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## Department of Main Roads

### Kenmore Bypass Preliminary Feasibility Study Summary Report



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## 1. Background

This document is a summary of the Kenmore Bypass Preliminary Feasibility Study completed in October 2007.

The Department of Main Roads (DMR) commissioned GHD to undertake a preliminary feasibility assessment of a proposed Kenmore Bypass along a preserved Moggill Pocket Sub-Arterial corridor. This corridor was planned in the late 1970s and preserved since then with property acquisition based on the planning layouts, to assist in meeting the future traffic demand in the Moggill Pocket region.

The proposed Kenmore Bypass is a three-kilometre link between Moggill Road at Pullenvale and the Centenary Highway at Fig Tree Pocket. Both of these roads are operating near or at capacity. Consistent growth in traffic along Moggill Road has resulted in a decreased level of service and an increase in concerns related to road safety and travel times. The Department of Main Roads has identified a bypass of Moggill Road, using the preserved corridor, as a potential solution to address the long-term transport needs in the Kenmore-Moggill area.

## 2. Planning Study Stages

The Kenmore Bypass Planning Study is a strategic planning investigation to assess the need and preferred alignment for a possible transport solution within the Kenmore Bypass corridor. The study involves a number of activities, which can be divided into three main stages of work:

- » **Stage 1A:** Preliminary Transport Modelling;
- » **Stage 1B:** Preliminary Feasibility; and
- » **Stage 2:** Options Analysis, Community Engagement, Finalisation of Concept Planning (Business Case Development) and Preliminary Design.

This document reports on Stage 1B, the Preliminary Feasibility Study.

## 3. Primary Objective and Scope of Preliminary Feasibility Study

The primary objective of the Preliminary Feasibility Study is to investigate the technical feasibility of a possible Kenmore Bypass between Moggill Road and the Centenary Highway interchange and to identify any major issues affecting the feasibility of this option. The aim of the study is not to find the best solution but rather to identify whether viable options exist. The study is based on limited information gathered during the assessment process and identifies risks to the proposal that will require further detailed investigations should a decision be made to proceed to the Options Analysis phase.

The scope of the study is:

- » To undertake a non-intrusive desktop study;



- » To assist DMR in deciding whether to continue to the Options Analysis phase (Stage 2);
- » To identify potential critical issues and risks for future investigations; and
- » To develop a Community Engagement Plan to be used for stakeholder consultation.

Additional work was also conducted as part of the study including:

- » A preliminary feasibility investigation of the effect of enabling increased operating speed of the Centenary Highway by increasing the radius of the existing 80 km/hr curve in the area of the possible Kenmore Bypass interchange; and
- » Developing a concept plan for the upgrading of Moggill Road between Marshall Lane and Kilkivan Avenue, including a multi-criteria analysis comparison with the proposed Kenmore Bypass.

## 4. Key Study Findings

### 4.1 Overview

The Preliminary Feasibility Study found that the proposed Kenmore Bypass is technically feasible. Significant land acquisition would be required to construct an interchange with the Centenary Highway. It may be possible to reduce land acquisition by the construction of retaining walls and by relaxation of the design speed.

### 4.2 Key Benefits of Kenmore Bypass

Analysis of the traffic impacts and benefits formed part of Stage 1A of the project, undertaken by Cardno Eppell Olsen. The detailed findings of the study are presented in the Strategic Modelling Report and the outputs were used as a basis for a capacity analysis and preparation of a preliminary cost-benefit assessment for the possible Kenmore Bypass.

Key outcomes from the Strategic Modelling Report if the bypass is constructed are:

- » Traffic demand for the bypass is estimated to be 19,000 to 25,000 vehicles per day (vpd) in 2026, depending on the configuration adopted;
- » Reduction of traffic demand on the section of Moggill Road between Pullenvale Road and west of Fig Tree Pocket Road in 2026 is expected to be 30% to 50% of the traffic volumes that would use Moggill Road should a bypass not be constructed. Predicted traffic demand for the same section of Moggill Road with a Kenmore Bypass in 2026 would be 20 to 40% below 2004 traffic demand.
- » A reduction in 'rat running' on local streets to avoid congested areas is likely to be experienced; and
- » Traffic demand along the section of the Centenary Highway between the Centenary Bridge and Moggill Road interchange can be expected to increase.

