Mud Walls Secondary Road Road Reinstatement

SUBMISSION to the PARLIAMENTARY STANDING COMMITTEE on PUBLIC WORKS

September 2011



Department of Infrastructure, and Resources

Mud Walls Secondary Road

Road Reinstatement

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	Name	Signature	Date
Authorised by:	Brian Williams	Brille	22-9-204

1. Background

1.1 Project

This project involves the widening and strengthening of approximately 10.2 km of road at the northern end of Mud Walls Secondary Road, located in the Coal River Valley in the municipality of Southern Midlands. The project extends from the existing railway crossing just north of Colebrook to the Ringwood Creek culvert. The road provides access to agricultural and rural properties in the valley and links Colebrook Main Road to the Midland Highway. The road is classed as a Category 5 road in the *Tasmanian State Road Hierarchy*.

The project is, for the sake of clarity, divided into two sections.

Section 1: The southern section of the project covers Link 44 from Ch. 5.16 km to Ch. 7.67 km on the Department of Infrastructure, Energy and Resources (DIER) Link reference maps.

Section 2: The remainder of the project covers Link 50 from Ch. 0.00 km to Ch. 7.69 km.

The upgrade works predominantly involve:

- Selected dig outs on Section 1 with a full reseal;
- Widening of the road on the eastern side, major drainage improvements, provision of a granular overlay and road shape correction on Section 2;

The location of the project is shown in Figure 1.

1.2 History

Mud Walls Secondary Road was previously a Council owned road, constructed in 1939. In 1999 ownership of the road was transferred from Southern Midlands Council to the Department of Infrastructure, Energy and Resources. Since 2004, the Mud Walls Secondary Road Action Group has been actively involved in seeking improvements to the condition of Mud Walls Secondary Road. This group has publicly lobbied for an upgrade.

In December 2009, the then Minister for Infrastructure, Graeme Sturges attended a

community meeting to listen to concerns about the condition of Mud Walls Secondary Road. In January 2010, the Government announced an election commitment of \$8M for strengthening and widening of the northern section of Mud Walls Secondary Road. At that time, a commitment was also made that the community would be given an opportunity to inform any review of the road.

In December 2010, consulting engineers pitt&sherry was commissioned to develop a concept design to deliver the election commitment. The concept design focuses on improving rideability and reducing the ongoing maintenance costs.

Several stakeholders have expressed a view that the upgrade should also include improving the alignment of the road and upgrading the Lovely Banks Road junction. Improving road alignment and upgrading the junction are not within the scope of this project.

The concept design meets the objective of the project and will bring the road up to the standard expected from a Category 5 road in Tasmania. There has been some comment from the community that the road should be reclassified to a Category 4 feeder road. DIER considers that the current classification of Mud Walls Secondary Road is correct, as it is a rural residential road that does not connect major townships and has low traffic and freight volumes. The function of Mud Walls Secondary Road is consistent with other Category 5 roads around the State including the Lake Leake Main Road and Lake Secondary Road. In recent years, a load limit of 25 tonnes gross mass was put in place to prevent heavy vehicles from using a road that is not designed for their use. This load limit will remain in place after construction is completed.

Currently, signs are installed along the Mud Walls Secondary Road to inform travellers that the road is not optimal along certain sections.

The concept design has been presented to the local community for review and comment prior to construction. A copy of the Report on Responses is included in Appendix A.



Figure 1 Location of project

1.3 Site Constraints

Prior to undertaking concept design an assessment of the existing road geometry was undertaken and the findings documented in the report by pitt&sherry entitled Mud Walls Secondary Road, Road Reinstatement, Geometric Assessment dated April 2011. The report found that there are significant sections which do not comply with the Normal Design Domain (NDD) criteria nor the Extended Design Domain (EDD) criteria outlined in the Austroads¹ Guide to Road Design Part 3: Geometric Design. Improvement of all the sections of road which do not comply with NDD or EDD would result in a substantial proportion redundant road.

The road geometry improvement and pavement rehabilitation cannot be undertaken within the budget provided for the project and therefore DIER has provided design exceptions. The design exceptions and design parameters are as follows:

- Upgrading of the road to contemporary design standards (in accordance with Austroads guidelines) is not required;
- Design speed is to be 80km/h;
- A clear zone requirement on Section 2, of 4m on the widened (eastern) side.

The concept development phase included the collation of ground, environmental and heritage information, geotechnical and pavement investigations and consultation with adjacent landowners. Seven pavement rehabilitation options for the project were developed, costed and considered in this phase. At the completion of this phase a preferred option was chosen for further development.

The detailed design phase is now underway. Construction will not proceed until the project is approved. Further consultation with adjacent landowners, public utility owners and the Southern Midlands Council is also underway.

This report summarises the objectives, investigations undertaken, a project description and the issues associated with the proposed project.

1.4 Objectives

The overall objectives of the project are to:

- Improve pavement strength;
- Improve pavement drainage;
- Improve safety; and
- Reduce maintenance costs.

2. The Existing Conditions

2.1 The Road

Mud Walls Secondary Road is a two-way two-lane road with an average sealed pavement width of 5.5 m with a varying shoulder width ranging from no shoulder up to 0.5m wide. There are a number of unsealed property accesses along the length of the project and one junction.

