# **Development of a Bridge Asset Management Plan for Southern Downs Regional Council**

A dissertation submitted by

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# ABSTRACT

Asset Management is defined as the combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective way (IIMM 2006, p. xii).

Southern Downs Regional Council's bridge network represents a large investment and many thousands of dollars are spent annually on maintenance and management. This project aims to develop a core Asset Management Plan for bridges.

The main objective of the dissertation is to compile a core Bridge Asset Management Plan for Southern Downs Regional Council Specific objectives are as follows:

- Minimise the whole of life cycle costs of bridge assets.
- Clearly justify forward works programs and expenditure.
- Ensure that legal obligations are met through compliance with relevant acts and policies.
- Report on asset description including current conditions and general overview of existing bridges.
- Determine the future demand and the effects of changing demand on the bridge assets.
- Produce a financial summary including long-term financial expenditure.
- Ensure that asset/service is maintained for present and future generations at an equitable cost.

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# **CERTIFICATION**

I certify that the ideas, designs and experimental work, results, analyses and conclusions set out in this dissertation are entirely my own effort, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

Nathan Walter 0050059086

Signature

Date

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# **EXECUTIVE SUMMARY**

This research project has developed a starting point for a core asset management plan, based on the methodology and processes from the International Infrastructure Management Manual. The project details;

- Background of the project;
- the purpose of the core asset management plan;
- current asset description and condition;
- details draft levels of service;
- considers the future demand;
- gives five examples of a lifecycle management plan;
- formulates a financial summary for the next 10 years; and
- suggests improvements to the plan.

The project has found that the timber bridge structures cost alot more to maintain during their life cycle than the concrete structures and that they are in much worse condition. It has found that the budgeted amounts for maintenance and capital renewal are well below what is required if the draft levels of service are adopted.

It is recommended that an annual timber bridge replacement program be instigated and the gap in funding required to deliver the draft levels of service be addressed.

# **1 INTRODUCTION**

This chapter details the background, scope, objectives, key stakeholders, methodology, consequences, risks and the outline of this dissertation.

#### 1.1 Background

Southern Downs Regional Council (SDRC) is located in southern Queensland about two hours drive south west of Brisbane. It has a population of 32,600 people spread between Warwick, Stanthorpe and surrounding areas. It covers an area of 7,120 square km and is bounded by Toowoomba Regional Council, Goondiwindi Regional Council, Lockyer Valley Regional Council, Scenic Rim Regional Council and the New South Wales border. The climate of the region ranges from mild summers to cold winters. The major industries of the downs are agriculture, horticulture, commerce, manufacturing and tourism and the region has an annual growth rate of approximately two percent. The major towns and villages located within the region include the main towns of Warwick and Stanthorpe and the smaller towns of Killarney, Allora, Leyburn, Maryvale and Dalveen.



Southern Downs Regional Council was formed by two former councils, Warwick Shire Council and Stanthorpe Shire Council in 2008 as a result of forced Queensland council amalgamations. The former Warwick Shire Council was rated as weak in regards to its financial sustainability due to its high rate of depreciation. There is still ongoing work in integrating the two former councils into one organisation in relation to management and delivery of assets and services to the community.

Southern Downs is famous for a number of local attractions and festivals. These include many sandstone heritage listed buildings from the early settlements, wineries and events like the famous Warwick Rodeo. There are also many natural attractions located in the region, and include Queen Mary Falls, Goomburra National Park and Girraween National Park.

Currently Southern Downs Regional Council does not have any asset management plans in place. Asset data has been recorded in various spreadsheets haphazardly over the years and stored in varying locations and on differing mediums. There has not been any integration of former Warwick and Stanthorpe bridge asset data records since the amalgamations. Council's main GIS system MapInfo has been updated to include the location of all bridge assets throughout the council region, however the only other piece of information attached to the record is a one word description on the type of asset (bridge, culvert, floodway, etc) and an old asset id number.

Council has adopted a strategic plan called Vision 2040 and a 2009 – 2014 Cooperate Plan which are important drivers in establishing Southern Downs Regional Council in the future. These plans outline many strategic plans and in relation to the management of assets owned by council. Recent new legislation 'Local Government Act 2009' requires Southern Downs Regional Council to produce a core asset management plan for all assets including bridges by December 2010.

### **1.2 Purpose of the Asset Management Plan**

The aim of this dissertation is to create a core asset management plan for bridges located in the Southern Downs Regional Council. The main objective of the plan is to minimise the whole of life costs of the assets whilst maintaining an acceptable level of service and ensuring that the asset meets all safety and legislative requirements. The core asset management plan in conjunction with other infrastructure asset management plans will help ensure that Council assets remain economically viable and that the council as a whole is sustainable. The plan will link with current corporate and strategic plans and policies and ensure that all legislative requirements are met. Bridges are part of the road infrastructure assets which is one of the most significant groups of community assets managed by Southern Downs Regional Council. Bridges are key elements in the road network and represent a substantial investment over an extended period of time. Every year many thousands of dollars are spent in maintaining, renewing and replacing these assets. Currently there is very little in the way of documentation of the processes and maintenance expenditure and it is conducted in a reactive way. This is one of the reasons why it is so important to have an asset management plan, which will employ the best practice and management to ensure that services are delivered in a consistent, economical and sustainable way.

From 1950's through to the 1970's council spent a considerable amount of money on creation of new bridge assets without much regard to the long term life cycle costs and total community benefit. This has resulted in a number of large timber bridge structures (3 spans or more) which require costly annual maintenance and inspections and have a big replacement cost with very little community benefit. This plan will ensure that any new bridge works are clearly justified and will generate significant community benefit for the investment outlay by council.

This project will produce the first bridge asset management plan developed for the council and will reform the current practices of asset management, seeking to ensure a more formal approach through the employment of asset management principles and methodology. The asset management plan is aimed at delivering the desired level of service at the least cost and moving the organisation away from the budget driven framework to service driven framework.



Figure 2 Budget driven framework versus service driven framework

From the diagram it is easy to see that currently the service levels are constrained by the budget which is based on historical data and increased at the rate of CPI each year. It is envisaged that through the adoption of this asset management plan the desired level of service will in fact drive the funds budgeted for bridges.

# **1.3 Aims and Specific Objectives**

The specific objectives and purposes of this core asset management plan are as follows:

- Demonstration of responsible asset stewardship;
- engagement of the community and relevant stakeholders to determine appropriate levels of service;
- supporting long term financial planning;
- minimise the whole of life cycle costs of bridge assets through asset management principles and methodology;
- production of a clearly justified forward works programs and expenditure;
- management of risk associated with asset failure;
- ensure that SDRC legal obligations are met through compliance with the relevant acts and policies;
- ensure the asset/service is maintained for present and future generations at an equitable cost;
- improved efficiency through better asset lifecycle management;
- accountability and transparency in council expenditure; and
- continual monitoring and improvement of the asset management plan and practices.

The outcomes of the plan will include;

- Adopted levels of service;
- quantification of the future demand and the impact this will have on the bridge assets;
- a lifecycle management plan for selected\* bridges including operations, maintenance and disposal; and
- a financial summary for the selected\* bridges including the required long-term future expenditure.

\*This will be extended to all bridge assets once this initial plan is reviewed and adopted by council.

# **1.4 Definitions of Bridge Assets**

This asset management plan will apply to the following structures:

- Bridges
- Large Drainage Structures

Adopted definitions of the two structures are detailed below;

- **Bridge** A structure which allows traffic be it pedestrian or vehicular to traverse an obstacle through elevation. It must consist of at least one or more of the following elements; piles, piers, headstocks or decking.
- Large Drainage Structure A major drainage structure which allows traffic, be it pedestrian or vehicular to traverse a watercourse through elevation. It is a self contained structure that has an opening span, height or diameter greater than 1.8 metres and a waterway area in excess of 3.0 square metres.



Figure 3 A typical bridge structure



Figure 4 Typical large drainage structure

### **1.5 Key Stakeholders**

The relevant stakeholders are considered any group or individual that has an interest in the services provided by SDRCs bridge infrastructure assets. The relevant key stakeholders include;

- Southern Downs Regional Council;
- Federal and State Government Agencies including Department of Transport and Main roads, Emergency Services, Army etc;
- grant funding bodies;
- local residents which include vehicular, cyclists and pedestrian traffic;
- local industries;
- commercial operators including tourist and transport operators;
- tourists and visitors to the region; and
- seasonal workers who relocate to the region for periods of up to six months a year.

These individuals and groups of stakeholders all have needs and expectations related to the standard of services delivered by the bridge infrastructure. These include providing quality, accessible (especially in times of flood), value for money services without negative impacts on the environment and community.

#### **1.6 Relationships with other Plans**

This asset management plan will become a key document in councils planning and budgeting processes, linking with the following cooperate and strategic documents;

- Southern Downs Regional Councils;
  - Strategic Plan
  - Corporate Plan
  - Relevant Policies & Strategies
  - Asset Management Policy

### **1.7 Project Methodology**

The methodology that has been used in completing the dissertation is outlined in the steps below:

1. Research background information on Bridge Asset Management Plans. A review of previous literature and information related to asset management plans, both in Australia and worldwide.

2. Define the purpose of the core AMP including the definitions of bridges.

3. Report on asset description including current conditions and general overview of existing bridges.

4. Determine the levels of service (LOS) for approximately five (5) selected bridges in relation to council's strategic goals and based on customer expectation and statutory requirements.

5. Determine the future demand and the effects of changing demand on the selected bridge assets.

6. Create a life cycle management plan for the selected bridges including operations, maintenance, and disposal, etc.

7. For the selected bridges, produce a financial summary including long-term future expenditure.

8. Present finding to peer group and submit dissertation in required format.

If time permits:

9. Extend the study to additional bridges.

10. Produce Asset Management practices including summary of Asset Management data, information systems, processes and implementation tactics.

11. Include a recommendation for improvement of the plan from the findings, including improvement strategy.

### **1.8 Consequences and Risks**

Southern Downs Regional Councils risk management policy follows the process outlined in the AS/NZS 4360: 2004 and is detailed in the diagram below;



Figure 5 Risk Management Plan

	Assess the likelihood and consequences from the hazard or risk								
	Consequences	Consequences							
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic				
Almost Certain	High	High	Extreme	Extreme	Extreme				
Likely	Moderate	High	High	Extreme	Extreme				
Possible	Low	Moderate	High	High	Extreme				
Unlikely	Low	Low	Moderate	High	Extreme				
Rare	Low	Low	Low	High	High				

Table 1 Risk Matrix

#### 1.8.1 Risks whilst undertaking Project

This is not a too many risks apparent whilst undertaking the project. The expected risks to be managed during the execution of project are detailed below.

During inspection of bridges;

- Snakes which are common to the area and often located in the long grass, which is common along sides of roads and under bridges etc.
- Falls from heights whilst inspecting the bridges.
- Traffic is an ever-present factor along roads and needs to be managed with appropriate signage plans when activities and inspections will impact on travelled path.

All of these risks are very minor if managed effectively and can be minimised through a workplace health and safety plan, traffic management plans and the correct use of personal protective equipment. For instance a high visibility vest must be worn during all inspections.

During compiling of information and write-up;

• No risks apparent.

Hazard	Consequence	Likelihood	Risk	Control
Snakes	Moderate	Rare	Low	Awareness of risk
Falls	Minor	Rare	Low	Awareness of risk
Traffic	Moderate	Unlikely	Moderate	Traffic Management Plan – Signage etc

Table 2 Risk Summary

#### **1.8.2 Risk beyond completion of project:**

The implementation of this asset management plan will manage to reduce most risks faced by council in relation to is delivery of services and is of critical importance in the safe management of assets. This is highlighted and detailed in the literature review with the case of Brodie vs Singleton Shire Council (Burns, 2001) which outlines the importance of effective management and records of council assets. It is through this core bridge asset management plan that will ensure the bridges under the control of Southern Downs Regional Council remain safe for use and are inspected regularly. It will also help demonstrate that council is managing the assets in the most effective way possible.

#### **1.9 Dissertation Outline**

This dissertation seeks to create a core asset management plan through the combination of management, financial and engineering principles and practices to deliver pre-defined levels of service in the most economical way.



The figure below outlines the formation of the core asset management plan;

It must be noted that this dissertation is the start of the asset management process for bridge assets. The plan will become a living document and will be continually monitored and improved over future years. Included as chapter 8 is a brief overview of suggested improvement measures to the asset management plan.

# 2 ASSET MANAGEMENT BACKGROUND

### 2.1 Introduction

This chapter will review literature related to the topic of Asset Management. It will outline the history and development of asset management and the impact it has had. The components of a core asset management plan will also be explored.

### 2.2 What is Asset Management?

Asset Management is defined as the combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost effective way (IIMM, 2006).

The word asset in relation to accounting means a thing of value that could be tangible or intangible. Assets can be classified as either physical or financial in nature. Physical assets can be both tangible and intangible. Tangible physical assets include roads, parks, bridges and stormwater infrastructure. Intangible physical assets can be in the form of intellectual property, patents or software. Financial assets include cash, stocks or other forms of financial investments. This is broken down further into current and non-current assets. Current Assets are those assets which are expected to be realised in cash or sold within one year of an organisation's balance date (IIMM, 2006). Non-current are all assets other than current assets, including assets held but not traded by a business in order to carry out its activities (IIMM, 2006). The focus of this literature review is non-current physical tangible infrastructure assets.

Examples of infrastructure assets under the control of local government include;

- Road networks (local)
- Bridges
- Stormwater networks
- Public buildings such as civic buildings, libraries etc.
- Parks and recreation facilities
- Water networks
- Sewerage networks

An asset management plan covers the description of the asset a, the levels of service that the asset provides, the future demand, lifecycle management plan, financial summary, asset management practices and a monitoring and improvement programme.

### 2.3 History of Asset Management

The concept of asset management was first formally adopted within the engineering profession during the privatisation of water utilities in Great Britain in the 1980s (Stapelberg, 2006).

The move towards asset management marks a change from reactive management which was the main method used for determining maintenance and replacement of infrastructure in the past.

### 2.4 Asset Management in New Zealand

New Zealand has been recognised as a world leader in asset management practices related to local government. Over the past 15 years New Zealand has seen a number of successive government reforms which have been aimed at improving the efficiency of asset management of local government infrastructure.

In the past the local government sector focused on capital works and had little documentation on the condition and location of existing assets. The maintenance of these existing assets was not recorded and as such councils operated in a largely reactive way only when the asset started to demonstrate failures and had already reached the end of is first lifecycle.

To combat these issues a national body was formed in 1995. The New Zealand National Asset Management Steering group (NAMS) is made up of representatives from the following major infrastructure related associations in New Zealand.

- INGENIUM—Association of Local Government Engineering NZ
- SOLGM—Society of Local Government Managers NZ
- Local Government Association of New Zealand
- Office of the Auditor-General
- New Zealand Water and Wastes Association
- New Zealand Recreation Association
- Association of Local Government Information Managers

# 2.5 The development of Asset Management in the Australian Local Government Sector

There are a number of important factors which are impacting on the adoption of asset management practices in Australia. The Commonwealth government has set a target to have all infrastructure asset classes managed by councils covered by core asset management plans with a deadline of December 2010.

In the early 1990s AAS27 legislation was introduced. This legislation required the reporting of asset values (replacement cost) and depreciation. Many councils in Australia then took on massive asset data collection to comply with AAS27. It was soon realised that this practice was beneficial not only to the accountants but also the engineering departments were able to use this information to help with decisions related to capital works and maintenance.

Perhaps the most important development for asset management in relation to local government came in 2001 after a landmark decision in the case of Brodie v Singleton

Shire Council. The high court found that Singleton Shire Council did not demonstrate that it had sufficiently inspected and maintained a timber bridge which collapsed whilst Mr Brodie was using it. This ruling removed the immunity for non-feasance from councils (Dr Morrison A.S., 2002).

The result of this court decision was that local councils had to be able to demonstrate that they are correctly allocating resources and that they are doing the best they can within their limited budget (Burns, 2010).

### 2.6 Bridge Asset Management Queensland

Bridges are a critical part of local, state and national road infrastructure assets. Due to their strategic locations over natural rivers and streams or over other obstacles, any bridge failure can have a severe impact on the community.

#### 2.6.1 Department of Transport and Main Roads

The department of Transport and Main Roads Queensland bridge stock comprises of some 2700 bridges and in excess of 10,000 major culverts with a combined replacement value in excess of \$2 billion (Main Roads, 2002). This ageing asset class is of critical important for maintaining a sufficient level of service to the general public. Department of Transport and Main Roads (DTMR) have been working on a state-wide integrated strategy for bridge management. This includes Bridge inspection and condition rating policy and procedures which have been well documented in the "Bridge Inspection Manual," information management though the Bridge Information System (BIS), load capacity and heavy load management policies and procedures and bridge maintenance policy and procedures.

### 2.7 Components of a Core Asset Management Plan

The components of a core asset management plan are as follows;

- Description of the purpose of the plan;
- report on current asset condition and description;
- statements on the levels of service which the asset provides and how they are measured;
- consideration of the future demand on the assets;
- construction of a lifecycle management plan which includes strategies and costs covering the assets life;
- a financial summary of long term expenditure;
- asset management practices; and
- monitoring and improvement program.

Each of these components are explained in greater detail as they are discussed in the following chapters of this dissertation.

### 2.8 Southern Downs Regional Councils Current Asset Management Plans and Practices

Currently SDRC has no asset management plans in place for any of its asset classes. Most maintenance work in relation to council infrastructure is of a reactive nature. There is a re-seal program in which road conditions are assessed annually and given a condition rating, which is then used to program the re-seals. This program however is limited by the budget and even though more money is required to keep the roads from getting worse overall no levels of service are set, so it is hard to justify the request more money from council.

# **3 CURRENT ASSET OVERVIEW**

This chapter details the asset hierarchy, current condition and the technical information which has been collected.

#### **3.1 Introduction**

The assets covered in this plan are shown below;



Figure 7 Overview of the Asset Management Process

As can be seen from the diagram there are two datasets for the assets. This simplifies the data capture and storage process as the data fields are significantly different between the two asset types.

### **3.2 Description of Assets**

Council currently looks after a total of 125 bridges, made up of 68 bridges and 78 large drainage structures. Attached n Appendix B is the 09/10 financial summary detailing the values of the bridges. Below is a pie chart summarising the number of each asset class and their respected values. As mentioned there is a huge amount of spreadsheets and records kept on these assets stored all over the council network. Work is currently underway in sorting, deleting duplicates and combining records into one master dataset which will be used with a program called my data and continually updated and maintained.



Figure 8 Numbers in each asset class and values of each asset group

The total replacement value of assets cover in this plan for the 09/10 financial year is \$33,962,642. Depreciation for this period was \$180,683.

### **3.3 Inspection Procedure**

Council currently has contractors engaged undertaking level two bridge inspections on all the bridges in the region. It was expected that the condition reports would be in early September but due to rain delays and resource issues they will not be ready until early December. The inspections have been carried out in accordance with Department of Transport and Main Roads Bridge Inspection Manual. This manual was created out of a need for a systematic state-wide management system as individual inspection regimes had been developed and managed at various District offices and were restricted by lack of funding and limited resources.

There are three levels of inspections detailed in the manual. These are;

- Level One which is a routine maintenance inspection carried out by trained council staff. The general functionality of the structure is assessed and any major problems or defects are identified for investigation.
- Level Two is a detailed inspection which requires specialist trained persons and involves drilling of the timber bridge components and identifies any issues with the structure. An overall condition rating is given and recommends remedial action and possible further investigation.
- Level Three is a detailed structural inspection carried out by a structural engineer. These are carried out when a structure is deemed to have major structural deterioration, damage or is behaving in a way different to the original design.

# **3.4 Condition States**

All of the structures inspected at level two are given an overall condition rating. There are five condition ratings which are outlined below;

Condition State	Subjective Rating	Description
1	Good / As new	Free of any defects with very little
		deterioration.
2	Fair	Free of any structural defects, and only
		deterioration of a minor nature evident i.e. in
		the protective coating etc.
3	<b>Poor</b> (requires	Minor defects affecting the durability and
	monitoring)	serviceability. Structure may require
		monitoring and possibly remedial action or
		further inspection by a structural engineer.
4	Very Poor (immediate	Defects affecting the durability and
	remedial action required)	serviceability which require immediate
		intervention and inspection.
5	Unsafe (bridge must be	The structural integrity is severely comprised
	closed until inspection	and bridge must be closed to traffic
	has been carried out by	immediately until a full inspection is carried
	structural engineer)	out and the subsequent recommended remedial
		action is carried out.

The last inspection of bridge assets (timber and concrete bridges) was carried out in 2004 and the summary of the condition states is detailed below.



# Number of Assets in each Condition State

Figure 9 Condition State of Bridge Asset group

It must be noted that all of the condition state 4 and 5 structures are timber. Due to this there will be a focus on the replacement and management program for the timber structures. All of the concrete bridges are condition state 1 through to 3. They have only minor issues currently and are not expected to have deteriorated much over the last six years.

A typical level two inspection report has been attached as Appendix C. Note the recommended maintenance and defects listed. Kital Road bridge will be looked at in more detail in chapter 6.

### 3.5 Conclusion

The current asset condition has been gathered through level 2 inspections on all bridge assets in accordance with the Main Roads Bridge Inspection Manual. The large drainage structures are currently having level one inspections carried out by trained council staff. Inspection reports for 2010 are not available in time to be considered for this dissertation. Therefore reference is made to the 2004 Bridge Inspection Reports to outline the process and methodology. The simple demonstration of condition four and five bridges is a representation of 'Gap Analysis' later in the financial section of this dissertation.

# **4 LEVELS OF SERVICE**

This chapter details the proposed levels of service set out for the bridge assets and the factors behind their adoption. The levels of service set out to support councils strategic goals, community expectations and to meet relevant legislation and statutory requirements.

### 4.1 Introduction

The level of service can be defined as the service quality / quantity for a particular activity or service area against which the service performance is measured. The levels of service are divided into the community and technical levels of service.

- Customer / Community LoS is defined as how the customer receives / perceives the service.
- Technical LoS is defined as the plans / measures in technical terms measured against a benchmark.

Since this is the first attempt to quantify the levels of service provided by bridge assets the core approach of documenting existing service levels has been undertaken. This has been achieved through consultation with relevant works supervisors, engineers and managers in a series of meetings. As a result of these consultations it was discovered that there was very little work carried out in regards to bridge maintenance and regular inspections due to a combination of staff turn-over and poor record keeping. The only work carried out on bridges over the last two financial years was of a reactive nature driven by customer requests.

### 4.2 Proposed Levels of Service

Due to the fact that levels of service form the basis of the maintenance and inspection programs it is imperative that all legislative, safety and community requirements are met. Currently there has not been any formal community consultation to determine community expectations and satisfaction. These expectations and satisfaction has been assumed for the first draft levels of service in consideration of complaints or requests lodged with councils customer service section. For some timber bridge replacements council has been dealing with effected stakeholders on a political level and design options have been produced and considered. A community consultation process has been suggested for improving the levels of service in future years and is detailed in the recommendations section. The following table outlines the assumed community levels of service that I have proposed and the derived technical levels of services designed to meet them. The performance targets and measurements are in the draft stages and are yet to be formally adopted by council. The inspection frequencies based on condition states have been adopted from the Bridge Inspection Manual (DTMR).

Key Performance Measure	Level of Service	Reason for Activity	Intervention Level	Hierarchy	Frequency / Responsiveness	Performance Indicator	Target Performance	Current Performance
Draft Communi	ty Levels of Serv	vice						
Quality	Provide a smooth ride	Community expectations	NA	ALL	NA	Customer service requests	Less than 10 per month	Currently performance tracking does not exist
Function	Ensure that the bridge meets user requirements for accessibility	Community expectations	NA	ALL	NA	Customer service requests	Less than 4 per month	Currently performance tracking does not exist
Safety	Provide safe suitable bridges, free from hazards	Community expectations	NA	ALL	NA	Customer service requests	Less than 10 per year	Currently performance tracking does not exist
Draft Technical	Levels of Servic	e						
Condition	Level 1 inspections	Identifying work needs to assist in maintenance program	NA	Concrete Bridges Timber Bridges	12 months 12 months	Frequency of inspections	100%	Currently performance tracking does not exist
				Culverts / Pipes	12 months			

Condition	Level 2 and 3	To assess the	NA		CS1-2	CS3	Frequency of	90%	Currently
	inspections	structural integrity					inspections		performance
		and capacity of the		Concrete	5 vears	3 vears			tracking does not
		bridge substructure		Bridges	5 years	5 years			exist
		and superstructure.		Diluges					
		Inspections will be							
		carried out in		Timber	5 years	3 years			
		accordance with		Bridges					
		DMR Bridge							
		Inspection Manual		Culverts /	F	2			
				Pipes	5 years	3 years			
				-					
					CS4		]		
					12 month	ns staggered			
				ALL	at 6 mon	thly			
					intervals	with Level			
					1 inspect	ion			
Accessibility	Provide	To ensure that	Notification	ALL	24 hours	s after	All emergency	100%	Currently
	appropriate	emergency works	of hazard to		event. M	ust be made	works including		performance
	hazard free	are performed to	bridge users		safe with	in 6 hours	barricades &		tracking does not
	access on bridge	remove dangerous			of event.		bridge closures		exist
	and approaches.	hazards to road					within 6 hours of		
		users					event.		
Quality	Routine	To ensure asset is		ALL	Carried of	out in			Currently
	maintenance	well maintained			conjunct	ion with			performance
					Level 1 i	nspections			tracking does not
									exist
Safety	Minor repairs	To ensure asset is		ALL	Within 4	months of		90%	Currently
	identified in	well maintained			identifica	ation of			performance
	Level 1				hazard.				tracking does not
	inspection								exist
L	1	L	1	1	1				

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Safety	Major repairs /	To ensure bridge	ALL	Annual program,	90%	Currently
	refurbishment	remains in a safe		ranked according to		performance
	identified in	and serviceable		risk and viability.		tracking does not
	level 2 and 3	condition				exist
	inspections					

Table 3 Draft Levels of Service

### 4.3 Summary

These draft levels of service will ensure that the bridges remain safe for use and that any problems or damage will be identified before they have an adverse impact on users. It is envisaged that these levels of service will be constantly reviewed and improved over time. The community levels of service should be obtained in future via questionnaires and surveys, e.g. telephone, door to door, public meetings, etc. The technical levels of service can be used to develop maintenance levels of service to describe the specific work and response in the workforce, which would be measurable.

# **5 FUTURE DEMAND**

This chapter will detail the expected future demand, the changes in technology and a proposal for the demand management plan.

### 5.1 Demand Forecast

The factors which are influencing the future demand include;

- Population increase;
- tourism industry growth;
- residential developments;
- change and growth of local industry; and
- changing demand from users.

The population of the region is expected to rise at 2% per annum. This growth is focused mainly in the towns of Warwick and Stanthorpe. Growth in the outer rural areas remains mostly stagnant. The tourism industry has remained steady over the last few years and currently no major increases are expected. As mentioned most residential developments are happening in and around the main towns in the region where the bridge assets are in good repair and handling the traffic volume well. With any change in local industry, for instance a new dairy farm, council considers the impact this would have on local infrastructure and any foreseeable issues are determined and remediated before approval is given.

The only issue which will be of concern to council will be changing demand of the users. This will be indentified through proposed community consultation in relation to satisfaction levels and expected levels of service. Any issues which arise from this will have to be addressed once the community consultation has been undertaken.

### **5.2** Changes in Technology

The changes in technology over the years which have an impact on bridges is the size and weights of the heavy vehicles. When the timber bridges and early concrete bridges were initially designed and constructed the heavy vehicle mass and dimensions were less than they are today. Currently all of the remaining timber structures are located in rural areas with few heavy vehicle traffic. Where there are load limits in place which would restrict heavy vehicles alternate routes are available. Therefore any changes in technology in the near future is not expected to impact on the current bridge assets.