### 4.3 Key Impacts of Kenmore Bypass

Investigations undertaken in the Preliminary Feasibility Study identified a number of impacts expected from the provision of a new transport link within an undeveloped corridor. These include amenity and environmental impacts. Additional land resumption (beyond current planning) may also be required to accommodate interchange arrangements with the Centenary Highway.



#### **4.4 Preliminary Cost – Benefit Assessment**

Preliminary assessments were developed for cost comparison purpose only. The estimates are neither detailed nor suitable for budgeting purposes. Significant contingency has been included to reflect both the maturity of the planning stage and the estimation process. The indicative cost for the possible Kenmore Bypass ranges between \$330 million and \$490 million for different preliminary interchange options including contingencies at the Centenary Highway interchange. The estimate excludes the cost associated with the upgrade of the Centenary Highway. If the interchange with the Centenary Highway (with western point being Kenmore Road) is excluded, the cost estimate of all the options is the order of \$210 million including contingencies. Preliminary cost-benefit assessments conducted for the most expensive options concluded that the benefits outweigh the costs.

#### **4.5 Preliminary Concept Plan for Moggill Road Upgrade and MCA**

The study included development of a preliminary concept plan for the upgrading of Moggill Road between Marshall Lane and Kilkivan Avenue, including a multi-criteria analysis comparison with the proposed Kenmore Bypass. The comparison showed that construction of the Kenmore Bypass provided greater overall benefits than a further upgrade of Moggill Road.

## **5. Preliminary Feasibility Study Desktop Investigations**

A number of desktop investigations were undertaken during the Preliminary Feasibility Study to assess the technical feasibility of the Kenmore Bypass. These are described below.

### **5.1 Review of Previous Planning**

Part of the desktop study consisted of the review of previous planning and information relevant to this project, for example concept-planning drawings of the Kenmore Bypass connection with Moggill Road provided by DMR and previously developed by SKM in 1989. To gain an understanding of the key environmental factors for the project the Environmental Scoping Study, the Cultural Heritage Audit and other relevant studies were reviewed.

### **5.2 Review of Public Transport Services and TransLink Infrastructure Plans**

DMR initiated discussion with TransLink in regard to the accommodation of future public transport services on the Kenmore Bypass. These discussions were used to determine the need to include public transport infrastructure along the bypass. TransLink indicated that Moggill Road would remain the primary public transport route and that additional public transport facilities were not required on the bypass. This approach is supported as the Kenmore Bypass would mainly cater for through traffic movements and would have limited direct access to the surrounding development. For these reasons Moggill Road is better suited as a public transport route. Diversion of traffic from Moggill Road to the bypass will help to facilitate the provision of bus priority lanes and/or High Occupancy Vehicle lanes on Moggill Road.

Further investigations will be required during the next study phases to ensure that adequate provision is made for public transport in the corridor.



### **5.3 Road Design**

The Preliminary Feasibility Study determined that the project would be feasible from a road design perspective. A summary of the concept options and associated feasibility is shown in Table 1 (preliminary Kenmore Bypass options) and Table 2 (preliminary Centenary Highway Interchange options). It should be noted that the options were developed as a basis for feasibility assessment only and therefore do not describe all the possible solutions.

#### **Kenmore Bypass**

Concept layouts have been produced. The key issues and findings are:

- » A bypass with a design speed of 90 km/hr is feasible, with a design speed of 60 km/hr for the connection to Moggill Road intersection;
- » A functional intersection of Moggill Road with the Kenmore Bypass can be achieved;
- » There is no low impact option for the bypass to cross Gem Road;
- » Reduction of the design speed to 70 km/hr would reduce the impact near Gem Road;
- » Kenmore Road could cross over the bypass with a single span bridge of approximately 50m in length; and
- » A satisfactory engineering solution for the stormwater drainage should be achievable.

#### **Centenary Highway Interchange**

Six preliminary interchange options were investigated, which include connections with the existing Fig Tree Pocket Interchange. The key issues and findings are:

- » Full reconstruction of the existing highway would be required for a design speed of 110 km/hr to eradicate the horizontal and vertical deficiencies;
- » The overpass bridges at Fig Tree Pocket Road and Kenmore Road will require replacement if the Centenary Highway is upgraded;
- » It should be possible to duplicate the Brisbane River Bridge on either the downstream or upstream side;
- » Weaving deficiencies will occur at Moggill Road or Sinnamon Road if an additional interchange is built for the Kenmore Bypass; and
- » The bifurcation of the Kenmore Bypass interchange would utilize the Fig Tree Pocket interchange, as some vehicle movements would require this interchange to access the bypass.