2.2 Traffic Flow

The most recent traffic counts indicate that the traffic flow on Mud Walls Secondary Road is around 630 vehicles per day including approximately 10% commercial vehicles.

The road currently has a load limit which will remain in place upon project completion.

2.3 Road Crashes

The crash record indicates that there were no fatal or serious crashes for the past five years. There have been seven minor crashes over that period, resulting in property damage (5 instances), with other damage either not known or recorded as 'minor'.

2.4 The Road Side Environment

The abutting land use is rural.

There are a number of large trees within or adjacent to the road reserve. Many of the trees are within the clear zone and are considered a hazard.

A number of power poles are close to the edge of the road.

¹ Austroads is the Association of Australian State Road Authorities

3. Project Justification

The justification for this project is derived from safety improvements, a reduction in the current maintenance costs and road user benefits. These main issues are discussed below.

3.1 Safety Benefits

The proposed project incorporates the following safety improvements for the road:

- A wider pavement which will reduce the likelihood of run-off-road crashes;
- Improved delineation through the provision of chevron alignment markers and upgrading of guide posts which will reduce the likelihood of run-off-road crashes; and
- Provision of curve warning signs with advisory speeds which will reduce the likelihood of run-off-road crashes.
- The removal of roadside hazards, reducing the severity of run-off-road crashes.

3.2 Maintenance Cost Savings

The proposed project will significantly reduce the recurrent pavement maintenance cost through:

- Provision of a stronger pavement; and
- Provision of unsealed shoulders and verge wearing surface will reduce road edge maintenance and provide pavement contrast to the road seal.

3.3 Road User Benefits

- Reduced severity of crashes; and
- Using an overlay will correct road crossfalls, improve ride quality and reduce vehicle operating costs.

4. Project Description

The proposed works can be categorised into:

- Cross section improvement;
- Pavement strengthening; and
- Drainage improvements.

Plans of the proposed works are in Appendix A.

4.1 Cross Section and Pavement Strengthening

The pavement will be widened along Section 2 on the eastern side of the road. The proposed cross section will provide a 6.0 metre sealed pavement (2 x 3.0 m lanes) with 0.5 m unsealed shoulders and 0.5 m unsealed verges.

The pavement investigation indicated that some sections of the existing pavement have insufficient strength to carry the estimated traffic loads for the next 20 years. Consequently the full road width, over the Section 2, will be reconstructed up to a depth of 100 mm and reshaped. A 130 mm pavement overlay and seal will then be provided.

Over Section 1 selected digouts of low strength pavement will be undertaken and the full width of the pavement will resealed.

4.2 Drainage

The existing cross road drainage system does not have adequate capacity at some locations. In these areas storm water backs up into the surrounding land and gradually flows through the culverts and pavement. There are areas where the road is at (or close to) the surrounding ground level in flat country which only allows the water to drain away slowly.

Existing culverts will be lengthened as required to accommodate the wider road in Section 2. The Section 2 drainage will be improved by the provision of table drains, larger culverts where required, subsoil drainage where practical and by an improved pavement shape allowing the water to run off the sealed surface.

Drainage will be improved in Section 1 with the asphalt lining of existing table and the provision of subsoil drainage in selected areas.

5. Existing Environment

5.1 Flora

A flora and fauna survey has been conducted of the road reserve and adjacent land. This study identified four species listed under the *Threatened Species Protection Act 1995* (Tas):

- Austrostipa scabra subspecies p falcata (sickle speargrass);
- Austrostipa nodosa (knotty speargrass);
- Lepidium pseudotasmanicum (shade peppercress); and
- Velleia paradoxa (spur velleia).

Previous surveys have also identified two species of threatened flora listed under both the *Threatened Species Protection Act 1995* (Tas) and *Environment Protection and Biodiversity Conservation Act 1999* (Cth):

- Velleia paradoxa (spur velleia); and
- Viola cunninghamii (alpine violet).

The study identified seven introduced plants listed as 'declared' weeds under the *Weeds Management Act 1999* (Tas):

- Rubus fructicosus (blackberry);
- Cytisus scoparius (english broom);
- Salix sp. (willow);
- Ulex europaeus (gorse);
- Erica Iusitanica (spanish Heath);
- Cirsium arvensis (californian thistle); and
- Carduus pycnocephalus (slender thistle).

5.2 Fauna

The flora and fauna survey also identified potential habitat for species listed under the *Threatened Species Protection Act 1995* (Tas) including *Oreixenica ptunarra* subsp. *roonina* (ptunarra brown butterfly) and *Pseudemoia pagenstecheria* (tussock skink). These two species could potentially inhabit tussock grassland in adjacent land. However, the habitat is considered marginal. Lathamus discolor (swift parrot) listed under both the Threatened Species Protection Act 1995 (Tas) and Environment Protection and Biodiversity Conservation Act 1999 (Cth) could utilise the black gums along the roadside for foraging, but this location is outside the core range of the species.

