Transport and Main Roads

Sunshine Coast Transport Project

Mooloolah River Crossing Alignment Assessment

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Queensland Government

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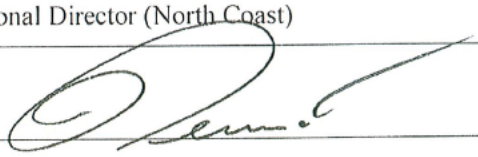
Signature  Date 29-3-2010

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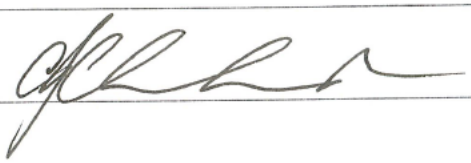
Signature  Date 29-3-10

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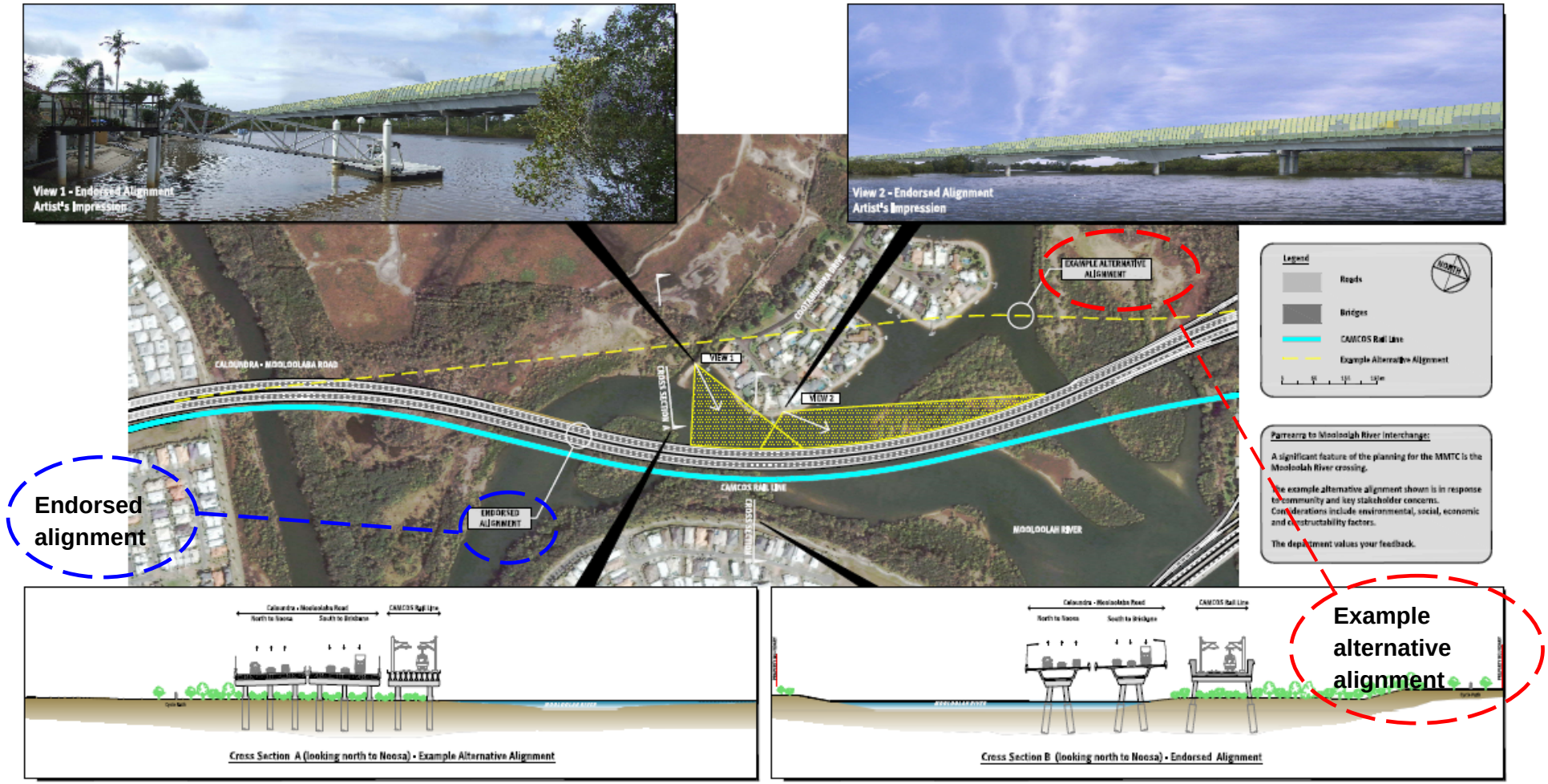

Figure 2 - options displayed at public displays August 2009

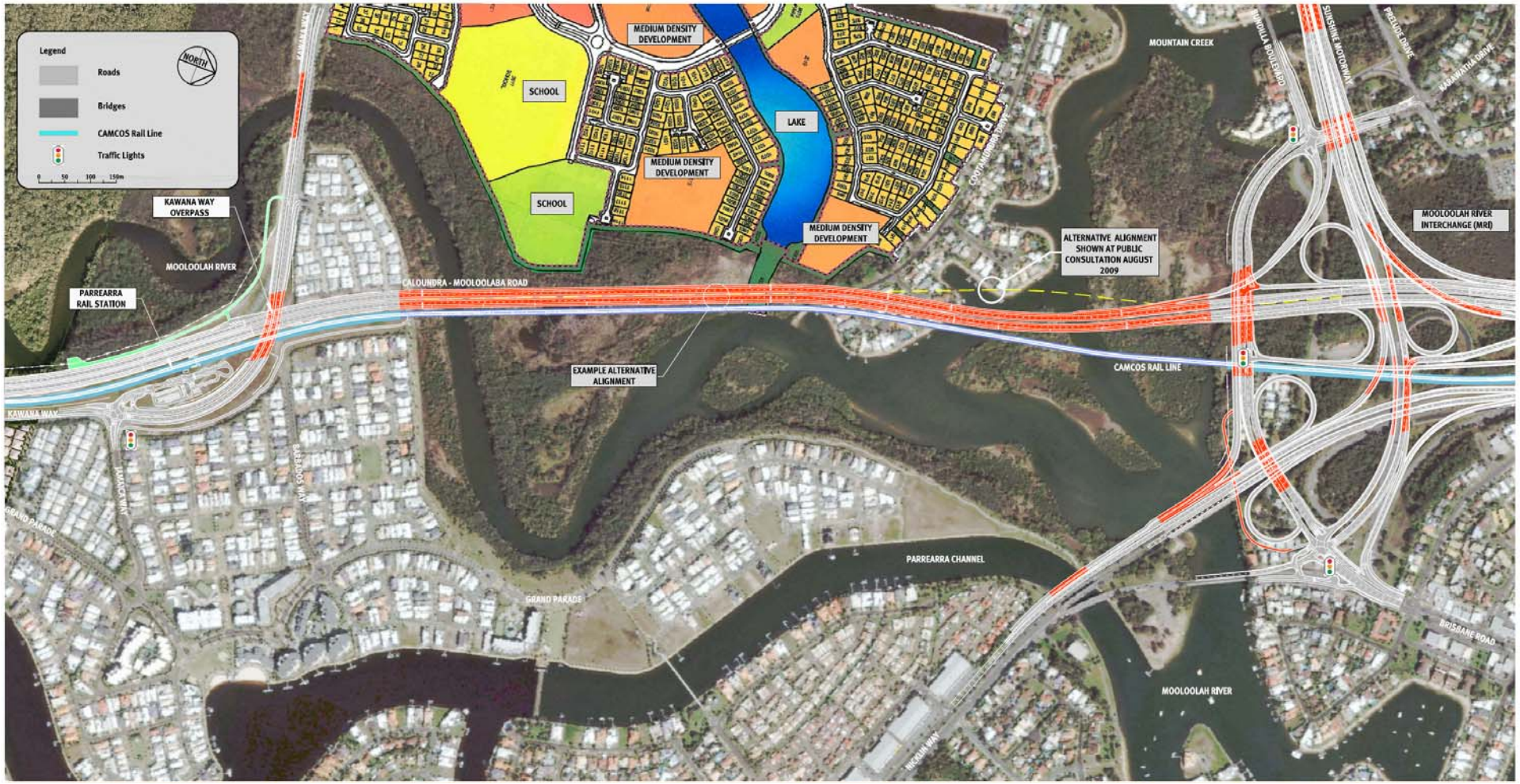

Figure 3 – land-based option

1 Executive summary

Feedback from the December 2008 Multi-Modal Transport Corridor (MMTC) public display raised community concerns about potential environmental impacts from the **endorsed alignment option** (see Figure 2) for the crossing of the Mooloolah River.