### **5.4 Land Requirements**

#### **Kenmore Bypass**

DMR and Brisbane City Council (BCC) own the majority of land required for a four-lane configuration along the bypass. Some isolated areas would require additional resumptions including:

- » East of Kenmore Road;
- » Around the horizontal curves near Gem Road;
- » Adjacent to Moggill Creek; and
- » Along Moggill Road at the intersection.



### **Centenary Highway Interchange**

Land requirements vary for each of the concept interchange options considered for the Centenary Highway as follows:

- » **Option 1** has the least impact of all options considered, due to the limited northern ramp movements between the Centenary Highway and the bypass;
- » **Options 2 and 3** significantly affect the residential area on the eastern side of the existing highway, due to the land required for the 40 km/hr loop to the Centenary Highway (south);
- » **Option 4** contains a large land requirement to the west of the Centenary Highway, due to the three level interchange. Land requirements in this option near Fig Tree Pocket are minimal, as the interchange is closed; and
- » **Options 5 and 6** have the greatest impacts of all options considered due to the realignment of the Centenary Highway. Land impacts occur east and west of the existing highway.





**Table 1 Preliminary Feasibility Bypass Option Summary**

Location	Name	Description	Advantages	Disadvantages
Kenmore Rd	Option KR1	Bypass under Kenmore Rd (with no ramps)	<ul style="list-style-type: none"> <li>Existing height of Kenmore Rd is suitable for Bypass to pass beneath</li> </ul>	<ul style="list-style-type: none"> <li>No direct connection of bypass to Kenmore Rd</li> </ul>
	Option KR2	Bypass under Kenmore Rd (with northern ramps)	<ul style="list-style-type: none"> <li>Improved local access from Kenmore Rd to Highway</li> </ul>	<ul style="list-style-type: none"> <li>Ramp grades would exceed 8%</li> <li>Proximity to interchange would complicate weaving movements</li> <li>Ramps could create a rat-running route to Fig Tree Pocket Rd Interchange</li> <li>Potential for residential impact near Kenmore Rd</li> </ul>
	Option KR3	At grade intersection of bypass with Kenmore Rd	<ul style="list-style-type: none"> <li>Improved local access between the bypass and Kenmore Rd</li> </ul>	<ul style="list-style-type: none"> <li>Bypass grades would exceed 8%</li> <li>Significant residential impact near Kenmore Rd</li> <li>Proximity to interchange would complicate weaving movements</li> <li>Ramps could create a rat-running route to Fig Tree Pocket Rd Interchange</li> <li>Intersection sight distance criteria would be difficult to achieve</li> </ul>
Gem Rd	Option GR1	Bypass to pass over Gem Rd. Retain existing Rd	<ul style="list-style-type: none"> <li>Local access along Gem Rd would be retained</li> </ul>	<ul style="list-style-type: none"> <li>Retaining walls and fill heights of up to 15m adjacent to existing residential houses</li> </ul>
	Option GR2	Bypass to pass under Gem Rd. Retain existing Rd	<ul style="list-style-type: none"> <li>Local access along Gem Rd would be retained</li> </ul>	<ul style="list-style-type: none"> <li>A tunnel would be expensive and complicated to construct</li> </ul>
	Option GR3	Bypass to pass through Gem Rd (severance of Gem Rd)	<ul style="list-style-type: none"> <li>Vertical and horizontal geometry of the bypass would not be constrained</li> </ul>	<ul style="list-style-type: none"> <li>Worsened local access for Gem Rd (south) residents</li> </ul>
	Option GR4	Bypass to pass over Gem Rd. Realign existing Rd	<ul style="list-style-type: none"> <li>Local access along Gem Rd would be retained</li> </ul>	<ul style="list-style-type: none"> <li>Realignment of Gem Rd would be complicated and would require residential resumptions</li> </ul>
	Option GR5	At grade intersection of Bypass with Gem Rd	<ul style="list-style-type: none"> <li>Improved local access between the bypass and Gem Rd</li> </ul>	<ul style="list-style-type: none"> <li>Significant residential impact near Kenmore Rd</li> <li>Existing steep grades of Gem Rd very difficult to accommodate</li> <li>Additional braking and noise issues along bypass</li> <li>Intersection sight distance criteria would be difficult to achieve</li> </ul>
Moggill Creek	Option MC1	Bridge height at RL 15m (height used in previous planning)	<ul style="list-style-type: none"> <li>Additional height across creek would enable grade-separation of Moggill Rd (if desirable)</li> <li>Increased flood immunity</li> </ul>	<ul style="list-style-type: none"> <li>Additional fill / structure required</li> <li>At grade connection to Moggill Rd difficult to accommodate vertically</li> </ul>
	Option MC2	Bridge height at RL 11m (height used in previous planning)	<ul style="list-style-type: none"> <li>Reduced fill / structure required</li> <li>At grade connection to Moggill Rd is not difficult</li> </ul>	<ul style="list-style-type: none"> <li>Grade-separation of Moggill Rd would be difficult due to reduced bridge height</li> <li>Reduced flood immunity</li> </ul>
Moggill Rd	Option MR1	At grade T intersection with priority given to Moggill Rd	<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>60km/hr approach to Moggill Rd for bypass</li> <li>Traffic would be encouraged to avoid the bypass and to use Moggill Rd</li> </ul>