5.3 Aboriginal Cultural Heritage

A desktop assessment has been undertaken in relation to Aboriginal cultural heritage. There are no listed TASI sites within the project area. However, there are numerous sites in the surrounding region. An Aboriginal heritage field survey was conducted for the project disturbance area. This study identified no Aboriginal heritage sites within the development footprint.

Three specific areas of potential archaeological sensitivity were identified along the route. These are specific locations where there is an elevated potential for Aboriginal heritage sites to be present.

The proposed road improvement works at each of these three locations will be confined to within 3m of the eastern extent of the existing road verge. As a consequence, the potential for disturbing Aboriginal heritage deposits that may be present in these areas is limited. However, specific management prescriptions have been developed to further limit potential impacts to any sites in these areas.

5.4 Historic Heritage

A Historic heritage survey has been undertaken for the project.

The proposed road upgrades will take place on the property boundaries of Ellesmere and Darlington. These properties are registered places under the Tasmanian Heritage Register and subject to the *Historic Cultural Heritage Act 1995* (Tas).

Darlington and Ellesmere are also listed under Schedule 4 of the *Southern Midlands Planning Scheme 1998.* No heritage values on Ellesmere or Darlington will be impacted by the proposed works.

The survey also identified the following unlisted heritage features:

- A heritage sensitivity zone around the property of Ringwood; and
- The Mud Walls Secondary Road conifers were found to have historical value for their age and demonstration of past landscaping practices.
- 5.5 Visual Impact

There will be some impact on visual amenity as it will be necessary to remove some trees to facilitate the road reinstatement and improve safety. However, the design will keep the number of trees required to be removed to an absolute minimum and the impact is considered to be minor.

6. Environmental and Heritage Safeguards

6.1 Proposed Management Regime

In order to limit the impact on the environmental and heritage values identified, the following processes and actions are being incorporated into the project:

- The area of land being acquired for completion of the works has been kept to the minimum practicable level required by good road design;
- Avoidance of all threatened flora species and minimisation of impacts to potential threatened fauna habitat;
- Locations with environmental values requiring protection will have fencing erected around them for the duration of the construction.
- All weed areas are clearly identified and requirements for the treatment of the various declared weeds will be included in the tender documents, so they can be appropriately managed during construction;
- Protection of the heritage values on the property of Ringwood;

- The Contractor will be made aware of the locations of the three Aboriginal heritage areas of potential archaeological sensitivity. Soil disturbance in these three areas will be restricted to within the footprint of the required road works; and
- In the event that any Aboriginal cultural heritage material is encountered during the construction phase the normal protocols will be followed. These require that all activities cease in the area immediately, pending consultation with the relevant Aboriginal community group(s) and the Manager, of Aboriginal Heritage Tasmania.

7. Social Implications

Potential social and economic impacts as a result of the proposed works will be positive, as the aim is to widen the road and improve the surface along Mud Walls Secondary Road, improving safety and road ride quality.

There will be some short-term social impacts arising from inconvenience associated with the road construction activities. These will be mitigated by good communication and traffic control during construction.

7.1 Property Impacts

There are eleven landowners who own land abutting the road.

There have been on-going discussions with all property owners to determine what works are necessary and to enable acquisition of the required land. Every effort will be made to ensure that individual concerns have been addressed.

7.2 Public Consultation

As part of the project a public consultation plan has been developed and is currently being implemented.

DIER has consulted with Southern Midlands Council to identify issues from ratepayers and road users that Council may be aware of which should be included within the scope of the project. The extent of the project was discussed with Council and Council supports the re-instatement of this section of Mud Walls Secondary Road.

During detailed design, meetings will be conducted with abutting property owners to:

- Explain the reasons for and objectives of the project; and
- Provide an opportunity to raise issues directly with the project team.

Late in this phase the focus is on the landowners to precisely define the:

- Extent of the required acquisition;
- Works at accesses;
- Replacement of fencing; and
- Changes to public utilities servicing their properties.

The land required for the works will be surveyed and the acquisition process will commence. This will involve the Office of the Valuer General and DIER Land Assets Group liaising with the landowners to agree on compensation to be paid.

The final phase of public consultation is during construction. During this period DIER will keep the travelling public informed of possible impacts through signage on the site and notices in the press. There will be close liaison between the contract administration team and adjacent landowners to ensure that the landowners are advised on works staging and potential impacts.

In summary, DIER will continue to consult with:

- Southern Midlands Council;
- Transportation bodies;
- Bus operators;
- Emergency services;
- Public utility providers; and
- Local residents.

Approvals

8.1 Planning Approval

The project area is entirely within the bounds of Southern Midlands Council. Use

and development within this municipality is governed by the *Southern Midlands Planning Scheme 1998* (updated 2007).

It has been confirmed by Council that a development application is not required to be submitted for this project.

8.2 Environmental Approvals

It is not anticipated that any approvals will be required in relation to flora and fauna listed under either the *Threatened Species Protection Act 1995* (Tas) or the *Environment Protection* and *Biodiversity Conservation Act 1999* (Cth).

Advice is being sought from the Policy Conservation and Assessment Branch (DPIPWE) in relation to the impacted potential threatened fauna habitat.