# 5.3 Demand Management Plan

Typically when a planned road upgraded is designed to cater for increased traffic or heavy vehicles any bridge assets are located along road are investigated and either planned upgrade assets it is recommended that the demand management plan and strategies be adopted directly from the roads asset demand management plan.
# **6 LIFE CYCLE MANAGEMENT PLAN**

For this chapter 5 bridges have been selected and a life cycle management plan detail for each one. This will give an indication of the methodology and will be extended to cover the rest of the assets in due course. Four bridges (2 timber & 2 concrete) and one large drainage structure will be investigated.

## 6.1 Life Cycle of an Asset

The costs involved in the lifecycle of an asset are maintenance, renewal/ refurbishment, disposal and initial capital cost. When an asset is constructed it is considered to be at the start of its life. It will be providing the designed level of service and in the case of a concrete bridge has an estimated remaining life of 80 years. As the asset progresses through its service life the level of service it provides reduces until it reaches a critical intervention point. The intervention point is a predetermined point at which an asset will need to be refurbished or replaced as it does not provide an appropriate level of service. Consideration is then given to the differing options involved in replacement. For example a timber bridge may have many major defects, which would cost far too much to repair and there would be no choice but to replace it. The replacement of the bridge with a similar type of structure could be very expensive, and there are other options such as a set of culverts, a floodway or closure of the road. It comes down to community benefit versus whole of life cost of the asset.

A diagram outline the lifecycle of an asset is given below:



Life Cycle of Asset

Where a particular asset will appear on the graph depends on its condition rating. It is proposed that the overall condition rating be used to calculate its remaining useful life, which is used to calculate the remaining life cycle cost of the asset and determine approximately when an asset will need to be renewed or replaced.

It is assumed that the useful life of a bridge will be 80 years then by correlating this to remaining useful life we get for the condition states;

- Condition State 1: 80 60 years remaining useful life.
- Condition State 2: 60 40 years remaining useful life.
- Condition State 3: 40 20 years remaining useful life.
- Condition State 4: 20 1 years remaining useful life.
- Condition State 5: No remaining useful life. The bridge needs to be rehabilitated, replaced or the level of service which it provides needs to be revised, ie load limits etc.

It should be noted that an asset can have a longer than expected life and this methodology ensures that the focus is on remaining useful life rather than age of a structure. For instance if a structure is 60 years old and is still in condition state 2 this means that the expected remaining life can be as high as 80 years, even though it is 20 years away from the end of its theoretical design life.

The lifecycle costs of an asset are demonstrated below in the graph. There is an initial construction cost of building the asset, then as the asset progresses through its useful life the costs of maintaining it grow steadily until it reaches a point where it needs to be refurbished. This cycle continues until the asset reaches the end of its useful life and needs to be disposed and replaced.



Figure 11 Asset Life Cycle Costs

## 6.2 Kital Road Bridge Life Cycle

Attached as appendix C is the bridge inspection notes from Kital Road Bridge. It is located near the town of Allora. It is on a very low trafficked road with only 6 vehicles per day. The bridge is a three span timber bridge. From the 2004 level two inspections the bridge has been classed as condition state four. The bridge is in very poor condition with numerous major faults. It is uneconomical to replace all the components which are at the end of the life, so it has been decided to replace the structure this financial year. Four replacement strategies will be investigated along with the life cycle cost of each option for comparison. The four options to be considered are;

- 1. Replacement of structure with a composite structure;
- 2. Replacement of structure with a low flow floodway with twin 2100 RC pipes;
- 3. Replacement of structure with a low level crossing;
- 4. Removal of structure and closure of crossing.

The factors which will be considered are financial, community, life cycle costing and environmental impact. The life cycle costs are determined using the draft levels of service for inspection intervals and the maintenance, materials and labour are averages taken from past bridge works.



**Figure 12 Location of Bridge** 

### 6.2.1 Option 1 Replacement of Structure with a Composite Structure

Wangers Toowoomba have developed composite materials which can be used to rehabilitate or replace a timber bridge. The composite materials behave in a similar way to timber allowing them to be used in conjunction with existing timber piles. During discussion with Wagners it was proposed that Wagners could design, certify, supply and install a composite bridge utilising existing timber piles. The structure would offer the same flood immunity as the existing bridge and would have a similar expected lifespan with very little maintenance required. The total cost from Wagners was \$200,000 + GST. This would include the design and certification, fabrication and supply of composite components to replace the timber components, the removal of the existing structure, and installation of composite components including piers, headstocks, girders, decking and kerbs.

The following table details the annual cost of the bridge as it would be for each condition state. The inspection times have been assumed and current council labour and plant hire rates have been used. The total cost is based on an expected life of 80 years and 20 years spent in each condition state.

	Туре	Frequency (years)	Cos	t	Anr	nual Cost
	Initial Cost	1	\$	200,000	\$	200,000
5	Level 1 Inspection	1	\$	463	\$	463
te ji	Level 2 Inspection	5	\$	1,200	\$	240
Sta	Routine Maintenance	1	\$	-	\$	-
Ŭ	Materials	1	\$	-	\$	-
		Tot	al Ar	nnual Cost	\$	703
5	Level 1 Inspection	1	\$	463	\$	463
te 2	Level 2 Inspection	5	\$	1,200	\$	240
Sta	Routine Maintenance	1	\$	347	\$	347
Ŭ	Materials	1	\$	500	\$	500
		Tot	al Ar	nnual Cost	\$	1,550
5	Level 1 Inspection	1	\$	463	\$	463
te 3	Level 2 Inspection	3	\$	1,200	\$	400
onc	Routine Maintenance	1	\$	463	\$	463
Ŭ	Materials	1	\$	1,500	\$	1,500
		Tot	al Ar	nnual Cost	\$	2,826
5 -	Level 1 Inspection	1	\$	463	\$	463
te 4	Level 2 Inspection	1	\$	1,200	\$	1,200
onc	Routine Maintenance	1	\$	926	\$	926
Ŭ	Materials	4,000	\$	4,000		
		Tot	al Ar	nnual Cost	\$	6,589
			Tota	al Cost	\$	433,360

Table 4 Cost over the life-cycle of asset

The community benefits would be minimal as this bridge only services six vehicles per day. The environmental impact of this structure would be minimal as it utilises existing piles, thus reducing the amount of river bank disturbance. The total life cycle cost of this asset, assuming 20 years in each condition state is \$433,360.

## 6.2.2 Option 2 Replacement of Structure with a Low Flow Floodway

After surveying the site a design has been drawn up by the design department incorporating two 2100mm diameter reinforced concrete pipes and a concrete running surface. The layout and long section have been attached in Appendix D. The total cost for supply and construction for this option is \$319,108.34 + GST. The estimate is attached as Appendix E.

The following table outlines the annual costs of this option for each condition state. The inspection times have been assumed and current council labour and plant hire rates have been used. The cost of inspections, maintenance etc is a lot less than that of a typical bridge. Again this structure has a design life of 80 years.

	Туре	Frequency (years)	Cos	t	Anr	nual Cost
	Initial Cost	1	\$	319,108	\$	319,108
5	Level 1 Inspection	1	\$	347	\$	347
te ji	Level 2 Inspection	5	\$	900	\$	180
Sta	Routine Maintenance	1	\$	-	\$	-
Ŭ	Materials	1	\$	-	\$	-
		Tot	al Ai	nnual Cost	\$	527
5	Level 1 Inspection	1	\$	347	\$	347
te 2	Level 2 Inspection	5	\$	900	\$	180
sta	Routine Maintenance	1	\$	347	\$	347
Ŭ	Materials	1	\$	500	\$	500
		Tot	al Aı	nnual Cost	\$	1,374
5	Level 1 Inspection	1	\$	347	\$	347
te 3	Level 2 Inspection	3	\$	900	\$	300
Sta	Routine Maintenance	1	\$	635	\$	635
0	Materials	1	\$	1,000	\$	1,000
		Tot	al Ai	nnual Cost	\$	2,282
5 -	Level 1 Inspection	1	\$	347	\$	347
litio te 4	Level 2 Inspection	1	\$	900	\$	900
onc Sta	Routine Maintenance	1	\$	1,225	\$	1,225
Ö	Materials 1 \$ 2,000					
		Tot	al Ai	nnual Cost	\$	4,472
			Tot	al Cost	\$	492,208

Table 5 Cost over the life-cycle of asset

The reduced community benefits from the lower level of flood immunity would be have very little impact as it services only six vehicles per day. The environmental impact of this structure would be moderate as there will be a lot of disturbance to the creek during construction, however the long term impact would be minimal. The total life cycle cost of this asset, assuming 20 years in each condition state is \$92,208.

## 6.2.3 Option 3 Replacement of Structure with a Low Level Crossing

After surveying the site a design has been drawn up by the design department a low level floodway crossing with a concrete running surface. The layout and long section have been attached in Appendix F. The total cost for supply and construction for this option is \$155,852.23 + GST. The estimate is attached as Appendix G.

The following table outlines the annual costs of this option for each condition state. Again this structure would have a design life of 80 years. Since this structure does not meet the requirements to be covered in this plan the inspections are not required, therefore the operating cost is very low for this asset as it would only require minor maintenance over its life.

	Туре	Frequency (years) Cost				Annual Cost		
	Initial Cost	1	\$	155,852	\$	155,852		
5	Level 1 Inspection	1	\$	347	\$	347		
te T	Level 2 Inspection	5	\$	900	\$	180		
onc	Routine Maintenance	1	\$	-	\$	-		
Ŭ	Materials	1	\$	-	\$	-		
		Tot	al Ar	nual Cost	\$	527		
5	Level 1 Inspection	1	\$	347	\$	347		
te 2	Level 2 Inspection	5	\$	900	\$	180		
ond	Routine Maintenance	1	\$	347	\$	347		
ō ·	Materials	1	\$	500	\$	500		
		Tot	al Ar	nual Cost	\$	1,374		
5	Level 1 Inspection	1	\$	347	\$	347		
te 3	Level 2 Inspection	3	\$	900	\$	300		
Star	Routine Maintenance	1	\$	635	\$	635		
õ	Materials	1	\$	1,000	\$	1,000		
		Tot	al Ar	nual Cost	\$	2,282		
5 -	Level 1 Inspection	1	\$	347	\$	347		
litio te 4	Level 2 Inspection	1	\$	900	\$	900		
onc	Routine Maintenance	1	\$	1,225	\$	1,225		
Ŭ	Materials	1	\$	2,000	\$	2,000		
		Tot	al Ar	nual Cost	\$	4,472		
			Tota	al Cost	\$	328,952		

Table 6 Cost over the life-cycle of asset

The reduced community benefits from the lower level of flood immunity would be have very little impact as it services only six vehicles per day. The environmental impact of this structure would be moderate as there will be a lot of disturbance to the creek during construction, however the long term impact would again be minimal. The total life cycle cost of this asset, assuming 20 years in each condition state is \$328,952.

### 6.2.4 Option 4 Removal of Bridge and Closure of Crossing

The final option is to remove the bridge and close the crossing to all traffic. This would cost \$15,000 + GST and is easily the cheapest option, however the bridge is used by a local farmer who has paddocks either side of the river. Whilst there are alternative routes, it is approximately a 5km round trip for the farmer, this is a long way to take farm machinery.

### 6.2.5 Recommended Option

It is recommended that council adopts the fourth option of closing the crossing as it is by far the cheapest option and only has a minor impact on the community. This issue went to council in August and after a public consultation process it was decided that option three was the best outcome for council and the community. Work is due to start in December 2010.

## 6.3 William Deacon Bridge Life Cycle

		•											50/4	s	heet		
Stru	cture	Con	ditio	n Insp	ection	Repor	t						B2/1	1	of 2		
Structu	re ID			10021			Structure	Name	William	Deacon Brid	ge		1				
Road T	уре			Local Art	erial												
tructu	ге Туре	l.		Bridge			Road Num	iber	N/A					and the second second	States 1		
onstru	uction Ty	/pe		Deck Un	it	-	Road Nam	e	Allora [	Drive			A Alin		105		
onstru	uction M	aterial		Concrete			Crossing		Dairym	ple Creek			+		24		
ate Of	Constru	uction		Unknowr	1	- 1	Suburb		Allora	NARS VIGES					10.00		
istrict				SDRC	NI	-	Owner		Southe	m Downs Re	dional Cr	ouncil	M DEACON BRIDGE	A14.47			
		2		Allera E	i	-	Legal Auto		sono	in bonno na	gioriai oc		CALLYIN E DOLE	10.00	4		
	elerence				4	-	Local Aut	tony	JUNG			2					
atitude	e (dec de	*9)		-28.0284	20	-	Number O	rspans				2	2		ALL PROPERTY.		
ongitu	ide (dec	aeg)		151.962	290	-	Length (m)	Abutment	to Abutme	int)		20,40					
ate Of	Last Ins	spection		Unknown	1		Height (m)	(Ground/W	ater to Dec	K Unit)		5.20	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AT LAD			
ispect	ion Date	£		13/08/20	10		Width (m) (	Outside ke	rb to kerb)			9.30	Contraction of the				
uture	Inspectio	on Date		13/08/20	15	C	Cell Length	n	N/A				CONTRACT OF STREET	1 States			
illed in By MEF Cell Width									N/A					A STATE OF THE OWNER	100		
spect	Level 2 Cell Height N/A										Cracks marked for monit	toring?	Yes				
nspect	tors			PH,MEF		0	Checked b	ý.	NL				Inspection Type	Programmed			
Chainag	ge (km)			0.53		4	on		Allora	Drive							
								- Andrewski - A									
c	ompone	nt Locat	ion	ssi			Quantity Per s Location Condition s Descript						on of item/condition ation of defects by location	type.			
Modification	Group	Component	Standard Number	Exposure Cla	Quantity	Unit	1	2	3	4	Maintanance Required	a Referen Numbe	nces of sketches and photos (Photo Reference Irs)				
0	AP1	GR1	728	1	1.0	Each		1			~	The end treat	ments on the guard rails ma	ly need to be asse	ssed if		
0	AP1	AP	70S	1	1.0	22		1				uney meet con	rent surety of design stand				
0	AP1	GR	728	1	1.0	Each		1			~	The end treat	ments on the guard rails ma	ly need to be asse	ssed if		
												they meet cur	rent safety or design standa	ards.			
0	A1	J1	150	1	8.7	Lin m	×	×	x	X		Believed to be	e a fixed joint. Unable to be	seen.			
0	S1	K1	3P	1	14.2	Lin m		14.2		1		Traffic kerb is	part of the pre cast outside	deck unit.			
0	S1 S1	WS K2	10 3P	1	123.0	m²		94.6	28.4		~	Moderate cra location. Scu Stripping of th 0005; Photo ( Traffic kerb is	cking of the wearing surface ppers need to be checked r le surface is also occurring 1006; Photo 0007; Photo 00 part of the pre cast outside	e above the abutm egularly to keep cl near the kerbs. Pl 15; Photo: 0016 deck unit	ent 2 joint ear. noto		
0	D1	14	150		87	Liner	~	v	× I	×		Bolioved to b	a fixed joint . Liephie to be	coon			
0	P1.	51	100	1	0./	Linm	×		*			Delieved to be	e a nixed joint. Unable to be	dock up?			
0	52	K1	ЗP	1	14.2	Linm	-	14.2				Franic Kerb is	part of the pre cast outside	ueck unit.			
	Oursell I	2									0						
Origina	overall F	raungs		0		1	2	3	4	5	Struct	ure was in good	condition at the time of inso	ection.			
angute			A an a		0.0	(Dat Dat	-	Chad	101 000	line and the set	Conden	no mas in good	sometion at the time of insp	ooudit.			
Widen	ning (WL	n, WRn)	I. Lengthe	ening (L1, I	L2), Raised	(Ra), Rede	cked (Re).	Shortening	(\$1, \$2), \$	strengthening	(St)						
Over	rall Inspe iments	ection		Repairs of The batte	requires to c er protection	racks in the	e wearing s ent 2 has s	surface abov evere erosio	ve the joint on at the ba	locations. ise of the wa	L						



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Figure 13 Draft summary of recent ARRB level two inspection

ARRB have recently completed their level two inspections on all of councils bridge assets and they are in the process of writing up the condition reports. The figure above is the front page of a draft inspection report for a concrete two span bridge located in Allora. The structure has been given an overall condition state rating of two. This means that the bridge has an expected remaining useful life of between 40 – 60 years. A life cycle management plan is outlined and costed below.

	Туре	Frequency (years)	Cost		Anr	nual Cost
	Initial MTCE cost	1	\$	7,500	\$	7,500
5	Level 1 Inspection	1	\$	347	\$	347
te 2	Level 2 Inspection	5	\$	900	\$	180
sta	Routine Maintenance	1	\$	347	\$	347
0	Materials	1	\$	500	\$	500
	_	Tot	al Ann	ual Cost	\$	1,374
5	Level 1 Inspection	1	\$	347	\$	347
te 3	Level 2 Inspection	3	\$	900	\$	300
sta	Routine Maintenance	1	\$	635	\$	635
Ö	Materials	1	\$	1,000	\$	1,000
	_	Tot	al Ann	ual Cost	\$	2,282
5 -	Level 1 Inspection	1	\$	347	\$	347
te 4	Level 2 Inspection	1	\$	900	\$	900
sta	Routine Maintenance	1	\$	1,225	\$	1,225
Ŭ	Materials	1	\$	2,000	\$	2,000
		Tot	al Ann	ual Cost	\$	4,472
			Total (	Cost	\$	170,060

Table 7 Cost over the life-cycle of asset

The repairs suggested by ARRB are estimated to cost approximately \$7,500. For the rest of the life of the asset it has been assumed that it will be in each condition state for 20 years. It is expected to cost \$1,374 annually while is remains in condition state two. This then increases to \$2,282 for CS3 and \$4,472 for CS4. The total estimate cost of operating this bridge until it is replaced is \$170,060. Note that this is only an approximation and CPI has not been applied to the figures.

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## 6.4 Bourke Road Bridge Life Cycle

Stru	tructure Condition Inspection Report											B2/1	Sheet		
Struct	ure ID			10081		T	Structure	Name	None						
Road	Туре			Local Ac	cess										
Struct	ure Type			Bridge			Road Num	ber	N/A					and the second second	and the second
Const	ruction Ty	/pe		Timber G	irder		Road Nam	e	Bourk	e Rd				i jai	all anothing of the
Const	ruction M	aterial		Timber			Crossing		Conda	amine River	5		Elin Sullar	A CONTRACTOR	
Date C	of Constru	iction		Unknown	E.		Suburb		Elbow	Valley					A State of the state
Distric	:t			SDRC			Owner		South	ern Downs	Regional Co	ouncil			
UBD R	eference			40 F-12			Local Auth	nority	SDRC		1.2016		139 //	And Description of the local division of the	
Latitud	de (dec de	eg)		-28.3633	40		Number O	f Spans				1			
Longit	ude (dec	deg)		152.208	290	L	.ength (m)	(Abutmen	t to Abutm	ient)		9.80			
Date C	of Last Ins	pection		Unknown	1	ŀ	leight (m)	(Ground/W	ater to De	ck Unit)		3.10			
Inspec	tion Date			08/10/20	10	v	Vidth (m) (	Outside ke	rb to kerb	)		4.60	N. A.		
Future	Inspectio	on Date		08/10/20	13	c	Cell Length	ı	N/A						
Filled	in By			MEF		c	Cell Width		N/A						· · · · · ·
Inspec	tion			Level 2		c	Cell Height		N/A				Cracks marked for mon	itoring?	No
Inspec	tors			MEF		c	Checked b	y	AV				Inspection Type	Programmed	
Chaina	age (km)			4.10		c	on		Bour	ke Rd			•		
cation	Compone	nt Locat	ion P	re Class	Þ			Quant Con St	tity Per dition tate		nance ed	Comment Loca Desc Refe Num	ts ation of item/condition cription of defects by location rences of sketches and phot nbers)	n type, tos (Photo Refere	nce
Modifi	Group	Compe	Standa Numbe	Expos	Quanti	Unit	1	2	3	4	Mainta Requir				
0	AP1	AP	700	1	1.0	Each			1		~	Approach	wearing surface is dirt and is i	n poor condition.	No give
0	S1	K1	3T	1	9.8	Lin m		-	9.8	-	~	way or brid	ige end markers on approach.	. Photo 0002	of the
-				1.45					0.0		25	timber kert	os is occurring.; Photo: 0014	iorate weathering c	
0	S1	D	20T	1	49.0	m²			49		~	Moderate v deck plank in places.;	weathering, splintering and los is is occurring. Dirt needs rem Photo: 0013	se of section of the noving from the tim	timber ber deck
0	S1	к	3T	1	9.8	Lin m		9.8				Moderate v	weathering of the timber kerbs	s is occurring.	
0	AP2	AP	700	1	1.0	Each			1		~	Approach way or brid	wearing surface is dirt and is in lge end markers on approach.	n poor condition. 1 . Photo 0005	No give
0	S1	G	22T	1	4.0	Each		3		1	~	Only the out has a very	utside girders (1 and 4) were of severe pipe inside the girder.	drilled. End 2 of gi	rder 1 was

Overall Ratings		1	2	3	4	5	Comments
Original	0			~			Structure was in poor condition at the time of inspection.
Widening (WLn , WRn ), Le	ngthening (L1, L2), Raised	(Ra), Rede	cked (Re),	Shortening	(S1, S2), St	rengthenin	g (St)
Overall Inspection Comments	Bridge should have I It was deemed to un Only the end of a nu An UBIU is required	nad the Und safe to use mber of gird for ARRB to	lerbridge in ladders to o fers could to undertake	spection un drill the girde be drilled fro a full drillin	it to inspect ers. m the deck. g survey of	t the bridge It is recor the bridge.	nmended that a full drill survey be conducted as soon as possible.



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Figure 14 Draft summary of recent ARRB level two inspection

The figure is the front page of a draft inspection report for a timber single span bridge located in Elbow Valley. The structure has been given an overall condition state rating of three. This means that the bridge has an expected remaining useful life of between 20 - 40 years. A life cycle management plan is outlined and costed below.

	Туре	Frequency (years)	Cost		Anr	ual Cost
	Initial MTCE cost	1	\$	12,500	\$	12,500
5	Level 1 Inspection	1	\$	463	\$	463
te 3	Level 2 Inspection	3	\$	1,200	\$	400
Sta	Routine Maintenance	1	\$	463	\$	463
Ŭ	Materials	1	\$	1,500	\$	1,500
		Tot	al Ann	ual Cost	\$	2,826
5 -	Level 1 Inspection	1	\$	463	\$	463
litio te 4	Level 2 Inspection	1	\$	1,200	\$	1,200
Sta	Routine Maintenance	1	\$	926	\$	926
Ŭ	Materials	1	\$	4,000	\$	4,000
		Tot	al Ann	ual Cost	\$	6,589
			Total	Cost	\$	200,800

 Table 8 Cost over the life-cycle of asset

The repairs suggested by ARRB are estimated to cost approximately \$12,500. For the rest of the life of the asset it has been assumed that it will be in each condition state for 20 years. It is expected to cost \$2,826 annually while is remains in condition state three. This then increases to \$6,589 for CS4. The total estimate cost of operating this bridge until it is replaced is \$200,800. Note that this is only an approximation and CPI has not been applied to the figures.