Location	Name	Description	Advantages	Disadvantages
	Option MR2	At grade T intersection with priority given to bypass	<ul style="list-style-type: none"><li>• Bypass design speed could be maintained into Moggill Rd (south)</li><li>• Traffic would be encouraged to avoid Kenmore and to use the bypass</li></ul>	
	Option MR3	Grade separated intersection	<ul style="list-style-type: none"><li>• Allows for a future grade-separated extension of the bypass further to the west.</li><li>• Impact to Moggill Rd would be minimised</li></ul>	<ul style="list-style-type: none"><li>• Larger land requirement than T-Junction options</li></ul>



**Table 2 Preliminary Feasibility Interchange Option Summary**

Name	Description	Highway Configuration	Kenmore Bypass Interchange	Fig Tree Pocket Rd Interchange	Service Roads	Advantages	Disadvantages
Option 1	Northern connections only between the Kenmore Bypass and the Centenary Highway.	6 lane upgrade of existing highway	Bifurcation	Full movement	No	<ul style="list-style-type: none"> <li>ÿ Simplest of all interchange options</li> <li>ÿ Minimal resumptions at interchange</li> </ul>	<ul style="list-style-type: none"> <li>ÿ Deficient geometry along highway</li> <li>ÿ Weaving issues northbound to Fig Tree Pocket Rd</li> <li>ÿ No southern ramps to highway</li> </ul>
Option 2	All movements provided between the Centenary Highway and the Kenmore Bypass including a 40km/hr connection from west to south.	6 lane upgrade of existing highway	Full movement	Full movement	South-bound only	<ul style="list-style-type: none"> <li>ÿ All interchange movements provided</li> </ul>	<ul style="list-style-type: none"> <li>ÿ Deficient geometry along highway</li> <li>ÿ Weaving issues northbound to Fig Tree Pocket Rd</li> <li>ÿ Large residential resumption footprint</li> </ul>
Option 3	Similar to Option 2, with a northbound service road connecting Kenmore Bypass to Fig Tree Pocket Interchange.	6 lane upgrade of existing highway	Split movement	Split movement	Yes	<ul style="list-style-type: none"> <li>ÿ All interchange movements provided</li> </ul>	<ul style="list-style-type: none"> <li>ÿ Deficient geometry along highway</li> <li>ÿ Large residential resumption footprint</li> </ul>
Option 4	Three level interchange with no connections to Fig Tree Pocket interchange.	6 lane upgrade of existing highway	Full movement	No movement	Yes	<ul style="list-style-type: none"> <li>ÿ All interchange movements provided</li> <li>ÿ Minimised residential resumption footprint</li> </ul>	<ul style="list-style-type: none"> <li>ÿ Deficient geometry along highway</li> <li>ÿ Worsened highway access from Fig Tree Pocket Rd</li> </ul>
Option 5	All movements provided between the Centenary Highway and the Kenmore Bypass including a three level interchange.	8 lane realignment upgrade of highway	Full movement	Split movement	Yes	<ul style="list-style-type: none"> <li>ÿ All interchange movements provided</li> <li>ÿ Improved geometry along highway</li> <li>ÿ Fast, free flowing ramp connections</li> </ul>	<ul style="list-style-type: none"> <li>ÿ Expensive and complicated layout</li> <li>ÿ Large residential resumption footprint</li> </ul>
Option 6	Northern connections only between the Kenmore Bypass and the Centenary Highway.	8 lane realignment upgrade of highway	Bifurcation	Split movement	Yes	<ul style="list-style-type: none"> <li>ÿ Improved geometry along highway</li> <li>ÿ Fast, free flowing ramp connections</li> </ul>	<ul style="list-style-type: none"> <li>ÿ No southern ramps to highway</li> <li>ÿ Expensive and complicated layout</li> <li>ÿ Large residential resumption footprint</li> </ul>