The proposed works on Darlington and Ellesmere do not adversely affect the historic cultural heritage significance of the registered places. Therefore an exemption has already been granted by Heritage Tasmania and the works may be completed without the need to seek approval from the Tasmanian Heritage Council.

8.3 State Policies

8.3.1 State Coastal Policy

The Tasmanian *State Coastal Policy 1996* is applicable to all land within a distance of one kilometre from the high-water mark. Thus the State Coastal Policy does not apply to this project.

8.3.2 State Policy on the Protection of Agricultural Land

The State Policy on the Protection of Agricultural Land 2000, provides for protection of the State's prime agricultural land from conversion to non-agricultural use and development. The policy defines Prime Agricultural Land as meaning:

Agricultural land classified or capable of being classified as Class 1, 2 or 3 land using the Class Definitions and methodology from the Land Capability Handbook, KE Noble 1992, Department of Primary Industry, Tasmania.

There is no prime agricultural land within the project area.

Thus the State Policy on the Protection of Agricultural Land does not apply to this project.

8.3.3 State Policy on Water Quality Management

In accordance with Section 35.1 of *The State Policy on Water Quality Management 1997*, all road construction works must employ measures consistent with best practice environmental management to prevent erosion and the pollution of streams and waterways by runoff from sites of road construction.

Appropriate silt control and sedimentation measures will be put in place to protect the surrounding waterways and prevent potential soil erosion on site.

9. Construction Program and Costs

9.1 Program

Project construction is programmed for the summers of 2011/12 and 2012/13. This allows works to be constructed with a lower risk of inclement weather, which would increase costs and delay construction causing extended disruption to the traveling public. The key dates are shown in Table 1.

Table 1.	
Program	

Project Phase	Start Date	End Date
Design development	June '11	Oct '11
Tendering and tender assessment	Nov '11	Dec '11
Construction	Jan '12	Apr '13

9.2 Costs

The cost estimates have been prepared using the Evans and Peck document, Best Practice Cost Estimation Standard for Publicly funded Road and Rail Construction. The document outlines the preparation of probabilistic estimates based on the risks and confidence levels. For this project P50 and P90 confidence level estimates have been prepared.

"P50 represents the project cost with sufficient risk provisions to provide a 50% level of confidence in the outcome i.e. that there is a 50% likelihood that the project costs will not be exceeded.

P90 represents the project cost with sufficient risk provisions to provide a 90% level of confidence in the outcome i.e. that there is a 90% likelihood that the project costs will not be exceeded."2

The major project components and estimated costs are shown in Table 2. The full estimate is in Appendix B.

The Community Roads Program will provide a funding allocation of \$8M towards this project with the Capital Investment Program providing a further \$2 in the 2013/14 financial year.

Table 2.	
Cost Estimate (P50)	

Cost Item	Amount (\$)
Environmental Works	\$79,239
Temporary Works / Traffic	
Management	\$211,545
Public Utilities	
Adjustments	\$86,243
Bulk Earthworks	\$1,395,174
Drainage (Longitudinal)	\$339,069
Drainage (Cross road)	\$48,196
Pavements	\$2,939,396
Road marking, signage,	
furniture	\$251,846
Landscaping	\$494,416
Supplementary Items	\$135,430
Inherent Contingency (P50)	\$787,800
Contingent Contingency (P50)	\$1,308,966
Escalation	\$290,000
TOTAL	\$10,050,00

2

As quoted by Evans and Peck, Best Practice Cost Estimation Standard for Publicly Funded Road and Rail Construction.

10. Conclusions and Recommendations

The design for the proposed project on the Mud Walls Secondary Road has been carried out with regard to an acceptable balance of priorities, risks and cost.

Where necessary, the desires of abutting landowners, Southern Midlands Council and public utility owners have been incorporated.

Once complete, the works will provide improved safety and reduced pavement maintenance costs through strengthening and improvements to pavement drainage.

It is recommended that the project be approved.

Appendix A

Community Feedback

REPORT ON RESPONSES

Mud Walls Secondary Road – North of Colebrook

30 Aug - 14 Sept 2011

Public Display

The plans for the road reinstatement works for Mud Walls Secondary Road North of Colebrook were put on display from 30-31 August 2011 at Colebrook Community Hall and from 31 August to 14 September at Midlands Council Offices in Oatlands. A response box was provided at both venues, asking for comments by 16 September 2011. The public display information was also placed on DIER's website. A public notice was placed in *"The Mercury"* on Saturday 27 August announcing the public display.

An advertising poster was located at Campania Post Office to advise local residents of the public display. A letter was sent to all resident post boxes at the Colebrook Post Office (over 250 residents).

The public display information consisted of two posters depicting:

- road elevations
- lane width
- shoulder and verge width
- table drains
- project scope and
- projected implementation timelines.

Below is a table detailing the number of responses received through various feedback mechanisms.

Source of Feedback	No of Responses		
Feedback Box, Southern Midlands Council Office, Oatlands	1		
Feedback Box - DIER, 4 th Floor, 10 Murray Street, Hobart	1		
Email/Phone call to Project Manager	0		
Written submission	0		
DIER Website	0		
Comments at Public Display held at Colebrook	7		
Total Responses	9		

Summary of Feedback

The majority of feedback received focussed on suggestions for safety improvements around the Lovely Bank junction, which are beyond the scope of this project. A number of people commented on foggy and icy sections along the road that require extra safety measures.