## 6.5 Bellinghams Road Bridge Life Cycle

Textore is         Total         Structure is and Number         None         Image is a structure is and Number         None           Read Type         Local Collector         Read Number         NA         Image is a structure is and Number         NA           Construction Type         Trinker Grader         Read Number         Beinghams Rd         Construction         Use is a structure is and Number         Delow Valkey         Image is a structure is a str	Stru	cture	Con	ditio	n Insp	ection	Repor	t						B2/1	s	heet
Sindu Turb         Tool         Sindu Turb         Not         Sindu Turb         Not           Sindu Tyre         Under Construction Tyre         Under Construction Tyre         Under Construction Tyre         Not         Image: Construction Tyre         Under Construction Tyre         Under Construction Tyre         Not         Image: Construction Tyre         Under Construction Tyre         Solution Rive         Under Construction Tyre         Image: Constructin Tyre         Image: Constructin Tyre <td< th=""><th>Chauch</th><th>une ID</th><th></th><th></th><th>10041</th><th></th><th></th><th>-</th><th>lama</th><th>None</th><th></th><th></th><th></th><th></th><th>1</th><th>of 2</th></td<>	Chauch	une ID			10041			-	lama	None					1	of 2
Note in product         Outse United         Road Number         NA           Construction Type         Timber Grief         Road Number         NA         Enclosing type         Income           Construction Type         Timber Grief         Creasing         Construction         Unicome         Staduut         Ellow Valley         Income	Bruch	ire iD			Local Co	lleator		structure	vame	None						
Januard type         Outge         Note         Note         Outge	Road	ype			Bridge	nector		load Num	har	NZA						
Construction         Product Name         Construction         Construction<	Const	uction T	-		Timber G	lirder		Coad Nam	bei	Relling	hame Pd			-	Do allon 1.	C. C.
Construction National Naterial Natextender National National National National National	Const	uction 1	ype		Timber G	siluei			e	Dennig	grianis Ru				And Part Store Store	and the second
Unker of Construction         Unknown         Study may         Evolve Valuey         Output of Spans           UBD Reference         39 1-13         Local Authority         SORC         Unknown         10 70           Latitude (dec deg)         122,142300         Number Of Spans         10 70         10 70           Date Of Last Inspection         Date Of Last Inspection         Berling (Matching to Deck Kinit)         1.70         10 70           Falue inspection         Date Of Last Inspection         Date Of Last Inspection         Date Of Langth (In) (GroundWater to Deck Kinit)         1.70         Inspection Date         06/10/2013         Cell Length         N/A         Cracks marked for monitoring?           Inspection         Level 2         Cell Width         N/A         Inspection Type         Programmed           Inspection         Local in of femicondition         South in or         Bellinghams Rd         Inspection Type         Programmed           Inspection         Local in of femicondition         Study of the South in of the South in South In orth         Study         AV         Inspection Type         Programmed           Other Remarks         Structure is a signed load limit of 241.         In         2         3         4         V         The approach aphate wearing surface is in poor condition. Numbers in the South orth in Sout	Constr	uction M	ateriai		Timber			rossing		Conda				-10.2		
Ubintic         SBRC         Own         Southern Downs Regional Council           UBD Reference         39 1 3         Local Authority         SDRC         Image: Construct Council         10           Landbuck (dec deg)         23.374:30         Number Of Spans         1         10         70           Longbuck (dec deg)         12.142:30         Length (m) (Abdument to Automent)         10.70         10         70           Under Otat Inspection         Usknown         Height (m) (Ground Water to Doek Unit)         10.70         10         70           Inspection Date         081/02/10         With (m) (Outside kerb to kerb)         5.90         Cracks marked for monitoring?           Inspection Turbe Tope Top	Date O	f Constru	uction		Unknown	ı	2	Suburb		Elbow	valley			387		AC
UBD Reference         39 1-3         Local Authority         SDRC           Longitude (dec deg)         237430         Number 07 Spans         1           Longitude (dec deg)         152.14230         Length (m) (Abutment)         10.70           Date Of Last Inspection         Unknown         Height (m) (GroundWater to Deck Unit)         1.70           Date Of Last Inspection         Del NUCL (M)         10.70         10.70           Date Of Last Inspection         Del NUCL (M)         NUA         5.90         Second           Fibre Inspection         Del NUCL (M)         NUA         Creaks marked for monitoring?           Inspection         Loval 2         Cell Height         NUA         Creaks marked for monitoring?           Inspection         Loval 2         Cell Height         NUA         Creaks marked for monitoring?           Inspection         MEF         Checked by         AV         Inspection Type         Programmed           Structure is a 1 span Imber road bridge, 1 traffic Lane wide.         Structure is a 1 span Imber road bridge, 1 traffic Lane wide.         Reference of ketches and photos (Photo Reference Numbers)         Structure has a signed load limit of 24t:         Structure has a signed load limit of 24t:         Reference of ketches and photos (Photo Reference Numbers)           0         AP1         AP	Distric	t			SDRC		C	Owner		South	ern Downs R	egional Co	uncil	S I MAY	10	
Listitude (dec deg)         -28.37343         Number Of Spans         1         1           Listitude (dec dec)         12.142300         Length (n) (Ablument o Ablument)         10.70           Date Of Last Inspection         Ukhnown         Height (n) (GroundWater to Deck Umi)         1.70           Inspection Date         08/10/2010         Width (n) (Outled kerb to knn)         5.90         Feature Inspection         Lewal 2         Cell Height         N/A           Filled in By         MEF         Cell Width         N/A         Cracks marked for monitoring?         Inspection         Inspection         Inspection         N/A         Programmed           Thispection         Lewal 2         Cell Height         N/A         Cracks marked for monitoring?         Inspection         Inspection         Inspection         Inspection         Programmed           Chanage (km)         6.80         on         Belinghams Rd         Inspection Type         Programmed           Structure has a signed load imit of 24t.         Structure has a signed load imit of 24t.         Inspection Type.         References of sketches and pholos (Photo Reference of references of sketches and pholos (Photo Reference of references of sketches and apholos (Photo Reference of references of sketch	UBD R	eference			39 I-13		L	ocal Auth	nority	SDRC	8		1		State of the local division of the local div	
Longitud (sec dag)         152.14239         Length (n) (Abutment) to Abutment)         10.70         170           Base Of Last Newson         Height (n) (CoundWate Doek Uni)         1.70         5.90         7.90 <t< td=""><td>Latitud</td><td>le (dec d</td><td>eg)</td><td></td><td>-28.3734</td><td>30</td><td>r</td><td>lumber O</td><td>fSpans</td><td></td><td></td><td></td><td>1</td><td></td><td>13</td><td>- Stree</td></t<>	Latitud	le (dec d	eg)		-28.3734	30	r	lumber O	fSpans				1		13	- Stree
Date of Last Imspection         Unknown         Height (m) (Ground Water to Deck Um)         1.7.0           Future Inspection         08/10/2013         Cell Length         N/A           Future Inspection         08/10/2013         Cell With (m) (Outside kerb to Deck Um)         NA           Future Inspection         Date of Lasy Impact Not Not Not Not Not Not Not Not Not No	Longit	ude (dec	deg)		152.142	390	L	ength (m)	(Abutment	to Abutm	ient)		10.70	44	and the state	The second
Interaction Date         081/02/01         Vidth (m) (Outside kerb to kerb)         5.90         Image: Solution of the solution o	Date O	f Last In:	spection		Unknowr	1	н	eight (m)	(Ground/W	ater to De	ck Unit)		1.70			
Partner inspective to the partner in the partner integration of the partner integratene in poor condition. The partner is the partner integration o	Inspec	tion Date	1		08/10/20	10	v	/idth (m) (	Outside ke	rb to kerb	)		5.90	CT ALL		
Field by Verter WEF       Cell Widh NA       Cracks marked for monitoring?         Inspection       Call Height NiA       Cracks marked for monitoring?         Inspection Type Programmed         Chalanage (km)       Subjection Type Programmed         Chalanage (km)       Colspan="4">Colspan="4"        Colspan="	Future	Inspecti	on Date		08/10/20	13	C	ell Length	1	N/A						
Inspection         Level 2         Cell Height         N/A         Cracks marked for monitoring?           Inspection         MEF         Checked by         AV         Inspection Type         Programmed           Chanage (Im)         6.80         on         Bellinghams Rd         Inspection Type         Programmed           Other Remarks         Structure is a 1 span timber road bridge. 1traffic lane wide. Aproach 1 is from the north. Structure has a signed load limit of 241.         Structure is a 1 span timber road bridge. 1traffic lane wide. Aproach 1 is from the north. Structure has a signed load limit of 241.         Structure is a 1 span timber road bridge. 1traffic lane wide. Aproach 1 is from the north. Structure has a signed load limit of 241.         Structure is a 1 span timber road bridge. 1traffic lane wide. Aproach 1 is from the north. Structure has a signed load limit of 241.         Structure is a signed load limit of 241.         Structure is a signed load limit of 241.           Structure is a signed load limit of 241.         Structure is a signed load limit of 241.         Interpret is the interpret is th	Filled	n By			MEF		с	ell Width		N/A			100	2. Star	and the second	
Inspectors         MEF         Checked by         AV         Inspection Type         Programmed           Chainage (km)         6.80         on         Bellinghams Rd         Bellinghams Rd         Bellinghams Rd         Bellinghams Rd           Other Remarks         Structure is a 1 span timber read bridge, 1 traffic lane wide. Approach 1 is from the north Structure has a signed load limit of 24t.         Structure is a 1 span timber read bridge, 1 traffic lane wide. Approach 1 is from the north Structure has a signed load limit of 24t.         Comments              Comments	Inspec	tion			Level 2		C	ell Height		N/A			Cra	icks marked for r	monitoring?	No
Chainage (km)       6.80       Delinghams Rd         Other Remarks       Structure is a 1 span timber road bridge, 1 traffic lane wide. Approach 1 is from the north Structure has a signed load limit of 24t.         Component Location       Comments         u       grad       grad <thgrad< th="">       grad       <thgrad<< td=""><td>Inspec</td><td>tors</td><td></td><td></td><td>MEF</td><td></td><td>c</td><td>hecked by</td><td><i>y</i></td><td>AV</td><td></td><td></td><td>Ins</td><td>pection Type</td><td>Programmed</td><td></td></thgrad<<></thgrad<>	Inspec	tors			MEF		c	hecked by	<i>y</i>	AV			Ins	pection Type	Programmed	
Other Remarks         Structure is a 1 span limber road bridge, 1 traffic lane wide. Appraach 1 is from than north. Structure has a signed load limit of 24t.         Comments         Comments           voga         voga <td>Chaina</td> <td>ige (km)</td> <td></td> <td></td> <td>6.80</td> <td></td> <td>0</td> <td>n</td> <td>2</td> <td>Bellin</td> <td>ighams Rd</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Chaina	ige (km)			6.80		0	n	2	Bellin	ighams Rd					
g       x       3       6 x       1       2       3       4       g x         0       AP1       AP       700       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0002         0       S1       K1       3T       1       10.7       Lin m       10.7       Image: Construction of the approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0002         0       S1       K1       3T       1       10.7       Lin m       10.7       Image: Construction of the approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0001         0       S1       K       3T       1       10.7       Lin m       9.7       1       ✓       The timber deck planks are weathering moderately with none of replacement at this stage. Photo: 0011       No         0       S1       K       3T       1       10.7       Lin m       9.7       1       ✓       The butment 1 end of the kerb has moderate splitting visible. Photo: 0009       No       AP2       AP       700       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0008       La	dification	Compone	ent Locat	ndard mber	oosure Class	antity			Quant Conc St	ity Per lition ate		Intanance quired	Comments Location of i Description References of Numbers)	tem/condition of defects by loc: of sketches and p	ation type, shotos (Photo Referen	nce
O       AP       AP       700       1       1.0       Each       1       1       Y       The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0002         O       S1       K1       3T       1       10.7       Lin m       10.7       Im       way or bridge end markers on approach. Photo 0002         O       S1       D       20T       1       63.0       m²       63       The timber deck planks are weathering moderately with none of replacement at this stage. Photo: 0011         O       S1       K       3T       1       10.7       Lin m       9.7       1       ✓       The timber deck planks are weathering moderately with none of replacement at this stage. Photo: 0011         O       S1       K       3T       1       10.7       Lin m       9.7       1       ✓       The approach asphalt wearing surface is in poor condition. N         O       AP2       AP       700       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. N         O       AP1       H       54T       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. N         O       A1       PRO	Ŵ	อ็	S	Sta	ĒX	ð	5	1	2	3	4	Ma Re				
O         S1         K1         3T         1         10.7         Lin m         10.7         Image: Constraint of the second of the	0	AP1	AP	700	1	1.0	Each			1		v	I he approach asph way or bridge end	nait wearing surfai markers on appro	ce is in poor condition. ach. Photo 0002	No give
O       S1       D       20T       1       63.0       m²       63       Image: Constraint of the second seco	0	S1	K1	3T	1	10.7	Lin m		10.7							
O       S1       K       3T       1       10.7       Lin m       9.7       1       ✓       The abutment 1 end of the kerb has moderate splitting visible. Photo: 0009         O       AP2       AP       700       1       1.0       Each       1       ✓       The abutment 1 end of the kerb has moderate splitting visible. Photo: 0009         O       AP2       AP       700       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. Now way or bridge end markers on approach. Photo 0008         O       A1       H       54T       1       1.0       Each       1       ✓       The approach asphalt wearing surface is in poor condition. Now way or bridge end markers on approach. Photo 0008         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       S1       G       22T       1       5.0       Each       5       ✓       Minor rot in the saywood on girder 1. Only minor internal pipin found in the timber girders.; Photo: 0018         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       A1       PRO       530       1 <td< td=""><td>0</td><td>S1</td><td>D</td><td>20T</td><td>1</td><td>63.0</td><td>m²</td><td></td><td>63</td><td></td><td></td><td></td><td>The timber deck pla</td><td>anks are weatheri</td><td>ing moderately with nor</td><td>ne in need</td></td<>	0	S1	D	20T	1	63.0	m²		63				The timber deck pla	anks are weatheri	ing moderately with nor	ne in need
O     AP2     AP     700     1     1.0     Each     1     V     The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0008       O     A1     H     54T     1     1.0     Each     1     V     The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0008       O     A1     H     54T     1     1.0     Each     1     V     The approach asphalt wearing surface is in poor condition. N way or bridge end markers on approach. Photo 0008       O     A1     PRO     530     1     12.0     m <sup>2</sup> 12     Rock and concrete type batter protection.       O     S1     G     22T     1     5.0     Each     5     Minor rot in the sapwood on girder 1. Only minor internal pipin found in the timber girders.; Photo: 0018       O     A1     PRO     530     1     12.0     m <sup>2</sup> 12     Rock and concrete type batter protection.	0	S1	к	ЗT	1	10.7	Lin m		9.7	1		~	of replacement at to The abutment 1 en	his stage.; Photo: d of the kerb has	0011 moderate splitting visit	le.:
O       AF       AF       100       1       1.0       Each       1       1       V       In expression applicable applica		4.00	40	700		10	E sinte		8550				Photo: 0009		spinning visit	nord Network
O       A1       H       54T       1       1.0       Each       1       1       Large internal piping was found in the LHS end of the headstor Photo: 0015         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       S1       G       22T       1       5.0       Each       5       Minor rot in the sapwood on girder 1. Only minor internal pipin found in the timber girders.; Photo: 0018         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         O       A1       PRO       530       1       12.0       m²       12       Rock and concrete type batter protection.         Other Hatings         Other Hatings         Other Hatings         Other Hatings         Other Hatings	0	AP2	AP	700	1	1.0	Each			1		v	way or bridge end	nait wearing surfai markers on appro	ce is in poor condition. each. Photo 0008	No give
O         A1         PRO         530         1         12.0         m²         12         Rock and concrete type batter protection.           O         S1         G         22T         1         5.0         Each         5         Minor rot in the sapwood on girder 1. Only minor internal piper found in the timber girders; Photo: 0018           O         A1         PRO         530         1         12.0         m²         12         Rock and concrete type batter protection.	0	A1	н	54T	1	1.0	Each		1				Large internal pipin	g was found in th	e LHS end of the head	stock.;
O         S1         G         22T         1         5.0         Each         5         Minor rot in the sapwood on girder 1. Only minor internal pipe found in the timber girders.; Photo: 0018           O         A1         PRO         530         1         12.0         m <sup>2</sup> 12         Rock and concrete type batter protection.           Overall Ratings	0	A1	PRO	530	1	12.0	m²		12	-			Rock and concrete	type batter protect	ction.	
O     A1     PRO     530     1     12.0     m <sup>2</sup> 12     found in the timber girders.; Photo: 0018       O     A1     PRO     530     1     12.0     m <sup>2</sup> 12     Rock and concrete type batter protection.	0	S1	G	22T	1	5.0	Each		5				Minor rot in the sap	wood on girder 1	. Only minor internal p	iping was
O         A1         PRO         530         1         12.0         m²         12         Rock and concrete type batter protection.           Overall Ratings         1         2         3         4         5         Comments           Original         0													found in the timber	girders.; Photo: 0	0018	6 - R
Overall Ratings         1         2         3         4         5         Comments           Original         0         -         -         -         Structure was in fair condition at the time of inspection	0	A1	PRO	530	1	12.0	m²		12				Rock and concrete	type batter protect	ction.	
Overall Ratings 1 2 3 4 5 Comments																
Original 0 / Structure was in fair condition of the time of inspection		Overall	Ratings				1	2	3	4	5	Comm	ents			
Structure was in fair condition at the time of inspection.	Origin	al			0				~			Structu	ire was in fair condition	on at the time of ir	nspection.	

Widening (WLn, WRn,) Lengthening (L1, L2), Raised (Ra), Redecked (Re), Shortening (S1, S2), Strengthening (S1)	5
the stand (in the standard s	Widening (WLn , WRn ), Length
Overall Inspection Comments       Monitoring of the timber headstocks is recommended as large internal 'piping' was found.         No give way or bridge end marker signs on approaches.	Overall Inspection Comments



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Figure 15 Draft summary of recent ARRB level two inspection

The figure is the front page of a draft inspection report for a timber single span bridge located in Elbow Valley. The structure has been given an overall condition state rating of three. This means that the bridge has an expected remaining useful life of between 20 - 40 years. A life cycle management plan is outlined and costed below.

		Туре	Frequency (years)	Cost		Anr	ual Cost
		Initial MTCE cost	1	\$	1,500	\$	1,500
E	-	Level 1 Inspection	1	\$	463	\$	463
Ĕ	te 3	Level 2 Inspection	3	\$	1,200	\$	400
ŭ	Sta	Routine Maintenance	1	\$	463	\$	463
Ū		Materials	1	\$	1,500	\$	1,500
			Tot	al Ann	ual Cost	\$	2,826
E	-	Level 1 Inspection	1	\$	463	\$	463
Ĕ	te 4	Level 2 Inspection	1	\$	1,200	\$	1,200
ŭ	Sta	Routine Maintenance	1	\$	926	\$	926
Ŭ		Materials	1	\$	4,000	\$	4,000
			Tot	al Ann	ual Cost	\$	6,589
				Total	Cost	\$	189,800
<b>1.1</b>	0.0	41 110 11	C				

Table 9 Cost over the life-cycle of asset

The repairs suggested by ARRB are estimated to cost approximately \$1,500 as they are only very minor in nature. For the rest of the life of the asset it has been assumed that it will be in each condition state for 20 years. It is expected to cost \$2,826 annually while is remains in condition state three. This then increases to \$6,589 for CS4. The total estimate cost of operating this bridge until it is replaced is \$189,800. Note that this is only an approximation and CPI has not been applied to the figures.

## 6.6 Hermitage Emuvale Road Bridge Life Cycle

Stru	Structure Condition Inspection Report												B2/1	1	Sheet of 2		
Structu	ire ID			10441		:	Structure N	lame	None								
Road T	ype			Local Col	lector												
Structu	ire Type			Bridge		1	Road Numb	ber	N/A								
Constr	uction Ty	ype		Deck Uni	t	1	Road Name	•	Hermit	age Emuva	le Rd			1	Sugar L		
Constr	uction M	aterial		Concrete		1	Crossing		Swan (	Creek					AL ANS		
Date O	f Constru	uction		Unknown	6	1	Suburb		The H	ermitage							
District	t			SDRC			Owner		Southe	rn Downs F	Regional Co	uncil	March Street				
UBD R	eference			29 F-7			Local Auth	ority	SDRC				m				
Latitud	e (dec de	eg)		-28.21072	20	1	Number Of	Spans	_			1			and the second s		
Longit	ude (dec	deg)		152.1072	260	L	ength (m)	(Abutment	to Abutm	ent)		11.80	P6-		and the second second		
Date O	f Last Ins	spection	/	Unknown	1	F	leight (m) (	Ground/W	ater to Dec	sk Unit)		3.10	04-1		Contraction of the		
Inspec	tion Date	n)		06/10/201	10	٧	Vidth (m) (G	Outside ker	rb to kerb)			5.30					
Future	Inspectio	on Date		06/10/201	13	c	Cell Length	).	N/A				the state in				
Filled i	n By			MEF		C	ell Width		N/A				20				
Inspect	tion			Level 2		c	ell Height		N/A				Cracks marked for mor	No			
Inspect	tors			MEF		c	Checked by		AV				Inspection Type	Programmed			
Chaina	ge (km)			0.88		c	on		Herm	tage Emuv	ale Rd						
C	compone	ent Locati	on									Comments					
lication	٩	oonent	dard oer	sure Class	tity			Quanti Cond Sta	ity Per lition ate		ta nance ired	□ Locatio □ Descrip □ Referer Numbe	n of item/condition otion of defects by locatic nces of sketches and pho rs)	on type, otos (Photo Refere	ence		
Modi	Grou	Com	Stand Numl	Expo	Quan	Unit	1	2	3	4	Main' Requ						
0	AP1	AP	700	1	1.0	Each		1									
0	A1	J1	150	1	4.5	Lin m	X	X	X	х		Believed to be	e a fixed joint. Unable to b	be seen.			
0	S1	K1	3P	1	11.8	Lin m			11.8		~	Outside deck kerbs. Paintir 0009	units continue to the supe ng is required to the top su	erstructure to form f urface of the kerb.;	he bridge Photo:		
0	S1	WS	10	1	53.0	m²		53									
0	S1	к	3P	1	11.8	Lin m			11.8		~	Outside deck kerbs. Paintir 0011	units continue to the supe ng is required to the top su	erstructure to form t urface of the kerb.;	he bridge Photo:		
0	A2	J	150	1	4.5	Lin m	X	×	X	х		Believed to be	to be a fixed joint. Unable to be seen.				
0	AP2	AP	700	1	1.0	Each		1									
0	A1	ww	510	1	2.0	Each		1	1		<ul> <li>✓</li> </ul>	The RHS win	ig wall is separating from the headstock.; Photo: 0014				

Overall Ratings	_	1	2	3	4	5	Comments
Original	0			√			Structure was in fair condition at the time of inspection.
Widening (WLn , WRn ), Lengthe	ening (L1, L2), Raised (	Ra), Rede	cked (Re), 8	Shortening (	\$1, S2), Str	rengthening	(St)
Overall Inspection Comments	Possibly ASR/AAR re	lated crac	(ing in the d	leck units. F	urther inve	stigation of	the cracking is required.



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Figure 16 Draft summary of recent ARRB level two inspection

The figure above is the front page of a draft inspection report for a concrete single span bridge located in The Hermitage. The structure has been given an overall condition state rating of three. This means that the bridge has an expected remaining useful life of between 20 - 40 years. A life cycle management plan is outlined and costed below.

		Туре	Frequency (years)	Cost		Anr	nual Cost
		Initial MTCE cost	1	\$	9,000	\$	9,000
5		Level 1 Inspection	1	\$	347	\$	347
Ĭ	Ē	Level 2 Inspection	3	\$	900	\$	300
	Sta	Routine Maintenance	1	\$	635	\$	635
Ö		Materials	1	\$	1,000	\$	1,000
			Tot	al Anr	nual Cost	\$	2,282
5	-	Level 1 Inspection	1	\$	347	\$	347
Ĭ	Ę	Level 2 Inspection	1	\$	900	\$	900
	Sta	Routine Maintenance	1	\$	1,225	\$	1,225
Ŭ		Materials	1	\$	2,000	\$	2,000
			Tot	al Anr	nual Cost	\$	4,472
				Total	Cost	\$	144,080
Tabl	. 10 /	Cost show the life sholls	of annot				

Table 10 Cost over the life-cycle of asset

The repairs suggested by ARRB are estimated to cost approximately \$9,000. For the rest of the life of the asset it has been assumed that it will be in each condition state for 20 years. It is expected to cost \$2,282 annually while is remains in condition state three. This then increases to \$4,472 for CS4. The total estimate cost of operating this bridge until it is replaced is \$144,080. Note that this is only an approximation and CPI has not been applied to the figures.

## 6.7 Conclusion

It can be seen very easily that the life cycle cost of a timber bridge is substantially more than that of a concrete bridge. This is one of the reasons behind the proposed program to replace the timber bridges on an annual basis to reduce the maintenance costing which is detailed in the following chapter.

# 7 FINANCIAL SUMMARY

## 7.1 Introduction

For a core asset management plan the financial summary should cover the next 10 years. Once the plan is improved this should be extended out to 25 years. Since the recent level two inspection reports are not available currently assumptions will be made as to the current conditions of the bridges. It is anticipated that all of the concrete bridges will be in condition states one, two and three and most of the large drainage structures will be in good repair also. The focus of the capital renewal and replacement of bridges will be on the timber structures as they are typically the oldest and most deteriorated assets. From the 2004 inspections it was found that five bridges were condition state 4 or worse. This means that four bridges have an expected remaining life of less than 20 years and one will need to be replaced very soon. After reading through the condition reports for the condition state 4 timber bridges, they were found to all be in very poor condition and close to the point of intervention (replacement/renewal) in their life cycle. It is recommended that council budget for the replacement of one timber bridge structure every year for the next 10 years to ensure that all timber bridges are replaced before they become unsafe. The location of the remaining timber bridges are in the rural areas of council, however some have quite a high traffic volume with no alternative routes available. In factoring an amount for replacement the case of Kital Road bridge is considered. It is anticipated that none of the timber bridges can be removed and the crossing closed so an average figure of \$250,000 is to be budgeted each year for a timber bridge replacement. The typical figures for annual operating costs are based on the trends of the previous three years for each asset class in each condition state and is outlined below.

	Туре	Frequency (years)	Cost		Ann	ual Cost
5	Level 1 Inspection	1	\$	463	\$	463
të jiti	Level 2 Inspection	5	\$	1,200	\$	240
Sta	Routine Maintenance	1	\$	-	\$	-
Ŭ	Materials	1	\$	-	\$	-
		Tot	al Ann	ual Cost	\$	703
5	Level 1 Inspection	1	\$	463	\$	463
te 2	Level 2 Inspection	5	\$	1,200	\$	240
Star	Routine Maintenance	1	\$	347	\$	347
ō	Materials	1	\$	500	\$	500
		Tot	al Ann	ual Cost	\$	1,550
5	Level 1 Inspection	1	\$	463	\$	463
te 3	Level 2 Inspection	3	\$	1,200	\$	400
Star	Routine Maintenance	1	\$	463	\$	463
ō	Materials	1	\$	1,500	\$	1,500
		Tot	al Ann	ual Cost	\$	2,826
5 -	Level 1 Inspection	1	\$	463	\$	463
te 4	Level 2 Inspection	1	\$	1,200	\$	1,200
Star	Routine Maintenance	1	\$	926	\$	926
ō "	Materials	1	\$	4,000	\$	4,000
		Tot	al Ann	ual Cost	\$	6,589

Table 11 Timber Bridge Operating Costs

	Туре	Frequency (years)	Cost		Ann	ual Cost
5	Level 1 Inspection	1	\$	347	\$	347
E II	Level 2 Inspection	5	\$	900	\$	180
sta or	Routine Maintenance	1	\$	-	\$	-
0	Materials	1	\$	-	\$	-
	_	Tot	al Annua	al Cost	\$	527
5	Level 1 Inspection	1	\$	347	\$	347
te 2	Level 2 Inspection	5	\$	900	\$	180
Sta	Routine Maintenance	1	\$	347	\$	347
Ŭ	Materials	1	\$	500	\$	500
		Tot	al Annua	al Cost	\$	1,374
5	Level 1 Inspection	1	\$	347	\$	347
fitio te 3	Level 2 Inspection	3	\$	900	\$	300
Sta onc	Routine Maintenance	1	\$	635	\$	635
0	Materials	1	\$	1,000	\$	1,000
		Tot	al Annua	al Cost	\$	2,282
5 -	Level 1 Inspection	1	\$	347	\$	347
te 4	Level 2 Inspection	1	\$	900	\$	900
Sta	Routine Maintenance	1	\$	1,225	\$	1,225
Ū	Materials	1	\$	2,000	\$	2,000
		Tot	al Annua	l Cost	\$	4,472

 Table 12 Concrete Bridge Operating Costs

	Туре	Frequency (years)	Cost		Annu	ual Cost
5	Level 1 Inspection	1	\$	232	\$	232
të ji	Level 2 Inspection	5	\$	600	\$	120
Sta	Routine Maintenance	1	\$	-	\$	-
0	Materials	1	\$	-	\$	-
		Tot	al Annua	l Cost	\$	352
5	Level 1 Inspection	1	\$	232	\$	232
te 3	Level 2 Inspection	5	\$	600	\$	120
Sta	Routine Maintenance	1	\$	347	\$	347
0	Materials	1	\$	500	\$	500
		Tot	al Annua	l Cost	\$	1,199
5	Level 1 Inspection	1	\$	232	\$	232
fe	Level 2 Inspection	3	\$	600	\$	200
Sta o	Routine Maintenance	1	\$	635	\$	635
0	Materials	1	\$ 1	L,000	\$	1,000
		Tot	al Annua	l Cost	\$	2,067
5 +	Level 1 Inspection	1	\$	232	\$	232
te diti	Level 2 Inspection	1	\$	600	\$	600
Sta o	Routine Maintenance	1	\$ 1	L,225	\$	1,225
0	Materials	1	\$ 2	2,000	\$	2,000
		Tot	al Annua	l Cost	\$	4,057

 Table 13 Large Drainage Structures Operating Costs

These annual costs have been combined with the 2004 condition state reports to calculate the funding required for maintenance of the assets over the next 10 financial years. The summary tables for each financial year is presented below.

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concroto Bridgos	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timber Bridges	0	2	6		5	
Thiber bruges	\$ -	\$ 3,100	\$ 16,956	\$	32,945	\$ 53,001
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	7	26	38		7	
	\$ 2,464	\$ 31,174	\$ 78,546	\$	28,399	\$ 140,583
				Tot	al	\$ 284,368

 Table 14 Maintenance Costs based on trends from previous 3 years for the 2011/2012 financial year

This equates to an annual maintenance expense of \$284,368 for next financial year. The condition states have been assumed to remain the same for the bridges which are not replaced over the ten year period as all identified maintenance items will be addressed, following recommendations from inspections. The following years maintenance expenses have not been indexed at CPI nor has the replacement/ renewal costs. These costs will be tabulated against the proposed budgeted amounts for the next ten years (refer to Appendix H for detail). It should be noted that council has used today's values in terms of the

budgeted amounts, and it is updated annually. There is not expected to be any new works in the next 10 years.