## 5.5 Pedestrians and Cyclists

The Preliminary Feasibility Study assessed the provision of facilities for pedestrians and cyclists and the findings are:

- » Provision has been made to incorporate pedestrian and cyclist facilities within the cross-section for the Kenmore Bypass, the upgraded Centenary highway and duplicated Brisbane River Bridge; and
- » Further investigations will be required to ensure connectivity of pedestrian and cycle pathways to the Kenmore Bypass, local roads and existing features.

## 5.6 Capacity Analysis

Using preliminary traffic modelling data, capacity analyses for two potential Centenary Highway interchange options (options 5 and 6) were undertaken. The findings for both options are:

- » Kenmore Bypass/Centenary Highway Interchange – deficiencies were revealed in the merge of the southbound and northbound ramp to the Centenary Highway. Further investigation is required to find an appropriate design solution but potential solutions are to provide additional lane capacity upstream of both northbound and southbound merges;
- » Kenmore Bypass/Moggill Road Intersection – a traffic signal solution can be provided; and
- » Kenmore Bypass Lane Capacity – a single lane in each direction should provide adequate capacity at the 2026 horizon.

## 5.7 Existing Services

A preliminary assessment, based on a Dial Before You Dig investigation, was carried out on the existing underground services within the Kenmore Bypass corridor. No major issues were identified that are likely to stop the project.

## 5.8 Geotechnical Assessment

The geotechnical assessment comprised a review of published information on site conditions and ground conditions, together with a walkover survey of those parts of the route where pedestrian access was permitted by DMR. The findings showed that, on the basis of the anticipated ground conditions, it should be possible to construct the Kenmore Bypass to the general intent of the current concept design. However, the anticipated ground conditions will significantly affect the construction cost of several project components, including:

- » Retention of cuts, notably in the vicinity of Kenmore Road and Gem Road;
- » Tunnelling near Gem Road;
- » Filled embankments on alluvium of the Moggill Creek floodplain;
- » Cut depths of up to 25m in the vicinity of Kenmore Road over the Centenary Highway; and
- » Fill heights of up to 15m of the Kenmore Bypass west of the Centenary Highway.

In addition, the sourcing and availability of suitable fill will significantly influence the cost of the project, depending on whether the improvement of the alignment of the Centenary Highway will be included in the project.



## 5.9 Structures

Investigations were undertaken to assess the feasibility of structures based on limited available geotechnical and hydraulic information. A broad review of structural possibilities for the alignment options was developed, which took the following factors into consideration:

- » Constructability;
- » Design constraints and risks;
- » Site constraints including property boundaries;
- » Geotechnical conditions and foundations;
- » Environmental (noise, flora and fauna);
- » Construction time and impacts on existing traffic flows during construction; and
- » Safety considerations.

The findings identified key issues that require consideration during the planning and design phases. These should be addressed early during the costing process to ensure that adequate funding and expertise is in place to enable adequate consideration. The issues are:

- » Impact on traffic flows during construction – This is particularly relevant during construction over/under/alongside the Centenary Highway. Poor choice of structural form, as well as poor planning and traffic management, can have major impacts on the traffic flow along this major road into Brisbane;
- » Geotechnical Information – A number of large structures along the route options is being considered which will impose significant foundation loads. Good geotechnical investigation planning will ensure adequate information is available for the efficient and effective design of the foundations; and
- » Safety – Construction hazards such as working at height or over water should be designed out or mitigated where possible by careful consideration of the construction methodology during the design phase.

## 5.10 Hydrological and Hydraulic Investigations

Investigations into the major hydraulic issues of the proposed Kenmore Bypass Bridge indicate the following expected outcomes:

- » Some impact on the 100 year Average Recurrence Interval (ARI) design flood in terms of predicted levels;
- » Up to 140 mm of afflux upstream of the proposed crossing;
- » No significant increase in the extent of inundation;
- » No property is placed at risk by the proposed bridge layouts; and
- » The flood risk upstream and/or downstream of the proposed Kenmore Bypass Bridge is not expected to increase to an extent that cannot be engineered.



