.

Environmental audits will be undertaken during the construction phase and will identify if the environmental objectives are being met. The audits will also identify any non-conformances with relevant environmental legislation, the EMP, the CEMP and the requirements of the construction contract.

DTEI will be responsible for the ongoing maintenance and environmental performance of the Northern Expressway.

how you can have your say

The Environmental Report has been prepared to describe the Northern Expressway proposal and to evaluate its potential environmental, social and economic effects.

Interested parties are invited to submit written comments on the Environmental Report. All submissions received will be considered by the Department for Transport, Energy and Infrastructure and a response to relevant submissions will be provided in a Supplement Report. The Environmental and Supplement Reports will be considered prior to finalising the proposed route for approval by the South Australian Government.

The Environmental Report can be viewed from mid March 2007 until Thursday, 19 April 2007 at the following locations:

***Service SA** **Government + Legislation Outlet** 101 Grenfell Street ADELAIDE SA 5000	**Playford Civic Centre Library** 10 Playford Boulevard ELIZABETH SA 5112	**Len Beadell Library** 55 John Street SALISBURY SA 5108
***Service SA** **Customer Service Centre** EDS Centre 108 North Terrace ADELAIDE SA 5000	**Playford Library** Shop 51 Munno Para Shopping City 600 Main North Road SMITHFIELD SA 5114	**Gawler Public Library** Institute Building 91 Murray Street GAWLER SA 5118
***Service SA** **Customer Service Centre** Northern Market Shopping Centre Cnr Murray Street and Cowan Street GAWLER SA 5118	**Salisbury West Library** Hollywood Boulevard SALISBURY DOWNS SA 5108	**Kapunda Public Library** 51–53 Main Street KAPUNDA SA 5373

Interested parties are invited to submit written comments on the Environmental Report. All submissions received will be considered by the Department for Transport, Energy and Infrastructure and a response to relevant submissions will be provided in a Supplement Report.

The Environmental Report can be viewed online at www.northernexpressway.sa.gov.au. If you wish to purchase the report, printed copies will be available from mid March 2007 until Thursday, 31 May 2007 at a cost of $88 from:

- Service SA Outlets marked with an asterisk (*)
- Service SA Online Shop at www.shop.service.sa.gov.au ($88 plus postage)
- Service SA Customer Contact Centre on 13 23 24 to mail order a copy ($88 plus postage).

For a complimentary copy of the Executive Summary and CD containing the Environmental Report and Technical Papers, please call 1300 658 621 or email northernexpressway@saugov.sa.gov.au.

how you can have your say

How to make a submission

You can comment on any aspect of the proposal, but it must be in writing. You may include:

- the nature of your interest in the proposal
- your opinions on the proposal
- any suggestions about alternatives or improvements to the proposal
- any additional measures you consider necessary to adequately protect the environment
- any errors or omissions in the Environmental Report
- any additional factual information you have, and its source
- any other aspects relevant to the proposal.

To assist our recording of your submission:

- include your name, address and date
- list points wherever possible – this makes the issues clearer
- refer each point to the appropriate section of the Environmental Report
- ensure that your submission is legible, if hand written.

All submissions will be public documents unless confidentiality is requested. The Department for Transport, Energy and Infrastructure may be challenged about this confidentiality through the *Freedom of Information Act 1991.*

Where to send your submission

Mark your submission as a 'Public submission on the proposed Northern Expressway' and forward by letter, fax or email on or before **5pm** on **Thursday, 19 April 2007** to:

Project Director
Northern Expressway
Department for Transport,
Energy and Infrastructure
Reply Paid 1
WALKERVILLE SA 5081

Fax: (08) 8343 2005
Email: northernexpressway@saugov.sa.gov.au

Open Days

You are encouraged to attend Open Days, where project staff will be available to discuss the project and answer questions. The Open Days will be held at the Playford Civic Centre, 10 Playford Boulevard, Elizabeth on:

- **Saturday, 24 March 2007 from 10am to 4pm** (information sessions at 11am, 1pm and 3pm)
- **Monday, 26 March 2007 from 6pm to 9pm** (information session at 7pm).

You are invited to attend Open Days, where project staff will be available to discuss the project and answer questions. The Open Days will be held at the Playford Civic Centre.

For more information

Visit the project website:

www.northernexpressway.sa.gov.au

Contact the project team:

Information line **1300 658 621**

Interpreter information **1300 658 621**

Email **northernexpressway@saugov.sa.gov.au**

Text message (SMS) **1999NEXY**

SMS cost is 25c per message of up to 160 characters regardless of carrier.

Για περισσότερες πληροφορίες γι' αυτό το πρόγραμμα οδοποιίας τηλεφωνήστε στο **1300 658 621**. Διαθέτουμε και διερμηνείς.

Se desiderate altre informazioni su questo progetto stradale telefonate al **1300 658 621**. Ci sono interpreti a disposizione.

Để có thêm thông tin về công trình đường bộ này xin hãy gọi điện thoại số **1300 658 621**. Sẽ có phiên dịch viên.

[illegible] **1300 658 621**. [illegible]

NORTHERN EXPRESSWAY