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	6		4	
Timber bridges	\$ -	\$ 3,100	\$ 16,956	\$	26,356	\$ 46,412
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	8	26	38		7	
	\$ 2,816	\$ 31,174	\$ 78,546	\$	28,399	\$ 140,935
				Tot	tal	\$ 278,131

Table 15 Maintenance Costs for the 2012/2013 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	6		3	
Timber bruges	\$ -	\$ 3,100	\$ 16,956	\$	19,767	\$ 39,823
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	9	26	38		7	
Large Dramage Structures	\$ 3,168	\$ 31,174	\$ 78,546	\$	28,399	\$ 141,287
				Tot	tal	\$ 271,894

Table 16 Maintenance Costs for the 2013/2014 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	6		2	
Timber bridges	\$ -	\$ 3,100	\$ 16,956	\$	13,178	\$ 33,234
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	10	26	38		7	
Large Dramage Structures	\$ 3,520	\$ 31,174	\$ 78,546	\$	28,399	\$ 141,639
				Tot	al	\$ 265,657

 Table 17 Maintenance Costs for the 2014/2015 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete bruges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	6		1	
Thiber bruges	\$ -	\$ 3,100	\$ 16,956	\$	6,589	\$ 26,645
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Large Drainage Structures	11	26	38		7	
	\$ 3,872	\$ 31,174	\$ 78,546	\$	28,399	\$ 141,991
				Tot	tal	\$ 259,420

Table 18 Maintenance Costs for the 2015/2016 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
concrete bruges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	6		0	
Timber bruges	\$ -	\$ 3,100	\$ 16,956	\$	-	\$ 20,056
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	12	26	38		7	
Large Dramage Structures	\$ 4,224	\$ 31,174	\$ 78,546	\$	28,399	\$ 142,343
				Tot	tal	\$ 253,183

Table 19 Maintenance Costs for the 2016/2017 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	5		0	
Thiber bruges	\$ -	\$ 3,100	\$ 14,130	\$	-	\$ 17,230
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	13	26	38		7	
	\$ 4,576	\$ 31,174	\$ 78,546	\$	28,399	\$ 142,695
				Tot	al	\$ 250,709

Table 20 Maintenance Costs for the 2017/2018 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete bruges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	4		0	
Timber bridges	\$ -	\$ 3,100	\$ 11,304	\$	-	\$ 14,404
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	14	26	38		7	
Large Dramage Structures	\$ 4,928	\$ 31,174	\$ 78,546	\$	28,399	\$ 143,047
				Tot	al	\$ 248,235

Table 21 Maintenance Costs for the 2018/2019 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
concrete bruges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	3		0	
Timber bridges	\$ -	\$ 3,100	\$ 8,478	\$	-	\$ 11,578
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	15	26	38		7	
Large Dramage Structures	\$ 5,280	\$ 31,174	\$ 78,546	\$	28,399	\$ 143,399
				To	tal	\$ 245,761

Table 22 Maintenance Costs for the 2019/2020 financial year

Condition States	1	2	3		4	Totals
Annual Coast	\$ 527	\$ 1,374	\$ 2,282	\$	4,472	
Concrete Bridges	4	28	22		0	
Concrete Bridges	\$ 2,108	\$ 38,472	\$ 50,204	\$	-	\$ 90,784
Annual Coast	\$ 703	\$ 1,550	\$ 2,826	\$	6,589	
Timbor Bridges	0	2	2		0	
Timber bruges	\$ -	\$ 3,100	\$ 5,652	\$	-	\$ 8,752
Annual Coast	\$ 352	\$ 1,199	\$ 2,067	\$	4,057	
Largo Drainago Structuros	16	26	38		7	
Large Dramage Structures	\$ 5,632	\$ 31,174	\$ 78,546	\$	28,399	\$ 143,751
				Tot	tal	\$ 243,287

Table 23 Maintenance Costs for the 2020/2021 financial year

The maintenance costs have taken into account that with the replacement of one timber bridge every year – the CS4 maintenance cost (for the first 5 bridges then CS3) was reduced by one and replaced with a CS1 maintenance cost for a large drainage structure

	Dedistad			Current Propo	ose	d Funding		Diffe	reno	e
Financial Year	Maintenance Expenditure	P	redicted Capital Renewal	Maintenance		Capital Renewal	Ma	intenance	R	Capital enewal
2011/2012	\$ 284,368	\$	250,000	90000	\$	255,000.00	-\$	194,368	\$	5,000
2012/2013	\$ 278,131	\$	250,000	100000	\$	350,000.00	-\$	178,131	\$	100,000
2013/2014	\$ 271,894	\$	250,000	100000	\$	135,000.00	-\$	171,894	-\$	115,000
2014/2015	\$ 265,657	\$	250,000	100000	\$	-	-\$	165,657	-\$	250,000
2015/2016	\$ 259,420	\$	250,000	100000	\$	-	-\$	159,420	-\$	250,000
2016/2017	\$ 253,183	\$	250,000	100000	\$	-	-\$	153,183	-\$	250,000
2017/2018	\$ 250,709	\$	250,000	100000	\$	-	-\$	150,709	-\$	250,000
2018/2019	\$ 248,235	\$	250,000	100000	\$	-	-\$	148,235	-\$	250,000
2019/2020	\$ 245,761	\$	250,000	100000	\$	-	-\$	145,761	-\$	250,000
2020/2021	\$ 243,287	\$	250,000	100000	\$	-	-\$	143,287	-\$	250,000

(new structure). Hence it shows that the operating expenditure will be reduced over time due to the renewal program.

Table 24 Summary of Predicted Expenditure versus Budgeted Expenditure

From the above table it is evident that if council decides to adopt the draft levels of service, that the maintenance funding will need to be increased by close to \$200,000 next year or over 300%. There is also a lack of funding for renewal of bridges after the 2013/2014 financial year. This will also require more funding if the proposed intervention level is adopted.

Other options to reduce the funding required is to consider reducing the draft levels of service. Another important life cycle management tool is to consider changing the operating levels of service of individual bridges. For instance a timber bridge with no load limit imposed with a condition state of four could have its life extended with a structural inspection and a load limit posted. This would not cost the council too much and would still allow for most traffic to use the bridge. A management method like this could greatly extend the useful life of a bridge. These options will need to be considered along with more detailed replacement strategy once the level two inspection reports are made available to council.

## 7.2 Gap Analysis

Based on the draft level of service statements that Southern Downs Regional Council will continue to maintain the assets until replaced, it shows that the funding allocated at present of \$100,000 is not enough to maintain the timber structures as per the planned maintenance proposal. Over the ten years the maintenance budget would be short \$1.6 million.

In the renewal program council has only made provisions in the current 10 year plan for three bridge replacements. The funding is falling short by \$1.8 million over the next ten years.

# 8 RECOMMENDATIONS FOR IMPROVEMENT OF THE ASSET MANAGEMENT PLAN

Recommended improvement strategies are outlined below;

- Develop advanced asset management plan and link it up with the new requirement of a 'Community Plan' under the LGA 2009.
- Develop for each bridge asset its own long term whole of life plan, cost, risk adn performance optimisation.
- Develop database register that is kept up to date.
- Refine levels of service.
- Establish predictive modelling with software 'My Predictor'
- Annual review of the asset management plan and devised actions.
- Council adoption of levels of service.
- Community consultation.
- Extend level two inspections to large drainage structures.

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# **APPENDIX A PROJECT SPECIFICATION**

University of Southern Queensland

#### FACULTY OF ENGINEERING AND SURVEYING

#### ENG 4111/4112 Research Project PROJECT SPECIFICATION

FOR:	Nathan Johan WALTER
TOPIC:	BRIDGE ASSET MANAGEMENT PLAN
SUPERVISORS:	Dr David Thorpe Christoph Eicher, Asset Engineer, Southern Downs Regional Council.
PROJECT AIM:	This project aims to develop a core Asset Management Plan (AMP) for bridges in the Southern Downs Regional Council (SDRC).

SPONSORSHIP: Southern Downs Regional Council.

#### PROGRAM:

- 1. Research background information on Bridge Asset Management Plans.
- 2. Define the purpose of the core AMP including the definitions of bridges.
- Report on asset description including current conditions and general overview of existing bridges.
- 4. Determine the levels of service (LOS) for approximately five (5) selected bridges in relation to council's strategic goals and based on customer expectation and statutory requirements.
- 5. Determine the future demand and the effects of changing demand on the selected bridge assets.
- 6. Create a life cycle management plan for the selected bridges including operations, maintenance, and disposal, etc.
- 7. For the selected bridges, produce a financial summary including long-term future expenditure.
- 8. Present finding to peer group and submit dissertation in required format.

#### If time permits:

- 9. Extend the study to additional bridges.
- Produce Asset Management practices including summary of Asset Management data, information systems, processes and implementation tactics.
- 11. Include a recommendation for improvement of the plan from the findings, including improvement strategy.

# **APPENDIX B – DATA VALUATION BRIDGES**

											BB Sun	BR_Sup	BB S	Sun BR	_Sup BR_	Sup B	B Sun			BB Total		
BR_Ameni	BR_M vValu	BR_Ass	BB Asset Name	BR_Seg ment BR_Hier	R_Len Width	BB Boad Name	BB Suburb	BR_Carr	BR_Locality	BR_Val	er_Struc	er_Struc BR	_Super_Stru er_St	truc ture	Struc er_3	Struc e	r_Struc BF	R_Super_Stru	BR_Super_Struc	Gross	BR_Total	BR_Total
ty	er_ID	et ID	Br(_Assecratic	Name archy	gth Triath	br (_r toda r tallio	DIC_OUDUID	Code	(old council)	Year	ture	Conditio <sup>ctu</sup>	ire Gross ture	Re	sidua Use	ful tu	ure ctu	ure WDV	ture Depr Exp	Replacement	WDV	Depr Exp
		5	-			-	-	· ·			Type	n 🔽		iu Γ	alue 🚽 life	- F		<b>•</b>	<b>•</b>	Cost 🗸		🗖
Bridges	1	1002	1 Allora Drive	530.00 B	28.00 8.7	0 William Deacon Bridge	ALLORA		WarwickShire	2009	С	2H	633360.00 APV H	High	0.40 1	00.00	50.00	576357.60	2280.10	633360.00	576357.60	) 2280.10
Bridges	2	1004	1 Bellingham's Road - Ch 6863	6863.00 B	9.60 5.3	0	ELBOW		WarwickShire	2009	T	2H	132288.00 APV F	High	0.40 1	00.00	50.00	120382.08	476.24	132288.00	120382.08	3 476.24
Bridges	5	1006	1 Bourkes Road (Loch Lomond)	4110 00 B	25.00 4.0	0	FLBOW		WarwickShire	2009	T	2H	96330.00 APV F	High	0.40 1	00.00	25.00	264026.00	346 79	96330.00	264026.60	) 346.79
Bridges	8	1014	1 Junabee Road	4950.00 B	22.00 8.3	5 Braithwaites Bridge	JUNABEE		WarwickShire	2009	C	3H	477620.00 APV H	High	0.40 1	00.00	25.00	391648.40	4776.20	477620.00	391648.40	4776.20
Bridges	9	1016	1 Cedars Crossing Road - Ch 0464	464.00 B	22.50 3.7	0 The Cedars Bridge	JUNABEE		WarwickShire	2009	С	3H	216450.00 APV H	High	0.40 1	00.00	25.00	177489.00	2164.50	216450.00	177489.00	) 2164.50
Bridges	11	1024	1 Condamine River Road	2800.00 B	22.05 4.2	1 Brosnans Bridge	KILLARNEY		WarwickShire	2009	C	3H	241359.30 APV H	High	0.40 1	00.00	25.00	197914.63	2413.59	241359.30	197914.63	3 2413.59
Bridges	12	1026	1 Condamine River Road 1 Connells Bridge Road - Ch 0050	5950.00 B	37.60 3.6	U O Rocky Crossing		:	WarwickShire	2009	C	3H 2H	120744.00 APV F 351936.00 APV F	High High	0.40 1	00.00	25.00	320261.76	1207.44	120744.00	320261.76	3 1207.44 S 1266.97
Bridges	14	1020	1 Connells Bridge Road - Ch 1060	1060.00 B	20.35 5.1	0	WHEATVALE		WarwickShire	2009	C	2H	269841.00 APV H	High	0.40 1	00.00	50.00	245555.31	971.43	269841.00	245555.31	971.43
Bridges	15	1032	1 Connells Bridge Road - Ch 1125	1125.00 B	9.50 6.9	0	WHEATVALE		WarwickShire	2009	С	2H	170430.00 APV H	High	0.40 1	00.00	50.00	155091.30	613.55	170430.00	155091.30	) 613.55
Bridges	19	1040	1 Grafton Street	0.00 B	32.00 10.1	0	WARWICK		WarwickShire	2009	C	1H	840320.00 APV H	High	0.40 1	00.00	75.00	815110.40	2016.77	840320.00	815110.40	2016.77
Bridges	20	1042	1 Hendon - Ellinthorpe Road - Ch 1120	1120.00 B	8.65 3.1	0			WarwickShire	2009	C	3H 2H	69/19.00 APV F	High High	0.40 1	00.00	25.00	57169.58	697.19	69719.00	5/169.50	5 697.19 1 380.95
Bridges	23	1044	1 Kadows Road	1220.00 B	7.40 6.1	0	CLINTONVAL		WarwickShire	2003	c	3H	117364.00 APV H	Hiah	0.40 1	00.00	25.00	96238.48	1173.64	117364.00	96238.48	3 1173.64
Bridges	24	1050	1 Kital Road	2330.00 B	38.00 5.6	0	ALLORA		WarwickShire	2009	C	4H	553280.00 APV H	High	0.40 1	00.00	10.00	370697.60	14938.56	553280.00	370697.60	14938.56
Bridges	25	1052	1 Lairds Lane	960.00 B	8.60 3.7	5	YANGAN		WarwickShire	2009	С	3H	83850.00 APV H	High	0.40 1	00.00	25.00	68757.00	838.50	83850.00	68757.00	838.50
Bridges	26	1054	1 Longs Bridge Road - Ch 1665	1665.00 B	13.90 4.4	0 0 Wilkies Bridge	MURRAYS		WarwickShire	2009	C	2H	159016.00 APV H	High	0.40 1	00.00	50.00	144704.56	572.46	159016.00	144704.56	5 572.46
Bridges	21	1056	1 Marvale Road	5238.00 B	38.00 4.5	0 VVIIkles Druge	MARYVALE		WarwickShire	2009	C	3H	414960 00 APV F	High	0.40 1	00.00	25.00	340267 20	4149.60	414960.00	340267.20	) 4149.60
Bridges	31	1064	1 Mullins Road - Ch 2435	2435.00 B	17.20 4.8	0 Cowley's Bridge	TALGAI		WarwickShire	2009	č	3H	214656.00 APV H	High	0.40 1	00.00	25.00	176017.92	2146.56	214656.00	176017.92	2 2146.56
Bridges	33	1068	1 Rockland Road - Ch 8399	8399.00 B	9.90 3.6	8	LESLIE DAM		WarwickShire	2009	С	2H	94723.20 APV H	High	0.40 1	00.00	50.00	86198.11	341.00	94723.20	86198.11	I 341.00
Bridges	34	1072	1 Sandy Creek Road - Ch 5773	5773.00 B	28.70 6.0	5	LESLIE		WarwickShire	2009	C	2H	451451.00 APV H	High	0.40 1	00.00	50.00	410820.41	1625.22	451451.00	410820.41	1 1625.22
Bridges	35	1074	1 Swantels Road	5340.00 B	43.10 3.9	5 Swantels Bridge	SWANFELS		WarwickShire	2009	C	2H 2H	254689 50 APV F	High High	0.40 1	00.00	50.00	402799.67	1593.49	442637.00	402799.67	1593.49
Bridges	38	1070	1 Tralee Road - Ch 4500	4500.00 B	12.40 5.6	0	PRATTEN	•	WarwickShire	2003	c	2H	180544.00 APV H	Hiah	0.40 1	00.00	50.00	164295.04	649.96	180544.00	164295.04	649.96
Bridges	40	1084	1 Upper Forest Springs Road	370.00 B	9.40 7.3	0	FOREST		WarwickShire	2009	C	3H	178412.00 APV H	High	0.40 1	00.00	25.00	146297.84	1784.12	178412.00	146297.84	1784.12
Bridges	41	1086	1 Wheatvale Plains Road	190.00 B	28.30 6.3	0	WHEATVALE		WarwickShire	2009	С	2H	463554.00 APV H	High	0.40 1	00.00	50.00	421834.14	1668.79	463554.00	421834.14	1668.79
Bridges	43	1088	5 Scrymgeour Road bridge	100.00 B	5.00 3.0	0			WarwickShire	2009	C	2H	39000.00 APV H	High	0.40 1	00.00	50.00	35490.00	140.40	39000.00	35490.00	) 140.40
Bridges	298	1281	9 Goomburra Road	13233.00 B	31.00 6.5	0			WarwickShire	2009	C	2H	525200.00 APV F	High High	0.40 1	00.00	50.00	477932.00	1890.72	525200.00	477932.00	1690.72
Bridges	304	1282	8 School of Arts Road	1985.00 B	65.00 3.5	0			WarwickShire	2009	C	2H	592800.00 APV H	High	0.40 1	00.00	50.00	539448.00	2134.08	592800.00	539448.00	2134.08
Bridges	306	1283	0 Tummaville Road	45.00 B	21.00 5.0	0			WarwickShire	2009	T	4H	546000.00 APV H	High	0.40 1	00.00	10.00	365820.00	14742.00	546000.00	365820.00	14742.00
Bridges	310	1283	4 Mullins Road - Warwick	466.00 B	11.00 4.5	0	_		WarwickShire	2009	Т	3H	130000.00 APV H	High	0.40 1	00.00	25.00	106600.00	1300.00	130000.00	106600.00	1300.00
Bridges	312	1285	6 Sundown Road	1112.00 B	16.40 3.9	0 Ballandean's	Ballandean		Stanthorpe	2009	C	2H	166296.00 APV H	High	0.40 1	00.00	50.00	151329.36	598.67	166296.00	151329.36	5 598.67
Bridges	313	1285	8 Reid Road	314.00 B	20 20 5 7	0	Gien Aplin Severnlea		Stanthorpe	2009	C	2H	299364 00 APV F	High High	0.40 1	00.00	50.00	272/21 2/	2916.92	299364.00	272/21 2/	2916.92
Bridges	315	1285	9 Pyramids Road	795.00 B	10.00 3.7	0 Bill Goebel Bridge	Girraween		Stanthorpe	2009	č	2H	96200.00 APV H	High	0.40 1	00.00	50.00	87542.00	346.32	96200.00	87542.00	346.32
Bridges	317	1286	1 Amiens Road	4706.00 B	46.50 7.0	0 Broadwater Bridge	Broadwater		Stanthorpe	2009	С	2H	846300.00 APV H	High	0.40 1	00.00	50.00	770133.00	3046.68	846300.00	770133.00	3046.68
Bridges	318	1286	2 Glenlyon Dam Road	3700.00 B	92.50 6.8	0 Barelli	Glenlyon		Stanthorpe	2009	С	1H	1635400.00 APV H	High	0.40 1	00.00	75.00	1586338.00	3924.96	1635400.00	1586338.00	3924.96
Bridges	319	1286	3 Mingoola Road 4 Deilwey Street	12/4.00 B	55.00 6.9	0 0 McCrogor Bridge	Mingoola		Stanthorpe	2009	C	2H	986700.00 APV H	High High	0.40 1	00.00	50.00	897897.00	3552.12	986700.00	897897.00	) 3552.12
Bridges	320	1284	5 Lock Street	418.00 B	16.80 7.8	0	Stanthorpe		Stanthorpe	2009	c	2H	340704.00 APV F	High	0.40 1	00.00	50.00	310040.64	1226.53	340704.00	310040.64	1226.53
Bridges	322	1284	6 Britannia Street	132.00 B	12.90 7.4	0	Stanthorpe		Stanthorpe	2009	č	2H	248196.00 APV H	High	0.40 1	00.00	50.00	225858.36	893.51	248196.00	225858.36	6 893.51
Bridges	323	1284	7 Bents Road	3000.00 B	9.20 5.2	0 First Crossing - Ballandean	Ballandean		Stanthorpe	2009	С	1H	124384.00 APV H	High	0.40 1	00.00	75.00	120652.48	298.52	124384.00	120652.48	3 298.52
Bridges		1286	4 North Branch Road	3766 B	8.1 4.	9	Goomburra		WarwickShire	2010	C	2H	94723.20 APV F	High High	0.40 1	00.00	50.00	96296.20	380.95	105820.00	96296.20	) 380.95 31173.64
Bridges	7	1200	1 Boxs Road - Ch 0226	226.00 B	12 95 4 8	0	TANNYMORE	:	WarwickShire	2010	C	2H	94723 20 APV F	High	0.40 1	00.00	50.00	87542.00	346 32	96200.00	87542.00	) 346.32
Bridges	324	1284	9 Bents Road	B	9.20 5.2	0 First Crossing - Anabranch	Ballandean	-	Stanthorpe	2009	č	1H	451451.00 APV H	High	0.40 1	00.00	75.00	770133.00	3046.68	846300.00	770133.00	3046.68
Bridges	4.00	1007	1 Boundary Road	476.00 B	7.50 5.0	0	WOMINA		WarwickShire	2009	Т	3H	97500.00 APV H	High	0.40 1	00.00	25.00	79950.00	975.00	97500.00	79,950.00	975.00
Bridges	10.00	1022	1 Clintonvale - Goomburra Road - Ch	2269.00 B	8.40 4.5	0	CLINTONVAL		WarwickShire	2009	C	4H	98280.00 APV H	High	0.40 1	00.00	10.00	65847.60	2653.56	98280.00	65847.60	) 2653.56
Bridges	17.00	1036	1 Freestone Road	1880.00 B	25.00 5.5	0 Palmers Bridge	FREESTONE		WarwickShire	2009	C	1H 2U	357500.00 APV F	High High	0.40 1	00.00	75.00	346775.00	858.00	357500.00	346,775.00	2 455 64
Bridges	22.00	1030	1 Inverramsav Road - Ch 11300	11300.00 B	8.90 5.6	0	GOOMBURR		WarwickShire	2003	c	2H	129584.00 APV H	Hiah	0.40 1	00.00	50.00	117921.44	466.50	129584.00	117921.44	466.50
Bridges	29.00	1059	1 Mountside Road - Ch 1800	1800.00 B	3.20 6.0	0	THE GLEN		WarwickShire	2009	C	3H	49920.00 APV H	High	0.40 1	00.00	25.00	40934.40	499.20	49920.00	40,934.40	499.20
Bridges	32.00	1066	1 North Branch Road	560.00 B	8.10 4.9	0	GOOMBURR		WarwickShire	2009	С	2H	103194.00 APV H	High	0.40 1	00.00	50.00	93906.54	371.50	103194.00	93906.54	4 371.50
Bridges	39.00	1082	1 Iummaville Road	1480.00 B	19.80 5.9	0			WarwickShire	2009	C	3H	303732.00 APV I	High	0.40 1	00.00	25.00	249060.24	3037.32	303732.00	249,060.24	3,037.32
Bridges	42.00	1088	6 Condamine River Road - Killarney (CH	4000.00 B	12.00 5.0	0	VVILLOVVVAL		WarwickShire	2009	T	3H	124800.00 APV F	High	0.40 1	00.00	25.00	ŏŏ∠/U.UU 102336.00	218.40	91000.00	102 336 00	218.40
Bridges	297.00	1281	7 Forest Springs -Goomburra Road	401.00 B	34.00 3.6	0			WarwickShire	2009	c	2H	317200.00 APV H	High	0.40 1	00.00	50.00	288652.00	1141.92	317200.00	288.652.00	1,141.92
Bridges	300.00	1282	1 Junabee Road	4984.00 B	20.00 5.0	0			WarwickShire	2009	С	2H	260000.00 APV H	High	0.40 1	00.00	50.00	236600.00	936.00	260000.00	236,600.00	936.00
Bridges	301	1282	2 Kerrick Road	2160 B	18	3			WarwickShire	2009	T	1H	140,400.00 APV H	High	40%	100	75	136,188.00	336.96	140,400.00	136,188.00	336.96
Bridges	305.00	1282	9 Spring Creek Road - Killarney	25339.00 B	65.00 4.0	4			WarwickShire	2009	1 C	2H	5/6000.00 APV F	High	0.40 1	100	50.00	615160.00	2433.60	676000.00	615160.00	2433.60
Bridges	308.00	1203	2 Condamine River Road - Killarnev	6054.00 B	8.00 4.0	4 0			WarwickShire	2009	c	1H	83200 00 APV F	High	0.40 1	00.00	75.00	80704 00	1/5	83200.00	80 704 00	199.68
Bridges	309.00	1283	3 Mullins Road - Allora	3769.00 B	19.00 3.5	0			WarwickShire	2009	C	1H	174200.00 APV I	High	0.40 1	00.00	75.00	168974.00	418.08	174200.00	168,974.00	418.08
Bridges	311.00	1283	5 Wiyarra - Cedar Crossing Road	450.00 B	25.00 4.0	0			WarwickShire	2009	С	3H	260000.00 APV H	High	0.40 1	00.00	25.00	213200.00	2600.00	260000.00	213,200.00	2,600.00
Bridges	303.00	1282	4 McMasters Road	6156.00 B	18.00 4.0	0			WarwickShire	2009	С	2H	187200.00 APV H	High	0.40 1	00.00	50.00	170352.00	673.92	187200.00	170352.00	673.92

## Nathan Walter

# **APPENDIX C – TYPICAL LEVEL TWO INSPECTION REPORT**

Structure Condi	tion Ins	pectior	Rep	ort		B2/	1	Sheet
								1 Of 4
Structure Id	701	0 <b>8</b> Kit	ni Rd	Name	Dalry	mple Creek		
Crossing Name				Alt. Name				
Structure Type	Bridge			Owner	110	Warwick Sl	nire Counc	eil
Construction Type	Girder/B	eam		District	5	Border Dist	rict (Mr)	
Construction Material	Timber	÷ •		LGA Id	110	Warwick Sł	nire Counc	zil
Inspector	Malcolm	J Brodie		Date	24-MA	AY-2004		
Inspection Level 2 Level 3		Program Excepti	nmed onal			Undersize	e Compone Underwa	ents
Road Section	n		i	Start	Ì	End	TDis	t
Id Description	s	Cway S	RPC	Dist	RPC	Dist	Start	End
188L Kital Road	C	1 C	1	2.330	1	2.368	2.330	2.368
Overall Ratings	1 2	3 4	5 Co	mments				
			Thi	s bridge is VERY	POOR of	ondition as can be s	een hy look as	Form 2 2 and 2 5