In response, the Queensland Department of Transport and Main Roads (TMR) undertook planning to identify other options for the crossing of the Mooloolah River.

An example alternative alignment (as shown in Figure 2) was displayed at a public display in August 2009 in order to generate community feedback.

Feedback from both displays has been considered and the example alternative alignment has been refined to become the **land-based option** (see Figure 3).

This report details the assessment undertaken, and recommends a preferred alignment.

The Mooloolah River crossing alignment is a challenge. On one hand, the endorsed alignment option has little direct impact on the Hideaway Waters area, but has environmental impact in the river. Whilst on the other hand, the land-based option has significant impact on the Hideaway Waters area but less environmental impact.

1.1 Option analysis

Based on the community feedback, several options have been investigated. Two options were carried forward for more detailed analysis:

- **endorsed alignment option** , or the “base case” (the alignment endorsed by Cabinet in April 2001)
- **land-based option.**

The bridge types chosen for comparison were

- Box-girder for the endorsed alignment (considered to be the ideal or gold-plated solution), and
- Conventional deck units for the land-based option.

These were considered the extremes in terms of economical and environmental impacts and were chosen with the aim of making the differences between options more obvious.

1.1.1 Multi-criteria assessment (MCA)

To assist in determining a preferred alignment a multi-criteria analysis (MCA) was undertaken for the two options based on the following criteria:

- social
- economic
- environmental

Technical issues have been considered under the above three criteria and have not been considered separately in the MCA.

1.1.2 Summary of MCA

The result of the MCA process together with a series of sensitivity tests indicates neither option presents a clear advantage over the other.

1.1.3 Social

Initially, feedback from the community and stakeholders in 2008 suggested the need to investigate other options. However, at the second display in 2009, the community strongly opposed the example alternative alignment because of the impact on Hideaway Waters. The endorsed alignment option has a lower social impact, though it must be pointed out there is a "frontline" of Hideaway Waters residents who are adjacent to the corridor and may be voal in their opposition to the endorsed alignment.

Whilst the land-based option would address the concerns of these residents, (through acquisition) a new "frontline" of Hideaway Waters residents would then be created further into the estate. This would in turn create an impact on the occupants of up to approximately 57 residential properties that comprise a major portion of the Hideaway Waters estate.

The social impacts of constructing a land-based option and therefore resuming a major portion of the Hideaway Waters estate were considered in this assessment and include:

- loss of community cohesion
- impact on support networks (residents required to relocate away from friends, neighbours and social support networks)
- increased stress and anxiety for residents not acquired
- impacts to community safety during construction due to increased traffic using local routes to access work areas
- significant access disruption during construction and operation
- increased construction noise and dust.

The endorsed alignment option is considered the socially responsible alternative given it:

- has minimal direct property impacts as the alignment is located within the river
- does not sever residential streets or neighbourhoods
- has limited impact on community cohesion as property acquisition is reduced, although some residents may voluntarily decide to relocate due to changes in local conditions.

1.1.4 Economic

The economic assessment shows the land-based option provides the best solution in financial terms. It represents an initial saving of $100M and a $200M cost saving when the ultimate layout of six lanes is constructed. Current planning timelines — based on traffic forecasts — suggest six lanes will not be required before 2026.

Both options can be staged – that is is an option using girder bridges for the long navigation spans only and more conventional bridge structure for the remainder of the endorsed alignment. Or one two-lane bridge for the lad based option. This reduces the cost saving by about $30M and $50M respectively (or $70M initial and $150M ultimate).

1.1.5 Environmental

The land-based option has less negative environmental impact on the river, though the recently constructed bridge for Eenie Creek Stage 3 at Noosa is a very good example of best practice in environmentally sustainable bridging and construction methods for sensitive areas and shows that either option can have manageable negative impact on the environment. Neither option has approval under the federal Environmental Protection and Biodiversity Conservation Act (EPBC) at this stage; however, investigations to date have not uncovered any environmental issues that cannot be addressed.

1.2 Recommendation

The investigation undertaken, as outlined in this report shows that there is not a compelling case to move from the endorsed alignment.

The land-based option has greater social impact (about 30 properties resumed) and creates a new “frontline” of Hideaway Waters residents.

The endorsed alignment option has environmental impacts in the river but these can be mitigated during design and construction.

It is the recommendation of this report that the endorsed alignment remain as the preferred alignment for the Mooloolah River crossing.

2 Definitions

Terms, abbreviations and acronyms	Meaning
CAMCOS	Caboolture to Maroochydore Corridor Options Study — the generic term given to the project that will deliver the rail infrastructure
DERM	Department of the Environment and Resource Management
EPBC	Environment Protection and Biodiversity Conservation Act (Cwlth)
IAS	Impact Assessment Study
KTIA	(Kawana) Transport Infrastructure Agreement. Kawana was added by the project team to the title of the agreement to avoid confusion with the Transport Infrastructure Act
MCA	Multi-criteria analysis
MMTC	Multi-Modal Transport Corridor which includes arterial and sub-arterial road components and a transit component along with the provision for pedestrians and cyclists
MRI	Mooloolah River Interchange
PT	Public transport
SCTP	Sunshine Coast Transport Project
Endorsed alignment option	The CAMCOS alignment (and by association, the MMTC alignment) endorsed by Cabinet in April 2001
Example alternative alignment	A hypothetical land-based alignment displayed in August 2009 to generate discussion and feedback from the community and stakeholders
Land-based option	Developed as a result of community feedback received on the example alternative alignment
Department of Transport and Main Roads	TMR
Queensland Transport	QT
Department of Main Roads	MR

3 Introduction

The purpose of this report is to recommend a preferred alignment of the Sunshine Coast Transport Project (SCTP) — formerly MMTC — as it crosses the Mooloolah River.

The MMTC project has now been merged with CoastConnect and CAMCOS and renamed the SCTP.

During community engagement conducted in November 2008 in relation to the MMTC, the endorsed alignment was challenged by both the general community and environmental groups as the best alignment option for crossing the river.

As a result, an example alternative alignment to the west of the endorsed alignment was displayed for community feedback in August 2009. At these sessions a commitment was made to Hideaway Waters residents that an announcement of the preferred alignment would be made by Christmas 2009. This undertaking was made based on the information available at the time.

This undertaking was not achieved. In the interim a media release was issued stating that additional investigation needed to be undertaken before the final alignment could be announced.

4 Background

4.1 History

The alignment for the MMTC was originally developed by a study undertaken in the early 1990's into the feasibility of an additional north/south corridor to supplement the Nicklin Way.

This alignment was subsequently adopted in the Kawana Transport Infrastructure Agreement (KTIA) entered into by the state (QT and MR) and the developers of Kawana in 1996. As a result the corridor was established between Caloundra Road in the south and the Mooloolah River (the old Caloundra City/Maroochy Shire boundary) in the north.

Several dwellings had been built previously on the western bank of the Mooloolah River in an area locally known as Hideaway Waters. The alignment chosen for the KTIA bisected the Hideaway Waters area and a proposed development (Kawana Island) on the eastern side of the river. Generally, the pre-existing residents, whilst not happy with the proposal, were accepting of it to varying degrees.

The alignment and corridor was endorsed by Cabinet in 2001 as part of the CAMCOS Impact Assessment Study undertaken to plan for a future rail network from Beerwah to the Maroochy Airport.