### **5.11 Environmental Investigations**

A Preliminary Environmental Assessment (PEA) was prepared to identify environmental opportunities and constraints associated with the proposed bypass alignment, in accordance with the requirements under Part A and Appendix C of the Road Project Environmental Processes Manual (RPEPM). The PEA also provides for the development of a draft Terms of Reference (TOR) for the Environmental Approvals Report (EAR), which may be undertaken as part of the future assessment of the road corridor.

A review of information provided by DMR was undertaken to assist in guiding the assessment for the PEA. The information provided included an Environmental Scoping Study and a Cultural Heritage Report (DMR, 2006). Assessments of the corridor were undertaken in accordance with Appendix C2 of the Road Project Environmental Processes Manual (RPEPM). The PEA concluded that there will be environmental impacts associated with the project, however, further assessment is required to establish the extent of impacts. It has identified that noise and social impact are significant high risk issues that need to be managed.

### **5.12 Establishment of Public Consultation Strategy**

While public consultation has not been undertaken, a Community Engagement Plan (CEP) has been prepared. The primary objective of this plan is to create a comprehensive, co-ordinated and integrated framework that will underpin the communications and community engagement process during Stage Two (if investigations proceed). If Stage One investigations indicate the preserved corridor could be feasibly used for a future bypass, DMR will progress planning in consultation with the community.

### **5.13 Comparison of Indicative Costs and Benefits**

Indicative estimates for various option costs were developed for comparative purposes only. The quantities and rates used to date are conceptual only, and need refinement and revision during any subsequent Options Analysis phase of the design. A general contingency of 40% has been used for the estimate. Costing undertaken as part of preliminary feasibility assessment does not capture project specific costs that are likely to become evident during detailed design and as such is not suitable for project budget purposes. The indicative option costs were compared with the anticipated value of the travel time and distance savings that the bypass will offer versus the 'do-nothing' scenario. As this was a high level preliminary feasibility study, other possible benefits were not calculated. Preliminary cost-benefit assessments conducted for the most expensive options concluded that the benefits outweigh the costs.

### **5.14 Preliminary Concept Plan for Moggill Road Upgrade and MCA**

In July 2007 DMR requested GHD to develop a concept plan for the upgrading of Moggill Road between Marshall Lane and Kilkivan Avenue, including a multi-criteria analysis comparison with the proposed Kenmore Bypass. The comparison showed that construction of the Kenmore Bypass provided greater overall benefits than a further upgrade of Moggill Road.



## 6. Key Risks and Issues Identified

At the conclusion of the preliminary feasibility phase, a *Value Management, Preliminary Feasibility and Risk Workshop* was held. The workshop examined the completed preliminary investigations and the key issues that could impact on the feasibility of the bypass. It also identified areas to be improved and refined during further study phases.

The following key issues for the project were identified:

- » The timing and funding for upgrading the Centenary Highway affecting the Kenmore Bypass;
- » The possibility of the project being prematurely stopped due to the underestimation of benefits to travel time and distance savings, road safety, public transport and the wider community;
- » The impact on amenity and segregation for residents abutting the Kenmore Bypass and Centenary Highway;
- » The impact on Kenmore residents if Gem Road is severed;
- » The complexities of tying in with the Centenary Highway, Fig Tree Pocket interchange (and adjacent interchanges) and the local road network;
- » The number of property resumptions required adjacent to the bypass and Centenary Highway;
- » Construction issues along the bypass and Centenary Highway;
- » Maintaining provision for pedestrians and cyclists along the Kenmore Bypass and Centenary Highway;
- » Environmental impacts to fauna, social, waste, hydrology and water quality;
- » Impact on traffic flows during construction; and
- » Costs associated with land resumptions and construction complexity.

## 7. Key Recommendations for Future Investigation

The following key recommendations were provided for the next phase of the project:

### 7.1 Road Design

- » Limited information was available during the preliminary feasibility phase and verification of traffic modelling information is necessary for further development of interchange and bypass options;
- » Additional interchange layouts, highway configurations and design criteria should be considered;
- » Further investigations are required to determine the horizontal and vertical geometry of the Kenmore Bypass. In particular, alignment review is necessary at Gem Road, Moggill Creek Bridge and Moggill Road; and
- » Detailed drainage investigations are needed along the bypass corridor to determine the hydraulic impacts



## **7.2 Public Transport**

Further investigations are required to ensure that adequate provision is made for public transport in the corridor.