The detail of all responses received in relation to the proposed design is provided at Attachment A.

Background

The number of responses received to the design was low, with only 2 people completing feedback forms and 9 responses received in total.

Senior Project Manager, Gunadasa Ginneliya and Stakeholder Engagement Unit (SEU) Manager, Graeme Nibbs set up and attended the public display at Colebrook Community Hall from 2:00-6pm on 30 August 2011. Guna and Amanda Keygan from the SEU also attended the display from 10:00am – 1:00pm on 31 August 2011.

After the display closed at Colebrook Community Hall the public display was then set up at the Southern Midlands Council Office from 31 August to 14 September 2011.

The Stakeholder Engagement Unit collated all responses received relating to the proposed design.

Attachment A: Summary of Comments Received

	Name	Form of feedback	Contact Details	Comments
1	Name not provided	Feedback form – DIER	Contact details not	Stated that design should have included alignment improvements, particularly leading up to the
		Internal public display	provided.	Lovely Banks junction in line with P135 of Austroads Guide to Road Design Part 3.
2	Name not provided	Comment at public display – Colebrook Hall – 30 August 2011	Contact details not provided	Enquired about the differences in work between Section 1 and Section 2 and the timing of the works.
3	Mrs Lancaster	Comment at public display – Colebrook Hall – 30 August 2011	62597241	 Enquired about the timing and raised several issues including: Lovely Banks Junction sight distance is bad – dangerous for school bus– particularly in Winter – a restricted speed limit in this section might help but most would probably ignore it. The hill near Leaches Road is blind at top when heading north and people cross to the wrong side of the road to avoid pot holes. Would like to see trucks kept off the road – many trucks come through 11pm – 5am.
4	Andrew Benson (Acting GM), Jack Lyell (Works Manager) and Craig Watley – Southern Midlands Council	Comment at public display – Colebrook Hall – 30 August 2011	Southern Midlands Council	 Discussed the following: Geometry of the road Noted that Council may seal 1st 15m of Leaches Road as it is currently difficult for their maintenance crews to grade. Would design prevent material ending up on the railway if culverts fail during heavy rain events (as it currently does). Lovely Banks Junction needs to be upgraded – gets very foggy in this area. Timeframe for implementation. Noted that there is a quarry at Interlaken. Areas of ice at the dip just before Lovely Banks junction and just over railway (hot mix has made this worse).
5	Alex Green (Councillor)	Comment at public display – Colebrook Hall – 30 August 2011	0429604153	 Discussed the following: Timing for implementation. Section 1 corners are nasty and gradients are poor – particularly around the railway area. Shame that funding is not available for improving road alignment, particularly around the shearing shed area. Need to look at signage along the road for the foggy sections.

6	Bob Campbell – Councillor and Chair Mud Walls Road Action Group	Comment at public display – Colebrook Hall – 30 August 2011	PO Box 68, Oatlands	 Discussed the following: Railway area and dip near Lovely Banks Section 1 are the areas most people are concerned about. Fog areas between railway and Graeme Isles race training track. Fog tends to be lighter towards the dam. Frost prone areas just before railway and just before Leaches Road Would like rails at drop-off areas near the railway – Section 1 is where people get nervous. Suggested reflective strip through the middle of the railing on W-Beams Sight distance problems – dip south of Lovely Banks Junction – this dip needs to be removed – tree trimming may also improve sight distance on the north side of this junction.
7	Vince Taskunas –General Manager, Public Policy and Communications, RACT	Comment at public display – Colebrook Hall – 31 August 2011	0417 005 647	 Discussed the following: Edge lines for the section being widened. Road is also a commercial route - also being used by vehicles that want to avoid the Brighton Bypass roadworks. Results of the traffic study and road usage.
8	Colin Beven, Councillor	Comment at public display – Colebrook Hall – 31 August 2011	Southern Midlands Council	 Indicated that he is glad that the project is proceeding. Discussed the following: Tree removal. Drainage improvements.
9	Betty Parsey	Feedback form – Southern Midlands Council Public Display at Oatlands	0407501620 or 6244 3151	Indicated that the work should result in a good safe road upgrade from the railway crossing North of Colebrook to the Midland Highway Junction. This is essential for vehicles from Tasman Peninsula and Eastern Shore to ensure a safe, pleasant drive.