S	trùct	ure	Con	dit	ion l	nspe	ction	Rep	ort				B2/2	Sheet
								-						2 Of 4
	S Insp	structio	ture I n Dat	d e 2	7 24-MA	0108 Y-200	4	Inspec	l tion L	Name evel 2	Da	lrymple C	reek	derwater 🛄
С	ompone	nt Loc	ation					Q	uantity		pb	Commer	its	
dification	dno	mponent	ndard mber	posure Class	antity	t		c	Per ondition State	n 1	intenance Ro	* Locati * Descri magni * Refer	on of item/co ption of defe tude,extent ences of skete	ndition cts by location type, ches and photos
Ž	ບັ	ပိ	Sta Nu	Εx	ð	ŋ	1	2	3	4	Ma	(Roll/	Exposure No:	5)
0	AP1	AP	700	1	1.0	EACH				1.0		The approach should be trim	is very rough med over as a	as can be seen in Photo 1 & 2. T a new seal placed.
0	AP1	GR	72T	1	2.0	EACH				2.0		This are not v These should	ery safe being be replaced w	timber as can be seen in Photo 8 rith steel guardrail.
0	AP1	PRO	530	1	200.0	M2		200.0						······
0	S1	BR	2T	1	19.0	LINM				19.0		This are not ve These should	ery safe being be replaced w	timber as can be seen in Photo 1 ith steel guardrail.
0	S1	к	3P	1	19.0	LINM			19.0	-		The kerb is ba	dly cracked w	ith area broken away as can be s
0	S1	ws	10	1	53.2	M2				53.2		The wearing s	urface is bad	y broken up as can be seen in Ph ed.
0	S2	BR	2T	1	19.0	LINM				19.0	İ	This are not ve These should	ery safe being	timber as can be seen in Photo 1
0	\$2	К	ЗP	1	19.0	LINM			19.0		İ	The kerb is ba	dly cracked w	ith area broken away as can be s
0	\$2	ws	10	1	53.2	M2				53.2	İ	The wearing s	urface is badly	y broken up as can be seen in Ph
0	\$3	BR	2T	1	19.0	LINM				19.0		This are not ve	ery safe being	timber as can be seen in Photo 1
0	S3	K	3P	1	19.0	LINM			19.0		<u> </u>	The kerb is ba	dly cracked w	ith area broken away as can be s
0	<b>S</b> 3	ws	10	1	53.2	M2				53.2	Í	The wearing s	urface is badly	/ broken up as can be seen in Ph ed
0	S4	BR	2T	1	19.0	LINM				19.0	İ	This are not ve	ery safe being	timber as can be seen in Photo 1
0	S4	к	3P	1	19.0	LINM			19.0			The kerb is ba	dly cracked w	ith area broken away as can be s
0	S4	ws	10	1	53.2	M2				53.2	İ	The wearing s	urface is badly	/ broken up as can be seen in Ph
0	AP2	AP	700	1	1.0	EACH				1.0		The approach	is very rough	as can be seen in Photo 1 & 7. T
0	AP2	GR	72T	1	2.0	EACH				2.0		This are not ve	rry safe being	timber as can be seen in Photo 8
0	AP2	PRO	530	1	200.0	M2		200.0				Triese should	ue replaceo w	un steel guardrail.
0	A1	н	54T	1	2.0	EACH		2.0						
0	A1	ABS	52P	1	10.0	M2				10.0		The abs has d	ropped over 4	0 mm as can be seen in Photo 10
0	A1	PRO	530	1	10.0	M2		10.0				I I IIS SHOULD DE	replaced to s	top son sphing through.
0	A1	Р	56T	1	4.0	EACH	1.0		1.0	2.0				
Pile ? Pile ?	1 has a vo 2 has son	ery larg	e pipe a it the tor	it the	top and t should	some rol be monite	t at grour ored.	nd level a	s can be	seen in l	=orm	2.5. This pile s	hould be repla	aced.
Pile /	hasav A1	ery lar	ge pipe 510	at the	e top and 2.0	at groun	nd level a	s can be	seen in l	Form 2.5.	. This	s pile should be	replaced.	
0	S1	D	29T	1	54.0	M2		2.5		54.0				
Then	e are alot	of the	deck un	its th	nat are ro	ted back	past the	kerbs as	can be s	seen in P	hoto	11 & 19 and Pi	noto 16 shows	that there are some units that ar
olime O	st rotted	away g	iving no	sup	port to th	e DWS.	The deck	should b	e replac	ed.	<b></b>			

-						nopo	ouon	Rep	ort				BZIZ	-	2.06	4
	5.98			ene							Sec.	10 10 100			3 01	4
	S	true	ture I	d.	7	0108			ľ	Name	Da	lrymple C	reek			
	Insp	ectio	n Dat	e	24-MA	Y-200	14 1	nspect	tion L	evel 2	17	] Level 3	Un	derw	ater [	
0			1	1		1				-	-			_		
С	ompone	nt Loc	ation		1.1	1	12.	Q	uantity Per		pbo	Comme	nts			
		-		lass				С	ondition	1	e R	* Locat	ion of item/co	nditio		
catio		nen	P z	ire (	2				State		nanc	* Descr	iption of defe-	ets by l	ocation t	ype,
odifi	dno.	dui	anda	post	lanti	4		-		-	inte	* Refe	ences of skete	ches a	d photo:	s
Σ	Ü	Ŭ	St	Ex	õ	5	1	2	3	4	Ms	(Roll/	Exposure Nos	5)		
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0	S1	W	710	2	1.0	EACH		1.0							pidocur	
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Corb	el 5 drille	d soun	d but th	e en	d of the c	orbel is b	adly crac	ked as c	an be se	en in Ph	oto 1	2 which mover	this corbel to	conditiv	n state 4	This corbol s
be re	placed.		FAT	14	0.0	LENOU	.,							containt	n state 4	. This corber s
0	PI	н	541	1	2.0	EACH				2.0						
Both shou	headstor Ider and	ks are 15 sho	not sup ws that	porte	ed on the	a pile corr between	ectly as on the head	an beser dstock an	en in Pho d the sh	oto 14 & oulder, T	15. P hese	hoto 14 shows should be fixe	that there is le	ess ther	1/2 of th	e headstock o
0	P1	P	56T	2	4.0	EACH			1.0	3.0						
Pile	has a v	ery larg	je sectio	on no	tting awa	y as can	be seen	in Form 2	.5. This	pile shou	ld be	spliced at a p	oint where the	pile is	ound.	
Pile : Pile :	2 has a v 3 has a v	ery larg	je sectio		tting awa	y as can	be seen	in Form 2	.5. This	pile shou	ld be	spliced at a p	oint where the	pile is s	ound.	
Pile	has a v	ery larg	le bibe	as ca	in be see	in in Form	2.3.10		a single and the second second second	in Discourse and		1	11			
110		ery larg	je pipe a	as ca	in be see	n in Forn	n 2.5. Thi	s pile sho	ould be s ould be s	pliced at pliced at	a poi a poi	int where the p int where the p	ile is sound. ile is sound.			
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O There allow O Sirde Sirde O O O O O O O O O O O O O	P1 S2 e are alot st rotted S2 S2 r1 has a r4 has a S2 P2 P2 P2 P2 P2 P2 P2 P2 P2 S3 e are alot st rotted S3 S3 r1 has a r4 r4 has a r4 r4 r4 r4 r4 r4 r4 r4 r4 r4 r7 r4 r7 r4 r7 r7 r7 r7 r7 r7 r7 r7 r7 r7 r7 r7 r7	Privary large WAL D of the away y SP G G Very I large W W COR H P ery larg COR H D D of the away y SP G G Very I large G G Very I large G G Very I large G G Very I large G G Very I large G G Very I large G G Very I large G G Very I large G Very I Very I large G Very I large G Very I Very I I I I Very I I I I I I I I I I I I I I I I I I I	29T 29T 29T 29T 22T 33T 22T 33T 22T 54T 56T 56T 56T 57T 29T 29T deck ur 33T 22T 22T	as ca 2 1 1 1 1 1 1 1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	n be see 8.0 54.0 54.0 19.0 5.0 0 0 0 0 0 0 0 0 0 0 0 0 0	n in Form EACH M2 Ited back the DWS. LINM EACH EACH EACH EACH EACH EACH M2 ted back the DWS. LINM EACH M2 ted back the DWS. LINM	n 2.5. Thi past the The deck as can be e seen in 3.0 e start of past the The deck	kerbs as should t 19.0 3.0 seen in Form 2.0 1.0 2.0 2.0 2.0 a pipe as 8.0 kerbs as should t 19.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2	can be s per replac 1.0 Form 2.5 5 that pla s can be se replac can be s per replac 2.0 Form 2.5	pliced at pliced at 54.0 seen in P ed. 1.0 5 that pla ce it in c 1.0 5 that pla ce it in c 54.0 seen in P ed. 2.0 5 that pla	a poi a poi hoto hoto	In where the p int where the p 11 & 19 and P in condition sta ion state 3 and 2.5. This pile t 11 & 19 and P	hoto 16 shows te 4 and should be mo	d be renitored	placed.	ome units that
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O Theralling O Sirdd O O Dile: O O Dile: O O Dile: O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd Sirdd O O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O Dirdd O O Dirdd Dirdd	P1 S2 e are alot st rotted S2 S2 s1 has a r 4 has a S2 P2 P2 P2 P2 P2 P2 P2 P2 S3 e are alot st rotted S3 st rotted st rotted S3 st rotted S3 st rotted S3 st rotted st ro	Privary large WAL D of the away y SP G G Very li large W W COR H P ery larg COR H D Of the away g SP G WAL COR H COR H COR COR COR COR COR COR COR COR COR COR	22T 33T 22T 33T 22T 33T 22T 33T 22T 54T 54T 56T 29T deck ur 54T 54T 54T 22T 33T 22T 22T 22T 22T 22T 22	as called a construction of the second secon	n be see 8.0 54.0 54.0 19.0 5.0 0 0 0 0 0 0 0 0 0 0 0 0 0	in Form EACH M2 Ited back be DWS. LINM EACH EACH EACH EACH EACH EACH EACH M2 Ited back be DWS. LINM EACH EACH EACH EACH Itel back back CH EACH EACH EACH EACH Itel back Itel back	n 2.5. Thi past the The deck as can be e seen in 3.0 e start of past the The deck as can be e seen in e seen in e seen in	kerbs as should t 19.0 3.0 seen in Form 2.1 1.0 5.0 2.0 2.0 a pipe as should t 19.0 1.0 seen in Form 2.1 19.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2	can be s per replac 1.0 Form 2.5 5 that pla s can be see replac can be s per replac can be s per replac can be s per replac	pliced at pliced at 54.0 54.0 een in P ed. 1.0 5 that pla ce it in c 54.0 seen in P ed. 2.0 5 that pla ce it in c ce it in c 54.0 5 that pla	a poi a poi a poi boto ce it i conditi	In where the p int where the p 11 & 19 and P 11 & 19 and P 2.5. This pile s 2.5. This pile s 11 & 19 and P 11 & 19 and P	te 4 and should be mo	d be renitored	placed.	are the pile is s

S	truct	ure	Con	dit	ion l	nspe	ction	Rep	ort				B2/2	Sheet
			-											4 Of 4
	S	strue	ture I	d	7	0108			1	Vame	Dal	rymple C	reek	
	Insp	ectio	n Dat	e ?	24-MA	Y-200	4	Inspect	tion L	evel 2	17	Level	Unde	rwater
C	ompone	nt Loc	ation	s			-2-	Q	)uantity Per		pba	Comme	nts	SALE NO. THE
lification	dn	Iponent	idard iber	osure Clas	ntity			c	on ditior State		itenance R	* Locat * Desci magn * Refe	ion of item/cond iption of defects itude,extent rences of sketche	ition by location type, s, and photor
Moc	Gro	Con	Stan	Exp	Qua	Colt	1	2	3	4	Mair	(Roll	Exposure Nos)	s and photos
0	P3	COR	27T	1	5.0	EACH		3.0	1.0	1.0				
Corb	el 1 has	a large	pipe in i	it as	can be s	een in Fo	rm 2.5 a	ind a crac	k in the s	side as ca	in be	seen in 18. T	his corbel should b	be monitored.
O D	P3	H	54T	1	t as can 2.0	EACH	in Form	2.5 which 2.0	i places i	t conditio	n stat	e 4 and shou	d be replaced.	
0	P3	P	56T	2	4.0	EACH		4.0						
0	P3	WAL	57T	2	80	FACH		80						
0	P 4		007	-	54.0	LHO		0.0						
There	54		291	1	54.0	M2				54.0				
allmo	st rotted	away g	deck un giving no	nts tr sup	port to the	itéd back ne DWS.	past the The decl	kerbs as k should t	can be so replace	seen in P ed.	hoto 1	1 & 19 and F	hoto 16 shows the	at there are some units that are
0	<b>S</b> 4	SP	33T	1	19.0	LINM		19.0						
0	\$4	G	22T	1	5.0	EACH		1.0	1.0	3.0				
Girde Girde Girde	r 1 has a r 2 has a r 3 has a	a very l a very l a large a very l	arge pip arge pip snipe wi arge pip	e thr e thr th pi	oughout oughout pe at E1	it length a it length a as can b	as can be as can be e seen ir	e seen in e seen in 1 Form 2.4	Form 2.5 Form 2.5 5 that pla	that play that play ce it in c	ce it in ce it in onditio	condition states of condition states of condition state 3 and condition state 3 and condition states of co	ate 4 and should b ate 4 and should b I should be monito	e replaced e replaced, ored,
0	S4	W	710	2	1.0	EACH	15 0011 04		1 0111 2.0	1.0		There is a lot	of debra in the cre	ek as can be seen in Photo 20
0	A2	н	54T	1	2.0	EACH		2.0				21 that should	i be clean out.	
0	A2	ABS	52P	1	10.0	M2		10.0	-					
0	A2	PED	440	2	10.0	EACH		10.0						
0	A2	P	56T	2	4.0	EACH			1.0	3.0				
Pile 1 Pile 2 Pile 3 Pile 4	has a v has a la has a v has a v	ery larg arge pip ery larg very lar	je pipe a be at the ge pipe a ge pipe	top top at the at th	top and that shou top and top and	at groun ild be mo at groun i at grour	d level as nitored. d level as d level a	s can be s s can be s is can be	seen in F seen in F seen in f	orm 2.5. orm 2.5. Form 2.5	This p This p This	bile should be bile should be pile should b	replaced.	
O	A2	seen ii WW	n Photo	22.	20	FACH		20		_	Т			
			010	-	2.0	CAUT		2.0						

De	efective	Comp	onent	s F	lei	ort						B2/3		Sh	eet	
			- =0100		•						-178			1 (	or 5	
	Stru	icture ld	70108		• • - •				Name	Dalrym	ple Cr	eek				
	Crossi	ng Name	Puidaa		••••		••••••	Alt.	Name							
	Structu	ire Type	Bridge	/ <b>D</b> .					Owner	110	War	wick Sh	ire C	ound	sil	
	onstruct	ion Type	Girder	Бе				I	)istriet	5	Bord	ler Distr	iet (A	Ir)		
Con	struction	Materia	1 1mber					L	GA Id	110	War	wick Sh:	irc C	ound	il.	
	1	nspector	Malcoli	m J	BI	odie			Date	24-MA	Y-2004					
Ins	pection La	evel 2 📋				P	rogran	ımed	$(\mathbf{X})$							
		evel 3				E	xceptic	onal	C 3			U	nder	wate	ar []]	]]
	Roa	d Sectio	n					Start		Е	nd		Т	Dist		
ld	l Descri	ption		s	Ċw	ay S	RPC		Tdist	RPC	Td	ist	Star	t	E	nd
188	L Kital I	Road		С	1	С	1		2.330	1	2.3	68	2.330	)	2	368
						Desci	rintian of	Defect								
	Compone	ent Locatio	n			* De	tailed De	scriptic	n					R	equire Action	ed .
ę				ass	tate	* Est * "O	timated ( http://de	Quantit tion rec	y wired 🗠		- 1 A				(1)	•
catio		aent	2.	102	on S	* Ur	gency of	action (	what, w	ho, when, h	iow)			É.	5	
diff	dino	od u	mbe	11SOC	nditi	* Re * Re	comment ference o	fed Tes f Sketcl	ting hes and I	Photos (Ro	Expose	tre Nos)		nitor	el 3 pecti	GL
Mo	ڻ	වී	Sta Nu	E.v.	υ	·		1995						Mo	Lev II ev	5
0	AP1	AP	700	1	4										<u></u>	1
The ap	prosch is ver	y rough as o	an be seen	in P	l hotu	1. Thi:	s should t	e trimm	ed over a	is a new sea	al placed.				I	
Ó	AP1	GR1	72T	1	4											-
This a	re not very sa	fe being tim	ber as can b	l i	en i	n Photo	o 8. These	e should	he repla	ced with ste	el guardra	aí L				
0	AP1	GR2	72T	1	4											×
This a	re not very ca	fe being tim	boras can b	0 38	en i	n Photo	o 8. These	: should	be replac	ced with ste	el guardra	ail.				
0	S1	ER1	2T	1	4				-							1
Thsa	re not very sat	e being tim	ber as can b	e se	en is	n Photo	o 1. These	e should	be replac	ced with ste	el guardra	ail.	ļ			
0	S1	BR2	2Т	1	4											~
This a	re not very sat	fe being tim	ber as can b	98.8	en is	n Photo	o 1. These	e should	be region	ecd with ste	cl quardra	ail.	l			
0	S1	К1	3P	1	3											
				·	Ŭ								ļ	·		
ine ke	ro is badly cr	acked with a	rea broken	awa	y as	can be	seen in I	Photo 3	& 4. This	kerb should	i be moni	tored.				
0	S1	К2	3P	1	3									~		
The ke	rb is badly cra	acked with a	area broken	awa	y as	can be	seen in I	Photo 3	& 4. This	kərb should	i be mcni	tored.	,			
0	<b>S</b> 1	WS	10	1	4				•							1
The wo	earing surface	is badly bro	oken up as d	can t	be se	en in F	Photo 5 &	6. This	should be	e replaced.			,			·
0	<b>S</b> 2	BR1	2T	1	4											1
This a	ra not very sat	ie being tim	beras can b	)e se	en i	h Photo	o 1. These	e should	be replac	ced with ste	el guardra	ail.	ļ			
0	<b>S</b> 2	BR2	21	1	4											1
This a	re not very sa	fe being timi	ber as can b	)e se	en li	1 Photo	o 1. These	e should	be replac	ced with ste	el guardra	ail.	ļ		,	L

De	fective	Comp	onent	s F	Rei	oort	B2/3	S	heet	
							02/0	2	Of 5	
	Strue Inspectio	ture Id on Date	70 24-MAY	108 (-2	004	Name Dalrymple C	reek	nderwat	er	
	Сотроне	ent Locatio	11			Description of Defect * Detailed Description			Requir	ed
Medification	Group	Component	Standard Number	Exposure Class	Condition State	<ul> <li>* Estimated Quantity</li> <li>* "Other" action required</li> <li>* Urgency of action (what, who, when, how)</li> <li>* Recommended Testing</li> <li>* Reference of Sketches and Photos (Roll/Exposed)</li> </ul>	are Nos)	Monitor	Icvel 3	Other
0	S2	К1	3P	1	3	en en en en en en en en en en en en en e			-	-
I he ke	erb is badly cra	acked with a	area broken	awa	y as	can be seen in Photo 3 & 4. This kerb should be mor	itored.			[
0	S2	K2	3P	1	3			×		<u> </u>
The ke	erb is badly on	ecked with a	area broken	awa	y as	can be seen in Photo 3 & 4. This kerb should be mor	itcred.			<u> </u>
0	S2	ws	1Ċ	1	4					~
The w	earing surface	is badly bro	) oken up as o	L can b	)3 S(	en in Photo 5 & 6. This should be replaced.				
0	83	BR1	2⊤	1	4					~
This a	re not very sat	fe being tim	ber as can b	e se	en i	Photo 1. These should be replaced with steel guard	rail.			<u> </u>
0	S3	BR2	2T	1	4					~
This a	re not very sa	te being tim	ber as can b	e se	en i	Photo 1. These should be replaced with steel guard	rail.			<u></u>
0	83	K1	ЗP	1	3			1		
The ke	arb is badly on	acked with c	rca brokon	awa	y as	oan be seen in Photo 3 & 4. This kerb should be mor	iitar <del>o</del> d.		I	<u> </u>
0	S3	K2	3P	1	3	·		<ul> <li>✓</li> </ul>	<u> </u>	
The ke	orb is badly cra	acked with a	rea broken	awa	y as	can be seen in Photo 3 & 4. This kerb should be mor	itored.			<u></u>
0	S3	ws	10	1	4					~
The w	earing surface	is badly bro	oken up as o	an k	0.0 54	en in Photo 5 & 6. This should be replaced.		·		1
0	<b>S</b> 4	BR1	2T	1	4					4
This a	re not very sat	fe being timi	ber as can b	e se	en ir	Photo 1. These should be replaced with steel guard	rail.	·		1
0	S4	BR2	2T	1	4					×
This a	re not very saf	fe being tim	ber as can b	iê se	en ia	Phote 1. These should be replaced with steel guard	rail.	·	1	1
0	54	K1	ЗP	1	3			V		
The ke	arb is badly cra	acked with a	rea broken	awa	y as	can be seen in Photo 3 & 4. This kerb should be mor	itored.	-	1	
0	S4	K2	ЗP	1	3			~		
The ke	erb is badly cra	acked with a	rea broken	awa	y as	can be seen in Photo 3 & 4. This kerb should be mor	itored.		1	
0	S4	ws	10	1	4					×
The w	earing surface	is badly bro	okan up as o	can t	be se	en in Photo 5 & 6. This should be replaced.		<u> </u>		·
0	AP2	AP	700	1	4					~

Defective Components Report B2/3												
		•	T-1		-			3 0	)f 5			
	Struc	ture Id	70	108		Name Dalrymple C	reek					
Inspection Date 24-MAY-2004 Inspection Level 2 [7] Level 3[												
Component Location						Description of Defect * Detailed Description			Required Action			
60		1		Class	ition State	* "Other" action required			(√)			
ficati		oner	brd	anre		* Urgency of action (what, who, when, how) * Recommended Testing		5	3 Hon			
Mođi	Grou	Com	Stand	Expos	Cond	* Reference of Sketches and Photos (Rull/Expos	aure Nos)	Monit	Level . Inspec	Other		
						· · · · · · · · · · · · · · · · · · ·						
The approach is very rough as can be seen in Photo 1 & 7. This should be trimmed over as a new seal placed.												
0	AP2	GR1	72T	1	4					¥		
This are not very safe being timber as can be seen in Photo B. These should be replaced with steel guardrail.												
0	AP2	GR2	72T	1	4					~		
This a	re not very sa	fe being tim	ber as can b	e se	en i	, n Photo B. These should be replaced with stoci guard	rail.	L				
0	A1	ABS	52P	1	4					J		
The al	bs has droppe	d over 40 m	m as can be	see	en in	Phote 10. This should be replaced to stop soil spilling	g through.					
0	A1	P1	56T	1	4					4		
Pile 1	has a very lar	ge pipe at th	top and so	me	rot a	! at ground level as can be seen in Form 2.5. This pies	should be rep	laced.	I			
0	۸1	P2	56T	1	3	Pile 2 has some rot at the top that should be monitor	red.	~				
0	A1	P3	56T	1	4			i	Ť	¥		
Pile 4	has a very la	ige pipe at t	he top and a	t gro	aund	l Hevel as can be seen in Form 2.5. This pile should be	e replaced.					
0	\$1	D1	29T	1	1					~		
There	are alot of the	deck units	that are role	d ba	ick p	! past the kerbs as can be seen in Pho;o 11 & 19 and Pi	hoto 16 chaw	s that there a	re som	0		
0	S1	t rotted awa G1	22T	supp 1	4	to the DWS. The deck should be replaced.						
Girder	1 has a very	arge snipe v	with rot at E	1 an	dal	arge shipe at E2 as can be seen in Form 2.5 that plac	a it in conditio	on state 4 an	d should	d		
be rep O	acd. S1	G2	22T	1	4					~		
Girder	2 has a vary	ame nine lh	rouchout is	eng	12.96	s can ba seep in Form 2.5 that place it in condition sta	to d and abou		<u></u>			
	211da d Vely	cee	227	enų.			ite 4 anti sinot					
	3,				1					•		
Girder	5 nas a very	large pipe tr		eng	n as	s can be seen in Form 2.5 that place it in condition sta	te 4 and shot	id be 'eplace	30.			
0	F 1	COR5	271	1	4					*		
Corbe corbel	S drilled sour should be rep	id but the er laced.	nd of the cor	be i	s ba	dly cracked as can be seen in Photo 12 which moved	l finis corbel to	condition sta	sile 4, T	iis		
0	P1	1-11	54T	1	4					7		
Both headstocks are not supported on the pile correctly as can be een in Photo 14 & 15. Photo 14 shows that there is less then 1/2 of the beadstock on the should end 15 shows that there is a can be wear the beadstock and the should end to should be fixed												
0	P1	H2	54T	1	4					~		
Both h	eadstocks are	not suppor	ted on the p	ile c	orre	J ctly as can beseen in Photo 14 & 15. Photo 14 shows is a can between the besidetook and the aboutton. The	that there is I	less then 1/2	of the			

De	Defective Components Report B2/3									
	Struc Inspectio	cture Id on Date	70 24-MA	108 Y-2	) 004	Name Dalrympic Control Inspection Level 2	reek. \${} U1	nderwate	er []]	
Component Location					Γ	Description of Defect * Detailed Description			Require	
Modification	Group	Component	Standard Num ber	Exposure Class	Condition State	<ul> <li>* Estimated Quantity</li> <li>* "Other" action required</li> <li>* Urgency of action (what, who, when, how)</li> <li>* Recommended Testing</li> <li>* Reference of Sketches and Photos (Rell/Expos</li> </ul>	ure Nos)	Monitor	Level 3 () Inspection ()	
0	P1	P1	56T	2	4	le contra de la co				
Pile 1	has a very lar	ge section r	otting away	as c	an b	l e seen in Form 2.5. This pile should be spiced at a pr	aint where the	é pite is soun	<u>с.</u>	
0	P1	P2	56T	2	3			Ý		
Pile 2	has a very lar	nge section n	otting away	as c	i ar b	) e seen in Form 2.5. This pile should be spiced at a po	oint where the	e pile is soun	с.	
0	P1	P3	56T	2	4					
Pile 3	has a very lor	rge pipe as o	i tăn be seen	l in F	orm	2.5. This pile should be spliced at a point where the pi	le is sound.	L	I	
0	P1	P4	56T	2	4					
Pile 4	l has a very lar	ge pipe as o	an be seen	l in F	) Srm	2.5. This plie should be spliced at a point where the pi	le is sound.			
0	\$2	D1	29T	1	4	· · · · · · · · · · · · · · · · · · ·				
Ihere	are alot of the	e deck units	that are rot	ed ba	l ack r	ast the keros as can be seen in Photo 11 & 19 and Pt	rato 16 show	s that there a	are sor	
units t O	hat are allmcs \$2	st rotted awa	y giving no	supr	ort i	to the DWS. The deck should be replaced.				
Girder	1 bas a res	large pine #	TO John of the	1000	l le c	can be easy in Come 2.5 that she at the sound of the	a dead-to-			
Giller	Thas a very	range pipe tr	abugnout it	ieng	in 99	s can be seen in Porti 2.5 that place it in condition stat	te 4 and shou	uid be replac	ea.	
0	52	G4	221	1	3			ľ		
Girder	4 has a large	snipc with p	tips at E2 a	is ca	n be	seen in Form 2.5 that place it in condition state 3 and	should be m	on tored.		
0	P2	P2	56T	2	4					
Pile 2 nile is	has a very lar sound.	ge section n	otting away	witi	the	start of a pipe as can be seen in Form 2.5. This pile s	hould be spli	iced at a poir	it wher	
0	\$3	D1	29T	1	4					
There	are alot of the	e deck units	hat are rote	l ed ba	i ack p	ast the keros as can be seen in Photo 11 & 19 and Pi	ncto 16 show	s that there a	are sor	
units t O	hat are allmos S3	st rotted awa	y giving no 22T	supp 1	ort i	to the DWS. The deck should be replaced.		1		
Girder	1 696 5 1051	larca pino #			L'	oor he seen in Com 2.5 that sloes it is condition stat	la dandah	uld be real or	~	
- C	nasavery	ange pipe tr	100gnou(it	T	araa	s car be seen in Ponn 2.5 (nat place it in condition sta	te 4 and shol			
		62	221	<sup>1</sup>	13					
Girder	2 has a large	snipe with p	pipe at E1 a	is ca	n be	seen in Form 2.5 that place it in condition state 3 and	should £e m	onitored.		
	\$3	G4	22T	1	3			×		
0	The second second second second second second second second second second second second second second second se		1 T.O	e ca	n be	seen in Form 2.5 that place it in condition state 3 and	should be m	onitored.		
O Girder	4 has a large	snipe with p	pipe at E2 a	0 00						
O Girder O	4 has a large \$3	G5	pipe at E2 a	1	4					
O Girder O Girder	4 has a large S3 5 has a very	G5 G5 large pipe th	22T 22T rroughout it	1 leng	4 tha:	s can be seen in Form 2.5 that place it in condition sta	te 4 and sho	uld be replac	ed.	