4.2 Reasons for an alternative alignment

From feedback received following the November 2008 public display it was clear that the community considered the endorsed alignment for the river crossing needed further investigation. It was suggested that alternatives needed exploring to be certain that the endorsed alignment was an acceptable option.

4.2.1 Environmental

One of the strongest outcomes of the November 2008 public display was concern from environmental groups and the wider community (51 of 191 responses) regarding environmental impact on river.

The Mooloolah River reach in this area is considered one the few remaining relatively undisturbed flood plains on the Sunshine Coast, albeit just upstream from a major marina area at the mouth of the river.

The 2005–2007 State of Waterways Report gives the Mooloolah River a B rating, which means "*Conditions meet all set ecosystem values in most of the reporting region; most key processes are functional and most critical habitats are intact.*[1]*"*

The report also states:

"Key waterway values of the estuary are healthy mangrove forests, fish habitats and flood plain areas in the upper reaches, regular flushing of the estuary with clean ocean water, a marina for recreational and commercial vessels and the Mooloolaba Spit and Point Cartwright outdoor recreation areas. The main threats are pollution runoff from existing urban areas, clearing of mangroves and streamside vegetation for residential and transport purposes and associated sediment and nutrient runoff.[2]*"*

There was some fear expressed that the shaded area caused by the width and relatively low height of the road and rail bridges would change the habitat for natural flora (mainly mangroves) to the point of allowing exotic species to dominate the small islands crossed. This concern will only become reality if and when the bridge reaches its ultimate six-lane stage. One way of mitigating this impact is to construct two three-lane bridges with a gap in between to allow light and rain to penetrate, rather than one wide six-lane bridge. This also has a staging benefit.

The public also has concerns on the visual impact of the bridges on the vista of the surrounding area and the amount of noise that would be generated from the structures. The original CAMCOS IAS discussed the issue of the MMTC needing to cross over the CAMCOS rail alignment as it crossed the river. However, the artist's impressions of the river crossing only showed a relatively low level rail bridge without a road component crossing over the rail at this location. It is likely that the adjacent residents in Hideaway Waters would have seen the proposed crossing in the 2001 CAMCOS IAS as less than desirable due to the high level road bridge being visible for some distance. The latest planning has changed the road over rail bridging configuration, making both road and rail on the same level, meaning the artist's impression does in fact give a good representation of the bridges. In addition the possible use of transparent noise barriers on the bridge will lessen the visual impact as well as reducing noise levels.

4.2.2 Technical

There is still some conjecture as to the final number of traffic lanes that will be needed in the 2026 design horizon. This is due to uncertainty concerning:

- success of transit-orientated developments proposed close to this area
- roll out of public transport (PT) initiatives to reduce reliance on the motor vehicle
- impact of peak oil on the future use of motor vehicles.

[1] State of Waterways Report 2005-2007, Page 33

[2] State of Waterways Report 2005-2007, Page 88

4.2.2.1 PT Uptake

Planning and traffic modelling has allowed for a 10% PT uptake and as a result three lanes in each direction will be required to meet demand in 2026. Further anticipated increases in PT uptake are expected to delay the need for the full six lanes until a later date. Multi-modal modelling which will include both public and private transport is to be undertaken to reassess the demand.

4.2.2.2 Bridge Structure

Investigations have been undertaken into bridge types that would minimise the environmental impact and also meet the Harbour Master's navigation requirements. The results suggest that the bridge will need to be roughly 1800m long, consisting of long (ideally up to 50m) spans and a central navigational span in the order of 90m. Longer spans will reduce the number of piers needed to be constructed in the river area itself. A six-lane box-girder road bridge is an option for spans of this magnitude. Two separated three-lane structures would also be an option as it allows for staging.

However, shorter span, less sophisticated bridges over similar environmentally sensitive areas have been constructed with minimal impact on the environment, albeit with a cost penalty. The recently constructed bridge for Eenie Creek Stage 3 at Noosa is a very good example of best practice in environmentally sustainable bridging sensitive areas.

For the rail component, a through-girder design is proposed for the 50m spans. Further investigation is necessary to determine a suitable design for the longer central span. The road and rail bridge spans should be matched to reduce impact and to aid navigation.

Given the limited use of the river for vessels other than recreational, the Harbour Master's requirements are considered to be the maximum requirement and will be further investigated.

The land-based option is able to be constructed using more conventional less sophisticated methods. The spans required for navigation are more reasonable as the crossing is more square reducing the span lengths.

4.2.2.3 Staging

Stakeholder feedback indicated a preference for a bridge design able to be constructed in stages, should the ultimate forecasted traffic volumes not eventuate.

For the endorsed alignment, one complete three lane structure will be constructed up front with greater initial cost. A second option using girder bridges for the long navigation spans only and more conventional bridge structure for the remainder has been briefly considered and will be further investigated as a way of reducing the cost of the crossing.

In either case for the endorsed alignment, the land-based option presents a more easily staged bridge.

5 Options considered

Right from the start of investigations into a possible alternative, it was considered essential that both the rail and road alignments be moved together and remain generally in the same corridor to minimise impacts on the river. The rail alignment requires a higher standard of geometry; therefore it will control the ultimate alignment.

5.1 Endorsed alignment option

This is the "base case" and is the alignment endorsed by Cabinet in April 2001. It remains the only approved alignment and a change will need Cabinet approval. It was one of the two alignments selected for further assessment.

5.2 Eastern option

This option was suggested by the Hideaway Waters residents and proposed to move the alignment to the east of the endorsed alignment, impacting on a different residential area known as Kawana Island. This was one of the areas developed under the KTIA. Due to obligations contained in the KTIA prohibiting additional resumptions from this and other areas, this option was discounted very early in the investigations. Notwithstanding this obligation, an alignment with similar environmental benefits to the example alternative alignment option was briefly investigated. It was found to impact upon around 150–200 homes in the Kawana Island estate.

This option was not considered further.

5.3 Example alternative option

The example alignment shown to the community in August 2009 (see Figure 2) was developed as a result from community and stakeholder feedback in 2008 to gauge community reaction.

Potentially impacted landowners, particularly those at the eastern end of Hideaway Waters asked that an alignment further to the west be investigated (far-western option.) This is discussed later in this report.

5.4 Land-based option

This option located the alignment in a position that places both the rail and road over land (except for more traditional or squarer river crossings) to maximise the benefits of moving out of the river, whilst at the same time reducing the impact on Hideaway Waters.

Around 30 dwellings are potentially directly impacted by this option. A total of 57 properties were identified in a wider "area of interest." Further investigation has been undertaken on this option.

5.5 Far-western option

This option was developed as a result of feedback from residents at the eastern end of Hideaway Waters to look at an option that would require land from the undeveloped part of Stockland's Bright Water estate; this would impact less on existing properties. The distance the alignment could shift to the west is constrained by;

- Rail geometrical standards
- Environmentally sensitive land (part of the TAFE facility) adjacent to the north-west quadrant of the MRI.

This option was verbally suggested on several occasions with the objective of houses being able to remain. Residents further west of the proposed corridor also proposed this alignment as this would potentially provide a more favourable outcome for them.

Geometric investigations have shown that an alignment that allows the eastern Hideaway Waters properties to remain is not feasible due to the horizontal and vertical alignments required to meet mandatory geometric standards. This would restrict the height available for access under the bridge to these properties, meaning resumption of even more homes with no additional increase in benefits.

On this basis, this option was not considered further.

5.6 Consideration of options

The following areas have been considered in order to determine a preferred alignment:

- Technical
- Social Impact
- Environmental Impact
- Economic.

These studies were carried out to allow an informed multi-criteria analysis to be undertaken. Below is a brief commentary on each area along with a table of benefits and disbenefits of each.

5.6.1 Technical

The technical evaluation of the options resulted in two options being considered for further investigation. These have been named;

- endorsed alignment option
- land-based option.

Both options meet the required geometric standards and are considered equal in this regard. The land-based option has fewer constructability and staging issues. To reduce environmental impact on the river, the endorsed alignment option could require long spans of up to 50m meaning a box girder design bridge may be necessary. In addition the large skew of the bridge may require a 90m navigation span as requested by the Harbour Master. There may be an opportunity for this requirement to be relaxed, possibly reducing the central span to about 60m.