Appendix B

Plans

Connecting Communities - Community Roads Program Mud Walls Secondary Road - North of Colebrook - Concept Design





Department of Infrastructure, Energy and Resources



Mud Walls Secondary Road - North of Colebrook - Concept Design



Department of Infrastructure, Energy and Resources



Appendix C

Estimates

Mudwalls Secondary Road

Cost Estimate

Project No. 1280-1-47

		Jase Estimate									
Base Estimate Date: Sep 2011		unit	qty		Rate	Amount	Comment				
2	Development Phase										
а	Project Management						This line to be removed in final estimate				
b	Preliminary Design	Item	1	\$	343,712	\$ 343,	112 Includes consultant project management costs				
С	Detailed Design	Item	1	\$	473,032	\$ 473,0	032 Includes consultant project management costs				
d	DIER Project Management	Item	1	\$	40,000	\$ 40,0	DIER provided rate				
	Subtotal: Development Phase					\$ 856,7	45				
3	Property Acquisition										
	Acquisition	Item				\$ 79,1	150 Based on \$3500 per ha plus \$5000 per property for survey and fees				
	Subtotal: Property Acquisition					\$ 79.1	50				
						\$ 935.8	195				
4	Total Pre-Construction Costs					• ,00,0					
4	DIER Project Management	Itom	1	¢	60,000	\$ 60.0	DOD DIER provided rate				
а	onext regest management	nem		Ŷ	00,000	φ 60,0	44 weeks Superinendent 2 per week @220/hr. Sunt Pen 1 day per				
b	Contract Administration	Itom	1	¢	250 720	¢ 250 -	44 weeks, superintendent z per week @220/iii, suprikejn Ldg per				
-	Client sunnlied Insurances Fees Levies	item	1	\$ \$	200,720		20 Week @ 100/11, 30/Pet Vision 40/ays pet week @ 123/11/				
С	chent supplied insurances, rees, Levies	Ttem	1	2	23,500	\$ 23,3					
	Subtotal: Delivery Phase Client Costs			-		\$ 342,2					
5	Total Client's Costs					\$ 1,278,1	14				
	Construction										
	Contractor's Direct Costs										
а	Environmental Works					\$ 79,2	239				
b	Temporary Works / Traffic Management					\$ 211,!	545				
С	Public Utilities Adjustments					\$ 86,2	243				
d	Bulk Earthworks					\$ 1,395,	174				
е	Drainage (Longitudinal)					\$ 339,0	069				
f	Drainage (Cross road)					\$ 448,	196				
q	Pavements					\$ 2,939,3	396				
h	Road marking, signage, furniture					\$ 251,8	346				
i	Landscaping					\$ 494,4	116				
i	Supplementary Items					\$ 135,4	130				
6	Tatal Contractor's Casts					¢ 6 200 E	.EA				
8	Client Supplied Materials or Services					\$ 0,000,0	- None				
-						•					
9	Total Construction Cost (TCC)					\$ 6,380,5	54				
	Total Construction + CA Cost					\$ 6,722,7	73				
10	Base Estimate					\$ 7,660,0	100				
							P50 P90				
1	Contingency - inherent risks			†			\$787.800 \$1.639.300				
	Contingency - contingent risks			1			\$130,000 \$1,703,000				
12	Total Contingency			1			\$2,096,766				
<u> </u>											
13	Project Estímate						\$9,760,000 \$11,070,000				
	Cashflow: Start Construction Jan 2012, Finish Construction April 2013										
14	Escalation (applied to Project Estimate)						290,000 \$ 340,000				
	% escalation (compared to base estimate + contingency)						3% 3%				
15	Total Outturn Cost						\$10,050,000 \$11,410,000				

Mud Walls Secondary Road

Cost Estimate

Project No. 1280-1-47 Inherent Risk Assessment

Risk			Qua	ntity			Rate							Adjusted Amount
Description	Unit	Base	Lower Bound	Most Likely	Upper Bound	Adjusted Value	Adjusted Quantity	Base	Lower Bound	Most Likely	Upper Bound	Adjusted Value	Adjusted Rate	
Pre-Construction														
Development Phase	Item	1	0.9	1	1.25	1.06	1.064	\$ 856,745	0.75	1	1.25	1.00	\$ 856,745	\$911,400
Acquisition	Item	1	0.95	1	1.1	1.02	1.021	\$ 79,150	0.75	1	1.5	1.11	\$ 87,555	\$89,400
Delivery Phase (Project Management and CA)	Item	1	0.85	1	1.25	1.04	1.042	\$ 342,220	0.75	1	1.25	1.00	\$ 342,220	\$356,800
Construction														
Environmental Works	km	10.2	9	10.2	11	10.03	10.030	\$ 7,769	0.9	1	1.25	1.06	\$ 8,264	\$82,900
Temporary Works / Traffic Management	Item	1	0.95	1	1.05	1.00	1.000	\$ 211,545	0.9	1	1.2	1.04	\$ 220,530	\$220,500
Public Utilities Adjustments	Item	1	0.95	1	1.1	1.02	1.021	\$ 86,243	0.9	1	1.25	1.06	\$ 91,740	\$93,700
Bulk Earthworks	Item	1	0.9	1	1.25	1.06	1.064	\$ 1,395,174	0.85	1	1.25	1.04	\$ 1,454,422	\$1,547,100
Longitudinal Drainage	Item	1	0.9	1.0	1.1	1.00	1.000	\$ 339,069	0.85	1	1.25	1.04	\$ 353,468	\$353,500
Cross Drainage	Item	1	0.9	1	1.25	1.06	1.064	\$ 448,196	0.85	1	1.25	1.04	\$ 467,229	\$497,000
Pavements and Sealing	Item	1	0.95	1	1.1	1.02	1.021	\$ 2,939,396	0.85	1	1.25	1.04	\$ 3,064,221	\$3,129,300
Road marking, signage, furniture	Item	1	0.9	1	1.25	1.06	1.064	\$ 251,846	0.85	1	1.25	1.04	\$ 262,541	\$279,300
Traffic Signals and Control Systems	Item	1	0.9	1	1.25	1.06	1.064	\$ 211,545	0.85	1	1.25	1.04	\$ 220,528	\$234,600
Landscaping	Item	1	0.95	1	1.1	1.02	1.021	\$ 494,416	0.85	1	1.25	1.04	\$ 515,412	\$526,400
Supplementary Items	Item	1	0.9	1	1.25	1.06	1.064	\$ 135,430	0.85	1	1.25	1.04	\$ 141,181	\$150,200
												A .11	I DALL ELLING ALL	AO 470 400