Defective Componer	B2/3	Sheet																	
·		·····		5 Of 5															
Structure Id Inspection Date 24-M	70108 AY-2	08 Name Dalrymple Creek -2004 Inspection Level 2																	
Component Location		Γ	Description of Defect * Detailed Description		R	Required													
Medification Group Compenent Standard Number	Exposure Class	Condition State	<ul> <li>* Estimated Quantity</li> <li>* "Other" action required</li> <li>* Urgency of action (what, who, when, how)</li> <li>* Recommended Testing</li> <li>* Reference of Sketches and Photos (Roll/Expose)</li> </ul>	aure Nos)	Monitor	Level 3 Inspection													
O P3 (OR1 271	1	3			×														
Corbel 1 has a large pipe in it as can be seen in Form 2.5 and a crack in the side as can be seen in 18. This corbet should be monitored.																			
O P3 (OR4 271	. 1	4				~													
Corbel 4 has a very large pipe in it as ca	n be se	en ir	] 1 Form 2.5 which places it condition state 4 and should	d bə replaced	J.														
O S4 D1 291	1	4				V													
There are alot of the deck units that are	There are alot of the deck units that are roted back past the kerbs as can be seen in Photo 11 & 19 and Photo 16 shows that there are some																		
O S4 G1 221	1 1	4	o the DVVS. The dack should be replaced.			<b>√</b>													
Girder 1 has a very large pipe throughout it length as can be seen in Form 2.5 that place it in condition state 4 and should be replaced																			
O S4 G2 22T	1	4				V													
Girder 2 has a very large pipe throughout	l it leng	j Uth BR	l ; can be seen in Form 2.5 that place it in condition sta	ite 4 and sho	uic be replac	ed.													
O S <sup>7</sup> G3 22T	1	3			1														
Girder 3 has a large snipe with pipe at E	1 as ca	n pe	i seen in Ferm 2.5 that place it in condition state 3 and	i should bo m	onitored.														
O S4 G5 22T	1	4																	
Girder 5 has a very large pipe throughout	ıt it leng	th as	l can be seen in Form 2.5 that place it in condition sta	ite 4 and sho	uld be replace	ed.													
O \$4 W 710	2	4				V													
There is a lot of debra in the creek as ca	n be se	en ir	! i Photo 20 & 21 that should be clean out.		L														
O A2 P1 56T	2	4		·		×													
Pile 1 has a very large pipe at the top an	nd at gro	l	l level as can be seen in Form 2.5. This pile should be	replaced.															
O A2 P2 56T	2	3	Pile 2 has a large pips at the top that should be mon	itored.	~														
Ο Λ2 Ρ3 56Τ	2	4																	
Pile 3 has a very large pipe at the too ar	nd at gro	l ound	l level as can be seen in Form 2.6. This pile should be	replaced.	I														
O A2 P4 56T	2	4																	
Pie 4 has a very large pipe at the top ar	nd at gro	Jund	l level as can be seen in Form 2.5. This pile should be	replaced.															
т	imbor	n:11		<b>C</b>		Dav									<b>–</b> ––––		S	heet	
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	mper	Drin	ing	Sur	vey	кер	ort								B2/5	<b>)</b>	1	Of 8	
Con ) 1 18	S Cros Stru Constru Inspectio Inspectio R d Dese 8L Kitz	tructo sing acture action on Ma Insp on Le Le coad S criptical Roa	ure ] Nan Tyj Tyj tteri oecto vel 2 vel 3 Secti on d	Id ne De Gi al Ti or M C V On	idge rder mber alcol	/Bean r m J B Progra Excep S Cw C 1	n Grodie amme tiona av S C	e ed [ 1 [ RPC 1	Alt. D L(	Nam Nam Owne Distric GA I Dat All El Dis 2.33	e I er ct d e 2 lemo	Dah 11 5 11 4-N ents 2PC	rym 0 0 VIA E	Warv Bord Warv Y-2004 rilled [] nd D 2.3	eek wick S er Dis wick S	hire C trict (l hire C Under T Star 2.33	ounci Mr) ounci water Dist	End 2.368	- - - -
								т	est Res	ults				Γ			lommen	ts	
Modification	Comp da e e e e e e e e e e e e	Component Component Component	Standard Number	Diameter (mm)	Location	Test D Diameter	Orientation (H, V, Other)	Solid	Rot	Pipe	% Consumed	Condition State	Undersize						
0	A1	P 1	56	400	<u>Lipses</u> T	16	H	180	<u></u>	220	55	4	- - -			<u></u>			
0	A1	P 1	56	400	GL	16	н	220	180		45	4	-						
0	A1	P 2	56	400	Т	16	н	300	100		25	3	-	-					
0	A1	P 2	56	400	GL	16	н	400		0	0	1							
0	A1	P 3	56	400	Т	16	н	400		0	0	1	$\vdash$						
0	A1	P 3	56	400	GL	16	н	400		0	0	1							
0	A1	P 4	56	400	т	16	н	180		220	55	4	-	1					
0	A1	P 4	56	400	GL	16	н	190		210	53	4	-						
0	S1	G 1	22	530	E1	16	н	430	100		19	2	:						
							1					1	1			% Con	sumed	 I	
* '	Test Loc	ation	s											CS	52	CS	3	CS	34
Cor	nponent	Def	ect	Lo	catio	n (Ab	brevi	iation)	(Des in co	cribe ( mmen	)the ts)	r (0,	)	E	MS	E	MS	E	MS
Pile Gird Corl Hea Hea	er bel dstock <sup>1</sup> dstock <sup>2</sup>	Pipe Pipe Pipe Edge Pipe	Area	Top End1 End1 End1 End1	(T), G (E1), (E1), (E1), (E1),	round I Midsp End 2 End 2 End 2	Level ( an (MS (E2), ( (E2), ( (E2), (	GL), (O S), End Other (C Other (C Other (C	) Othe 2 (E2), )) ))	r Othe	r (O)	. A (* V ř.		1-20 1-20 1-20 1-5 1 - 4	1-20 1-30 1-20 1-5 5mm	21-35 21-35 21-35 6-10 46 - 6	21-35 31-50 21-35 6-10 55mm	36-50 36-50 36-50 11-20 66 - 9	36-50 51-70 36-50 11-20
Hea Hea Otł 1.	dstock <sup>1</sup> dstock <sup>2</sup> ner Comp 4 <i>rea of he</i>	Edge Pipe onent	Area t - Er k (%)	End1 End1 ater re	(E1), (E1), levar	End 2 End 2 It com	(E2), ( (E2), ( pone f sectio	Other (C Other (C nt code on (top,	)) )) e and <i>botton</i>	descr	ibe les).	loci	atio	1-5 1 - 45 n in cor	1-5 5mm nment	6-10 46 - 6 s field.	6-10 5mm	11-20 66 - 9	11- 0m

Maximum pipe diameter (mm) in headstock for internal piping defects.
 Members in excess of CS4 deterioration are critical and should be replaced immediately.

т	imber	r Drill	ina	Sur	Vev	Ren	ort								P2/5		She	et	
			ing	U	vey	Keb									D2/3	·	2 0	f 8	
S	ructur	e Id		70108	3					Nan	ne	Dal	ryn	nple (	Creek				
S	arvey I	Date 20	4-M	AY-2	004	. I	nspec	tion L	evel 2	2	]	1	Leve	el 3 🗌	] U	nderwa	iter		
	Con	nponent I	.ocat	ion		Test I	etails	Т	est Res (mm	sults )						Com	ments		
1111-101			L	· · ·									. •						
1			umbe			197					P	ate							
catio		nent	rd N	er	g	J.	other				Sunc	ion St	ZC					-	
Lodifi	roup	ompo	anda	iame (mm)	ocati	iamet	rient í, V,	bild	ot	pe	Con	budit	aders						
2	9 ·	0	00	P	_ <u></u>	<u> </u>	08	ശ്	2	E.	*	0	5			- V 10280 A. 101800			
	01	01	22	550	EI	10	v	90	170	2/0	83	4							
0	51	61	22	530	MS	16	н	530		0	0	1							
0	81	G 1	22	530	MS	16	V	380		150	28	2							
0	S1	G 1	22	530	E2	16	н	530		0	0	1							
0	S1	G 1	22	530	E2	16	۷	350		180	34	3							
0	S1	G 2	22	440	E1	16	н	340		100	23	3							
0	\$1	G 2	22	440	<b>E</b> 1	16	٧	240		200	45	4							
0	S1	G 2	22	440	MS	16	Н	240		200	45	3							
0	S1	G 2	22	440	MS	16	V	240		200	45	3							
0	\$1	G 2	22	440	E2	16	н	240		200	45	4							
0	<b>S</b> 1	G 2	22	440	E2	16	v	240		200	45	4							
•	\$1	GЗ	22	500	E1	16	н	500		0	0	1							
0	\$1	G 3	22	500	E1	16	٧	425		75	15	2							
0	S1	G3	22	500	MS	16	н	500		0	0	1							
0	S1	G 3	22	500	MS	16	ν	500		0	0	1							
0	S1	·G 3	22	500	E2	16	Н	500		0	0	1							
0	S1	-G 3	22	500	E2	16	v	470		30	6	2							
0	S1	G 4	22	470	E1	16	Н	470		0	0	1							
0	S1	G 4	22	470	E1	16	v	420		50	11	2							
0	S1	·G 4	22	470	MS	16	н	450	20	0	4	2							
0	S1	G 4	22	470	MS	16	v	450	20	0	4	2							
0	\$1	G 4	22	470	E2	16	н	470		0	0	1							
0	\$1	G 4	22	470	E2	16	v	470		Ó	Ó	1							
0	<b>S</b> 1	G 5	22	500	<b>E</b> 1	16	н	260		240	48	4							
	<u>S1</u>	65	22	500	E1	16	V	110		390	78	A							
	01	00	~~	000		10	, v			050	10	1							

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т	imbe	r <b>Drill</b> i	ing	Sur	vey	Rep	ort								В	2/5	Sheet
Si S	tructur urvey )	e Id Date 24	4-M	70108 AY-2	3 004	 Ь	nspec	tion L	evel	Nan 2 : 🗹	ne :	Dal I	ryn Levo	iple	Cree	k U	nderwater
and the second second	Con	nponent L	ocat	ion		Test I	etails	T	est Res (mm	sults )							Comments
Modification	Group	Component	Standard Number	Diameter (mm)	Location	Diameter	Orientation (H, V, Other)	Solid	Rot	Pipe	% Consumed	Condition State	Undersize				
0	S1	G 5	22	500	MS	16	н	500		0	0	1					
0	\$1	G 5	22	500	MS	16		350		150	30	2					
0	\$1 \$1	G 5 G 5	22	500	E2 E2	16 16	H V	380		120 400	24 80	3					
0		OR 1	27	500	F2	16	H	500		0	0	1					
0	P1	OR 1	27	500	E2	16	v	500		0	0	1					
0	P1	OR 2	27	500	E2	16	н	500		0	0	1					
0	P1	OR 2	27	500	E2	16	v	500		0	0	1					
0	P1	IOR 3	27	500	E2	16	Н	500		0	0	1					
0	P1	IOR 3	27	500	E2	16	v	500		0	0	1					
0	P1	IOR 4	27	500	E2	16	н	500		0	0	1					
Ŷ	P1	(OR 4	27	500	E2	16	۷	500		0	0	1					
0	P1	OR 5	27	500	E1	16	н	300	200	0	40	4					
0	P1	IOR 5	27	500	E1	16	V	300	200	0	40	4					
0	P1	P1	56	410	Т	16	н	210	200	0	49	4					
0	P <b>1</b>	P 2	56	410	Т	16	н	310	100	0	24	3					
0	P1	P 3	56	410	Т	16	н	250		160	39	4					
0	P1	P 4	56	410	Т	16	H	110		300	73	4					
0	\$2	Ģ 1	22	500	E1	16	H	450	50	0	10	2					
0	S2	G 1	22	500	E1	16	V	450	50	0	10	2					
0	\$2	G1	22	500	MS	16	н	430	70	0	14	2					
0	S2	G 1	22	500	MS	16	v	430	70	0	14	2					
0	S2	G 1	22	500	E2	16	н	500		0	0	1					
0	S2	G 1	22	500	E2	16	v	425		75	15	2					
0	S2	G 2	22	500	E1	16	Н	250		250	50	4					

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	urvey	Date				1	nspec	tion L	Level .	2 : Y	.) 		Jeve	el 3 :	·!	0	nde	erwa	ter	i)	
	Con	nponent L	∕ocat	ion		Test I	etails	Т	est Res (mm	aults )								Com	nent:	3	
Modification	Group	Com ponent	Standard Number	Diameter (mm)	Location	Diameter	Orientation (H, V, Other)	Solid	Rot	Pipe	% Consum ed	Condition State	Undersize								
0	S2	G 2	22	500	E1	16	v	250		250	50	4									
0	S2	G 2	22	500	MS	16	н	250		250	50	3									
0	\$2	G 2	22	500	MS	16	v	250		250	50	3									
0	S2	G 2	22	500	E2	16	н	470	30		6	2									
0	S2	G 2	22	500	E2	16	٧	420	30	50	16	2									
0	S2	G 3	22	500	E1	16	Н	500		0	0	1									
0	S2	G 3	22	500	E1	16	٧	500		0	0	1									
0	S2	G 3	22	500	MS	16	Н	460		40	8	2									
0	S2	G 3	22	500	MS	16	٧	460		40	8	2			•						
0	S2	G 3	22	500	E2	16	Н	500		0	0	1									
0	S2	G 3	22	500	E2	16	۷	475		25	5	2									
0	\$2	G 4	22	500	E1	16	н	500		0	0	1									
0	S2	G 4	22	500	E1	16	V	500		-0	0	1									
0	S2	G 4	22	500	MS	16	Н	500		0	0	1									
0	S2	G 4	22	500	MS	16	V	500		Ō	0	1									
0	S2	G 4	22	500	E2	16	н	500		0	0	1									
0	S2	G 4	22	500	E2	16	ν	450		50	10	2									
0	Ş2	G 5	22	500	E1	16	Н	430		70	14	2									
0	\$2	G 5	22	500	E1	16	v	380		120	24	3									
0	S2	G 5	22	500	MS	16	н	500		0	0	1									
0	S2	G 5	22	500	MS	16	V	500		0	0	1									
0	S2	G 5	22	500	E2	16	н	500		0	0	1									
0	S2	G 5	22	500	E2	16	V	400		100	20	2									
0	P2	OR 1	27	500	E2	16	н	450		50	10	2									
0	P2	OR 1	27	500	E2	16	V	450		50	10	2									

Т	imbe	r Drilli	ina	Sur	vev	Rep	ort								B2/	5			Sh	eet		
									<u>.</u>						01	<u> </u>			5 (	Of 8		_
S	tructu	re Id		70108	8					Nar	ne	Dal	ryn	nple (	Creek							
S	urvey	Date 22	4-IVI	AY-2	.004	h	nspec	tion L	ævel (	2 [ ]	]	I	Lev	el 3 🗌		U	nde	rw	ater	[	]	
	Con	nponent L	ocat	ion		Test I	Octails	1	est Res (mm	sults )							C	Com	ment	5		_
a silved i sun With				-								-		2.1								
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icatio		onenf	NP	_ ter	8	fer	othe				sume	ion S	ize								1. i	
fodif	roup	duro	tand	iame (tmm	ocati	iame	Hient H, V,	olid		ipe	Con	ondi	nders									
0	P2		27	500	F2	16	Ре	450	<u>_</u> .⇔	50	10	0	P									<u> </u>
	P2	IOR 2	27	500	E2	16		450		50	10	2	_									
0	P2	IOR 3	27	500	E2	16	•	400		100	20	2										_
	P2		27	500	E2	10		400		100	20	2										_
	P2		27	500	E2	10	Ц	400		100	20	- 4										
	P2		27	500	LZ	16		500			0	1										_
0	FZ		21	500	E2	10	v	500		0	0											
0	P2	IUR 5	21	500	EZ	10	н	500		0	0	1										
0	P2	IOR 5	27	500	E2	16	V	500		0	0	1										
0	P2	P1	56	400	Т	16	н	400		0	0	1										
0	P2	P2	56	400	Т	16	н	200	150	50	50	4										
0	P2	P3	56	400	Т	16	н	400		0	0	1										
0	P2	P4	56	400	Т	16	т	400		0	0	1										
0	<b>S</b> 3	G1	22	570	E1	16	н	430	140	0	25	3										
0	<b>S</b> 3	G1	22	570	E1	16	V	280	140	150	51	4										
0	S3	G1	22	570	MS	16	т	490		80	14	2										
0	<b>S</b> 3	G1	22	570	MS	16	v	270		300	53	4										
0	\$3	G1	22	570	E2	16	т	520		50	9	2										
0	<b>S</b> 3	G1	22	570	E2	16	V	470		100	18	2										
0	<b>S</b> 3	G2	22	470	E1	16	н	420		50	11	2										
0	<b>S</b> 3	G2	22	470	E1	16	V	370		100	21	3										
0	<b>S</b> 3	G2	22	470	MS	16	н	470		0	0	1				-						_
0	<b>S</b> 3	G2	22	470	MS	16	V	470		0	0	1										_
0	<b>S</b> 3	G 2	22	470	E2	16	н	440	30	0	6	2										_
0	<b>S</b> 3	G 2	22	470	E2	16	V	390	30	50	17	2										-
0	<b>S</b> 3	G3	22	500	E1	16	н	500		0	0	1										_

Т	imbe	r Drilli	ina	Sur	Vev	Ren	ort								Bo	15			Sheet		
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St	tructu	re Id		70108	3					Nan	ie I	Dal	ryn	iple (	Creek						
S	urvey	Date 24	4-M	AY-2	004	. b	nspec	tion L	evel 2	2 🔽	]	I	leve	13		U	nder	wate	ar [	]	
	Со	nponent L	ocat	ion		Test D	etails	Т	est Res	ults	44				·		C	omme	nits		<u> </u>
					1. A.		-	and an Angar	(mm)												
Modification	Group	Component	Standard Number	Diameter (mm)	Location	Diameter	Orientation (H, V, Other)	Solid	Rot	Pipe	% Consumed	<b>Condition State</b>	Undersize								
0	S3	G 3	22	500	E1	16	V	425		75	15	2									
0	S3	G 3	22	500	MS	16	н	390	110		22	2									
0	S3	G 3	22	500	MS	16	V	390	110		22	2									
0	S3	G 3	22	500	E2	16	н	500		0	0	1				_					
0	S3	G 3	22	500	E2	16	v	450		50	10	2									
0	83	G 4	22	470	E1	16	н	470		0	0	1									
0	S3	G 4	22	470	E1	16	v	420		50	11	2									
0	S3	G 4	22	470	MS	16	н	470		0	0	1									
0	S3	G 4	22	470	MS	16	v	470		0	0	1									
0	S3	G 4	22	470	E2	16	Н	420	50	Ő	11	2									
0	S3	G 4	22	470	E2	16	V	370	50	50	21	3									
0	S3	G 5	22	550	E1	16	н	350		200	36	4									
0	S3	G 5	22	550	E1	16	٧	175		375	68	4									
0	S3	G 5	22	550	MS	16	н	480		70	13	2									
0	S3	G 5	22	550	MS	16	V	345		205	37	3	Π								
0	S3	G 5	22	550	E2	16	н	450	100		18	2									
0	S3	G 5	22	550	E2	16	V	275	100	175	50	4									
0	P <b>3</b>	(OR 1	27	500	E2	16	Н	380		120	24	3									
0	P3	(OR 1	27	500	E2	16	v	350		150	30	3									
0	P3	(OR 2	27	500	E2	16	н	500		0	0	1									
0	P3	(OR 2	27	500	E2	16	v	500		0	0	1									
0	P3	KOR 3	27	500	E2	16	н	500		0	0	1		-							
0	P3	IOR 3	27	500	E2	16	v	450		50	10	2									
0	P <b>3</b>	(OR 4	27	500	E2	16	н	440		60	12	2									
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s	tructur	e Id		70108	3					Nan	ne	Dal	ryn	nple (	lreek		
s	urvey l	Date 24	I-M	AY-2	004	b	aspec	tion L	.evel 2	2 📿	]	I	eve	el 3 🗌	τ	Inderwate	r []]]
	Con	nponent L	ocat	ion		Test I	etails	<b>1</b>	est Res (mm)	sults )						Comme	1(5
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itio n		ent	Numbe				ion ther)		e Age is		med	n State					
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¢	P3	P4	56	400	т	16	н	400		0	0	1					
0	S4	G 1	22	500	E1	16	н	400	100	0	20	2					
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0	S4	G 2	22	470	E1	16	н	330	140		30	3					
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S	ructur	e Id		70108	3					Nan	ne	Dal	ryn	aple (	Creek						
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to our and analyzed	Com	ponent L	ocat	ion		Test E	<b>Details</b>	Т	est Res (mm)	ults )							0	comme	ents		
Modification	Group	Component	Standard Number	Diameter (mm)	Location	Diameter	Orientation (H, V, Other)	Solid	Rot	Pipe	% Consumed	Condition State	Undersize						-		
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0	A2	P1	56	400	т	16	н	100		300	75	4								··	
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Level 2 Insp	ection Repo	rt - P	boto	د لا ٢٩	etches Record	B2/6	SI	ieet
		r		50.51	Cetelles Record	B2/0	1 (	)f 10
Strue	ture Id 701	08			Name Dalrymple C	reek		
Crossing	Name			A	lt. Name			
Structur	e Type Bridge				Owner 110 Wa	rwick Shi	re Council	
Construction	n Type Girder/l	Beam			District 5 Bor	der Distri	ict (Mr)	
Construction M	aterial Timber				LGA Id 110 Wa	rwick Shi	re Council	
Ins	pector Malcoln	1 J Bro	odie		Date 24-MAY-200	4		
Inspection 1	Level 2		Prog	gramme	ad [ 🗹 ]			
]	Level 3		Exc	eptiona	1 []]]	U	nderwater	
Road	Section			Sta	rt End		TDist	H
Id Descript	ion	S Cwa	yS R	PC	Dist RPC	Dist	Start	End
188L Kital Ro	ad	<u>C 1</u>	. <u>C</u>	1	2.330 1 2.	368	2.330	2.368
					<b></b>			
			Loc	ation	Description			
		, r		t l	* Deck Surface (full width	and alignm	ent)	
<b>E</b> 11. (E		icatie		onen	<ul> <li>Side view (waterway, space of the side view (waterway, space of the side of t</li></ul>	ans, piers, e er constructio	ne)	
Film/Exposure Number	Sketch No	odifi	Loup	duo	<ul> <li>Deficient Component an</li> <li>Undefined Elements</li> </ul>	d Major Del	ects	
		Σ	0	0				Iđ
Photo 1		0	AP1	AP	This shows the alignment ove	r the bridge.		1800000172
Photo 10		0	A1	ABS	This shows the under side of	the bridge at t	his location.	1800000180
Photo 11		0	S1	D1	This shows the state of the de	eck.		1800000182
Photo 12		0	P1	(OR5	This shows the state of the co	rbel.		1800000187
Photo 13		0	P1	P1	This shows the underside of t	he bridge at th	nis location.	1800000188
Photo 14		0	P1	H1	This shows the top of the pile.	,		1800000185
Photo 15		0	P1	H1	This shows the top of the pile.	,		1800000186
Photo 16		0	S1	D1	This shows the state of the de	ick.		1800000183
Photo 17		0	P2	P2	This shows the underside of t	he bridge at th	is location.	1800000189
Photo 18		0	P3	(OR1	This shows the crack in the co	orbel.		1800000190
Photo 19		0	S1	D1	This shows the state of the de	eck.		1800000184
Photo 2		0	AP1	AP	This shows the location of the	end of the br	idge.	1800000173
Photo 20		0	S4	w	This shows the debra in the c	reek.		1800000192
Photo 21		0	S4	w	This shows the debra in the c	reek.		1800000191
Photo 22		0	A2	P1	This shows the undereside of	the bridge at	this location.	1400000274
Photo 3		0	S1	K1	This shows the state of the ke	erb.		1800000177
Photo 4		0	S1	K1	This shows the state of the ke	яb.		1800000178
Photo 5		0	S1	ws	This shows the state of the D	WS.		1800000175
Photo 6		0	S1	ws	This shows the state of the D	WS.		1800000176

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Level Z msp	ection Repo	n - F	ποιο	50.3	ketches Record	B2/6	2 Of 10
Structu Inspection	re Id 7010 Date 24-MAY-	) <b>8</b> 2004	 Insj	pection	Name Dalrymple C Level 2	reek 3	derwater []
			Loe	ation	Description		
Film/Exposure Number	Sketch No	Modification	Group	Component	<ul> <li>Deck Surface (full width</li> <li>Side View (waterway, sp</li> <li>Underside (deck and pie</li> <li>Deficient Component an</li> <li>Undefined Elements</li> </ul>	and alignmen ans, piers, etc) r construction) d Major Defec	t) ts Id
Photo 7		0	AP2	AP	This shows the end of the brid	lge.	1800000179
Phote 8		0	AP1	GR1	This shows the timber guardra	ail.	1800000174
Photo 9		0	53	w	This shows the side of the brid	lge.	1800000181

evel 2 Inspection Report - Photos & Skete	ches Record	B2/6	3 Of 10
Structure Id 70108 No Inspection Date 24-MAY-2004 Inspection Lev	ame Dairymple C	reek 3 [] Und	erwater[]
Pictures Id 1400000274 Date 24-MAY-2004 Film / Exposure Number Sketch No			
Photo 22 Description This shows the undereside of the bridge at this location. Ned. Concern Number Come Code Code Code Code Code Code Code Cod			
O         A         2         P         1           Id         1800000172         Date         24-MAY-2004			
Film / Exposure Number     Sketch No       Photo 1			
Id     1800000173     Date     24-MAY-2004       Film / Exposure Number     Sketch No       Photo 2		Ð	<b>A</b>
Mod     Category     Number     Comp Code     Comp No       O     AP     1     AP			

vel 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
		4 Of 10
Structure Id70108NameDalrymple CInspection Date24-MAY-2004Inspection Level 2 ()Level	reek 3 [] Ui	nderwater()
Pictures		
Id 180000C174 Date 24-MAY-2004		
Film / Exposure Number Sketch No Photo 6	lation to	
Description This shows the timber guardrail.	1	
Mod     Category     Number     Comp Code     Comp No       O     AP     1     GR     1		- aig
Id 1800000175 Date 24-MAY-2004		-
film / Exposure Number Sketch No Phota 5		and the second
Description	17:5	1
Mod Category Number Comp Code Comp No O S 1 WS	-7	
Id 1300000176 Date 24-MAY-2004	and the second	
7ilm / Exposure Number Sketch No Photo 6		
Description This shows the state of the DWS.		and the second
Mod Category Number Comp Code Comp No O S 1 WS		