The use of a box-girder design is considered a worst case scenario in terms of economics.

As discussed earlier, there are examples of shorter span bridges constructed successfully over environmentally sensitive areas. The optimum span length and type of bridge structure will be determined in the detailed design phase.

For the MCA process, the technical issues associated with both options were considered under the other criterion.

5.6.2 Social impact

Not surprisingly the land-based option has a far greater social impact compared to the endorsed alignment option. It requires the acquisition of about 30 homes at the eastern end of Hideaway Waters. The actual number of acquisitions has not been determined and is less than the 57 identified inside the area of interest developed for the example alternative alignment. In addition it exposes homes (new “frontline”) that the endorsed alignment did not impact upon.

The majority of the homes are owned by retirees attracted by the unique coastal amenity.

The land-based option also increases safety impacts on the community during construction due to the increased construction traffic accessing local roads.

This land-based option will acquire the majority of the Hideaway Waters estate. This option will sever streets and neighbourhoods and result in a loss of community cohesion and impact on residents’ social support networks as friends and neighbours are acquired or relocate away.

The endorsed alignment option will have minimal direct property impacts as it is located in the river. Whilst there is a visual amenity impact, the social impact on this community is significantly reduced. Streets and neighbourhoods will not be severed, allowing this elderly community to retain its social support networks.

Hideaway Waters estate residents were consulted during the CAMCOS IAS process in the late 1999 to early 2001 period. While not happy with the endorsed alignment they generally are accepting of it. However, several residents living in Imara Court have expressed opposition to the endorsed alignment option.

5.6.3 Environmental impact

It must be pointed out up front that neither of the options have federal approval under the EPBC Act. A decision on either option must have this caveat attached.

Management plans are being formulated to satisfy the requirements of the Act. Notwithstanding the above, neither option has environmental impacts that cannot be mitigated. They have somewhat different impacts, with the land-based option having a smaller impact area on "virgin" environment as it traverses the previously developed residential area. Having 450 metres less over the river than the land-based option will have less impact on the river and wetlands, with about 7 piers (25 metre spans) in the river and Mountain Creek. In contrast, the endorsed alignment option has greater impact on the river — more than three times the number of piers in the river (up to 25 - based on 50-metre spans).

Both options are considered to have the similar Cultural Heritage and Native Title issues. There is a large shell midden on the bank of the river to the south of Hideaway Waters where the alignments are common. A management plan for the midden has been discussed with the traditional owners and will be finalised during detailed design.

5.6.4 Economic

The evaluation considered the ultimate six-lane construction for each option, box-girder bridge for the endorsed alignment and conventional units for the land-based alignment. The land-based option delivers the best economic solution in terms of cost, BCR and NPV.

It has been estimated that the land-based option has potential cost savings in the order of $100M for the first stage to $200M for the ultimate project.

The first stage being a single two lane/two way conventional bridge for the land-based option and one three lane box-girder bridge (that is half of the ultimate two three-lane bridges) for the endorsed alignment. This effectively means the box-girder bridge at the first stage provides the structure for a third lane before it is needed based on traffic demand.

An option for the endorsed alignment that provides the box-girder design for crossing of the navigation channel only (built to three lanes to satisfy the ultimate traffic requirement) with the remainder of the crossing the same structure as proposed for the land-based option reduces the cost differential to $70M for the initial stage and $150M for the ultimate.

This means that both options can be staged to provide capacity as traffic demands dictate, effectively spreading the capital costs over a longer period. Tables 1 & 2 on the following page provide a summary of the economics.

Table 1 — Capital cost estimates (2010$m)

Item	Endorsed alignment	Land-based alignment	Two-lane/two-way land-based alignment	Two-lane/two-way endorsed alignment (single three-lane structure)	Cost difference (at ultimate six-lane stage)	Cost difference (at two-lane stage)
Construction cost	367	214	127	220		
Principal's costs	184	169	99	103		
Contingency	138	96	58	75		
Total	689	479	284	398	210	114

Note – the above estimates for the endorsed alignment are based on a box-girder design. Other options will reduce the price differential by $30M for the initial stage and $50M for the ultimate stage should it eventuate.

Table 2 — CBA summary results ($m)

CBA ($m)		6% Discount Rate	
		Endorsed alignment	Land-based alignment
Discounted Costs		-$517.1	-$348.5
Agency Costs	CAPEX	-$600.0	-$447.0
	OPEX	-$1.0	-$0.8
	Residual Value	$84.0	$99.3
Discounted Benefits		$700.2	$668.3
Road User Costs	Travel Time	$238.4	$227.3
	Vehicle Operating Costs	$424.3	$405.2
	Accidents	$37.4	$35.8
Results	BCR	1.4	1.9
	NPV	$183.1	$319.8
	IRR	7.6%	10.1%

5.7 Hideaway Waters impact

Since the public display of the example alternative alignment, TMR has received 53 applications for hardship acquisition, not all of which are inside the area of interest. Following early planning work an area of interest was identified detailing the catchment in which hardship acquisitions would be considered. Of the 57 properties in this area, all except one have homes built on them.

Residents to the west of this area of interest have also made applications for acquisition based on being located on the new “frontline”. As these residents fall outside the identified catchment area their properties are not being considered for acquisition.

Figure 4 shows the status of the hardship acquisition.

5.8 Comparison of options

Table 3 following is a summary of the benefits and disbenefits of the two options.

Table 3 – comparison of options

Option	Benefit	Disbenefits
Endorsed alignment	Lower social impact • Minimal direct property impacts as alignment is located in the river. • Alignment does not result in severance of residential streets or neighbourhoods. • Community aware of the corridor. • Reduced stress and anxiety related to property acquisition and uncertainty about property decisions. • Less impacts on community safety during construction. • Reduced impact on amenity for residents within the Cootamundra Drive neighbourhood not acquired for the project, due to: - decreased construction noise and dust - less exposure to traffic noise during operation - fewer changes in the residential character of the neighbourhood.	Environmental impact • Impact on river vista. • Larger area of impact on mangroves. • Overall width of road and rail structures is likely to change the existing environment in the area covered by the shadow of the structure. • Potential impact to non-inhabited islands in the river. • Management techniques for petrochemical (environmentally hazardous) spill or major incident on bridge more complex. Higher cost • Ideally requires box girder bridge structure, though investigations are likely to result in a less sophisticated and more economic solution. • Able to be staged (minimum of one three-lane bridge compared with a single two-lane bridge for the land-based option means infrastructure must be constructed ahead of need). Technical • Requires a large central navigation span due to the highly skewed crossing of the navigation channel. The span length may be reduced if the Harbour Master's navigation requirements are relaxed slightly.

Option	Benefit	Disbenefits
Land-based alignment	Lower cost • Conventional deck unit type bridge construction. • Easily staged.	Higher social impact • Resumption of about 30 established homes in Hideaway Waters. • Would impact on community cohesion as streets and neighbourhoods are severed. • Increased stress and anxiety for residents not acquired for the project due to changes in local conditions, indirect impacts on properties, and so on. • Impacts on community safety during construction due to increased traffic using Cootamundra Drive to access work areas. • Changes in resident's perceptions about community safety in the longer term due to change in character from residential area, loss of neighbours and support networks and so on. • Creates a new "frontline" of residents who were previously removed from the alignment. • Requires relocation of communities.
	Environmental impact • Uses area previously disturbed (developed) (450m length). • Reduced impact on mangroves. • Doesn't destroy the river vista. • More sustainable in the long term. • Less impact on uninhabited islands in river.	
	Technical • Crosses navigation channel more squarely, reducing span required.	