Adjusted Base Estimate\$8,472,100Base Estimate\$7,658,700

Inherent Risk Assessment \$813,400

Mud Walls Secondary Road

Cost Estimate

Project No. 1280-1-47 Contingent Risk Assessment

Risk	Consequence	Consequence	Likelihood	Distribution		Principal Value			Values				Risk Formulae		
Risk description	Consequence Description	\$	%		Principal affected		%min	Lower Bound	%ML	Most Likely	%Max	Upper Bound	Likelihood	Consequence	Contingent Cost
Feasibility and Funding															
Excluded															
Political / Community					+										
Change of government objectives, new policy/regulations.	Increases construction cost.	\$319.028	10%	PertAlt	Construction Cost	\$6.380.554	1.0%	\$63,806	5%	\$319.028	20%	\$1,276,111	0.10	\$436.004	\$43,600
Outcomes of Public Display lead to design and acquisition changes	Increases base estimate.	\$383.000	2%	PertAlt	Base Estimate	\$7,660,000	1.0%	\$76.600	5%	\$383.000	20%	\$1,532,000	0.02	\$523,433	\$10,469
Planning and Environment															
AHT require site investigations and AHO still not working on investigation	Delays project by 1 year, increases														
(assumed vear delay)	cost escalation	\$319.028	100%	PertAlt	Project Estimate	\$6.380.554	2.0%	\$127,611	5%	\$319.028	10%	\$638.055	1.00	\$340.296	\$340,296
Aboriginal beritage investigations identify sites of significance prior to		\$017,020	100%	, ci d'ut		\$0,000,001	2.010	•121,011		017,020	10%	0000,000		0010,270	0010,270
construction	Increases design fees	\$16 335	10%	PortAlt	Design Fees	\$816 745	0.5%	\$4.084	2%	\$16.335	5%	\$40,837	0.10	\$18.377	\$1,838
Design / Scope changes / design variations	indicuses design rees.	\$10,333	10%	TOTAR	besign rees	\$010,743	0.3%	\$4,004	2 10	\$10,333	576	\$40,037	0.10	\$10,577	\$1,030
besign / scope enanges / design variations				••••••		•••••	•••••	••••••			• • • • • • • • • •		•••••		
Error or omission in design identified and requires additional / changed work	Increases construction cost	¢101 E00	1.08	DortAlt	Paco Estimato	\$7.440.000	0.5%	\$20,200	2 59	£101 E00	10%	\$744,000	0.10	60(1 717	\$26,172
Now standard adopted	Increases construction cost.	\$191,000	10%	PertAlt	Dovolopmont Phase	\$7,000,000	U. 3%	\$30,300	2.3%	\$191,000	20%	\$700,000	0.10	\$201,717	\$20,172
New standard adopted.	increases design cost.	\$00,074	076	PertAit	Organization Construction	\$600,740	5.0%	\$42,037	10%	\$00,074	20%	\$171,349	0.05	\$92,014	\$4,041
New standard educated	l	6104 AFF	1.0%	DentAlt	Construction +	¢/ 700 770	1.0%	er 7 000	201	6104 AFF	500	6004 100	0.10	615 (O/F	C15 (0)
New Standard adopted.	increases construction cost.	\$134,400	10%	PertAit	CONTRACT AGININ	\$0,722,773	1.0%	\$07,220	276	\$134,400	376	\$330,139	0.10	\$100,000	\$13,000
Site Related issues															
Heavier rainfall than envisaged delays delivery of project (prolongation of	l	****	1.00		Construction +	A / 300 330	0.00		0 50		500				
project)	Increases construction cost.	\$168,069	10%	PertAlt	Contract Admin	\$6,722,773	0.3%	\$16,807	2.5%	\$168,069	5%	\$336,139	0.10	\$170,870	\$17,087
Discovery of additional services not shown	Increases construction cost.	\$25,873	10%	PertAlt	Utility Works	\$86,243	25.0%	\$21,561	30.0%	\$25,873	50%	\$43,122	0.10	\$28,029	\$2,803
World wide price increase on steel, fuel, bitumen.	Increases construction cost.	\$63,806	50%	PertAlt	Construction Cost	\$6,380,554	0.5%	\$31,903	1.0%	\$63,806	5%	\$319,028	0.50	\$101,025	\$50,513
Quarry shutdown. Need new source of material.	Increases Pavement cost.	\$146,970	2%	PertAlt	Pavement Costs	\$2,939,396	2.0%	\$58,788	5%	\$146,970	10%	\$293,940	0.02	\$156,768	\$3,135