Structure Id       70108 Inspection Date       Name       Dalrymple Creek Inspection Level 2         Inspection Date       24-MAY-2004 Inspection Level 2       Level 3       Underwater         Pitures         Id       1800000177       Date       24-MAY-2004         Pitures       Description       Description         Description       Date       24-MAY-2004         Pits shows the state of the kerb.       Description         Name       1         O       1       K         Id       1800000176       Date         Pita / Exposure Number       Stateh No         Photo 3       1       K         Id       1800000176       Date         Pita / Exposure Number       Stateh No         Photo 4       Description         This shows the state of the kerb.       Description         This shows the state of the kerb.       Description         The State State of the kerb.       Description         The State State of the kerb.       Description         The State State of the kerb.       Description         The State of the kerb.       Description         The Zeposure Number       State No         Poto 7       Description	vel 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
Structure Id       7018       Name       Datrymplc Creek         Inspection Date       24-MAY-2004       Inspection Level 2       Level 3       Underwater         'itetres         Id       1800000177       Date       24-MAY-2004       Date       Date         ibis shows the state of the karb.       secretion       secretion       Date       24-MAY-2004         Id       1800000178       Date       24-MAY-2004       Date       Date       Date         Id       1800000178       Date       24-MAY-2004       Date       Date <t< th=""><th></th><th>CE C</th><th>5 Of 10</th></t<>		CE C	5 Of 10
Pictures         Id       1800000177       Date       24-MAY-2004         Ilm / Exposure Number       Sketch No         hoto 3	Structure Id70108NameDalrymple CInspection Date24-MAY-2004Inspection Level 2Level	3 [] U	nderwater
Id       1600000177       Date       24-MAY-2004         Film / Exposure Number       Sketch No         Proto 3	Pictures		
Description   This shows the state of the kerb.   Mod Category   0 S   1 K   1 1     Id 1800000178   Date 24-MAY-2004     Film / Exposure Number   Sketch No     Photo 4     Description   This shows the state of the kerb.     Mod   Category   Number   Comp Code Comp No   O   S   1   Kate     Mod   Category   Number   Sketch No     Photo 7     Mod   Category   Number   Sketch No     Photo 7     Name   Comp Code Comp No   O   S   1   Kate     Name   Sketch No     Photo 7     Name   Sketch No     Photo 7     Name   Sketch No      Photo 7     Name   Sketch No     Photo 7     Name   Sketch No     Photo 7     Name   Sketch No     Photo 7     Name     Sketch No     Photo 7     Name <th>Id 1800000177 Date 24-MAY-2004 Film / Exposure Number Sketch No</th> <th></th> <th></th>	Id 1800000177 Date 24-MAY-2004 Film / Exposure Number Sketch No		
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Mid       Category Number       Comp Code Comp No         0       S       1       K       1         Id       1800000178       Date       24-MAY-2004         Film / Exposure Number       Sketch No       Image: Sketch No       Image: Sketch No         Potot 4       Image: Sketch No       Image: Sketch No       Image: Sketch No         Potot 4       Image: Sketch No       Image: Sketch No       Image: Sketch No         Mod       Category Number       Comp Code Comp No       Image: Sketch No         Id       1800000179       Date       24-MAY-2004         Film / Exposure Number       Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Photo 7       Image: Sketch No       Image: Sketch No         Image: Sketch No       Image: Sketch No       Image: Sketch No         Image: Sketch No       Image: Sketch No       <	This shows the state of the kerb.		A PARTY OF
Id       1800000178       Date 24-MAY-2004         Film / Exposure Number       Sketch No         Photo 4	Mod     Category     Number     Comp Code     Comp No       O     S     1     K     1		
Photo 4   Description   This shows the state of the kerb.   Mod   Category Number   Comp Code   Comp No   Comp Code   Comp No   Comp Code   Comp No   Comp Code   Comp No   Comp Code   Comp No   Comp Code   Comp Code   Comp No   Comp Code   Comp Code   Comp No   Comp Code   Comp Code   Comp No   Comp Code   Comp Code   Comp No   Comp Code   Comp Code   Comp Code   Comp No <td< td=""><td>Id 1800000178 Date 24-MAY-2004</td><td></td><td></td></td<>	Id 1800000178 Date 24-MAY-2004		
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Description       This shows the end of the bridge.       Mod     Category Number       O     AP       2     AP	Id     1800000179     Date     24-MAY-2004       Film / Exposure Number     Sketch No       Photo 7	i.	
Mod     Category Number     Comp Code     Comp No       O     AP     2     AP	Description		
Mod     Category     Number     Comp Code     Comp No       O     AP     2     AP	This shows the end of the bridge.		
	Mod     Category     Number     Comp Code     Comp No       O     AP     2     AP	yas.	. d

evel 2 Inspect	tion Report - Ph	otos & Sketches Rec	ord B2/6	Sheet
in a mopoor		ieros a orietories ivec		6 Of 10
Structure Inspection Da	Id 70108 te 24-MAY-2004	Name Dalryr Inspection Level 2	nple Creek Level 3 [] Und	lerwater
Pictures				
Id 1800000	180 Date 24-MAY-	2004		
Film / Exposure Num Photo 10	ber Sketch No			
Description		The second second second second second second second second second second second second second second second s		_
This shows the unde	r side of the bridge at this	location.		-
Mod Category Nur	nber         Comp Code         Comp           1         ABS	No	1-1	and the second
Id 18000001 Film / Exposure Numl Photo 9 Description This shows the side of Mod Category Nur O S	B1     Date     24-MAY-       ber     Sketch No       of the bridge.       aber     Comp Code Comp       3     W	2004		
Id 18000001 Film / Exposure Numl	82 Date 24-MAY- ber Sketch No	2004		
Photo II			Contraction of Contraction	and the second se
This shows the state	of the deck.		STATE A	the state
Mod Category Nur O S	nber Comp Code Comp 1 D 1	No		

el 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
		7 Of 10
Structure Id70108NameDalrymple CInspection Date24-MAY-2004Inspection Level 22	reek 3 [] U	nderwater
lictures		
Id 1800000183 Date 24-MAY-2004	Sec.	
hoto 16	CALL AND ADDRESS	Contraction of the second
escription	The second second	
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ilm / Exposure Number Sketch No hoto 19	Service Party	2 Enter
escription		
his shows the state of the deck.		13 10
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escription his shows the top of the pile.	The second	
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		a China and China and China and China and China and China and China and China and China and China and China and

vel 2 Inspection Report - Photos & Sketches Record	B2/6	Sheet
		8 OF 10
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Pictures		
Id 1800000186 Date 24-MAY-2004	BALLET STRONG	0.07
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lacarintian		
his shows the top of the pile.		1 y
And     Category     Number     Comp Code     Comp No       O     P     1     H     1	-	
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Photo 12		the second second
Description	N/N=	
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Iod     Category     Number     Comp Code     Comp No       O     P     1     COR     5		
Id 1800000188 Date 24-MAY-2004	Parata	
film / Exposure Number Sketch No		F
Description This shows the underside of the bridge at this location.		
Ind     Category     Number     Comp Code     Comp No       O     P     1     P     1		
		72

Structure Id       70108       Name Dahymple Creek         Inspection Date       24-MAY-2004       Inspection Level 2 :: Level 3 :: Underwater:::         Id       1800000189       Date       24-MAY-2004         inspection       Sketch No       Inspection       Inspection         is shows the underside of the bridge at this location:       Impection       Impection       Impection         id       1800000190       Date       24-MAY-2004       Impection       Impection         id       1800000190       Date       24-MAY-2004       Impection       Impection         id       1800000190       Date       24-MAY-2004       Impection       Impection       Impection         id       1800000190       Date       24-MAY-2004       Impection       Impect	vel 2 Inspection Report - Photos & Sketches Rec	ord B2/6	Sheet
Structure Id 7018   Inspection Date 24-MAY-2004   Inspection Level 2 Level 3     Id 1800000189   Date 24-MAY-2004   Into Forgen Number Sketch No   nolo 17			9 Of 10
Id 100000199 Date 24-MAY-2004   Im / Exposure Number Sected No   O P P P	Structure Id70108NameDalrynInspection Date24-MAY-2004Inspection Level 2	nple Creek Level 3 [] Un	derwater
If       180000189       Date 24-MAY-2004         Im / Exposure Number       Sketch No         noio 17	lictures		
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escription   in shows the underside of the bridge at this location.   o P   o P   c Sected No   o P   c Conp Code Comp No   o P   c Conp Code Comp No   o P   c Conp Code Comp No   o S   d Category Number   secription   is shows the debra in the creek.   od Category Number Comp Code Comp No   o S   d W	Im / Exposure Number Sketch No hoto 17		A REAL PROPERTY AND
It is shows the underside of the bridge at this location.   o P   o P   2 P     1d 1800000190   Date 24-MAY-2004   Im/ Exposure Number Sketch No   od Category Number   Softmin Softmin   is shows the crack in the corbel. Im/ Exposure Number   od Category Number   Con 1     is shows the debra in the creek.   od Category Number   od S   d Category Number   Sketch No   olo 21   scription   is shows the debra in the creek.   od Category Number   od Category Number   Sketch No   olo 21   scription   is shows the debra in the creek.   od   od   Category Number   Comp Code Comp No   O   S   d   Category Number   Comp Code Comp No   O   S   d   M   S   M   V	escription II II II II II II II II II II II II II		11
od Category Number Comp C	his shows the underside of the bridge at this location.	the Known	/ main
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Structure Id       70108       Name       Dalrympic Creek         Inspection Date       24-MAX-2004       Inspection Level 2 [2]       Level 3 []]       Underwater []]         etures       Id       180000192       Date       24-MAY-2004       Inspection Level 2 [2]       Level 3 []]       Underwater []]         in / Exposure Number       Sketch No       010 20       Inspection Composition       Inspectio	ucture Id       70108       Name       Dalrymple Creek         tion Date       24-MAY-2004       Inspection Level 2       Level 3       Underwater         180000192       Date       24-MAY-2004       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         are Number       Sketch No       Inspection Level 2       Date 21-MAY-2004         Bary Number       Comp Code Comp No       Date 24-MAY-2004       Date 24-MAY-2004         Bary Number       Comp Code Comp No       Date 24-MAY-2004       Date 24-MAY-2004         Bary Number       Comp Code Comp No       Date 24-MAY-2004       Date 24-MAY-2004         Bary Number       Comp Code Comp No       Date 24-MAY-2004       Date 24-MAY-2004         Bary Number       Comp Code Comp No       Date 24-MAY-2004       Date 24-MAY-2004         Bary Number       Comp Code Comp No       <
Structure Id       70108       Name       Dairymple Creek         Inspection Date       24-MAY-2004       Inspection Level 2       Level 3       Underwater         etures         Id       1800000192       Date       24-MAY-2004       Date       Date         id       1800000192       Date       24-MAY-2004       Date       Date       Date         is stores       Stetch No       Date       24-MAY-2004       Date       Date <t< th=""><th>uttre Id       70108       Name Dalrymple Creek         finn Date       24-MAY-2004       Inspection Level 2       Level 3       Underwater         1800000192       Date 24-MAY-2004       Inspection Level 2       Inspection Level 3       Underwater         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         18000000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         18000000000000000000000000000000000000</th></t<>	uttre Id       70108       Name Dalrymple Creek         finn Date       24-MAY-2004       Inspection Level 2       Level 3       Underwater         1800000192       Date 24-MAY-2004       Inspection Level 2       Inspection Level 3       Underwater         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         18000000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         1800000192       Date 24-MAY-2004       Inspection Level 3       Inspection Level 3       Inspection Level 3         18000000000000000000000000000000000000
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etures	1800000192       Date       24-MAY-2004         number       Sketch No         the debra in the creek.         20000       The comp Code Comp No         2       A
tures	1800000192       Date 24-MAY-2004         nare Number       Sketch No         the debra in the creek.       Image: Comp Code Comp No         a       M
tures	180000192       Date 24-MAY-2004         sure Number       Sketch No         the debra in the creek.       Image: Comp Code Comp No         gry Number       Comp Code Code Code Code Code Code Code Code
Id       1800000192       Date 24-MAY-2004         mr / Exposure Number       Sketch No         olo 20       seription         seription       sishows the dobra in the creek.         d       Category Number       Comp Code Comp No         D       S       4         W       Output       Seription         Sishows the dobra in the creek.       Seriet Comp Code Comp No         D       S       4         W       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Comp Code Comp No         Seriet Comp Code Comp No       Seriet Code Code Comp No         Seriet Code Code Code Code Code Code Code Code	180000192       Date 24-MAY-2004         sure Number       Sketch No         the debra in the creek.       gay Number Comp Code Comp No         3       4       W
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scription         is shows the dobra in the creek.         ad       Category Number Comp Code Comp No         b       s         d       Television         d       Category Number Comp Code Comp No         b       s         d       Television         d       Category Number Comp Code Comp No         D       s         d       W	
stripion           a         category Number Comp Code Comp No           b         a         d	the debra in the creek.         a       a         b       d        <
is shows the debra in the freek.	
d       Category Number       Comp Code Comp No         N       N	gory       Number       Comp Code Comp No         3       4       W



## APPENDIX D – LAYOUT AND LONG SECTION LOW FLOW FLOODWAY KITAL ROAD



#### Nathan Walter

# APPENDIX E – ESTIMATE FOR LOW FLOW FLOODWAY

Activity No.		Unit	Amount	Quantity	Rate	Amount ¢	
801	Site Establishment		Amount		3	3	
	Other simples with an electric and hold any shed and the						
	Setup signage, site container and hold pre start meeting						
	Labour						
	Forman + Ute	/hr	8.06	2	\$ 48.20	\$ 388.49	
	Seconded supervisor will assist with the construction of the concrete						
	deck and pipe installation						
	Ganger + Ute	/hr	8.06	1	\$ 40.01	\$ 322.48	
	l abour	/hr	8.06	2	\$ 27.58	\$ 444.59	
			0.00				
	<u>Plant</u>						
	Excavator + Operator	/hr		1	\$ 128.00	s -	
	Truck 12t	/hr		2	\$ 86.00		
					00.00		
	Prime mover and Low Loader + Operator	/hr	8.06	2	144.9	\$ 2,335.78	
	<u>Materials</u>						
	Security Fencing	/day	50		50	\$ 2,500.00	
	Cite container	(day)	50		E 50.00	S 2 500 00	
	Site container	/day	50		\$ 50.00	\$ 2,500.00	
	Toilet	/day	50		\$ 50.00	\$ 2,500.00	
			Sub Tota	al Cost Site	set up & pack up	\$ 10,991.34	
803	Survey/Setup & Design						
	Locate sevices, peg out control line and establish cut area						
	l abour					2	
	Forman + Ute	/hr	16.12	2	\$ 48.20	\$ 1,553.97	
	Ganger + Ute	/hr	16.12	1	\$ 40.01	\$ 644.96	
	l abour	/hr	16 12	2	\$ 27.58	\$ 889.18	
			10.12	_	¢ 21.50	000.10	
	Materials						
	Survey Pegs & Paint	item			\$200	\$200	
				Sub 1	fotal Cost Set out	\$ 3 288 11	
						• -,	
<u>822</u>	Demolition of Existing Bridge	1					
	(to be complete 1 week before start of works)						
	Quotes for the demontor of the extisting bruge where called December 2000.						
	Ironbark Demolition Dty Ltd (Choopport option)	itom			\$11,750	5 \$11,750	
	nonbark Demontion Pty Ltd (Cheaperst Option)	item			911,750	\$11,750	
	Burk Industries Pty Ltd	item			\$12,800		
		Sub T	otal Cost D	emolition o	of Existing Bridge	\$11,750	
	LOWFLOW FLOODWAY						
<u>820</u>	Remove & Stock Pile Existing Top Soil - Unit rate of \$12.5 per m3						
	Tan 100mm of tan apil shall be removed from the parthworks aits and Stock piled						
	Topsoil shall be respred over excavation site after bulk earthworks site and stock piled						
	300m <sup>3</sup> of to soil to be removed						
	Labour					2	
	Forman + Ute	/hr	16.12	1	\$ 48.20	\$ 776.98	
	Ganger + Ute	/hr		1	\$ 40.01	<b>b</b> -	
	Labour	/hr		2	\$ 27.58	\$-	
	Plant						
	Excavator + Operator	/hr	16.12	1	\$ 128.00	\$ 2,063.36	
	Truck 12t	/hr	16.12	1	\$ 86.00	\$ 1,386.32	
						s .	
	Sub Tota	al Cost	Remove &	Stock Pile	Existing Top Soil	\$ 4,226.66	

<u>805</u>	Install Erosion & Sediment Control						
	Silt socks shall be installed on all exposed soil						
	All stockpiles shall be protected by silt fencing						
	Labour					4	
	Forman + Ute	/hr		1	\$ 48.20	\$ -	
	Ganger + Ute	/hr	32.24	1	\$ 40.01	\$ 1,289.92	
	Labour	/hr	32.24	2	\$ 27.58	\$ 1,778.36	
	<u>Plant</u>						
	Mini Excavator + Operator contractor	/hr	16.12	1	\$ 80.00	\$ 1,289.60	
	Materials						
	Cill Engeling	item			¢ 200.00	¢ 200.00	
	Sit Fencing	item			\$ 200.00	\$ -	
	Silt Sock	/m		50	\$ 10.00	\$ 500.00	
	Sub	Total C	ost Install	Erosion &	Sediment Control	\$ 5,057.88	
820	(Material to be stock piled onsite or given away to surrounding property owners)						
	Total cut 3525m3						
	Use two12t trucks						
	30 loads per day per tuck						
	240m3 per truck per day						
	Unit rate of \$12 per m <sup>3</sup>						
	<u>Labour</u>					15	
	Forman + Ute	/hr	120.9	1	\$ 48.20	\$ 5.827.38	
	Congos I lito	/br	120.0	1	¢ 40.01	¢ 4 027 01	
	Ganger + Ote	/11	120.9		a 40.01	\$ 4,037.21	
	Labour	/hr	120.9	2	\$ 27.58	\$ 6,668.84	
	<u>Plant</u>						
	Excavator + Operator	/hr	120.9	1	\$ 128.00	\$ 15,475.20 \$	
	Body Truck 12t	/hr	120.9	2	\$ 86.00	\$ 20,794.80	
	Loader + operator (Maintain stock pile)	/hr	32.24	1	\$ 101.40		
	Materials						
		Sub	Total Cos	t Excavatio	on of Approaches	\$ 53,603.43	
<u>810</u>	Diversion of Flow & Coffer Dam						
	(install small coffer dam upstream)						
	Pump must be fited with suction protector						
	Labour					1	
	Forman + Ute	/hr	8.06	1	\$ 48.20	\$ 388.49	
	Ganger + Ute	/hr	8.06	1	\$ 40.01	\$ 322.48	
	Labour	/hr	8.06	2	\$ 27.58	\$ 444.59	
	<u>Plant</u>						
	Excavator + Operator	/hr	8.06	1	\$ 128.00	\$ 1.031.68	
	Materials					\$ - \$ -	
					e 450.00	\$ - 7 - 7 - 00 - 00	
	Pump & noses (way require pump to dewater constition area 6inch)	item	50		ຈ 150.00	a 7,500.00	
			Sub	Total Cost	Diversion of Flow	\$ 9,687.24	

#### ENG4111/4112

	Supply Lay & Install Twin 2100 Pipes						
-	Labour					4	
	Forman + Ute	/hr	32.24	2	\$ 48.20	\$ 3,107.94	
	Ganger + Ute	/hr	32.24	1	\$ 40.01	\$ 1,289.92	
	Labour	/hr	32.24	3	\$ 27.58	\$ 2 667 54	
	Diast		02.21	, i	· 21.00	2,001.01	
	12 Truck & dog + Operator	/nr	32.24	2	\$ 137.02	\$ 8,835.05	
	Excavator + Operator	/hr	32.24	1	\$ 128.00	\$ 4,126.72	
	WackerPac	/hr	32.24	2	\$ 10.00	\$ 644.80	
	CRANE Materials	hr	12	1	\$ 321.00	\$ 3,853.00	
	Crusher Dust (hedding)	/t		25	\$ 12.00	\$ 300.00	
	2100 v 2 44 Elush alass 2 ( thisk well)	100		14 64	¢ 744.00	s 10,903,16	
		/m		14.04	3 744.00	5 10,032.10	
	2100 Headwalls class 2 ( 1:2 Embankment twin cell)	eacn		2	\$ 7,960.00	\$ 15,920.00	
	Stabilized back fill	/t		50	\$ 20.00	\$ 1,000.00	
	Sub To	otal Cos	t Supply L	ay & Instal	I Twin 2100 Pipes	<b>\$</b> 52,637.13	
<u>820</u>	Place & Compact fill						
	Total fill requred 326m <sup>3</sup>						
	Fill shall be compacted in 300mm layers						
	<u>Labour</u>					3	
	Forman + Ute	/hr	24.18	2	\$ 48.20	\$ 2,330.95 \$	
	Ganger + Ute	/hr	24.18	1	\$ 40.01	\$ 967.44 \$ -	
	Labour	/hr	24.18	3	\$ 27.58	\$ 2,000.65	
	Plant						
	Excavator + Operator	/hr	24.18	1	\$ 128.00	\$ 3,095.04	
	12 Truck & dog + Operator	/hr	24.18	2	\$ 137.02	\$ 6,626.29	
	WackerPac	/hr	24.18	2	\$ 10.00	\$ 483.60	
	Water cart + Operator	/hr	24.18	1	\$ 32.24	\$ 779.56	
	Pallar /Pad faat) + Oparatar	/hr	24.18	1	s 88.80	\$ 2.149.36	
		/111	24.10		00.05	U 2,143.30	
	<u>Materials</u>						
			Sub Tot	al Cost Pla	ce & Compact fill	<b>\$</b> 18,432.90	
830	Supply & Construction of Concert Deck 56m3 @ \$377/m3						
<u>830</u>	Supply & Construction of Concert Deck 56m3 @ \$372/m3					4	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour		20.04		c 10.00	4	
<u>830</u>	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute	/hr	32.24	2	\$ 48.20	4 \$ 3,107.94	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute	/hr /hr	32.24 32.24	2	\$ 48.20 \$ 40.01	4 \$ 3,107.94 \$ 2,579.84	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour	/hr /hr /hr	32.24 32.24 32.24	2 2 3	\$ 48.20 \$ 40.01 \$ 27.58	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant	/hr /hr /hr	32.24 32.24 32.24	2233	\$ 48.20 \$ 40.01 \$ 27.58	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump	/hr /hr /hr	32.24 32.24 32.24 16.12	2 2 3	\$ 48 20 \$ 40.01 \$ 27.58 \$ 200.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour <u>Plant</u> Concrete Pump <u>Materials</u>	/hr /hr /hr	32.24 32.24 32.24 16.12	22	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump <u>Materials</u> Concrete	/hr /hr /hr /hr	32.24 32.24 32.24 16.12	2 2 3 1 27	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh	/hr /hr /hr /hr /m3 /sheet	32.24 32.24 32.24 16.12	2 2 3 1 1 27 12	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork	/hr /hr /hr /m3 /sheet /m	32.24 32.24 32.24 16.12	2 2 3 1 2 7 12 66	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 10.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork	/hr /hr /hr /m3 /sheet /m	32.24 32.24 32.24 16.12	2 2 3 1 27 12 66	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 10.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tota	/hr /hr /hr /m3 /sheet /m	32 24 32 24 32 24 16.12 16.12	2 2 3 1 27 12 66 500struction	\$         48.20           \$         40.01           \$         27.58           \$         200.00           \$         270.00           \$         150.00           \$         10.00           \$         10.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32	
810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete hatters	/hr /hr /hr /m3 /sheet /m il Cost	32 24 32 24 32 24 16.12 16.12	2 2 3 1 27 12 66 500struction	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 270.00 \$ 150.00 \$ 10.00 h of Concert Deck	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete batters Labour Labour	/hr /hr /hr /m3 /sheet /m I Cost	32.24 32.24 32.24 16.12 Supply & C	2 2 3 1 27 12 66	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 10.00 • of Concert Deck	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32	
<u>830</u>	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete batters Labour Formor / Ute	/hr /hr /hr /m3 /sheet /m I Cost	32.24 32.24 32.24 16.12 Supply & C	2 2 3 1 27 12 66 <b>Construction</b>	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 <b>a of Concert Deck</b>	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 \$ 21,329.32	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete batters Labour Forman + Ute Forman + Ute	/hr /hr /hr /m3 /sheet /m I Cost	32.24 32.24 16.12 Supply & C	2 2 3 1 27 12 66 <b>Construction</b>	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 <b>a of Concert Deck</b>	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 \$ 21,329.32 \$ 1,553.97 \$ .	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Ganger + Ute	/hr /hr /hr /m3 /sheet /m I Cost	32.24 32.24 16.12 Supply & C 16.12 16.12	2 2 3 1 27 12 66 construction 2 2 2	\$ 48 20 \$ 40 01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 <b>a of Concert Deck</b> \$ 48 20 \$ 40.01	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 \$ 21,329.32 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,289.92	
830	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tote Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Ganger + Ute Labour	/hr /hr /hr /m3 /sheet /m il Cost /hr /hr	32.24 32.24 32.24 16.12 Supply & C 16.12 16.12 16.12 16.12	2 2 3 1 27 12 66 construction 2 2 2 2 3	\$ 48.20 \$ 27.58 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 <b>a of Concert Deck</b> \$ 48.20 \$ 40.01 \$ 27.58	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 \$ 21,329.32 \$ 1,553.97 \$ 1,289.92 \$ 1,333.77	
<u>830</u>	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tota Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Ganger + Ute Labour Plant	/hr /hr /hr /m3 /sheet /m I Cost /hr /hr	32.24 32.24 32.24 16.12 Supply & C 16.12 16.12 16.12	2 2 3 1 27 12 66 construction 2 2 2 3	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 <b>a of Concert Deck</b> \$ 48.20 \$ 40.01 \$ 27.58	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 2 \$ 1,553.97 \$ 1,289.92 \$ 1,333.77	
830 810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tote Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Concrete Pump Concrete Pump Concrete Pump Concrete Pump Concrete Pump Concrete Pump Concrete Pump	/hr /hr /hr /m3 /sheet /m I Cost /hr /hr /hr	32.24 32.24 32.24 16.12 5upply & C 16.12 16.12 16.12 16.12	2 2 3 1 27 12 66 5 onstruction 2 2 2 3 3	\$ 48 20 \$ 40 01 \$ 27.58 \$ 200 00 \$ 270 00 \$ 150 00 \$ 150 00 \$ 10 00 <b>a of Concert Deck</b> \$ 48 20 \$ 40.01 \$ 27.58 \$ 170.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 7,290.00 \$ 1,800.00 \$ 21,329.32 \$ 21,329.32 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,333.77 \$ 1,333.77 \$ 2,740.40	
810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tote Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Materials	/hr /hr /hr /m3 /sheet /m I Cost /hr /hr /hr	32.24 32.24 32.24 16.12 5upply & C 16.12 16.12 16.12 16.12	2 2 3 1 27 12 66 500struction 2 2 2 2 3 3	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 10.00 \$ 10.00 \$ 48.20 \$ 40.01 \$ 27.58 \$ 170.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 7,290.00 \$ 1,800.00 \$ 7,290.00 \$ 21,329.32 \$ 21,329.32 2 2 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,333.77 \$ 2,740.40	
<u>830</u>	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tota Sub Tota Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Pump	/hr /hr /hr /m3 /sheet /m /hr /hr /hr /hr /hr	32.24 32.24 32.24 16.12 5upply & C 16.12 16.12 16.12 16.12	2 2 3 1 27 12 66 66 66 22 2 2 3 1 1 5	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 \$ 10.00 \$ 40.01 \$ 27.58 \$ 40.01 \$ 27.58 \$ 170.00 \$ 27.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 660.00 \$ 21,329.32 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,333.77 \$ 2,740.40 \$ 3,105.00	
830 830 810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tote Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Mesh	/hr /hr /hr /m3 /sheet /m /hr /hr /hr /hr /hr /m3 /sheet	32.24 32.24 32.24 16.12 5upply & C 16.12 16.12 16.12 16.12	2 2 3 1 27 12 66 66 66 22 2 2 3 1 1 5 14	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 \$ 40.01 \$ 27.58 \$ 40.01 \$ 27.58 \$ 170.00 \$ 27.58	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 7,290.00 \$ 7,290.00 \$ 7,290.00 \$ 1,800.00 \$ 660.00 \$ 21,329.32 2 2 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,289.92 \$ 1,333.77 \$ 2,740.40 \$ 3,105.00 \$ 2,111.20	
830 810 810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Sub Tote Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Mesh Shot Crete Pump	/hr /hr /m3 /sheet /m /hr /hr /hr /hr /hr /hr /hr	32.24 32.24 32.24 16.12 5upply & C 16.12 16.12 16.12 16.12	22 23 11 27 12 66 60 22 2 2 3 3 11 15 14	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 \$ 48.20 \$ 40.01 \$ 27.58 \$ 27.58 \$ 170.00 \$ 27.58 \$ 207.00 \$ 207.00 \$ 200.00	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 1,800.00 \$ 7,290.00 \$ 1,800.00 \$ 21,329.32 \$ 21,329.32 \$ 1,553.97 \$ 1,289.92 \$ 1,289.92 \$ 1,289.92 \$ 1,333.77 \$ 2,740.40 \$ 3,105.00 \$ 2,111.20 \$ 2,111.20	
810	Supply & Construction of Concert Deck 56m3 @ \$372/m3 Labour Forman + Ute Ganger + Ute Labour Plant Concrete Pump Materials Concrete Mesh Formwork Supply & Construct Concrete batters Labour Forman + Ute Ganger + Ute Labour Forman + Ute Concrete Pump Materials Concrete Pump Materials Concrete Pump Materials Concrete Mesh Shot Crete Pump	/hr /hr /m3 /sheet /m il Cost /hr /hr /hr /hr /hr /hr /hr /hr	32.24 32.24 32.24 16.12 16.12 16.12 16.12 16.12 16.12 16.12 16.12	22 23 11 27 12 66 5005truction 22 22 23 3 11 15 14 15 14 1	\$ 48.20 \$ 40.01 \$ 27.58 \$ 200.00 \$ 270.00 \$ 150.00 \$ 150.00 \$ 10.00 \$ 10.00 \$ 27.58 \$ 48.20 \$ 40.01 \$ 27.58 \$ 27.58 \$ 170.00 \$ 27.58 \$ 200.00 \$ 200.0	4 \$ 3,107.94 \$ 2,579.84 \$ 2,667.54 \$ 3,224.00 \$ 7,290.00 \$ 7,290.00 \$ 7,290.00 \$ 1,800.00 \$ 7,290.00 \$ 1,800.00 \$ 21,329.32 \$ 21,329.32 \$ 21,329.32 \$ 2,329.32 \$ 2,329.32 \$ 2,329.32 \$ 2,329.32 \$ 2,329.32 \$ 3,105.00 \$ 2,111.20 \$ 2,015.00 \$ 2,015.00 \$ 2,015.00	