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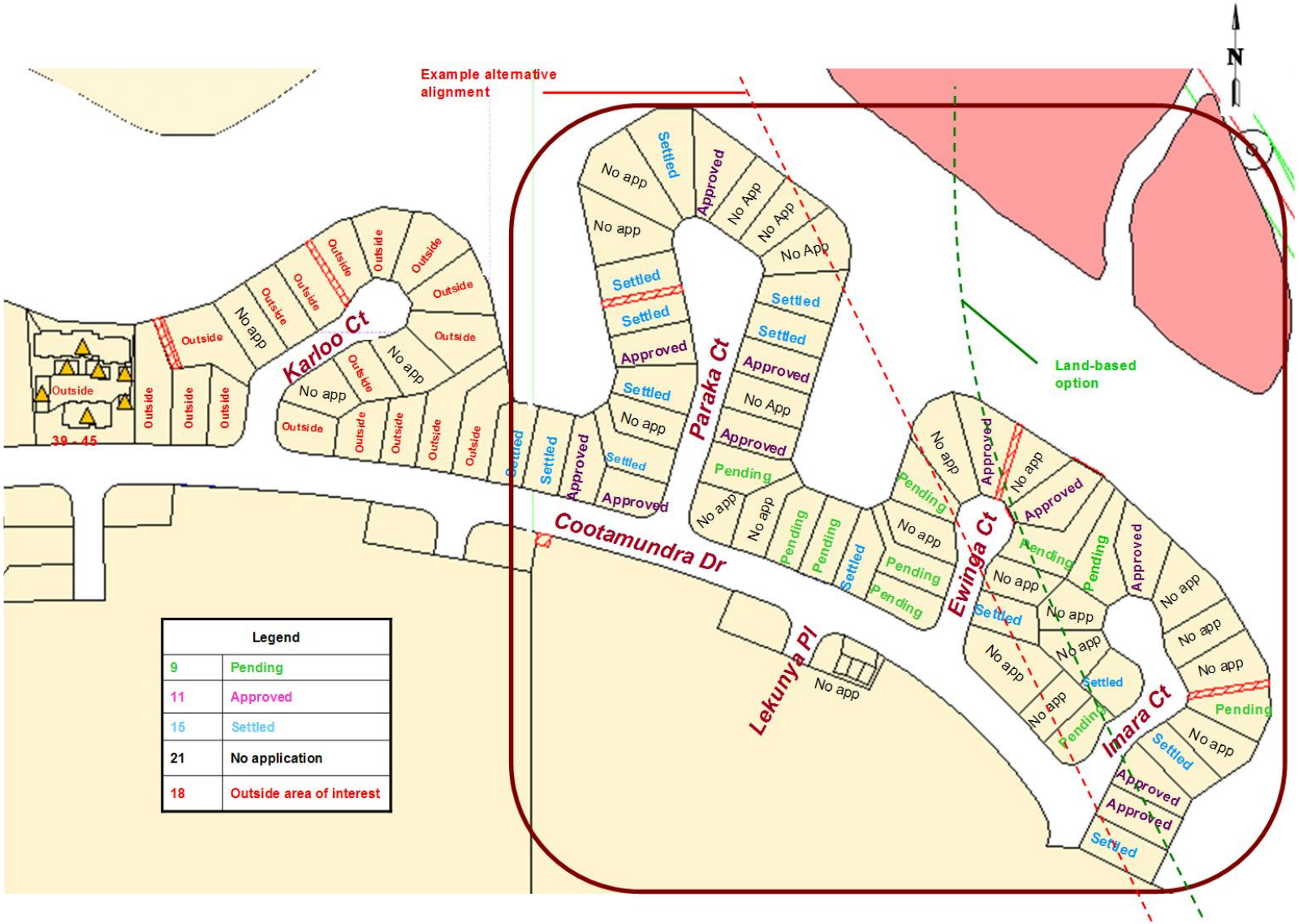


Figure 4 – Hideaway Waters Hardship Acquisition Status (current 29 March 2010)

6. Multi Criteria Analysis

This methodology has been used as a tool to allow comparison between the two options being considered. The methodology is detailed in Appendix B. The MCA has been used to merely guide the decision on the alignment, not to make the decision.

Three high-level criteria initially identified during the process were:

- Social
- Environmental
- Economic.

The fourth criteria, technical, was considered and it was deemed that the above three criteria would include technical matters. As an example, constructability is covered under environment (methods to reduce impact) and economic (change in cost).

These three criteria were further refined to identify nine sub-criteria that were weighted according to the ranked importance of each. These sub-criteria were then scored independently by the workshop attendees (see Appendix B1). The scores were then averaged for use in the MCA. Table 4 shows the results of the MCA.

As the criteria weightings were developed by the workshop attendees, a series of sensitivity analyses was undertaken.

Table 4 also shows the results of sensitivity analyses undertaken:

1. Social criteria was increased to 45% (social dislocation increased to 25%), environmental criteria remaining at 35% and reducing economic to 20% gave a result of endorsed 215, land-based 191.
2. Social criteria was increased to 50% (social dislocation increased to 30%), environmental criteria decreased to 25% and reducing economic to 25% gave a result of endorsed 208, land-based 193.
3. Social criteria was increased to 60% (social dislocation increased to 40%), environmental criteria decreased to 20% and reducing economic to 20% gave a result of endorsed 197, land-based 204.
4. Making social and environmental equal at 50% (no economic criteria) gave a result of endorsed 206, land-based 206.
5. A fifth sensitivity analysis was undertaken with weightings derived by a similar process undertaken for the Bruce Highway Upgrade; Cooroy to Curra (C2C) project. Initially the C2C project team had undertaken a similar weightings exercise, followed by another which included the community reference group. It was found that weightings determined with community input were vastly different from those determined by the C2C project team

   As C2C had four criteria for assessment, with transport also considered, the weightings used for sensitivity analysis five are the three criteria common to both projects (social, environmental and economic) modified by the addition of an equal share of the transport weighting. This gave the weightings of social 56%, environment 24% and economics 20%. Table 5 shows this in detail.

6.1 Results

As can be seen from the assessment there is minimal difference between the two options. The land-based option has less environmental impact and the endorsed alignment has the least social impact on the community.

Sensitivity analyses one to three show that when the three are all weighted roughly the same or social is weighted up to 50% the land-based option has a slight advantage.

Sensitivity analysis four shows that both social and environmental impacts are equal. The addition of economic impacts swings the overall trend towards land-based.

Sensitivity analysis five is the likely result if greater weighting is given to the criteria — social impact. It is considered that the results of this analysis would better reflect the sentiment of the Sunshine Coast community as demonstrated at the August 2009 public display.

The outcome of the analyses is that the land-based option does not present a compelling case to change the alignment from the Cabinet endorsed alignment.