Unforeseen ground condition. Latent condition.	Increases earthworks cost.	\$69,759	25%	PertAlt	Earthworks Cost	\$1,395,174	2.0%	\$27,903	5%	\$69,759	10%	\$139,517	0.25	\$74,409	\$18,602
Safety / OHS							[I				
					Construction +		1			[1			
A safety incident disrupts the program	Increases construction cost.	\$336,139	10%	PertAlt	Contract Admin	\$6,722,773	2.5%	\$168,069	5%	\$336,139	12%	\$806,733	0.10	\$386,559	\$38,656
Authority Caused Delays / Costs during Construction	1														
Tender award delayed by 6 months.	Increases escalation cost.	\$17,321	5%	PertAlt	Base Estimate	\$216,514	2.0%	\$4,330	8%	\$17,321	16%	\$34,642	0.05	\$18,043	\$902
Project period extends by another year.	Increases escalation cost.	\$22,186	20%	PertAlt	Base Estimate	\$221.861	1.0%	\$2.219	10%	\$22,186	33%	\$73.214	0.20	\$27,363	\$5,473
					Construction +										
Legal dispute	Increases construction cost.	\$336.139	10%	PertAlt	Contract Admin	\$6.722.773	2.5%	\$168.069	5%	\$336,139	12%	\$806.733	0.10	\$386.559	\$38,656
Service relocation cost increases	Increases construction cost.	\$17 249	50%	PertAlt	Public Utilities	\$86 243	10.0%	\$8,624	20%	\$17.249	50%	\$43 122	0.50	\$20,123	\$10.062
		••••	00%		Construction +	000,210	10.0%	0,02	20%	••••	00%	• 10, 122	0.00	010,110	010,002
Service Authorities do not deliver works on time	Increases construction cost	\$336 130	10%	PortAlt	Contract Admin	\$6 722 773	1.0%	\$67.228	5%	\$336 130	10%	\$672.277	0.10	\$347 343	\$34 734
		\$330,137	10.8	FEILAIL	Construction :	\$0,722,773	1.0%	\$07,220	5.6	\$330,137	10%	\$072,211	0.10	\$347,343	\$34,734
Contractor makes a claim during the contract period	Increases construction cost	¢470 E04	100%	DortAlt	Contract Admin	¢4 700 770	0.5%	622 (14	70/	£470 E04	25%	£1 400 402	1.00	¢500.447	\$500.447
laduatrial	increases construction cost.	9470,374	100.%	FEITAIL	Contract Admin	\$0,722,773	0.3%	\$33,014	7.70	3470,374	2370	\$1,000,073	1.00	\$377,447	\$377,447
Industrial					Construction .										
Industrial disputes	Increases construction cost	¢007 100	500	DentAlt	Contract Admin	¢/ 700 770	1.0%	er 7 000	50	6004 100	1.0%	e(70.077	0.05	6047.040	617.0/7
Contractual / Commercial	increases construction cost.	\$336,139	5%	Pertait	CONTRACT ADMIN	\$6,722,773	1.0%	\$67,228	5%	\$336,139	10%	\$672,211	0.05	\$347,343	\$17,307
Contractual / Commercial															
Aboriginal heritage investigations identify sites of significance during	Delay and additional work, increases				Construction +										
construction	construction cost	\$134,455	10%	PertAlt	Contract Admin	\$6,722,773	0.5%	\$33,614	2%	\$134,455	5%	\$336,139	0.10	\$151,262	\$15,126
					Construction +										
Financial claim goes to court.	Increases construction cost.	\$336,139	2%	PertAlt	Contract Admin	\$6,722,773	2.5%	\$168,069	5%	\$336,139	12%	\$806,733	0.02	\$386,559	\$7,731
	Tendering concurrent with other				Construction +										
Market risk	projects (5% cost increase)	\$336,139	5%	PertAlt	Contract Admin	\$6,722,773	1.0%	\$67,228	5%	\$336,139	10%	\$672,277	0.05	\$347,343	\$17,367
Contractor goes insolvent.	Increases CA cost by 10%	\$34,222	1%	PertAlt	PM + CA	\$342,220	5.0%	\$17,111	10%	\$34,222	35%	\$119,777	0.01	\$45,629	\$456
Delivery							[1					
					Total Construction		[1		1		1			
National Labour rate change.	Increases cost by 2.5%.	\$7,976	2%	PertAlt	Cost	\$6,380,554	0.0%	\$1,595	0.125%	\$7,976	1%	\$63,806	0.02	\$16,217	\$324
	1		<u> </u>		Total Construction		h	+i			<u>+</u>	1		i	j
Labour shortages during construction	Increases construction cost.	\$319.028	5%	PertAlt	Cost	\$6,380 554	1.0%	\$63,806	5%	\$319.028	10%	\$638.055	0.05	\$329.662	\$16 483
		4017/020	070	101041	1	\$5,550,354	1.070	\$00,000	0.10	0017,020	1073	\$000,000	5.05	0027,002	\$10,400

Total Contingent Risk \$1,337,628