<u>810</u>	Construct Concrete cut off Wall						
	Labour					2	
	Forman + Ute	/hr	16.12	2	\$ 48.20	\$ 1,553.97	
	Ganger + Ute	/hr	16.12	2	\$ 40.01	\$ 1.289.92	
	l abour	/hr	16.12	3	\$ 27.58	\$ 1333.77	
		/111	10.12	5	ψ 21.30	φ 1,555.11	
	<u>Plant</u>						
	Concrete Pump	/hr	16.12	1	\$ 170.00	\$ 2,740.40	
	Materials						
	Concrete	/m3		9	\$ 207.00	\$ 1,863.00	
	Mesh	/sheet		2	\$ 150.80	\$ 301.60	
		Sub Tot	al Cost Co	nstruct Con	crete cut off Wall	\$ 9,082.66	
905	Supply & install rock prosion protection						
005						2	
	Labour					3	
	Forman + Ute	/hr	24.18	2	\$ 48.20	\$ 2,330.95 \$ -	
	Ganger + Ute	/hr	24.18	1	\$ 40.01	\$ 967.44	
	Labour	/hr	24.18	3	\$ 27.58	\$ 2,000.65	
	Plant						
	12 Truck & dog + Operator	/hr	24.18	2	\$ 137.02	\$ 6,626.29	
	Excavator + Operator	/hr	24 18	1	\$ 128.00	\$ 3 095 04	
	Materials	. 			.20.00	5,000.04	
	Grass Seed	each		10	ະ <b>ວ</b> 15.00	ə 150.00	
	Rock	/m3		50	30	\$ 1,500.00	
	Concrete	/m3		50	\$ 207.00	\$ 10,350.00	
	Sub Total	Cost S	upply & ins	stall rock e	rosion protection	\$ 27,020.37	
	APPROACH ROADWOKS						
830	Formation of approaches						
000						2	
						2	
	Forman + Ute	/hr	16.12	1	\$ 48.20	\$ 776.98 \$ -	
	Ganger + Ute	/hr	16.12	1	\$ 40.01	\$ 644.96 \$ -	
	Labour	/hr	16.12	2	\$ 27.58	\$ 889.18	
	<u>Plant</u>						
	Grader + Operator	/hr	16.12	1	\$ 123.81	\$ 1,995.82	
	Roller (Multi) + Operator	/hr	16.12	0.5	\$ 95.39	\$ 768.84	
	Roller (pad foot) + Operator (18t< if possible)	/hr	16.12	0.5	\$ 88.89	\$ 716.45	
	Water eart + Operator	/br	16.12	1	¢ 22.24	¢ 519.71	
			10.12		JZ.24	\$ 515.71	
	12t Truck & dog + Operator ( 5 trucks, 1 days two loads each) \$11/ton	/nr	4.03	5	\$ 137.02	\$ 2,760.95	
	Materials						
	Type 2.1 (150 x 6m wide box out)	/t		250	\$ 12.00	\$ 3,000,00	
		ľ.		200	12.00	5,000.00	
						AD 070 00	
		Su	u Total Co	st Formatic	on of approaches	ə 12,072.90	
<u>840</u>	Seal of approaches 360m2 @ \$18.40/m2						
	<u>Labour</u>					1	
	Forman + Ute	/hr	8.06	1	\$ 48.20	\$ 388.49	
	Ganger + Ute	/hr	8.06	1	\$ 40.01	a - \$ 322.48	
	Labour	/hr	8.06	2	\$ 27.58	\$ - \$ 444.59	
	Plant						
	19 Tauk	(h-	0.00		e 407.00	e	
		/11	8.06	1	a 137.02	a 1,104.38	
	Roller (Multı) + Operator	/hr	16.12	0.5	\$ 95.39	\$ 768.84	
	Materials \$8/m2						
	Ritumon	1		1675	¢ 100	\$ 2,002,50	
		/L		15/5	1.90	ψ 2,332.50	
	IUmm	/t		18	s 17.00	ъ 306.00	
	14mm	/t		18	\$ 17.00	\$ 306.00	
			Sub To	tal Cost So	al of approaches	\$ 6.633.20	
			the second second second second second second second second second second second second second second second se		and a second secon	0.033.63	

<u>830</u>	Table drain protection								
	Labour							1	
	Forman + Ute	/hr	8.06	1	\$	48.20	\$ ¢	388.49	
	Ganger + Ute	/hr	8.06	1	\$	40.01	\$ \$	322.48	
				_	_		\$	-	
	Labour	/hr	8.06	2	\$	27.58	\$	444.59	
	<u>Plant</u>								
	Materials								
							_		
	Grass Seed	kg		10	\$	15.00	\$	150.00	
			Sub Total	Cost Table	drai	n protection	\$	1,305.56	
<u>851</u>	Install signage & reinstate property fencing								
	Labour							1	
	Forman + Ute	/hr	8.06	1	\$	48.20	\$	388.49	
	Ganger + Ute	/hr	8.06	1	\$	40.01	\$ \$	322.48	
	Labour	/hr	8.06	2	\$	27.58	\$ \$	- 444.59	
	Materials								
	Fencing	item			\$	2.000.00	s	2.000.00	
							-		
	Signs	item			\$	1,500.00	\$	1,500.00	
		Sub To	tal Install G	iuide Posts	& In	stall signage	\$	4,655.56	
					Sub	Total GST ex	\$	265,923.62	
	CONTINGENCES								
<u>852</u>	Contingencies								
	Contingencies 20%				\$	0.20	\$	53,184.72	
		1	1			Sub Total	\$	319,108.34	
	GST 10%	item				0.1	\$	31,910.83	
		Tot	al Cost of J	lob In Cont	inge	ncies & GST	\$	351,019.17	





## **APPENDIX G – ESTIMATE LOW LEVEL CROSSING**

ity No		Unit	Amount	Quantity	Rate	Amount	
	Site Establishment		Amount		•	•	
	Setup signage, site container and hold pre start meeting						
	Labour						
	Forman + Ute	/hr		1	\$ 48.20	<b>\$</b> -	
	Seconded supervisor will assist with the construction of the concrete deck and pipe installation						
	Ganger + Ute	/hr		1	\$ 40.01	<b>\$</b> -	
	Labour	/hr		2	\$ 27.58	<b>\$</b> -	
	Plant						
	Excavator + Operator	/hr		1	\$ 128.00	s -	
	Truck 12t	/hr		2	\$ 86.00		
	Prime meuer and Low Loader L Operator	/hr		2	144.0	¢ 0.025.70	
		/nr		2	144.9	a 2,335.70	
1	Materials						
	Security Fencing	/day	20		50	\$ 1,000.00	
	Site container	/day	20		\$ 50.00	\$ 1,000.00	-
	Toilet	/day	20		\$ 50.00	\$ 1,000.00	
			Sub Total	Cost Site	set up & pack up	\$ 5,335.78	
-	Survey/Setup & Design						
	Locate services, peg out control line and establish cut area					1	
;	Labour						
	Forman + Ute	/hr	4.03	1	\$ 48.20	\$ 194.25	
	Ganger + Ute	/hr	4.03	1	\$ 40.01	\$ 161.24	
	Labour	/hr	4.03	2	\$ 27.58	\$ 222.29	
	Materials						
	Survey Pegs & Paint	item			\$100	\$100	
				Sub	Total Cost Set out	<b>\$</b> 677.78	
	Demolition of Existing Bridge	1					
	(to be complete 1 week before start of works) Quotes for the demolition of the existing bridge where called December 2008						
						5	
	Ironbark Demolition Pty Ltd (Cheapest option) confirmed with Ironbark quote	item			\$11,750	\$11,750	
	Burk Industries Pty Ltd	item			\$12,800		
		Sub Tot	tal Cost De	molition (	of Existing Bridge	<b>\$</b> 11,750	
	Remove & Stock Pile Existing Top Soil - Unit rate of \$12.5 per m3						
	Top 100mm of top soil shall be removed from the earthworks site and Stock piled Topsoil shall be respread over excavation site after bulk earthworks is complete						
	Labour					2	
	Enrman + 1 Ite	/hr		1	\$ 48.20	s .	
	Gangar + I Ita	/hr			\$ 40.04	- د د	
		/111			ψ 40.01	ч - с	
	Labour	/nr		2	ə 27.58	ə -	
	Plant						
	Excavator + Operator	/hr	4.03	1	\$ 128.00	\$ 515.84	
	Truck 12t	/hr	4.03	1	\$ 86.00	\$ 346.58	
I							Į –

Silt socks shall be installed on all exposed soil					
Erosion protection shall be inspected daily					
<u>Labour</u>					
Forman + Lite	/hr		1	\$ 48.20	s -
				40.20	\$-
Sanger + Ute	/hr	8.06	1	\$ 40.01	\$ 322.4
Labour	/hr	8.06	2	\$ 27.58	\$ 444.
<u>Plant</u>					
Mini Excavator + Operator contractor	/hr	8.06	1	\$ 80.00	\$ 644.8
Materials					
Silt Fencing	item			\$ 100.00	\$ 100.0
Silt Sock	/m		20	\$ 10.00	\$ - \$ 200.0
C.	uh Tatal Ca	at la stall E		Cadimant Cantas	¢ 4 744 5
31		ist install e	TOSION &	Sediment Contro	<b>3</b> 1,711.0
Excavation of Approaches & Floodway - Unit rate of \$16.2 per m3					
(Material to be delivered to Allora dump)					
Use four 12t truck & dogs					
8 loads per day per tuck					
120m3 per truck per day Unit rate of \$16.20 per m <sup>3</sup>					
Labour					
Forman + Ute	/hr	40	1	\$ 48.20	\$ 1,928.0
Ganger + Ute	/hr	40	1	\$ 40.01	\$ 1,600.4
Labour	/hr	40	2	\$ 27.58	\$ 2,206.4
<u>Plant</u>					
Backhoe + operator	/hr	40		\$ 78.09	\$ 3,123.6
Excavator + Operator	/hr	40	1	\$ 128.00	\$ 5,120.0
Grader + Operator	/hr	40	1	\$ 123.81	\$ - \$ 4,952.4
Body Truck 12t & dog	/hr	32	4	\$ 86.00	\$ 11,008.0
Materials					
	C. h	F-4-1 C4	<b>F</b>		t 20.020.0
	Sub	lotal Cost	Excavatio	on of Approaches	\$ 29,938.8
Diversion of Flow & Coffer Dam					
(install small coffer dam upstream) Pump must be fitted with suction protector					
l abour					
Forman + 1 Ito	/br	0	4	¢ 40.00	¢
	/11	0.00		♥ 40.20	e 2004
		đ.U6	- 1	φ 40.01	ə 322.4
Labour	/hr	8.06	2	ະອັ <u></u> 27.58	\$ 444.5
<u>Plant</u>					
Excavator + Operator	/hr	8.06	1	\$ 128.00	\$ 1,031.6
Materials					\$ - \$ -
Pump & Hoses (May require nump to dewater construction area Sinch)	item	20		\$ 150.00	\$ - \$ 3,000 (
a mp a nosos (may require pump to demater construction area onicit)	itelli	20		- 150.00	5,000.0
		Sub T	otal Cost	Diversion of Flow	\$ 4,798.7

Installation of 600rcp & u/s& d/s concrete apron & cement treated fill in f	loor of cre	<u>ek</u>			
<u>Labour</u>					
Forman + Ute	/hr	40	1	\$ 48.20	\$ 1,928.0
Ganger + Ute	/hr	40	1	\$ 40.01	\$ - \$ 1,600.4
Labour	/hr	80	2	\$ 27.58	\$ - \$ 4.412.8
			_		• 1,112.0
<u>Plant</u>					
12 Truck & dog + Operator	/hr	24	1	\$ 137.02 \$ 128.00	\$ 3,288.4 \$ 5,120.0
Backhoe + operator	/hr	40		\$ 78.09	\$ 3,120.0
Roller <u>Materials</u>	hr	8	1	\$ 89.00	\$ 712.0
600RCP Rock protection u/s & d/s & creek floor other than under nines	m /m3	2.4	4	\$ 200.00 30	\$ 1,920.0 \$ 1,200.0
Cement treated gravel fill & backfill around pipes	/m3		36	80	\$ 2,880.0
lean mix in floor of creek under pipe	m3		4.2	250	\$ 1,050.0
Concrete for- floodway slab, apron & protection works	/m3		15	\$ 450.00	\$ 6,750.0
Sub Tota	al Cost Sup	oply & inst	all rock e	rosion protection	\$ 33,981.6
Supply & install rock erosion protection u/s& d/s of floodway & table dra	ins				
l abour					
	lbr	40		¢ 40.00	C 774 /
roman + Ute	/nr	16	1	ຈ 48.20	\$ //1.2 \$ -
Ganger + Ute	/hr	16	1	\$ 40.01	\$ 640. <sup>-</sup> \$ -
Labour	/hr	16	2	\$ 27.58	\$ 882.5
<u>Plant</u>					
12 Truck & dog + Operator	/hr	16	2	\$ 137.02	\$ 4,384.6
Backhoe + operator	/hr	16	1	\$ 78.09	\$ 1,248.0
Materials					
Rock	/m3		110	30	\$ 3,300 (
Concrete	/m3		10	\$ 250.00	\$ 2,500 (
		nhu 9 inst			¢ 12,300.0
300 100	ai cost sup	ргу остпы	all fock e	rosion protection	\$ 13,720.3
Formation of approaches \$24/m2					
<u>Labour</u>					3da
Forman + Ute	/hr	24	1	\$ 48.20	\$ 1,156.8 \$
Ganger + Lite			4	\$ 40.01	\$ 960.2
Canyor - Ole	/hr	24	1	φ 40.01	1.00 -
Labour	/hr /hr	24	2	\$ 27.58	\$ 1,323.8
Labour Plant	/hr /hr	24	2	\$ 27.58	\$ 1,323.8
Labour Plant Grader + Operator	/hr /hr /hr	24 24 24	2	\$ 27.58 \$ 123.81	\$ 1,323.8 \$ 2,971.4
Labour Plant Grader + Operator 12t Truck + Dog	/hr /hr /hr	24 24 24 24	1	\$ 27.58 \$ 123.81 \$ 99.90	\$ 1,323.8 \$ 2,971.4 \$ 3,196.9
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator	/hr /hr /hr /hr	24 24 24 16	1	\$ 27.58 \$ 123.81 \$ 99.90	\$ 1,323.8 \$ 2,971.4 \$ 3,196.8
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator	/hr /hr /hr /hr /hr	24 24 24 16 24	1 2 1 2 1 1 2 1 1 2 1 1 1 1 1 1 1 1 1 1	\$ 27.58 \$ 123.81 \$ 99.90 \$ 95.39	\$ 1,323.8 \$ 2,971.4 \$ 3,196.8 \$ 2,289.3
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator Materials	/hr /hr /hr /hr /hr	24 24 24 16 24	1	\$ 27.58 \$ 123.81 \$ 99.90 \$ 95.39	\$ 1,323.4 \$ 2,971.4 \$ 3,196.8 \$ 2,289.3
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator Materials	/hr /hr /hr /hr	24 24 24 16 24	1	\$ 27.58 \$ 123.81 \$ 99.90 \$ 95.39	\$ 1,323.8 \$ 2,971.4 \$ 3,196.8 \$ 2,289.3
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator Materials Type 2.1 (90m x 7x, 150) each approach pugged & cement treated	/hr /hr /hr /hr	24 24 24 16 24 24	1	\$ 27.58 \$ 27.58 \$ 123.81 \$ 99.90 \$ 95.39 \$ 95.39	\$ 1,323.8 \$ 2,971.4 \$ 3,196.8 \$ 2,289.3 \$ 3,250.0
Labour Plant Grader + Operator 12t Truck + Dog Roller (Multi) + Operator Materials Type 2.1 (90m x 7x .150) each approach pugged & cement treated	/hr /hr /hr /hr /hr /hr	24 24 24 16 24 24 250	1	\$ 27.58 \$ 123.81 \$ 99.90 \$ 95.39 \$ 13.00	\$ 1,323.8 \$ 2,971.4 \$ 3,196.8 \$ 2,289.3 \$ 3,250.0

Discourse Constant and the Add Solis C						
Bitumen Seal of approaches \$11.56/m2						
<u>Labour</u>						
Forman + Ute	/hr	8.06	1	\$ 48.20	\$	388.4
Ganger + Ute	/hr	8.06	1	\$ 40.01	\$ \$	- 322.4
Labour	/hr	8.06	2	\$ 27.58	\$ \$	- 444.5
<u>Plant</u>						
12t Truck + Dog	/hr	8.06	1	\$ 99.90	\$	805.1
Roller (Multi) + Operator	/hr	8.06	0.5	\$ 95.39	\$	384.4
Materials_						
Bitumen seal 90x7m @ 3.6l/m²	/L	2268		\$ 1.90	\$	4,309.2
10mm	/t	10		\$ 27.60	\$	276.0
14mm	/t	13		\$ 27.60	\$	358.8
		0.1.7.4	10 10			7 000 4
Install signage & reinstate property fencing						
Install signage & reinstate property fencing_ Labour						
Install signage & reinstate property fencing	/hr	8.06	1	\$ 48.20	\$	388.4
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute	/hr /hr	8.06 8.06	1	\$ 48.20 \$ 40.01	\$ \$ \$ \$	388.4
Install signage & reinstate property fencing Labour Forman + Ute Ganger + Ute Labour	/hr /hr /hr	8.06 8.06 8.06	1	\$ 48.20 \$ 40.01 \$ 27.58	\$ \$ \$ \$ \$	388.4 - 322.4 - 444.5
Install signage & reinstate property fencing Labour Forman + Ute Ganger + Ute Labour Materials	/hr /hr /hr	8.06 8.06 8.06	1	\$ 48.20 \$ 40.01 \$ 27.58	\$ \$ \$ \$ \$	388.4 - 322.4 - 444.5
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute Labour <u>Materials</u> Fencing	/hr /hr /hr item	8.06 8.06 8.06	1	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	388.4 322.4 444.5 2,000.0
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs	/hr /hr /hr item	8.06 8.06 8.06	1	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	388.4 322.4 - 444.5 2,000.0 1,500.0
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs	/hr /hr /hr item item	8.06 8.06 8.06	1 1 2 ide Posts	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 \$ 1,500.00	S S S S S S S S S S S S S S S S S S S	388.4 322.4 444.5 2,000.0 1,500.0 <b>4,655.5</b>
Install signage & reinstate property fencing Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs	/hr /hr /hr item item	8.06 8.06 8.06	1 1 2 iide Posts	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 <b>\$ 1,500.00</b> <b>\$ Install signag</b>	S S S S S S S S S S S S S S S S S S S	388.4 
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs CONTINGENCES	/hr /hr /hr item item	8.06 8.06 8.06	1 1 2 ide Posts	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b>	S S S S S S S S S S S S S S S S S S S	388.4 - 322.4 444.5 2,000.0 1,500.0 <b>4,655.5</b> <b>129,876.8</b>
Install signage & reinstate property fencing_ Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs CONTINGENCES Contingencies /Maintenance	/hr /hr /hr item item	8.06 8.06 8.06	1 1 2 ide Posts	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b> <b>\$ 1,500.00</b>	S S S S S S S S S S S S S S S S S S S	388.4 322.4 444.5 2,000.0 1,500.0 4,655.5
Install signage & reinstate property fencing. Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs CONTINGENCES Contingencies /Maintenance Contingencies 20%	/hr /hr /hr item item	8.06 8.06 8.06	1 1 2 iide Posts	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 <b>&amp; Install signage</b> Sub Total GST ex \$ 0.20	S         S           S         S	388.4 
Install signage & reinstate property fencing. Labour Forman + Ute Ganger + Ute Labour Materials Fencing Signs CONTINGENCES Contingencies /Maintenance Contingencies 20%	/hr /hr item item item	8.06 8.06 8.06	1 1 2	\$ 48.20 \$ 40.01 \$ 27.58 \$ 2,000.00 \$ 1,500.00 <b>&amp; Install signage</b> Sub Total GST e> \$ 0.20 <b>Sub Total Street</b>	S S S S S S S S S S S S S S S S S S S	388.4 322.4 444.5 2,000.0 1,500.0 4,655.5 129,876.8 25,975.3 155,852.2

### **APPENDIX H**

Capital Expenditure	Ongoing Annual		Budge	t year									Forecast y	ear			
Project name	Main	20	)11	20	)12	20	13	20	14	20	15	20	16	20	)17	20	018
	IVIGIN	Tatal Cast	Subsidy/	Tatal Oast	Subsidy/	Tatal Cast	Subsidy/	Tatal Cast	Subsidy/	Tatal Cast	Subsidy/	Tatal Cast	Subsidy/	Tatal Cas	Subsidy/	Tatal Ora	Subs
Roads & Drainage		Total Cost	i rade in	Total Cos	Trade in	Total Cost	Trade in	Total Cost	Trade In	Total Cost	Trade In	Total Cost	Trade in	Total Cos	Trade in	Total Cos	Trad
Roads Asset Maintenance		4 450 000		4 450 000		4 400 000		1 100 000		4 400 000		4 400 000		4 400 000		4 400 000	
Reseals		1,450,000		1,450,000		1,400,000		1,400,000		1,400,000		1,400,000		1,400,000		1,400,000	-
Gravel Resheeting		750,000		750,000		750,000		750,000		750,000		750,000		750,000		750,000	1
Bridges Special Maintenance		90,000		100,000		100,000		100,000		100,000		100,000	-	100,000		100,000	4
Kerb and Channel replacement		25,000	17	25,000		25,000		25,000		25,000		25,000	0	25,000		25,000	4
Upgrade Existing Unconstructed Accesses		15,000		15,000		15,000		15,000		15,000		15,000	-	15,000		15,000	1
Council Roadworks Projects																	-
Activity St reconstruction stage 2 (Warwick)		170,000									2						_
easements etc.		0															
Andreatta Lane (Pozieres) upgrade from gravel std to bitumen std						130,000								_			
Anemone St reconstruction Stage 1 (Killarney)		180,000															
Anemone St reconstruction Stage 2 (Killarney)				200,000													
Bakers Rd Floodway construction (Mt Colliery)				80,000													
Canningvale Rd widen bitumen seal (Warwick)		150,000															
Charlie Gully Rd extend bitumen seal (Upper freestone)						100,000											
Fitzroy St (Albion to Canning) rehabilitate and replace K&C (Warwick )		350,000															
Fitzroy St (Stanley Av to rail line) widen and K&C (Warwick)						100,000											-
Gibbs Lne upgrade to bitumen sealed std (Ballandean)		100,000										2					
Glen Aplin Sts bitumen seal (Glen Aplin)		80,000															
Glengallan/Ogilvie Rd stormwater		100,000															
Glenlyon/Warroo St Upgrade (Wallangarra)		100,000															
Glenvale Rd improvements (sealing high mtc areas) (Leslie Dam)				100,000													
Harslett Rd (Amiens) widen bitumen seal						100,000											
Inverleigh Rd eastern end realignment and intersection improvements								100.000									-
(Rosenthal Hts)					<i>.</i>			100,000					-				
Kingsleigh Rd extend bitumen seal (Rosenthal Heights)		-															_
Lyndhurst Lane Bridge Replacement and approaches (Rosenthal Heights)						1,000,000											
Mapes Rd rehabilitate and widen				150,000													
Marino Rd Widening (Broadwater)		170,000															
Massey Boney Mountain Rd widen and rehabilitate to Aerodrome (Massey)				200,000													
Mt Colliery Village Bitumen sealing (Mt Colliery)	-	80.000															+
Mt Tully Rd Safety Improvements				100 000													+
Neville Ln / Eukey Rd Intersection improvement (Storm King)		-		200.000								-					+
Osbaldeston Rd widen gravel and floodway construction (Sugarloaf)		200.000			0						-	2					
Pradella Rd western end and Scott Camps Rd southern end upgrade															×		
gravel rd to bitumen standard				200,000													
Pratten George St roundabout (Warwick)								170,000									
Railway St K&C replacement (Stanthorpe)		50,000															
Spring Creek Rd Widen Floodway (Amiens)				70,000													
Springdale Rd Safety Improvements				100,000													
Sundown Rd (Currs to Bents) reconstruct and widen bitumen seal																	
(Ballandean)		80,000										2					_
Teale Rd widening (Thulimbah)		180,000											0			<u> </u>	
Tummaville Rd Bridge Replacement timber bridge with culverts (Leyburn)		250,000															
Unallocated Council Roadworks				350,000		570,000		1,900,000		2,200,000		2,200,000		2,200,000		2,200,000	1
Upper Wheatvale Rd rehab and widen (East of Hendon Deuchar Rd)				200.000													
(Deuchar)				300,000									0				-
Poads to Pocovory				000,0C												<b> </b>	-
Assumed that the Roads to Recovery program will continue at similar																<u> </u>	-
levels as previous										1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150
Donnellys Castle Re rehabilitate and widen northern End				150,000	150,000	150,000	150,000									<u> </u>	
Doyles Rd (northern end) rehabilitate (Spring Creek Allora)		250,000	250,000														
Elks Lane Floodway (Greenlands)		100,000	100,000													L	
Glen Rd/Willi St Intersection Improvements (Warwick)		130,000	130,000													<u> </u>	
Goomburra Rd rehabilitate and widen (Gladfield)				200,000	200,000	200,000	200,000									L	
Hermitage-Emuvale Rd rehabilitate (Hermitage)				200,000	200,000	200,000	200,000										

### Nathan Walter

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uy/	T L L A	Subsidy/		Subsidy/
in	i otal Cost	I rade in	i otal Cost	I rade in
	1,400,000		1,400,000	
	750.000		750.000	
	100,000		100,000	
	100,000		100,000	
	25,000		25,000	
	15,000		15,000	
-				
		0		
		9		
	2,200,000		2,200,000	
000	1 150 000	1 150 000	1 150 000	1 150 000
	1,100,000	1,100,000	1,100,000	1,100,000