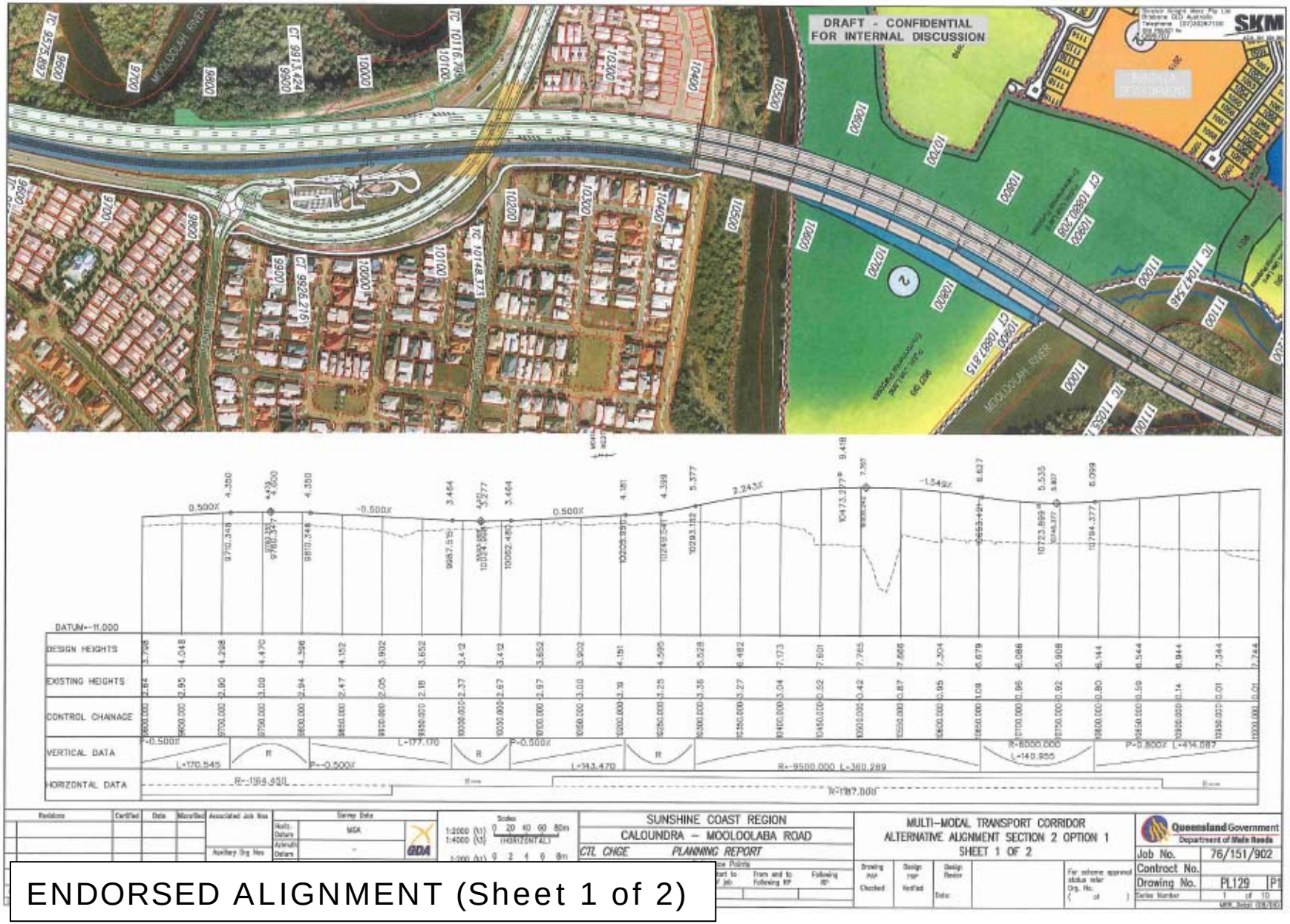
TABLE 4 — Mooloolah River crossing — MCA

Criteria	Scoring	Workshop Outcome					Sensitivity Analysis 1			Sensitivity Analysis 2			Sensitivity Analysis 3			Sensitivity Analysis 4		
			Scoring		Result			Result			Result			Result			Result	
		% Weighting	Endorsed	Land Based	Endorsed	Land Based	% Weighting	Endorsed	Land Based	% Weighting	Endorsed	Land Based	% Weighting	Endorsed	Land Based	% Weighting	Endorsed	Land Based
1	**Environmental**																	
1.1.	Impact on aquatic/riparian environment	15	3	1.38	45	20.6	15	45	20.6	10	30	13.8	10	30	13.8	20	60	27.5
1.2.	Impact on terrestrial environment	15	2	2.25	30	33	15	30	33.8	10	20	22.5	5	10	11.3	20	40	45
1.3.	Hydraulic impact — road impact through natural discharge or an environment incident (e.g. spill)	5	2.88	1.5	14.4	7.5	5	14.4	7.5	5	14.4	7.5	5	14.4	7.5	10	28.8	15
	Sub-total	35			89.4	61.9	**35**	**89.4**	**61.9**	**25**	**64.4**	**43.8**	**20**	**54.4**	**32.5**	**50**	**129**	**87.5**
2	**Social**																	
2.1.	Social dislocation	20	1.13	2.88	22.5	57.5	25	28.1	71.9	30	33.8	86.3	40	45	115	30	33.8	86.3
2.2.	Impact on recreational basin and future development	7.5	2.25	1.25	16.9	9.38	10	22.5	12.5	10	22.5	12.5	10	22.5	12.5	10	22.5	12.5
2.3.	Impact on people (noise, visual, air, light, water)	7.5	2.13	2	15.9	15	10	21.3	20	10	21.3	20	10	21.3	20	10	21.3	20
	Sub-total	35			55.3	81.9	**45**	**71.9**	**104**	**50**	**77.5**	**119**	**60**	**88.8**	**148**	**50**	**77.5**	**119**
3	**Economic**																	
3.1.	Cost – capital and whole of life	15	3	1.25	45	18.8	10	30	12.5	10	30	12.5	10	30	12.5	0	0	0
3.2.	Staging capability – (cash flow; affordability)	10	2.38	1.13	23.8	11.3	5	11.9	5.63	10	23.8	11.3	5	11.9	5.63	0	0	0
3.3.	Delivery timeframes	5	2.38	1.25	11.9	6.25	5	11.9	6.25	5	11.9	6.25	5	11.9	6.25	0	0	0
	Sub-total	30			80.6	36.3	**20**	**53.8**	**24.4**	**25**	**65.6**	**30**	**20**	**53.8**	**24.4**	**0**	**0**	**0**
	Totals	**100**			**225**	**180**	**100**	**215**	**191**	**100**	**208**	**193**	**100**	**197**	**204**	**100**	**206**	**206**

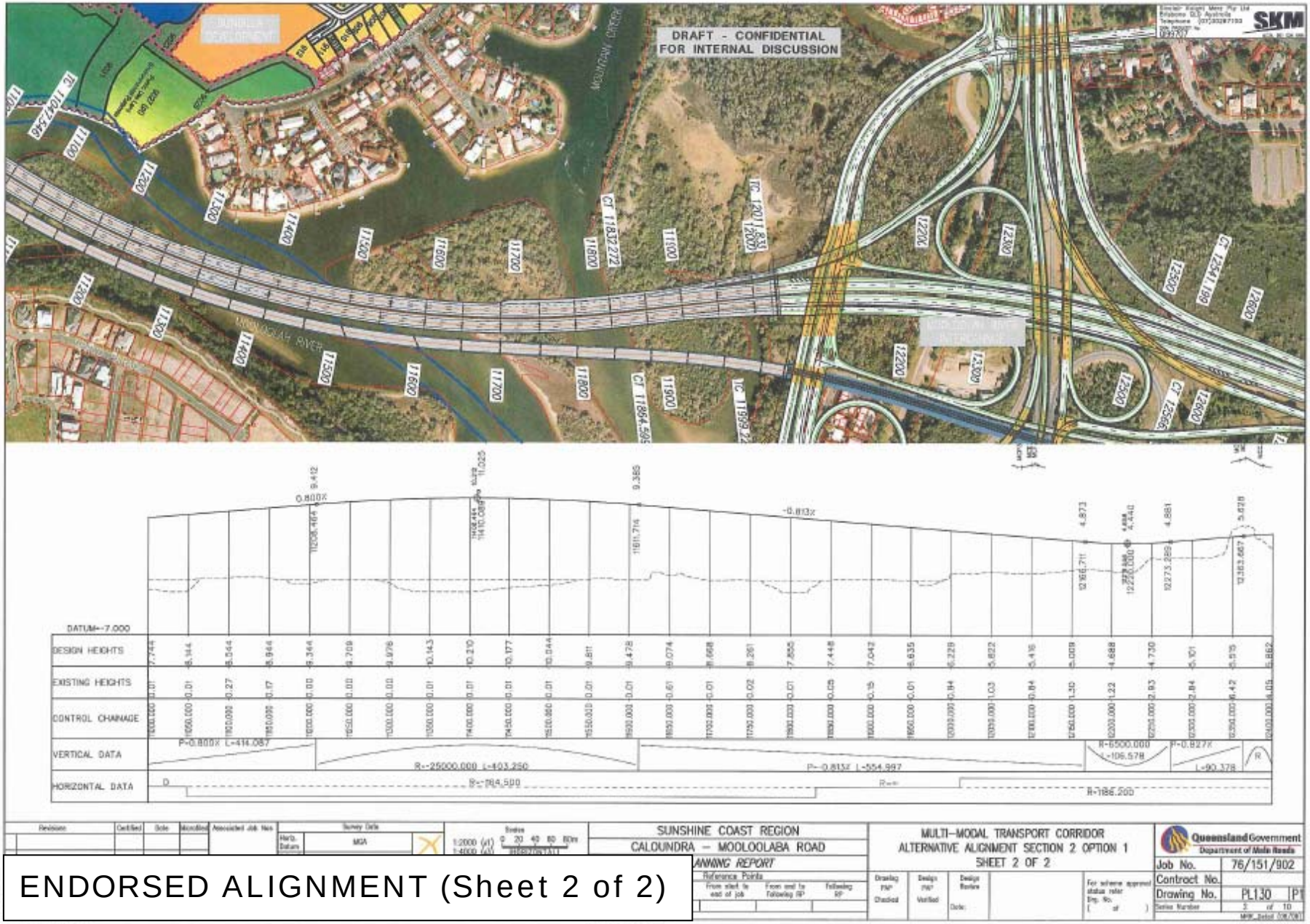
TABLE 5 — Mooloolah River crossing – sensitivity analysis 5 (based on C2C weightings)