## **7.3 Land Requirements**

Consultation with local residents should be undertaken in conjunction with the development of option layout plans.

## **7.4 Pedestrians and Cyclists**

Further investigations are required to provide connectivity of pedestrian and cycle pathways along the Kenmore Bypass and at the Centenary Highway.

## **7.5 Capacity Analysis**

- » For the Kenmore Bypass/Centenary Highway interchange, alternative options or additional capacity should be considered to assess the capacity of merge segments; and
- » Further capacity analyses should be conducted once intersection and interchange layouts and traffic estimations have been refined.

## **7.6 Existing Services**

- » The conflict with the existing large water mains at Moggill Road and also at the Kenmore Road overpass (over the Centenary Highway) is potentially significant. Further investigation is required;
- » Confirmation with service authorities is required to clarify affected extents of underground and aboveground services and possible relocation options;
- » Detailed potholing of existing services is recommended;
- » The fibre optic services crossing the Centenary Highway at the Fig Tree Pocket interchange require further investigation to determine their extent and relocation options; and
- » Relocation rates, quantities and alignments have not yet been determined.

## **7.7 Geotechnical Assessment**

- » Extensive geotechnical investigation is required at the start of the next phase; and
- » The sourcing and availability of suitable fill will significantly influence the cost of the project.

## **7.8 Structures**

- » Desktop structural assessments have been completed to date. As options develop, further structural investigations will need to be completed with comparison between feasible structure types; and
- » Impact on traffic flows during construction along the Centenary Highway and local roads must be determined. Structural forms and traffic management impacts must also be determined.





## **7.9 Hydrological and Hydraulic Investigations**

- » Revised hydraulic modelling of Moggill Creek (bypass bridge and footbridge) should be undertaken to better represent the effects of existing structures and the proposed bypass;
- » Impacts on the effect of Brisbane River backwater on the proposed bypass need to be investigated; and
- » Lower ARI design flood events should be simulated to investigate maximum velocities and risk from scouring.

## **7.10 Environmental Investigations**

A variety of environmental assessments will need to be completed including:

- » Water quality assessment of Moggill Creek;
- » Acid sulphate soils assessment around Moggill Creek;
- » Erosion and sediment control plan specific to the project;
- » Baseline noise assessment and road traffic noise assessment;
- » Air quality monitoring to quantify impact around Kenmore from the operation of the new bypass;
- » Waste management assessment to manage the waste generated along the construction zone;
- » Detailed fauna and flora assessment along the road corridor;
- » Detailed Social Impact assessment with special attention to incorporating key stakeholders;
- » Visual impact assessment; and
- » Cultural heritage assessment.

## **7.11 Community Engagement Plan**

- » Identification of local stakeholders to be completed with a stakeholder register;
- » Stakeholders need to be informed about the study objectives, processes, drivers and future consultation opportunities;
- » Assist the immediate community to understand the need for an alternative to present traffic conditions, the scope and timetable;
- » Achieve broad understanding among stakeholders of the need for the bypass planning and the implications of a 'do-nothing' scenario; and
- » Provide easy and accessible ways for stakeholders to review and comment on the study's Terms of Reference and planning options.

## **7.12 Indicative Costs and Benefits**

- » Quantities and rates used to determine option costs are conceptual and need refinement with sensitivity analysis.
- » A detailed benefit-cost evaluation should be conducted.



### **7.13 Risk Assessment**

The necessary control actions are to be researched thoroughly and it is prudent to consider additional risk assessments / risk management activities as the project matures.

### **7.14 Possible Staged Implementation**

Further investigation on a staged implementation of the Kenmore Bypass is recommended, consisting of the initial construction of the bypass (possibly connecting to the Centenary Highway via the Fig Tree Pocket Interchange) and future construction of the interchange.

## **8. Conclusion**

The feasibility assessment found that an engineering solution could be provided to construct a Kenmore Bypass between the Centenary Highway at Fig Tree Pocket Road and Moggill Road. Land acquisition will be required to achieve appropriate design standards. The key recommendations listed in the previous section are proposed for the next design phase of the project.



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