Criteria / Scoring		Workshop Outcomes			Sensitivity Analysis 5		
		% Weighting	Result		% Weighting	Result	
			Endorsed	Land Based		Endorsed	Land Based
1	**Environmental**						
	Sub-total	35	89.4	61.9	20	51.9	34.7
2	**Social**						
	Sub-total	35	55.3	81.9	56	73.6	149
3	**Economic**						
	Sub-total	30	80.6	36.3	24	62	29
	Totals	100	225	180	100	188	212

Appendix A – Option layout plans



ENDORSED ALIGNMENT (Sheet 1 of 2)



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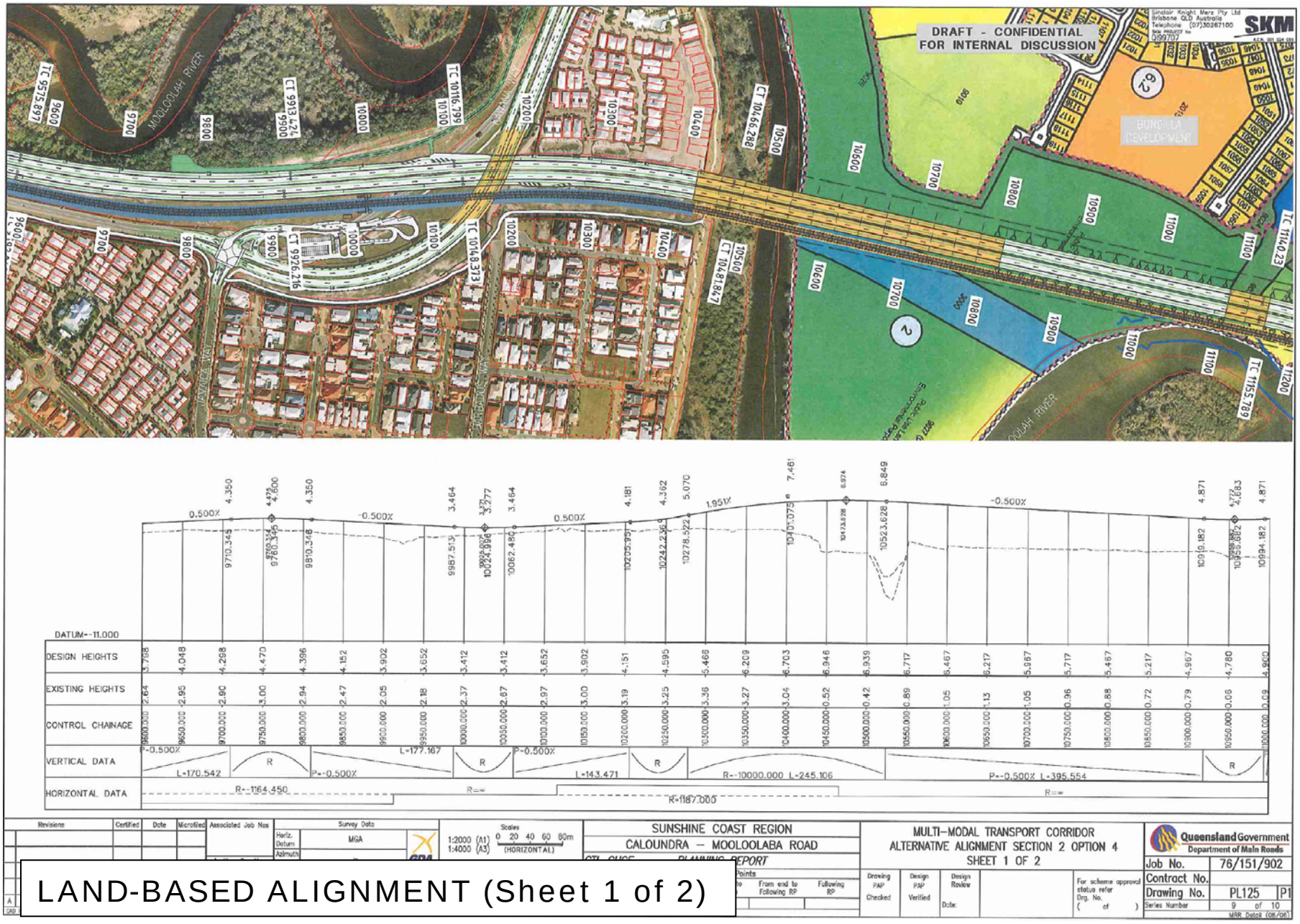
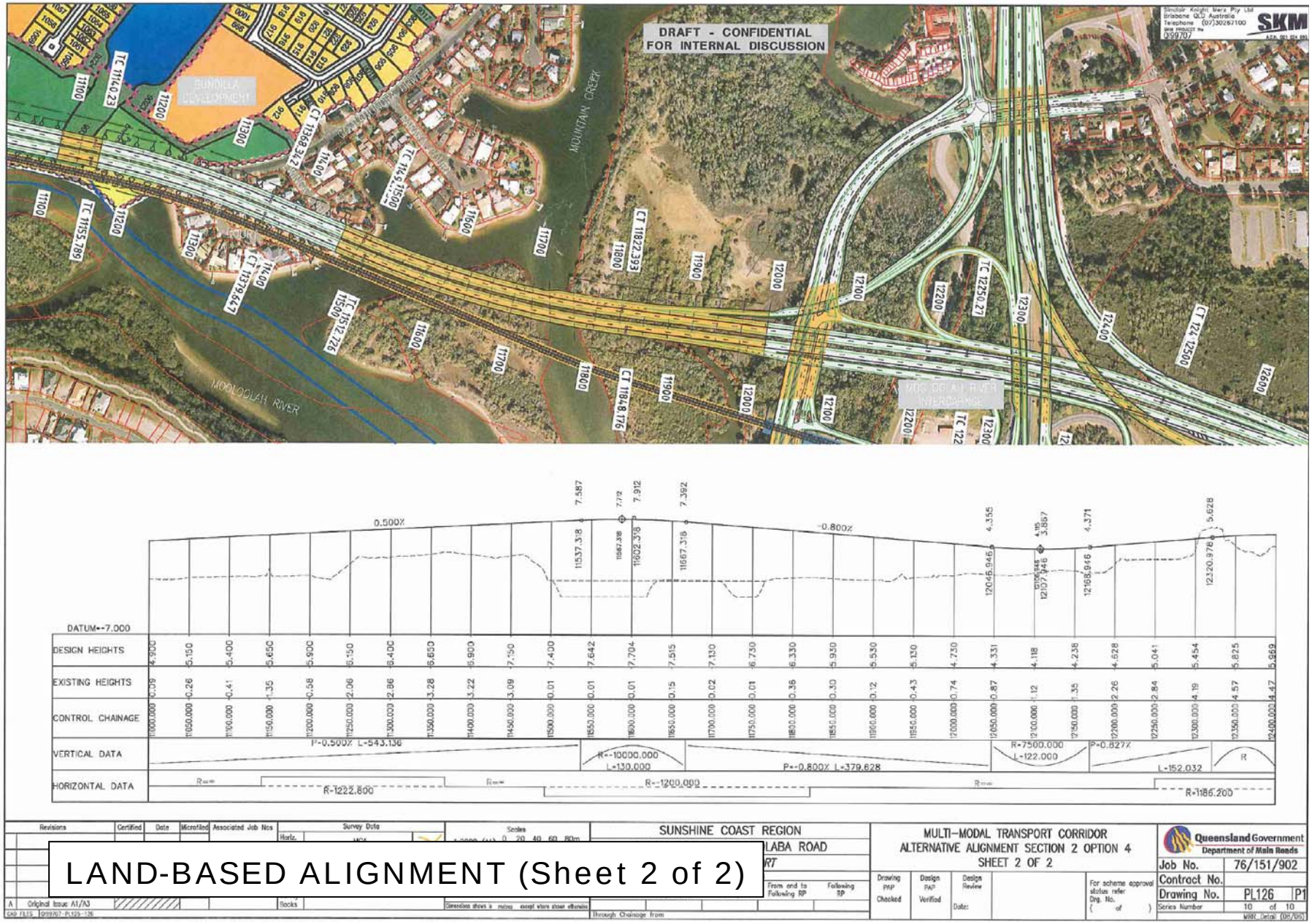


LAND-BASED ALIGNMENT (Sheet 1 of 2)



LAND-BASED ALIGNMENT (Sheet 2 of 2)

Appendix B – Multi-criteria assessment

Workshop to develop criteria to enable assessment of options for MMTC Bundilla

1 Background

Owing to community reaction in relation to the initial option presented for the Mooloolah River crossing for MMTC Bundilla a second option was developed and presented. The response to this led to the decision to conduct a Multi Criteria Analysis (MCA) of the two options to determine the better option, taking account of the social, economic and environmental impacts of each option.

The MCA Workshop was facilitated by Nigel Tanner, Director of BTLi Pty Ltd at 260 Queen Street, Brisbane on 27 January, 2010.

The Workshop Objective sent out to participants with the agenda stated that:

The workshop will determine the social, environmental and economic criteria and weightings for the Mooloolah River crossing. These will be used by the Steering Committee in the selection of a preferred alignment for ultimate approval by Cabinet.

The Workshop was opened by Derek Skinner, General Manager, Major Infrastructure Projects, who highlighted the importance of the workshop to the decision making process.

2 Agreement on High Level Criteria

Following discussion by participants it was agreed that the three high level criteria already identified (Environment, Social and Economic) were appropriate to use as primary headings for the development of more detailed criteria.

3 Discussion of potential environmental, economic and social impacts

A discussion followed on what were seen by participants to be some of the more significant impacts of the alignment options under each of the primary headings. The discussion was informed by additional input on the economic impacts from Ben Ellis (SKM economist) who had done an economic analysis of the options, and Simon Stirrat (Principal Biodiversity Planning Officer) on the environmental impacts. It was further informed by additional work that had already been completed on environmental and social impacts.

4 Notional Weightings of Primary Criteria

Following the 'impacts' discussion individual participants made a notional assessment of the weightings that should be allocated to each of the main criterion areas. Each of the main criteria was allocated a percentage weighting with the total weightings having to add up to 100%. The mean of participants' weightings against each criterion was taken to provide a broad guide to check against after rating the more detailed criteria.

The result was Environment 35%, Economic 35%, Social 30%.

5 Development of Criteria

The large group divided into three groups with each group containing a broad mixture of background and roles. Each group developed a list of criteria under one of the main headings. They then rotated around the other headings and added to each other's work. This resulted in an extensive list of possible criteria.

6 Rationalisation of Criteria

Groups reformed with at least one member of each original group in three new groups to ensure depth of understanding of the listed criteria. Each group then rationalised the criteria on their sheet to eliminate duplication. They further reduced the criteria by eliminating criteria where they agreed both options had an equal/neutral impact.

This resulted in a list of three criteria under each of the three main impact areas of Environment, Social and Economic.

The large group then divided into two groups to rank order the criteria from 1 through to 9. They then allocated a percentage weighting to each criterion, with the total weightings required to total 100%.

The two groups then compared their weightings and discussed their thinking, particularly focusing on areas where there was variation. As there was only a small variation between the weightings of the two groups the resulting discussion enabled ready agreement on final weightings. These are listed in table B.1 below.

Table B.1 Criteria and Weightings from MMTC Bundilla Workshop 27 January 2010.

	Criteria	**Weighting %**
	Environmental	
1.	Impact on aquatic/riparian environment	15
2.	Impact on terrestrial environment	15
3.	Hydraulic impact — road impact through natural discharge or an environment incident (e.g. spill)	5
	Total	**35**
	Social	
4.	Social dislocation (acquisition, emotional aspects, ability to move on)	20
5.	Impact on recreational basin (fishing, water-based activities) and future development	7.5
6.	Impact on people (noise, visual, air, light, water)	7.5
	Total	**35**
	Economic	
7.	Cost – capital and whole of life	15
8.	Staging capability – (cash flow; affordability)	10
9.	Delivery timeframes	5
	Total	**30**

NB: A number of criteria were excluded as they were seen to be impacted equally by both options.

7 Final Scoring of Options

The two options will subsequently be scored on a 1–3 scale against each of the criteria where 1 = low 2 = medium and 3 = high to determine the preferred option for recommendation to Cabinet.

A high means a high negative impact and low equals a low negative impact. That will help scoring criteria like cost and staging. So if one option allows for staging and the other doesn't, and staging is seen as positive, you would score the first one low and the second one high. If one has a positive impact on cost (helping to keep it lower) then it would score lower than the other.

When scoring, add a note to indicate explaining the high, medium or low score chosen. This may be helpful for the decision makers in reviewing the resulting recommendation.

The score is multiplied by the weighting for each criterion. This can either be whole number (e.g. 15 for item 1) or the decimal percentage (.15) when multiplying. The result will be the same.

The option with the lowest score will have the lowest negative impact.

Appendix B1: MCA Workshop Attendees

Name	Position	Organisation – Business Unit	Remarks
Derek Skinner	General Manager (Major Infrastructure Projects	TMR — MIP	Gave overview and introduction
Alan Churchward	Executive Director (Project Delivery) (Main Roads Projects)	TMR — MIP	Only attended at the very start
Ken Williamson	Project Director	TMR — MIP	
Wayne Perkins	Project Technical Director	TMR — MIP	Scorer
Darren Black	Project Commercial Director [Director (Major Projects Evaluation)]	TMR — PID	Scorer
Russell Lewis	Contract — Project Manager	TMR — MIP	Scorer
Peter Bell	Contract — Project Manager	TMR — MIP	Scorer
Halina Roberts	Project Support Officer	TMR — NCR	
Sean O'Meara	Business Manager	TMR — PID	Scorer
Dan Koch	Principal Advisor (Corridor Planning)	TMR — ITP	Scorer
Ben Ellis	Economist	SKM	Scorer
Andrew Macpherson	Infrastructure Coordinator	DIP	Scorer
Simon Stirrat	Principal Biodiversity Planning Officer	DERM	Scorer
Nigel Tanner	Facilitator	BTLi Pty Ltd	

btli

A.B.N. 40 084 838 120

Wayne Perkins
Project Manager, Main Roads Projects
Asset and Operations / Major Infrastructure Projects
Department of Transport and Main Roads
PO Box 183
Gympie Qld 4570

12 March, 2010

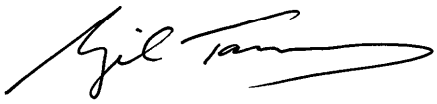
Re: Multi-Criteria Analysis (MCA) Workshop for MMTC Bundilla

Dear Wayne

I enclose the final report on the results of the MCA Workshop for MMTC Bundilla.

In presenting this report I would like to confirm that this report is an objective summary of the outcomes of the workshop and that no pressure has been placed on me to vary any aspects of the process or the outcomes.

Yours sincerely,



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